مشـــاريـــع التخـــــرج

لطلاب وطالبات كلية العلوم التطبيقية

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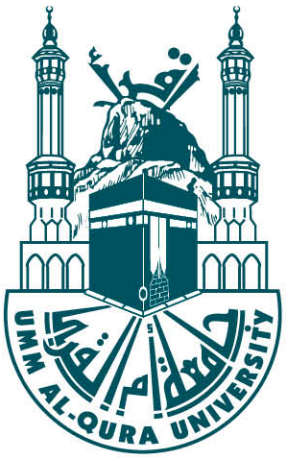
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بسم الله الرحمن الرحيم

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كلمة عميد كلية العلوم التطبيقية

الحمد لله رب العالمين والصلاة والسلام على سيد الخلق اجمعين سيدنا محمد وعلى آله وصحبه وسلم .

إنه يسرني بأن افتتح هذا الكتيب الخاص بعرض مشـــاريع التخرج لطلاب وطالبات كلية العلوم التطبيقية بكلمات شكر وتقدير لجميع القائمين على انجاز هذا العمل المتميز فلا يخفى على الجميع بأن مشـــروع التخرج للطالب هو عبارة عن فكرة معينة تقدم حل او خدمة للمجتمع للاستفادة منها في مجالات مختلفة في العلوم الحياتية ولا يشـــترط ان تكون فكرة جديدة فمن الممكن ان تطور فكرة موجودة مسبقاً يرجى منها اســـتحداث الجديد او تطوير ما هو كائن فمشروع التخرج يعتبر كاختبار للطالب لتطبيق ما حصل عليه من علوم مختلفة خلال دراسته وتطبيقها باستخدام التقنيات التي تعلمها خلال فترة دراسته فهو خلاصة لسنوات دراسته وقياس لقدراته عن طريق ايجاده للحلول باستخدام احد التقنيات الموجودة او بأن يقوم بتطوير حل من ابتكاره و ايضا اختبار قدراته في ادارة الوقت ولعل ما يحتويه الكتيب من ابحاث ومشاريع وافكار متنوعه لهو خير دليل على تميز طلابنا وطالباتنا متمنيا للجميع التوفيق والتميز دائما وابدا سائلا الله العلى القدير ان يوفقهم في حياتهم العلمية والعملية.

والله الموفق..

عميد كلية العلوم التطبيقية

أ.د. وائل بن محمد العامودي

كلمة وكيل كلية العلوم التطبيقية للشؤون الاكاديمية

الحمد لله الذي بحمده تتم الصالحات والصلاة والســـلام على ســـيدنا محمد عليه أفضل الصلاة والسلام وبعد

انطلاقا من أهمية البحث العلمي في عالمنا الحاضر فقد أصبح ولايزال هو السبب الرئيسي بعد الله في تقدم الشعوب وتنافسها في تحقيق الانجازات العلمية التي تخدم المجتمعات وتحل الكثير من المشاكل والتحديات التي تواجهها.

وكلية العلوم التطبيقية تأتي ضمن احدى كليات الجامعة العلمية التي تتميز بمشاركتها الفاعلة في مجال البحث العلمي والتي حرصت في تعليم أبنائها الطلاب والطالبات اساسيات البحث العلمي وادواته الصحيحة من خلال مقرر مشروع التخرج الذي تم ادراجه في كافة برامجها الاكاديمية.
وتحرص الكلية بجميع اقســـامها في كل عام ان تولي مقرر مشروع التخرج الأهمية البالغة ايمانا من كافة أعضاء هيئة التدريس ان هذا المقرر يؤســـس وينمي لـــدى الطالب فكرة البحث العلمي والابتكار ويجعله قادرا على التعامل مع مصادر المعلومات بطريقة صحيحة لتســـاعده في بناء وتطوير الأفكار البحثية مستقبلا وتجعله قادرا على المساهمة في بناء مجتمع العلم والمعرفة.
في الختام أتقدم بوافر الشكر والتقدير للزملاء والزميلات المشرفين على مشاريع التخرج لما بذلوه من جهد لتحقيق الهدف المنشود من مشاريع التخرج.

والشكر لأبنائنا الطلاب والطالبات على هذا الجهد الرائع وعلى هذه الأفكار العلمية التي تم إخراجها بشكل منظم يليق بطلاب وطالبات كلية العلوم التطبيقية.
شكري وتقديري لســـعادة عميد كلية العلوم التطبيقية أ.د. وائل العامودي لدعمه المستمر واهتمامه الكبير بطلاب وطالبات الكلية.

والله الموفق والمستعان ...,

وكيـــل كليـــة العلوم التطبيقية
للشؤون الاكاديمية
د. اسماعيل بن إبراهيم الثقفي

كلمة وكيلة كلية العلوم التطبيقية لشطر الطالبات

الحمد لله رب العالمين والصلاة والسلام على أشرف الأنبياء والمرسلين سيدنا محمد صلى الله عليه وسلم وعلى آله وصحبه أجمعين.

في اطار رؤية المملكة 2030، وتماشياً مع رسالة كلية العلوم التطبيقية، فقد حرصت الكلية دوماً على تحقيق أقصى درجات التوافق بين مهارات الخريجين، ومتطلبات سوق العمل عن طريق تطوير الخطط الدراسية لبرامج الكلية، وتطوير المعامل، ومشاريع التخرج، وتشجيع الابتكار و التفكير الابداعي، وتحقيق متطلبات ومعايير الاعتمادات الأكاديمي سعيا الى توفير تعليم مبني على أسس علمية صحيحة.

ويعد مشروع التخرج عمل يقوم به كل طالب على وجه الاستقلال وبذلك يختلف هذا المقرر عن بقية المقررات في الحرية الواسعة التي يملكها الطالب، والتي تهدف إلى تنمية قدراته الفكرية والعلمية التي تمنح الطالب القدرة الذاتية على البحث وجمع المعلومات من المراجع الأصيلة المختلفة. كما يتيح المشروع البحثي أيضاً للطالب أن يظهر من خلال التطبيق العلمي الذي يجسده في البحث مدى المعرفة النظرية المكتسبة التي تمثل الحصيلة المعرفية للمقررات التي تلقاها في التخصصات الأساسية للكلية على مدى دراسته.

ختاماً، خالص الشكر والتقدير لسعادة عميد الكلية ا.د.وائل العمودي ولسعادة وكيل الكلية للشؤون الاكاديمية ولجميع منسوبي وطلاب وطالبات الكلية للمجهودات المبذولة لإنتاج هذا العمل بالصورة المتميزة.

وكيلة كلية العلوم التطبيقية
(شطر الطالبات)
د. تهاني بنت محمد باوزير

افتتاحية مشاريع تخرج طلاب وطالبات كلية العلوم التطبيقية

تأتي مشاريع التخرج لطلاب وطالبات كلية العلوم التطبيقية كل عام ضمن أولويات الكلية لإبراز الجهد الذي يقوم به الطلاب والطالبات بإشراف أساتذتهم في مختلف البرامج الأكاديمية

وهـــذا العام تم ولله الحمد تقديم 151 ملصق علمي ناتجة عن مشـــاريع التخرج للبكالوريوس والماجستير ويأتي ذلك انطلاقا من الحرص على الجودة التي تطبقها الكلية من ناحية تعليمية في تقديم هذا المقرر وتحقيق أهدافه في التأســـيس الصحيح والمبني على أســـس علمية لتعليم الطلاب أدوات البحث العلمي وكيفية الحصـــول على المعلومة من مصادرها العلمية وتحليلها وكتابة النتائج ومناقشتها.

وقـــد كان مجموع عدد الطلاب والطالبات لهذا العام ما يقارب 455 طالب وطالبة وشـــارك في الاشراف عليهم 71 عضو هيئة تدريس من الشطرين.

ووكالة الكلية للشـــؤون الاكاديمية تضع بين ايديكم هذا الكتيب للملصقات العلمية Posters لأقسام الكلية الاحياء والكيمياء والفيزياء والعلوم الرياضية ابرازا للجهود المبذولة راجين من الله ان ينتج من هذه المشـــاريع البحثية ما يتم نشره في مجلات علمية عالمية ومحلية للمساهمة في تقديم الأفضل للجامعة ولمجتمع مكة المكرمة.



الأقسام



مشاريع تخرج

قسم الأحياء

كلمة رئيس قسم الاحياء

الحمد لله الذي وفق وأعان طلابنا وطالباتنا بقسم الأحياء على إنهاء بحوث تخرجهم وإنجازها وفق المنهجية العلمية الصحيحة، وإنه لمن دواعي سروري وفخري أن أرى ثمار جهدهم؛ فما هذه البحوث إلا نتاج غايات وقدرات عالية ومهارات وإمكانات متميزة دفعت بهم نحو تحقيق التميز والإبداع في إنتاجهم البحثي في مرحلة البكالوريوس. وهذه الأبحاث النوعية تحمل في طياتها طموح شباب واعٍ يحمل رسالة عظيمة لخدمة وطنه ورفع شأنه بين الأمم، وشباب قادر على التعامل مع متغيرات العصر وتطوراته. طلابنا وطالباتنا أنتم جزء من استشراف المستقبل الواعد وإنجازاتكم مصدر فخر للقسم وللكلية التي كانت هي نقطة انطلاقاتكم نحو تحقيق أهدافكم السامية، نقدر جهودكم التي تكللت بالنجاح في نهاية مسيرتكم الدراسية لكم خالص الدعوات بالتوفيق وبمزيد من الإنجازات العلمية.

د. محمد بن مناحي البقمي

كلمة وكيلة رئيس قسم الاحياء

الحمد لله الذي بفضله تتم الصالحات، تعد مشاريع التخرج بيئة مناسبة لتدريب الطلاب على ظروف البحث العلمي واكسابهم المهارات اللازمة للباحث. يساعد التنوع الطبيعي في مجال علوم الحياة والتطور التكنولوجي السريع الذي يشهده هذا العلم على اشباع ميول كثير من الطلاب حيث تتوفر المجالات المناسبة لخلق مواضيع في مشاريع التخرج جذابة ومثيرة للاهتمام تلامس ظروف العصر والمواضيع البحثية التي تشغل العلماء في الوقت الحاضر. ولا يغفل الدور الذي بذله المشرفين في انارة اذهان طلابهم واكسابهم بالخبرات اللازمة وتوجيههم ليكونوا في المسار الصحيح الذ يساعدهم على تطوير أفكارهم وإخراج مشاريعهم البحثية بصورة جيدة. فلهم ولطلابهم جزيل الشكر سألين المولى لهم التوفيق الدائم.

د. وداد بنت سليم الجهني

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Posters

الملصقات العلمية

لمشاريع التخرج

قسم الأحياء

بكالوريوس

Effect of smoke on Radish (*Raphanus sativus*) seeds germination

Almalki M , Alzhrani A , Alsahhaf A , Aljauaid A , Alahmdi A , Allehebi A , Alotibi A , Qudus M , Bakhathlaqi A , Alamri G , Alyazidi Z , and Doman M

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Abstract

Plant-derived smoke is a known factor for promoting plant growth and development and has a positive impact on many plants, where smoke contains many active compounds, which have potential agricultural uses. Four active compounds have been identified: : karrikins (KARs), cyanohydrins, butenolides, and hydroquinones. In this research, we experimented with the effect of smoke on radish seed germination where the seeds were treated with smoke for a different periods of time: 0 control, 5 min, 10 min, 15 min, 20 min, 25 min, 30 min. The seeds were then grown in dishes containing sand soil, other dishes containing sand soil, as well as 1:10 ashes. Smoke and ash have also shown positive results in germination, growth, and the development of radish plant. So that's in a group A (Sandy soil only), the highest germination rate is 78%, which is when exposed to smoke for 25 minutes and the lowest germination rate is 59%, and this is when exposed to smoke for 5 minutes. The longest shoot length is 7cm and the longest root length is 2.73cm which is when exposed to smoke for 20 minutes. and the shortest shoot length is 5.49cm and the shortest root length is 2.35cm that is in the control sample. The highest value for fresh weight is 0.48g and dry weight is 0.062g when exposed to smoke for 20 minutes. And the lowest value for fresh weight is 0.31g and dry weight is 0.04g that is in the control sample. As for Group B(sandy soil with ash), The highest germination rate is 96%, which is when exposed to smoke for 30 minutes and the lowest germination rate is 70%, and this is in control sample. The longest shoot length is 7.3cm and the longest root length is 2.83cm which is when exposed to smoke for 30 minutes. The shortest shoot length is 5.77cm and the shortest root length is 2.38cm that is in the control sample. The highest value for fresh weight is 0.41g and dry weight is 0.054g when exposed to smoke for 30 minutes. And the Lowest value for fresh weight is 0.3g and dry weight is 0.041g that is in the control sample.

Introduction

In the life cycle of a plant, a seed represents the termination of the last generation as well as the beginning of a new generation. As the connection between generations, seeds pass along genetic information and maintain each species' characteristics. Ideally seeds should germinate immediately after ripening to maximize reproduction [2]. Seed germination is considered to be the most vulnerable and crucial phase in a plant's life cycle [5]. The seed germination process is controlled by many external environmental factors, such as light, temperature, and moisture, as well as by internal growth regulators [3]. If a seed does not germinate in suitable conditions which include conducive temperature, atmospheric composition, and water availability the seed must either be dead (not viable) or viable but in a dormant state. Breaking seed dormancy remains the most important factor in improving seed germination [6]. Plant-derived smoke is a well-known agent for promoting plant growth and development; and positively affects plant species from various habitats. The seed germination cues associated with fire or post-fire environments were identified as heat, temperature, chemicals, and smoke. On the other hand, smoke produced during fire was recognized as the major germination cue in post-fire environments [4]. Smoke contains many different compounds, and several attempts have been made to identify these active compounds. Four major active compounds with potential agricultural use have been identified and isolated: karrikins (KARs), cyanohydrins, butenolides, and hydroquinones [3]. Smoke affects the water uptake process in seed germination by changing the permeability of the internal cuticle via increased the number and size of permeates [2].

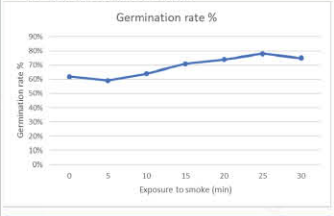
In this paper, we'll experiment with the effect of smoke on the radish seed germination. Radishes (Raphanus sativus) belong to the Brassicaceae. Radish seeds take about 4 to 10 days to germinate. Radish seeds germinate faster with optimal soil temperature range, humidity, and air circulation.

Objective

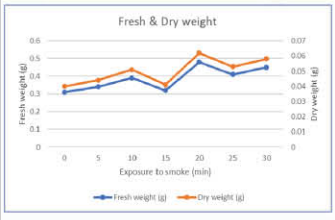
To study the effect of smoke on radish seeds germination.

Results

Group A (Sandy soil only):







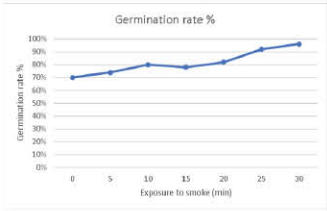


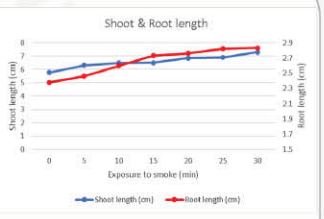
highest germination rate

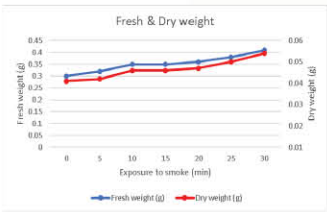


lowest germination rate

Group B (sandy soil with ash).









highest germination rate



lowest germination rate

Discussion

Smoke has shown positive results on *Raphanus sativus* in terms of seed germination and plant development, where the germination rate in the controlled sample was 62%, and when exposed to smoke for 25 minutes the germination rate increased to 78%. As for the second experiment in which sandy soil was used with ash, the germination rate in the controlled sample was 70%, and when exposed to smoke for 30 minutes also increased the germination rate to 96%, in addition to the increase in shoot length, root length and fresh and dry weight in both trials. due to the fact that smoke has an impact on the absorption of water in seed germination by increasing the number and size of permeability [2]. It also is karrikins that play a role in seed germination and plant development [4]. Ash has had a positive impact on seed germination as ash is an important source of micro and macronutrient [1].

Conclusion

It is concluded from this work that the smoke derived from the plant has significantly increased the germination of the seeds and has increased the length of the shoots and roots length and from the fresh and dry weight.

Acknowledgments

We thank all those who contributed and helped complete our project, led by the head of the biology department, Dr. Mohammed Al Baqami, as well as Dr. Mostafa Koutb for his supervision and follow-up to us and teach us the basics of scientific research.

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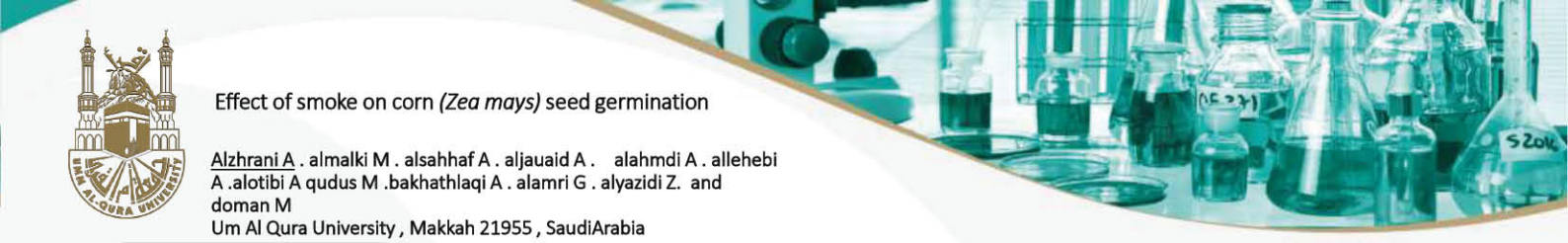

Effect of smoke on corn *(Zea mays)* seed germination

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Abstract

Smoke as a seed germination promoter has been well recognized in many countries. It was first discovered in a fire-prone area, but has since been studied and applied even in fire free areas. It has been proven to exist in endangered species, medical species and crops and it is especially well recognized as useful for post-mining restoration.
And today, in my project, I present to you a simple design that talks about the effect of smoke on corn seeds.
and we will talk about the differences that occurred in the experience with pictures of the changes,The best among our experience was the cultivation without ashes for corn seeds, where the germination rate reached 100% and its lengths were from 5.3 cm to 6.9 cm in the length of the vegetative system. The length of the shoots, and in the weights, the weights of cultivation without ashes were greater than the soil mixed with ashes

Introduction

Smoke derived from plant materials has been reported for positive effects on plant's flowering, (Keeley, 1993), somatic embryogenesis (Senaratana et al., 1999), seeds germination (Todorovic et al., 2005, Aslam et al., 2014), seedling growth (van Staden et al., 2006, Moreira et al., 2010; Aslam et al., 2014), pollen performance and elongation of pollen tube (Papenfus et al., 2015). These effects of smoke solution are attributed to the presence of active compounds i.e. butenolide and few more like cyanohydrins (Flematti et al., 2004; Flematti et al., 2011). Smoke derived compounds are heat stable, water soluble and effective at low concentrations (Flematti et al., 2004; van Staden et al., 2004). Smoke solution affects plant growth as it modulates endogenous plant growth hormones (van Staden et al., 2000) and initiating cell cycle activities which assist early emergence of the radicle (Jain & van Staden, 2006). Smoke solution not only affects seed germination but also enhancing the length and mass of the plant's seedling (Sparg et al., 2005).
Maize (Zea mays L.) belongs to family Poaceae. It is a profitable, stable and dependable agricultural crop in Pakistan (Ahmed et al., 2003). However, the yield of maize in Pakistan is very low comparing to the world (MINFAL, 2009). Little work is documented on post-germination effects of smoke solution on plant growth. In this paper, we evaluated post germination effects of smoke solution on physiological and biochemical growth parameters of maize plante , Australia. Rokich and Dixon (2007) identified smoke-stimulated seed germination across phylogeny, life form, seed- dormancy class, habitat type, and fire regions; summarized multiple restoration studies in Banksia woodlands; compared physical restoration techniques such as soil-stabilizers (like polymer gels, bitumen, oil-shale solid waste, and jute-matting) to topsoil seed banks, application of seed-coating, earlier sowing time, soil raking and others, and found smoke played a significant role in seed germination. Some in-situ smoke-stimulated seed germination tests have shown that smoke application has a potential role in large-scale restoration (Ashton et al. 1997, Roche et al. 1997, Enright and Kintrup 2001, Lloyd et al. 2000, Read et al. 2000, Rokich and Dixon 2007). Studies of the effect of smoke on soil seed banks produced similar management suggestions (Ablla et al. 2007,Ablla 2009).

Objective

To study The effect of smoke on corn seed germination .

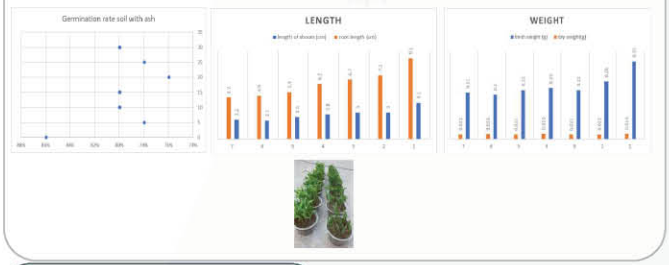
Results



Group A (sand soil only):



Group B (sandy soil with ash):



Discussion

When smoking seeds experimented, we found that 0 minuts smoking and without ash, the germination rate was 100%. The plant growth was observed more quickly. And all the seeds smoked for a longer period of time. The rate of germination decreased until it reached in 30 minutes smoking a rate of 90%, which is the lowest percentage in the experiment in the soil without ash. When experimenting with smoking and cultivation in soil with 1 to 5 ashes, we found in seeds not exposed to smoking, germination rate of 86%. But in 5 minutes of smoking, the percentage decreased by approximately 8%, then it increased again in 10 and 15 minutes of smoking to 80%. Then it decreased again in 20 minutes of smoking to 76%. Then, it increased again, reaching 80% in 30 minutes of smoking. Also, in plant growth, the percentage was better in the soil without ash, and the growth in it was fast and long in seedlings. The soil with ashes had a slow growth rate and short in seedlings of maize seed.

Conclusion

Through the research which we have conducted, over a number of weeks in smoking seeds and planting them for corn seeds, I concluded that it is best to plant them in soil free of ash and not to expose them to smoke, and the germination rate was 100%, its growth is fast, and the length of the plant. And I do not recommend smoking corn seeds and planting them in soil with ashes because it causes grit in plant growth and the germination rate is less than the pure soil

Acknowledgments

We thank all those who contributed and helped to complete our research project, in the forefront of which is Dr.muhammad Al-Buqami, for providing all the necessary supplies to complete our research, and Dr. Mostafa Koutb for supervising our research project, teaching us the basics of scientific research.

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Title
Names
University

الالتهـــاب الـرئـوي
Pneumocystis pneumonia

اسماء الطالاب / مشعل الزهراني - علوي الشريف - خالد الصاملي - فارس الزهراني
إشراف الدكتور/ علي مغربي

Abstract

The immune system or the immune system is a system of vital processes that are carried out by organs, cells and particles inside the body of an organism in order to protect it from diseases, toxins, cancer cells and foreign particles. This biological system identifies pathogens, such as microbes or viruses, and neutralizes or destroys them. A healthy immune system distinguishes healthy cells and vital tissues of the body from foreign organisms that cause disease. The body's immune system can recognize countless pathogens (antigens) and foreign bodies, ranging from viruses, parasites, worms, and microbes. Note that these pathogens can evolve rapidly, can successfully evade the immune system, adapt and reproduce in the host's body. To meet this challenge, there are sophisticated mechanisms in the immune system that can identify pathogens and neutralize their danger.

Introduction

Pneumonia caused by microorganisms that do not cause illness often can occur in healthy people, in people with weakened immune systems. People often have shortness of breath, a dry cough, and a fever. Doctors often use a chest X-ray along with microscopic exams of sputum samples to make a diagnosis. Antibiotics, anti-fungal or anti-viral drugs are used to treat this type of pneumonia, and any problem with the immune system is treated. It is an infection of the lungs, and for patients who have a weak immune system, pneumonia may be caused by many microorganisms, including those that do not usually cause pneumonia. Several conditions may weaken the immune system, and they include: Cancer and chemotherapy drugs used to treat cancer Defects in white blood cells Diseases like AIDS Certain drugs (such as corticosteroids, chemotherapy drugs, and drugs used to treat autoimmune or connective tissue disorders.

Discussion:

Treatment:

Antibiotics, antivirals, or antifungals Treating any problem with the immune system, Pneumonia treatment is based on:

A specific problem with the immune system The severity of the disease Microorganisms that may cause infection Doctors usually give an antibiotic that is effective against many microorganisms (broad-spectrum antibiotic), and if the patient's condition does not improve, doctors may use an additional drug that is effective against viruses or fungi. Even when pneumonia is treated, the overall mortality rate is higher than the death rate for patients with community-acquired pneumonia, because treating the infection in patients with immune system problems is very difficult and because these patients have a tendency to be severe. Even before the onset of pneumonia. Treatments aimed at improving the immune system are also important for treating pneumonia in those with immune system problems. For drugs that suppress the immune system (such as chemotherapy drugs or drugs used to treat autoimmune disorders), they should be stopped temporarily until the infection clears up.

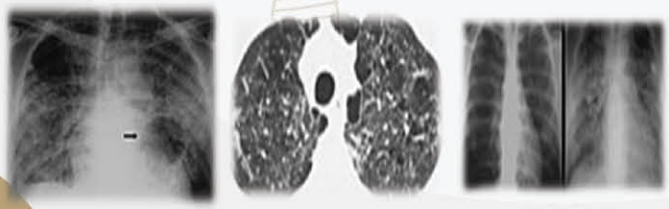
Protection:

Doctors often give treatments to help boost a patient's immune system and prevent pneumonia, for example, for patients whose immune system has weakened due to cancer treatment, doctors may give them a drug called a granulocyte-colony stimulating factor. To boost production of white blood cells (the kind that fight infection). Patients who face an increased risk of infection should be vaccinated against pneumococcal and Haemophilus influenzae. A combination of the antibiotic trimethoprim / sulfamethoxazole may also be used to help prevent Pneumocystis pneumonia in people at risk. Side effects of this drug, which are especially common in people with AIDS, include a rash and a decrease in the number of white blood cells that fight infection and fever. Alternative preventive drug treatments include dapsone, atovaquone, and pentamidine (they can be taken as a spray that is inhaled directly into the lungs).

Conclusion:

The immune system is not limited to humans and vertebrate animals, as simple microbes such as bacteria possess an immune enzyme that protects them from viral infections. The immune system of living organisms evolved with the ancient eukaryotes, where this immune mechanism remained with its modern successor of plants, fish, reptiles, insects and all organisms. These are immune mechanisms that include antimicrobial peptides, phagocytosis and complement system. This is not to mention some vertebrates like humans that have more complex and intelligent defense mechanisms. The immune system of vertebrates is composed of many immune cells, immune cells, and proteins that interact with each other in an advanced dynamic way through a complex network of connections to resist invasive disease-causing organisms.

Photos:



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Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of (*Petroselinum crispum*) seeds

Student name: Ahmed Hameed mohammed Alhazmi
Course Instructor: Dr. Alae Ahmad Chakib Jabbour

Abstract

Daily irrigation

We notice in the daily irrigation leads to inhibition of growth because the anaerobic conditions formed impede the growth process ,and the roots suffocate to deprive them of free oxygen

Irrigation twice a week

We note that irrigation twice a week is better than other irrigation treatments because of the lack of water stress on the soil and the best irrigation of the parsley plant is lost.

Irrigation once a week

We note that the plant's need for water varies according to its type. Some plants need a large amount of water, and some do not need water. Therefore, watering every week may be flowing to some types without the others.

Half Irrigation

We notice the death of most seedlings due to lack of water and severe drought on the soil

Introduction

:Water Water sources in the world

The General Assembly explicitly called for actions leading to the provision of "safe, clean, accessible and affordable drinking water and sanitation for all" This recognition of access to safe water as a human right came at the mid-point of the International Decade for Action "Water for Life". This Decade, which began in 2005, was intended to generate momentum in meeting various international water and sanitation targets.

: Depletion of the world's water sources

Increasing population numbers, expanding areas of irrigated agriculture and economic development are drivers for an ever-increasing demand for water worldwide. Although globally such demand can be met by surface water availability (i.e., water in lakes, rivers and reservoirs),

Water sources in the Kingdom of Saudi Arabia:

Groundwater resources are precious commodity in general and for arid regions in particular. Their exploration, exploitation, protection and management play significant role in societal activities. In the Kingdom of Saudi Arabia, extensive aquifers are available in the Arabian Shelf. The Saq aquifer is one of the most important aquifers in the northwestern part of Saudi Arabia. It is made up of a Cambro-Ordovician sandstone) **Ellis RH)** formation, which extends over 1200 km in Saudi Arabia

Water stress problems water scarcity and its dangers:

You want to show a participation of 809 million cubic meters of water, through the establishment of projects that reach the width of other projects, by watching the presentation of King Fahd's participation in the Bisha region, where the capacity of the torrents reaches, and the risk of floods is reduced.

Water requirement of crops:

To be successful as a hydroponic grower, one has to be aware of plants' exact requirements for optimal growth. Plants generally require water and nutrients to grow.

Water immersion stress problems and risks:

Many regions of the world suffer from the problem of soil salinization, as one third of agricultural land on the planet Land salinisation of soil from agricultural crops Low yields of some crops to the Food and Agriculture Organization

: seedling growth (*Petroselinum crispum*

Parsley is a type of flowering plant in the Apiaceae family that is native to the central and eastern Mediterranean region (Sardinia, Lebanon, Israel, Cyprus, Turkey, southern Italy, Greece, Portugal, Spain, Malta, Morocco, Algeria and Tunisia), but has been naturalized in Elsewhere in Europe, it is widely grown as an herb and vegetable. . Pojar, J and **(MacKinnon, A. 2004)**

Volatile oils and the most important of them

(Apiole) is an apiole compound Myristicin is a myristicin compound

Furocoumarin Flavonoids Which is found in a large percentage equivalent to 4 times its percentage in lemon, where it was found that every 100 grams of vitamin C Parsley contains 165 milligrams of the vitamin, which helps in increasing the body's resistance to cold diseases

Objective

Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of (*Petroselinum crispum*) seeds

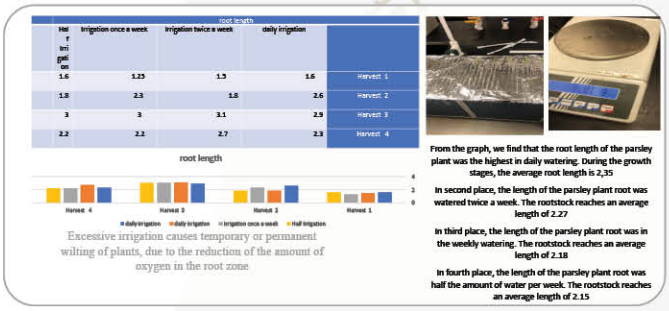
Results



Heavy irrigation leads to the emergence of symptoms on plants that resemble those of a lack of irrigation water. Increasing soil irrigation leads to less aeration of the soil



We found that the number of parsley leaves was the highest for irrigation twice a week. An increase in the number of leaves also occurred during the growth stages (during the four weeks, during the fourth harvest).
Average number of leaves (13,2).
In the second place was in daily irrigation, where the average number of leaves was (13,2).
And in third place it was irrigation once a week, where the average number of leaves was (12.9).
Finally, he was in irrigation for half a week. Where the average number of vacations was (12.05).



Excessive irrigation causes temporary or permanent wilting of plants, due to the reduction of the amount of oxygen in the root zone

From the graph, we find that the root length of the parsley plant was the highest in daily watering. During the growth stages, the average root length is 2,35

In second place, the length of the parsley plant root was watered twice a week. The rootstock reaches an average length of 2.27

In third place, the length of the parsley plant root was in the weekly watering. The rootstock reaches an average length of 2.18

In fourth place, the length of the parsley plant root was half the amount of water per week. The rootstock reaches an average length of 2.15

Discussion

Number of leaves:

Heavy irrigation leads to the emergence of symptoms on plants that resemble those of a lack of irrigation water. Increasing soil irrigation leads to less aeration of the soil, and thus less water and nutrient absorption by the roots. ... And when planting seeds in the ground, in the case of increased moisture in the soil, this leads to a decrease in the percentage of germination.

root length:

Excessive irrigation causes temporary or permanent wilting of plants, due to the reduction of the amount of oxygen in the root zone and the difficulty of their breathing due to the displacement of water and clammy air in the slurry spaces

stem length:

Who reached out to The water stress led to a decrease in plant height and the reason for that To a decrease in the water stress of the stem cells below the level What is required to elongate cells, resulting in shortening of the phalanges

Ratio of root/shoot fresh weight:

The percentage of soft water in the soil increases with the increase in the percentage of organic matter, because it improves the properties and construction of the natural soil, and increases its ability to retain water, in addition to that the organic matter is one of its properties that it has a high ability to retain water, but the point of wilting in it is also higher

Ratio of root/shoot dry weight:

The water stress led to a decrease in weight The plant does so because it reduces the absorption of water and nutrients Before the plant as a result of water stress

Succulence

And the water that can benefit the plant is limited to the extent It is its content from field capacity soil moisture from annular capacity to permanent wilting point and annular capacity The water, after being well moistened, then allows leaching to occur, which causes a slight change in the water content

Dry matter content

The effect of the secretions of the roots freed from Some of the studied plants by improving their growth status, as an increase in the length of their root system was observed And vegetable and whole plant in addition to an increase in dry weights.

dry weight of the plant:

After the tree was uprooted, it was cut and taken to special ovens in which it was not dried from moisture ... The field study indicates that The percentage of humidity in the main stem reaches 11.2% and the humidity in the young branches (which is more than Diameter

Conclusion

plant. The parsley plant is an important vegetable crop with a high economic value, as parsley is produced in various regions of the world with a temperate climate and exported to a group of low-producing and non-productive countries, as it is a good source of .income that yields abundant financial returns for farmers of the productive state

Parsley is included in many nutritional and therapeutic recipes, because it contains a group of nutrients such as proteins, carbohydrates, amino acids, fats, vitamins, calcium, iron, potassium, sodium, zinc and folic acid. Parsley is also used in preparing various types of salads.

:Eating parsley daily contributes to supporting digestive health, in part due to its role in supporting the liver

.It increases levels of the major antioxidant glutathione in the liver and also supports other antioxidant enzymes

.It has been proven that parsley can work to regenerate liver tissue after damage from chronic diseases

Parsley stimulates the production of bile in the liver, which is needed for the digestion of fats in the intestine. Lack of bile production contributes to poor digestion, bacterial growth, and hormonal disorders.

Acknowledgments

I would like to thank Dr. Alaa Jabbour for the very effort he made with us during this semester. I would like to thank my friends Talal Al-Suhaimi and Khal Al-Daadi for their assistance to me, and I thank my mother and father for their motivation during my university career.

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Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of (Phaseolus vulgaris) seeds

Student name: Wesam Abdullah Hajib.
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Abstract

Water is a critical input for agricultural production and it is important in food security. Kingdom of Saudi Arabia suffers from a lack of water sources beside the harsh climate which make some difficulties in agriculture. That's why we must choose the suitable species to grow it that do not require much water, drought tolerant, and had high nutritional and economic value. In this study we choose *(Phaseolus vulgaris)* seeds to study the effect of irrigation amount and drought on germination and some of the physiological aspects of the plant; by cultivation 200 seeds of Phaseolus vulgaris in 12 pots divide into 4 irrigation transactions; each transaction has 3 pots. These transactions are: daily irrigation, irrigation twice a week (control plant), irrigation once a week, half irrigated every week. And record the measured factors which are: leaves number, stem length, stem diameter, root length, root/stem ratio (fresh and dry), succulent, dry matter content. Results show that daily irrigation and irrigation twice a week are the favorable transaction for *Phaseolus vulgaris* where there was increasing in leaves number, stem length, stem diameter, root length, root/stem fresh weight and succulent, and decreasing in root/stem dry weight and dry matter content. And opposite results in irrigation once a week; increasing in root/stem dry weight and dry matter content and decreasing in leaves number, stem length, stem diameter, root length, root/stem fresh weight and succulent. Half irrigation every week was the lowest measurement results among all transactions.

Introduction

Water is at the center of economic and social development; it is vital to basic human needs, manage the environment, and sustain economic growth. Water is a critical input for agricultural production and it is important in food security.

world's total water supply is about 332.5 million mi3 of water, over 96 %is saline. And, over 68 % of the total freshwater is locked up in ice and glaciers, and 30 % is in the ground. Fresh surface-water sources, such as rivers and lakes, only constitute about 22,300 mi3, which are the sources of most of the water people use every day **(*Peter H. Gleick, 1993*)**. The water resources in the KSA are depend on the non-renewable groundwater sources, renewable surface and groundwater sources, desalinated water and treated wastewater **(*MOEP, 2010*)**. These sources are associated with uncertainty and can be affected by climatic change in future **(*Chowdhury et al., 2012*)**.

The water requirements of the kingdom (24.8 bcm in 2015) are steadily growing annually at 7%. About 90% of total water supplied to Agriculture **(*MEWA, 2019)*** which represents an environmental challenge given its high reliance on non-renewable resources. This lack of water sources beside the harsh climate makes some difficulties in agriculture and seed germination.

Seed generally germinate when it has all suitable conditions. But not all seeds have the same germination requirements. They need the proper temperature, moisture, air, and light conditions to germinate. The first requirement for germination is water for hydrolysis, for hydration of enzymes, cell membranes and organelles to their operational conformation, and help in cell expansion that is initiated by germination.



The crop water requirements depend on: (1) the climate: one crop grown in different areas will have different water needs, (2) the crop type: it influences on the daily water needs of a fully grown crop, and the duration of the total growing season of the crop, (3) the growth stage: plants requirements in seedling differ than in fully developed tree. The transportation and digestion of food cause the cells of the seed embryo to develop and divide. The embryo grows until it forms into a seedling, which has every necessary part to start photosynthesis and grow into the mature plant.



Crops grown under open environments often pass-through periods of abiotic stress during their life cycle. Of these is water stress which adversely impacts the physiology of plants, especially photosynthetic capacity.

Drought is one of the most important plants stresses and occurs for several reasons, including low rainfall, salinity, high and low temperatures, and high intensity of light **(*Hamideh et al., 2016*)**. It causes reducing growth, marginal leaf scorch, wilting, tip dieback, premature leaf drop, chlorosis, decrease plant resistance to pathogens, and, in severe case, plant death.

Another stress is water logging (Immersion stress) which is a condition when water is in excess amount more than its optimum requirement (***Senthil, 2016***) -water gets filled in the pores of the soil which are previously occupied by O2- It creates an anaerobic situation in the rhizosphere due to which the plant suffers from hypoxia (deficiency of O 2) or anoxia (absence of O 2), and depresses growth and survival of the plants **(*Senthil, 2016*)**.

As we discussed previously, Kingdom of Saudi Arabia suffers from a lack of water sources beside the harsh climate which make some difficulties in agriculture. That's why we must choose the suitable species to grow it that do not require much water, drought tolerant, and had high nutritional and economic value.

One of these species is *Phaseolus vulgaris*, or common bean, is a herbaceous annual plant, grown worldwide for its edible beans, used both as the dry seed and as unripe fruits. It helps in reduce body weight, good for colon and rectal cancer, source of dietary fibers, lower blood sugar, lowers cholesterol levels, lower risk of developing lung cancer **(*WebMD*)**, an important source of proteins, minerals (iron and zinc) and vitamins for many human populations **(*Beebe et al., 2000*)**. It is now widespread and cultivated as a major food crop in many areas around the world due to its high levels of variation in growth habit, different seed characteristics, adaptation ability, and its water efficiency.

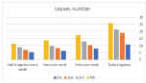
Phaseolus vulgaris is a good choice to cultivate in Saudi Arabia environments and can withstand the harsh conditions in it.

Objective

to Study the effect of irrigation amount and drought on germination and some of the physiological aspects of (***Phaseolus vulgaris***) seeds.

Results

- Leaves number: leaves number is the highest in the daily irrigation, leaves number increased through all the four harvested, whereas the average number was (19.16). In second place we find irrigation twice a week with average number equal to (12.16). Then, irrigation once a week with average number equal to (9.49). And finally, half irrigation every week with average number equal to (8.16).



- Stem length: stem length is the highest in the daily irrigation, stem length increased through all the four harvested, whereas the average number was (25.74). In second place we find irrigation twice a week with average number equal to (22.16). Then, irrigation once a week with average number equal to (19.49). And finally, half irrigation every week with average number equal to (18.32).



- Root length: the highest root length was in the daily irrigation and irrigation twice a week where are almost equal with average number equal to (2.35) and (2.36), root length increased through all the four harvested. In second place we find irrigation once a week with average number equal to (2.08). And finally, half irrigation every week with average number equal to (1.98).



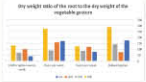
- Stem diameter: stem diameter is the highest in the daily irrigation, stem diameter increased through all the four harvested, whereas the average number was (8.66). In second place we find irrigation twice a week with average number equal to (7.74). Then, half irrigation every week with average number equal to (7.24). And finally, irrigation once a week with average number equal to (6.91).



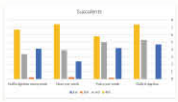
- Root/stem fresh weight: wet weight ratio of the root to the wet weight of the vegetable gesture is the highest in the daily irrigation, with average number equal to (97.00). In second place we find half irrigation every week with average number equal to (93.68). Then, irrigation twice a week with average number equal to (89.72); root/stem fresh weight increased in the second harvested and fall down in the rest harvested. And finally, irrigation once a week with average number equal to (81.97).



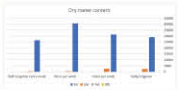
- Root/stem dry weight: dry weight ratio of the root to the dry weight of the vegetable gesture is the highest in irrigation once a week with average number equal to (174.04). In second place we find the daily irrigation with average number equal to (170.32) Then, irrigation twice a week with average number equal to (102.97). And finally, half irrigation every week with average number equal to (87.00).



- Succulents: the amounts of succulents are the highest in the daily irrigation with average number equal to (128.78). where in irrigation twice a week, irrigation once a week, and half irrigation every week succulents is almost equal; with average number equal to (3.78), (3.49) and (3.61).



- Dry matter content : dry matter content ratio is the highest in irrigation once a week with average number equal to (10279.5%). In second place we find irrigation twice a week with average number equal to (8426.2%). Then, the daily irrigation with average number equal to (7845.9%). And finally, half irrigation every week with average number equal to (6790.6%).



Discussion

- Effect of daily irrigation (immersion stress) on Phaseolus vulgaris plant: Too much water can lead to extended oversaturation of soil moisture in the root zone, resulting in the inability of the root system to respire normally, thus inhibiting the growth of the plants, whereas insufficient water cannot meet the normal water requirements of the crops, resulting in slow growth **(*Wang, et al., 2016*)**. But the results show a normal growth of the plant and it does not undergo any stress; that Phaseolus vulgaris prefers moist soil **(*Ken Fern, 2008*)**.



- Effect of irrigation once a week on Phaseolus vulgaris plant: water requirement depends on crop type, growth stage, etc. **(*Parwin, 2014*)**. Some plants need large amount of water while other not; for Phaseolus vulgaris irrigation once a week caused a stress symptom appear in yellowing leaves and weakness of the plant; due to lower rate of photosynthesis and respiration than the usual rate.
- Effect of half irrigation every week (drought stress) on Phaseolus vulgaris plant: It is generally accepted that water stress adversely affects the physiological, morphological, and growth traits of Phaseolus vulgaris **(*Siddique, et al., 1997*)**. Drought can cause nutrient deficiencies, even in fertilised soils, due the reduced mobility and absorbance of individual nutrients, leading to a lower rate of mineral diffusion from the soil matrix to the roots (***Silva, et al., 2011)***. Leaves number is decreased, decreases root growth and results in decreased nutrient uptake (***Siddique, et al., 1997***), decrease of normal growth for stem length and diameter thus; increase root/stem fresh weight as a form of resistance to drought stress, and finally, death of the plant.



Conclusion

This study was to Study the effect of irrigation amount and drought on germination and some of the physiological aspects of crops Which is considered a global food stock. Crops one of the important plants which can be grown and harvested for food or profit. By use, crops fall into six categories: food crops, feed crops, fiber crops, oil crops, ornamental crops, and industrial crops. There are a few studies on crop plant in KSA: especially field study, so it recommended to make more studies to improve National Food Security and to know the suitable way for cultivate this plant in face of water scarcity and the drought in our country.

Acknowledgments

I thank Dr. Yasser Al-Marwae for support this project.
I thank Dr. Alae Jabbour for his cooperation with us and for providing full assistance in this project.
Thank Teacher : Abed Al-lehebi and Teacher : Muhammad Nahas for providing us all devices and tools.

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Effectives for some Plant Extract on Pathogenic Fungi Which Cause a Root Rots and Death of Seedlings in Agricultural Crops

Supervisor :
Dr. Ali Al – maghraby
2020-2021

Researchers By :
Yazeed Khalid Bukhary

Abstract

Fungi have been isolated from the root zone of the cucumber plant, and they are defined as: *Fusarium* sp, *Rhizoctonia* sp, *Pythium* sp, *Aspergillus niger* and *Alternaria alternate*. The disease of seedlings and root rot in cucumbers causes a serious problem for cucumber crops under the conditions of protected cultivation, and causes great losses in plants, especially in repeated plantations in the same soil. Through the previous study, it is clear the effective role of plant extracts to combat plant pathogenic fungi instead of using chemical pesticides because of their harmful effect on the environment and humans. Based on results the high ability of filtrate extract of Ziziphus spina-christi extract was observed with a concentration of 5% on the inhibition of the longitudinal growth of the *Pythium* sp, where the rate of inhibition was 61.11% in water compared to the rest of the treatments. It was also observed that the concentration of 5% in the filtrate of the Lawsonia inermis extract was more effective in inhibiting the longitudinal growth of the *Rhizoctonia* sp compared to the Ziziphus spina-christi extract in the concentration of 5% in the inhibition amounting to 53.33%. The results were compared to the control experiment, where the inhibiting rate for pathogenic fungi was 0%.

Introduction

Plant diseases need to be controlled to maintain the quality and abundance of food, feed, and fiber produced by growers around the world. Beyond good agronomic and horticultural practices, growers often rely heavily on chemical fertilizers and pesticides. Such inputs to agriculture have contributed significantly to the spectacular improvements in crop productivity and quality over the past 100 years. Today, there are strict regulations on chemical pesticide use, and there is political pressure to remove the most hazardous chemicals from the market. Additionally, the spread of plant diseases in natural ecosystems may preclude successful application of chemicals, because of the scale to which such applications might have to be applied.

Biopesticides show several advantages when compared to chemical products. They decompose more quickly in the environment and are generally less toxic towards non-target species (Thakore, 2006). Additionally, their modes of actions are usually distinct from those of conventional pesticides. This implies that they can often help suppress resistant pathogens and that they can be applied in alternation with other pesticides to avoid resistance development.

Pathogenic fungi are among the most dangerous and most harmful fungi. Their pathological symptoms usually appear on the vegetative system after they have completely managed to eliminate the root system ***(Garrett, 1970).*** Several methods were used to limit the damage caused by fungi, such as the use of chemical pesticides, which later turned out to be not a strategic solution, as the use of chemical pesticides led to many environmental and health problems And disturbance of the natural balance of the living (***Mechrotra et al., 1995***) In addition, many of them lost their effective effect due to the development of new strains of pathogens by these chemicals (***Buchenauer, 1995).*** The biological control study of some plant diseases affecting agricultural crops has been able to avoid the problems resulting from the use of chemical control. Alternative methods of chemical pesticides have been used, including the use of plant extracts that possess antimicrobial activity (***Ayres et al., 1980, Zaika, 1988***) because these extracts contain compounds that act against microorganisms (***Kunin, 1993, Finch, 1998***) and are distinguished. Minimal environmental impact (***Brunelli, 1995).*** The trend has increased at the present time to use plant extracts to improve the growth of economically important plants and increase their production. Plant extracts contain many compounds, allelopathic inhibition is complex and can involve the interaction of different classes of chemicals, such as phenolic compounds, flavonoids, terpenoids, alkaloids, steroids, carbohydrates, and amino acids organic acid, Alkaloids, Terpenoids and Steroids as well as some toxic gases ***(Putna,1987).***

Rhizoctonia solani and Fusarium oxysporum and Pythium aphanidermatum and Macrophomina phaseolina are fungi cause seedlings death and root rot in cucumbers, large losses for plants, especially under the conditions of protected agriculture.

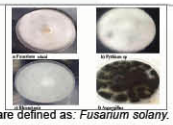
Research results showed that the plant extracts of *Zizphus spina-christi* leaves had achieved a significant decrease in the growth rate and inhibition rate of the pathogenic fungus F.oxysporim, which causes root rot disease of cucumber plants ***(Paultiz et al, 1992) .***

Objective

This research aims to study the effect of plant extracts on the growth of some pathogenic fungi that infect agricultural crop plants. The objectives of this research can be summarized as follows:

1. Extracting chemical compounds from the leaves of plants under study.
2. Study the vital activity of plant extracts and their ability to inhibit the growth of pathogenic microorganisms and fungi.
3. Test the effectiveness of plant extracts in fighting plant diseases instead of chemical pesticides.
4. Reduce environmental pollution by using natural plant extracts instead of chemical pesticides.
5. Test different concentrations of plant extracts, up to the effective concentration affecting pathogenic fungi.

Results



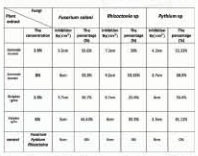
1-Survey and Isolation of the Cucumber Root-rot Pathogens:
Fungi have been isolated from the root zone of the cucumber plant, and they are defined as: *Fusarium solany. Rhizoctonia sp., Pythium sp., Aspergillus niger. Alternaria alternata* .

2- Determination of active substances of plants under study :

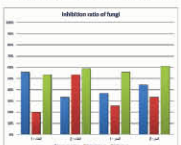
Lawson contains of (2- Hydroxyl - 1,4 Naphthalene) , tannic acid ,chrysophanic acid , anthraquinone , mucilage , gallic acid , mannite cyan glycosides , sterols , triterpenes ***(Saadabi,2007).***

Ziziphus spina contains of flavonoids, sterols, peptids, alkaloids, glycosides and polyphenols ***(Gupta & Bansal, 2003)***.

3-The effect of plant extracts on the growth of some plant pathogenic fungi.
Based on results from the table(1), the high ability of filtrate extract of *Ziziphus spina-chrisfi* extract was observed with a concentration of 5% on the inhibition of the longitudinal growth of the *Pythium sp*, where the rate of inhibition was 61.11% in water compared to the rest of the treatments. It was also observed that the concentration of 5% in the filtrate of the *Lawsonia inermis* extract was more effective in inhibiting the longitudinal growth of the *Rhizoctonia sp* compared to the *Ziziphus spina-christi* extract in the concentration of 5% in the inhibition amounting to 53.33%. The results were compared to the control experiment, where the inhibiting rate for pathogenic fungi was 0%. As shown in **Table(1).**



Table(1) shows the effect of overlapping concentrations of plant extracts of *Ziziphus spina-christi* and Lawsonia inermis plants on inhibiting the fungal growth of some pathogenic fungi.

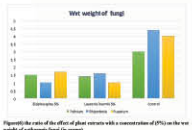


4-The effect of plant extracts (Lawsonia inermis and Ziziphus spina) 5% concentration on the wet weight of fungi.

It was clear from the result the ability of plant extracts to weaken the growth of pathogenic fungi compared to the control experiment (Ziziphus spina) 5% had an effective role in inhibiting the growth of the *Fusarium* sp where the weight of the fungus was 1 g, while Lawsonia inermis gave a concentration of 5% high inhibitory capacity of the *Rhizoctonia* sp was 1 g.

Fungi / Plant extracts	Wet weight of fungi		
	Pythium	*Rhizoctonia*	*Fusarium*
Ziziphus spina 5%	1.7g	1g	1.7g
Lawsonia inermis 5%	1.4g	1.5g	1g
Control	3g	4.4g	4g

Table (2) the effect of plant extracts with a concentration of (5%) on the wet weight of pathogenic fungi (in grams).



Figure(6) the ratio of the effect of plant extracts with a concentration of (5%) on the wet weight of pathogenic fungi (in grams)



Discussion

The disease of seedlings and root rot in cucumbers causes a serious problem for cucumber crops under the conditions of protected cultivation, and causes great losses in plants, especially in repeated plantations in the same soil.

The results of isolation in the roots of cucumber plants affected by the disease showed that the fungi (*Fusarium, Pythium and Rhizoctonia*) are fungi that Prevail among the isolated pigs. *Pythium* was the most dominant, followed by the *Fusarium*; *Rhizoctonia* ***(Inbar et al, 1994, Al-ttuwaijri, 2008)***, where he confirmed that these pathogenic fungi with the collected cucumber samples indicate that these fungi are endemic in the soil and that the reproduction of the host's culture in the same soil leads to increased disease***(Inbar et al, 1994).***

The results confirmed the ability of the extract of *Ziziphus spina-christi* and Lawsonia inermis plant, with its different concentrations, to inhibit the growth of pathogenic fungi. The greater the concentration, the greater the effect is given to controlling the pathogens. plant extracts have been used in many studies for the flowers, roots and leaves of plants that contain toxic substances against many agricultural pests (insecticidal, bacterial, fungal) , including *Alternaria alternata*, *Rhizoctonia solani, Fusarium solani, Fusarium oxysporum*, where the study demonstrated inhibitory activity against the tested fungi ***(Hadizadeh et al., 2009).***

The study demonstrated the ability of plant extracts to inhibit the growth of pathogenic fungi as many previous studies have confirmed. Lawsonia inermis has an anti-fungal growth effect with different concentrations in relation to many pathogens. The aqueous extract of the leaves showed their effectiveness against the fusarium ***(Altuwaijri , 2002).***

Conclusion

Fungi have been isolated from the root zone of the cucumber plant, and they are defined as: *Fusarium solany, Rhizoctonia* sp, *Pythium* sp, *Aspergillus niger* and *Alternaria alternata* The disease of seedlings and root rot in cucumbers causes a serious problem for cucumber crops under the conditions of protected cultivation, and causes great losses in plants, especially in repeated plantations in the same soil

Through the previous study, it is clear the effective role of plant extracts to combat plant pathogenic fungi instead of using chemical pesticides because of their harmful effect on the environment and humans. Based on results the high ability of filtrate extract of Ziziphus spina-christi extract was observed with a concentration of 5% on the inhibition of the longitudinal growth of the *Pythium* sp, where the rate of inhibition was 61.11% in water compared to the rest of the treatments. It was also observed that the concentration of 5% in the filtrate of the Lawsonia inermis extract was more effective in inhibiting the longitudinal growth of the *Rhizoctonia* sp compared to the Ziziphus spina-christi extract in the concentration of 5% in the inhibition amounting to 53.33%. The results were compared to the control experiment, where the inhibiting rate for pathogenic fungi was 0%.

Acknowledgments

First and above all, we thank God for his countless blessing and for granting us the capability to complete this work successfully.

We wish to express our sincere gratitude to our supervisor, Dr. Ali Al - maghraby for his continuous support and for his immense knowledge and valuable advice.

Our deep thanks to the head of department, Dr. Yasser Almorouei.

Last but not the least, we are highly indepted to all who have provided us with the assistance to accomplish our project.

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Effect of salinity in the germination of beans
Abdulaziz naif abusadah
Umm – al-qura



Abstract

Salinity was one of the major problems in many parts

of the world from ancient times. These fields have been restricted to crops, which appeared mainly in arid and arid regions.

Effective, immediately affects and affects tablets. The effect of stress on the soil to the soil to the plant on the ground you are raising.

salinialinity has a variety of impacts on agricultural crops, and it can be divided into direct and indirect effects. The direct effects include those that have to do with the increase in the osmotic pressure of the soil solution, as the increase in the osmotic pressure in the soil solution leads to the inability of the plant to absorb the water neces

ary for the biological processes. And the toxic effects of some ions on the plant. As for the indirect effects of salinity on the plant, it includes those effects that arise from the deterioration of the natural and chemical properties of t
he soil as they affect the growth and development of the plant. Its deterioration means an adverse response of the plant to growth and development. All effects, whether direct or indirect, negatively affect plant productivity and to different degrees according to the plant's sensitivity to these effects.

Introduction

Most crop plants are salt tolerant upon germination but are sensitive to salt during emergence and vegetative development. The salinity inhibits the growth of roots and shoots. However, supplemental calcium partially alleviates growth inhibition. The effect of Ca is shown to be associated with the maintenance of plasma membrane selectivity for K on Na. Reproductive growth is less sensitive to salt stress than vegetative growth although the stress in wheat salt can accelerate reproductive growth, inhibit spike growth and reduce yield potential, while in rice which is more salt sensitive, lower yield is mainly associated with reduced tillage, and by spikelet. Aseptic in some varieties. Plants with improved salt tolerance should thrive in salt field conditions with many additional stresses. Salinity exhibits interactions with many stresses, among others with boron toxicity, but the mechanisms of salinity interactions with boron remain unknown. To better understand crop tolerance under salt field conditions, future research should focus on crop tolerance to a combination of stresses

Discussion

Saline soils affect growth, growth, productivity, physiological disturbances and metabolism in plants. Plants are adversely affected by seed germination, survival, morphology, development, productivity and componentsSalinity decreases growth by decreasing the water potential of the root zone, the toxicity of specific ions increases, and the nutritional imbalance increases as the internal concentration of sodium ions increases.

Conclusion

The reason for non-germination and delayed growth of seeds is that water absorption by the seeds of the crop is low when salinity levels are high. This causes restriction of water movement and a decrease in its absorbed quantity as a result of increased osmotic tension caused by salinity, which leads to a decrease in the rate of seed germination or as a result of an increase in the concentration of some elements such as sodium and chlorine in the seeds to reduce toxicity. In an experiment conducted on the crop of wheat and barley, under different levels of salinity. It was found that increasing the salinity of irrigation water leads to a decrease in the percentage of germination as well as in the lengths of the seeds. This is due to the effect of osmotic pressure on the plant to prevent the movement of water towards the seeds.

Objective

The aim of the research study:The study aims to assess the salt tolerance of lentils at (0, 10g, .20g, 30g).The effect of these concentrations on seed germination and some growth parameters through estimating the percentage of germination, length of the shoot, root depth, number of leaves per plant, fresh and dry weights of the plant, as well as the percentage of water content of salt-stressed plants compared to comparison plants

Acknowledgments

I thank the subject teacher Prof. Dr. Mohsen Kamal for his help, teaching us, and monitoring us at all times, may God help you, and I thank my fellow students.

Results

The bean seeds were grown in pots under suitable climatic conditions and the pots were divided into 4 groups to study the effect of 3 variables of sodium chloride solution (10 grams of salt, 20 grams of salt, 30 grams of salt) on the germination and growth of the bean seeds by comparing them with the plants of comparison (0Control)

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Effect of saline water on seed germination and early seedling growth of the halophyte quinoa

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Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of (*Capsicum annuum*) seeds

Student name: Abdulrahman Awad Almalki
Course Instructor: Dr. Alae Ahmad Chakib Jabbour

Abstract

The effect of different irrigation treatments, such as daily irrigation (flood stress), twice weekly irrigation, once weekly irrigation, and half watering per week (drought stress) on different growth parameters of plants were studied (*Capsicum annuum*)
The daily irrigation significantly increased during the growth stages on the number of leaves, the length of the root, the length of the stem, the diameter of the stem, the ratio of the wet weight of the root to the shoot total of the stem and the ratio of the dry weight of the root to the shoot and the juice content and the dry matter content.
While irrigation twice, it had a low decrease in the growth stages On the number of leaves, root length, stem length, stem diameter, ratio of root wet weight to stem shoot, ratio of dry root weight to stem shoot, juiciness and dry matter content
Once the irrigation had a marked decrease in all the studied growth parameters from the number of leaves, root length, stem length, stem diameter, , ratio of root wet weight to stem shoot, ratio of dry root weight to stem shoots, juiciness and dry matter content
Irrigation of half a water per week had a marked decrease in all the studied growth parameters from the number of leaves, root length, stem length, stem diameter, the ratio of the wet weight of the root to the stem shoot and the ratio of the dry weight of the root to the shoot total of the stem, juiciness and dry matter content

Introduction

Water sources in the world
1- Surface water: Surface water includes all forms of water bodies above the surface of the earth .Such as streams, rivers, lakes, wetlands, and oceans
2- Ground water is meant by groundwater water that seeps through the layers of the earth consisting of gravel, sand, or crushed rocks such as limestone, and which contain materials with pores and spaces between their grains that make them permeable
Depleting water sources in the world
T shaped water accounted for %70 of the planet, but the amount available for the use of which is only 3%, with this percentage the amount of fresh water that man can be used in all areas of life represent Kalshrb, bathing, agriculture and other activities, while Two-thirds of this water remains trapped in frozen glaciers, or is not available for human use, and it is reported that an average of 1.1 billion people around the world face a problem in their access to enough water
Water sources in the Kingdom of Saudi Arabia
The problem of water in the Kingdom is its geographical location, where there are many dry desert areas, and there are no places, such as lakes and rivers, and it is considered to be low in rain, and it is subject to evaporation quickly due to high temperatures, so temperatures in the summer may reach 50 degrees Celsius. Or more
Depletion of water sources in the Kingdom of Saudi Arabia
Because of the scarcity of water, the Kingdom of Saudi Arabia is working hard to preserve agriculture and avoid almost total dependence on imports, so Saudi Arabia has established many dams to store rainwater and use it for irrigation, especially in areas located in the southwest of the country, such as the Bish Dam and the King Fahd Dam which contains the largest reservoir in Country
Water stress problems Water scarcity and risk
Water scarcity is the state of water resources in the world, and its link to human demand for them, as water scarcity and scarcity are seen as the lack of sufficient water to meet the demand for it, and among its most obvious symptoms is the suffering of the ecosystem, its significant deterioration, and the sharp decline in the water percentage. Groundwater, in addition to inequality and fairness in water distribution
Water stress problems with submersion and risk
Flooding the plant in water affects the aeration of the soil and prevents the roots from breathing, so the root cells die because they do not receive oxygen
Water requirements for crop plants
Plants differ from any other living organism in expressing their need for water in terms of quantity and timing , as we find that some plants exhibit symptoms of wilting as a result of the intense need for water, for example beets, but there are many vegetables that do not show signs of wilting despite their need. to water such as carrots, cabbage, asparagus and others . Therefore, you must know the amount of water that must be added to each crop and when to add
The amount and duration of irrigation varies according to several factors:
soil type, crop type, weather factors, especially temperature, plant growth periods
Seedling growth
Initial growth factors
Water: Because water is life, it provides this seed with power and stimulates it to live again, but the quantity of water must be wary, so that we find that it is important to it, except that flooding the seed with water stands an obstacle to its growth .
Air: The seed must be subjected to ventilation, in order to obtain the oxygen that brings it to life
***Capsicum annuum* : Plant**
Food: It is used as a kind of condiment, although it is considered as a vegetable as well .Digestive and tonic for digestive juices, has an effect on blood fats and tonic for blood vessels .Repellent, asthma, and useful in asthma, cold, bronchitis, pneumonia, tonic, anti-tumor, regenerator of the immune system cells in the blood, spleen and lymph tissues, and stimulant to secrete antibody compounds that improve the immune system .Rich in Vitamin C and cold-fighting antioxidants
Medicine :Capsaicin , the chemical in chili peppers that makes it hot, is used as a sedative in topical ointments, nasal sprays, and patches to relieve pain
Chemical Irritants :Capsaicin extracted from chili peppers is used in the manufacture of pepper spray and tear gas as chemical irritants, and forms of less-lethal weapons to control unruly individuals or crowds .Such products have a high potential for misuse and may cause injury or death

Objective

The study of water needs, diving, and drought pressure on seedling growth and some physiological aspects of it
(***Capsicum annuum***) seeds
It is the study of the effect of irrigation operations: daily, twice a week, once a week and half once a week on the different growth measures of (***Capsicum annuum***).

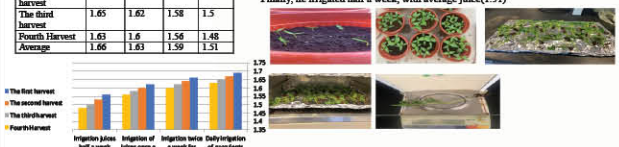
Results

We find that the arrangement of the number of leaves, the length of the root, the length of the stem, the diameter of the stem, the ratio of the wet weight of the root to the shoots of the stem, the ratio of the dry weight of the root to the shoot of the stem, the juice and the dry matter content were the highest in daily irrigation
And then in second place he was in irrigation twice a week
And in third place he was in irrigation once a week
And brother, he was in irrigation half a week

Table . The result of succulence of the seedling

harvest	Daily irrigation of succulents	Irrigation a twice a week for succulents	Irrigation of juices once a week	Irrigation juices half a week
The first harvest	1.69	1.66	1.62	1.56
The second harvest	1.67	1.64	1.6	1.53
The third harvest	1.65	1.62	1.58	1.5
Fourth Harvest	1.63	1.6	1.56	1.48
Average	1.66	1.63	1.59	1.51

We find that the ranking of succulents was the highest in daily irrigation, as there was an increase in succulents during the four harvesters, as the average juicer was (1.66)
And then in second place he was in irrigation twice a week, where he was the average juice(1.63)
And in third place, it was in irrigation once a week, as it was the average juicer(1.59)
Finally, he irrigated half a week, with average juice(1.51)







study of the effect of the amount of irrigation water and drought on germination and some physiological aspects of (*Nasturtium officinale*) seeds.

Name : Abdulrahman Saleh Al- Harthi
Course Instructor : Dr Alae Ahmad Chakib Jabbour
2020-2021

Abstract

A new effect was studied in New Evidence (immersion stress), twice-weekly, weekly, and half-week irrigation, and different growth parameters for plants (Nasturtium officinale). Evidence:
Daily irrigation:
Growth rate was good during all growth factors.
Irrigation twice a week:
The growth rate was high and we observe an increase during all stages of the studied growth factors.
Irrigation once a week:
We observe a decrease during the two growth stages in all the studied growth factors.
Watering half once a week:
The symptoms of wilting appeared on the plant as a result of plant growth in a poor environment with water, and we notice a decrease during all stages of all studied growth parameters.

Introduction

- World's water sources:
Water is secured for the human community from two main sources, namely: surface water and groundwater

- The problem of water shortage in the world:
Water shortage is defined as the scarcity of availability of potable water due to rapid population growth, climate change, lack of materials and poor infrastructure, as many regions have reached the upper limit for safe use of water, especially in arid regions, and this phenomenon is an increase at a rate equal to twice the rate of population growth in the world During the past century, water shortages have directly affected health; Every day, more than 800 children die around the world due to the use of water that is unfit for human use and contaminated with wastewater

- Water sources in the Kingdom of Saudi Arabia:
One of the most important causes of the water problem in the Kingdom of Saudi Arabia is its geographical location, as there are many dry desert areas, and there are no places such as lakes and rivers, and it is considered little rain, and it is exposed to evaporation quickly due to high temperatures, as summer temperatures reach 50 degrees Celsius or more.

- The problem of water shortage in the Kingdom of Saudi Arabia:
The Kingdom of Saudi Arabia is considered a scarce water resource, in addition to unsustainable agricultural practices and overgrazing, which has turned the lands into arid lands, causing desertification, and among the most important causes of water shortage are the following:
1- Intensive crop irrigation and excessive use of water
2- Too much water consumption by individuals
3- Excessive use of groundwater as a result of population, social and economic growth

- Water stress problems of water scarcity and risks:
Lack of water is one of the most common reasons why plants become unhealthy and wither in a very short period of time, and among these reasons:
1- Slow vital processes
2- It reduces the movement of foodstuffs
3 leaves wilt
Water immersion stress problems and risks:
The biggest reason to kill houseplants is to over-water them, which leads to rotting of the roots. So the best solution is to water the plants on a schedule that does not make them thirsty or flooded

- Water requirements for crop plants:
Water in its various forms is one of the important factors that affect plant growth, development and production, because water plays a sensitive and important role in every stage of plant growth, starting from the stage of germination and ending with the stage of fruit formation. Water not only enters the formation of plant cells, but also dissolves the substances contained in them, and it also plays the role of a mediator in the transfer of organic and inorganic substances and the analysis of mineral salts absorbed by the roots to different parts of the plant and without water the plant cannot perform vital processes

Objective

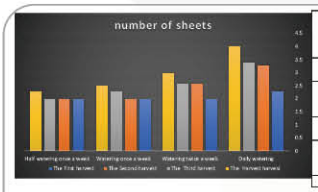
The study of water needs, diving, and drought pressure on seedling growth and some physiological aspects of it
Seeds (Nasturtium officinale)
It is the study of the effect of irrigation operations: daily, twice a week, once a week and half once a week on the different growth measures of the plant (Nasturtium officinale).

Results

- The number of leaves: in daily irrigation it was the best and most beautiful form and the most number and it was in irrigation twice, which is the second best irrigation for the number of leaves. We notice the withering from the beginning of the watering once a week and the beginning of death in half the water.
- The length of the stem: the length of the stem in daily irrigation was the highest in the length, followed by irrigation twice a week, but in irrigation once it was very decreasing and the half irrigation was very little
- Root length: the root length in daily irrigation was at the highest rate in length, twice irrigation was less, and in irrigation once and half the water, it was almost equal.
- The diameter of the stem: the diameter of the stem was large in daily irrigation and irrigation twice a week, it was less in irrigation, but once and half the water.
- The ratio of the wet weight of the root to the shoots of the stem: it was in daily irrigation at a higher rate than twice a week, and in irrigation once was low, and in the half the irrigation was very low.
- The ratio of the dry weight of the root to the dry weight of the stem shoot: it was in daily irrigation at a higher rate than twice a week, and it was in irrigation once low, and in the half irrigation was very low
- juiciness: The juiciness was high in daily irrigation, and it was less in irrigation twice a week, but in irrigation once a week and a half, it was almost equal and equal.
- The dry matter content: the numbers were significantly higher in daily irrigation and slightly less in irrigation twice a week, but in irrigation once a week it was less than the previous one, and in half the irrigation it was le





Harvest	Daily watering	Watering twice a week	Watering once a week	Half watering once a week
The First harvest	2.3	2	2	2
The Second harvest	3.3	2.6	2	2
The Third harvest	3.4	2.6	2.3	2
The Harvest harvest	4	3	2.5	2.3
Averages	9.92	2.55	2.20	2.07

- We find that the number of leaves in the (*Nasturtium officinale*) plant was the highest in daily irrigation, as there was an increase in the number of leaves during the stages of growth during the four harvesters in the four weeks, where the average length of the diameter was (9.92)

-Then the second place was in irrigation twice a week, where the average number of leaves was (2.55)

-And then the third place was in irrigation once a week, where the average number of leaves was (2.20)

-Finally, irrigation was half-watered a week, as the average number of leaves was (2.07)

Discussion

- In the first treatment: daily irrigation (immersion) inhibits growth because anaerobic conditions form hinde the growth process, choking the roots to deprive them of free oxygen. Increased water leads to the accumulation of anaerobic breathing products as well as inhibiting salt absorption
However, the written results of all crops did not give the above where the growth of the plant was normal and the plant did not fall under any stress as a result of not observing the rules of irrigation or non-compliance with the pre-specified dose or may be the result of the leakage of gravity water from the pots and did not create non-air conditions in the root environment and suitable for the field capacity of the soil in which the gestures grew with the need of the plant resulting from not being exposed to jihad

- In the second treatment: Rey every three days: this treatment leads to: the near-normal growth of the plant

- In the third treatment: Irrigation every week: the plant's need for water varies depending on its type, some plants need to grow to a large amount of water and some do not need and therefore irrigation every week can be suitable for some species without others and due to the type of plant

- In the fourth treatment, half-rey symptoms appeared in the form of complete wilting with plant dwarfation, lack of branching and few leaves for all plant species studied due to:
The prolonged water deprivation of the plant exposes it to the water stress associated with the symptoms of wilting followed by plant death, and the reason is the growth of the plant in a water-poor environment, i.e. an abnormal state of plant growth. It was also found that the lack of branching of the plant under stress pressure because the plant lacks branching to reduce the vegetative total relative to the root group increases its water content, a kind of resistance to it

Conclusion

We conclude that the appropriate irrigation for (Nasturtium officinale) is daily irrigation, and we also want to mention that the Kingdom of Saudi Arabia is considered a scarce water resource, in addition to unsustainable agricultural practices and overgrazing, which turned the lands into arid lands, causing desertification,
We want to address the nutritional importance of (Nasturtium officinale), as it contains high levels of vitamins such as vitamin A and vitamin C, and is rich in minerals such as calcium, iron, zinc and phosphorous, and is useful for patients with heart and chest, diabetes, liver and thyroid gland. It helps to strengthen sexual ability, prevent hair loss, prevent constipation because it is rich in fibers, prevent malnutrition, diuretic, and because these experiences are relatively few in the Kingdom of Saudi Arabia, especially field experiments. We recommend conducting more field experiments on crop plants for food self-sufficiency, enhancing national food security and the importance of estimating water needs and reducing the depletion of water resources in the cultivation of agricultural crops.

Acknowledgments

I want to thank the head of the biology department, Dr. Muhammad Al-Buqami, for his support for this project.
I thank Dr. Alaa Jabbour for his cooperation with us and his assistance to us and for standing with us in all stages and times of the project
I also thank the laboratory technicians: the first of them is Teacher Muhammad Nahas, Teacher Abed Al-Lahibi and TeacherMuhammad Al-Zahrani for their cooperation with us.

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Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of *(Pisum sativum)* seeds

Student name: Talal Abdullah ALsohaimi
Course Instructor:Dr. Alae Ahmad Chakib Jabbour

Abstract

daily irrigation
The daily irrigation at the beginning of the first week of the irrigation distribution did not show any symptoms on the paper We note in (Table1) the first harvest did not show any symptoms, but on days 14 and 21 it appeared in yellowing due to the immersion has an effect on dryness, the lack of oxygen prevents it from breathing in the soil
Irrigation twice a week
We notice in previous rounds that the plant had good growth and did not show any symptoms or drought. The immersion was very convenient. We observe on days 7, 14, 21 and 28 in (Tables 1, 2, 3, etc.) in terms of leaf appearance, plant height, so it is economical for water.
Irrigation once a week
In the second week we notice the emergence of drought, the death of some leaves, the lack of succulence in it, we notice in (Table 7) the lack of juice in which we say not suitable for irrigation for some types of plants
Half Irrigation
Very bad growth in which some plants die from the first week. (Figure7,1) They increase in every harvest in which leaves fall a lot because of the juices in which are very little growth

Introduction

Water sources in the world
Water resources are natural resources of water that are potentially useful. Uses of water include agricultural, industrial, household, recreational and environmental activities. All living things require water to grow and reproduce 97% of the water on the Earth is salt water and only three percent is fresh water; slightly over two thirds of this is frozen in glaciers and polar ice caps. (Earth's 2009) The remaining unfrozen freshwater is found mainly as groundwater, with only a small fraction present above ground or in the air(Scientific 2008)
Depletion of the world's water sources
Water scarcity is the lack of fresh water resources to meet the standard water demand. Humanity is facing a water crisis, due to unequal distribution (exacerbated by climate change) resulting in some very wet and some very dry geographic locations, plus a sharp rise in global freshwater demand in recent decades driven by industry. Water scarcity can also be caused by droughts, lack of rainfall, or pollution. This was listed in 2019 by the World Economic Forum as one of the largest global risks in terms of potential impact over the nextdecade(Global2019)
Water sources in the Kingdom of Saudi Arabia
Saudi Arabia is a desert like country with no permanent river or lakeand very little rain fall (FAO, 2009). Water is scarce and extremely valuable. With the country's rapid growth, thedemand for water is increasing. Aquifers are the majorsource of water in Saudi Arabia. They are vastunderground reservoirs of water. Another major source of water is desalination of sea water. The Saline Water (Al-Zahrani, 2009a)
Depletion of water sources in the Kingdom of Saudi Arabia
Although the extreme importance of water Saudi Arabia faces a huge risk because of the inappropriate use of water resources, as well as the limited stock of non-renewable groundwater, which is depleting fastly, now a days the clean water is Rare due to the climate change conditions and the much demand of the water for the agriculture and other needs , the sewerage water costs the country much amount of money beside the needs of building an infrastructure which occupies that huge demand of water which needs an enhancement on the short term(Sagga, A. M.: 1998)
Water stress problems water scarcity and its dangers
Water Stress Indicatora country or region is said to experience "water stress" when annual water supplies drop below 1,700 cubic metres per person per year. At levels between 1,700 and 1,000 cubic metres per person per year, perio A 2006 United Nations report focuses on issues of governance as the core of the water crisis, saying "There is enough water for everyone" and "Water insufficiency is often due to mismanagement(Larsen2009)
Water requirement of crops
. By defining the reference crop as hypothetical with an assumed height of m, a surface resistance of 70 s m"' and an albedo of 0.23, closely resembling the evaporation of an extensive surface of actively growing and adequately watered green grass of uniform height, the FAO Penman-Monteith method was developed overcoming previous deficiencies and providing values more consistent with actual crop-water-use data worldwide. (DOORENBO 1977)
seedling growth(*Pisum sativum*)
The pea is most commonly the small spherical seed or the seed-pod of the pod fruit Pisum sativum. Each pod contains several peas, which can be green or yellow. Botanically, pea pods are fruit(Rogers, Speed 2007)since they contain seeds and develop from the ovary of a (pea) flower. The name is also used to describe other edible seeds)

Objective

Study of the effect of irrigation water and drought on germination and some physiological aspects of ***(Pisum sativum)***seeds

Results

Table2: root length in a plant *Pisum sativum*

root length in a plant Pisum sativum				
Harvest	Half irrigation	Irrigation once a week	Irrigation twice a week	daily irrigation
Harvest 1	9.3	10	12	11
Harvest 2	9.4	9.3	14.7	12.3
Harvest 3	8.6	9.5	15.4	13.6
Harvest 4	9.2	9.2	16	13.8

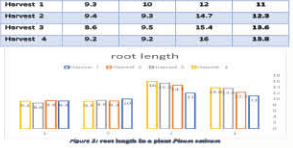
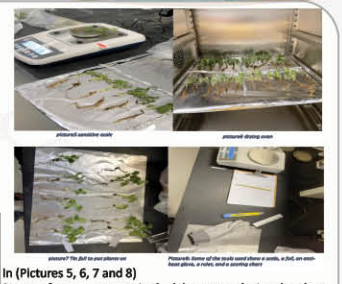


Figure 2: root length in a plant *Pisum sativum*

1	Irrigation twice a week	Root growth is very excellent, the best of which is watering twice a week, and medium (14.52)
2	daily irrigation	Root length in the third week was not good and average length (12.65)
3	Irrigation once a week	Root length is weak and of medium length(9.5)
4	Half Irrigation	Root length is poor in half-watering weekly of medium length (9.12)



In (Pictures 5, 6, 7 and 8)
Stages of measurements in the laboratory, placing the plant on the tin and cutting and separating the stem from the root, taking measurements on the scale of the root and then the stem
And measure the length with a ruler inserted into the oven at 105 ° C for 48 hours

Table2: Number of leaves in a plant *Pisum sativum*

Number of leaves in a plant Pisum sativum				
Harvest	Half irrigation	irrigation once a week	irrigation twice a week	daily irrigation
Harvest 1	38	30	30	34
Harvest 2	29	31	30	38
Harvest 3	13	11	20	19
Harvest 4	4	7	13	15



Figure 1: Number of leaves in a plant *Pisum sativum*

1	Irrigation twice a week	We notice an increase in the number of leaves during the growth stages, and the best one was in terms of watering twice a week, and the average was (26.25)
2	daily irrigation	The number of leaves was excellent but it was noticed that in the third week the number of leaves decreased and the average was (23)
3	Half Irrigation	growth of the number is weak (19.2)
4	Irrigation once a week	The average The number of sheets was perfect for the first week. In the second week, leaf wilting was observed and the average number of leaves was (17.25).



pictures1 The stage of plant growth pictures2 The first harvest

In (Pictures 1 and 2) the growth phase of the seedling, if the growth is complete, we divide it into four sections, daily irrigation, irrigation twice a week, irrigation once a week and a half time for four weeks every week, one harvest. We go to record the measurements and weights in the laboratory and record them in Tables.

Discussion

Number of leaves
on Pisum sativum plant, studied the adding of irrigation water every 3 day intervals to maintain 100% field capacity and exposure of plants to water-stress through irrigated at 6 day intervals (slight-stress condition), 9 day intervals (mild-stress condition) and 12 day intervals (severe-stress condition (defoliation) causes the plant to die **(Bogdan J, Zagdańska B (2006)).**
root length
The effect of increased irrigation
Excessive irrigation causes temporary or permanent wilting of plants, as a result of reducing the amount of oxygen in the root zone and the difficulty of their breathing due to the displacement of water and clammy air in the slurry spaces(ABHSM 2006)
stem length
Also, the plant usually continues to absorb water from the soil less so Its content is less than the state of the permanent point of wilt, but the absorption is very slow to replace the lost water Dehydration explains, and lack of water leads to stunted growth and eventually leads to death as a result of dehydration Figure this relationship**(Naor A (2006)**
Ratio of root/shoot fresh weight
The results of the study showed the water stress on the vegetative part with respect to the stem and the leaf area on the (Histal and Malti), the negative impact was at all levels of drought, which are consistent with which proved the negative effect of this stress on plant growth and production in all stages of its growth and development**(Fereres. 2001),**
Ratio of root/shoot dry weight
Plant starvation causes temporary or permanent wilt, and consequently plant drying and death. Slows down the vital processes inside the plant and thus weakens the growth of the plant**(Zalman 2000)**
Succulence
In the short term, if the amount of water absorbed by the plant is less than the rate of transpiration through the stomata, then this does not only negatively affect the plant, but if this condition persists, that is, the water loss by transpiration is greater than the absorption, then water shortage arises inside the plant and thus The plant will definitely wilt**(Fereres. 2001)**
Dry matter content
Dry biomass production is shown in Deficit irrigation affected negatively dry matter production for both crops. Statistical analysis revealed significance for deficit irrigation treatments, but not for organic amendment treatments. Differences between deficit irrigation treatments started to be oblivious 40 days after transplanting **(Hudson, B. D., 1994)**
dry weight of the plant
There was a reduction of about 40% when the crop was subjected to deficit irrigation during the whole growing period, in agreement with They showed that pea is very sensitive to drought with yield losses when irrigation water was reduced by 50%. Biomass production and harvest index were affected reported that full irrigation of field pea showed the best yields**, (Duzdemir et al. (2009).**

Conclusion

We studied the importance of the current study the effect of water stress and water requirements of crop plants on the germination and growth of crop plants, which would reduce the depletion of water sources, preserve it and cultivate important crop plants that are a component of food security, and provide employees and finances. And because these experiments are relatively few in the Kingdom of Saudi Arabia, especially field experiments. We recommend conducting more field experiments on crop plants for food self-sufficiency, enhancing national food security and the importance of estimating water needs and reducing the depletion of water resources in the cultivation of agricultural crops.
It is necessary to conduct studies on the pea plant of nutritional and economic importance because the Kingdom of Saudi Arabia lacks a field study of peas and their importance to society, and it is an economic plant in terms of water and human labor This is based on the laboratory experience that was conducted

Acknowledgments

He sent a thank you letter to the parents, expressing their appreciation for me and their interest in me. They are the ones who supported me who have turned my weakness and broken moments into moments of strength and joy. Thank you, Dr. (Ali Ahmed Shakib Jabbour). This wouldn't have happened without the grace of God, and then I stood beside me. Everything is the softest loyalty, the most beautiful greeting, and the sweetest praise.
Words of praise do not fulfill your right, thank you for your efforts, (Khaled Al-Daadi and Ahmad Al-Hazmi)

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Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of (*Vigna savi*) seeds

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Second Term - 1442 – 2021

Abstract

A new effect has been studied in a new evidence (immersion stress), irrigation twice a week, week, and half week, and different growth parameters of plants (***Vigna savi***) evidence **daily irrigation** the growth rate was good and we notice an increase during the growth or harvest stages along the root, stem length and stem diameter, while there was a decrease during the growth or harvest stages on the ratio of the wet weight of the root to the wet weight of the shoots (stem) and the ratio of dry weight. The root depends on the dry weight of the shoots (stem), on the juices, and on the dry matter content **Irrigation twice a week** the growth rate was high and we notice an increase during the growth or harvest stages along the root and the length of the stem and the diameter of the stem, and the ratio of the wet weight of the root to the wet weight of the shoots (stem) and the ratio of the dry weight of the root to the dry weight of the shrub (stem) And on the juiciness and on the dry matter content **Irrigation once a week** we notice a decrease during the growth or harvest stages on all the studied growth parameters from root length, stem length and stem diameter and on the ratio of the root wet weight to the wet weight of the shoots (stem) and the ratio of the dry weight of the root to the dry weight of the shoot total (Stems), on the juices, and on the dry matter content **Irrigation was half once a week** the symptoms of wilting appeared on the plant due to the growth of the plant in a poor environment with water and we notice a decrease during the growth or harvest stages on all the studied growth parameters from root length, stem length and stem diameter, and on the ratio of the wet weight of the root to the wet weight. Of the shoots (stem) and the ratio of the dry weight of the root to the dry weight of the shoots (the stem) and on the juiciness and on the dry matter content

Introduction

- **World : the in sources Water :**

Alternative water sources are needed to fill the supply and demand gap and reach a sustainable net sustainable water balance in urban areas. Good research has been done on potential single source water solutions, but full integration of alternative water supply (for example, rainwater, rainwater, gray water, wastewater)

- **Depleting water sources in the world :**

Millions of pumps of all sizes finish sending Subterranean Mail around the world , there is increasing global competition for water, and many major local aquifers are becoming depleted. This is due to direct human consumption as well as to agricultural irrigation with groundwater

- **Water sources in Saudi Arabia :**

Groundwater resources are a precious commodity in general and for arid regions in particular Their exploration, exploitation, protection and management play an important role in community activities. In the Kingdom of Saudi Arabia, extensive aquifers are found in the Arabian shelf. The Saqq reservoir is one of the most important aquifers in the northwestern part of the Kingdom of Saudi Arabia

- **Depletion of water sources in Saudi Arabia :**

The unprecedented development in the Kingdom of Saudi Arabia has resulted in the problems of depletion of subterranean areas in arid regions. In order to avoid such an unfinished situation. Comprehensive measure of groundwater resources is utmost. The Safra Valley Basin has been selected as an experimental area for an intensive groundwater exploration study

- **Water stress problems, water scarcity and risk :**

The different water use sectors have contributed to increased water scarcity by increased water wastage through inefficiencies as well as pollution. Climate change has also attributed to water shortages and droughts in some areas and floods in others around the globe. , Current trends show that numerous water systems which sustain ecosystems, as well as growing human populations, have become stressed. Water sources are either being degraded by various types of pollution becoming unsuitable for use or have dried up

- **Stress and risk of immersion problems :**

Requirements for both sterility and avoidance of dehydration in plant tissue cultures can impose sealing requirements that severely limit the rate of gas exchange in and out of the culture vessel. Conditions within the culture vessel, such as the depth of any water cover, presence of gelling factors, mass and tissue porosity and temperature, also strongly influence gas exchange rates

- **Water requirements for crop plants :**

Due to lack of knowledge of the minimum water requirements for crops and the specific time for irrigation, the farmer uses wasteful water supply under his leadership and instead of reducing the delicate needs of crop weeds in and converting his land to Caesar. The problem of water supply and availability of crops is a very difficult problem limiting soil water alone may significantly delay growth and thus lead to partial or complete failure of the crop

- **Seedling growth :**

Cowpeas have a relatively higher drought tolerance compared to other legume crops. It is widely cultivated in semi-arid regions Clearly, cowpea is both responsive to favorable growing conditions and capable of growing under drought, heat, and other abiotic stresses , The nutritional content of cowpea grain is impor- tant because it is eaten in quantity by millions of people who otherwise have diets lacking in protein, minerals, and vitamins

Objective

Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of (***Vigna savi***) seeds

It is the study of the effect of irrigation operations: daily, twice a week, once a week and a half times a week on the different growth parameters of a plant (***Vigna savi***).

Results

- **Number of leaf** : We find that the number of leaves of the ***Vigna savi*** plant was highest in irrigation twice a week, as there was an increase in the number of leaves during the four weeks during the four harvests The second place is daily irrigation, the third is -irrigation once a week, and the fourth is half-watering per week

- **Root length :** We find that root length in ***Vigna savi*** was the highest in twice-weekly irrigation, as there was an increase in root length during the four weeks during the four harvests The second place is daily irrigation, the third is irrigation once a week, and the fourth is half-watering per week

- **leg length :** We find that the stem length of the ***Vigna savi*** plant was the highest in twice-weekly irrigation, as there was an increase in stem length during the four weeks during the four harvests The second place is daily irrigation, the third is irrigation once a week, and the fourth is half-watering per week

- **Stalk diameter :** We find that the stem diameter of the ***Vigna savi*** plant was the highest in twice-weekly irrigation, as there was an increase in stem diameter during the four weeks during the four harvests The second place is daily irrigation, the third is irrigation once a week, and the fourth is half-watering per week

- **The ratio of root wet weight to the shoots (stem) :** We find that the ratio of root wet weight to the wet weight of the shoots (stem) of the ***Vigna savi*** plant was the highest in twice-weekly irrigation, as there was an increase in the ratio of root wet weight to the wet weight of the shoots (stem) during the four weeks during the four harvesters The second place is daily irrigation, the third is irrigation once a week, and the fourth is half-watering per week

- **The ratio of dry weight of root to shoots (stem) :** We find that the ratio of dry root weight to dry weight of shoots (stem) in ***Vigna savi*** was the highest in twice-weekly irrigation, as there was an increase in the ratio of dry root weight to dry weight of shoots (stem) during the four weeks during the four harvests The second place is daily irrigation, the third is irrigation once a week, and the fourth is half-watering per week

- **Succulents :** We found that the succulents in ***Vigna savi*** were the highest in twice-weekly irrigation, as there was an increase in succulence during the four weeks during the four harvesters The second place is daily irrigation, the third is irrigation once a week, and the fourth is half-watering per week

- **Dry matter content :** We found that the dry matter content of ***Vigna savi*** was the highest in twice-weekly irrigation, as there was an increase in the dry matter content during the four weeks during the four harvests The second place is daily irrigation, the third is irrigation once a week, and the fourth is half-watering per week

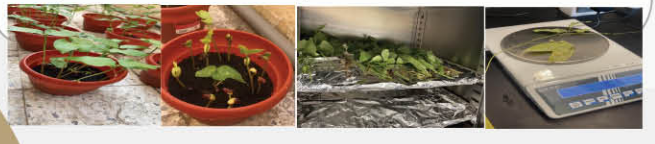
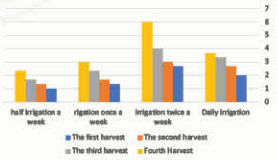


Table No. (2) The result of stem length of seedlings

Harvest	Daily irrigation	Irrigation twice a week	Irrigation once a Week	half Irrigation a week
The first harvest	2	2.66	1.33	1
The second harvest	2.66	3	1.66	1.33
The third harvest	3.33	4	2.33	1.66
Fourth Harvest	3.66	6	3	2.33
Average	2.91	3.91	2.8	1.58



Curve No. (2) as a result of stem length of seedlings

- We find that root length in ***Vigna savi*** was the highest in twice-weekly irrigation, as there was an increase in root length during the four weeks during the four harvests.

_ Irrigation twice a week was the highest average root length (3.91)

_ The second place was in daily irrigation, where the average root length was (2.91)

_ The third place was in irrigation once a week, where the average root length was (2.8)

_ The fourth place was in irrigation half water per week, where the average root length was (1.58)

Discussion

_ In the first treatment: daily irrigation (immersion) leads to inhibition of growth because the anaerobic conditions formed impede the growth process, so the roots suffocate to deprive them of free oxygen, and the excess of water leads to the accumulation of anaerobic respiratory products such as acetate, acetone and ethanol in addition to inhibiting the absorption process of salts

_ Irrigation of the second treatment: Irrigation every three days: This treatment leads to: that the seedling growth rate was high and we notice an increase during the growth stages or harvesters on all the studied growth parameters due to the water needs of the plant

_ Watering the third treatment: Irrigation every week: the plant's need for water varies according to its type. Some plants need to grow a large amount of water, and some do not need water. Therefore, watering every week may be suitable for some types without others and is due to the type of plant

_ In the fourth treatment, without irrigation (dehydration) if the amount of water lost from the plant exceeds what the plant can absorb and to a large degree, the symptoms of permanent wilting appear clear on it and often it ends and this is due to the importance of water for the plant

Conclusion

The growth rate of seedlings was high and we notice an increase during the growth or harvest stages of all the studied growth parameters of the plant (***Vigna savi***) in irrigation twice a week, and the depletion of water sources in the Kingdom of Saudi Arabia resulted from the unprecedented development in the Kingdom of Saudi Arabia in the problems of depletion of subterranean areas in arid regions. . In order to avoid such an incomplete situation. Great emphasis has been placed on agricultural activities that can only be achieved by carefully displaying and exploiting existing groundwater resources

The nutritional importance of the plant:

excellent source of dietary fiber, for this reason, eating them helps to improve the health of the digestive system in general, combat constipation and diarrhea, and improve the absorption of nutrients during the digestive process. Also, beans contain high levels of vitamin C, which contributes to strengthening the immune system and the fiber content of cowpea Diet helps to improve cholesterol levels in the body by reducing harmful cholesterol and increasing good cholesterol levels, which improves cardiovascular health and because these trials are relatively few in the Kingdom of Saudi Arabia, especially field trials. We recommend conducting more field experiments on crop plants to achieve food self-sufficiency, enhance national food security and the importance of estimating water needs and reducing the depletion of water resources in the cultivation of agricultural crops

Acknowledgments

I thank Dr. Muhammad Al-Buqami for his support for this project.
I thank Dr. Alaa Jabbour for his cooperation with us and for his full assistance on this project.
I thank the laboratory technician: Muhammad Al-Zahrani, Muhammad Nahas for providing us with all the equipment and tools.

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First 15 December 2018 Part of the Springer Water book series (SPWA) - Department of Geography, School of Ecological and Human SustainabilityUniversity of South AfricaJohannesburgSouth Africa

Title Names University

Study The Effect of Light on Plant germination and growth of (Solanum Lycopersicon) seeds

student's name: Sanad Musa Al Juhani
Supervisor ..Prof. Dr. Mohsen Kamal Hassan Ebrahim

Abstract

Tomato seeds type (SUPER STRAIN B) were planted, the pots were placed in rooms to experiment with the effect of light on them, and the sources of light used were LED lamps, then the pots was divided into four different sections (darkness for 24 hours a day, light for 24 hours a day, 12 \ 12 light and darkness daily, and outside to the sun daily) on some parameters of germination and growth of the tomato plant and the

Introduction

In regions, where tomatoes are grown in fields, the seedlings are often pre-grown in greenhouses followed by transplanting. The transplanting process is a stressful event for small seedlings; stress can be caused by low soil and air temperatures(Melton and Dufault1991), water deficit, soil salinity, and increased wind. In general, environmental stress causes growth retardation, a delay in flowering and fruit formation and thus potentially lower total yield. To overcome transplant stress, seedlings are required to be in good condition. High seedling quality can be achieved by managing the growth conditions in the greenhouse during the nursing period. Nutrition, temperature, water availability, and light conditions are known to influence the stress tolerance of seedlings.

Growers and consumers are willing to replace chemical growth retardants with more ecologically friendly solutions. An alternative to chemicals is provided by photobiology;

plant growth manipulation is possible with light by using different wavelength

combinations. In the horticulture industry, light in greenhouses has been manipulated for

decades to produce better quality ornamentals and greenhouse vegetables (KadmanZahavi et al. 1976).

Objective

The study aims to assess the degree of tolerance of tomato type (SUPER STRAIN B) to different levels of light and to evaluate the effect of light on plants.

Growth, germination percentage, shoot length, root length, number of leaves per plant, fresh weight, and dry weight will be evaluated and thus in this study, we will study the effects from four light stages.

Results

The plants that grew in the dark and the plants that grew in the light for (24) hours, their growth rate was less than the plants that grew in 12 hours of light and 12 hours of darkness. In light for a period of 24 hours, darkness or light interruption causes a decrease in the depth of the vegetative system, which led to a lack of depth of the root, as it recorded its highest value with a length of (9.2) and recorded its lowest value with a length of (7.0) and there was no effect on the number of leaves and that the plants The plants that grew in constant light have less fresh weight than plants grown under natural light, or 12/12 dark, light as they recorded the highest fresh weight value (0.073) and the lowest fresh weight value (0.021) as well A dry weight loss also occurred

root length

tomato plants grown for 20 days; the plant was watered twice every day for the duration of the experiment

Treatment	Dark	Light	12/h Dark 12/h Light	(SUN)
1	0.7	1.0	2.5	2.2
2	1.0	1.2	2.6	2.4
3	1.2	1.4	2.9	2.7
Average	0.97	1.2	2.67	2.43
STDEV	±0.24	±0.2	±0.21	±0.25

Table (2) shows us that the plants that grew in the dark and the plants that grew in the light for 24 hours, the absence of darkness or light causes a decrease in the depth of the vegetative system, which led to a decrease in the depth of the root, as it recorded its highest value with a length of (2.9) and recorded its lowest value Length (0.7)

Discussion

This research was conducted to study the ability of tomato plants to endure, resist and sensitive to the following light treatments (darkness for 24 hours a day, light for 24 hours a day, 12/12 light and darkness daily, and outside to the sun daily) in the germination stage and the growth stage where the seeds were placed Their growth and after germination were measured, percentage of germination, fresh and dry weight, and other growth parameters. Germination The results obtained showed that changing the light on the tomato plant, either in cases of constant darkness or constant light, led to a clear decrease in growth, and with the passage of days, this decrease increased directly. Data (Ohkuma et al. 1963) indicate that the reduced growth as well as the paleness of the leaves of tomato plants grown under constant light may be explained by the accumulation of starch and sugar. As for growth, it was also observed from the results of the current study that the constant light of the tomato plant led to a decrease in the length of the shoot, root depth, fresh and dry weight and in constant darkness. The plant to return its plant tissues to light where it can again use photosynthesis and live. Photosynthesis depends on environmental cues, such as light quality, water availability in the root zone, as well as air humidity.

Conclusion

It turns out that constant light and constant darkness has negative effects on the growth of the tomato plant. Plants are known to be static and self-feeding, and therefore their entire life cycle is strongly influenced by the lighting environment and the process of photosynthesis, and it is considered the main source of oxygen formation.

Acknowledgments

I would like to thank
Dr. Mohsen Kamal for his valuable guidance and for helping me complete the project This wouldn't have happened without the grace of God, and then he stood by me through all of it. All thanks and appreciation to him.

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Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of (*Vicia faba)* seeds

Student name: Khaled matr ALdaadi
Course Instructor: Dr. Alae Ahmad Chakib Jabbour

Abstract

daily irrigation
We notice in the daily irrigation that there is a lot of water in it. On the fourteenth day, some symptoms appeared, such as a change in the color of the leaf (Table 1), weakness of the stem (Table 3) and a lot of juice in it (Table 7), and on Day 21 there is no clear increase in length (Table 3)

Irrigation twice a week
We observe watering twice as better in results in terms of length (Table 3), mumber of leaves (Table 1), no flooding or stress in the plant, growth on day 14, 21 and 28 in terms of large number of leaves. Root length is good (Table 2)

Irrigation once a week
With irrigation once a week, we notice the emergence of drought and wilting of the plant on day 14 (Table 1) and no growth or new leaves appearing on day 21 (Table 3)

Half Irrigation
During watering for half a week, we observe the death of some plant leaves due to severe drought (Table 1). There is no leaf or stem growth, the amount of juice is very low (Table 7), the percentage of dehydration is high (Table 8)

Introduction

Water sources in the world
Water is the most important component of the earth it is almost seventy one percent of the earth surface, worldwide the sources of water is huge such as the ground water, surface water and the sewerage water Water is one of the most important axes of economic and social development, as it is essential to meet human needs, manage the environment, and ensure the sustainability of economic development. Water and sanitation services in the urban sector represent a high cost to the state, and service levels need to improve quality, and the sector also requires improvement of institutional conditions and governance mechanisms.(1)

Depletion of the world's water sources
After thousands of years of human development in which water has been a plentiful resource in most areas, amounting virtually to a free good, the situation is now abruptly changing to the point where, particularly in the more arid regions of the world, water scarcity has become the single greatest threat to food security, human health and natural ecosystems. Based on a recent IWMI study we estimated that nearly 1.4 billion people, amounting to a quarter of the world's population, or a third of the population in developing countries, live in regions that will experience severe water scarcity within the first quarter of the next century(2)

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Water sources in the Kingdom of Saudi Arabia
Saudi Arabia is one of the driest countries in the world. While desalination plants currently installed in the country represent 30% of the world's desalination capacity, seawater desalination alone will not be able to provide sufficient supplies to meet the increasing freshwater demand. However, with only of the total municipal wastewater generated currently being reused, the Kingdom is projected as9 %the third largest reuse (3)

Depletion of water sources in the Kingdom of Saudi Arabia
Although the extreme importance of water Saudi Arabia faces a huge risk because of the inappropriate use of water resources, as well as the limited stock of non-renewable groundwater, which is depleting fastly, now a days the clean water is Rare due to the climate change conditions (4)

Water stress problems water scarcity and its dangers
Many plant processes are affected by mild water stress, with cell growth probably the most sensitive. Except for turgor-mediated processes, the physicochemical basis for the transduction of small changes in water status into alterations in metabolism remains obscure(5)

Water requirement of crops
Accurate planning and delivery of the necessary amount of water in time and space can conserve water. The primary objective of irrigation is to apply water to maintain crop Evapotranspiration when precipitation is insufficient. Hess (6)

Water immersion stress problems and risks
water stress for the vast majority of Africans typically remains low, reflecting poor water infrastructure and service, and low levels of use. Modest increases in water use could reduce constraints on economic development pollution, and challenges to

human health. Developing
explicit geospatial indicators that link biogeophysical socioeconomic, and engineering perspectives constitutes an important next step in global water assessment

seedling growth Vicia faba
Vicia faba has a high nutritional value as a leguminous crop rich in protein and is grown in an area estimated at more than 6 million hectares. In terms of economic importance, beans are ranked first in terms of area between winter crops , The importance of this crop is due to its high nutritional value, which contains vitamins and other nutrients. Vicia faba Cultivation leads to an increase in the nitrogen content of the soil, which enhances the fertility of the soil because it contains boron and is considered a very rich source of protein, which is a major source for many residents of poor countries. The bean yield is between 22 to 25%, Finally, it is so it is important to achieve the crops which have both value in economic and nutritional which shows it is efficiency in water use due to the world shortage water(8)

Objective

Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of (*Vicia faba*) seeds

Results

Table2: root length in a plant (Vicia faba)

root length in a plant (*Vicia faba*)

Harvest	daily irrigation	Irrigation twice a week	Irrigation once a week	Half irrigation
Harvest 1	13.6	14	13	13
Harvest 2	14.8	16	13.2	12
Harvest 3	14	16.7	12	13
Harvest 4	14	17.2	13	11

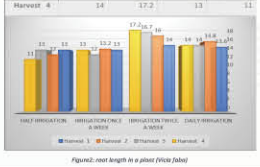

Figure2: root length in a plant (Vicia faba)

1. It was observed that the root length of the bean plant was highest in irrigation twice a week. During growth stages, average root length= 15.4
2. The length of the root was in the daily watering. Where the root reaches the mean length= 14.1
3. The length of the root was in the weekly watering. Where the root reaches the mean length= 12.8
4. The length of the root was half the amount of water per week. Where the root reaches the mean length =12.25

Some pictures are in the growth stages



(Picture 2) Stage before plant division

(Picture 1) The seedling growth stage in the first week

(Pictures 1, 2, 3 and 4) illustrate the stages of growth and divide them into several sections Irrigation twice a day and watering once a week and a half Harvest every seven days for 28 days



(Picture 4) shows irrigation twice a week



(Picture 3) We divided the plant into daily watering

Some pictures while doing the experiment in the lab



(Picture 6) The plant distribution stage with its



(Picture 5) After taking samples, they are inserted into the oven

(Pictures 5,6,7) Post-harvest Take the measurements of the weights and divide them in the tin and put them in the oven



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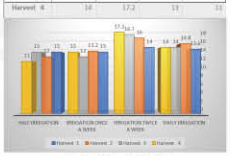

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Discussion

Number of leaves
Beans about. If your garden doesn't get sufficient rain, you must water. Watering is probably the most critical summer gardening chore for many people, and it's the job most often done wrong)9)

root length
Avoid frequent, light waterings. Water deeply but gently to a depth of four to six inches. Thorough soaking encourages the roots to seek water deep in the soil. With a deep root system, the plants can survive hot, dry weather a lot better(10)

stem length
nalysis of variance of the data for growth characters presented in showed that severe drought stress condition caused gradual decrease in most of the growth characters except stem diameter and number of green leaves per plant viz., time required to reach to 50%(11)

Ratio of root/shoot fresh weight
who concluded that the effect of water stress on plant growth under water deficit conditions in the soil could be determined from smaller sizes of leaf or low plant heights or decreased fresh or dry weight and later lower yield and yield component characters. In the same concern(12)

Ratio of root/shoot dry weight
decreasing plant growth with increasing plant densities was also observed by The interaction of plant densities and variable water supplies are presented in clearly obvious that, a general the highest density suffered a higher water stress than the other densities(13)

Succulence
all investigations showed that the of leaf succulents were able to survive long periods without water even when soil water content dropped close to 0% of field capacity. For non-succulent shrubs, however, there was considerable variation in their ability to withstand drought(14)

Dry matter content
Everyone is familiar with the favourable effects of mineral nutrients on plant growth It is almost equally well-known that mineral deficiency leads to a relatively more important share of the root system in the total mass of the plant. Such expressions as "the plant is seeking nitrogen" are based on this phenomenon, (15)

dry weight of the plant
The dry weight is an estimate of a body or of a body samples weight when all water has been removed, means the weight of the sample, excluding the weight of the water in the sample The dry weight is determined by means of drying processes which would remove water (16)

Conclusion

Water wealth is one of the most important natural resources and one of the basic elements of economic activities in general And cultivation of it in particular, as the percentage of what is consumed by the agricultural sector is about 21% of the available water The Kingdom of Saudi Arabia suffers from a scarcity of groundwater The current and future water situation, the deterioration in the quantity and quality of water, and the decrease in the per capita share of it have been paid Researchers to adopt some methods to cope with the water deficit. One of the most prominent of these methods is the use of mechanized irrigation methods Scheduling irrigation, adopting irrigation method, developing traditional irrigation methods, as well as applying all operations Which contribute to raising the efficiency of water use

And the provision of human and financial effort. And because these experiments are relatively few in the Kingdom of Saudi Arabia, especially field experiments. We recommend more field trials of crop plants for food self-sufficiency

We recommend the cultivation of fava beans and their economic and nutritional importance, and they are water-saving. We recommend them

Acknowledgments

Special thanks (Dr. Alae Ahmad Chakib Jabbour) My best wishes for good health
I thank my friend (Talal Al-Suhaimi) for helping me

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The effect of smoke on (*Lupinus termis)* Lupine seeds

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Allehbi A , Alotibi A , Qudus M , Bakhathlaqi A , Alyazidi Z , and Dom an M

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Abstract

The smoke derived from the plant is considered a stimulant for some plants, but we discovered that it is an inhibitory agent in the seeds of lupine, as the smoke contains an inactive compound, and the compound nitrogen dioxide (NO2) has been recognized.

In this paper we experimented with the effect of smoke on germination of lupine seeds, where we applied the seeds with smoke for a different period of time: 0 control, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 minutes, 30 minutes . Then we divided it into two groups (A and B) and group A (sandy soil only) had the highest germination rate in the control plate and the germination rate was 80%, the lowest germination rate was 14% when exposed to smoke for 30 minutes, and the vegetative height was the highest average length of 8.8 cm In a control dish that was not exposed to smoke, the lowest average vegetable length was 5 cm, the highest root length was 6.7 cm when exposed to smoke 5 minutes, and the shortest root length was 3.1 cm when exposed to smoke for 30 minutes, the highest fresh weight value was 0.54g.

The seeds that have not been exposed to smoke and have a minimum weight of 0.28 g, and the highest and a dry weight value of 0.08 g at the control dish and the lowest value of 0.03 g at the minute 30, as for group B (soil mixed with ash) the highest germination value of 62% at the control The lowest value of germination was 0% when exposed to smoke, minutes 25 and 30, and the vegetative height was the highest average length of 7.6 cm at the control and the shortest value was 3.1 cm when exposed to smoke, minute 20 and the highest root length was 6.2 cm at the control and the lowest value was 3.8 cm when exposure For 20 minute smoke, the highest value in fresh weight is 0.41g when exposed to smoke, the lowest value is 0.12g when exposed to smoke, minute 20, and the highest value in dry weight is 0.06g at the control and the lowest value is 0.02g when exposed to smoke 20 minutes

And negative results appeared in most of the dishes mixed between soil and ash in germination of lupine plant in growth and development.

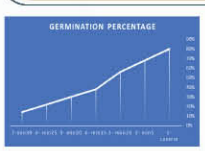
Introduction

In fire-prone habitats, many breeders, especially seeds, are called to resume growth as a result of natural forest fires. Fires are natural and widespread A feature of temperate ecosystems and in many plants , Seedlings of the species are restricted to the habitats created by such disturbances (Keeley 1994; Bond & Van Wilgen 1996). The seeds of many species are adapted to germinate in response to one or more physical signals With fire. Heat from a fire or drought Seed coat (Jeffrey et al. 1988; Brits et al. 1993) . For many varieties, the response to fire has shaped plant growth and ,Development and was responsible for the derivation, Similar structures and life forms in disparate taxonomic groups (Dixon & Roche 1995; Keeley & Bond 1997) , Fire played an important role in the succession ,At germination. It is crucial for seed recruiting , Many varieties. In addition to the more obvious germination signals provided by the heat, the active ingredients (the signals), Contains smoke-breaking stillness and germination stimulation (De Lange & Boucher 1990; 1993b), Interrelationships between fire as a primary indicator of germination And the smoke it produces as a possible secondary signal, in Different environmental situations and a set of germination strategies will be reviewed in an effort to improve them ,Understand and highlight evolutionary concepts ,Lots of smoke and germination involved Strategies ,The characteristics may affect the germination of seeds stored in umbrellas or soil seed banks. These signals may operate during fires, in the immediate post-fire environment, or for long periods after a fire, or perhaps more importantly, in communities over long distances from the fire. Smoke sticks are heat, volatile and soluble in water, can be stored for long periods of time and absorb on many surfaces including the seed material and the substrate from which it can be washed (Brown & Van Staden 1997) , Plant smoke plays an important role in Hibernate break for many species. (De Lange W Boucher 1990) From several genera and families, it also exhibited Improve germination with smoke treatments. The surveys mainly focus on the types of fire-prone areas, Smoke has been shown to be effective on larger species, A group of families that differ in environment, reproductive strategy, seed size and morphology (Brown et al.1993a, Dickson and Roche 1995, Pierce et al. 1995, Roche et al. 1997a, Van Staden et al. 2000).

Objective

Study the effect of fumes and ash on germination of Lupinus termis

Results

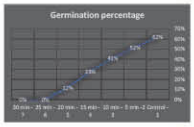




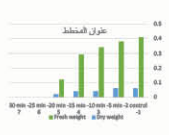




Soil mixed with ash







Discussion

When experimenting with the germination rate of lupine seeds, it became clear to us that lupine seeds were exposed to smoke. The germination of the plant was insignificant, and in 25 and 30 minutes the soil was mixed with ashes. The seeds were 100% retardant, the effect of the ash was toxic to the seeds, the smoke contained nitrogen dioxide (NO2), and like the least inhibition, the seeds were not exposed to smoke, the soil was only sandy, and the germination was. I was. The rate was. 80%

Conclusion

From 14 dishes, and in each dish 50 seeds, we selected 10 seeds from each plate and tested the efficacy of ash inhibition in germination potential, and the germination process was evaluated, and we found that the smoked seeds and soil mixed with ash are very inhibitory, as germination did not occur in most dishes and the effect of ash was toxic For lupine seeds we do not recommend using ash to fertilize the soil when planting lupine seeds

Acknowledgments

We extend our sincere thanks and appreciation to everyone who contributed and helped complete our research project, in the forefront of which is Dr. Muhammad Al-Buqami to provide all the necessary supplies to complete our research, and Dr. Mustafa Qotb on supervision. Our research project teaches us the basics of scientific research. We thank you very much with our best wishes for i

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Effect of smoke on the germination of sunflower seeds [*Helianthus annus L.*]

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Abstract

In this research, we experimented with the effect of smoke from charcoal on sunflower seeds, and the study was conducted on two experiments, where we planted the seeds in pots containing sandy soil, and other pots containing sandy soil in addition to ash in a ratio of 1: 5.

The seeds were treated with charcoal smoke at different time intervals: 0 control, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 minutes, 30 minutes.

From the results, we deduced that pots containing sandy soil only had the highest germination rate of 44% when exposed to coal smoke for 5 minutes and the lowest germination rate was 22%. The highest length of the plant in it was 21.5 cm and the longest root 4.1 cm in the control sample, and the minimum length of the plant is 14.2 cm and the minimum root length is 2 cm, and this is when exposed to coal smoke for 30 minutes. The highest value of the fresh weight of the plant in the soil pots was 4 g and the dry weight was 1.2 g and this was in the control sample and the lowest value of the fresh weight of the plant was 2.4 g and the dry weight 0 69 g when exposed to charcoal smoke for 15 minutes.

As for the pots containing sandy soil and ash, the highest germination rate was 26% and this is when exposed to coal smoke for 5 minutes and the lowest germination rate was 2%. This is when exposed to charcoal smoke for 30 minutes, The highest length of the plant in it was 18.5 cm and the longest root was 3.1 cm Control sample, and the minimum length of the plant was 12 cm and the minimum root length was 1 cm.

This is when exposure to coal smoke for 10 minutes, The highest value of the fresh weight of the plant in sandy soil and ash pots was 7 g and the dry weight was 2.1 g and this is in the control sample, and the lowest value for fresh weight The plant has 2.4 g and the dry weight is 0.8 g, and this is when exposed to charcoal smoke for 25 minutes.

Introduction

In the life cycle of a plant, a seed represents the termination of the last generation, as well as the beginning of a new generation.

Seed germination may be defined as the fundamental process by which different plant species grow from a single seed into a plant. This process influences both crop yield and quality.

The complete process of seed germination is carried out in the following steps:

During the beginning stage of germination, the seeds take up water rapidly and this results in swelling and softening of the seed coat at an optimum temperature. This stage is referred to as Imbibition.

It starts the growth process by activation of enzymes. The seed activates its internal physiology and starts to respire and produce proteins and metabolizes the stored food. This is a lag phase of seed germination.

By rupturing of the seed coat, radicle emerges to form a primary root. The seed starts absorbing underground water. After the emerging of the radicle and the plumule, shoot starts growing upwards. In the final stage of seed germination, the cell of the seeds become metabolically active, elongates and divides to give rise to the seedling.

In this study, we studied the effect of smoke on sunflower seeds [Helianthus annus L.].

Sunflower (Helianthus annuus L.) is an important ornamental member of the family Composite.

It has as economic importance worldwide as oil content, and is considered as second most important oil seed crop of the world.

For the growth and formation of sunflower plants, temperature is a major factor affecting growth. The germination of seeds is greatly affected by the change in temperature.

Additionally, sunflower seeds are a good source of beneficial plant compounds, including phenolic acids— which also function as antioxidants. When sunflower seeds are sprouted, their plant compounds increase.

Organic charcoal ash has no practical significance for the plant as a source of potassium, because the ash is stored in dry places, and when it is placed with the soil, the water rinses it from the soil nutrients.

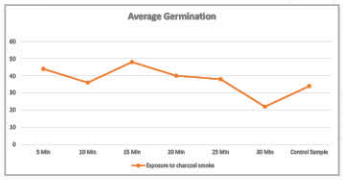
But in any case, the use of ash in small quantities will be beneficial to the soil, as for excessive use of it will negatively affect the plant and soil, and its increased use leads to raising the alkalinity of the soil, and then the concentration of salts.

Objective

The aim of this research is to study the concentration of the effect of organic charcoal smoke and ash on the germination of sunflower seeds [*Helianthus annus L.*] in terms of seedling growth and germination rate.

Results

First Experience (sandy soil only)

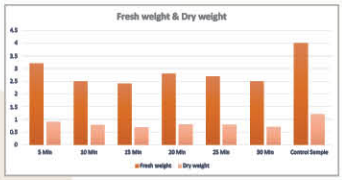


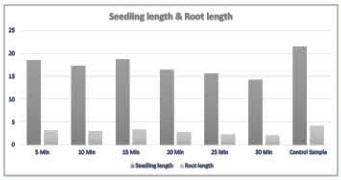
The highest germination rate



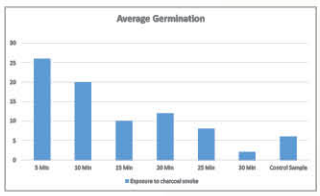
The lowest germination rate







Second Experiment (sandy soil with ash)

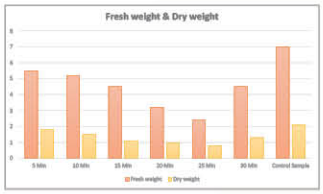


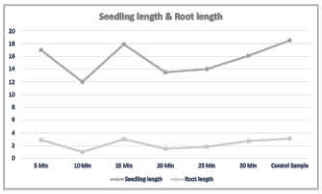
The highest germination rate



The lowest germination rate







Discussion

The seeds that were planted in dishes containing only sandy soil showed positive results on [*Helianthus annus L.*] in terms of seed germination, and their growth was faster compared to dishes containing sandy soil and ash, but it was observed that the fresh weight of the plant in sandy soil dishes was lower. From fresh weight to soil and ash dishes. These results indicate the effect of charcoal smoke on seed germination in dishes containing soil and ash. Also, if the ash is placed in increased quantities in the compost, the soil alkalinity will increase which will affect the plant's absorption of many elements such as phosphorous, manganese and copper.

Conclusion

Seedling size, root length, wet weight, and dry weight of seedlings increase in size at a moderate temperature and in good environmental conditions for the plant, and in this experiment, we studied the effect of organic charcoal smoke and ash on the germination of [*Helianthus annus L.*] seeds, and the results proved to us that coal ash does not benefit the soil as it affects the properties of The plant.

Acknowledgments

Those in charge of implementing this project would like to extend their sincere thanks and gratitude to Dr. Mustafa Qutub, who supervised this study, and for all the guidance and valuable information that he provided to us, which affected the topic of our research and our study in various aspects, and we also thank Umm Al-Qura University and the Department of Biology.

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Effect of Smoke on Vigna (*Vigna unguiculata*) Seed Germination

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Abstract

Smoke as a stimulant for seed germination is well known in many countries. It was first detected in a fire prone area, but has since been studied and applied even in fire-free areas..
In this paper we experimented with the effect of smoke on germination of Vigna seeds, where we applied the seeds with smoke for a different period of time: 0 control, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 minutes, 30 Then we divided it into two groups (A and B) and group A (sandy soil only) had the highest germination rate minutes in the control plate and the germination rate was 30%, the lowest germination rate was 8% when exposed to smoke for 30 minutes, and the vegetative height was the highest average length of 7,3 cm in a control dish that was not exposed to smoke, the lowest average vegetable length was 1.8 cm, the highest root length was 5.1 cm when exposed to smoke 5 minutes, and the shortest root length was 1 cm when exposed to smoke for 30 minutes,
the highest fresh weight value was 0.50g ,The seeds that have not been exposed to smoke and have a minimum weight of 0.4 g, and the highest and a dry weight value of 0.40 g at the control dish and the lowest value of 0.01 g at the minute 30, as for group B (soil mixed with ash) the highest germination value of 28% at the control The lowest value of germination was 6% when exposed to smoke, minutes 25 and 30, and the vegetative height was the highest average length of 2.7 cm at the control and the shortest value was 1 cm when exposed to smoke, minute 20 and the highest root length was 3.4 cm at the control and the lowest value was 1.4 Cm when exposed for 20 minutes of smoke, the highest value in fresh weight is 0.30 grams when exposed to smoke, the lowest value is 0.3 grams when exposed to smoke, minute is 20, and the highest value in dry weight is 0.25 grams when exposed to smoke and the lowest value is 0.01 grams when exposed to smoke For 20 minutes.

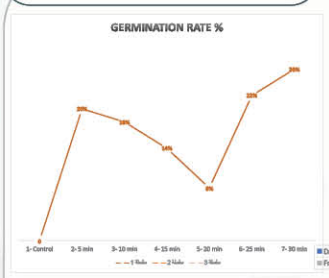
Introduction

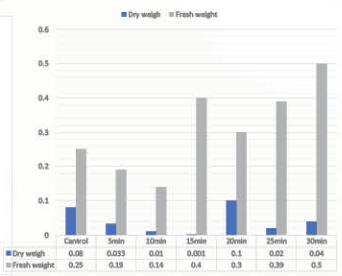
In this experiment we want to study the effect of smoke and ash on seed germination.Where smoke affects the water absorption process in seed germination by changing the permeability of the inner epidermis by increasing the number and size of permeability.Response dynamics was revealed as a change in water uptake during germination, subsequent growth, and acceleration of protein proliferation, In the life cycle of a plant, a seed represents the termination of the last generation as well as the beginning of a new generation. As the connection between generations, seeds pass along genetic information and maintain each species' characteristics. Ideally seeds should germinate immediately after ripening to maximize reproduction . Seed germination is considered to be the most vulnerable and crucial phase in a plant's life cycle . The seed germination process is controlled by many external environmental factors, such as light, temperature, and moisture, as well as by internal growth regulators . If a seed does not germinate in suitable conditions which include conducive temperature, atmospheric composition, and water availability the seed must either be dead (not viable) or viable but in a dormant state. Breaking seed dormancy remains the most important factor in improving seed germination . Plant-derived smoke is a well-known agent for promoting plant growth and development; and positively affects plant species from various habitats. The seed germination cues associated with fire or post-fire environments were identified as heat, temperature, chemicals, and smoke. On the other hand, smoke produced during fire was recognized as the major germination cue in post-fire environments . Smoke contains many different compounds, and several attempts have been made to identify these active compounds. Four major active compounds with potential agricultural use have been identified and isolated: karrikins , cyanohydrins, butenolides, and hydroquinones . Smoke affects the water uptake process in seed germination by changing the permeability of the internal cuticle via increased the number and size of permeates..

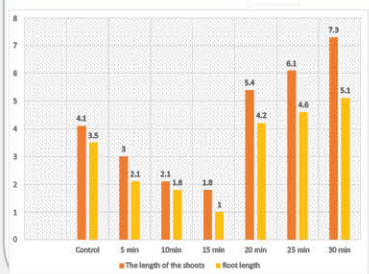
Objective

The primary purpose of this study was to determine if any species have smoke responsive germination .and also the extent to which ash affects germination.

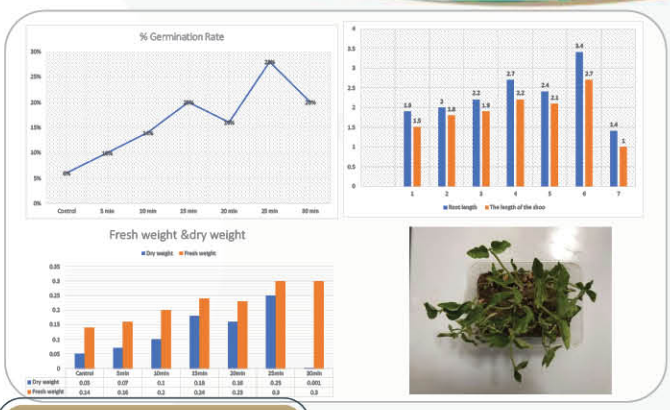
Results











Discussion

the growth was slightly less than the soil that was mixed with ash
the use of ash in increased quantities in the compost affects the alkalinity of the soil and the growth of the plant, Smoke has shown positive results in terms of seed germination and plant development due to the fact that smoke has an impact on the absorption of water in seed germination
The seeds that were planted that contained soil only the plants grew in it abundantly and their growth was faster than the pot that contained a mixture of soil and ash .

Conclusion

To conclude, mixing the soil with ash has scientifically proved to aid in the speed of plantation, due to the ash being a good composting agent. Mixing plants seeds with smoke that comes from coal which has been turnd to ash also has an effect, due to smoke being huge amount of CO2, which is the material that the plant breath. Therefore, the clear conclusion of the process is the speed of photosynthesis
It is concluded from this work that the smoke derived from the plant has significantly increased the germination of the seeds and also has increased the length of the shoot and root length and from the fresh and dry weight as in the first experiment in which sandy soil was used only.

Acknowledgments

We thank everyone who contributed and helped complete our research project, especially my parents in agricultural guidance, Dr. Muhammad Al Buqami for providing all the necessary requirements to complete our research, and Dr. Mustafa Qotb for supervising our research project and teaching us the basics of scientific research. We would also like to thank technicians for their assistance to us with some equipment The coefficient.

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Graduation project poster

Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of *(Cucumis sativus*) seeds

Names: RAJWAN WALEED KAREEM ALDEEN
Course instructor : Dr: ALAE AHMAD JABBOUR
Second Term : 1442-2021

Abstract

The effect of different irrigation treatments of daily irrigation (stress of immersion), twice weekly irrigation, once weekly irrigation, and half watering per week (drought stress) on different growth parameters of Cucumis sativus plants were studied. The daily irrigation was (it was good but not ideal) along the root and stem length and on the ratio of the wet weight of the root to the wet weight of the vegetative mass, the succulence and the dry matter, and, there was a decrease during the growth stages, the leaves and the diameter of the stem and the ratio of the dry weight of the root to the dry weight. For the shoots (stem).
While watering twice, it had an increasing effect during the growth stages on the root length, stem length, and stem diameter, on the ratio of the root wet weight to the wet weight of the shoots (stem) and the ratio of the dry weight of the root to the dry weight of the shoots (stem) and on the succulents and on Dry matter content.
Once irrigation had a diminishing effect during growth stages, on all the studied growth parameters of root length and stem diameter, the ratio of dry root weight to dry weight of the shoots (stem), juiciness and dry matter content. There is also an effect on increasing and then decreasing on the ratio of root wet weight to wet weight of shoots (stem) and leaves. And the occurrence of an increase in the length of the stem.
Irrigation half once a week had a diminishing effect during the growth stages, on all the studied growth parameters of root length and stem diameter, and on the ratio of root wet weight to the wet weight of the shoots (stem) and the ratio of dry root weight to the dry weight of the shoots (stem) And on the juiciness and on the dry matter content. The effect of increasing and then decreasing the number of sheets. He was under the influence of increasing stem length.

Introduction

Water requirements Global water in its various forms is considered one of the important factors that affect plant growth, development and production, because water plays a sensitive and significant role in every stage of plant growth, starting from the stage of germination and ending with the stage of fruit formation. Not only does water enter the formation of plant cells, but also dissolves the substances contained in them. It also plays the role of a mediator in transporting organic and inorganic materials and analyzing mineral salts that are absorbed by the roots to different parts of the plant and without water the plant cannot carry out vital processes. This leads to an imbalance in the biological and physiological processes of the plant .
Water sources in the world Water sources represent the natural water found on Earth's surface, regardless of whether it is a vapor, liquid, or solid that humans can use. Here are the most important sources of water underground water: Groundwater represents up to 98% of liquid freshwater, much of it is deposited at great depths, which makes the costs of pumping and utilizing it quite high. Ground water is the water under the surface of the earth in conditions of 100% saturation, and if the percentage is less than 100% of saturation, then the water is called "soil moisture". ((6)) Surface of the water: Surface water is the water found on the surface of the earth. It includes two types, the first is salt water, such as the oceans and seas of the earth, and the second is fresh water. Like lakes, rivers, and streams.
Water resources in the Kingdom of Saudi Arabia The Kingdom of Saudi Arabia is one of the arid desert countries in the world, so its water resources are very few, and for this reason the Kingdom relies on modern technical means that increase its water resources. Surface water is available from precipitation, desalination of sea water: desalinated seawater is the source of water production. This source provided 5% of the Kingdom's supply. Agricultural terraces: It is a way to take advantage of rainwater, as this water and clay sediments are stored to form fertile soil suitable for agriculture. Ground water: It is one of the most important sources of water in the Kingdom, which are wells and springs. Groundwater provides 84% of the Kingdom's supply. Sanitation: wastewater is obtained by treating it, and it is estimated at 32 million cubic meters per day.
Depletion of world's water sources In the past decades it has emerged that the world suffers from an increasing shortage of drinking water. Fresh water does not constitute more than 0.3% of the water reserve on Earth, and it does not reach everyone, as 20% of the population of our planet lacks it. The kingdom of Saudi arebia is characterized by low annual rainfall and lacks permanent rivers or permanent water bodies. As well as depleting groundwater resources. Although water is a renewable resource, its availability is very low for the community. There is tremendous pressure on the existing water resources due to the increase in population . The pressure on water resources in the Kingdom has multiplied due to agricultural development and led to their partial depletion, especially in the case of non-renewable fossil waters
Water stress problems water scarcity and its dangers Stress from lack of water (water stress or stress from drought) is a constant threat to plant survival, as many plants that perform physiological processes may not be able to survive in the environment in which they live. Due to water stress or low soil moisture content. This, of course, is related to the prevailing weather conditions (lack of rain, high temperature, increased wind speed, low relative humidity in the air ... etc.), so soil dryness is defined as a lack of soil water that meets the needs of the plant (i.e., minimal absorption). Soil depletes water quickly that meets its requirements to carry out vital activities, and there is no photosynthesis that meets plant requirements and leads to wilting, weakness and death.
Water immersion stress problems and risks Excessive watering causes the plants to wilt either temporarily or permanently as a result To reduce the amount of oxygen in the root area and difficulty breathing. As a result of replacing water with air in the interstitial spaces of the grains Soil and therefore weak roots and inability to absorb water. Excess watering slows down the vital processes inside the plant like one Photosynthesis and respiration, and causes the excretion of some elements Food, and its lack of availability for absorption by the plant due to its weakness The ability of the roots to absorb it as a result of increased water in an area The roots and lack of ventilation, which causes symptoms of deficiency of some Elements on the leaves of plants like yellowing.
Seeding growth is the morphological and physiological change of the seed resulting from the absorption of water, which occurs by osmotic pressure, as the speed of respiration increases with increasing water absorption. Then the seed shortness is ruptured, the root grows, and its growth rate is faster than that of epicotyl. This is important in stabilizing the seedlings and providing them with water and nutrients.
Cucumis sativus a horticultural climber of cucurbits. They are planted in the ground at a depth of 12-18 mm and then spread upwards. It is picked more than once throughout the year and is estimated to last between 80-100 days. It is native to Southeast Asia, but its cultivation has been distributed in many places in the world. And the warm atmosphere is suitable for its growth. How does cucumis sativus grow? Choose an area that gets the most sunlight. In hot places, a distance of 30 cm is left between each plant, and the depth at which the seeds are planted is 3 cm. Water the plants three times a week, especially when the plants are flowering and bearing fruit. Benefits of Cucumis sativus: C. sativus fruits and seeds are valuable in medicinal systems .
They find the pulp and peel of cucumbers. The extracts contain a high concentration of lactic acid (~ 7-8% w / w). Pulp tissue contains more than 50% (59.9%) lactic acid followed by exfoliation (25.1%) and juice (15%) that are used in the treatment of warts, dryness and chemical peeling of the skin((20)) . According to the USDA, one cup of 142 grams of chopped raw cucumber contains the following nutrients: (Water: 137 g). (Calories: 17) (Protein: 0.8 grams). (Fat: 0.2 grams). (Carbohydrates: 3.1g) (including 2.0g sugar) (Fiber: 1.0g) (Calcium: 19.9g) (Iron: 0.3mg) (Magnesium: 17mg) (Phosphorus: 29.8mg) (Potassium: 193mg) (Sodium: 2.8)) (mg) (vitamin C: 4.5 mg) (folate: 19.9 micrograms) (beta-carotene: 44 micrograms) (lutein + zeaxanthin 22.7 micrograms) (vitamin K 10.2 micrograms)

Objective

Study the effect of irrigation water intake and drought on germination and some physiological aspects of (Cucumis sativus) seeds. And to know all the phenomena resulting from the different irrigation operations (daily irrigation - twice a week irrigation - once a week irrigation - half watering a week)

Results

Number of leaves: In daily watering the number of leaves was good, but not ideal. As for irrigation twice a week, the leaves were in the best condition and in an ideal manner. And irrigation for once a week was inappropriate. And half of the watering per week was not very good and there was a drastic decrease
Stems Length: In daily watering the growth was good but weak. In both irrigation, the growth of the stems was excellent and was at its best. In irrigation, the stems were weak and wilting once. Half a week watering, the stems were very weak and wilted and yellowed.
Root length: The length of the roots in the daily watering was okay due to its exposure to flooding stress. As for irrigation twice a week, there was an increase in length perfectly. Watering once a week, the roots were not good. Half the watering per week, the roots were short to maximum and not good.
Stem diameter: The stem diameter was good in daily watering but decreased in the last harvest. Watering twice a day was the best and ideal for the stem's diameter. Watering once, the week was not ideal. Half of the irrigation in the week was the last place among them
Ratio of root wet weight to stem wet weight ratio: Daily irrigation was good, but it was not stable and got a decrease. And irrigation twice a week was the best and optimal among them. And irrigation once a week was poor and poor. And half of the irrigation per week was the last and the lowest among them.
The ratio of dry root weight to dry stem weight ratio: Daily watering was good but not ideal. And irrigation twice a week was the best and optimal among them. And watering once a week was not good and was decreasing. And half of the irrigation per week was the last and the lowest among them.
The succulent: daily irrigation was the second center in terms of containing the juiciness. The ideal freshness ratio was in irrigation twice a week. As for watering once a week, it was a concession to the juice percentage. The last place was half of irrigation, which had been subjected to severe drought stress.
Dry matter: daily irrigation according to the study was good and increasing. As for irrigation twice a week, it was the best and the best in progress. As for irrigation, once a week, I had to give In to dry matter. Finally, half of the irrigation during the week was a very low dry matter and a downward slope.



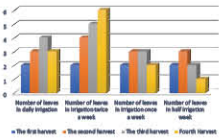



The effect of irrigation amounts on the number of leaves in the *Cucumis sativus* plant

Table

harvest	Number of leaves in daily irrigation	Number of leaves in irrigation twice a week	Number of leaves in irrigation once a week	Number of leaves in half irrigation week
The first harvest	2	2	2	2
The second harvest	3	4	3	3
The third harvest	4	5	3	2
Fourth Harvest	3	6	2	1
Average	3	4.25	3.33	2

The effect of irrigation amounts on the number of leaves in the Cucumis sativus plant





We found that the number of cucumber leaves was highest for irrigation twice a week. There was also an increase in the number of leaves during the growth stages (during the four weeks. During the fourth harvest). Average number of leaves is (4.25).
In second place was irrigation once a week, where the average number of leaves was (3.33).
And in the third place was in daily irrigation, where the average number of leaves was (3).
Finally, he was in irrigation half a week. Where the average number of leaves was (2).

Discussion

In daily irrigation, cucumbers grow well, but they are not ideal. This is due to the plant's inability to absorb water flexibly as a result of water stress.
The weights were also not perfect. Because the water was suffocating the plant from the process of exchanging oxygen.
In general: although there is sufficient amount around the roots, the activity of the weakened cell reduces their absorption capacity and thus the packing pressure in the cells decreases, which converts the cytoplasm into inert cytoplasm, thus impeding transport and water inside the plant.
Also, water saturation of the soil leads to the formation of carbon dioxide, which leads to a decrease in permeability and a lack of oxygen in the soil, and thus the process of breathing in the environment of the roots and the process of absorption.
Irrigation twice a week :In watering twice a week the growth of cucumbers was excellent. Water balance, all physiological processes and gas exchange are achieved perfectly the leaves were open and larger and there was an increase in their numbers. Also, among all treatments, there was an increase in the length of the stems with an increase in their diameter. And increase the length of its roots and weights, wet and dry, to provide all the appropriate conditions for the growth of the ideal option.
Irrigation once a week : we notice poor growth and the occurrence of yellowing and paleness of the cucumber plant, because of that it appears on plants, showing stress in the form of partial yellowing and general weakness of the plant compared to the control, due to the presence of the plant under the pressure of partial drought stress, so that the rates of photosynthesis and respiration are lower than the usual rate, which affects the functioning of vital processes, including the building and formation of organic matter in the cell juice.(28)
And in our project, we noticed a decrease in growth and a wilting occurrence. It is compatible with one of GUAN farmer's experiments
The lack of organic matter formation results from slow photosynthesis processes as an inevitable consequence of closing the stomata due to the increased accumulation of ABA hormone in the leaves, and the lack of organic matter formation not only damages the course of reactions but also affects the water absorption processes in the roots from the soil because this reduces the osmotic pressure inside The cellular juice of the root cells, which makes the plant unable to meet its water needs inside the cells.
Half Irrigation a week:, the plant loses more than its absorption, and thus this leads to the emergence of symptoms of continuous wilting, which often ends with the death of the plant. In our project, we noticed a decrease in all growth factors. Drought has different effects on the studied physiological aspects and it depends on the time of its occurrence. It also plays an important role in closing the stomata when the plant is exposed to drought stress or as a reaction to the decrease in the water content in the soil. This, in turn, reduces the organic sugar content in the cellular juice of the cells as a result of the plant's inability to fix CO2 and thus its inability to carry out the photosynthesis process necessary for the formation of materials necessary for metabolic activities.)30)
Also, the decrease in the respiratory rate as an inevitable consequence of closing the stomata causes plant death by accumulating anaerobic products of CO2 and ethyl alcohol.
Depriving the plant of water for a long period exposes it to water stress associated with the symptoms of wilting, which is followed by the death of the plant, and the reason is the plant's growth in an environment poor in water

Conclusion

The estimation of the water requirements of cucumbers is of great importance in determining the amount.The need for cucumbers for water is one of the basic requirements for the optimal investment of water resources.It must have a water balance and appropriate environmental conditions. And the plants should not be exposed to any water stress, either as a result of drought in the soil or as a result of increased moisture in it, as the plants do not regain their strong growth after these conditions, which requires regular irrigation and giving the plants the required water needs. Also, the amounts of irrigation water should not be overestimated for plants, because it will lead to damage to plants and the occurrence of water depletion. In our current study, we found the best irrigation rate for cucumber plants, which is twice a week. Thus, this contributes to the preservation of daily wastage of water. The Kingdom of Saudi Arabia is one of the arid desert countries in the world, so its water resources are very few and therefore our experience of cultivating cucumbers has led to a reduction in the wastefulness of water sources in the Kingdom of Saudi Arabia and its preservation. Human and financial effort.
And because these experiments are relatively few in the Kingdom of Saudi Arabia, especially field experiments. We recommend conducting more field experiments on crop plants for food self-sufficiency, enhancing national food security and the importance of estimating water needs and reducing the depletion of water resources in the cultivation of agricultural crops.
Benefits of Cucumis sativus: Cucumber has fewer calories than it contains in dietary fiber, which improves the absorption of nutrients during digestion and facilitates excretion. Cucumbers are rich in a number of important vitamins, such as vitamin K, which are needed to help blood to clot. Cucumber helps moisturize, cleanse and soothe the skin, and it is suitable for all skin types from oily, dry and combination. Contains very high levels of water, and it is a natural weight loss agent.
And many other benefits. Therefore, the importance of planting crops in general is the basic rule in meeting the human and animal needs of agricultural products. Taking into account water conservation. Therefore, such studies must be conducted in the future.

Acknowledgments

I would like to thank everyone who helped me implement this project. And thanks to the administrative group at the College of Applied Sciences headed by Dr. Wael Al-Amoudi.
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Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of (Coriandrum sativum) seeds

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Second term: 1442 - 2021

Abstract

The study relied on several irrigation treatments (daily irrigation - twice weekly irrigation - once weekly irrigation - half irrigation a week)
And it adopted several different standards for ***Coriandrum sativum***

Daily irrigation: During the growth stages there was a noticeable increase in root length, stem length, and stem diameter.
Also, during the harvest stages, the growth was fairly good, as there was an increase in the wet weight of the root on the wet weight of the stem and the ratio of the dry weight of the root to the dry weight of the shoots (stem), the juiciness, and the dry matter content.

Irrigation twice a week: During the growth stages there was an increase in root length, stem length and stem diameter,
Also, during the harvest stages, the growth was the best and completely natural growth, as there was an increase in the wet weight of the root on the wet weight of the stem and the ratio of the dry weight of the root to the dry weight of the shoots (stem), the juiciness and the dry matter content.

Irrigation once a week: There was a decrease during the growth and harvest stages and the decrease was in all growth parameters (root length, stem length, stem diameter, the wet weight of the root on the wet weight of the stem and the ratio of the dry weight of the root to the dry weight of the shrub (stem) and on the juiciness and on the dry matter content)

Half- irrigation per a week: There was a decrease during the growth and harvest stages and the decrease was in all growth parameters (root length, stem length, stem diameter, the wet weight of the root on the wet weight of the stem and the ratio of the dry weight of the root to the dry weight of the shrub (stem) and on the juiciness and on the dry matter content)

Introduction

Water requirements:
There is a need to reduce consumption and identify the main needs of agricultural crops. Agriculture is the main consumer of water in the world
Irrigation accounts for more than 70% of global water withdrawals,
Irrigation plays a big role in the process of developing agriculture

The stress of immersion and drought:
Water is a stressful factor for plants, whether in a state of deficiency (drought) or an increase in it, which is called flooding stress.
Drought affects the growth and development of plants and all the physiological and metabolic processes that it performs, and this is related to its intensity
the formation of leaves and flower organs stops upon exposure to drought as a result of stopping cell division, and drought affects breathing and causes a decrease in the plant's protein content due to the increase in the rate of decomposition and lack of structure, with an increase in the plant's content of free amino acids.

Seedling growth:
All salts increased plant yield (plant wet weight) compared to the comparison treatment. Most of the growth traits have been increased including plant height, fresh and dry weight of the plant.
Coriandrum sativum (C. sativum) is one of the spices most used in cooking around the world, . C. sativum contains bioactive phytochemicals that are accounted for a wide range of biological activities including antioxidants, anticancer, neuroprotective, anxiolytic, anticonvulsant, analgesic, migraine relief, hypolipidemia, hypoglycemia, antihypertensive, antimicrobial and anti-inflammatory

Crop plants:
Agricultural productivity depends on increasingly extreme weather events, Plant molecular biologists attempt to understand the mechanisms involved in stress responses and provide knowledge that can be used in breeding programs.

Depleting water sources in the world
Water shortage is the scarcity of availability of potable water due to rapid population growth, climate change, material shortages and poor . and this phenomenon is increasing at a rate equal to twice the rate of population growth in During the last century, nearly 785 million people around the world lack safe drinking water, and water shortages directly affect health; Every day, more than 800 children die around the world due to the use of water that is not suitable for human use and contaminated with wastewater, as the problem of water shortage is one of the most important issues that human rights organizations focus on.

Depletion of water sources in the Saudi Arabia:
Water use total water needs of the Kingdom increased by an average of 7% during the period from 2011 to 2015, to reach 24.6 billion cubic meters in 2015, compared to 19.2 billion cubic meters in 2011, and the agricultural sector's water needs were the fastest growing at a rate of 7%. This is followed by the urban sector, at 6%, and the industrial sector, at 5%.

Objective

Study of water requirements, immersion and drought stress on seedling growth and some physiological aspects of (***Coriandrum sativum***) seeds.

And knowledge of appropriate irrigation for plants through different irrigation treatments (daily irrigation - twice irrigation - once weekly irrigation - half irrigation a week).

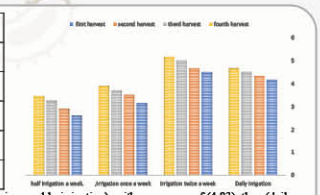
Results

In the number of leaves we find that the leaves of a plant (***Coriandrum sativum***) were the highest in the treatment of (irrigation twice a week), where the average number of leaves was (2), then followed by (daily irrigation) with an average of (1.9). (Irrigation once a week) and (half irrigation a week) are equal at an average of (1.7).
the length of stem that there is an increase in (twice-weekly irrigation), with an average of (11.1), then (daily irrigation) with an average (9.95). It decreases in (irrigation once a unit per week) at an average of (9.6), followed by (half an irrigation per week) with an average of (9.1)
the root length of the stem that there is an increase in (twice-weekly irrigation), with an average of (4.83), then (daily irrigation) with an average (4.41). It decreases in (irrigation once a unit per week) at an average of 3.56), followed by (half an irrigation per week) with an average of (3.05).
in the stem diameter of the stem that there is an increase in (twice-weekly irrigation), with an average of (0.503), then (daily irrigation) with an average (0.49). It decreases in (irrigation once a unit per week) at an average of (0.41), followed by (half an irrigation per week) with an average of (0.40).
the wet weight of the root on the wet weight of the stem that there is an increase in (twice-weekly irrigation), with an average of (0.18), then (daily irrigation) with an average (0.14). It decreases in (irrigation once a unit per week) at an average of (0.11), followed by (half an irrigation per week) with an average of (0.1).
the dry weight of the root on the dry weight of the stem that there is an increase in (twice-weekly irrigation), with an average of (0.56), then (daily irrigation) with an average (0.121). It decreases in (irrigation once a unit per week) at an average of (0.11), followed by (half an irrigation per week) with an average of (0.10).
the juicer harvesters of the stem that there is an increase in (twice-weekly irrigation), with an average of (2.76), then (daily irrigation) with an average (2.58). It decreases in (irrigation once a unit per week) at an average of (2.45), followed by (half an irrigation per week) with an average of (1.74).
dry matter content that there is an increase in (twice-weekly irrigation), with an average of (61.8), then (daily irrigation) with an average (42.08). It decreases in (irrigation once a unit per week) at an average of (9.6), followed by (half an irrigation per week) with an average of (9.1).






harvest	half Irrigation a week.	Irrigation once a week	Irrigation twice a week	Daily irrigation
first harvest	4.16	4.5	3.15	2.6
second harvest	4.33	4.66	3.5	2.9
third harvest	4.5	5	3.7	3.25
fourth harvest	4.66	5.17	3.9	3.45
Average	4.41	4.83	3.56	3.05



We find in the root length of the stem that there is an increase in (twice-weekly irrigation), with an average of (4.83), then (daily irrigation) with an average (4.41). It decreases in (irrigation once a unit per week) at an average of 3.56), followed by (half an irrigation per week) with an average of (3.05)

Discussion

Daily irrigation of coriander plants:
-Daily irrigation leads to growth inhibition because the anaerobic conditions formed impede the growth process and the roots suffocate to deprive them of free oxygen.
- The amount of water is sufficient around the roots, but the weak cell activity reduced their absorption capacity and thus reduced the swelling pressure in the cells. The active cytoplasm turns into an inert cytoplasm, which impedes the movement of water inside the plant...
-However, the results were fairly good (but not the best) as the plant growth was almost normal and the plant did not fall under the influence of stress or immersion

twice-weekly irrigation:
-Plants perform photosynthesis or photosynthesis to build glucose, which is the main food source, and plants depend in this process on the presence of sunlight, water and carbon dioxide. Plants need sunlight to use as an energy source.
-Plants need sufficient quantities of water to grow, and the amount of water in this treatment was very suitable for their growth.
-This treatment leads to normal plant growth (and it was the best treatment for the ***Coriandrum sativum***).

irrigation once a unit per week
-The plants need for water differently due to the different types of plants
-Some plants need a large amount of water
-irrigation once a week may be appropriate for some plants, but this type of coriander plant was not suitable for it, as coriander plant needs more water per week.
-It appears on plants, showing stress in the form of partial yellowing and general weakness of the plant, due to the presence of the plant under the pressure of partial drought stress, so that the rates of photosynthesis and respiration are lower than the usual rate, which affects the functioning of biological processes, including the building and formation of organic matter in the cellular juice and others.

Half Irrigation a week:
-Depriving the plant of water for a long period exposes it to water stress associated with the symptoms of wilting, which is followed by the death of the plant, and the reason is the plant's growth in an environment poor in water.
-It was also found that the lack of branching of the plant under the stress of stress due to the lack of branching of the plant to reduce the shoots in relation to the roots, increasing its water content, and this is a kind of resistance to it.
-It also plays an important role in closing the stomata when plants are exposed to drought stress or as a response to low water content in the soil. This, in turn, reduces the organic sugar content in the cellular juice of the cells as a result of the plant's inability to fix CO2 and thus its inability to carry out the photosynthesis process necessary for the formation of materials necessary for metabolic activities.

Conclusion

The nature of our country, the Kingdom of Saudi Arabia, lacks agricultural supplies and field experiments, and we especially mention crop plants such as (***coriander sativum***) This necessitated strenuous efforts to achieve self-sufficiency in agricultural crops, preserve available water resources from depletion and reduce material and human effort.
So, it was necessary for the light to emerge about therapeutic studies to contribute to limiting the aggravation of this problem and finding multiple methods to confront it, which gave our study on the effect of water stress and the water needs of crop plants, especially (***coriander sativum***) of the utmost importance, which revolves around germination and growth and determining the amount of water needed for plant growth

These experiences are very few in the Kingdom, especially field experiments, and we highly recommend conducting more of these experiments in the future, as these experiments will be a fundamental key in order to achieve self-sufficiency in food and the importance of vegetable crops.

Acknowledgments

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I thank Dr. Alae Jabbour for his cooperation with us and for providing full assistance in this project.
Thanks Teacher : Muhammad Nahhas, Teacher : Abed Al-liheby and Teacher : Mohammed Al- Zahrani for providing us all devices and tools.

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Title
Names
University

Graduation project poster

The study of water needs, diving, and drought pressure on seedling growth and some physiological aspects of (Zea mays) seeds

Name:. Emad salh Ali Al-Zahrani
Course Instructor : Dr Alae Ahmad Chakib Jabbour
Second Term - 1442 – 2021

Abstract

The effect of (immersion stress) on (**Zea mays**) was studied in four irrigation treatments: Water irrigation daily / Watering two days a week / Watering once a week / Watering half a week"

- **Daily irrigation :**

The growth rate was stellar very high during all growth factors.

- **Irrigation twice a week :**

The growth rate was good, and we notice a smaller increase from daily irrigation during all stages of the studied growth factors.

- **Irrigation once a week :**

We observe a significant decrease during the growth stage in all the studied growth factors.

- **Irrigation is half a time in The week :**

Symptoms of wilting appeared on the plant as a result of plant growth in an environment lacking water, and we notice a decrease during all stages of all studied growth parameters.

Introduction

Water sources in the world:
Surface water:
Surface water includes all forms of water bodies above the earth's surface; Such as streams, rivers, lakes, wetlands, and oceans, and it is reported that they cover 71% of the Earth's surface, and studies indicate that 99.7% of this water is found in the oceans and soil.
Ground Water
Ground water, which is obtained by drilling wells, is water located below the ground surface in pores and spaces in the rock, and is used by approximately 78%
The problem of water shortage in the world
The different water use sectors have contributed to increased water scarcity by increased water wastage through inefficiencies as well as pollution. Climate change has also attributed to water shortages and droughts in some areas and floods in others around the globe. , Current trends show that numerous water systems which sustain ecosystems, as well as growing human populations, have become stressed. Water sources are either being degraded by various types of pollution becoming unsuitable for use or have dried up .
Water sources in the Kingdom of Saudi Arabia:
One of the main reasons behind the water problem in the Kingdom of Saudi Arabia is its geographical location, where there are many dry desert areas.
Among the updated sources
1-Seawater desalination 2- Agricultural terraces 3- Surface water 4- Ground water
Source Water Protection
Source Water Protection is a planning process conducted by local water utilities, as well as regional or national government agencies, to protect drinking water sources from overuse and contamination. The process includes identification of water sources, assessment of known and potential threats of contamination, notification of the public, and steps to eliminate the contamination. The process is applicable to lakes, rivers and groundwater (aquifers)
Water Stress:
This map shows the average exposure of water users in each country to baseline water stress, and the ratio of total withdrawals to total renewable supply in a given area. A higher percentage means that more water users are competing for the limited water supply.
Water is a stressful factor for plants, whether in a state of deficiency (drought) or an increase in it, which is called flooding stress. Drought affects the growth and development of plants and all the physiological and metabolic processes that it performs, and this is related to its intensity, the time of its occurrence and the length of time it is exposed to .it
Seedling growth:
Seed germination
The first stage of plant growth is placing the seeds in suitable soil and covering them with compost. It is where the seeds begin to produce young shoots. Several environmental factors control this process, such as the depth at which the seeds are placed, the availability of water and heat, so that the water activates special proteins called "enzymes", and these enzymes are responsible for germination so that the seeds begin to germinate the roots under the ground, and then the plant begins to grow up and appear on the soil. And after the leaves are formed, they start to take advantage of the sun's rays and grow towards them, and this is known as the process of photosynthesis

Objective

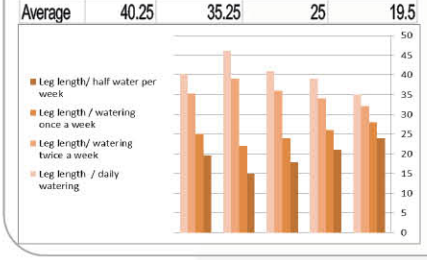
The study of water needs, diving, and drought pressure on seedling growth and some physiological aspects of it (**Zea mays**) seeds
It is the study of the effect of irrigation operations: daily, twice a week, once a week and half once a week on the different growth measures of (**Zea mays**).

Results

In the growth stages of Zea mays, we have noticed that the best growth stages are as follows:
In the number of leaves: We found in daily irrigation that the number of leaves is two long, dark green leaves and this is what distinguished it from various other irrigation treatments
Stem diameter: We found that the stem diameter in daily irrigation is much better than other irrigation parameters because it is thick and strong
Stem length: In daily irrigation, the length of the stem was very high, with some stems reaching only more than 45 cm
Root length: The length of the rootstock varies according to the different irrigation treatments, as the less water, the more expansion of the roots in the soil to find water
Ratio of root wet weight / stem shoots: We find that the diameter of the stalk of Zia Mace was highest in irrigation once a week and twice a week. There was an increase in stem diameter during the growth stages
Root dry weight ratio / stem shoots: Zea mays yielded the highest irrigation results once per week and twice per week. Where there was an increase during the growth stages significantly
Juice: Zea Mays had higher results on irrigation once a week and twice a week. Where he was there during the growth stages
Dry matter content: Zea mays were highest at watering once a week and twice a week. Where it was present during the growth stages (during the four stages during the four seasons)



Harvest nu	Leg length	Leg length/ wa	Leg length / w	Leg length/ hal
The first ha	35	32	28	24
The secon	39	34	26	21
The third h	41	36	24	18
Fourth Har	46	39	22	15
Average	40.25	35.25	25	19.5





We found that the plant root length ranking (Zea mays) was highest for watering once per week and twice per week. An increase in stem length occurred during the growth stages (during the four weeks during the four seasons), where the average stem length in daily irrigation was (40.25). Then, in second place, irrigation was carried out twice a week, with average leg lengths (35.25). And in the third place, irrigation was carried out once a week, with
the average leg lengths being (25). Finally, they were fed half a week.
Average leg length was (19.5)

Discussion

Scientific discussion:.
Daily watering treatment (immersion)
Where the plant growth was normal growth and the plant did not fall under any stress with continuous growth and increase in the length of the plant, the color of the plant and its roots branching out more and faster .
Irrigation treatment twice a week :
Natural plant growth without falling under water stress, as it is considered moderate and appropriate irrigation without damaging the plant .
Irrigation treatment once a week :
Irrigation affects once a week on the plant as it makes the plants compete for food and they are very weak, which affects the growth of plants completely and may lead to the death of the plant quickly
In the fourth treatment, half an irrigation:
Slow growth of the plant in the germination stage, but the death of the plant is faster than before with severe plant .weakness and very high water stress

Conclusion

Conclusion:

Through the study that we conducted (water stress on plants) it became clear to us that the best irrigation of (Zea mays) is daily irrigation, and Saudi Arabia is considered one of the countries that are greatly exposed to depletion in water resources. Wells and natural groundwater
(Zea mays) is a type of plant, and it is the third most important crop in the world after wheat and rice, and its original home is southern Mexico and Guatemala, and the American Indians used it as a source of flour
Corn is a perennial herbaria more than 2 meters high. It is a monoecious plant with separate male and female flowers
Economic importance:
It is considered one of the important food and fodder crops for its use in feeding the livestock sector as grains with concentrates or as green fodder and in the manufacture of silage. Brooms or canisters. Perhaps its importance for the Arab world lies in its tolerance of drought, and its cultivation in areas with limited rainfall
The importance of corn for humans :
Corn has many benefits for the body, including preventing heart disease, reducing blood pressure, stimulating nerve .cells in the brain, in addition to containing high calories and many important vitamins and minerals .

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Effect of smoke on fenugreek (*Trigonella foenum-graecum*) seeds germination

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Abstract

The effect of smoke on fenugreek germination, in all cases, this smoke was found to significantly delay the rate of germination. Moreover, the smoke delayed the levels of certain enzymes known to be important in the germination of these seeds. And we'll talk about the differences that occurred in the experiment with the pictures of the changes. In this paper we will know the effect of smoke on fenugreek seeds in terms of germination as the seeds were treated with smoke for different periods Time: 0 control, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 minutes, and 30 minutes. Then the seeds were grown in dishes containing sandy soil and other dishes containing sandy soil with ashes at a rate of 1/5, and the results of germination were shown with sand The highest germination rate is 80%, which is when exposed to smoke for 0 (control) and the lowest germination rate is 18%, and this is when exposed to smoke for 20 minutes. The longest root length is 14.5cm and the longest shoot length is 9.5cm which is when exposed to smoke for 5 minutes and the shortest root length is 12.5 cm and the shortest shoot length is 7 cm when smoke for 30 minutes. The highest value for fresh weight is 0.20g and dry weight is 0.09g when exposed to smoke for 25 minutes. And the lowest value for fresh weight is 0.14g and dry weight is 0.3g when exposed to smoke for 30 minutes. Sandy soils with ash recorded the highest 80% germination rate and this is in the control sample. The lowest germination rate is 14% upon exposure to smoke for 15 minutes. The highest value for fresh weight is 0.19g and dry weight is 0.09g when exposed to smoke for 20 minutes. And the Lowest value for fresh weight is 0.12g and dry weight is 0.02g when exposed to smoke for 5 minutes.

Introduction

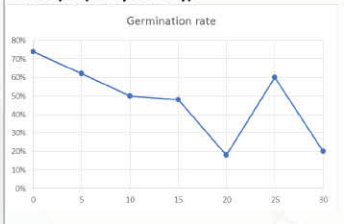
The role of fire-related cues (smoke and heat) in alterations of ecosystem prop-erties in fire-prone areas such as chaparral, fynbos, kwongan or matorral, in Aus-tralia, both Americas and Africa is obvious (Roche et al. 1997.[1] In the life cycle of a plant, a seed represents the termination of the last generation as well as the beginning of a new generation. As the connection between generations, seeds pass along genetic information and maintain each species' characteristics. Ideally seeds should germinate immediately after ripening to maximize reproduction (Baskin & Baskin 1998, Fenner & Thompson 2005). However, ideal germination conditions may not be common, since seed germination is influenced by various environmental factors.[2]The seed germination process is controlled by many external environmental factors, such as light, temperature, and moisture, as well as by internal growth regulators, such as gibberellins (GAs), abscisic acid (ABA), and the GAs to ABA ratio [20, 21, and 22]. Gibberellin and abscisic acid control seed germination and dormancy initiation by stimulating the synthesis and production of α-amylase during seed germination. The role of smoke-water is also important in the production of plant hormones during seed germination. Cembrowska-Lech and Kepczynski reported that smoke-water influenced several biochemical processes, such as the activity of α amylases and β-tublin accumulation in dormant seeds of Avena fatua L. In addition, the active compound of smoke-water reduced the ABA level and regulated GA during Arabidopsis seed germination. [3]
Although some previous studies have shown that the smoke can be prepared from all plant species, and that their effect is similar on seed germination, Smith et al. reported that there may be thousands of unknown compounds in smoke, and that the positive effects of smoke on seed germination may depend on the plant species. [4]To the best of our knowledge, most studies on the impact of smoke- on seed germination have been conducted on the Arabidopsis plant and fire-following species. Additionally, most studies investigating the positive effects of smoke on seed germination have been conducted on native species of Australia [5].

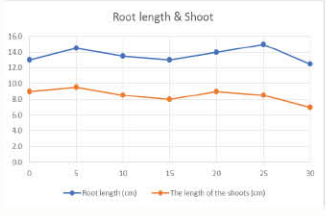
Objective

Study of the effect of smoke on fenugreek seeds germination.

Results

Group A (Sandy soil only):









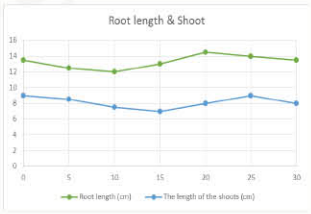
highest germination rate



lowest germination rate

Group B (sandy soil with ash).









highest germination rate



lowest germination rate

Discussion

When experimenting with the effect of smoke on seed germination, it became clear to us that the highest percentage of germination was in the treatment of sand only, at a rate of 74%, and also the lowest rate of germination was in the treatment of 16%, as for the other treatment, which was the effect of smoke on the seeds and adding ash with sand at a rate of 1/5. We notice the highest rate of germination of 80% and the lowest rate of germination of 14%, and this indicates that there is an effect on the seeds by ash. Smoke has shown positive results on Fenugreek in terms of seed germination and plant development due to the fact that smoke has an impact on the absorption of water in seed germination by increasing the number and size of permeability [5]. Light et al. (2009) reported that smoke from burning plant material stimulated seed germination of numerous species worldwide. Thus, smoke-water may be acting on the seed coat in a way similar to scarification, by which the dormant embryo may more efficiently imbibe water and uptake oxygen (Egerton-Warburton, 1998) [6].
An important component of biomass smoke is ethylene, a chemical cue known to stimulate the germination of seed. The action of ethylene includes promoting radial cell expansion, increasing seed respiration, and promoting endosperm to rupture (Kucera et al., 2005)[7].

Conclusion

The seeds of fenugreek were selected for study and the effect of smoke on them. The seeds were planted in two different factors, the first of them was only sand, and we note that the germination percentage was good and close to each other, while we planted it with sand and ash, and the germination rate of the seeds was good and this indicates that the seeds are affected by smoke. And the ashes in the sand, the germination rate reached 80%, and it was the highest percentage among others, and this indicates the effect of smoke on fenugreek seeds.

Acknowledgments

We thank everyone who contributed and helped complete our research project, in the forefront of which is Dr. Muhammad Al-Buqami and Dr. Mustafa Qutb for supervising our research project, teaching us the basics of scientific research, helping him write the correct scientific research and helping him choose the appropriate seeds.

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Applications and advances of CRISPR-Cas9 in genetic disorder and infectious disease

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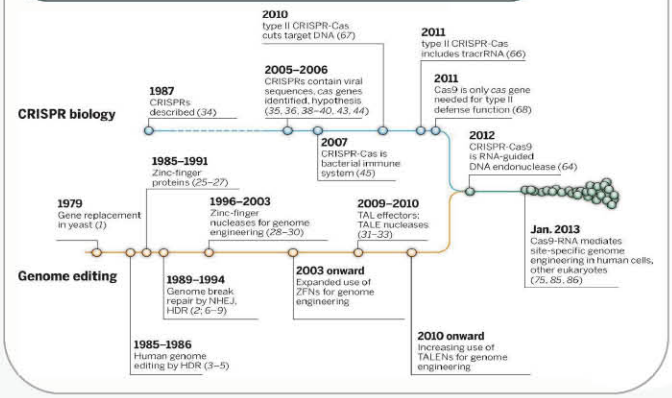
Abstract

CRISPR (clustered regularly interspaced palindromic repeat) technology was adapted from the natural defense mechanisms of bacteria and archaea (the domain of single-celled microorganisms). CRISPR technology is a simple powerful tool for editing genomes. It allows researchers to easily alter DNA sequences and modify gene function. Its many potential applications include correcting genetic defects, treating and preventing the spread of diseases and improving crops. However, its promise also raises ethical concerns. In popular usage. "CRISPR" is shorthand for "CRISPR-Cas9. These organisms use CRISPR-derived RNA and various Cas proteins, including Cas9, to foil attacks by viruses and other foreign bodies. They do so primarily by chopping up and destroying the DNA of a foreign invader. CRISPRs are specialized stretches of DNA. In this literature review, we present a brief history and focus on the applications and advances of CRISPR-Cas9 in progression of cancers, infectious diseases and genetic disorder which responsible for the inherited disorders.

Introduction

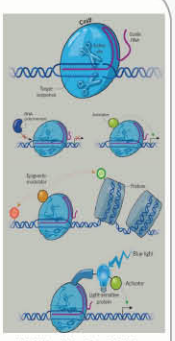
CRISPR is the set of molecular scissors that is changing the world. It is an enzyme that cuts DNA, and scientists figured out in 2012 that they could deploy it for cheap, effective gene editing: Just tag the CRISPR molecule with a bit of RNA (a slim sliver of genetic material that sticks to DNA) to guide it, and it can cut out and "rewrite" any snippet of DNA its wielders would like to target. Researchers have been playing with CRISPR for years, tackling HIV, deleting genetic diseases from the cells of experimental human embryos, and raising the possibility of cross-species organ transplants. Some scientists are even seriously talking about resurrecting the long-extinct woolly mammoth with CRISPR's help.

History and biology of CRISPR CAS system



Functionality

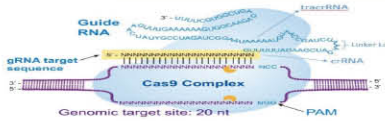
CRISPR sequences are an adaptive immune method that prokaryotes such as bacteria use when they survive a viral attack, they incorporate extracts of the virus's DNA into their genomes.
If the virus attacks again, will destroy it with the help of the cas9 protein.
The CRISPR-Cas9 system consists of two main components: the enzyme Cas9, which is like a molecular scissor that cuts DNA, and a small molecule of RNA.
The CRISPR-Cas9 enzyme is broken so it cannot cut DNA, but with a suitable vector RAN, it can bind to a specific part of the genome.
CRISPR inhibiting the dead Cas9 enzyme prevents the binding of proteins needed for gene expression or CRISPR activating enables the activated protein to bind to the dead Cas9 protein and that stimulate specific gene expression Cas9, whether dead or alive, can be linked with switches that can be controlled by some chemicals.



HACKING CRISPRCAS9

Mechanism

The guide RNA consists of two RNA molecules; (crRNA) and (tracrRNA) which act together to target a specific genome sequence and interact with the Cas9 nuclease. A linker loop, facilitates the implementation of gene editing strategies. The CRISPR/Cas9 complex recognizes a protospacer adjacent motif (PAM). The PAM is critical for initial DNA binding. The phosphodiester group at position +1 in the target DNA strand interacts with the minor groove of the duplexed PAM, possibly resulting in local strand separation, the so-called R-loop, immediately upstream of the PAM. Target DNA melting starts at the level of PAM recognition, resulting in directional R-loop formation expanding toward the distal protospacer end and concomitant RNA strand invasion and RNA-DNA hybrid formation.



Evolution and structure of Cas9. The structure of S. pyogenes Cas9 in the unliganded and RNA-DNA–bound forms.

Application

CRISPR applicationsCRISPR used to investigate target genes in genome modification splicing, transcription and epigenetic regulation. They have been applied in a research setting to investigate and treat genetic diseases, infectious diseases, cancers, and immuno-logical diseases. The translational use of CRISPR/Cas in monogenic human genetic diseases has the potential to provide long-term therapy after a single treatment. We summarize the recent applications of the CRISPR/Cas system in the generation of disease models and in the treatment of genetic diseases *in vitro* and *in vivo* that has been widely used in generating cell models for diseases, such as Inherited eye disease, Muscular genetic disease, Genetic liver disease, Congenital genetic lung disease, Hemoglobinopathies.

Conclusion

Interest in the field of CRISPR-Cas has rapidly increased in recent years. Numerous studies shed light onto the underlying genetic and biochemical processes of the adaptive prokaryotic immune system thus revealing its potential in modern medicine. The CRISPR/Cas9 system makes genome engineering technology feasible for application in many fields including human diseases. The technology has enabled efficient targeted modification of crops and is currently being developed to treat and cure genetic diseases. It should be emphasised that the power of the CRISPR-Cas9 technology also raises serious ethical and societal issues. It is of utmost importance that the technology is carefully regulated and used in responsible manner.

Acknowledgments

Praise be to Allah who blessed us to complete this research. The prophet, peace be upon him, said, "Who does not thanks people does not thanks Allah". We would like to thank our families who encouraged and helped us during all these years at the university, And our thanks goes to our lecturers, especially Dr. Maryam Thabit, for the help and support she gave us to complete this research.

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Effect of salinity on seed development in *Ocimum basilicum* (The Paradis Plant)

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Abstract

Salinity is one of the most common environmental problems in arid and semi-arid regions. It is an abiotic stress factor that limits crop production and affects plant growth, one of these plants is sweet basil (*Ocimum basilicum)* which is an annual medicinal and aromatic plant from the Lamiaceae family. Sweet basil leaves are a good spice by grinding, drying and adding them to foods. Sweet basil essential oil is used in perfumery, as the essential oil is extracted from the leaves and tops of flowers by steam distillation. The aim of this study is observation the effect of salt stress on seed germination and development of sweet basil. Also, an estimate of changes in oil content in sweet basil under different salt concentrations. Among the negative effects of salinity is a significant decrease in both, the growth of sweet basil seeds and essential oils content.

Introduction

Sweet basil is an annual aromatic herb belongs to dicot family Lamiaceae, genus *Ocimum* and species *basilicum* (Noor *et al.*, 2019). The name Basil comes from the Greek word Basileus, which means 'king' due to the royal fragrance of this herb (Grieve, 1931). The calyx has two lips, the upper lip is usually broad. The corolla also has two lips with a longer lower lip white or violet in colour (Nassar *et al.*, 2013). Sweet basil leaves have two specialized glands trichomes, Peltate and Capitate glands. Each peltate gland consists of four secretory cells that form a disc. The secretory disc cells expand as the gland grows and becomes completely inflated as it fills with the essential oil constituents (Fig.1) (Gang *et al.*, 2001). Sweet basil leaves are contain between 0.5 and 1.5% essential oils, which are complex mixtures of biological active substances with beneficial to humans (Cruz *et al.*, 2020). Three major components in sweet basil commonly: linalool (7–59%) which showed wide range of biological activities such as sedative and stress relief, estragole (5–29%) it is sweet, herbaceous anise fennel type odor used in fragrance compositions, and eugenol (2–12%) it is used in perfumeries and flavorings (Preedy, 2016) (Table 1). The factors that affect the growth of sweet basil plant are divided into two factors, biotic factors such as Fusarium fungus that causes Fusarium wilt disease and abiotic factors including low temperature and salinity.

Table (1): Chemical composition of essential oils of *Ocimum basilicum* in different places (Pandey *et al.*,2014).

Plant species	Major constituents (%)	Place
O. basilicum	Methyl chavicol (70.00%), Linalool (25.00%), Eugenol (5.00%)	Um Rnaba
O. basilicum	Linalool (45.70%), Eugenol (13.40%), Methyl eugenol (9.57%), Fenchyl alcohol (3.64%)	Turkey
O. basilicum	Limonene (10.40%), Linalool (50.80%).	Western provinces of Cameroon
O. basilicum	Linalool (44.18%), 1,8-Cineole (13.65%), Eugenol (8.59%)	Egypt

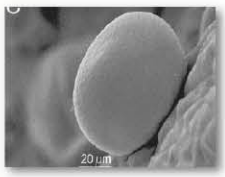

Fig.(1): SEM Side view of a fully expanded peltate gland (Gang *et al.*, 2001).

Objective

- **Comparing the effects of different salt concentrations on seed germination of sweet basil.**
- **Estimating the changes in oil content of sweet basil under different salt concentrations.**

Results

According to Çamlıca and Yaldız (2017) Germination rate were measured at the end of the germination periods. The germination varied from 3 to 14 days and the highest germination obtained from the control applications followed by the others (Çamlıca and Yaldız, 2017).

Table (2): Number on germination seeds in sweet basil (Çamlıca and Yaldız, 2017).

Doses (mM)	Number of Germinating seed	Doses (mM)	Number of Germinating seed
0	19.67^{a}	140	17.00^{bc}
20	19.33^{ab}	160	16.67^{c}
40	19.00^{abc}	180	16.67^{c}
60	18.33^{abc}	200	13.00^{d}
80	18.33^{abc}	220	7.33^{e}
100	17.33^{abc}	240	3.33^{f}
120	17.33^{abc}		



Fig.(2): Germination seeds on sweet basil.

Keramati *et al.* (2016) showed the difference in sweet basil oil content and essential oil yield (Table 3).

Table (3): Effect of salt stress on sweet basil essential oil content (Keramati *et al.*, 2016).

Salinity (dS m^{-1} NaCl)	Essential oil content (%)	Essential oil yield (L ha^{-1})
0	0.846b	17.629a
3	0.869a	14.313b
6	0.778c	10.699c
9	0.405d	4.689d



Fig.(3): Oil extraction of sweet basil leaves.

Discussion

According to Çamlıca and Yaldız (2017) the results indicated that salinity doses had a significant effect on the measured traits salt stress caused significant decrease in germination of sweet basil seeds. This decrease started after 40mM salinity dose. The germination stopped at 240 mM salinity dose (Table 2). The Keramati *et al.* (2016) study show that sweet basil essential oil content and essential oil yield decreased significantly with salinity increase (Table 3). However, there was a slight increase (3% compared to the control) in essential oil content when sweet basil plant were subjected to moderate salinity stress 3 dS m^{-1} NaCl. Compared to the control, 8% reduction was recorded in essential oil content when salinity was increased to 6 dS m^{-1}. This decline was more noticeable when salinity reached to 9 dS m^{-1} and almost decreased to the half (52% reduction) (Keramati *et al.*, 2016).

Conclusion

Application of NaCl from 0-240 mM had significantly effect on sweet basil seed germination. Highest germination rate was seen under control condition and followed by 20 mM salt dose. Depending on the increased salt levels, germination were decreased. Sweet basil essential oil content and essential oil yield decreased significantly with salinity increase.

Acknowledgments

First of all, we thank God for the good health and all the blessings that he has granted to us and the strength to complete this work. With all our feelings of gratitude, we express our gratitude to Dr. Maha Al-Jabri for her initiative, endurance and criticism of the construction, her constant monitoring of us, and the preparation of this research. We also thank everyone who supported us in completing this valuable research, vice president of the Department of Biology at Umm Al-Qura University Female Section Dr. Widad Al-Juhani, Dr. Heba Mujahid, Dr. Muna Al-Maliki, and we thank Dr. Hassan Al-Zahrani and Dr. Nouf Asiri from King Abdulaziz University. Finally, we would like to thank our generous self for completing this research to the fullest.

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The effectiveness of toxins in some invertebrate animals

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Supervisor-*Dr. Maryam Alghamdi*

Abstract

This research aims to explain wasp venom toxins and its medical applications, Wasp venom contains mixture of various bioactive compounds of diverse nature and function. It contains consist of few peptides' certain elements, acids, amines, As antimicrobial resistance spreads throughout the globe, new substances will always be necessary to fight against multidrug-resistant microorganisms. Venoms of wasps and Venoms of many animals have recently gained attention in the search for new antimicrobials to treat infectious diseases, and Also Results revealed that the venom markedly inhibits the cancer cells and could be considered a potential source for developing new drugs.

Introduction

The stinger in wasps:

Wasp venom is produced inside a venom gland, then stored in a venom sack. It seeps out through valves to coat a smooth, barbless stinger. The wasp keeps this little weapon stored inside a sheath, The males don't have stinger.

How are wasps different from bees?

In behavior, wasps are more aggressive in nature compared to bees. And wasps can sting several times, whereas a bee can sting only once,This is due to the stinger , sharp and flat in wasps, and serrated in bees.

Components present in the wasp venom:

Wasp venom components are generally categorized as:

a) High molecular weight proteins includes phospholipases etc .

b) Low molecular weight peptides includes mastoparans etc .

c) Bioactive molecules such as histamine , serotonin etc .

Some applications of Wasp venom:

Wasp venom also contains some peptides, which are antimicrobial and anticancer in nature and may act like antibiotics, used as good pest control agents, also used as invaluable tools in neuropharmacology.

Objective

I highlight the benefits of using wasp venom in medical and pharmaceutical applications in general and treating some diseases ,cancers and Microbial resistance in particular.

Results

The scientist proved (Jafar *et al.*, 2014) In vitro antibacterial effect of wasp (*Vespa orientalis*) venom.

Vespa orientalis crude venom displayed a significant effect against different gram-positive and gram-negative bacterial strains emplyed in this study. The corresponding MICs of the crude venom were respectively found to be 64, 8, 64 and 128 µg/mL using the conventional microdilution method (Figure 1 and Table 1).

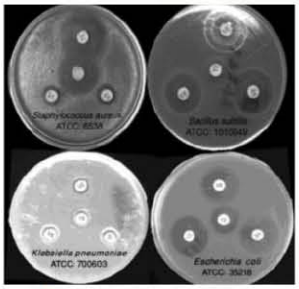

Figure 1 Inhibitory effect of *Vespa orientalis* (VE: venom extract, 30 µg/disc) on the growth of different bacterial strains compared with tetracycline (TE: tetracycline, 30 µg/disc).

Table 1 Inhibitory effect of *Vespa orientalis* crude venom on different strains of bacteria

Microorganisms	Inhibition zone[1] (mm)		MIC[2] (µL/mL)	
	Venom	Tetracycline	Venom	Tetracycline
S. aureus	12.6 ± 0.31[3]	28.1 ± 0.64	64	0.125
B. subtilis	22.7 ± 0.62	18.9 ± 0.14	8	0.125
E. coli	22.4 ± 0.68	19.3 ± 1.75	64	0.5
K. pneumonia	10.2 ± 0.12	12.1 ± 0.13	128	1

Discussion

The crude venom exhibited activity against both gram-positive and gram-negative bacteria and the MICs obtained in microbroth kinetic system were similar to those found using conventional broth microdilution method. A shorter incubation period was required in the former technique and percentages of growth inhibition were also measurable.

Conclusion

All tested bacterial strains were found to be susceptible to the venom and among them, *B. subtilis* was the most sensitive. In addition, the present findings indicate that the crude venom is more effective against gram-positive than gram-negative bacteria.

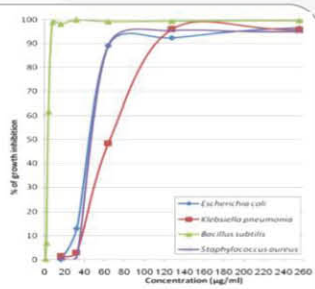

Figure 2 Inhibitory effect of various concentrations of *Vespa orientalis* crude venom on the growth of different bacterial strains.

Acknowledgments

I would like to start by thanking God Almighty for granting me the power and effort to complete this research. Second, I express my deep thanks and gratitude to my supervisor, Dr. Maryam Al-Ghamdi, for her efforts and continuous follow-up during my writing of this research, and for her contribution to the suggestions and valuable comments. Also, I would like to thank my family, one by one, for as long as they have been the best support for me in every step of my studies, their support and encouragement for me throughout this studying period won't be forgotten.

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Progress Towards the Digitization of Umm Al-QuraUniversity Herbarium, Alzahir Campus

Renad Hosni Alfattni -Rahaf Turki Banah- Nouf Mosfir Aljmeeli- Sara Mohammed Alzahrani- Haneen Shafeq Labban - Lama Ibrahim Almahmoud.

Supervised By: Dr. Samah Abdullah Alharbi.
Umm Al-Qura University, Department of Biology

Abstract

The inventory of the Umm Al-Qura University Herbarium, Alzahir Campus, reveals that the herbarium includes 175 vascular plant species belongs to 29 families and 121 genera. This represents 95% of the species recorded in Makkah city.A preliminary website portal for the herbarium was created on Scratchpad under the name UQU herbarium (http://mlh.myspecies.info/).

Introduction

Herbarium collections are a one-of-a-kind record of our world's biodiversity and natural history accumulated over centuries. Herbarium digitization is the process of converting analogue to digital signals of specimen data and electronic biodiversity documentation. A digital herbaria database is a novel computational method in which information from herbarium specimens is stored and made easily accessible to taxonomists. In Saudi Arabia, many universities and research centers are interested in plants, both collecting and preserving them and the herbarium at Umm Al-Qura University Alzahir Campus has about 1500 specimens and is classified as a teaching herbarium.

Objective

This project aims to

- inventory the herbarium
- use digital technology to make the data contained in herbarium collections easily accessible online for research and teaching purposes.

Method

2.1 Data collection

The herbarium was inventoried

2.2 Developing a web portal on scratchpad

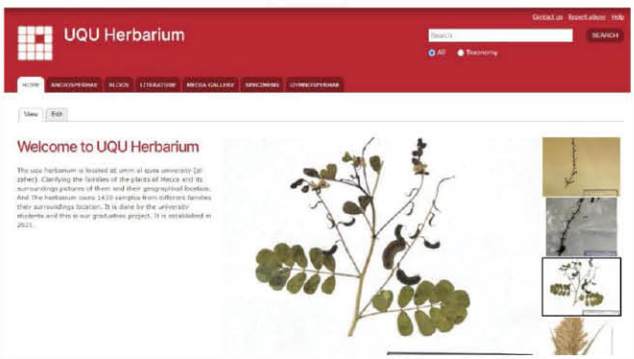

Figure1. The home page for the UQU Herbarium website http://mlh.myspecies.info/).

The label information of 188 specimens of Fabaceae were uploaded to the website

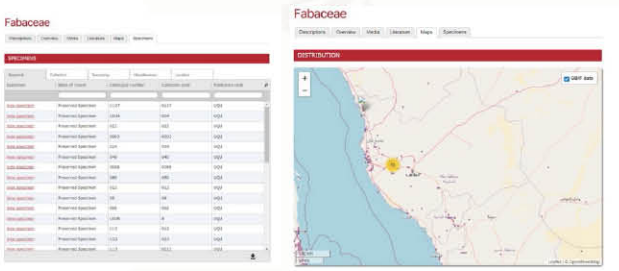

Figure 2. label data and distribution map of Fabaceae specimens

Results

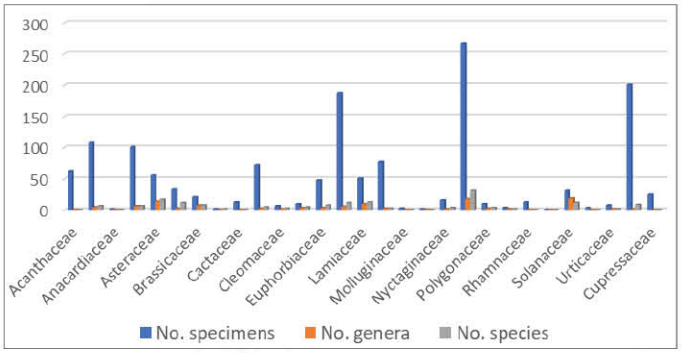

Figure 3. Families represented in the Umm Al-Qura University Herbarium, Alzahir Campus

Table 1. Largest six plant families represented in the Umm Al-Qura University Herbarium, Alzahir Campus

NO.	Name	Species
1	Poaceae	31
2	Asteraceae	17
3	Lamiaceae	13
4	Fabaceae	12
5	Boraginaceae	12
6	Solanaceae	12

Conclusion

- The Umm Al-Qura University Herbarium, Alzahir campus harbor valuable plant collection, which serve as standards for identifying the correct name for holy Makkah plants and allowing for effective education of Saudi Arabia's vegetation.
- We recommend that the digitization project be continued and that the herbarium's entire collection be digitized.

Acknowledgments

We would like to express our gratitude to Dr. Samah Alharbi, who accompanied us on our journey to the completion of this research and left a lasting impression through her positive encouragement, critique, and support.

References

Dietary Fibres as a new natural source of antioxidant compounds extracted from melon by-products

Shahad Al-Qurashi, Ruba al-asmari, Abeer shraheli, Mashael Al-maliki,Renad Al-hazmi, Raghad Al-sharif

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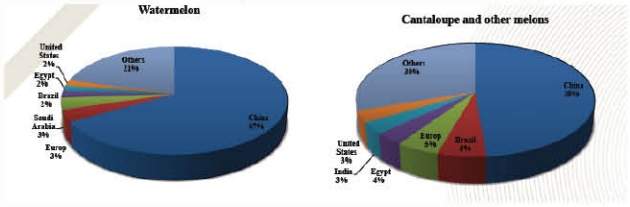
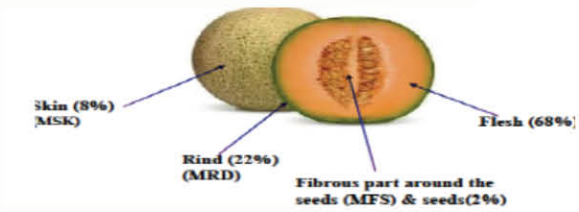
Introduction

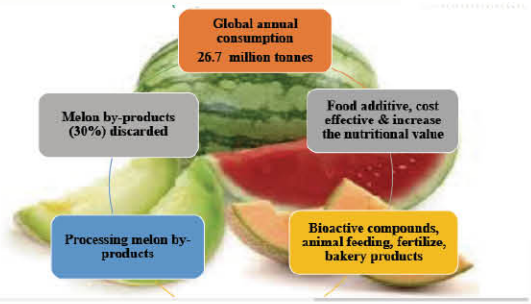
Melons belong to the family Cucurbitaceae, which are edible fleshy fruits. They are a commercially important crop in many countries, being cultivated in all temperate regions of the world, in part due to their good adaptation to soil and climate (Villanueva et al., 2004). The largest importers of melons are the Asia, Middle East, and Saudi Arabia, where the cantaloupes being more favoured by consumers in these markets. Melon consumption continues to grow annually (Thornsbury, 2014). The pulp or flesh part of melons is fibrous and juicy with a particular aromatic flavour and strong smell; the fruit pulp can be consumed fresh while the skin, rind, and the fibrous or netting part around the seed are mostly discarded.

Melon World Production

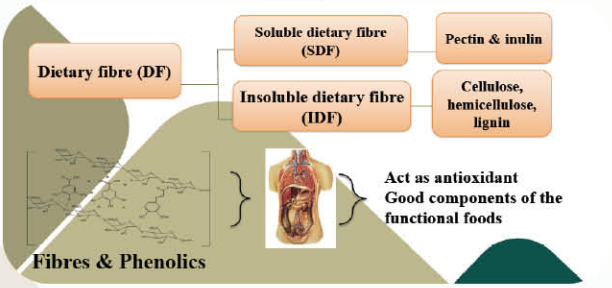




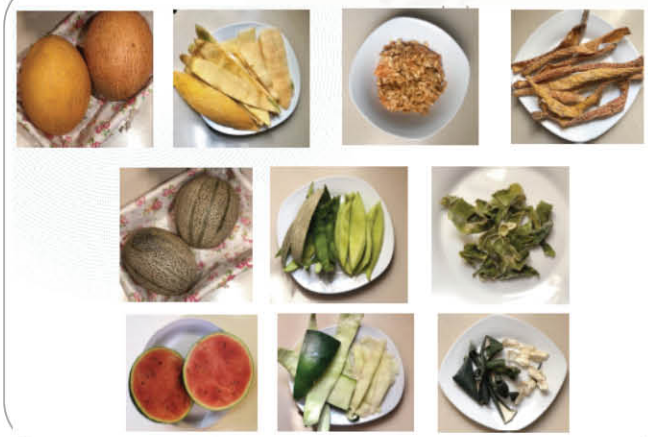
Why Melons by-products?



Bioactive compounds in melons



Material



Methods

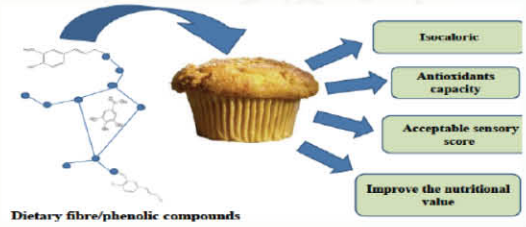
Melon skin (MSK) AND Rind (MRD) after spread in trays, it has been dried from 24 to 72 h, then were grounded to a fine powder. Then the powder was incorporated into the muffin at levels of 2.5 and 5%)

Ingredients	Control	MSK, MRD & MFS (2.5%)	MSK, MRD & MFS (5%)
Wheat flour (g)	65	63.375	61.75
MSK, MRD & MFS powder(g)	-	1.625	3.25
Sugar (g)	37.5	37.5	37.5
Baking powder (g)	3	3	3
Salt (g)	0.615	0.615	0.615
Milk (mL)	60	60	60
Egg (small)	1	1	1
Canola oil (mL)	20	20	20
Number of muffins	3	3	3

MSK: Melon skin; MRD: melon rind; MFS: Fibrous part around the seeds

Conclusion

Dietary fibres with associated phenolic compounds from melon by-products have not yet been studied and available data are fragmentary and dispersed; accordingly, this study will optimize their procurement and subsequent value-added use. It will also fill the existing knowledge gap about the role of antioxidants and dietary fibre that will be extracted from melon by-products. Thus, this study will provide value-added melon by-products and as a cost effective source of natural food ingredients.



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Chemopreventive Effect of Sulforaphane (SFN) in Human Stomach Adenocarcinoma

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Abstract

Sulforaphane (SFN) extracted from broccoli sprouts has previously been examined for its potential properties in carcinomas, however, the basic mechanisms of anti-cancer activity in SFN are still not fully understood. This study focuses on the effects of SFN on gastric cancer (GC), by using MTT assay, fluorescence microscope and flow cytometry analysis. The results showed that SFN can significantly impair the ability to form colony and inhibited cell viability. SFN induced apoptosis in GC cells in a dose-dependent manner; indicating that SFN has a potential therapeutic application in the treatment and prevention of GC.

Introduction

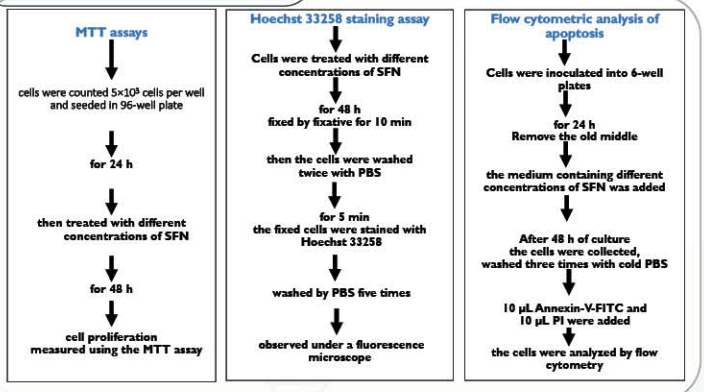


Sulforaphane (SFN) is a naturally occurring isothiocyanate and widely distributed in brassica plants. It is obtained from cruciferous vegetables such as broccoli, Brussels sprouts or cabbages. Isothiocyanate found in nature and are of interest in food science and medicine. Vegetable foods with characteristic flavours due to isothiocynates include wasabi, mustard and capers. It has long been known that the consumption of green and yellow vegetables, especially crucifers, is associated with a lower cancer risk. Ability to induce phase II detoxification enzymes, such as glutathione S-transferase and quinone reductase.

Table1:- summary of the in vitro studies investigating the effect of sulforaphane on chronic disease

DISEASE	PROPOSED MECHANISM OF SFN EFFECT
Cancers (lungs - blooder – breast - prostate - non-hodgkin's lymphoma).	1-Modulation of drug metabolizing enzymes (DME). 2- Induction apoptosis. 3-Induction of cell cycle arrest . 4-Anti-inflammatory.
Kidney diseases	Nuclear factor erythroid-derived-2 (Nrf-2) mediated induction of phase 2 enzymes .
Diabetes	1-Reduction of oxidative stress . 2- Restoration of endothelial function. 3-Activation of Nuclear factor erythroid-derived-2 (Nrf2).
Ocular disorder (retinitis pigmentosa)	1- Upregulation of retinal thiredoxin (Trx), thioredoxin reductase (TrxR). 2- Nuclear factor erythroid-derived-2 (Nrf-2) Upregulation of retinal glutathione (GSH) and quinine reductase (QR).
Respiratory disease	Upregulation of glutathione-S-transferases (GST) and quinine reductase (QR) in the airway epithelial cells
Neurodegenerative disorders (parkinson's disease - stroke – Alzheimer's disease)	1- Inhibition of acetyl cholinesterase. 2- upregulation of antioxidant gene expression.
Cardiovascular disorders (oxidative stress plays – atherosclerosis - myocardial ischemia -chemical-induced cardiac toxicity)	Nuclear factor erythroid-derived-2 (Nrf-2) mediated reduction in the pro-inflammatory state.
gastric diseases	Nuclear factor erythroid-derived-2 (Nrf-2) dependent eradication of H. pylori

Method



Results

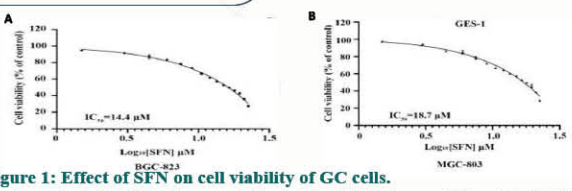


Figure 1: Effect of SFN on cell viability of GC cells.

As shown in A & B, MTT assays indicated that SFN decreased the cell viability in GC cells. The cell viability of BGC-823 (A) and MGC-803 (B) cells were measured by MTT assay after treated with different concentrations of SFN for 48 h, and the IC_{50} values of BGC-823, MGC-803 and GES-1 cells were 14.4 and 18.7 μM, respectively.

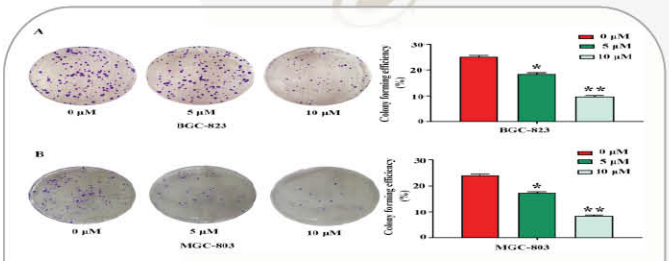


Figure 2: SFN inhibits colony formation of GC cells.

The colony formation assay (A & B) shows that SFN induced a dose-dependent decrease in colony formation efficiency in the BGC- 823 and MGC-803 cell lines.

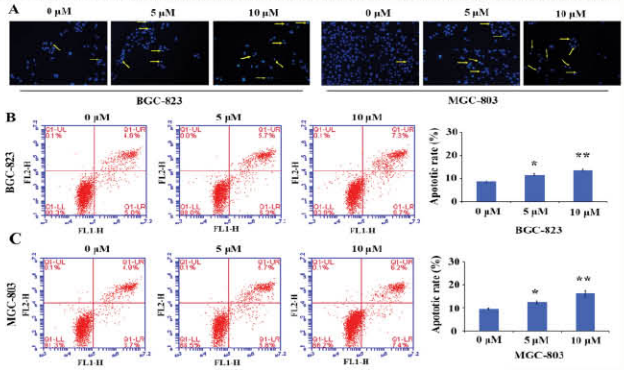


Figure 3: SFN induces apoptosis in GC cells

Hoechst staining (A) shows that SFN obviously induced GC cells apoptosis, after treatment with 5 and 10 μM of SFN for 48 h, some typical apoptosis-related morphological changes such as nuclear shrinkage and nuclear condensation were observed in BGC-823 and MGC-803 cells. The apoptosis rate in BGC-823 (B) and MGC-803 (C); cells treated with different concentration of SFN for 48 h was detected by flow cytometry after Annexin V/PI double staining. The apoptosis rate was calculated and depicted in a bar chart, and the values indicate the mean ± SD for three separate experiments, the statistical values were determined by Student's t-test, *P < 0.05, **P < 0.01.

Conclusion

In conclusion, this study found that SFN inhibited cell viability, inhibited colony formation and induced apoptosis in BGC-823 and MGC-803. Indicated that SFN plays a major role as a potential drug for clinical applications in GC.

Acknowledgments

First and foremost, we thank God for his immeasurable grace and for giving us the ability to complete this work successfully. We would like to express our sincere gratitude to our Supervisor, Dr. Maryam Thabit, for her continuous support and valuable advice.

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Towards an updated checklist of endemic flora of the south-western region of Saudi Arabia

Wed Saeed Al-Haij ,Shahad Abdulrhman Al-Amoudi ,Shatha Khaled Al-Rehaily , Mona Ateeq Al-Huthali ,Shoroug Masry Al-Otaibi

Supervisor by :
Dr. Samah Abdullah Alharbi

Abstract

The updated checklist of endemic flora of the south-western region of Saudi Arabia prepared in this project includes 38 species distributed in 27 genera and 20 families, with information on their occurrence at the local level.

Introduction

The Southwestern region of Saudi Arabia is a centre of plant diversity, harbour a great portion of the country's endemic species. However, knowledge of endemic taxa in this region are fragmentary, and it appears that some of these species are being severely threatened. Over the past two decades, plant taxonomy has advanced substantially due to the use of molecular and computational techniques. So, updating the endemic flora of Saudi Arabia based on current taxonomic opinion will allow it to have more value for conservation assessment.

Objective

The aim of this report is to

1. Provide an updated inventory of the endemic angiosperm flora of southwestern region of saudi arabia.
2. Emphasize the importance of setting conservation goals and ensuring the long-term survival of saudi arabia's endemic plants.

Methods

2.1 Study area

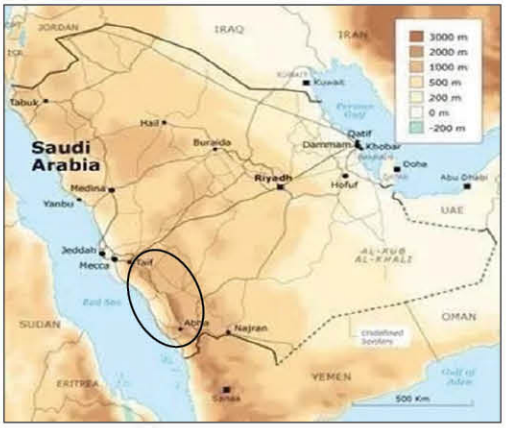

Figure 1. Map of Saudi Arabia showing the study area.

2.2 Data collection

1. All available literature on vegetation in the south-western region was the basic source of information used.
2. To ensure the endemism status of the targeted species to Saudi Arabia, Plants of the World Online portal (POWO) was used.

2.3 Updating nomenclature and taxonomic circumscription

1. Angiosperm Phylogeny Group used to re-circumscribe families
2. To check the currently accepted name of plants POWO was used.

2.4 International Union for Conservation of Nature (IUCN) Global Conservation Status

The global conservation status of the species was checked against the IUCN Red List of Threatened Species (https://www.iucnredlist.org/).

Results

- There are 38 endemic species belong to 27 genera and 20 families.
- 5.2 %. has changed names
- The endemic species occur in Asir region, Al-Baha, Jizan, Najran mainly in the mountainous areas.
- None of these species have yet been assessed for the IUCN Red List.

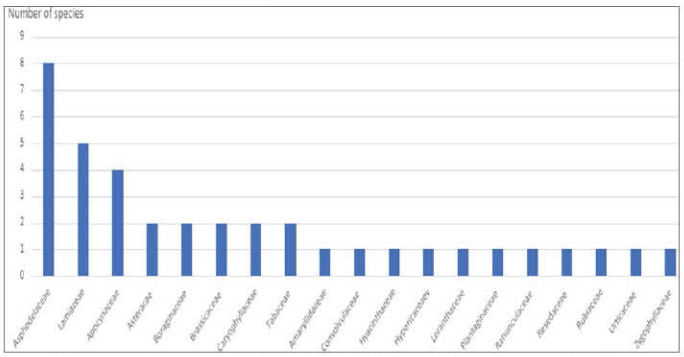

Figure 2. Plant families with number of endemic species


Albuca pendula


Ceropegia khalidbinsultanii


Aloe shadensis

Conclusion

- Threatened and endangered species in southwestern region must be carefully monitored and managed, and conservation efforts prioritized to conserve biological diversity.
- it may be necessary to conduct more research for a more comprehensive understanding of endemic species.
- More checklists and updating them in the kingdom will help us to identify plants and access them using current names and concepts and this supports greater efficiency in assessing threats of extinction.

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Acknowledgments

We thank God first for completing this research and We thank our supervisor, Dr.Samah Abdullah Alharbi for her guidance,

Micropropagation - A Tool in Plant Tissue Culture

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Abstract

Plant micropropagation is an important tool in plant tissue culture that is commercially applied to plant cultivation, preservation, and research. Here, we demonstrate plant micropropagation stages, methods, applications and some examples of micropropagated plant species. The growth of plantlets can be divided into five major stages, beginning with the selection of mother plants (explant), establishment, propagation, rooting and transplantation. We can obtain a large number of propagules by using callus regeneration, organogenesis and somatic embryogenesis. Commonly, plants chosen for micropropagation are those that are hard to be propagated by using conventional agriculture techniques, normally hard to root. By using phytohormones called auxins, the shoots are induced to form roots. Besides, several phytohormones aid in transplantation.

Introduction

Plant cell culture technologies were introduced at the end of the 1960's as a possible tool for both studying and producing plant secondary metabolites. In the early 1970s, *in vitro* mass production of clonal propagules of a limited number of agriculturally important plants, became feasible. Micropropagation is the industrial process of plant-based production of plants through tissue culture or cell culture techniques. The most outstanding merits offered by micropropagation, over the conventional methods are in a relatively short time and space large number of plants can be produced.

Objective

- To review some studies of plant micropropagation.
- To demonstrate the plant micropropagation stages how it began and how it was redefined.
- To give an idea about the some methods used in plant micropropagation and to collect the answers of how plant micropropagation technique became an alternative to traditional agriculture.

The plant micropropagation stages

During stage 0 which is selection of mother plant, it is essential to ensure that the mother plant is the correct plant and free from any contamination or infection. In stage I which is establishment, the axillary bud explant is usually used in initiation of culture, other explants are used for only a limited number of plant species. After selecting the explant, must purify the surface of the explant. The main objective of stage II, is the rapid propagation of propagules and to realize propagation with maintaining genetic stability. In stage III which is rooting, in some species adventitious roots form on the shoots, therefore transferred directly to the soil, whereas in other species, a separate rooting procedure using special media is needed. During stage IV which is transplantation, the main objective is to transfer the plants from in vitro condition to ex vitro in soil under normal ecological conditions.

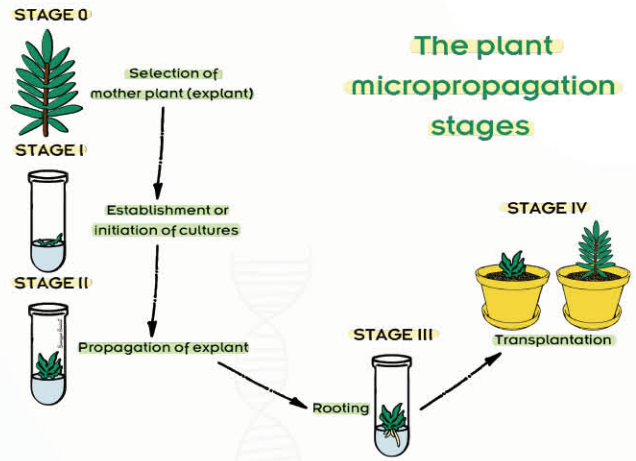

Figure 1. Schematic representation of the plant micropropagation stages.

Some methods used in micropropagation

There are various methods used in micropropagation, it is depend on producing a whole plant by isolating part of the plant ,sterilize it then wash it with distilled water and finally place it in a nutrient medium to stimulate plant growth. These methods includes: callus culture, suspension culture, embryo culture, protoplast culture and the last method, which is the most common, is meristem culture.

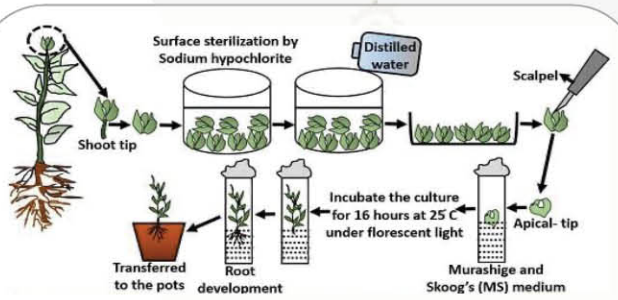

Figure 2. Method of meristem culture

Meristem culture is a technique in which a dome-shaped part of the stem tip's meristem is excised and transfer to nutrient medium that stimulates plant growth.

Major crops in commercial micropropagation

There are many different crops used for micropropagation the most important example is bananas which depend on meristem culture and follow four basic steps including sterilization, initiation, multiplication, and rooting. In addition, the example of peanuts depends on the protocol of silver nitrate. There are some examples used in micropropagation, including sugarcane, peaches and potatoes.



Figure 3. Steps of banana micropropagation.

Conclusion

Agriculture in the conventional sense is labor-intensive and time-consuming, resulting in lower plant production. Therefore, to overcome this problem and produce plants in large quantities, plant tissue culture techniques are used, in this review, the techniques of plant micropropagation have been highlighted. Plant micropropagation is very significant in many current researches and studies. Plant micropropagation include five stages, beginning with the selection of mother plant (explant), establishment, propagation, rooting and transplantation. If the plants cannot survive at the last stage, therefore they could not be successful in micropropagation. In addition, central to any successful plant micropropagation is an efficient propagation methods. The procedure of these methods is based on preparation and sterilization of nutrient medium suitable for the type of plant, followed by isolating the propagules and cutting it into small pieces then transfer it to the preprepared medium until the callus begins to formation. Finally, sub-culturing after a certain time, which varies depending on the plant type. The most important examples of crops that were used in micropropagation are banana, peanuts, sugarcane, potato and peach.

Acknowledgments

First and foremost, all praises and thanks are to Allah, who has been the source of our energy throughout our study and blessed us with the potential to complete this research. We are grateful to express our heartfelt gratitude to our advisor Dr. Haneen Abuauf, for her excellent guidance, advice, critical reading, comments and valuable suggestions, and her friendly and positive approach offered us during this project. Finally, extend our thanks to all professors at the Biology department at Umm Al-Qura University.

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Sonic Hedgehog Mutation On The Human Craniofacial Disorders

Nosaibah Mandorah, Mona Ziniy, Ghodaf Al-subaie and Jawaher Al-mgaty
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Abstract

Sonic hedgehog (SHH) protein expression was critical in driving organogenesis during human embryo development. Notochord releases SHH protein and induces the ventral neural tube to form the floor plate and produce SHH.

When mutations occur in the pathway of SHH due to several genetic or environmental factors, this leads to many disorders, including Holoprosencephaly (HPE) and Medulloblastoma (MB).

Studying the human SHH-PTCH-GLI pathway was necessary to understand the mechanisms of human birth defects and cancers, therefore, the identification potential treatment targets. This review focuses mainly on understanding the SHH-PTCH-GLI pathway and its clinical importance in humans.

Introduction

Hedgehog gene: was first identified in the fruit fly screens of *Christiane Nüsslein-Volhard* and *Eric Wieschaus* 1980.

The hedgehog genes encode signaling molecules that were active in short- and long-range patterning processes during embryogenesis (Heussler et al., 2003).

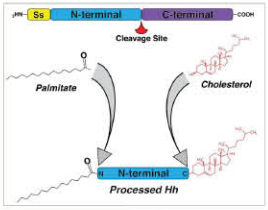
Sonic hedgehog (SHH): protein that was produced using instructions from the SHH gene. This protein functions as a chemical sign, which was necessary for embryonic development.

SHH function:

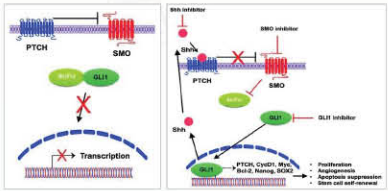
- The play the most important roles in development.
- It involved in cell proliferation and specialization, and the body's natural shape.
- SHH important for the growth of the frontal lobe of the forebrain.

SHH Signaling Pathway

The SHH signal was produced as a large protein that undergoes modifications after translation before becoming a functional molecule (Abramyan, 2019).



- If SHH signaling was not bound to PTCH1, then PTCH1 inhibits SMO and GLI transcription factors become inactive.
- GLI transcription factors bind to a protein called SUFU, which isolates and binds to GLI transcription factors. After binding, GLI-SUFU remains in the cytosol and was subjected to phosphorylation **(Figure A)**.
- If SHH binds to PTCH1 this will reduce the inhibition of PTCH1 on SMO.
- When SMO was activated, the SUFU-GLI complex was degraded, allowing GLI to be transported backward to bring it back into the nucleus and regulate expression of target genes **(Figure B)**.



(A) SHH pathway OFF (B) SHH pathway ON

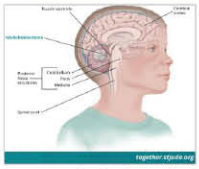
Mutations

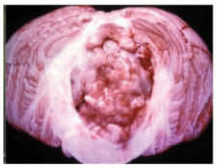
Medulloblastoma (MB)

It well known as brain embryonal tumor which affect the cerebellum, that involved in muscle organization, balance, and movement. This tumor will appear due to different types of gene mutations, and there were at least four subtypes of MB.

It was normally diagnosed at a young age, especially in infants younger than 10 years.

- **Symptoms :** headaches, nausea, vomiting, tiredness, dizziness, double vision and, unable to walk or stand without help.
- **Treatment :** the surgery to remove the tumor, radiation therapy and chemotherapy.



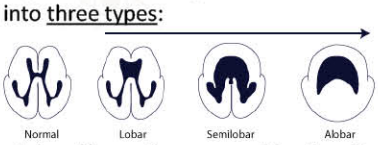


Holoprosencephaly (HPE)

It was results from an incomplete midline cleavage of the forebrain and includes a wide spectrum of intracranial and craniofacial midline defects.

It may occur either for genetic (such as trisomy 13) or environmental (alcohol and smoking ...etc.) reasons.

- The severity of varies among affected individuals, it can be grouped into three types:



- **Craniofacial malformations caused by the disorder:**



- **Treatment:** Currently, there is no known cure.

Conclusion

- Primary cilium It plays a particularly important role in Hedgehog signal transduction.
- When determining the basics of the formation of SHH signaling, the interaction between the SHH ligand, PTCH1, and SMO was elucidated.
- In the craniofacial region, there was strong evidence linking SHH coreceptors to HPE (e.g., Cdon, Gas1, BOC), which appear to play significant roles in susceptibility to SHH signal disruption.
- Serious facial abnormalities common in people with SHH mutations and, Individuals with ZIC2 mutations have fewer and less severe craniofacial anomalies.

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Lactic Acidosis and It's Indication In Human Blood

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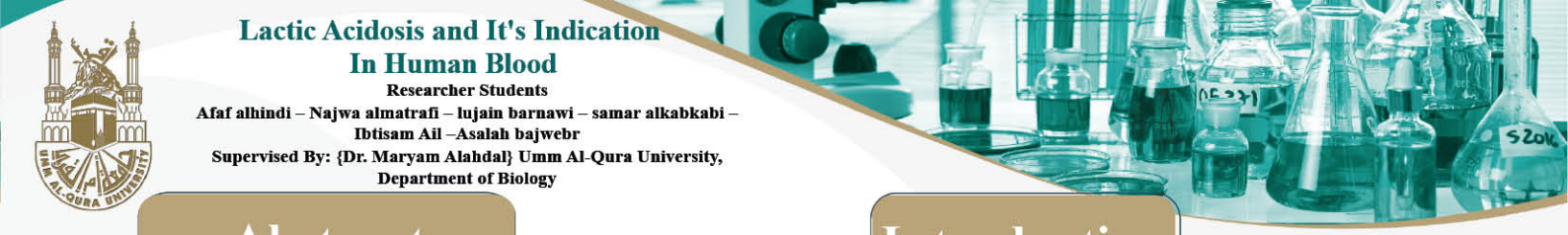
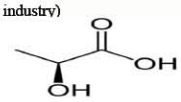


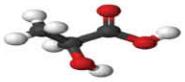
Abstract

Lactic acid is produced in physiologically normal processes, and as a common finding in disease states. When increased production is comorbid with decreased clearance, the severity of the clinical course escalates. Importantly, the effects of severely elevated levels of lactic acid can have profound hemodynamic consequences and can lead to death. Serum lactate levels can be both a marker for risk as well as a therapeutic target. The higher the level and the longer the time to normalization of elevated serum lactate, the greater the risk of death. Lactate is one of the most crucial intermediates in carbohydrate and nonessential amino acid metabolism. Lactic acid is produced mainly by muscles, skin, and red blood cells, especially in the absence of oxygen. This review presented and evaluated the effect of lactic acidosis and discusses whether accumulation of lactic acid, or in reality lactate and / or hydrogen (H +) ions, is a major cause of skeletal muscle fatigue, i.e. Decline of muscle force or power output leading to impaired exercise performance.

Introduction

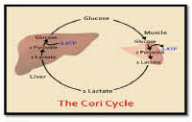
Lactic acid or lactate is organic compound which produced during fermentation from pyruvate by lactate dehydrogenase. This reaction in addition to producing lactic acid, also produces (NAD) that is then used in glycolysis to produce energy source (ATP).Normal range (0.6-1.8mmol/L).German physician–chemist Johann Joseph Scherer who first demonstrated the occurrence of lactic acid in human blood under pathological conditions .Scherer described the cases of seven young women who all died peripartum .In the conclusions of his 1843 book, attached high importance to the fact that he found lactic acid high in blood in cases of puerperal fever, which he had not found before in healthy persons.is present in the body in different proportions in (muscles - red blood cells - intestine - liver).It is utilized in the (food industry -chemical industry -cosmetic industry -medicine and pharmaceuticals industry)





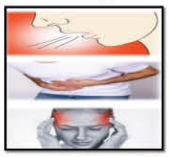
Lactic acid production and Cori Cycle

Lactic acid is normally produced in excess by about 20 mmol/kg/day, which enters the bloodstream. It is then metabolized mostly via the liver and the kidney. Some tissues can use lactate as a substrate and oxidize it to carbon dioxide (C02) and water, but only the liver and kidney have the necessary enzymes to utilize lactate for the process of gluconeogenesis. The tissues which normally produce excess lactic acid include the skin, red cells, brain tissue, muscle, and the gastrointestinal (GI) tract .
Cori cycle Cori cycle, or lactic acid cycle is a metabolic pathway. Lactate produced by anaerobic glycolysis in muscles, is transported to the liver and converted into glucose which then returns to the muscles and is cyclically metabolized back to lactate. The cycle is is important in producing ATP during muscle activity and prevent lactic acidosis in the muscle under anaerobic conditions.



types of lactic acidosis

Type A: This is the most common form of the disorder. It is caused by decreased blood flow and hypoxia when there is a mismatch between oxygen delivery and consumption, with the resulting anaerobic glycolysis.The use of lactate levels to diagnose patients with sepsis-induced insufficient blood flow has been emphasized. However, hyperlactemia can indicate insufficient oxygen delivery due to any type of shock. Conditions that cause type A lactic acidosis include: Decreased blood flow to tissues due to hypovolemia, cardiopulmonary arrest, sepsis, shock, heart failure, lung disease, anemia is rarer and has been thought of as hyperlactatemia without clue of tissue hypoxia; however, many causes of Type B lactic acidosis have occult hypoperfusion ,And Common drugs and toxins, such as nucleoside reverse-transcriptase inhibitors (NRTIs), toxic alcohols, salicylates, propofol and cyanide, can interfere with oxidative phosphorylation leading to lactic acidosis. lactic acidosis may be caused by one of the following conditions: impairment of cellular functioning ,localized areas of tissue hypoperfusion , Liver disease ,Leukemia ,Kidney, disease Strenuous exercise.





Blood Lactic Acid During Exercise

When you exercise, your body uses oxygen to break down glucose for energy. During intense exercise, there may not be enough oxygen available to complete the process, so a substance called lactate is made. Lactic acid is manufactured when glycogen and glucose are broken down to pyruvate to produce adenosine triphosphate otherwise known as ATP (pyruvate) During intense exercise, lactate production is several times higher than resting levels. The release of hydrogen ions (H +) associated with lactate can lead to a significant decrease in muscle pH, which leads to acidosis

How fast lactic acid disappears from your blood after heavy exercise the lactic acid levels are back down to baseline within about an hour. It is true that it goes down faster with either walking or jogging, but it also goes down pretty fast if you do nothing.



Lactic acid test

- Test that measures the level of lactic acid made in the body. generally done on a blood sample .
- DO NOT exercise for several hours before the test. Exercise can cause a temporary increase in lactic acid levels .
- A blood sample is needed. Most of the time blood is drawn from a vein located on the inside of the elbow or the back of the hand .

Normal Results :

- Normal results range from 4.5 to 19.8 milligrams per
- deciliter (mg/dL)
- Abnormal Results Means The body tissues are not
- getting enough oxygen .

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Treatment

Lactic acidosis Type A: tissue hypoxia Sepsis (septic shock).

Treatment: with the appropriate antibiotic agents. resuscitate with rapid intravenous fluids used to reduce lactic acid levels within the first hour of recognition colloid solutions is effective in restoring tissue perfusion in patients with sepsis or hypovolemia , If a colloid solution is indicated, albumin should be used.

Lactic acidosis type B:

It is not caused by hypoxia. It is caused by: Drugs and toxins Metformin (biguanide).

Treatment: discontinuation of causative drug, hemodialysis, which will correct the metabolic acidosis and remove metformin. For Kidney disease, Hemodialysis or continuous hemofiltration, useful mode of therapy when severe lactic acidosis exists in renal failure.





Conclusion

Lactate is an important substrate and product in intermediary metabolism. .Lactic acidosis has numerous etiologies and can be classified based on the presence or absence of tissue hypoxia. The presence of elevated lactate levels has important prognostic implications in these patients. Lactic acidosis occurs when the body produces too much lactic acid and cannot metabolize it quickly enough. The condition can be a medical emergency. The onset of lactic acidosis might be rapid and occur within minutes or hours, or gradual, happening over a period of days. The best way to treat lactic acidosis is to find out what has caused it. Untreated lactic acidosis can result in severe and life-threatening complications. In some instances, these can escalate rapidly. Consideration of the cause of lactic acidosis is a crucial step in its treatment. During intense exercise, your body uses oxygen to break down glucose for energy, there may not be enough oxygen available to complete the process, so a substance called lactate is made accumulation of lactic acid, or actually lactate extraction and / or hydrogen ions (H +), was the main cause of skeletal muscle fatigue, i.e., reduced muscle strength or energy production leading to poor muscular performance

Acknowledgments

We thank the almighty God for the good health and all his blessing that he granted to us during our work. With reverence, we express our deep sense of gratitude to **Dr. Maryam Alahdal**, for her initiative, endurance, .constructive criticism, constant monitoring, and the preparation of this research Also, special thanks should be given to my student colleagues who helped me in many ways, and I am very .grateful for the opportunity, I have had to work with them Finally, words alone cannot express the love and gratitude I owe to my beloved family for their encouragement and understanding & endless love, through the duration of my studies.

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The effect of Wnt signaling in (HCC)

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Abstract

- Wnt proteins comprise a major family of signaling molecules that organize and influence a myriad of cell biological and developmental processes.
- This review provides a perspective on the emerging verification that the aberrant regulation of Wnt signaling was a critical mechanism for the development of HCC.

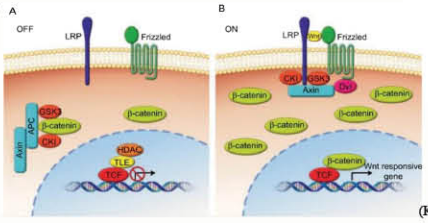
Introduction

- Wnts were extracellular proteins that activate diverse cell surface receptors linked to Wnt canonical and noncanonical Wnt signaling pathways, which initiates when it was bind to Frizzled: LRP5/LRP6 receptor complexes (Acebron and Niehrs., 2012).
- During development, the requirement for Wnt can be observed at stages as initial as the first cleavages of the zygote all the way to adulthood where Wnts adjust tissue homeostasis after discovery of the pathway, multiple dysfunctions and mutation of these pathways were shown to be related to several diseases, as well as HCC (Anastas, Moon., 2013).

Wnts Signaling in normal tissue

A. In off case of Wnt: Cytoplasmic β-catenin preppers a complex with APC, Axin, CKI, and GSK-3 and was targeted for proteasomal degradation, at the same time Wnt target genes were suppressed.

B. In on case of Wnt: Between Frizzled and lipoprotein receptor a receptor complex formed, which results to accumulation of β-catenin in the cytoplasm and nucleus, whilst it works as a coactivator for T cell-factor proteins to operate Wnt responsive genes.



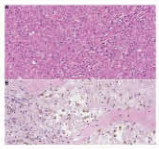
(Khalaf et al., 2018).

Role of Wnt/β-catenin signaling in (HCC) development

- Wnt/β-catenin signaling acts as a necessary part in hepatocyte development and function (Geng et al., 2014).
- In normal hepatocytes, presence of the β-catenin destruction complex (APC, Axin, and GSK-3) make the levels of β-catenin are low (Geng et al., 2014).
- The reports indicate that the presence of β-catenin mutation that up to 20-40% , Axin1 mutation was shown in 3–16% and Axin2 mutation was shown in 3% of all cases of HCC (Waisberg and Saba., 2015).

Wnt canonical signaling pathway/(Axin1/β-catenin)

- In Axin mutation: Axin mutations were found in chromosomally unstable HCCs that were associated with HBV infection, while β-catenin mutations were found mainly in non-HBV, well differentiated, chromosomally stable HCCs (Zucman et al., 2015).
- The tumor shows expression of β-catenin protein in the nucleus and/or cytoplasm (Khalaf et al., 2018).

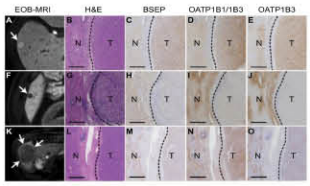


(Huang et al ., 1999)

- In β-catenin: There are some HCC tumors appear from the malignant transformation of hepatocellular adenomas (HCAs) tumors usually have mutations in the β-catenin gene.
- The most HCC tumors that contain β-catenin mutation develop from normal liver tissue (Vilchez, Turcios,et al.,2016).

Expression of target genes Wnt/β-catenin using MRI imaging

- The presence of a β-catenin mutation in HCC tumors can provide important information related to diagnosis and response to treatment (Kitao et al., 2015).
- Gadoxetic acid (Gd-EOB-DTPA)-enhanced magnetic resonance imaging was a hepatocyte contrast agent and provide precise molecular information about HCC (Ueno et al ., 2014).



(Ueno et al ., 2014)

Conclusion

- Hepatocarcinogenesis it was caused by genetic changes that affect many of the signals, leading to uncontrolled growth of liver cells.
- Multiple studies propose that the presence of β-catenin mutation in HCC tumors was related with a more favorable prognosis and gives valuable information about treatment response and tumor behavior.
- Nowadays, small molecular therapy focussing the Wnt/β-catenin pathway was being studied for treatment of HCC.

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The role of active compound in plant extract for treating Gingivitis disease.

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Abstract

This study aimed to evaluate the potential anti-inflammatory effects of three extracts (*Alkanna tinctoria, Salvia officinalis, Syzygium aromaticum*). These plants have been reported to have antimicrobial activities against the pathogens responsible for oral infections, and are often prone to developing good antibiotic resistance. An alternative to this resistance is to use three medicinal concentrations (5-10-15%) from all plant extracts and the tested bacterial strains are *Escherichia coli* and B1 isolated from the mouth. The results of the study in this project showed efficacy. Of the plant extract in inhibiting the oral bacterial isolate and the extract of *alkana tinctoria* 15% (18 mmol) gave an inhibitor of *Escherichia coli.* The plant extract of the plant *Salvia officinalis* gave 15% (12 mmM) concentration the highest inhibitors of B1 bacteria, *Syzygium aromatic* extract at a concentration of 15% (11 mM) gave inhibition of *Escherichia coli,*. The three plants, *Alkanna tinctoria, Salvia officinalis,* and *Syzygium aromaticum* were more effective than mouthwashes as they gave inhibition (6 mM) at two concentrations of 10-15%, respectively.

Introduction

Oral diseases are among the most prevalent diseases globally and have serious health and economic burdens, greatly reducing quality of life for those affected [1] and according to world health organization {WHO} Antibiotic resistance is one of the biggest threats to global health, food security, and development today, leads to longer hospital stays, higher medical costs and increased mortality economic cost will also be significant, and the world economy will being hit by up to $100 trillion by 2050[2] so we have to find a natural alternative more effective and less harmful than antibiotics good example of this is the use of medicinal herbs . [3] These plants contain one or more chemical components that have the potential to treat a specific disease. Several plants are used in oral health ; and according to literature review the role of salvia officinalis, alcana tinctoria, Syzygium aromaticum, and their effective due to the it's active compounds , salvia officinalis , sage is a member of the lamiales and the most effective compounds is caffeic acid and borneol , sage have been used in traditional medicine for the relief of pain,[4] protecting the body against inflammation, bacterial and virus infection and it's shown it's activety in treating oral diseases such as , gingival inflammation sage also act as antiplaque. the active compounds in clove it's Eugenol[4] , clove has been used to treat oral diseases such as alleviation of tooth pain and reduce periodontal inflammation[5] , alkanet this plant are rich source of chemical compounds[6] such as Shikonin and acetylalkannin , it's have a antimicrobial effect which play an important role in oral diseases treatment and By applying alkanet root essence oil on the inflammation area, this will reduce the symptom and painful caused by the inflammation[6] Anti-MDR Bacterial Activity of Alkanna tinctoria Leaves of A. tinctoria were used efficiently against multiple drug resistant (MDR) bacteria by diffusion method. A. tinctoria proved effective against MDR isolates. Phytochemical analysis of A. tinctoria leaves revealed that these have versatile biochemical molecules that may kill or inhibit the drug-resistant human pathogenic bacteria[7].

Aim of study

1- The use of plant extracts in the treatment of mouth infections
2- Isolation of bacteria and fungi from the oral in pure culture
3- Making different concentration of plant extract
4- Study the effect of some plant extract prepared in the laboratory on inhibition of microbes.
5- Conducting a comparative between the effect oh plant extract and medicinal mouthwashes

Methods

1-Selection of plant samples and drying
2- Preparation of different concentration 5%,10%15% and filtration by Seitz filters
3- Bacteria isolation and purification
4- role of plant extracts in their different concentrations on inhibiting bacterial growth



Concentrations (5%, 10%, 15%)	Concentrations (5%, 10%, 15%)	Concentrations (5%, 10%, 15%)
Salvia officinalis	Alcana tinctoria	Syzygium aromaticum

Results

1.Active compound in plant extracts

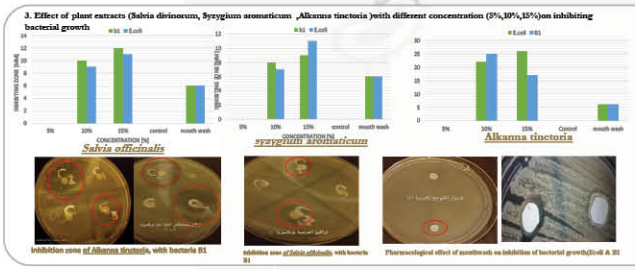
	Botanical name of plant	Active compound
1	*salvia officinalis*	ketones chlorogenic acid Bormeol Flavone glycosides Pulegone
2	*alcana tinctoria*	oxygenated monoterpine chloroform Aeruginosa
3	*Syzygium aromaticum*	Eugenol gallic acid caffeine hydroxybenzoic acids ellagic quercetin

2.microbial isolation and pure culture and staining

E coli bacteria B1



3. Effect of plant extracts (Salvia divinorum, Syzygium aromaticum ,Alkanna tinctoria)with different concentration (5%,10%,15%)on inhibiting bacterial growth



inhibition zone of Alkanna tinctoria, with bacteria B1 | inhibition zone of Salvia officinalis, with bacteria B1 | Pharmacological effect of mouthwash on inhibition of bacterial growth(Ecoli & B1

Discussion

Based on the results obtained, salvia officinalis, alcana tinctoria, Syzygium aromaticum. The extracts possess antibacterial activity, at a concentration of 10% and 15%, to inhibit the growth of Escherichia coli and B1 bacteria.salvia officinalis gave the highest inhibition effect of 15% for B1 (12 mm) while it gave the lowest inhibition effect of 10% (9 mm) for E. coli. The concentration was 15% better in inhibition of B1 bacteria, reaching (12 mm) .. a plant on inhibition of pathogenic microbes due to its active compounds and this is in agreement with previous studies that confirmed the role of Salvia officinalis that it has a wide range of biological activities, such as antioxidants, antibacterial and antibacterial Infections.The results showed the ability of Cyssegium Aromatum. The extract showed inhibition of the growth of Escherichia coli and B1 bacteria, where the effect of inhibiting E. coli was achieved at a concentration of 10% (7 mm) and the extract showed inhibition of B1 bacteria at a concentration of 10% and 15% to reach (8 mm) and (9 mm), respectively. . With drug treatment whose inhibition (6 mm), cesium aromatium extract is good at inhibiting bacteria. These results are consistent with previous studies that confirmed the role of Syzygium A. ,. Several studies have also shown that clove oil has antifungal activity. The phenolic components of cloves are known for their fungicide properties. [62]The results showed the ability of Alana tinctoria extract to inhibit E. coli and B1 bacteria. It gave the highest inhibition effect of Escherichia coli at 15% (26 mm) and the concentration of B1 at 10% had the highest inhibition effect of (25 mm). The results of the drug treatment also showed inhibition of E. coli and B1 bacteria, which were (6 mm), respectively. By observing the results and comparing them, we find that the extracts of Alcana tincturia 10% and 15% gave the highest inhibitory capacity compared to the drug treatment. A plant that inhibits pathogenic microbes because it contains effective compounds, and this is consistent with many previous studies that confirmed the role of alkana tinctoria as an anti-inflammatory and antimicrobial.

Conclusion

Based on the results obtained, salvia officinalis, alcana tinctoria, Syzygium aromaticum. The extracts possesses an antibacterial activity against, This study demonstrated that the Alcana tinctoria extracts from excellent antimicrobial activities against bacterial oral infection.Compared to Syzygium aromaticum extract, Alkanna tinctoria and salvia officinalis, extracts is the best.It also showed that plants extracts was found to be a better antimicrobial agent, exhibiting broad range of antimicrobial activity against bacterial oral infection of the common chemical antibiotic used. Therefore, it has the potential to be used for medical purposes and to be utilized as antimicrobial of oral infectionsIn this study, Alkanna tinctoria and Salvia officinalis had shown to possess antimicrobial effect against E. coli and Bacteria isolates from oral (B1). This natural plant extract can be commercially used as the alternative treatment regimen for reduce the use of antibiotics.

Acknowledgments

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Praise be to God in whose honor and majesty the works of virtue are carried out, We would like to express our appreciation and gratitude to our supervisor, Dr. Magda Al Tuwaijri, for her encouragement, advice, support, availability and patience during this endeavor. She was a real source of knowledge and motivation for us, and we really appreciate her efforts. We also thank Dr. Wadad Al-Juhani, Deputy Head of the Biology Department, for the support we received from her. and Dr Rana Khayat, For her effort on coordinating graduation projects,We would like to express our gratitude to researcher Meshaal Al-Maliki and Miss Hoda Al Sharif for their assistance. We express our deepest appreciation to our families, who have been nothing but supportive and encouraging to us. Thanks also to our friends for their support and being with us when we need help. Thank you all for your support.

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The effect of parasitic mites on the behavior of poultry's.

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Abstract.

The past had no value for poultry; it was raised for the purpose of financial benefits. Nowadays, it is essential for farmers and has a big role in the economy, and farmers are interested in providing balanced food and using modern methods to entertain them. However, there are either some factors may affect the health of poultry because of the presence of a northern mites parasitic (Ornithonysus sylvarum), the NMP which can infect poultry in general, there is awareness among breeders and farmers that they are monitoring the behavior of nesting and egg laying behavior, also to bathing with dust .

Introduction.

Many external factors may affect the production and survival of chickens. The poultry may be infected with various types of external parasites such as mites and lice, causing symptoms such as irritation, lameness, and weakness, and may sometimes reach death, which leads to economic losses. The Northern Fowl Mite (NFM) Ornithonyssus Sylviarum is The most common and damaging parasite. Three chicken behaviors of interest were identified as distinct associated with chicken welfare. These behaviors are defined as 1) pecking 2) preening 3) dustbathing. 'Behavior' is the most readily accessible and commonly used index for assessing an individual animal's health.

The effect of infection by mites on dust bathing behaviors in poultry.

It is an innate behavior in birds and poultry and is for 20-30 minutes, due to internal and external factors. It aims to preserve feathers by creating a balance between fat levels and the removal of external parasites. It is a behavior that improves the structure and structure of feathers, increases the strength of the leg muscles and prevents deformities. Moths affect behavior due to the sucking of poultry blood as it affects its weight and production. The skin color is reddened and the feathers turn gray and hurt it. Crete dust is used to reduce the amount of mites and the behavior often ends in distracting poultry.

The effect of infection by mites on preening behaviors in poultry.

preening it is a maintenance behavior and an efficient behavioral strategy for defending against ectoparasites. The NFM affected on the preening behavior in poultrys by the increased time spent preening and number of preening resulting in the itching and anemia, which could be associated with a negative emotional state, resulting disruption of resting in.

	Time spent preening (s)			
Week	Vent	External Wings	Neck-chest	Total time spent preening (s)
0	$28.1^{a} \pm 9.6$	$2.0^{a} \pm 2$	3.5 ± 0.8	68.7 ± 26.6
9	$69.1^{b} \pm 9.6$	$10.7^{b} \pm 2$	6.3 ± 0.8	152.9 ± 26.6
Test Statistic	$F_{1,6} = 9.74$	$F_{1,6} = 7.84$	$F_{1,6} = 5.42$	$F_{1,6} = 5.34$
P-value	0.02	0.03	0.06	0.06

[a,b]Different superscripts in a column indicate a significant difference ($P < 0.05$).

Table 1main effects of week on the time spent preening by NFM means and standard errors are reported for both significant effects and trends.

The effect of infection by mites on foraging behaviors in poultry.

Foraging behavior of Poultry is an aspect of the animal feeding behavior in natural environments, where various activities are undertaken in order to search for, identify and catch food. foraging nvolves activities such as ground pecking, scratching and locomotor activities. Northern fowl mite (Ornithonyssus sylviarum) effects on metabolism, body temperatures, decreased activity or listlessness, and egg production.

The effect of infection by mites on nesting behaviors in poultry.

Nesting behavior is an example of natural behavior with a predominantly internal motivation, that is, it does not depend on the external environment, if the bird is not able to build the nest, this need is frustrated and the hen demonstrates its frustration sitting and not performing any activity , with apparent frustration signs, such as excessive locomotion and exploratory activities. In addition, frustration may be physiologically expressed by egg retention in the eggshell gland. Resulting in an extra calcium layer on the eggshell . According to, these signs indicate that the hen's welfare was compromised by the lack of a suitable nest .Through studies have not detected the effect of mites on the behavior of nesting.

The control, prevention and treatment of mites on poultry.

Controlling mites is essential in maintaining the health, wellbeing and production efficiency of poultry . Main risk factors for mite's prevalence are: 1.poorhouse and furniture design: building design is a significant factor. 2. inadequate cleaning and disinfecting. There is biological control of mites for example desiccant dusts. Another entomopathogenic fungi have effect against red mite at high concentrations suspended in sunflower oil. There is a good natural predator of mites like beetle. Treatment is normally aimed at attempting to end the mite problem, by using insecticidal sprays, dusts or essential oils and treatment should focus on treating the mite habitat.

Conclusion

In conclusion of this research, the results showed some effects of the Northern Red Mite (NFM) on the following poultry behaviors. preening behavior affects by increasing the time spent grooming and the number of grooming times resulting in itching and anemia. Forging behavior affect metabolism, body temperature, decreased activity or lethargy, and eggproduction. And in nesting behavior, the researcher faced some difficulties in finding signs of dreaming effect, as it was not discovered through studies. Treating by making changing in poorhouse, furniture and take care of cleaning or using biological controls but preventing, and treating can be by organic or chemical products.

Acknowledgments

First and foremost we thank God Almighty for the good health that He granted us during our work despite this sensitive period. With reverence, we express our deep gratitude to Dr. Rana O. Khayat for her sincere initiative, constructive criticism, dedication, constant monitoring and her endeavor to do better for the preparation of this research.
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Cows' welfare and milk production

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Abstract

The level of welfare has an impact on the animal production, so high levels of welfare lead to an increase in cows' production. the loose housing (free range) has been recognized as the most efficient, animal friendly and more milk productivity . Feeding behavior has a crucial role to improve the efficiency. The welfare of cows plays an important role in the care behavior, the greater the welfare the better their care for young .

Introduction

Cows 'milk has been a daily food for many people, and humans have consumed cows' milk for many years, Cows are the largest source of milk consumed by Humans in the world

The aim and objectives:

1. The effect of welfare on milk production.
2. Compare between the animal welfare in tie-housing system and loose housing system.
3. The effect of free range on the cow milk quality and productivity levels
4. The association between feeding behavior and welfare.
5. The impact of welfare on the maternal's care behavior .

Objective

1-The effect of welfare on milk production:

The attainment of good welfare should be of prime importance in the field of cow. Poor cows husbandry is considered to be a significant decrease in the welfare of cows, which leads to an increase in disease and a change in natural behavior. Thus the welfare should be high by providing a comfortable, smooth and healthy surface for standing and walking. Both affect milk production.

2.Compare between the animal welfare in tie-housing system and loose housing system:

All types of housing have both advantages and disadvantages.
loose housing systems instead of tie stall barns are recommended for the diary cows' welfare.

3. The effect of free range on the cow milk quality and productivity levels:

Housing system	Milk production (Kg)	protein	Fat	Lactose
Tied cow	cows production is approx. 8120	The average protein content fluctuated from 3.08% to 3.48%	Milk fat content is affected from day to day by genetics and environment	The average lactose content was 4.50% lower due to more interference with the metabolism
Free range	Average milk yield and quality per cow increased by 6% . *It means* 8610			The average lactose content is 4.62% higher due to fewer infections .

4. The association between feeding behavior and welfare.

Feeding behavior and use for determining cows' health, the association between feeding behavior and welfare, factors that influence feeding behavior.

5. The impact of welfare on the maternal's care behavior:

The maternal's care given to the calf is important especially in the first days after birth as it helps the calf's growth and existence because the body of the calf in this period is more vulnerable and needs special care to stay alive

Conclusion

cows are the largest source of milk consumed by Humans in the world. Caws' milk is a source of many vitamins. Cows that are raising in a significant decrease in the welfare are at more risk of diseases . the amount of milk on the day of milking and feeding is higher in loose system compared to a tie stall samples. feeding behavior helps in understanding and knowing the health status of cows. There is a strong relationship between welfare and caring behavior as caring behavior helps cows understand and act on social behavior.

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Gene Silencing and its Applications in Plants

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ABSTRACT

Gene silencing (GS) is considered a promising tool for studying gene functions, improving various crop traits as well as providing resistance to pathogens. Silencing may be done at the transcript or at the post-transcript level. Gene silencing can be done using either RNAi or CRISPR. RNAi silences genes by generating knockdowns at the mRNA level, while CRISPR generates knockouts at the DNA level. Genetic silencing played an important role in protecting plants from pathogens, silencing the synthesis pathways of many compounds in plants such as nicotine, caffeine and gluten, as well as improving the quality of fruits and prolonging their shelf life, but silencing by traditional methods requires genetic modification of the plant and this takes a long time in addition to these, genetically modified plants has faced great rejection from most societies. Induction of gene silencing by external spraying of dsRNA molecules complementary to the pathogen's gene on plant is one of the modern, fast, inexpensive, and environmentally friendly methods that do not require genetic modification of plant and will enhance plant resistance against many pathogens. This application is recognized as spray-induced gene silencing (SIGS).

Key words: Gene silencing, RNAi, miRNA, siRNA, HIGS, SIGS.

INTRODUCTION

Gene silencing is defined as an epigenetic modification of gene expression leading to inactivation of previously active genes. Gene silencing is used in the course of normal development and differentiation to repress genes whose products are not required in specific cell types or tissues. This may apply to individual genes or larger chromosome regions (Feng *et al.*, 2010). Mechanisms responsible for repression of genes involve changes in levels of DNA methylation, alterations in covalent modifications of histone proteins, chromatin compaction, or destabilization of mRNA. Gene silencing can act at the transcriptional or posttranscriptional level; the two phenomena being referred to as transcriptional gene silencing (TGS) and posttranscriptional gene silencing (PTGS). Genes affected by TGS are not transcribed at all, or transcripts are produced at very low levels. In PTGS, the affected gene is transcriptionally active but its transcripts undergo rapid degradation, resulting in the absence of translatable mRNA (Matzke *et al.*, 2007; White and Allshire, 2008; Matzke *et al.*, 2009; Siomi *et al.*, 2010). This review reports and discusses the main molecular mechanisms involved in plant gene silencing, compares the mechanisms and experimental workflow and the applications of this technology in plant improvement.

METHODS OF GENE SILENCING

CRISPR and RNAi are the most widely used gene silencing methods. RNAi and CRISPR interrogate gene function by blocking gene expression and analyzing its effect on phenotype. RNAi silences genes by generating knockdowns at the mRNA level, while CRISPR generates knockouts at the DNA level.

RNAi METHOD

RNA interference (RNAi) exploits the endogenous system for miRNA-induced gene silencing to artificially inhibit gene expression via translational regulation. Short RNAs can be introduced to the cell as either shRNAs (short hairpin RNAs) or siRNAs (small interfering RNA). Both shRNAs and siRNAs are ~21 bp long and are designed to have complementarity to the target mRNA. shRNAs are dsRNAs that contain a loop structure, and are processed into siRNA by the host enzyme DICER. siRNA are dsRNA containing 2 nt 3` end overhangs. After processing, one strand of the siRNA will be loaded into the RISC (RNA-induced silencing complex). The siRNA will bind to its target based on complementarity. If the binding between the siRNA and the mRNA is perfect, the RISC will cleave the mRNA. If the binding between the siRNA and the mRNA is not perfect it will cause translational inhibition, but no mRNA cleavage will occur (Figure 1).

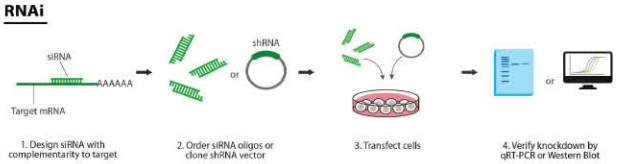

Figure 1: Workflows for using RNAi to achieve gene silencing

CRISPR-Cas9 METHOD

CRISPR stands for Clustered Regularly Interspaced Short Palindromic Repeats. The engineered CRISPR system is composed of two parts: a single guide RNA (sgRNA) and Cas9 nuclease. These components come together to form a ribonucleoprotein (RNP). The ~20 bp at the 5` end of the sgRNA (the crRNA) guides the Cas9 nuclease to a specific target sequence in the genome. In order for Cas9 to cleave the DNA, it must first recognize a DNA sequence Protospacer Adjacent Motif (PAM) sequence to the 3` of the target sequence. The PAM sequence required by Cas9 differs depending on which species the Cas9 nuclease originates from; for example spCas9 from Streptococcus pyogenes has a PAM sequence of 5`-NGG.

After binding with the DNA, Cas9 will cause a double stranded break at the target site. Error-prone NHEJ repair of the site by the cell will induce InDel mutations. Because each cell will undergo a different editing event, screening is necessary to isolate a cell line that has frameshift mutations resulting in a significant change in the translated protein (often truncation), leading to gene knockout (Figure 2).

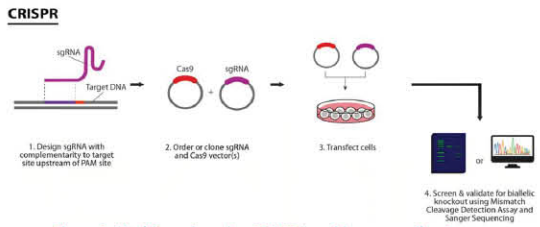

Figure 2: Workflows for using CRISPR to achieve gene silencing

GENE SILENCING IN PLANT VIA NON-TRANSGENIC APPROACH

Traditional application of RNA-mediated gene silencing to control various pests and diseases or improve crop features is through transgenic approach, whereas the dsRNA/hpRNA construct must be prepared and the transgenic plants need to be generated. However, generation of these resistant transgenic plants may cause substantial delay as it is highly dependent on the transformability and genetic stability of the target crop plant species. Furthermore, limited acceptance of the genetically modifed organism (GMO) by consumer will make the application less favourable.

Recently, a number of studies showed that the RNA gene silencing could be induced by just spraying dsRNA corresponding to the pathogen's gene on plant. This application is recognized as spray-induced gene silencing (SIGS) (Figure 3). Spray-induced gene silencing (SIGS) is a novel non-transformative strategy for plant protection. The dsRNAs and/or siRNAs targeting pathogen gene(s) are sprayed onto surfaces of plants. There are two possible pathways to silence pathogen gene(s) through spraying dsRNAs and/or siRNAs. (1) A fungal pathogen directly takes the dsRNAs and/or siRNAs up and the dsRNAs are cleaved into siRNAs by the fungal DCL proteins. (2) The host plant takes the dsRNAs and/or siRNAs up first and the dsRNAs are cleaved into siRNAs by the plant DCL proteins. Both uncleaved dsRNAs and siRNAs are then transferred into the fungal cells in which the dsRNAs are cleaved into siRNAs by the fungal DCL proteins. In both cases, the siRNAs in the fungal cells degrade the fungal pathogen mRNAs to counteract pathogen virulence.Thus, this approach silences pathogen's gene without introducing heritable modifcations into the plant genome (Koch *et al*, 2016; Wang and Jin, 2017; Cagliari *et al*, 2018).

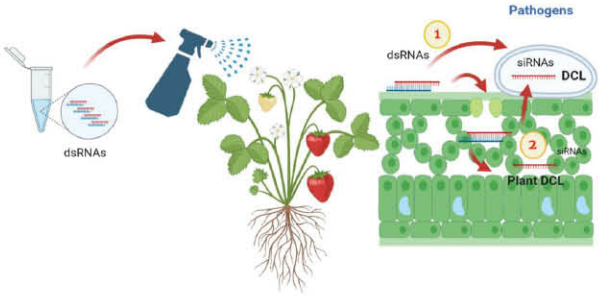

Figure 3: Spray-induced gene silencing (SIGS) for crop protection against fungal pathogens

Genetically Modified Crops

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Abstract

Genetically modified (GM) crops has been effect both the environment and the human health. Here, we focus on gene transformation techniques for GM crops to allow the transfer of genes for specific traits. Furthermore, to obtain resistant GM crops to pests, it is very efficient to use Bt gene from the Bacillus thuringiensis bacteria and also, lectins and inhibitors were used as plant defense proteins for producing pest resistant GM crops. There are many examples of GM crops, therefore, we mention the genes that they work on their modification and the method and process that used for producing GM crops. There is an economic impact of using GM crops and how they affect the countries income over the years and also, we will talk about the economic advantages and disadvantages of using this technology.

Introduction

While the population is growing up, the agriculture system has been affected to the environment, So the science have improved and use genetic engineering techniques and manipulate with DNA and RNA of the organisms. Most important features of genetic modified (GM) crops are, to be resistant from diseases, pests, herbicides, and can consume toxin. GM crops has been growing so fast by the years and spread all around the world. Also, GM crops are necessary for responding to nutrients requirements for the population. The spreading of GM crops are in many countries especially in poor countries.

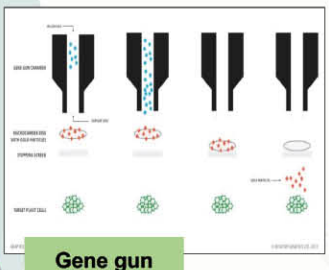
Objective

The purpose is to describe the concept of GM crops and how they added desired characteristics to enhance food value and maintain the plant quality and health. Also to explain how GM is important for reduction of pesticide effect and harmful insects for plant.

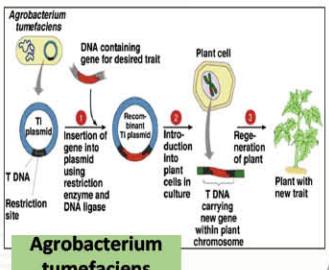
Techniques of genetic modification

1) Gene gun: gene gun system is a device used to deliver exogenous DNA RNA, or protein to cells. By coating particles of a heavy metal with a gene of interest and firing these micro-projectiles into cells using mechanical force.

2) **Agrobacterium tumefaciens mediated transformation method:** is the causal agent of crown gall disease it is a rod-shaped, Gram-negative soil bacteria. Symptoms are caused by the insertion of a small segment of DNA (known as the T-DNA, for 'transfer DNA' from a plasmid into the plant cell, which is incorporated at a semi-random location into the plant genome.



Gene gun



Agrobacterium tumefaciens method

Pest resistance GM crops

Using Bacillus thuringiensis (Bt) bacteria is very efficient way for making pest resistant GM crops. Bt is a bacterium that lives in soil that forms spores during its stationary growth cycle phase. The spores contain crystals, predominantly covering one or more Cry and Cyt proteins known as δ-endotoxins with the potent and specific insecticidal activity that can kill the pests.

Another example is lectins are present in large quantities in storage organs and seeds that are particularly vulnerable to pathogens or pest insects and most plant lectins are synthesized as inactive precursors that become active only after sequestration in the midgut of insects or different organelles in pests

Examples of GM crops

Golden Rice: is a variety of rice engineered and biofortified crop to help combat vitamin A deficiency, they injected a small of the psy gene and Crt1 into the rice genome.

Maize: GM corn was developed in the same way as golden rice because the proportion of beta-carotene doubled by gene Crt B and Crt I.

Tomatoes: Tomatoes have been genetically engineered to produce a higher proportion of anthocyanins, increasing their nutritional value and benefits, thanks to the introduction of the Dilila and Rosea 1 gene It is responsible for the accumulation of anthocyanins.

Potatoes: They conducted the gene silencing method and were able to inhibit the gene expression of the PPO enzyme, and a brownish-free crop was obtained.



The economic impact

Advantages

- Reducing financial losses.
- Reducing the usage of pesticides.
- Helps growing more food with fewer resources.

- **Disadvantages:**
- These plants would grow for one season only.
- They would produce seeds that do not germinate.
- Farmers would have to buy a fresh supply of seeds yearly.

Conclusion

The use of genetic engineering techniques is very important for GM production. Many methods were used to generate GM crops to obtain new traits in plants, such as, gene gun system and by using agrobacterium tumefaciens mediated transformation method. Furthermore, crops were produced and manipulated to be resistant to pests, especially for plants' most harmful pests. Generating GM crops has an economic impact and there are some advantaged and some disadvatages.

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Value-added utilization of phenolic compounds from watermelon by products

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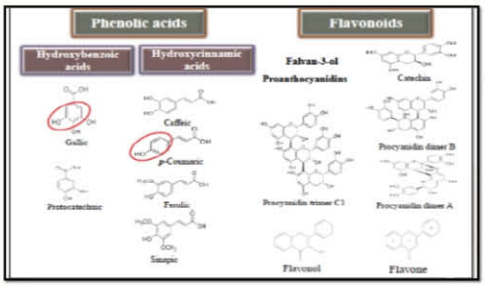
Introduction

Phenolic compounds are important bioactive compounds of melon by-products, which are identified in plant foods and represent a wide variety of compounds characterized by a phenolic structure (aromatic ring bearing one or more hydroxyl groups) The phenolic structures are diverse and can be classified into different groups (Scalbert et al., 2005). Distinctions are thus made between phenolic acids, flavonoids, lignans, and stilbenes. In addition to this diversity, phenolic compounds may be associated with carbohydrates (simple and complex), lipids, organic acids, and some phenolic compounds can also be linked to cell wall components such as cellulose, hemicelluloses, and lignin.

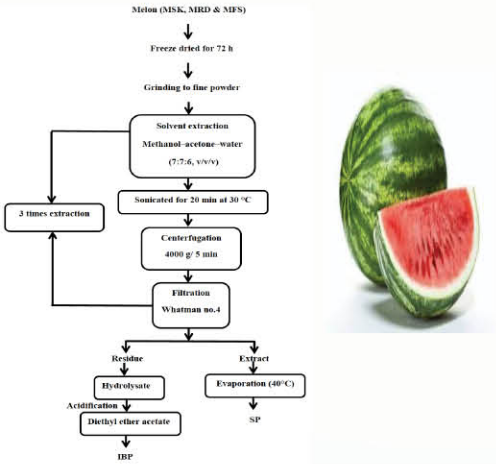


The level of phenolics in plant sources also depends on cultivation techniques, cultivar, growing conditions, extraction methods and extraction temperature, ripening process, as well as processing and storage conditions (Ongphimai et al., 2013).

Objective

The aim of this study is to present a detailed analysis of the different classes of phenolic compounds isolated from melon by-products, namely, the soluble (SP) and insoluble-bound phenolics (IBP). Thus, this study will provide generate detailed information about the bioactive compounds present in melon by-products.

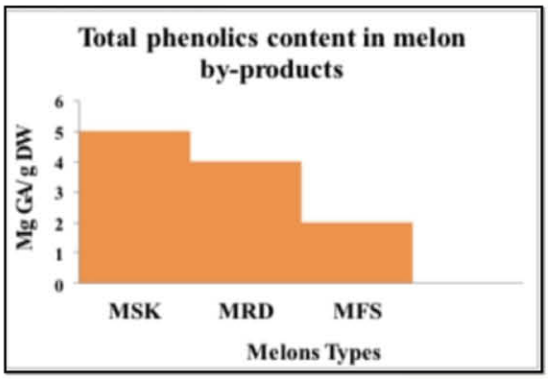
Experimental Design



Discussion and Results

- The amounts of phenolic of MSK, MRD, and MFS that are extracted from each selected melon, would contain the highest levels as MSK> MRD> MFS, respectively

- MSK, MRD, MFS of melon by-products, which are a rich source of phenolics, will be an excellent source of natural antioxidant



Conclusion

Phenolics from watermelon processing by-products will have antioxidant activities; thus, melon by-products such as the MSK, MRD, and MFS will serve as a potential source of phenolics which act as natural antioxidants and this study will provide generate detailed information about the bioactive compounds present in melon by-products to fill the existing gap in the literature and also to make use of the said by-products in a value-added manner.

Acknowledgments

We would especially like to thank the Biology Department, and those students who contributed to this research and thank everyone in the audience

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The role of alternative medicine in treating dermatitis

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Supervised By
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Abstract

This study aimed to evaluate the possible anti-inflammatory effects of three extracts (*Azadirachta indica* , *Curcurma longa* and *Cinnamomum zeylamicum*) skin is the main interface between the body and the environment, and therefore the skin is exposed to the invasion of pathogenic microorganisms. The high prevalence of infection and long exposure to antibiotics has lead to the antibiotic resistance of microorganisms. A good alternative to this resistance is the use of folk medicine. The antibacterial activity was evaluated and based on the zone of inhibition using agar disc diffusion method with different concentration(5-10-15%) and the tested bacterial strains are *Escherichia coli* and B1 isolated from skin. The results of the study showed *Curcurma* and *Azadirachta* extract at 10% gave inhibition diameter (13 mm) of *E.coli* bacteria. Also, *Azedarach* and *Curcuma* at a concentration of 15%, inhibition reached 12 mm of B1 bacteria. . *Cinnamomum* extract in its different concentrations gave the lowest inhibitory ability compared to *Azadirachta* and *Curcurma* , where the highest inhibition diameter was (6-8 mm) for the con.10-15%, respectively with B1 bacteria.

Introduction and literature review

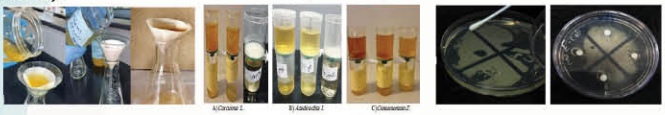
According to the World Health Organization, infectious diseases are a significant cause of morbidity and mortality worldwide, among the common diseases are skin diseases, as the skin is the main interface between the body and the environment, and therefore the skin is exposed to the invasion of pathogenic microorganisms[1]. Bacterial infections such as cellulitis, impetigo, and folliculitis, majority are caused by the gram-positive bacteria *Staphylococcus* and *Streptococcus*[2]. The high prevalence of infection and long-term exposure to antibiotics has lead to the antibiotic resistance of microorganisms. Multidrug resistant patterns in Gram-positive and negative bacteria have resulted in difficult-to-treat or even untreatable infections with conventional antimicrobials. which require development of novel treatment options and alternative antimicrobial therapies[3]. Nature always stands as a golden mark are becoming aware of the potency and side effect of synthetic drugs. According to the literature review, the role of *Curcurma longa* (Turmeric), *Azadirachta indica* (Neem) and *Cinnamomum zeylanicum* (Cinnamon) and effects due to contain active compound. Neem is a member of the mahogany family, Meliaceae[4]. The most effective compounds is nimbinin and azadirachtin. Neem has a remarkable effect on chronic skin conditions. Acne, psoriasis, eczema, ringworm and even stubborn warts[5]. effectiveness of Neem for dermatitis has been showed as anti-bacterial, anti-inflammatory and wound healing[6]. While the genus *Curcurma longa.* (Zingiberaceae) used in herbalism as a traditional medical remedy for cutaneous inflammation [7]. The active compounds in Turmeric is curcumin. Effectiveness of Turmeric for dermatitis has showed as help wounds heal by decreasing inflammation and oxidation[8]. curcumin has been traditionally used to manage atopic dermatitis symptoms[7]. The genus *Cinnamon* is an aromatic tree belonging to the family Lauraceae[9]. *Cinnamomum zeylanicum* has a coagulant effect and therefore it can be used against hemorrhaging. Moreover, it possesses potent antibacterial, antifungal and antitermitic[10]. Active compounds in cinnamon is cinnamaldehyde and eugenol. Effectiveness of *Cinnamomum zeylanicum* for dermatitis in some research reports, cinnamon has shown against acne bacteria. Cinnamaldehyde, a major constituent of cinnamon, shows anti-inflammatory activity[11]. some studies determined that cinnamon has remarkable antimicrobial activity against some skin infection agents, and food pathogens.[10].

Aim of the study

- Reducing the use of antibiotics and replacing them with safer treatment
- The use of plant extracts in the treatment of infections of the skin
- Isolation of bacteria from the skin in the pure culture.
- Making different concentrations of plant extracts.
- Study the effect of some plant extracts prepared in the laboratory on inhibition of microbes.
- Conducting a comparative experiment between the effect of plant extracts and medicinal drugs.

Methods

1. Selection of plant samples and drying
2. Prepare plant extracts with different concentrations5%,10%15% and filtration by Seitz filters
3. Bacteria isolation from skin and purification
4. The role of plant extracts in their different concentrations on inhibiting bacterial growth(Disk Diffusion Method).

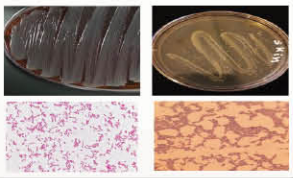


Results

1.Active compound in plant extracts

	Botanical name of plant	Active compound
1	Azadirachta indica	Nimbin
		Nimbinin
		Quecertin
		Gedunin
		Azadirachtin
2	Cinnamomum zeylanicum	Cinnamaldehyde
		Eugenol
		Cinnamyl acetate
		Caryophyllene
		Caryophyllene oxide
3	Curcurma longa	Curcumin
		Zingiberene
		Turmerone
		Atlantone

2.Microbial isolate and pure culture and staining
(*Ecoli* B1)



3. Effect of plant extracts (*Curcurma longa* ., *Azadirachta indica*. and *Cinnamomum zeylanicum*)with different concentration (5%,10%,15%)on inhibiting bacterial growth

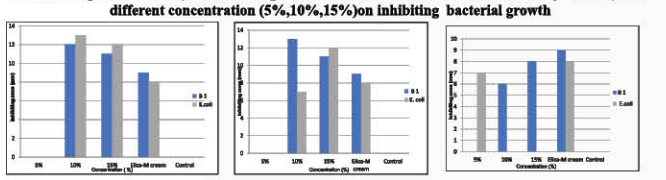


Chart 1: Antimicrobial activities of *Curcuma longa* extract; Inhibition zones average (mm) of extract

Chart 2: Antimicrobial activities of *Azadirachta indica* extract; Inhibition zones average (mm) of extract

Chart 3: Antimicrobial activities of *Cinnamomum zeylanicum* extract; Inhibition zones (mm) of extract



Inhibition zone of *Curcuma longa*, with bacteria E.coli

Inhibition zone of *Azadirachta indica*, with bacteria B1

Inhibition zone of *Cinnamomum zeylanicum*, with bacteria *E.coli*

Figure 16: Role of Elica-M cream in inhibition of bacterial growth of *E.coli*

Discussion

The results based on the zone of inhibition using agar disc diffusion method with different concentration (5%, 10%, 15%) showed the effectiveness of plant extracts, were was *Curcurma longa.* highest inhibition average with *E.coli* at 10% (13mm) and (12mm) with B1. This result consistent with previous studies, as indicated by a study of Dimas et al., reported the animal studies suggest *Curcurma longa* may kill bacteria and viruses. The aqueous extract of *Curcurma longa* has antibacterial effects. Both curcumin and the oil fraction suppress growth of several bacteria like *Streptococcus, Staphylococcus..*
Azadirachta indica. showed highest inhibition with *E.coli* at 10% (13mm) and at 15% was better in inhibiting B1 bacteria reaching (12 mm). The result consistent with previous studies, as studies have shown, Dharmendra K. Y. was reported for In vitro study against *Enterococcus feacalis* has shown potential antimicrobial roles of Neem. Arshad H. et al., showed Neem has a remarkable effect on chronic skin conditions. Acne, psoriasis, eczema, ringworm and even stubborn warts when Neem oil are used.
Were the *Cinnamomum zeylanicum.* showed inhibition at 5% for *E.coli* (7mm) in diameter, and inhibition of B1 bacteria with a con. of 10% and 15%, reaching a diameter of (6 mm) and (8 mm), respectively. This result consistent with studies, an a recent study by Maedeh Ghovvati et al., the acne patients were treated with cinnamon gel for 8 weeks. Where the result shown effectiveness of the cinnamon, results have been most probably attributed to antibacterial and anti-inflammatory activities of Cinnamon. The extracts had a more effective role in inhibition compared with treatment drug (Elica-M cream).

Conclusion

Based on the results obtained, *Azadirachta indica* (Neem) and *Curcuma longa* (Turmeric) extracts possesses an antibacterial activity against, This study demonstrated that the *Azadirachta indica.* and *Curcuma longa.* extracts from excellent antimicrobial activities against bacterial skin infection. Compared to *Cinnamomum zeylanicum*(Cinnamon) extract, *Azadirachta indica.* and *Curcuma longa.* extracts are the best .

Therefore, it has the potential to be used for medical purposes and to be utilized as antimicrobial of skin infections.

Acknowledgments

Our praise is offered to the creator, Allah, whose guidance helped us to achieve our Objectives . We also express our deep gratitude and sincere appreciation to our respectable supervisor, Dr. Majdah Altuwaijri for her meticulous supervision, support and valuable remarks and encouragement during our work in this graduation research .
Our great gratitudes to Dr. Widad Al-juhani , Vice president of Biology department and Dr Rana Khayat, For her effort on coordinating graduation projects, also we thank Miss. Huda Al-Shareef for her valuable contribution to help us prepare the requirements for the practical part of this research.
Finally, all thanks and love to our beloved families for their encouragement, understanding through our education journey. And to our friends who supported us and were with us all days, Our words will not be fulfilled to return their favor .

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Gene silencing by small interfering RNA (siRNA): mechanism and applications

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Abstract

Gene silencing is the regulation of gene expression in a cell to prevent the expression of a certain gene. Gene silencing can occur during either transcription or translation and is often used in research. Gene silencing can occur post transcriptionally due to mRNA degradation and/or repression of its translation. These effects are often mediated by small RNA regulators such as small interfering RNAs (siRNAs, microRNAs (miRNAs), or Piwi-associated RNAs (piRNAs), which are generated from different forms of double-stranded RNA (dsRNA) accumulating in cells. Small RNAs, particularly siRNAs, can also participate in silencing of genes at the level of transcription. siRNA (small interfering RNA) is able to regulate the expression of genes, by a phenomenon known as RNAi (RNA interference). siRNA has been considered to be the major player of gene therapy and shows broad therapeutic potential to treat a various gene-promoted disease including viral infection and cancer, Gene therapy is a promising therapeutic platform because it targets disease-causing genes in a sequence-specific manner, which enables more precise and personalized treatment of diverse life-threatening diseases. The specific nature of the inhibition of protein production of cells has resulted in an explosion of research to understand and exploit RNAi. The technique is now established in in vitro systems, and much work is focused on adapting RNAi for in vivo application. The potential of the technology in understanding physiological and pathological processes is significant, while its development as a therapeutic agent holds much promise as targeted agents. This review will describe the basic biological processes that drive siRNA, indicate current areas of areas research, and forecast future areas of development.

Introduction

RNAi are referred as gene knockdown technologies: the transcription of the gene is unaffected; however, gene expression, i.e., protein synthesis, is lost because mRNA molecules become unstable or inaccessible. Furthermore, RNAi is based on naturally occurring phenomenon known as Post-Transcriptional Gene Silencing. Gene silencing is generally defined as an epigenetic modification of gene expression leading to inactivation of previously active individual genes or larger chromosome regions. (Roberto,2019)

RNA interference (RNAi) is a powerful gene silencing tool that utilizes 21–25-nucleotide (nt) small interfering RNA (siRNA) to degrade a particular mRNA in highly sequence-specific manner. siRNA has been considered to be the major player of gene therapy and shows broad therapeutic potential to treat a various gene-promoted disease including viral infection and cancer . (Hu, et al.,2020).

Compared to chemical drugs and antibodies, it is a new class of drugs that is distinguished by targeting mRNA directly, thus suppressing the expression of the disease-causing proteins. Despite the huge therapeutic potential of siRNA, its clinical application remains challenging, mainly due to the lack of efficient delivery system. siRNA has been under clinical development for approximately 16 years. During that lengthy period of time, dozens of siRNA have been evaluated in clinical trials, but only one siRNA-based drug (Patisiran) has been approved by the Food and Drug Administration (FDA) under orphan drug status. (Roberto,2019)

- RNA interference (RNAi):

RNA interference It is a biological process through which gene expression is inhibited, where small pieces of RNA can shut down protein translation by binding to the messenger RNAs that code for those proteins.

The small pieces of RNA come in three varieties:

- short hairpin RNA is a type of RNA interference technology leveraged to study the function of unknown genes.

Generally, it is an artificial molecule with the introduction of corresponding RNA genes to the cell through a vector (Paddison, P,et al.J.2002).

- miRNA Small double-stranded, non-protein coding RNAs, generated from single-stranded microRNA gene transcripts by the Dicer. (Stony Brook.2010).

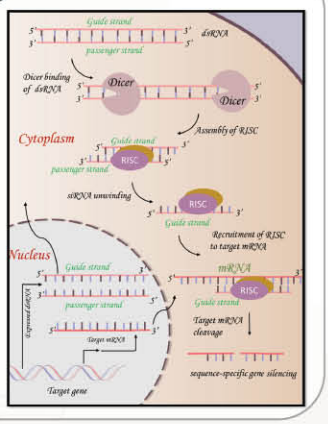
The first miRNA was discovered in C. Elegans in 1993(Bartel DP. March 2018).

- Small interfering RNA double-stranded, non-protein coding RNAs involved in gene silencing functions, Endogenously, siRNAs are generated from by the same ribonuclease, Dicer, that generates miRNA and shRNA (Hamilton AJ, Baulcombe DC.1999).

Mechanism of siRNA

❖ How is siRNA formed in a normal cell?

- Double-stranded RNA formed when complementary DNA strands are transcribed into RNA (symmetrical transcription from opposing promoters, these single-stranded complementary RNAs base pair to form ds RNA)
- In the cytoplasm, the dsRNAs are associated with, Dicer cleaves the double-stranded RNA (dsRNA). each siRNA strand as 2 to 3 nucleotide-long 3' overhangs.
- This smaller fragment of dsRNA then incorporated into RISC complex; siRNA strands are separated. Once assembled in RISC, the passenger strand of the siRNA duplex is cleaved and released.
- The antisense single-stranded siRNA component then guides and aligns the RISC complex on the target mRNA and cleaves the mRNA.

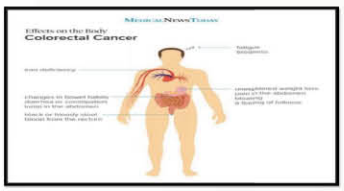


siRNA application

❑ siRNA in medical application such as colorectal cancer.

CRC Is the third most widespread cancer in the world and the second leading cause of cancer death, it affects men and women of all racial and ethnic groups. (Colorectal Cancer Alliance, 2019).

The clinical practice of siRNA delivery has a limitation, due to enzymatic degradation by serum nucleases resulting in poor stability and poor cellular uptake at target site, so nowadays, Nano carriers such as polymeric nanoparticles and lipid-based nanoparticles are highly used due their stability for siRNA delivery in colorectal cancer treatment. (Innovare Academic Sciences Pvt Ltd, 2019).



❑ Botrytis cinerea {grey mold diseases}

is generally considered as a necrotroph, which uses a diverse array of lytic enzymes and phytotoxins to damage or destroy host cells in order to acquire nutrients (Petrasch S,2019) To overcome these issues, biotechnological approaches using genetic engineering have extensively been employed to control gray mold diseases

- siRNA Regulate the Virulence of B. cinerea:

B. cinerea, employs a variety of virulence factors, including siRNA, to induce host susceptibility, such siRNA effectors play significant roles in the early stage of B. cinerea infection, B. cinerea uses siRNA effectors to manipulate the innate immunity of plant hosts by suppressing host defense responses. (Weiberg A, 2013).

- The Role of RNA Silencing in Plant Defense against Nonviral Pathogens:

Viruses are a direct target of RNA silencing mechanisms, Recent studies have provided evidence that RNA silencing pathways also play a role in plant defense against nonviral pathogens and insects, which could provide an alternative platform for developing disease and insect control strategies in plants, while more research is required to establish specific roles of RNA silencing pathways in plant defense against nonviral pathogens and insects.



Discussion

There are three strategies for RNAi: short hairpin RNA (shRNA), endogenous microRNA (miRNA) and small interfering RNA (siRNA). siRNA is more suitable for drug use because it does not require genome integration and can be easily synthesized. Since rational design of siRNA can specifically inhibit endogenous and heterologous gene expression, it can modulate any disease-related gene expression. For example, most cancer is caused by oncogene overexpression or gene mutation, so it may be possible to cure cancer by disease-related gene suppression via rational siRNA design.

Small interfering RNAs are currently the most widely used nucleic acid-based sequence-specific gene silencing molecules.one of the most significant advances has been the discovery of small (20–30 nucleotide [nt]) noncoding RNAs that regulate genes and genomes. This regulation can occur at some of the most important levels of genome function, including RNA processing, chromatin structure, RNA stability, chromosome segregation, transcription, and translation (Carthew, Sontheimer, 2009).

Conclusion

Gene therapy is a promising therapeutic platform because it targets disease-causing genes in a sequence-specific manner, which enables more precise and personalized treatment of diverse life-threatening diseases. By introducing a certain nucleic acid modality to the desired tissue of the patient, gene expression can be downregulated, increased or corrected. Small interfering RNA (siRNA), molecules used to trigger gene inhibition and it is a type of non-coding, regulatory RNA involved in the sequence-specific degradation of target mRNA in the RNA interference pathway, (Hu, etc. ,2020). siRNA is an important type of RNA interference, especially in regulating genetic change in human cells, and it can overcome many diseases such as age-related macular degeneration, diabetic macular degeneration, as well as cancer. Most importantly, the therapeutic siRNAs must reach their intended targets; If not, you may damage non-target cells.

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The effect of salinity on the tomato plant

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Umm Al - Qura University



Abstract

Tomato seeds can be grown in pot under backyard conditions, and the pots were divided into four groups to study the effect of three concentrations

From a solution of sodium chloride (0.6, 0.4, 0.2%) on some standards of germination and growth of tomato plants, and it was found that increasing the concentration of salinity negatively affects the plant.

Introduction

Salinity was one of the major problems in many parts of the world from ancient times.
Irrigation-dependent crops are mainly attached to this problem, especially in arid and semi-arid regions.
And it is considered one of the main problems hindering agricultural development

Discussion

This research was conducted to study the ability of tomato plants to withstand (resist) irrigation with salt solutions of different concentrations of NaCl. In the stages of germination and vegetative growth

Conclusion

It was found that increasing the concentration of salinity in the irrigation water for plants negatively affects and this effect is evident with the increase in the concentration of salinity

Objective

It is to know the extent of the effect of salinity on the tomato plant according to certain standards and concentrations of salinity (0.0% 0.2% 0.4% 0.6% of sodium chloride) and the effect of these concentrations on seed germination and some growth parameters.

Acknowledgments

Thanks and appreciation to His Excellency Prof. Dr. Mohsen Kamal, the supervisor of the course (Graduation Project), and for helping us to implement and complete it, and for assisting the Head of the Biology Department, Dr. Muhammad Al-Buqami

Results

Tomato seeds were grown in pots to study the effect of three concentrations of NaCl
And that increasing the salinity concentration leads directly to the decrease in the growth rate

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effect of smoke on wheat *(Triticum vulgare)* seeds germination

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Abstract

The impact of plant-derived smoke as a promoter of seed germination in many crops is well documented. [1] However, very little is known about the appropriate plant species for smoke-water preparation.[2] the effect of smoke-water on the germination and the post-germination parameters in non-fire-prone environments.[3]

Today in my project, we will try this experiment with wheat seeds, and we will see the results, differences, and the effect of coal ash on seed germination.

We noted in Table A:

The highest germination rate is 18%, which is 25 minutes when exposed to smoke, and the lowest germination rate is 6% when exposed to smoke 15 minutes, while the longest root 10.4 cm was in control and the lowest root length was 1 cm when exposed to smoke 15 minutes, while the length of the longest shoots. It was 8.5 cm when exposed to smoke for 15 minutes, and the minimum length was 4 cm when exposed to smoke 5 minutes, while the highest value of fresh fire was 0.48 when exposure to smoke was 10 minutes and the lowest weight was 0.04 when exposed to smoke 5 minutes, while the highest dry weight value was 0.15 when Exposure to smoke is 25 minutes and the minimum weight 0 when exposed to smoke is 5 minutes.

We note in Table B:

The highest germination rate is 16% when exposed to 15 minutes of smoke and the lowest germination rate is 1% when exposed to smoke 5 minutes, while the longest root is 3.14 cm when exposed to smoke 30 minutes and I say root length was 1.3 cm was in control, while the total length The highest fresh weight was 11.14 cm when exposed to smoke for 30 minutes and the lowest was 7 cm when exposed to smoke for 25 minutes and also when controlled, while the highest fresh weight was 2.16 when exposed to smoke 30 minutes and the lowest was 0.2 when exposed to smoke 10 minutes, while the dry weight The highest was 1.24 at 30 minutes of smoke exposure and the lowest 0.01 was at control.

Introduction

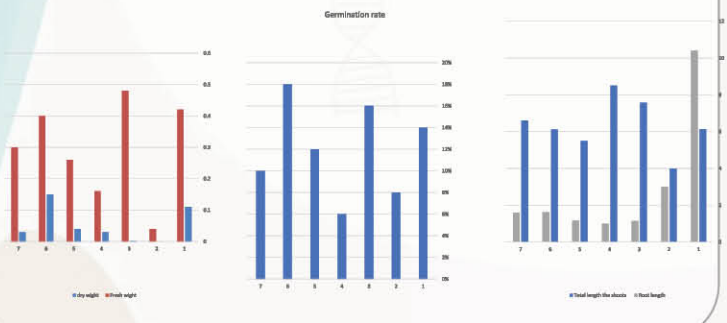
Germination rate is significantly affected by several abiotic and biochemical factors. In developed and developing countries, the residue of the previous crop is often eliminated using fire, and this technique has now been described as "prescribed burning" . Although this practice is convenient and cost-effective, it also has many hazards, including air pollution and killing of beneficial soil microorganisms. Based on prescribed burning, researchers have been able to use smoke resulting from the fire in fire-prone regions to promote seed germination . Subsequently, plant-derived smoke and aqueous extracts obtained from smoke have many applications as tools in the field of agriculture and/or to improve the conservation of threatened or rare species. Although some previous studies have shown that the smoke-water can be prepared from all plant species, and that their effect is similar on seed germination. there may be thousands of unknown compounds in smoke, and that the positive effects of smoke on seed germination may depend on the plant species. Additionally, a recent study has reported that the active compounds that can stimulate seed germination have not existed in smoke derived from different legume materials. The seed germination process is controlled by many external environmental factors, such as light, temperature, and moisture, as well as by internal growth regulators, such as gibberellins (GAs), abscisic acid (ABA), and the GAs to ABA ratio The role of smoke-water is also important in the production of plant hormones during seed germination

Objective

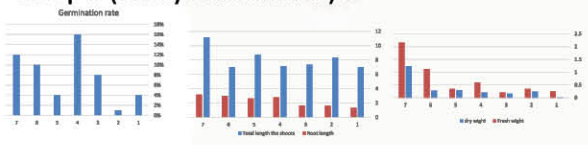
Measuring the effect of smoke on the germination rate of wheat seeds.

Results

Group A (Sandy soil only) :



Group **B** (Sandy soil with ash) :



After 5 Days of the experiment :



Discussion

When experimenting with the effect of smoke on germination of wheat seeds, it became clear to us that wheat seeds in laboratories that were not exposed to coal smoke had a germination rate of 14%
We also notice in the laboratories that were exposed to coal smoke for 25 minutes, the germination rate is 18%.
We notice that in the laboratories, which were exposed to coal smoke for 5 minutes, and was mixed with soil and coal ash, its germination rate was weak, which is 1%. As we can see also in the factories that were exposed to 15 minutes of ash smoke, and it was mixed with soil and coal ash, with a high germination rate of 16%.

Conclusion

The most obvious result of this study is that not all plants are suitable for preparing smoky water. After testing the study on wheat seeds, we reached various results in the germination rate between the seeds exposed to coal smoke and the times of their exposure to smoke. It was concluded that the percentage of seed germination in the soil is low and also the percentage of germination is low in the soil mixed with coal ash, and we did not see a germination rate in all the experiment. It reached a germination rate of 50%, which means that the study is poor with wheat seeds.

Acknowledgments

We thank everyone who contributed and helped in the completion of our research project, in the forefront of which is Dr. Muhammad Manahi Al-Buqami for providing all the necessary requirements. We also thank those who contributed and helped complete our research project led by Dr. Mustafa Qotb for supervising our research project and teaching us the basics of scientific research

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Effect of smoke on Bean (*Vicia faba*) seed germination

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Abstract

Smoke as a stimulant for seed germination is well known in many countries. It was first detected in a fire prone area, but has since been studied and applied even in fire-free areas. It has been shown to be found in endangered species, medicinal species, and crops and is known to be particularly beneficial for recovery after mining.

And today, in my project, I am presenting to you a simple design that talks about the effect of smoke on the bean seed. And we'll talk about the differences that occurred in the experiment with the pictures of the changes. After planting, it was found that the highest percentage of germination was 60%, where the plate was watered daily and the lowest percentage 0%, which is the plate that was exposed to smoke for 30 minutes and the highest root length was 14.6, and the plate was exposed to smoke for 5 minutes, and the minimum root length was 13 and was exposed to smoke . . 15 minutes ago. As for the length of the shoots, the highest was 11.5 and the lowest was 8.5. The highest fresh weight was 5.6 and the lowest weight was 3.5. The highest dry weight was 1.4 and the lowest weight was 1.3. The plate that was exposed to smoke for 30 minutes did not show any results, and these measurements belong to group A. While group B has the highest germination rate of 70% and the The height of the top .lowest 0%. The highest root length is 14.6 and lowest is 30% plant was 11.5 and below 8. Fresh top weight 4.5 and below 3.2. And finally, the highest dry weight is 1.5 and the lowest is 1.2. As for the last dish, which was exposed to smoke for 30 minutes and mixed with the ashes, the ash limits its growth

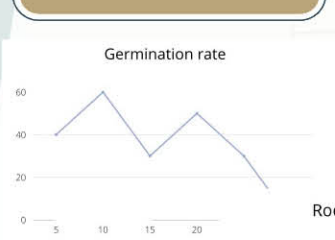
Introduction

The Influence of Plant-derived Smoke Application on Seed Germination: Smoke, as a fire by-product, in fire-prone areas, was identified as a seed germination promoter in 1990 (de Lange and Boucher 1990). Research addressing germination response to smoke has occurred in fire prone areas, such as Fynbos in Africa (see Brown et al. 2003 as a review), California chaparral in America (Keeley and Fotheringham 1998), dry deciduous forest in India (Singh and Raizada 2010), and Eucalyptus woodland in Australia (Enright and Kintrup 2001). However, a considerable number of studies have indicated that smoke application also can influence seed germination in fire-free areas (Pierce et al. 1995, Figueroa and Cavieres 2012). Furthermore, plant-derived smoke application research has expanded to agricultural and horticultural species (Kulkarni et al. 2011), medical species, and weeds (Sparg et al. 2005, Stevens et al. 2007), and has shown promise for stimulating germination and seedling growth in other economically valuable species (see Kulkarni et al. 2011 as a review).

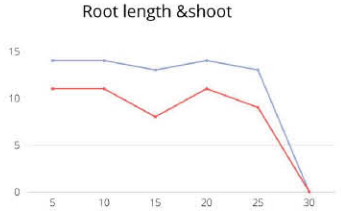
Objective

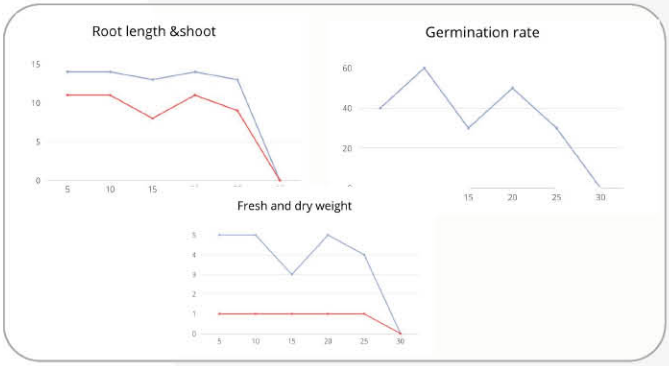
The prima- ry purpose of this study was to determine if any species have smoke-responsive germination .and also the extent to which ash affects germination

Results









Discussion

When planting, I discovered that smoke is a good factor for cultivation and that some dishes have a fairly good germination rate, and that the method of irrigation was daily at a rate of once every morning in the hour between 7:00 and 9:00, and it is possible that the different rate of germination was due to ash and in Panel No. (7) The germination rate was 0%

Conclusion

I found ash can be a germination inhibitor. We found Panel 7 to prevent 100% germination. As for the fresh weight, it is very close and the root length is close in the two soils. It also found that the plant should not be in sunlight all the time, so it should be under shade from the scorching rays of the sun. And the plate should not be on a hot surface, because the surface heat spoils the germination

Acknowledgments

I would like to thank everyone who helped us present this project headed by Dr. Mustafa Kotb, who cooperated with us and explained everything to us and simplified it in the most difficult circumstances, the most extreme of which was our inability to come to the university due to the epidemic. (COVID-19) Thank you all

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effect of The effect of smoke on the germination of barley *(Hordeum vulgare)* seeds

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Abstract

In this experiment we are studying the effect of coal smoke and its ash on the germination of barley seeds, as the result indicates an unclear indication of the effect of smoke on the seeds, whether negatively or .positively, and in the case of ash, the effect was negative on the seeds Where the highest rate of germination was 94%, the lowest rate of germination was 56%, And that the proportions of lengths (rhizome length, stem length, shoot length) are longer in samples prepared without ashes. and it was found that the highest length of the rhizome was (8.91cm) and less. The length of the stalk was (2.76 cm), while the highest length of the stalk was (3,59 cm), while the lowest length was (1,78 cm). The highest shoots length was (17,1 cm) and the lowest length in the shoots was (4,22 cm) The highest net weight of the samples was (8 g), the lowest net weight among them was (2 g), and the .most dry weight was (4 g) and the least dry was (0.8 g)

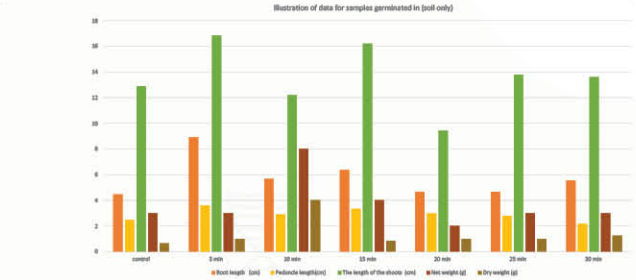
Introduction

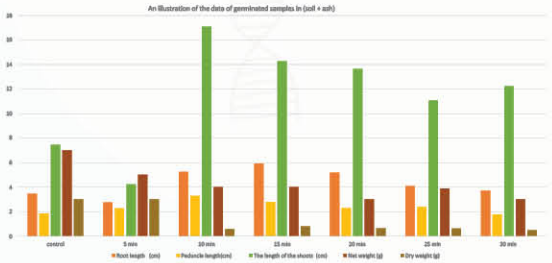
Coal in its general sense is:
a black or brown rock, often black in color, flammable and combustible, and it is found in ground layers or veins,It is composed mainly of carbon, with varying proportions of other elements (hydrogen, sulfur, oxygen, and nitrogen, among others **[A]**
The burning of coal releases several toxic gases that pose a threat to plants, soils and the environment in general, the most important of which are:
:The burning of coal releases several toxic gases that pose a threat to plants, soils and the environment in general, the most important of which are:
The release of carbon dioxide is the most important pollutant in the atmosphere.

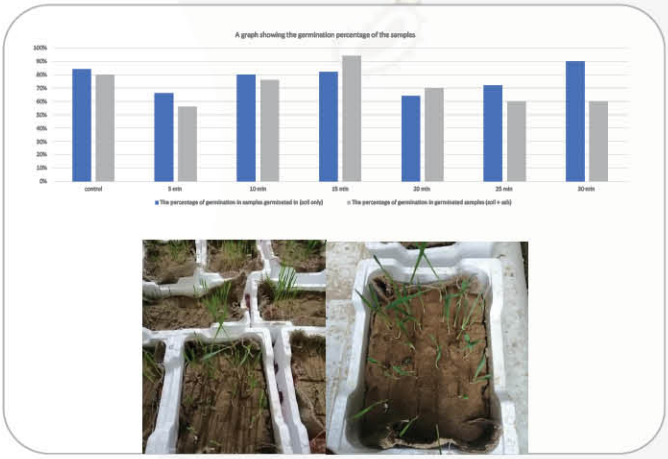
Objective

Examine the effect of smoke from charcoal on germination of barley seeds, whether negative or positive

Results







Discussion

When experimenting with the effect of smoke from charcoal on plants, it became clear to us that the highest percentage of germination was in the sample that was prepared (with sand and ash) and exposed to smoke for a period of (15 minutes), and that the length ratios (root length, stem length, shoot length) were longer. In the forbidden samples without ash, it was found that the highest length of the rootstock was (8.91 cm), while the highest length of the stalk was (3.5 cm), while the highest total shoots length was (17.1 cm).

Conclusion

we recommend not to add ash to the soil when growing plants, due to its obvious negative impact through experience

Acknowledgments

We thank everyone who contributed and helped complete our research project, especially my parents in agricultural guidance, Dr. Muhammad Al-Buqami for providing all the necessary requirements to complete our research, and Dr. Mustafa Qotb for supervising our research project and teaching us the basics of scientific research. We would also like to thank technicians for their assistance to us with some equipment. The coefficient

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The effect of carbon monoxide on the lack of oxygen in the human blood

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Abstract

Carbon monoxide is a toxic gas, There is carbon monoxide in our home like gas heaters, furnaces and chimneys, When you are in a closed place that emits carbon monoxide gas, and you inhale this toxic gas, it enters the lung and replaces oxygen and sticks to red blood cells and goes to the tissues of the body and causes the person's death or serious tissue damage

Introduction

In winter, on cold nights, and as soon as we feel cold, we all search for anything that warms our bodies, such as chimneys and gas heaters, there is a hidden killer that we do not see or feel, it is carbon monoxide gas and how it causes a lack of oxygen in the human blood, we hope that this research will be useful and educate the readers, and most importantly, we hope that the research will be a reason to save people's lives

Materials and Methods

Carbon monoxide is a toxic gas that is colorless, flavorless, and also odorless, There is carbon monoxide in burning fumes such as car exhaust and small fuel engines, and also in our home like gas heaters, furnaces and chimneys, red blood cells are concave cells that do not contain nuclei, but rather contain hemoglobin pigment, after we breathe oxygen and enters the lung, then it is transferred to the blood vessels in the lung, and then it is attached to the hemoglobin of the red

blood cells, When you are in a closed place that emits carbon monoxide gas or a place that does not have good ventilation, and you inhale this toxic gas, it enters the lung and replaces oxygen and sticks to red blood cells and goes to the tissues of the body and causes the person's death or serious tissue damage.

Results

"Headache, dizziness, weakness, nausea, vomiting, chest pain, and confusion are the most common symptoms of carbon monoxide poisoning. Inhaling large amounts of carbon monoxide gas can lead to loss of consciousness or death"[1]
And these symptoms are similar to the symptoms of flu , If you feel these symptoms and you have been exposed to carbon monoxide, do not think that what happened to you is flu, you should see a doctor immediately, Pregnant women are considered one of the groups most affected by carbon monoxide poisoning, in addition to the symptoms mentioned previously, the fetuses whose mothers are exposed to carbon monoxide gas, resulting in either the death of the fetus or the birth of a weak child, or the child develops behavioral disorders after birth.

Discussion

Annually, have your heating systems, water heaters, and any other gas, coal, or oil-fired tools inspected by a professional. Do not use portable chemical heaters inside the house, as these heaters do not have the ability to ignite, so they burn coal that leads to the emission of carbon monoxide inside the house, room or camp. Put a carbon monoxide detector in your home and check the device's battery in the fall and spring seasons. Gas appliances must be adequately ventilated so that carbon monoxide does not circulate in the home or room. Check and clean the chimney annually. Failure to clean it leads to blockage of ventilation in the fireplace, which may lead to the emission of carbon monoxide gas inside the house or room.

Conclusion

In conclusion, we hope that you learned by your reading of this research, and your reading was interesting, and that you liked our research, and we hope that our research achieved its goals by alerting you about the danger of carbon monoxide, and how you deal with it, and how to avoid poisoning with it, Take care of yourself, your families and your loved ones, and God bless you.

Reference

[1]: https://cutt.us/lLYFT - [2]: https://cutt.us/TqzMW - [3]: https://cutt.us/7NJtI - [4]: https://cutt.us/o9n2Y

[5]: https://cutt.us/zYl4r - [6]: https://cutt.us/4vIlg - [7]: https://cutt.us/Cwrty - [8]: https://cutt.us/iS4TU

[9]: https://cutt.us/eqtMl



The Role of The Environment in Human Behavior

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Dr. Ali Hassan Maghrabi

Abstract

The environment is affected by human behavior, and the environment affects human behavior. Behavior is adapted to the environment by classical conditioning and Operant Conditioning. Can adopt policies that reduce human activities that affect the environment and natural resources so that they are maintained to the highest possible, and achieve environmental sustainability. There are factors in society that affect the environment and Increase the environmental degradation. Common environmental problems often occur from dynamic situations as a result of behavioral factors and processes. Perception of environmental problems begins when assessing the actual deterioration of interests. The environment has more than factor affecting human behavior.

Introduction

The environment is important in the existence of life, and there are different types of living and non-living organisms. Dependence on the environment is carried out in water, food, air, etc. Human behaviors affect the environment and bring about changes directly or indirectly. When environmental changes occur to suit the needs of society, this creates serious impacts on the environment. Some problems such as biodiversity loss and global warming pose an existential risk to humans. We must control and modify our behaviors to conserve natural resources and achieve Environmental Sustainability. Environmental sustainability improves the role of human behaviour in ecosystems and achieves balance. There are social and instinctive factors and influences that give short-term thinking more value than long-term thinking. Environmental sustainability gives attention to two aspects of environmental damage : it is adaptation and mitigation. Adaptation is the recognition of current and expected damage and implements ways to achieve better results. Mitigation reduce damage to natural systems. Environmental degradation occurs when environmental resources are depleted or natural habitats are destroyed. The environment influences human behavior and therefore it is best to avoid these influences to reach our goals and promote human interaction and well-being.

Objective

- Clarify the Types of Conditioning of Human Behavior.
- Achieving Environmental sustainability by Human Behavior.
- The Effects of The Environment on Human Behavior.

Results

- Classical conditioning : Learning with classical conditioning occurs when stimulation is associated with response(Farnsworth, 2019). When different results are reached that are linked to certain stimuli, in this case we achieve classical conditioning (Benitez, Guilbeault, 2020).
- Operant Conditioning : In this type of learning behavior is modified by results, and is known as automated conditioning. With stimuli (when rewarded or punished) we can control behavior in Operant conditioning(Farnsworth, 2019).
- Environmental policy : Many cases of serious pollution have been resolved after 30 years of Environmental Policy. In automotive fuels Prohibition of the use of lead, Prohibition of the use of DDT in pesticides etc. The world is in greater need of renewable energy sources(Vlek, Steg, 2007).
- Societal Driving Forces of Environmental Decline: When we follow forces A,T,P,I, C, (A= average Affluence, T= average resource intensity of the Technology, P= population,I= Institutions, C= Culture) in terms of quantitative and qualitative evolution from the beginning of the existence of humans on Earth, we will get a long-term perspective(Vlek, Steg, 2007).
- Environmental problems : Many environmental problems can be described as the Commons dilemma(Edney, 1980). External influences may combine for many individual decisions and appear optimal and rational decisions, but in the collective situation they may become suboptimal and irrational, which is what we really don't want(Vlek, Steg, 2007).
- Environmental Risk, Stress, and Annoyance : When assessing the actual deterioration of interests, you begin to realize the commons dilemma. People have many reasons why they give more weight to short-term individual interests than to long-term shared interests (Vlek, Steg, 2007).
- Behavioral Processes and Environmental Motivations : Often dynamic situations develop over time and common dilemmas occur, which may be the result of many behavioral factors and processes (Vlek, Steg, 2007). Human behavior depends for many motivates, you may be conflicting and may not be conflicting (Lindenberg, Steg, 2007).
- Environmental Behavior Change and Technology : Whatever strategies are considered, their effectiveness largely depends on the proper diagnosis and adjustment of the actual determinants of behavior (Vlek, Steg, 2007).
- Changing the habit by changing the setting : In case you want to try to improve the quality of the environment, we have to change behaviour to reduce environmental impact, Of environmental problems, environmental noise, air pollution, garbage rooted in human behavior (Abusafieh, Razem, 2017).
- Factors that influence decisions that encourage pro-environmental action : The theory of value and belief (Stern, 2000) and the normative activation model (Schwartz, 1977) assume that a person who feels a moral obligation to the environment will act pro-environment.
- Interventions to promote pro-environmental behavior : Many motivational factors are associated with certain energy behaviors (Abusafieh, Razem, 2017). There are two types of motivation that are influenced by alerts and are considered behavioral economic concepts.
- Proenvironmental behavior : These are protective behaviors or actions taken by individuals to preserve the environment, It is known as sustainable, green or environmentally friendly behavior (Krajhanzl, 2010).

Discussion

Since the past decades, humans need to be sensitive to the surrounding environment in order to survive, Which means that we have an innate awareness of the environment and we are looking for an environment of a certain quality. Humans have an urgent need for Safety and security, And they look for these characteristics in their environment, We also seek physical comfort. The environment can enhance or impair interaction between humans . For example, an attractive space with comfortable chairs and privacy can encourage family members to stay and visit patients. The environment affects people's behavior and motivation for action. For example, a huge corridor filled with additional hospital equipment will invite employees to leave other things in the hall, while a clean corridor and proper storage space will encourage employees to spend time putting these things away. The environment affects the mood : For example, The results of many studies showed that the room is bright with natural and artificial lighting can improve health conditions such as insomnia, depression, and sleep (Kreitzer, 2016). People's mood and well-being are influenced by various factors of the built environment, including lighting, space allocation, access to nature, indoor air quality, color, thermal comfort, noise, preferred environment and user control of space (Charnofsky, 2012).

Conclusion

Classical conditioning in which the stimulus is linked to the response and achieve different results as a result of certain stimuli. Operant Conditioning in which behavior is modified by results, and behavior control occurs using stimuli. As the population continues to grow, the quantity and quality of environmental resources decrease, and the relationship between them directly. Also, as the population continues to grow, this leads to an increase in material consumption and production. By using policies that change driving forces, environmental sustainability can be protected and enhanced by reducing the overall environmental impact of human activities. Common dilemmas are difficult to deal with and appreciate. Problem denial and myopia are Two factors particularly effective in reducing collective interests. Through individual behavior data, computer simulations of shared dilemmas show the fate of shared resources, and give a preconception about the use of shared resources. Changes in human behavior can be encouraged by addressing the knowledge, preferences and beliefs of individuals and groups. Decision-making does not always depend on rational choices, usually comes from irrational thinking and emotions. The environment affects human behavior by space, noise, nature, colors, light and air.

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Effect of smoke on Cucumber (*Cucumis sativus*) seeds germination.

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Abstract

In this project, an experiment was conducted to study the effect of smoke on germination of cucumber seeds. The methods and techniques that will be used in this experiment will be presented. Some cucumber seeds were taken and exposed to smoke at seven different times: 1- Control of 2-)5 min(3-)10 min(4-)15 min(5-)20 min(6-)25 min(7-)30 min(. The seeds were soaked in water for two hours. These seeds were divided into two groups, where group A was soil only, and group B was soil and ash at a ratio of 1/5. 14 days after transplantation, results were monitored. It turns out that in group A: The greatest germination rate was in Plate 1 where the percentage was 84% and the lowest germination rate was in Plate 7 where the percentage of germination was 28%. The tallest plant group was in plate 1, at 13.94 cm the minimum bud length was in plate number 7 which was 9.17 cm .It turned out that the largest root length was on plate 1, being 3.62 cm and the shortest root length in plate 7 was 1.83 cm .It was found that the largest normal weight in the tablet 3 was 10.67 g and The lowest normal weight in Panel 4 was 5.28 g. It was found that the largest dry weight in plate 3 was 0.32 g, and the lowest dry weight in panel 4 was 0.15 g. And in group B: The highest rate of germination was in plate 1, where the percentage was 76%, and the lowest rate of germination was in plate 7, where the percentage was 22%. It was found that the greatest length of the vegetative total was in plate 1, where it reached 14.76 cm, and the lowest length was in plate 7, where the length was 11.29 cm. The largest length of roots was in plate 1, where the length reached 3.83 cm, and the minimum length of roots was in plate 7, where the length was 2.37 cm. It was found that the largest fresh weight was in plate 3, reaching 10.76 g, and the lowest fresh weight in plate 6, which was 6.33 g. It was found that the largest dry weight was in plate 3, reaching 0.32 g, and the lowest dry weight was in plate 6, which was 0.18 g. So, based on the resultsgiven, we conclude that smoke has an effect on seed growth, but other factors also have an important role in germination, such as temperature, light and pH. Therefore, we say that the matter is related to the time period of the seeds and the conditions that affected them.

Introduction

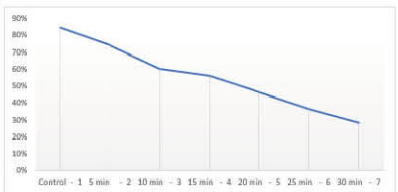
The Influence of Plant-derived Smoke Application on Seed Germination: Smoke, as a fire by-product, in fire-prone areas, was identified as a seed germination promoter in 1990 (de Lange and Boucher 1990). Research addressing germination response to smoke has occurred in fire prone areas, such as Fynbos in Africa (see Brown et al. 2003 as a review), California chaparral in America (Keeley and Fotheringham 1998), dry deciduous forest in India (Singh and Raizada 2010), and Eucalyptus woodland in Australia (Enright and Kintrup 2001). However, a considerable number of studies have indicated that smoke application also can influence seed germination in fire-free areas (Pierce et al. 1995, Figueroa and Cavieres 2012). Furthermore, plant-derived smoke application research has expanded to agricultural and horticultural species (Kulkarni et al. 2011), medical species, and weeds (Sparg et al. 2005, Stevens et al. 2007), and has shown promise for stimulating germination and seedling growth in other economically valuable species (see Kulkarni et al. 2011 as a review).

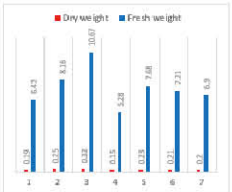
Objective

Effect of smoke on Cucumber *(Cucumis sativus)* seeds germination.

Results

The first experiment A (sandy soil only).







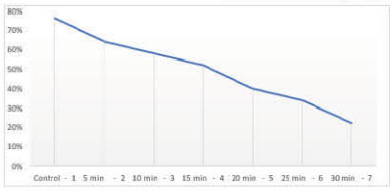


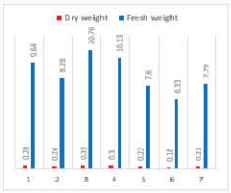
highest germination rate

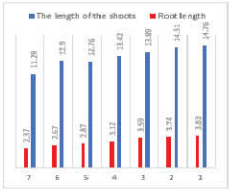


lowest germination rate

The second experiment B (sandy soil and ash).









highest germination rate



lowest germination rat

Discussion

After completing the experiment and taking the results, it was found that the percentage of germination, root length and vegetative height in group (A), which is only soil, was greater than in group (B), which represents soil with ash by 1/5, but the difference was in weights in the two groups. , Such as normal weight and dry weight. The weights were found to differ in the two groups, and they were often greater in group (B), which is a soil with ash in a ratio of 1/5.There may be other factors that influenced the growth results such as temperature, light, and pH. This was demonstrated in the Texas herb experiment by Clifford H. Koger, Krishna N. Reddy, Daniel H. Poston.
Where the results of the experiment indicate that the seeds of Texas grass are able to germinate in a variety of conditions, but results differ depending on the conditions they are going through.

Conclusion

So, based on the results given, we conclude that smoke has an effect on seed growth, but other factors also have an important role in germination, such as temperature, light and pH. Therefore, we say that the matter is related to the time period of the seeds and the conditions that affected them.

Acknowledgments

We dedicate this project to our beloved University of Umm al-Qura in general, and then to the College of Biology in particular , and to the head of the biology department \ Muhammad Manahi Al-Buqami , and to our respected dr \Mustafa Qutb , Then to everyone who helped in this work.

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Published in Diss. 2014.**

Effect of smoke on (*Eruca sativa*) seed germination

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4-Azam Aljauaid , 5-Mohammed Almalki , 6- Abduelah Raziq Allehebi ,
7- abdulaziz alotibi , 8- mohammed fouad qudus , 9-AbdulAziz AbdulBari Bakhathlaqi ,
10-Ghalib ali alamri , 11- ziad alyazidi , 12-Marwan doman

Abstract

My project is a simple design that talks about the effect of smoke on (Eruca sativa) seeds. Furthermore, I have bought (Eruca sativa) seeds and collected all the tools and supplies needed for plantation process.
First, I have put the (Eruca sativa) seeds in water. Second, I have exposed the seeds to smoke. Third, I have planted the seeds in two types of soil.
What got affected in my experiment is five things:
Germination percentage
Root length
The length of the shoot
Fresh weight
Dry weight
The soil that has been mixed with ash worked as a catalyst for seeds plantation.
In this paper, we experimented with the effect of smoke on germination of (Eruca sativa) seeds. The seeds were treated with smoke for different time periods: 0 control, 5 minutes, 10 minutes, 15 minutes, 20 minutes, 25 minutes, 30 minutes. Then, the seeds were grown in dishes containing sandy soil, and other dishes containing sandy soil and ash. However, Smoke and ash have also shown positive results in (Eruca sativa) germination, growth and development. In soil only (sandy soil only), the highest germination rate is 46%, which is when exposed to smoke for 25 minutes, and the lowest germination rate is 19%, and this is at the control. The longest plant is 6 cm and the longest root is 7 cm, which is when exposed to smoke for 20 minutes whereas the shortest root length is 4 cm, and the shortest root length is 6.5 cm at the control. The highest fresh weight value is 0.33g and dry weight 0.08g when exposed to smoke for 20 minutes. The minimum fresh weight is 0.25g and the dry weight 0.02g when exposed to smoke for 10 minutes. As for soil and ash, the highest rate of germination is 47%, which is when exposed to smoke for 30 minutes, and the lowest germination rate is 18%, which is when exposed to smoke for 20 minutes. The longest plant is 7 cm and the longest root is 10.5 cm when exposed to smoke for 5 minutes whereas the shortest plant length is 5 cm and the shortest root length is 6.5 cm. This is when exposed to smoke for 20 minutes. In addition, the highest fresh weight value is 0.39g and dry weight 0.08g when exposed to smoke for 25 minutes. The minimum fresh weight value is 0.23g and the dry weight 0.02g. This is when exposed to smoke for 10 minutes.

Introduction

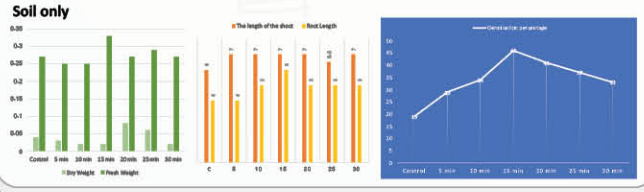
Some species do not germinate under optimal conditions, and may not respond to other dormancy cutters, but may sprout after a fire. Biologists and environmental scientists have observed this species, now called a fiery meridian, in fire-prone areas. Based on these observations, the researchers hypothesized that some aspects of the fire environment might have promotional effects on seed germination and testing of fire signals such as heat, ash, nitrite, and charred wood. In 1990 De Lange and Boucher tested the effects of smoke from a mixture of dry and fresh plants on seed germination. Their results identified a new method for triggering seed hibernation: smoke stimulation (De Lange and Boucher 1990.(
Smoke stimulates germination through several active compounds. One compound is karrikinolide (Flematti et al. 2004, Dixon et al. 2009). Its properties are well suited to being stable under high temperature, soluble in water, and active over a wide range of concentrations. In 2011, Flematti et al. (2011) isolate a second active smoke compound, glycerol nitrile, which may explain the differences in germination studies between full smoke and karrikinolide (Downes et al. 2010). Glyceronitril is stable for years and releases cyanide (Flematti et al. 2011), which is a stimulant for seed germination in low concentrations while also known to be toxic to organisms (Siegien and Bogatec 2006). Another compound, 3,4,5-trimethyl furan-2 (5H) one, can inhibit
Germination and reducing the effect of karrikinolide (Light et al. 2010.(
Species from fire-prone ecosystems worldwide, such as Fynbos (see Brown et al. 2003 as a review) and Sudanese savannah (Dayamba et al. 2010) in Africa, and eucalyptus forests in Australia (Enright and Kintrup 2001) shrub forests in central Spain (Perez-nandez and Rodriguez-echeverria 2003), dry deciduous forest in India (Singh and Raizada 2010), pine and oak and mixed forests in Mexico (Zuloaga-Aguilar et al. 2011) and California chaparral (Keeley and Fotheringham 1998) have shown their response For smoking. The effect of smoke on seed germination also extends to fire-free ecosystems, such as Karoo in South Africa (Pierce et al. 1995) and the evergreen matorral in Chile (Figueroa and Cavieres 2012).

Objective

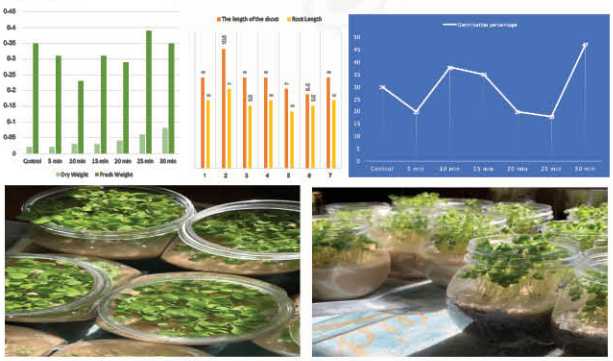
The study of the effects of smoke on(Eruca sativa) seeds.

Results

Soil only



Soil and ash



Discussion

To begin with, I have two types of soil. One soil is regular soil mixed with ash. The second soil is regular soil not mixed.
In the soil mixed with ash, the ash worked as a catalyst for the time consumed in growing the plant, similar to research references.
In the regular soil, the growth was slightly less than the soil that was mixed with ash.
Smoke has shown positive results on (Eruca sativa). These results indicate the role of negative ash in the soil, which greatly affected the plant's growth.
After the experiment was over, it was found that the germination with smoke in some dishes increases germination by 50%.
This indicates that the ash was an auxiliary to the seed.
As for germination in the soil, it's slower than germination by smoke, but in varying proportions from one plate to another.

Conclusion

To conclude, mixing the soil with ash has scientifically proved to aid in the speed of plantation, due to the ash being a good composting agent. Mixing plants seeds with smoke that comes from coal which has been turnd to ash also has an effect, due to smoke being huge amount of CO2, which is the material that the plant breath. Therefore, the clear conclusion of the process is the speed of photosynthesis, even though it is not a lot comparing it to the soil ash mix 1\5.

Acknowledgments

Whoever does not thank people does not thank God. I offer you the most beautiful expressions of thanks and gratitude from a heart overflowing with love, affection, respect and appreciation for you my family. Where did you say thank you. My thanks will not fulfill your right. Truly you pursued, the pursuit was grateful. We express our gratitude to us not to forget that the highest degree of appreciation is not represented by speaking words, but by applying them. Thank you Dr. Muhammad Mustafa Qutb

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مشاريع تخرج

قسم الكيمياء

كلمة رئيس قسم الكيمياء

بسم الله والحمد لله والصلاة والسلام على سيدنا رسول الله، وعلى آله وصحبه وسلم، أما بعد..
ايماناً من قسم الكيمياء في دوره الفعال في تشـــجيع وتنمية المهارات البحثية ودعم هذه الجهود فـــي ظل تزايد المطالب في الإنتاج البحثي التطبيقي الذي يعتبر محركاً رئيســـياً لتنمية المجتمع والتطور العلمي والصناعي. لذلك يســـرنا أن نضع بين أيديكم مشاريع التخرج التي هي ثمرة الجهد والعمل لأبنائنا الطلاب بقســـم الكيمياء، ولتشجيعهم في بناء مجتمع المعرفة ودعم اقتصاد الوطن مستقبلاً بإذن الله.

د. معتز بن هاشم مراد

كلمة وكيلة رئيس قسم الاحياء

الحمـــد لله الذي بحمده تتـــم النعم والصلاة والســـلام على من بُعث رحمـــة للأمة، اما بعد:
انطلاقاً من أهمية التطوير ومواكبة التقدم الذي تحظى به بلادنا ولما لعلم الكيمياء من أهمية وتأثير على كافة العلوم الأساسية والتطبيقية فإننا نحمد الله على التعاون والتكاتف بين أعضاء قسم الكيمياء وطلابه وطالباته والذي كانت ثمرته إنجاز مشاريع التخرج على اعلى المستويات نسأل الله عز وجل التقدم لطلاب وطالبات وجميع منسوبي القسم وأن يوفق الجميع لخدمة هذا الوطن لمزيد من الرقي والازدهار.

د. منى بنت عبدالمعطي الحسني

قسم الكيمياء	العـــدد
عدد الملصقات العلمية (طلاب)	23
عدد الملصقات العلمية (طالبات)	46
عدد الطلاب	46
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عدد المشرفين	13
عدد المشرفات	21

Posters

الملصقات العلمية

لمشاريع التخرج

قسم الكيمياء

بكالوريوس

High performance liquid chromatography method for selected common drugs

Names: Fahad Allahyani, Nami Al-Sharif, Mohammed Shata and Jameel Mnokhan
University: Department of Chemistry, Faculty of Applied Sciences, Umm Al-Qura University, Makkah, Saudi Arabia

Abstract

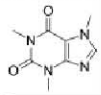
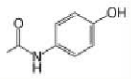
In this study, a new modified analytical method was applied for the determination of two common drugs, caffeine and paracetamol. Shimadzu (model LC-2030) high performance liquid chromatography (HPLC) was used to perform the analysis. C8 column (Shodex, 5µm, 150 × 4.6 mm) was used to separate both compounds at wavelength 243 nm. The mobile phase was methanol and deionized water (40:60) with a flow rate of 1.0 mL/min. The retention times of caffeine and paracetamol were 2.36 and 2.85 min respectively. The total analysis time was 4 min

Introduction

Caffeine:
It is an alkaloid in the Xanthine group and is among the psychotropic drugs in the stimulant group. It is found in tea, coffee, energy drinks, and medicines. 400mg is the appropriate amount for an individual's consumption per day. Excess of this amount causes problems the most famous of which are: (heart palpitations, insomnia and nausea).

Paracetamol: It is the most popular substance used in therapeutic medicines due to its high ability to reduce fever, relieve pain and eliminate headaches. And 1000mg is the highest dose a person gets per day, as excess causes liver failure, which may cause death. Mostly it was prepared artificially, but it is also found in tar which can be extracted to obtain it. The most common prescriptions that contain paracetamol are(fevadol, panadol).

HPLC instrument: High performance liquid chromatography (HPLC) is the most famous instrument for analyzing non-volatile chemical compounds. it depends on the separation of compounds through a column of separation coated from the inside with a substance that interacts with the compounds in the sample, and then the separated compounds are detected using UV detector. There are some factors that can affect the quality of separation such as solvents, column type, pressure rate, temperature, analysis time and detector type. These parameters are calibrated to suit the naturalness of the materials and the materials to be separated.

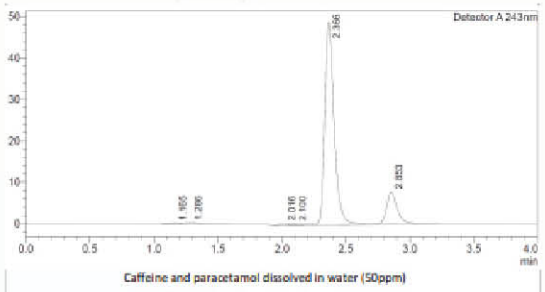





Objective

Develop a simple and rapid analytical method in order to detect and separate caffeine and paracetamol in different samples

Results



Ret. Time	Area	Height
2.366	249705	48896
2.853	46579	7911

Discussion

Different HPLC methods, mobile phases, flow rates and wavelengths were tested in this study. These methods were obtained from the literature and they were used with some modifications. Using a combination of methanol and deionised water (40:60) was found to be the best mobile phase to separate the two analytes. The isocratic HPLC method used a flow rate of 1.0 mL/min. The column was C8 and its temperature was set at 40 C. The total analysis time was 4 min which was enough to separate caffeine and paracetamol in the standard mixture.

Conclusion

After testing different analytical methods, this HPLC method at wavelength 243 nm was the best for this type of separation. Different samples can be prepared and then analysed using this method which leads to separate two of the most common drugs. However, sample preparation methods need also to be optimised in order to isolate and purify these compounds and that can be another research project.

Acknowledgments

Primarily we would thank Allah for being able to complete this project with success. Then I would like to thank our Project supervisor Dr.(Jalal Althakafy), whose valuable guidance has been the ones that helped us patch this project and make it full proof success, his suggestions and his instructions has served as the major contributor towards the completion of this project. Then we would like to thank our parents and friends who have helped us with their valuable suggestions and guidance that have been helpful in various phases of the completion of this project. Fahad Allahyani Nami Al-Sharif Mohammed Shata Jameel Mnokhan

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Umm Al-Qura University

Sulfonamides: Synthesis and Biological Activity

Abstract

Reviewing the sulfonamides, its importance, methods of preparation and biological activity , specially in antimicrobial and anticancer.

- Saeed Shnaitiy
- Mohammed Alakbari
- Faisal Almasoudi
- Abdullah Almalki



Introduction

Sulfonamide is a man-made (synthetic) medicines that contain the sulfonamide functional group (-S(=O)2-NH2), it is also called sulfa drugs. Many people use it imprecisely to refer only to antibiotics that have a sulfonamide functional group in their chemical structure.

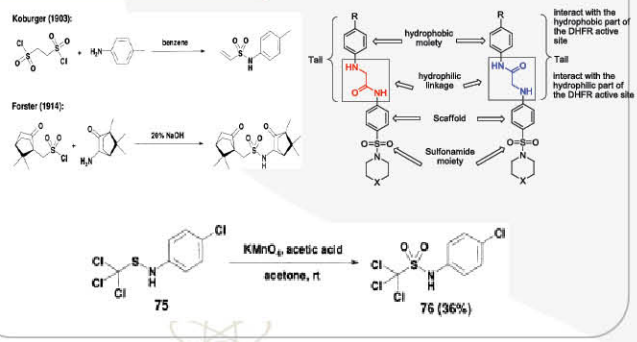
Objective

- Synthesis of some sulfonamides
- Know the properties of sulfonamides
- Know the relationship between the structure and the biological activity

Results

Learn the importance of the sulfonamides in human's life from the above-mentioned aspects, and learn about the appropriate preparation methods.

Discussion



Conclusion

In conclusion, synthesis of sulfonamides from: 4-(piperidin-1-sulfonyl)aniline and 4-(morpholinosulfonyl) aniline

Acknowledgments

Beside learning the educational material, he learned to stand in the lab as researcher under supervision Dr. Essam, graciously.

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CORROSION AND CORROSION CONTROL OF IRON AND ITS STEEL ALLOYS

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Abstract

Iron and its steel alloys are used widely in a broad field of industrial and machinery because of their good mechanical properties. They are generally subjected to corrosion phenomenon in different environments especially in acidic media. Corrosion of metals and alloys and its serious effects are considered as large global problems facing all countries in the world, which caused heavy financial losses for the global economy. In view of these facts, the present research project aims to introduce a review about the corrosion of iron and its steel alloys in different media and the methods of controlling it. The project is also extended to investigate the corrosion of Sabic steel in 2.0 M sulfuric acid solution (corrosive medium) and its inhibition by tryptophan using weight-loss method at room temperature. The obtained results indicated that tryptophan acted as efficient inhibitor for the corrosion of Sabic steel in sulfuric acid solution.

Introduction

Sabic steel (from SABIC Company, Saudi Arabia) is widely utilized in various construction applications, infrastructures, and so forth, but it suffers from corrosion attack, which is regarded as a substantial economic and safety concern. Corrosion is a naturally occurring electrochemical process, which results in deterioration of useful properties in a material due to reactions with its environment. This type of damage usually affects metallic materials, and typically produces oxide(s) and/or salt(s) of the original metal. Most structural alloys corrode merely from exposure to moisture in the air, but the process can be strongly affected by exposure to acids, bases, salts and organic chemicals. It can be concentrated locally to form a pit or crack, or it can extend across a wide area to produce general deterioration [1-3]. Thus, a considerable effort was devoted to develop more efficient, economically viable and environmentally compliant methods to prevent metallic corrosion [4,5].

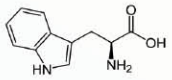
Employment of corrosion inhibitors is considered as one of the most effective, practical and economic methods to protect metallic surfaces against corrosion in aggressive media [1-8]. Corrosion inhibitors are compounds used to control corrosion of the metal surface. Most of the inhibitors are organic compounds containing heteroatoms, such as nitrogen, oxygen, sulfur, unsaturated bonds and all kinds of aromatic cycles [1-4]. Relying on the actions of these heteroatoms, inhibitors are adsorbed onto the metal surface and block the metal surface, and thus do not permit the corrosion process to take place. The influence of the inhibitor upon metal corrosion is often associated with physical or chemical adsorption [6,7]. Cost, health issues, and environmental regulation restrictions have made researchers focus on the development of non-toxic organic compounds used as corrosion inhibitors [5-8].

Objective

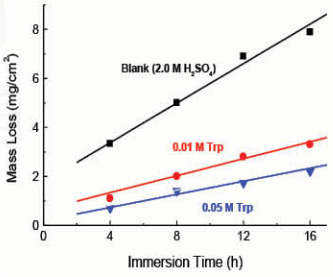
The objective of the present research project was searching about the corrosion of iron and its steel alloys in different media and the methods of controlling it. The project is also extended to investigate the corrosion of Sabic steel which is considered as one of the significant steel alloys in 2.0 M sulfuric acid solution and its inhibition by the amino acid tryptophan using weight-loss method at room temperature.

Results

Weight-loss versus immersion time for Sabic steel in 2.0 M sulfuric acid solution (corrosive medium) in the absence and presence of in different concentrations of tryptophan (inhibitor) at 25 °C.



Tryptophan



The corrosion rate (CR) was calculated in mils penetration per year (mpy) from the following equation [9]

$$\text{CR (mpy)} = \frac{KW}{Atd}$$

where K is a constant equals 3.45 x 10^6, W is the weight loss in grams, A is the specimen area in cm^2, t is time in hour and d is the density of mild steel (7.86 g/cm^3).

The inhibition efficiency (% IE) of the synthesized surfactants on the corrosion of mild steel were calculated as follows [10]

$$\%\ \text{IE} = \left[1 - \frac{CR_{inh}}{CR}\right] \times 100$$

where CR and CR_{inh} are corrosion rates in the presence and absence of the inhibitor.

Values of CR of steel and %IE of tryptophan inhibitor are listed in the following Table:

Medium	Corrosion rate (mpy)	Inhibition efficiency (% IE)
2.0 M sulfuric acid (corrosive medium)	235	---
2.0 M sulfuric acid + 0.01 M tryptophan	58	78
2.0 M sulfuric acid + 0.05 M tryptophan	40	83

Discussion

The obtained results of weight-loss method indicated that the amino acid tryptophan acted as efficient inhibitor for the corrosion of Sabic steel in sulfuric acid solution and the inhibition efficiency was found to depend on the concentration of the amino acid. The suggested inhibition mechanism involves adsorption of the amino acid on the Sabic steel surface because it contains polar groups such as O and N and each atom is considered as an adsorption center. The extent of inhibition efficiency depends on the electron density around this center. These electrons interact with the vacant *d*-orbital of iron present on the Sabic steel surface and adsorb strongly on the surface protecting the surface from the aggressive medium.

Conclusion

First, the review collected from the literature survey concerning the corrosion of iron and its steel alloys and the methods used to inhibit consists of high topics of interest of wide scientific society. This is obvious from the great number of studies conducted and published so far. Focus is on the inhibition efficiencies obtained using various organic and inorganic compounds as corrosion inhibitors in various conditions. Second, the obtained results of the experimental part indicated that tryptophan acted as efficient inhibitor for the corrosion of Sabic steel in sulfuric acid solution and the inhibition efficiency was found to depend on the concentration of the amino acid.

Acknowledgments

The Supervisor **Prof. Dr. Ahmed Fawzy and the students** of the research project would like to thank the Chemistry Department, Faculty of Applied Sciences, Umm Al-Qura University for all facilities presented to them.

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Determination of caffeine and paracetamol using high performance liquid chromatography technique

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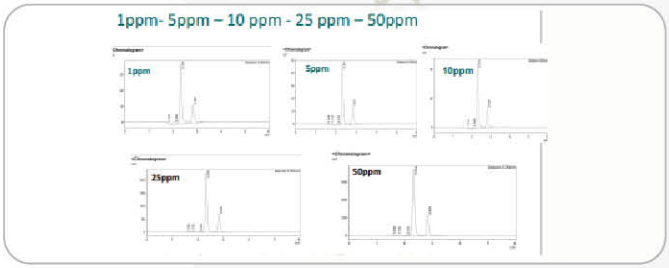
University: Department of Chemistry, Faculty of Applied Sciences, Umm Al-Qura University, Makkah, Saudi Arabia

Abstract

In this study, a new modified
A simple and easy to operate high performance liquid chromatography (HPLC) method was optimized to separate both caffeine and paracetamol in a mixture. C8 column (Shodex, 5µm, 150 × 4.6 mm) was used to separate both analytes which were prepared and diluted using distilled water. The mobile phase was methanol and deionized water with 0.1% formic acid (40:60) with a flow rate of 1.0 mL/min. The total analysis time was 6 min and the retention times of caffeine and paracetamol were 2.82 and 2.31 min respectively. The UV detector was used to detect these compounds at wavelength 254 nm. This method showed that the two analytes can be easily separated in a mixture and it can be applied to analyse these compounds in different matrices.



Introduction

Caffeine It is a central nervous system (CNS) stimulant of the methylxanthine class and the world's most widely consumed psychoactive drug. Unlike many other psychoactive substances, it is legal and unregulated in nearly all parts of the world. There are several known mechanisms of action to explain the effects of caffeine. The most prominent is that it reversibly blocks the action of adenosine on its receptors and consequently prevents the onset of drowsiness induced by adenosine. Caffeine also stimulates certain portions of the autonomic nervous system Paracetamol It is a widely used analgesic and antipyretic. It is extracted from tar, and generally used to treat fever, headache, pain and light aches. Paracetamol is an essential ingredient in many cold and flu recipes. Paracetamol was first made in 1877 and is the most commonly used medication for pain and fever in both the United States and Europe. It is on the World Health Organization's list of essential medicines.

Objective

Develop a simple and rapid analytical method in order to detect and separate caffeine and paracetamol in different samples

Results

HPLC method from the literature was used with some modifications. The mobile phase was methanol and deionised water with 0.1% formic acid (40:60) and the column was C8 column (Shodex, 5µm, 150 × 4.6 mm). This isocratic HPLC method was successfully used to separate caffeine and paracetamol in a mixture.

HPLC METHOD	
Mobile phase	40% methanol 60% 0.1%formic aced + water
Flow rate	1.0mL / min
wavelength	254
temperature	40 C
Time	6 min

5 different concentrations of caffeine and paracetamol were used

Discussion

A number of HPLC methods with different mobile phases was investigated. However, the chosen HPLC method was successfully applied to separate caffeine and paracetamol in a mixture because it showed a better separation between the two analytes. The total analysis time was 6 min with a flow rate of 1.0 mL/min. The wavelength was 254 nm which showed a good response for both compounds. The lowest concentration that can be analysed using this method was 1 ppm.

Conclusion

The method was successfully applied to separate two common pharmaceuticals, caffeine and paracetamol. The run time is relatively short, which enables rapid analysis and quantitation of many samples. The lowest concentration that can be detected was 1ppm which can be very useful for the analysis of compounds at low concentrations.

Acknowledgments

Many thanks to our supervisor Dr. Jalal Althakafy for his support and advice throughout the duration of the study and we would like to thank deanship of faculty and department of chemistry for all facilities supported our project

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Cyanation Of Aryl Halides Using New Palladium Catalyst

Abstract

An efficient method for preparation of aryl nitriles – using palladium complex as an efficient catalyst and K4[Fe(CN)6] as a green cyanide source – from aryl bromides under microwave irradiation has been reported. This complex has been demonstrated to be an active and efficient catalyst for this reaction. Using a catalytic amount of this synthesized palladium complex in DMF at 130 ◦C led to production of the Cyanoarenes in excellent yields in short reaction times

Introduction

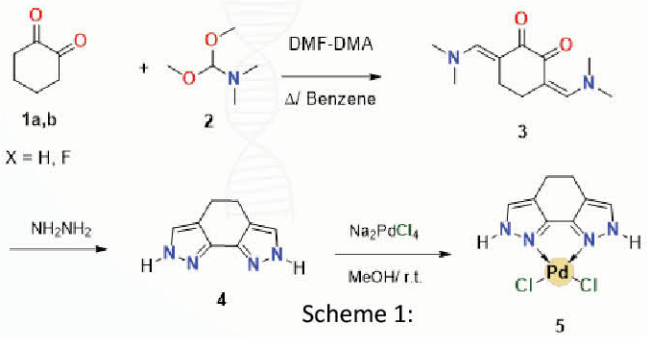
Substituted benzonitriles represent important materials for the preparation of different commercial compounds [1 – 7]. cyanide functional group may be converted to other functional groups [8,9], therefore they play significant roles in modern organic synthesis. Furthermore, in medical chemistry [10]. Some Cyanide chemicals are toxic, sensitive to moisture, or produce heave metal waste. These difficulties have been overcome using inexpensive and non toxic potassium hexacyanoferrate (II), K4[Fe(CN)6], as an efficient source of cyanide [11 – 14].

Objective

Finding an efficient method for preparation of aryl nitriles. The method we used is Cyanation of aryl halides using K4[Fe(CN)6] as non-toxic source of cyanide using Palladium complex under microwave irradiation

Results

Firstly, we made the catalyst by reacting ligand 4 with sodium tetrachloropalladate affords the corresponding palladium complex in good yield as depicted in scheme 1.

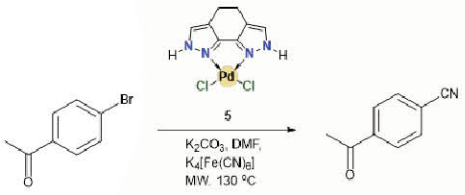


Scheme 1:

Preparation of ligand 4 and complex 5

Discussion

we tried high boiling point and microwave-active polar solvents and found that inexpensive and readily available DMF showed the best result, as shown in scheme 2.



Scheme 2

Application of complex A as a catalyst for the cyanation reaction was examined by optimizing both base and solvent under microwave conditions. We treated 4-bromoacetophenone with K4[Fe(CN)6] in the presence of K2CO3 as a base for this reaction, the microwave-inactive solvents were not suitable.

Conclusion

In this investigation, we have developed a fast and efficient catalyst for the conversion of aryl halides to cyanoarenes using non-toxic potassium hexacyanoferrate(II) instead of toxic alkali cyanides as a green chemistry method using microwave irradiation with high yields and short reaction times.

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We would like to thank Dr. Mohamed Rabie Shaaban Genidi for guiding us, teaching and giving feedback And a special thanks for Um AlQura chemistry department for providing us with a safe work place and materials

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Title: Mesoporous materials, Preparation, applications: A review

Names: Ahmed Munzer, Abdulaziz Alotaibi, Abdullhadi Alshomrani, Abdullah Al-Qurashi

Abstract

Mesoporous materials have some unique features, such as a high surface area, which is normally associated with wide pore volume in addition to good thermal and mechanical stability. These properties have attracted researchers to study the use of mesoporous materials in many applications. In this review we will focus on the applications of mesoporous materials in catalysis and water treatment applications.

Introduction

The healthiness of humans and the environment is an important requirement for sustainable life. The availability of fresh and clean water is essential to protect a healthy life. Excesses in industrialization and civilization have resulted in unlimited water pollutants as organic and inorganic contaminants. The attention given to these materials was accompanied by a focus on its property's improvement, to be nontoxic, more effective, and low cost, which opens a huge door in the development of water treatment technology, where these materials play a critical role as promising an effective method used to remove environmental pollution and the advance of human life. Typically, in water purification, when the bulky material presents in a small size form or as a nanoparticle, these materials will have several advantages such as the large numbers of active sites and high surface area, which give high efficiency in the treatment process.

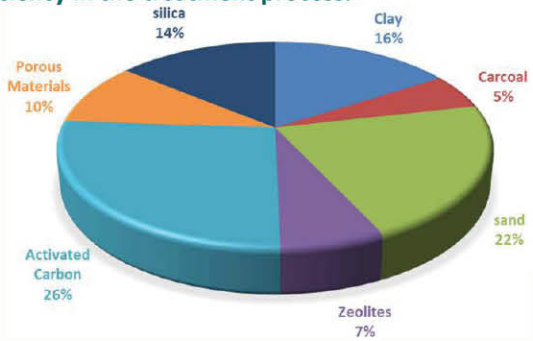


Figure 1. The % of the use of different materials in water treatment

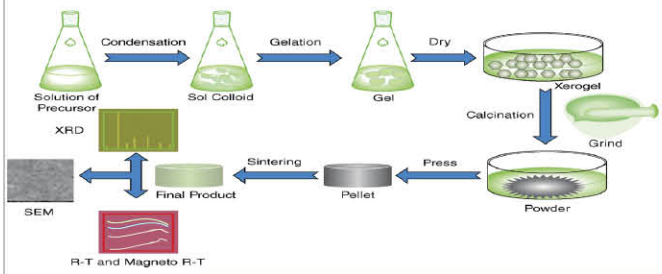
Objective

- ❑ Preparation of mesoporous materials
- ❑ Properties of mesoporous materials
- ❑ Some applications of mesoporous materials

Preparation

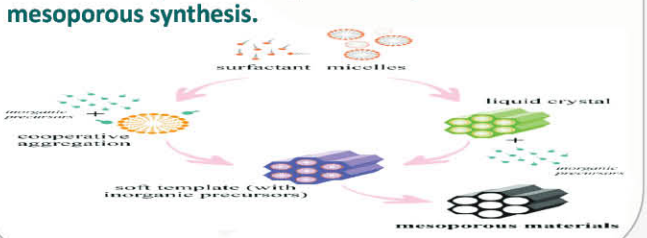
➢ Sol-gel method

Initially, a colloidal suspension is formed (called a sol) in which the inorganic network of material starts to grow. After that, the solution converts to a gel in a gelation process and the pore size/shape is controlled in the sol/gel transition.

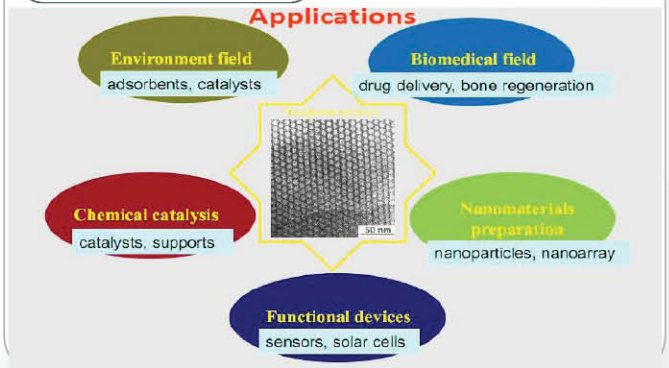


➢ Template assisted technique

In this technique, the template is responsible for the mesoporous synthesis.



Applications



Acknowledgments

We sincerely thank Prof. Dr. Abdel-Rahman Khder for his continuous guidance and support during the preparation of the graduation project, as well as this final poster.

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Umm Al-Qura University

1,3-Dipolar Cycloaddition: Synthesis and Reactions of Azomethine Ylides

1. HANI ALI AL- SHEHRI
2. Zeyad Mahmoud Malibari
3. Mohannad Abdel-Aziz Bawazir
4. Qasem Abdullah Al-Thagafi
5. Ahmad Mossaed Al- Omeyri

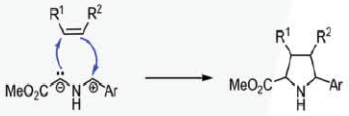


Abstract

1-Phenylpyrazolidine-3,5-dione (**1**) was prepared according to the cyclocondensation reaction of malonic acid and phenyl hydrazine in presence of phosphorus oxychloride, the different substituted 4-arylidene-1-phenylpyrazolidine-3,5-dione derivatives **2a-e** were prepared by the condensation reaction of (1) with different aromatic aldehydes in refluxed dioxane.

Introduction

Azomethine ylides are planar 1,3-dipoles composed of one nitrogen and two terminal sp^2 carbon atoms. In recent years, azomethine ylides have become one of the most investigated classes of 1,3-dipoles and, based on their cycloaddition chemistry, various methods for the synthesis of pyrrolidine derivatives have been developed.

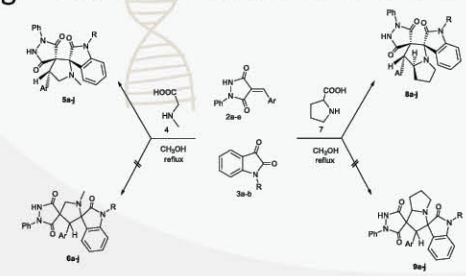


Objective

- AZOMETHINE YLIDES DIPOLAR CYCLOADDITION.
- EFFECT OF DIFFERENT SOLVENTS ON DIPOLAR CYCLOADDITION.
- MECHANISMS INVOLVED IN THIS TYPE OF CYCLOADDITION.

Results

Reaction of (*Z*)-4-arylidene-1-phenylpyrazolidine-3,5-diones **2a-e** with non-stabilized azomethine ylides, generated in situ via decarboxylative condensation of sarcosine **(4)** or L-proline **(7)** and isatins **3a,b** in refluxing methanol afforded only one product in each reaction as indicated by TLC in a highly regio- and stereo-selective manner.



Discussion

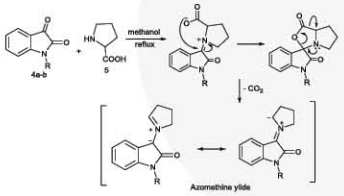
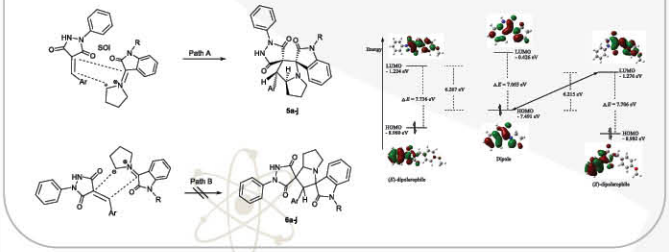


Table 1. Effect of the reaction medium on the synthesis of compound 5a

entry	Solvent	Time (h)	Yield (%)[a]
1	Ethanol	10	76
2	Methanol	10	83
3	2-propanol	15	71
4	Acetonitrile	15	69
5	Dioxane	20	52
6	Tetrahydrofuran	20	60



Conclusion

In conclusion, regioselective synthesis of a series of novel dispiro[pyrazolidine-4,3'-pyrrolidine-2',3''-indoline]-2'',3,5-triones and dispiro[pyrazolidine-4,3`-pyrrolizidine-2`,3``-indoline]-2``,3,5-triones through 1,3-dipolar cycloaddition of azomethine ylides generated in situ via decarboxylative condensation of isatin derivatives and sarcosine or L-proline with various (*Z*)-4-arylidene-1-phenyl-pyrazolidine-3,5-dione derivatives dipolaro-philes in methanol as suitable reaction medium.

Acknowledgments

The authors are highly indebted to Umm Al- Qura university and the chemistry department for supporting us in an accomplishing this project , and special thanks to **Dr. Essam M . Hussein** for his supervision and support of the project.

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Spectrophotometric determination of copper(II) using different reagents

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Abstract

A simple and rapid spectrophotometric method for the determination of copper(II) by using methyl orange(MO), bromocresol green(BCG), bromothymol blue(BTB), eriochrome black T(EBT) and murexide (MD)(ammonium purpurate) as different types of reagents with buffer solution pH 3, except with murexide, buffer solution pH 9 was used Murexide show good results and formed metal complex more stable other reagents and gave good absorbance at 444nm.

Introduction

The discovery of innovative chemosensor for the precise detection of trace amounts of alternative metal ions is vitally important target of chemists. Metal ions play indispensable roles in countless chemical reactions in addition to alternative bio-processes. Amongst these metal ions, copper is one of the fundamental ions necessary for the human beings [1,2]. It is well known to has strong binding ability to numerous ligands that approved it to be necessary element for biological systems [3]. On contrary, different analytical methods such as spectrophotometric [5] and potentiometric ion selective electrodes or sensors [6] have many advantages such as wide concentration range, high selectivity, low cost, high sensitivity, high reusability, simple use and rapid determination.

Method

Preparation of Standard Solutions:

Stock solutions ($10^{-3}M$) of Copper(II) salt and each reagent were prepared by dissolving the calculated weight in a 50 ml calibrated flask, dissolved in a least amount of ethanol, and completed to the mark with deionized water.

Apparatus

A UV-visible spectrophotometer model Shimadzu UV-Vis with 10 mm quartz cells was used for spectrophotometric determinations. The pH measurements were performed by using a pH-meter, model 3510, Jenway Instruments.

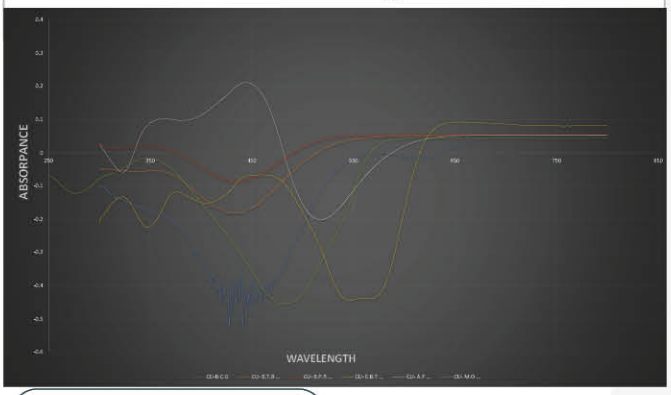
Procedure for calibration curve

One milliliter of 10-3 M of Cu(II) solution, was transferred into a series of 50 ml separating funnels. A 1.0 ml of 1x 10-3M dye solution and 5.0 ml of buffer solutions of (pH 3 for 4 reagents but murexide was added in presence pH 9). The volume of the aqueous phase was adjusted to 10 ml with distilled water and mixed well. The absorbance of the test color solutions was measured against the blank.

Results and Discussion

UV–Vis spectral study is considered one of the most useful techniques that is applied to confirm the coordination of ligand constituent atoms to the metallic center. It is also regarded one of the most significant tools that are used to differentiate between alternative geometrical structures; square planar, octahedral, and tetrahedral, of metal chelates. Electronic spectra of the azo dye ligand (L) and its complexe;

L-Cu, was measured in aquace solution within the wavelength range 250–800 nm. The advantage of working on two different concentrations lets you the ability to know the best reagent for the determination of copper(II).In the first concentration of copper $10^{-3}M$ acts as and the second concentration $10^{-5}M$ as limit of detection, only one reagent could give good absorbency MD. Murexide(MD) was excellent in determination of copper(II) and gave a perfect absorbency for both concentrations at maximum wavelength 444nm.



Conclusion

In the present investigation simple, rapid, sensitive and reproducible method was proposed for the determination of Cu (II) using deferent reagents such as MO, BCG, BTB, EBT and MD. EBT shows the best absorbance using Murexide(MD) and imit of detection. The results show that the proposed methods are simple, sensitive, and reproducible and can be used for routine analysis of copper ion in different real samples.

Acknowledgments

Many thanks to our supervisor Prof. Amr Lotfy for his support and advice throughout the duration of the study and we would like to thank deanship of faculty and head of chemistry department for all facilities supported the project and continuously the educational process despite the difficulties towards the world about COVID-19, also to many thanks Mr. Zainy for helping to get chemicals and spectra measurements.

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Spectrophotometric determination of Nickel(II) using different reagents

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Abstract

A simple and rapid spectrophotometric method for the determination of Nickel(II) by using methyl orange (MO), bromocresol green (BCG), bromothymol blue (BTB), eriochrome black T (EBT) and murexide (ammonium purpurate MD) as different types of reagents with buffer solution pH 3, except with murexide, buffer solution pH 9 was used The limit of detection for nickel(II) was noted an$10^{-6}M$ by measuring the absorbance at 478, 435, 433, 535, 485 nm for MO, BCG, BTB, EBT, MD, respectively.

Introduction

The pollution by heavy metals from natural waters and soils is of great concern due to their potentially toxic effects on living beings. Nickel was long thought to be essential for plants and some domestic animals [1]. but not considered to be a metal of biological importance until 1975, when Zerner discovered that urease was a nickel enzyme [2]. Compared with other transition metals, nickel is a moderately toxic element. However, it is known that inhalation of nickel and its compounds can lead to serious problems, including cancer of the respiratory system [3]. Spectrophotometry [4] and other methods [5] have been reported for the determination of nickel (II) in environmental samples. EDX-FS and ICP-OES are sophisticated and costly methods that requires dedicated specialist to operate. On the other hand chromatography are time consuming while voltammetry, and colorimetry not reproducible. Hence, these techniques are not suitable for routine analysis of large sets of samples where rapid analysis is needed.

Method

Preparation of Standard Solutions:

Stock solutions $(10^{-3}M)$ of Nickel(II) salt and each reagent were prepared by dissolving the calculated weight in a 50 ml calibrated flask, dissolved in a least amount of ethanol, and completed to the mark with deionized water.

Apparatus

A UV-visible spectrophotometer model Shimadzu UV-Vis with 10 mm quartz cells was used for spectrophotometric determinations. The pH measurements were performed by using a pH-meter, model 3510, Jenway Instruments.

Procedure for calibration curve

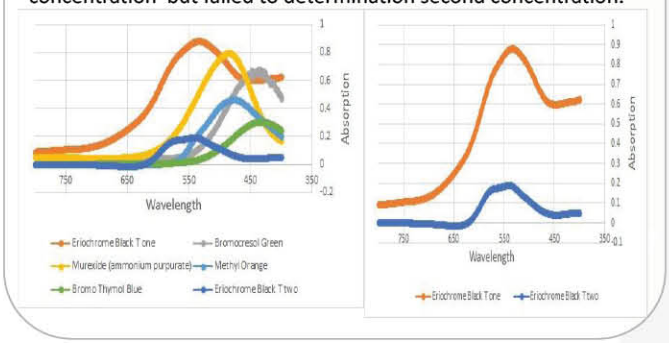
One milliliter of $10^{-3}M$ of Ni(II) solution, was transferred into a series of 50 ml separating funnels. A 1.0 ml of $1 \times 10^{-3}M$ dye solution and 5.0 ml of buffer solutions of (pH 3 for 5 reagents but murexide was added in presence pH 9). The volume of the aqueous phase was adjusted to 10 ml with distilled water and mixed well. The absorbance of the test color solutions was measured against the blank.

Results and Discussion

$Ni(II) = 10^{-3}$ M

#	Reagent	λ max	Absorption
1	Methyl Orange	478.0 nm	0.460
2	Bromocresol Green	435.0 nm	0.675
3	Bromothymol Blue	433.0 nm	0.303
4	Eriochrome Black T	535.0 nm	0.879
5	Murexide (ammonium purpurate)	485.0 nm	0.792
	$Ni(II) = 10^{-5}$ M		
4	Eriochrome Black T	543.0 nm	0.188

The advantage of working on two different concentrations lets you the ability to know the best reagent for the determination of Nickel(II).In the first concentration of nickel $10^{-3}M$ we got good results for all the reagents, but by going down to the second concentration $10^{-5}M$ only one reagent could give good absorbency. Eriochrome Black T was excellent in determination of Nickel(II) and gave a perfect absorbency for both concentrations. Murexide (ammonium purpurate) gave a high absorbency for first concentration but failed to determination second concentration.



Conclusion

In the present investigation simple, rapid, sensitive and reproducible method was proposed for the determination of nickel (II) using deferent reagents such as MO, BCG, BTB, EBT and MD. EBT shows the best limit of detection. The results show that the proposed methods are simple, sensitive, and reproducible and can be used for routine analysis of nickel ion in different real samples.

Acknowledgments

Many thanks to our supervisor Prof. Amr Lotfy for his support and advice throughout the duration of the study and we would like to thank deanship of faculty and head of chemistry department for all facilities supported the project and continuously the educational process despite the difficulties towards the world about COVID-19, also to many thanks Mr. Zainy for helping to get chemicals and spectra measurements.

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Title corrosion inhibition of carbon steel

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Abstract

The inhibition effect of urea and methyl urea toward the corrosion of carbon steel in 1 M HCl solution was studied using weight loss measurements. The percentage inhibition efficiency increases with increasing the concentration of the inhibitor. The inhibition process was explained due to the adsorption of these compounds on the surface of carbon steel. The adsorption obeys Freundlich isotherm. The negative values of ΔG°ads indicate the adsorption process of inhibitors on the carbon steel surface is spontaneous. The sequence of the %IE increase in the following order: methyl urea > Urea. The extent of inhibition depends on the electron density of the substituent group

Introduction

There are many applications of carbon steel in the industry. So, it is very important to study of the corrosion behavior of carbon steel in hydrochloric acid (HCl) due its application in chemical cleaning and pickling of the carbon steel. Unluckily, the use HCl leads to the subversive attack on the carbon steel surfaceMost often inhibitors are organic compounds containing electro donating or electro repelling functional groups, hetro atoms in their chemical structure. These atoms facilitate the adsorption process and thus we get a highly efficient inhibition. [1-9].

Objective

The objective of this work is to study the inhibiting effect of urea and methyl urea toward the corrosion of C-steel in 0.5 M HCl solution using weight loss measurement.

Results

3.1. Weight loss measurement Figures 1and 2 show the weight loss - time curves for carbon steel in 1.0M HCl solution in absence and presence of different concentrations of urea and methylurea compounds. Inspection of these figures reveals that by increasing the concentration of these compounds, the weight loss of carbon steel samples is decreased. This means that the presence of these compounds retards the corrosion of carbon steel in 1.0M HCl or in other words, these compounds act as inhibitors. The linear variation of weight loss with time in uninhibited and inhibited 1.0 M HCl solution indicates the absence of insoluble surface films during corrosion. In this case, the inhibitors are first adsorbed onto the metal surface and thereafter impede corrosion either by merely blocking the reaction sites (anodic and cathodic) or by altering the mechanism of the anodic and cathodic partial processes. The value of corrosion rate (Rcorr.) was calculated from the following equation [10]: R!"##=Δ% &' (1) where,ΔW is the average weight loss of steel coupons in the corrosive solution. S is the total surface area of the specimen, and t is the immersion time The percentage inhibition efficiency (% IE) and the surface coverage (θ) which represents the part of the metal surface covered by the inhibitor molecules were calculated using the following equations [11]: I.E = (Rfree - Radd / Rfree) X100 (2) θ = (Rfree - Radd / Rfree) (3) where, Rfree and Radd are the weight losses of carbon steel without and with addition of inhibitors, respectively. The calculated values of the percentage of inhibition efficiency and the surface coverage of inhibitors are listed in table 2. Inspection of these figures reveals that; the value of inhibition efficiency increases with increasing concentration of urea and methyl urea compounds and the order of inhibition efficiency decreases in the following order. Methyl urea > Urea Table 2.Variation of corrosion rate (Rcorr.) degree of surface coverage (θ), and percentage inhibition efficiency (%I.E) of C-steel in presence of different concentrations of urea and methyl urea

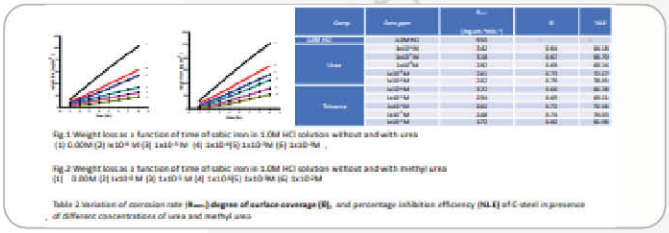

Fig.1 Weight loss as a function of time of cabic iron in 1.0M HCl solution without and with urea (1) 0.00M (2) 1x10⁻⁴ M (3) 1x10⁻³ M (4) 1x10⁻²(5) 1x10⁻¹M (6) 1x10⁻¹M .

Fig.2 Weight loss as a function of time of cabic iron in 1.0M HCl solution without and with methyl urea (1) 0.00M (2) 1x10⁻⁴ M (3) 1x10⁻³ M (4) 1x10⁻²(5) 1x10⁻¹M (6) 1x10⁻¹M

Table 2 Variation of corrosion rate (R_{corr.}) degree of surface coverage (θ), and percentage inhibition efficiency (%I.E) of C-steel in presence of different concentrations of urea and methyl urea

Discussion

Urea and methyl urea compounds inhibit the corrosion process by the adsorption on metal surface. The adsorption process can be regarded as a single substitution process in which an inhibitor molecule, In, in the aqueous phase substitutes an "x" number of water molecules adsorbed on the metal surface [11-13]. In.(aq) + X H2O(sur) ------->In(sur) + H 2O(aq). (4) where, X is the ratio of the number of a water molecule replaced by a single surfactant molecule. In order to obtain a suitable adsorption isotherm, attempts were made to fit θ to various isotherms e.g., Temkin, Frumkin, Langmuir, Freundlich, Flory-Huggins and Bockris-Swinkels. .By far the best results of investigated inhibitors were fitted by Freundlich adsorption isotherm equation [14] which is given as: log θ = logk + n logC (5)
where k and C represent the equilibrium constant of adsorption process and inhibitor concentration, respectively. A plot of log θ against log C of the investigated inhibitors for the corrosion of carbon steel 1.0 M HCl solution at 30ºC. Straight lines with intercept of log k were obtained indicating that the adsorption of these compounds on the steel surface follows Freundlich adsorption isotherm.



Fig 3 Freundlich adsorption isotherm plotted as C/e versus different inhibitors concentrations of carbon steel in 1.0 M HCl solution 1) Urea 2) methyl urea The equilibrium constant of the adsorption process, K, which is related to the standard free energy of adsorption (ΔG°ads) by [11]: K = 1 / 55.5 exp (-ΔG°ads / RT). (6) It is known that Kads represents the strength between adsordate and adsorbent. Large values of Kads imply more efficient adsorption and hence better inhibition efficiency. The values of K, ΔGoads are calculated by Langmuir isotherm and tabulated in Table (3). Inspection of the data of this Table shows that the negative values of ΔG°ads ensure the spontaneity of the adsorption process and stability of the adsorbed layer on the carbon steel surface. It clear that, the methyl urea is more inhibition efficiency than urea due to the occurrence of electron donating methyl group (−CH3). The presence of the methyl group increased the electron

Conclusion

1- Urea and methyl urea are good inhibitors for the corrosion of carbon steel in 1.0 M HCl solution. 2-The inhibition efficiency increases with increasing the concentration of inhibitor 3-The inhibition process is due to adsorption of urea and methyl urea drugs on the steel surface. 4-The adsorption obeys Freundlich isotherm

Acknowledgments

We deep thanks to Prof. Dr. Metwally Abdallah professor of physical chemistry, for his continuous help, support, encouragement, fruitful discussion, guidance and interpreting the results. Many thanks are also extended to Dr. Moataz Morad ,Head of Chemistry Department and all the staff members of chemistry Department, Umm Al Qura University, for their cooperation and encouragement.

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Title Spectrophotometric Estimation of Flutamide in Pure and in Pharmaceutical Preparations

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Abstract

Three simple, rapid, precise, sensitive, and accurate visible spectrophotometric methods (A, B, and C) are described for the estimation of flutamide in both pure and pharmaceutical preparations. They are based on the diazotization of reduced flutamide (FA) with nitrous acid followed by coupling with acetyl acetone (method A), citrazinic acid (method B), and 8-hydroxyquinoline (method C) to form colored azo dyes, exhibiting absorption maxima (*λmax) at 410, 440 and 500 nm, for methods A, B, and C,* respectively.

Introduction

Flutamide (FA), chemically known as 2-methyl-N-[4-nitro-3-(trifluoromethyl)phenyl]-propanamide, is a potent nonsteroidal antiandrogen drug primarily used to treat prostatic cancer [1–3]. Flutamide belongs to a class of drugs known as anti-androgens (anti-testosterone). Testosterone is a natural hormone that is responsible for the growth and spread of prostate cancer cells in humans. Flutamide works by blocking the effects of testosterone, thereby slowing down (decrease) the growth and spread of prostate cancer cells. Different analytical methods for the quantitative determination of FA in pure form, in pharmaceutical preparations and in biological fluids, including HPLC [4], electrochemical reduction [5] and spectrofluorometry [6] have been reported.

The present work proposes three simple, sensitive, and inexpensive methods which allow a quick determination of FA in pure form and in dosage forms. The developed three visible spectrophotometric methods are based on diazocoupling reactions using acetyl acetone (AA), citrazinic acid (CZA), and 8-hydroxyquinoline (HQ) as the coupling agents.

Methods

The methods that involve the aromatic amino group in reduced flutamide undergo diazotization with nitrous acid, and resulting diazonium ion was coupled with acetyl acetone (Method A), citrazinic acid (Method B), and 8-hydroxyquinoline (Method C) to formcolored azo-dyes and exhibiting absorption maxima (*λmax) at 410, 440 and 500 nm,* respectively for methods A, B, and C (Figure 1). The formed colored azo dyes are stable for a period of 2 h in eachmethod.





Spectrophotometric measurements

All the absorption spectral measurements are made using Shimadzu UV-1800 (UV-Vis.) spectrophotometer (Japan) with scanning speed 400 nm/min, bandwidth 1.0 nm and equipped with 10.0 mm matched quartz cells.

Results

Figure 1: Absorption spectra for 5 *μg/mL FA (methods A–C).*

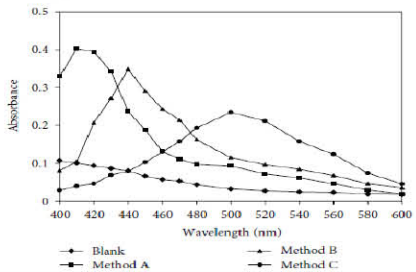
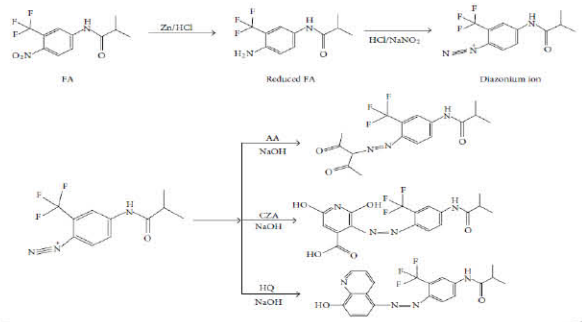


Table 1. Optical characteristics and precision.

Parameter	Method A	Method B	Method C
λ_{max} (nm)	410	440	500
Linear range (μg/mL)	0.5–12	0.5–10	0.3–10
Molar absorptivity (ε), (L/mol/cm)	2.23×10^4	2.04×10^4	1.35×10^4
Sandell sensitivity (μg cm^{-2})	0.0281	0.0136	0.0205
Intercept (*a*)	0.0124	0.0179	0.0116
Slope (*b*)	0.0734	0.0669	0.0439
LOQ (μg/mL)	0.1197	0.1047	0.2587
LOD (μg/mL)	0.0395	0.0345	0.0854

Discussion

Two steps are involved in the reaction that produces the colored azo dyes. In the first step, reduced FA is treated with nitrite solution in hydrochloric acid medium and undergoes diazotization to give diazonium ion. In the second step, the diazonium ion is coupled with the coupling agent's acetyl acetone (Method A), citrazinic acid (Method B), and 8- hydroxyquinoline (Method C) to formcolored azo dyes in an alkaline medium. The reaction pathways of all the methods are shown in Scheme 1.



Conclusion

The developed visible spectrophotometric methods are sensitive, accurate, precise, reproducible, and economical and can be successfully applied for the determination of flutamide in bulk and in pharmaceutical dosage forms. The most striking advantage of the spectrophotometric methods developed is that diazotization was carried out at room temperature, and cooling to 0– 5 *◦C was not necessary. The methods are unaffected by slight* variations in the experimental conditions such as basicity, reagent concentrations, and temperature.

Acknowledgments

The authors are grateful to Dr. Nizar ElGuesmi for helpful discussion and chemistry departemet for providing laboratory facilities.

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Title Spectrophotometric determination of pKa value of nonsteroidal antiinflammatory celecoxib drug

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Abstract

Celecoxib (CLX) is a selective cyclooxygenase-2 (COX-2) inhibitor; however, the application of CLX is compromised due to its poor aqueous solubility and low oral bioavailability. In this study, pKa value were determined by using the dependence of the capacity factor on the pH of the mobile phase. The method developed was successfully applied to determination of this drug compound in laboratory-prepared mixtures and their commercial pharmaceutical dosage forms.

Introduction

Visualization of molecules can help to understand the interactions and molecular pathways of pharmacologically active substances. Labeled substances are tools to identify unknown binding partners and to clarify the details of the mechanism of action. Celecoxib (1) (Celebrex™) is a non steroidal anti-inflammatory drug used for the treatment of numerous diseases and medical conditions including osteoarthritis, rheumatoid arthritis, acute pain, painful menstruation, and menstrual symptoms. [1,2] This pharmaceutical agent exerts its pharmacological effect as a highly selective cyclooxygenase (COX-2) inhibitor. Celecoxib was used as a lead compound, the structures of six-membered rings, five-membered heterocycles, and substituents on five-membered heterocycles were transformed by using the principle of bioisosterism .

Methods

A series of universal buffer solutions of pH range 2.54-13.50 were prepared as recommended by Britton [3]. The pH of all solutions was adjusted to the required value using pH-meter type HI 8014 HANA instruments.

The effect of different pH values on the formation of Drugs with metal ions under investigation was studied in suitable buffer media (universal, borate, phosphate, ammonia, citrate, acetate, pure HCl or pure NaOH) as optimum buffer for investigating the complexes. A series of solutions was prepared in which 1.0 mL of 1 x 10-3 M solution of drug and 9.0 mL of buffer of different pH values in 10.0 mL measuring flask and completed with distilled water. The absorption spectra were recorded in the UV and visible regions against a blank of the pure buffer solution of the same pH value.





Spectrophotometric measurements

All the absorption spectral measurements are made using Shimadzu UV-1800 (UV-Vis.) spectrophotometer (Japan) with scanning speed 400 nm/min, bandwidth 1.0 nm and equipped with 10.0 mm matched quartz cells.

Results

To estimate the ionization constant of the studied drugs using spectrophotometric method, The half-height method [4] was used:

This method is based on the fact that at the half-height of the pH-absorbance curve, the dissociated and undissociated species exist in equivalent quantities, this: pK = pH at A ½ (where: A1/2 = [(Amax-Amin)/2] + Amin)

Table 1. pH values and the corresponding absorbance at λ_{max} = 250 nm

pH	2.54	3.24	4.37	5.95	6.47	7.11
Abs	0.965	0.971	0.969	0.968	0.961	0.970
pH	8.53	9.75	10.34	12.00	12.70	13.50
Abs	0.993	1.010	1.088	1.248	1.265	1.271

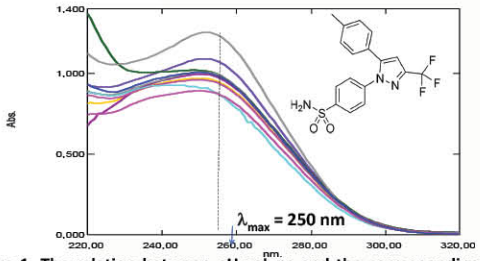

Figure 1. The relation between pH values and the corresponding absorbance for celecoxib (The half-height method).

Discussion

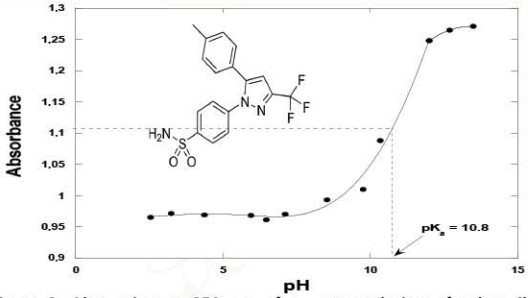

Figure 2. Absorption at 250 nm of a water solution of celecoxib as a function of pH. The point of inflection gave a pKa value of 10.80.

Table 2. pK_a values of some Drugs

Name of Drugs	pKa	Name of Drugs	pKa
Theophyline	0.7	Sulphadimidine	7.4
Ampicilin	2.5	Theophylline	8.8
Aspirin	3.5	Atropine	9.7
Phenylbutazone	4.5	Adrenaline	10.2
Sulfacetamide	5.4	Celecoxib	10.8
Trimethoprim	6.4	Ascorbic acid	11.5

Conclusion

Celecoxib is a relatively persistent drug in river water underenvironmental conditions. The photochemical reactions are moreimportant than the chemical reactions in aqueous solution, at apH value of 7.8, to foresee its degradation in surface water. Thebiological degradation is negligible.

Acknowledgments

The authors are grateful to Dr. Nizar ElGuesmi for helpful discussion and chemistry departemet for providing laboratory facilities.

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Title Photophysical properties of Aryl and heteroaryl azo dyes derived from hydroxyquinolin-2 (1*H*)-*one*

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Abstract

In this study, 6, 8-dichloro-4-hydroxyquinolin-2(1*H*)-one was prepared and was coupled with a series of diazonium salts derived from aromatic and heteroaromatic amines for synthesis of the corresponding azo dyes. The effects of organic solvents with different polarities, pH values and substituents of the diazotising components on the maximum absorption wavelength of the colorants were discussed and evaluated in detail. The acidity constants (p*Ka*) of the dyes were also determined using the spectrophotometric method.

Introduction

Organic dye chemistry is facing a very interesting development as a result of their application in different research fields including electronic [1] the photo-physical behavior of a dye dissolved in the corresponding solvent depends on the solvent properties as well as dye-solvent interactions. These interactions influence the intensity, maximum absorption wavelength and shape of the absorption and fluorescence band [2]. It is known that fluorescent dyes, which absorb and emit light, have an extremely rigid and extended π-system [3,4]. Furthermore, some efficient chromophoric and metallochromic indicators have 8HQ in their structure [5]. The presence of a stable chromophore azo group (–N=N–) conjugated with an aromatic ring creates a molecule with intense and highly stable color in different solvents throughout the visible region of light [6]. Encouraged by the aforementioned results, , 8-dichloro-4-hydroxyquinolin-2(1*H*)-one was prepared and was coupled with a series of diazonium salts derived from aromatic and heteroaromatic amines for synthesis of the corresponding azo dyes. The solvatochromic properties of the dyes are discussed in relation to the nature of the homocyclic and heterocyclic rings and the substituents. The effects of acids and bases on the visible absorption spectra of the dyes were also studied in detailusing the spectrophotometric method.

Methods

The UV-vis absorption spectra of compounds 5-18 were measured over the range of wavelengths between 300 and 600 nm in a variety of solvents with different polarities, namely trichloromethane (non-polar), acetonitrile, DMF and DMSO (polar-aprotic), acetic acid and ethanol (polar-protic), in concentrations of 10−5-10−4 mol/L.

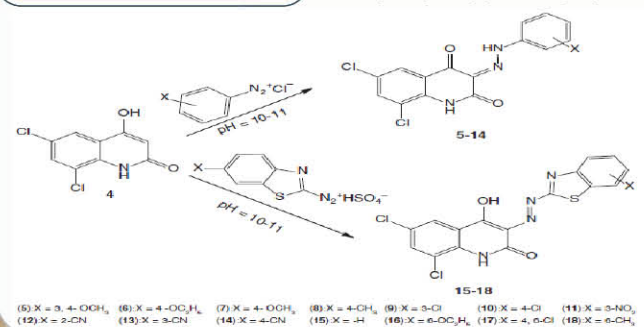


Spectrophotometric measurements

All the absorption spectral measurements are made using Shimadzu UV-1800 (UV-Vis.) spectrophotometer (Japan) with scanning speed 400 nm/min, bandwidth 1.0 nm and equipped with 10.0 mm matched quartz cells.

Results

Scheme 1 Synthesis of 3-aryl- and 3-hetaryl-4-hydroxyquinolin-2(1*H*)-*ones*



(5) X = 3, 4- OCH_3 (6) X = 4-OC_2H_5 (7) X = 4- OCH_3 (8) X = 4-CH_3 (9) X = 3-Cl (10) X = 4-Cl (11) X = 3-NO_2
(12) X = 2-CN (13) X = 3-CN (14) X = 4-CN (15) X = -H (16) X = 6-OC_2H_5 (17) X = 4, 6-Cl (18) X = 6-CH_3

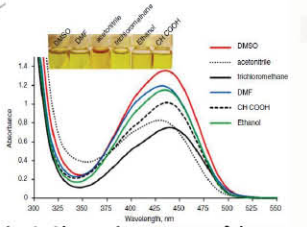


Fig. 1. Absorption spectra of dye 10 in various solvents

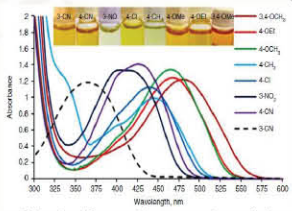


Fig. 2. Absorption spectra of dyes in chloroform

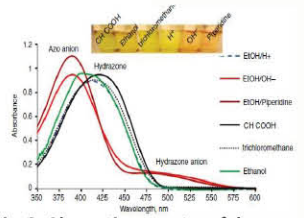


Fig. 3. Absorption spectra of dye 13 in acidic and basic solutions.

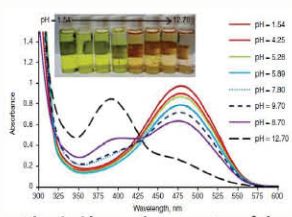
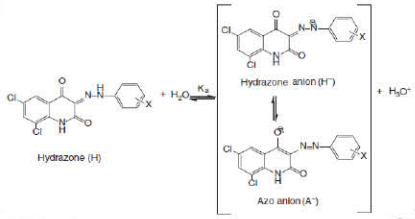


Fig. 4. Absorption spectra of dye 5 in the pH range 1.54-12.70

Scheme 2 Deprotonation of 6, 8-dichloro-3-arylazo-4-hydroxyquinolin-2(1*H*)-*one dyes*



Discussion

As is apparent from Figs. 1-4, the electronic absorption spectra of these benzothiazolyl-quinolone azo dyes did not show a regular variation with the polarity of the solvents. It was also observed that these dyes resulted in only a single absorption peak in all of the solvents used. It was found that dye 16, which contains an electron donor substituent at the 6 position of the benzothiazolyl group, showed bathochromic shifts. It should also be noted that the maximum absorption wavelength of the azo form is lower than that of the hydrazone form.

Conclusion

A series of four novel azo-quinolone disperse dyes, and their characterisation and absorption behavior were studied. Absorption spectra results for these compounds revealed that dyes 5-14, which have homoaromatic diazotising components, exist by forming keto-hydrazo-keto species (T2) as an equilibrium of E ⇌ Z isomerism in solution.

Acknowledgments

The authors are grateful to Dr. Nizar ElGuesmi for helpful discussion and chemistry departemet for providing laboratory facilities.

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Spectrophotometric determination of pKa and some heavy metals

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Supervised by: Dr. Mohammed A. Kassem

Abstract

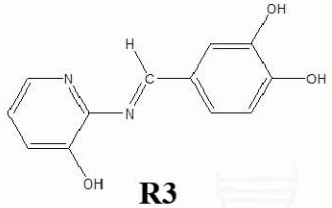
A simple, selective and highly sensitive spectrophotometric methods has been developed for the determination of some heavy metals using some organic reagents have been discussed. The absorbance was measured at optimum λmax. Other optimum experimental parameters such as buffer solution, amount of buffer, concentration of reagents and sequence of addition have been investigated. Also, the ionization constants for some Schiff bases were determined spectrophotometrically.

Introduction

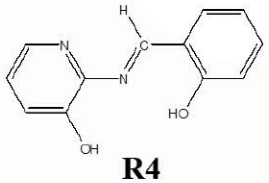
The term heavy metal refers to any metallic chemical element that has a relatively high density and is toxic or poisonous at low concentrations. Examples of heavy metals include mercury (Hg), cadmium (Cd), arsenic (As), chromium (Cr), thallium (Tl), and lead (Pb). **Heavy metals are dangerous because they tend to bioaccumulate**. Bioaccumulation means an increase in the concentration of a chemical in a biological organism over time, compared to the chemical's concentration in the environment. In recent years, the extraction and determination processes of trace metal ions or species from different matrices especially aqueous samples have become of increasing importance and have received more and more attention. **Therefore, it is important to develop simple, rapid, and efficient methods for monitoring heavy metals** in the environment. The most widely used methods for analyzing metal ions are inductively coupled plasma optical emission spectrometry (ICP-OES) and atomic absorption spectrometry (AAS), but their sensitivity and selectivity are usually insufficient for direct determination of iron at a very low concentration level in complex matrix environmental samples.

Objective

The using of Some Schiff bases for determination of Cu(II) and Ni(II) using spectrophotometric methods, in addition, determination of their ionization constants, pKa. The first step was the preparation of universal buffer solution which used for the both purposes .

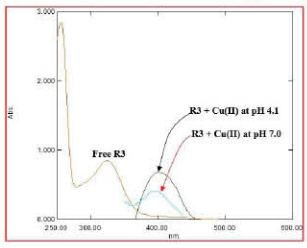


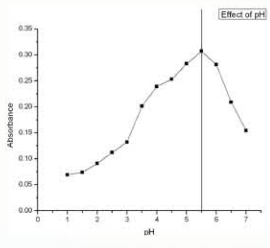
R3

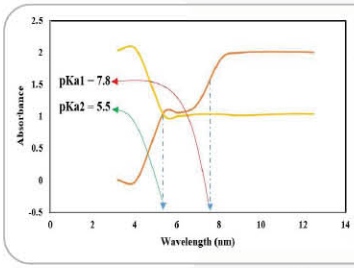


R4

Results







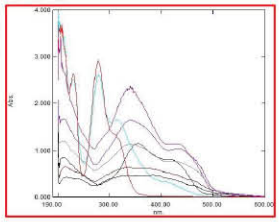


Fig. The absorption spectra for $1x10^{-4}$ M reagent 4 at different pH

Discussion

The bands of the Schiff bases were shifted in their position or show variation in extinction whereas other exhibits a new band by increasing pH of the medium as shown in the following Figs. The pH-absorbance curves of the ligands at different wavelength corresponding to λ_{max} are of typical Z or S shaped as shown in Figs. This behavior is utilized for the determination of the acid dissociation constant (pK_a) of these compounds by applying the half-height method (HHM),

Conclusion

It was concluded that the developed spectrophotometric method using Some Schiff base reagents R3 and R4, was simple, accurate, sensitive, and reproducible. It could be directly and easily applied for Cu(II), Ni(II) determination. Also, the ionization constants for the free Schiff base were determined.

Acknowledgments

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Spectrophotometric studies on optimizing the conditions for the interaction between atenolol and different reagents

1. Abstract

We present a study on optimizing the conditions for the interaction between atenolol and reagents like thoron and zincon using a double-beam UV-Vis spectrophotometer. Phosphate buffer was proven to provide suitable medium for the interaction between atenolol and zincon, whereas borate buffer was better for the interaction between atenolol and thoron. The effect of the reaction medium temperature on the absorbance of atenolol-thoron and atenolol-zincon were studied alongside the effect of reaction time on the absorbance. The proposed methods are recommended for the determination of atenolol in real samples.

2. Introduction

Ion pairs are formed when a cation and anion, which are present in a solution of an ionizable substance, come together to form a discrete chemical species The general interaction between a drug and a reagent to form an ion-pair complex. Atenolol is used with or without other medications to treat high blood pressure (hypertension). In our work, we present a study on optimizing the conditions for the interaction between atenolol and different reagents like thoron and zincon. The interaction between the reagents and the drug were confirmed by using a double-beam UV-Vis spectrophotometer.

3. Method

The solutions of atenolol, thoron and zincon were prepared in concentrations of 0.001 M using distilled water as a solvent. Two types of buffers named phosphate and borate were used. Then the test solutions were made by mixing atenolol, the reagents, the buffers and distilled water in 10 volumetric flasks. Their colours are shown in fig 1 and fig 2.

Spectroscopic measurements were made using quartz cells in wavelengths between 340 and 800 nm.

Several studies were conducted on the optimizing conditions, the effect of the reaction time on the ion-pair absorbance as well as the effect of the reaction medium on the stability of the ion-pair absorbance.



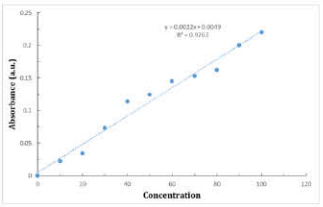
Fig 1: Atenolol-thoron solutions.



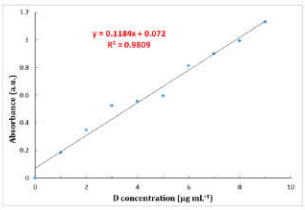
Fig 2: Atenolol-zincon solutions.

4. Results and Discussion

a. Atenolol with Thoron:
It was found that atenolol with thoron with borate buffer were suitable for ion-pair complex formation.



b. Atenolol with Zincon:
It was found that atenolol with zincon with phosphate buffer were suitable for ion-pair complex formation.



5. Conclusion

Atenolol was detected by ion-pair complex formation method by using two reagents and two buffer solutions. All the parameters affecting the formation of ion-pair and its absorbance were evaluated using a double-beam UV-Vis spectrophotometer. The optimised method showed promising results. When comparing atenolol-thoron and atenolol-zincon, the absorbance of the ion-pair complex of the latter was higher due to its intensive colour.

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Acknowledgments

We would like to show our respect and gratitude to our supervisor for his education support and leadership. Also, we thank the Head of the Chemistry Department for giving us the opportunity to acquire new learning skills, and we would like to thank them for their efforts in supporting the project and continuing the educational process despite the Difficulties facing the world around COVID- 19.

Synthesis and evaluation of an efficiency pyrazole systems incorporated with fatty chain as surface active agents

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University: Chemistry Department, Faculty of Sciences, Umm Al-Qura University

Abstract

Synthesis of active heterocyclic derivatives with the related fused systems incorporating a long chain of a fatty compound was described via the reactions of pyrazole derivative **2** with enaminones, and β-diketones. Hydroxylation of the synthesized compounds using a number of moles of propylene oxide gave nonionic surface-active agents having a good solubility in water, easy to handle, good biodegradability and announced surface properties that revealed the importance of their applications in avoiding pollution problems, and making them safe for humans and the environment. The surface properties and antimicrobial activity of these compounds were investigated, which showed low toxicity, high efficiency in the surface and biological activities. Therefore, these compounds may be exhibit capable potential in industry applications and can be used in the manufacture of cosmetics, textiles, moderate emulsifiers, dyes, pesticides and drugs.

Introduction

Heterocyclic structures are an important key in the synthesis of different drugs, pesticides, and natural products due to their efficiency, variety of substituents, and low toxicity, as well as they have demonstrated biological activities against various human diseases [1-3]. The important applications of pyrazolopyrimidine derivatives in the pharmaceutical industry as well as various biological activities have stimulated extensive research, and publication of numerous the articles in this field [4]. In addition, the pyrazole skeleton and the related fused systems are bioactive molecules as anticancer, anti-inflammatory, antioxidant, antifungal, herbicidal, insecticidal, agrochemical industry and they appear an important structural component in natural compounds [9-11]. On the other hand, many of compounds containing heterocyclic moieties have surface and antimicrobial activities were synthesized and found that they having efficiency in industrial applications such as detergents, toiletries, cosmetics, cleaning, hygiene products, textiles, personal care, petrochemicals, pharmaceuticals and electronics to perform the required function of cleaning, softening, emulsification [12,13]. The rate of biodegradation for these materials is very important for the effect of these products in aquatic environments after the end-use [14]. According to the above facts and through our program in the synthesis of heterocyclic derivatives incorporated fatty compounds [15-17].

Objective

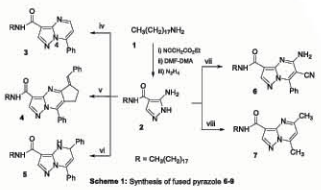
In this work, an attempt was made to synthesis of bioactive heterocyclic derivatives incorporated fatty chain having efficiency, easy-to-handle, high solubility in water, good biodegradability which manifested the importance of their application in avoiding pollution problems, and making them safe for humans as well as the environment, so they can be used in the manufacture of moderate emulsifiers, cosmetics, textiles and dyes,….etc.

Results

This project was implemented in three steps

Step 1: Synthesis of an efficiency heterocyclic systems (2-7)

The pyrazole derivative was prepared as a starting material for the synthesis of different heterocyclic moieties (2-7) by treating it with chemical reagents as illustrated in the **Scheme 1**.

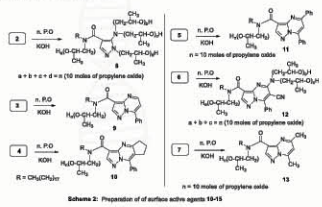


Scheme 1: Synthesis of fused pyrazole **6-9**

i) $NCCH_2CO_2Et$, ii) DMF-DMA, iii) N_2H_4, iv) PhCOCH=CH-NMe_2, v)PhCHO/cyclopentane, vi) PhCOCH=CHPh, vii) PhCH=$C(CN)_2$, viii) $CH_3(COCH_3)_2$

Step 2: Preparation of nonionic surface active agents (8-13)

All the synthesized pyrazole derivatives (2-7), which have active hydrogen atoms were propoxyled by heating above its melting point with a number of moles of propylene oxide (10 moles) in the presence of KOH, in each case, to yield environmentally friendly surface-active agents (8- 13). As shown in **Scheme 2**.



Scheme 2: Preparation of of surface active agents **10-15**

Step 3: Evaluation of the surface properties of synthesized targets (8-13)

In order to check the efficiency of the synthesized nonionic surfactants in industrial applications as commercial surfactants, some of the properties such as surface and interfacial tension, cloud point, wetting ability, foaming properties, emulsion stability and biodegradability were investigated.

Discussion

Some of the surface properties of the synthesized surfactants were investigated to obtain the data of their surface activities. These compounds revealed efficiency as surface activity making it used in the detergents, drugs, emulsifiers, cosmetic and food applications. Generally, the most of the synthesized products showed an ability to decrease the surface tension and high cloud points mean that these compounds have good performance in hot water, which can be used over a wide range of temperatures. The synthesized surfactants revealed that a high efficiency in the wetting times. Some of the surfactants have moderate foaming properties, the ability of emulsion from the results revealed that these surfactants have relatively low oil–water emulsion stability. This means these surfactants have low emulsification tendency. The biodegradation values of these surfactants specify them as biodegradable compounds and pass the international level (98% after 8 days).

Table 1: Surface properties of the synthesized compounds (**10-15**)

Sample	S. T (dyne/cm) 0.1 wt %	I. T (dyne/cm) 0.1 wt %	Cloud Point °C	Wetting (sec)	Emulsion Stability (min)	Foam height (mm)	
						0 min	5 min
8	31	10.4	77	58	44	32	25
9	39	15.3	78	76	61	25	19
10	38	14.8	81	89	57	22	17
11	40	16.8	98	94	33	36	29
12	36	14.0	95	67	52	25	20
13	37	14.6	69	78	55	28	22

Table 2: Biodegradability of the synthesized compounds (**10-15**)

Sample	1st day	2nd day	3rd day	4th day	5th day	6th day	7th day	8th day
8	39	47	57	68	79	89	96	-
9	46	52	60	67	73	80	87	94
10	44	50	57	64	71	79	85	92
11	48	56	63	68	74	81	87	91
12	43	49	56	63	70	79	86	90
13	45	53	60	67	74	80	88	93

Conclusion

New groups of ecologically safe of surface-active agents incorporated heterocyclic nucleus as pyrazole and the related fused systems were synthesized from easily renewable and cheap resources. Propoxylation of the synthesized heterocycles with propylene oxide (10 moles) produced nonionic surfactants (8-13) having announced surface properties, which exhibited good degradation susceptibility within 8 days. These surfactants revealed a low toxicity to human beings and the environment owing to their solubility and good biodegradability. So, they can be used in the manufacture of emulsifiers, dyes, luminophores for optical applications, drugs, pesticides, cosmetics and other industries. From these studies, it is understandable that further derivatization and heterocyclization of these heteroanalogues of fatty compounds can be served as new templates for their activity discovery and could probably lead to more potent agents in this field.

Acknowledgments

The authors are greatly appreciative to the staff of Chemistry Department, Faculty of Science, Umm Al-Qura University for facilitating in carrying out the investigation for the newly synthesized compounds.

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Title: Synthesis of oleochemicals with thiadiazol e derivatives based surfactants

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Abstract

A series of hydrophobically thiadiazole, pyridazine, and pyrimidine having surface and biological activities were synthesized from cheap, available and safe raw materials such as fatty acids. Thus, diazotization of thiadiazole derivative **2** and coupled with malononitrile yielded the hydrazono derivative **3**, which was used for construction of various active compounds having low toxicity, good solubility, biodegradability, surface activity. The results revealed that these materials have the ability to reduce surface tension, reduce wetting time and varying degrees of foam and emulsion stability, which makes use in different industries fields. Beside their biodegradability, which confirmed that these compounds are eco-friendly for human and the environmental.

Introduction

Heterocyclic compounds are great importance and abundant in nature due to their structural subunits, which are present in many important products as hormones, antibiotics and vitamins [1-2]. Nitrogen compounds represent one of the most effective and widely developed in heterocyclic chemistry fields [3].Therefore, nitrogen derivatives are an important class in medicinal chemistry for the facilitating understanding of biological processes [4]. In addition thiadiazole derivatives are useful moieties that reveal wide activity because of exists of N=C-S bonds within the structure of the ring, which is important part of antimicrobial activity [5]. On the other hand, many of fats and oils are using to produce customized products, which are useful for the synthesis of environmentally, friendly, new compounds [6]. Surface active agents are compounds containing hydrophobic and hydrophilic groups, which lead to an increase in solubility, moisturizing, foaming, and other surface properties, making them possess many applications from consumer to industrial materials, as toiletries, emulsifiers, cleaning, detergents, cosmetics and antistatic agents [7]. Several surface-active agents that containing heterocyclic moiety are present extensive biological activity, which can be served in the importance industries [8-14]. For these facts encouraged me to synthesis of thiadiazole **2** from palmitic acid as useful starting materials for synthesis of the heterocyclic derivatives based surfactants for use in vitro applications to facilitate the development of more potent and effective antimicrobial agents.

Objective

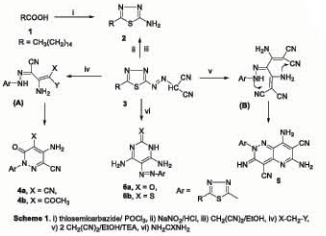
In this work, an attempt was made to synthesis of efficiency thiadiazole with the related systems and study their behavior in liquid solutions. These compounds are possessing, easy-to-handle, high solubility in water, good biodegradability which manifested the having importance of their application in avoiding pollution problems, and making them safe for humans as well as the environment, so they can be used in the manufacture of detergents, emulsifiers, cosmetics, textiles, dyes and other industrial applications.

Results

This project was achieved in the following steps

Step 1: Synthesis of an hydrophobically thiadiazole systems (2-6)

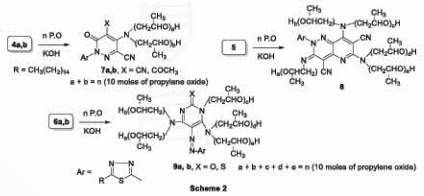
The thiadiazole derivative 3 was prepared as a starting material from palmitic acid for the synthesis of different thiazdiazole bearing pyridazine and pyrimidine with fused systems (2-6) by treating it with chemical reagents as illustrated in the **Scheme 1**.



Scheme 1. i) thiosemicarbazide/ $POCl_3$, ii) $NaNO_2$/HCl, iii) $CH_2(CN)_2$/EtOH, iv) X-CH_2-Y, v) 2 $CH_2(CN)_2$/EtOH/TEA, vi) NH_2CXNH_2

Step 2: Preparation of nonionic surface active agents (7-9)

The synthesized thiadiazole derivatives (4-6), were propoxyled by heating above its melting point with a number of moles of propylene oxide (10 moles), in each case, to yield environmentally friendly nonionic surfactant (7- 9) as shown in **Scheme 2**.



Scheme 2

Step 3: Evaluation of the surface properties of synthesized targets (7-9)

to study the behavior of these targets and in order to check their efficiency in industrial applications as commercial surfactants, some of the surface properties such as surface and interfacial tension, cloud point, wetting ability, foaming properties, emulsion stability and biodegradability were investigated.

Discussion

Initial compound **2** was designed and by diazotisation, followed by coupling smoothly with malononitrile afforded the thiadiazole derivative **3 (Scheme 1).** Reaction of **3** with ethyl acetoacetate and/or ethyl cyanoacetate gave pyridazine **(4a,b)**. Moreover, refluxing of malononitrile with **3** yielded pyridopyridazine **5**. In addition, the reaction of urea and/or thiourea with **3** gave pyrimidine **(6a,b)** respectively. Finally, the addition of propylene oxide (10 moles) to the presence of active hydrogen atoms in compounds **(4-6)** gave products **(7-9)** having a higher degree of efficiency as surfactants. **(Scheme 2)**.

Investigation of surface properties

In this study, we studied the efficiency of these compounds against some surface properties as surface and interfacial tension, the degrees of turbidity, wetting ability, foam and emulsifying stability **(Table 1)**, which can be uses as detergents, paints, plastics, textiles, raw materials treatment, water purification, anti-corrosion materials, various petroleum industries. In addition, the degree of toxicity of these compounds and impact on the environment to prevent the environmental pollution by measuring the speed of decomposition **(Table 2**). The results show a decrease in the surface and interfacial tension values, meaning that these products have clear surface activity. Also, through our study of the foam property, we found that these compounds proved varying degrees of foam property, which may offer wide applications in the dyeing and auxiliary industries. In addition, the results revealed that these products highly efficient as wetting agents, which may be useful in the textile industry. Moreover, the results showed that these targets exhibited high turbidity degrees, which makes it used at high temperatures without losing its functions. Furthermore, these surfactants proved good emulsion stability, which could be useful it as emulsifying or in textile industry. Finally, these products demonstrated a high rate of degradation in the range of 95% degradation at around 7 days, which makes it safe to use in various applications of life without the occurrence of any pollution to the environment, human, either animal or soil

Table 1: Surface properties of the synthesized compounds **(7-9)**

Materials	S.T (dyne/cm) 0.1 wt%	I.F.T (dyne/cm) 0.1 wt%	Foam h (mm) 1wt. %	Wetting t (sec.) 1wt. %	Cloud Point °C	Emulsions (min.) 10 ml oil
7a	31	7.5	88	60	68	114
7b	31	8..0	90	57	77	99
8	32	10.5	84	71	70	123
9a	30	8.5	92	64	67	110
9b	31	9.5	95	67	68	100

Table 1: Biodegradability of the synthesized compounds **(7-9)**

Materials	1st day	2nd day	3rd day	4th day	5th day	6th day	7th day
7a	38	46	55	66	77	89	-
7b	36	42	50	63	75	87	90
8	39	48	59	70	79	90	-
9a	37	44	52	74	82	89	96
9b	40	48	60	72	80	90	-

Conclusion

- This study demonstrated that further heterocyclic derivatization from fatty acids can result in new templates for surface activity discovery and could potentially lead to more potent agents in this field.
- The newly synthesized compounds **(7-9)** exhibited surface activity, which may be of use in various textile methods such as scouring and dyeing, where surfactants are used to remove oily impurities from fibers.
- These compounds have distinct surface activity, which can be used in many industrial applications such as manufacture of detergents and cosmetics.

Acknowledgments

The authors are greatly appreciative to the staff of Chemistry Department, Faculty of Science, Umm Al-Qura University for facilitating in carrying out the investigation for the newly synthesized compounds.

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Title: Synthesis of oleochemicals with study of their behaviour in the aqueous solutions
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Abstract

Synthesis of condensed and non-condensed heterocyclic rings with long fatty chains as surface active biological compounds. 2-cyano-3-(dimethylamino)-*N*-octadecylacrylamide was used to synthesize heterocyclic products by interacting with appropriate chemical reagents. These compounds were transferred to nonionic surface-active agents by condensation with propylene oxide. The surface properties showed that these compounds have a high solubility that helps them to easy absorption and adsorption with other compounds. In addition, they have a high ability to decrease the surface tension of the liquids, good wetting and emulsification power, which can be used at different temperatures without losing their surface or biological properties and enable them for use in industrial and pharmaceutical purposes easily

Introduction

Oleochemical products are have practical applications such as pharmaceuticals, photo sensitizers, dyes, plant protection agents, monomers and other applications is organic synthesis and are entering into wide range of applications and used in the synthesis of other organic compounds, which play an important role in the medicinal fields due to their diverse biological and pharmacological activities [1-3]. On the other hand, the surface-active agents are used in variety of products have a widely applications in cleaning formulations, household, toiletry, cosmetics and herbicides [4]. Commercial surfactants are found in skin/hair, care products and drug delivery systems, which used in environmental remediation, food processing and protein extraction because the low interfacial area, toxicity and electrolyte resistance [5]. Because of the effectiveness of the surfactants in hard water, it plays a wider role in industrial innovation and maintains its safety in the acidic, neutral and basic media, which show the compatibility of the skin properly, and can be formulated using ionic surfactants [6] The surface molecules have a high efficiency that makes them sustainable manufactured sources and are more effective in their applications to create new materials [7]. For our program aimed to use new and simple methods for the construction of functionally compounds, which are cheap, effective, and safe, which can be apply as biodegradable compounds, agricultural chemicals from the raw materials, which available laboratory [8-10].

Objective

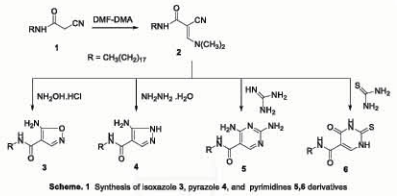
In this work, an attempt was made to synthesis of efficiency oleochemical containing heterocyclic systems with the study of their behavior in aqueous solutions. These compounds are possessing, easy-to-handle, high solubility in water, good biodegradability. So, these products can be use in the manufacture of detergents, emulsifiers, cosmetics, textiles, dyes and other industrial applications.

Results

This project was achieved in the following steps

Step 1: Synthesis of oleochemicals containing heterocyclic systems **(3-6)**.

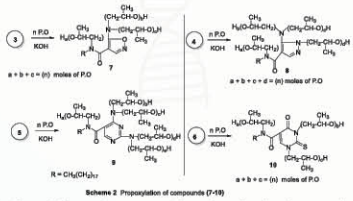
Reaction of cyanoacetamide **1** [prepared by treatment of octadecyl amine with cyanoacetic acid] with dimethylformamide-dimethylacetal (DMF-DMA) in toluene gave the enaminonitrile **2** as a starting material for the synthesis of oleochemicals bearing isoxazole, pyrazole, and pyrimidine systems **(3-6)** by treating it with different nucleophiles as shown in the **Scheme 1**.



Scheme. 1 Synthesis of isoxazole **3**, pyrazole **4**, and pyrimidines **5,6** derivatives

Step 2: Preparation of surface active agents (7-10)

The synthesized products (3-6), were propoxyled by heating above its melting point with a number of moles of propylene oxide (10 moles), in each case, to yield environmentally friendly nonionic surfactant (7- 10) as shown in **Scheme 2**.



Scheme 2 Propoxylation of compounds (7-10)

Step 3: Evaluation of the surface properties of synthesized targets (7-10)

To study the behavior of these targets and in order to check their efficiency in industrial applications as commercial surfactants, some of the surface properties such as surface and interfacial tension, cloud point, wetting ability, foaming properties, emulsion stability and biodegradability were investigated.

Discussion

The enaminonitrile **2** was synthesizes in good yield, by treatment of of cyanoacetamide **1** [prepared by treatment of octadecyl amine with cyanoacetic acid] with dimethylformamide-dimethylacetal (DMF-DMA) **(Scheme 1).** Reaction of **2** with different nucleophiles as hydroxyl amine hydrochloride, hydrazine hydrate, guanidine and/or thiourea, in each case, gave the isoxazole **3**, pyrazole **4**, and /or pyrimidine **6,7** respectively. Finally, the addition of propylene oxide (10 moles) to the presence of active hydrogen atoms in compounds **(3-6)** gave products **(7-10)** having a higher degree of efficiency as surfactants. **(Scheme 2)**.

Behavior of the synthetic products (7-10) the aqueous solutions

In this study, we studied some surface properties as surface and interfacial tension, the degrees of turbidity, wetting ability, foam and emulsifying stability **(Table 1)** to check the efficiency of these compounds, which can be uses as detergents, paints, plastics, textiles, raw materials treatment, water purification, various petroleum industries. In addition, the degree of toxicity of these compounds and impact on the environment to prevent the environmental pollution by measuring the speed of decomposition **(Table 2)**. The results show a decrease in the surface and interfacial tension values, meaning that these products have clear surface activity. Also, through our study of the foam property, we found that these compounds proved varying degrees of foam property, which may offer wide applications in the dyeing and auxiliary industries. In addition, the results revealed that these products highly efficient as wetting agents, which may be useful in the textile industry. Moreover, the results showed that these targets exhibited high turbidity degrees, which makes it used at high temperatures without losing its functions. Furthermore, these surfactants proved good emulsion stability, which could be useful it as emulsifying or in textile industry. Finally, these products demonstrated a high rate of degradation in the range of 95% degradation at around 7 days, which makes it safe to use in various applications of life without the occurrence of any pollution to the environment, human, either animal or soil

Table 1: Surface properties of the synthesized compounds **(7-10)**

Samples	Surface Tension (dyne/cm)	Interfacial Tension (dyne/cm)	Wetting time (sec)	Foam height (mm)	Emulsion stability (min)
7	39	16.5	60	24	47
8	29	9.5	48	45	32
9	28	9.4	46	47	29
10	35	13.5	52	30	42

Table 1: Biodegradability of the synthesized compounds (**7-9**)

Samples	1st day	2nd day	3rd day	4th day	5th day	6th day	7th day	8th day
7	45	48	53	61	70	79	84	91
8	34	37	43	50	61	72	80	90
9	34	39	42	49	58	69	77	89
10	39	45	50	58	63	72	81	90

Conclusion

New oleochemical containing pyrimidine and pyran systems, have been synthesized with their easily integrated systems of fatty sources. The highly efficient non-ionic surfaces show improved properties as soluble agents, conditioning agents, surface activity, and in various cosmetics based formulations. In addition, these surfactants exhibited easily degradation after uses. Therefore, these safety compounds can be applied more widely in various industrial and medical fields.

Acknowledgments

The authors are greatly appreciative to the staff of Chemistry Department, Faculty of Science, Umm Al-Qura University for facilitating in carrying out the investigation for the newly synthesized compounds.

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Effect of Amoxicillin on Corrosion of Al in acidic Solutions

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Abstract

The effect of an antibiotic Amoxicillin on the corrosion of Al was studied in 0.5 M H_2SO_4 at different concentrations using weight loss. The inhibition was found to increase with increasing the inhibitor concentration.

Introduction

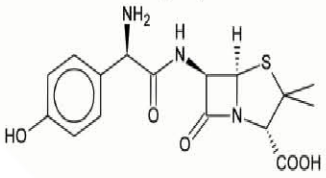
The organic compounds have triple or conjugated double bonds or aromatic rings in their molecular structures and usually contain polar functions with nitrogen, sulfur, or oxygen atoms, which are the major adsorption centers. Inhibitors play an important role in facilitating the adsorption of these compounds onto metal surfaces. reducing corrosive attack in an acidic medium A bond can be formed between the electron pair and / or the π-electron cloud of the donor atoms and the metal surface. [1-4]

Objective

The present study to examine anti bacterial known amoxicillin to be used as corrosion inhibitor for Al metal in H_2SO_4 solution .

Amoxicillin:

365.4 g/mol



Results and Discussion

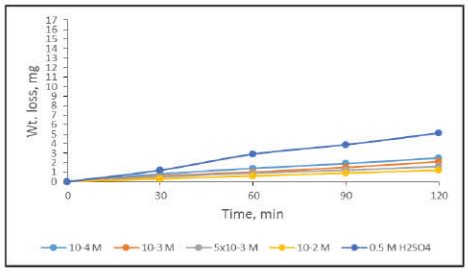


Fig. (1): weight loss- time curves for the corrosion of Al in 0.5 M H_2SO_4 in different concentration of Amoxicillin.

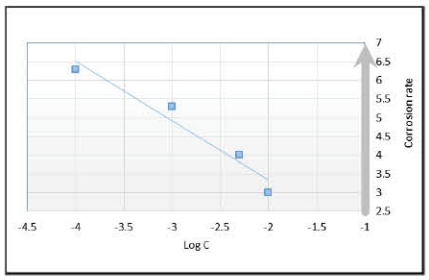


Fig. (2): corrosion rate- log C plot of Amoxicillin for Al in 0.5 M H_2SO_4.

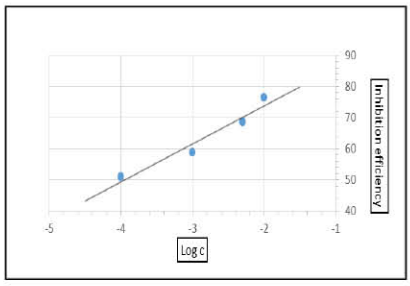


Fig. (3): Inhibition efficiency - log C plot of Amoxicillin for Al in 0.5 M H_2SO_4.

The effect of increasing concentration of Amoxicillin on the weight loss of Al vs. time curves at 25°C. It is obvious that the weight loss of Al in the presence of Amoxicillin varies linearly with time and is much lower than that obtained in blank solution. The linearity obtained indicated the absence of insoluble surface film during corrosion and that the inhibitor was first adsorbed onto the metal surface and, therefore, impede the corrosion process. [5]

The inhibition efficiency (%I E) were calculated using the following e equation:

$$\%I\,E = \frac{weight\ loss(pure) - weight\ loss(inh.)}{weight\ loss(pure)} x100$$

Conclusion

The effect of temperature on corrosion inhibition has been studied. The inhibition was found to increase with increasing the inhibitor concentration and decreases with rise in temperature.

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Extraction Of Organochlorine Pesticides In Environmental Water Samples Using Ionic Liquid-Based Membrane

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Abstract

The extraction of organochlorine pesticides (OCPs) by two new ionic liquids (4-methylbenzenaminium tetrachloroferrate (III) and 1-naphthylammonium tetrachloroferrate (III)) were synthesized and utilized .by used membrane-protected micro-solid-phase extraction (μ-SPE) . The result was effective and successful .

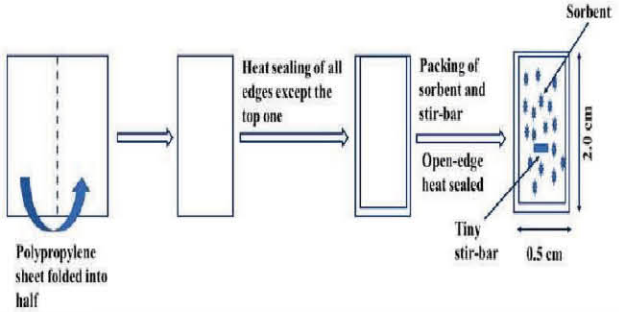
Introduction

Organochlorine Pesticides (OCPs) are classified under persistent. Organic Pollutants (POPs). OCPs were indiscriminately used as agrochemicals before 1970 [1]. Classical methods of sample preparation rely on techniques such as liquid–liquid extraction (LLE) and solid-phase extraction (SPE), but they consume large volumes of hazardous organic solvents and subsequently produce significant amounts of waste, which is not safe for workers as well as the environment [2]. This makes the foundation of developing new sample preparation techniques that are either solventless or consume negligible volumes. The aim of poster preparing a new type of membrane to cover the previous defects.

Method

A membrane piece was cut from the Polypropylene membrane roll and folded into half. All the edges of the folded membrane piece were heat-sealed to shape it like an envelope with one open end. The sorbent material (1 mg of [4-MA] $[FeCl_4]$, along with a tiny stir bar (7mm×2 mm), was packed from the open end, and it was then heat-sealed. The SB-μ-SPE device was immersed in the 10 mL of the sample solution, or spiked aqueous solution (50 μg/L), and it was then stirred for 15 min. After the extraction, the SB-μ-SPE device was taken out of the sample solution, washed with deionized water, and then dried with a lint-free tissue. The SB-μ-SPE device was then transferred to a glass vial, and 200 μL of n-hexane : toluene mixture was added for desorption.

Results



Scheme 1. Fabrication of SB-μ-SPE device

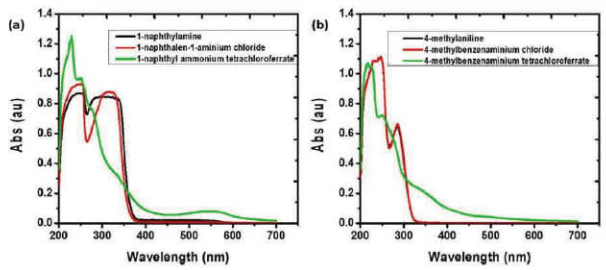


Fig. 1. The UV/vis spectra of a) [1-NA] $[FeCl_4]$ and b) [4-MA] $[FeCl_4]$

Discussion

Two sets of absorption bands are observed in the UV region at around 230 nm and 250 nm, which may be associated with tetrahedral coordination of the anionic part $[FeCl_4]$ -. UV–Vis shifts to lower energy levels in both the ionic liquid when ferric chloride is introduced, Generally, both Ionic liquid exhibited very low absorption, and this makes them better alternatives for the extraction of different analytes from aqueous media and favorable in analysis using UV detection technique.

Conclusion

[4-MA] $[FeCl_4]$ was employed as a sorbent in SB-μ-SPE for the extraction of OCPs from environmental water samples due to its relatively better performance than [1-NA] $[FeCl_4]$. The extraction features of may [4-MA] $[FeCl_4]$ be attributed to its porous structure and probability of forming hydrophobic as well as electrostatic interactions with target OCPs. SB-μ-SPE exhibited excellent performance in terms of analytical method .

Acknowledgments

Thanks to myself for what I have done throughout my university career, and I thank my supervisor, Dr. Enas, for the time you spent making the effort for us and finally, I thank my family for their support me.

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Preparation of Polycellulose acetate \ZnO Composite By Casting Evaporation Technique

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Abstract

Cellulose acetate (CA) is a very important component in various applications. In this study the poly cellulose acetate (PCA)/Zinc oxide (ZnO) composites was synthesized with different ZnO weight ratio (1%, 2%, 3%, 4% and 5%). The casting evaporation technique was used to preparation of these composites. The formation of composites was confirmed by using IR technique.

Introduction

CA is one of the main constituents of wood, wool and cotton. Therefore, it used in the wood, textile and paper industries. Moreover, it is used as a film base in photography, a component in some coatings, a frame material for eyeglasses and a synthetic fiber in the manufacture of cigarette filters [1]. **ZnO is utilized as an added substance in various materials and items including beauty care products, food supplements, rubbers, plastics, pottery, glass, concrete, lubricants, paints, treatments, cements, sealants, colors, food varieties, ferrites, fire retardants and medical aid tapes.** [2]

Objective

Study and prepare PCA/ZnO composites in different weight ratio by using casting evaporation technique.

Results

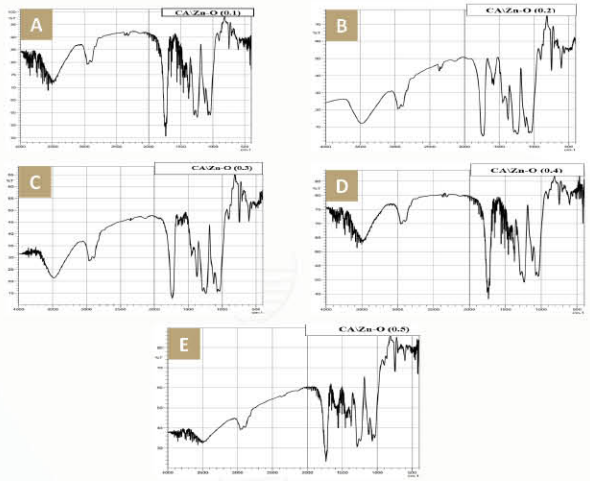

Fig.1. Show the FTIR Spectra Of (A) PCA/$ZnO_{(0.1)}$, (B) PCA/$ZnO_{(0.2)}$, (C) PCA/$ZnO_{(0.3)}$, (D) PCA/$ZnO_{(0.4)}$, (E) PCA/$ZnO_{(0.5)}$

Discussion

By comparing the composites IR peaks with the IR peaks of pure PCA[3], **it has been found that the peaks of our composites are matched with peaks of pure PCA. In addition, the appearance of a distinctive peak at 480 cm^{-1} in our composites which is belong to the Zn-O vibration** [4] **further confirming the formation of our composites .**

Conclusion

The PCA/ZnO composites have been prepared with different ZnO weight ratio, The preparation pf them was successfully confirmed by IR technique. The synthesized PCA/ZnO composites can be used in many fields such as: food packaging, optical papers, antimicrobial paper, and bioactive paper , It can also be used in biomedicine, catalysis and electronic fields. [5]

Acknowledgments

We thank Umm Al-Qura University, especially the Department of Chemistry. We sincerely thank the Supervisor, Dr.Tahani Bawazir for their support and assistance for us with their experiences during the work period and for exerting their efforts to guide us.

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Preparation of polycellulose acetate\CuO composites by Casting evaporation technique

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Abstract

Cellulose acetate (CA) is one of the most important esters of cellulose. Depending on the way it has been processed cellulose acetate can be used for great variety of applications[1]. In this research, we report the synthesis of composites based poly cellulose acetate (PCA) and CuO. The synthesis was performed via casting evaporation method at different CuO weight ratio (1%, 2%, 3%, 4% and 5%). The fabrication of composites was confirmed by using IR technique.

Introduction

Cellulose acetate (CA) is one of the most important esters of cellulose. Depending on the way it has been processed CA cab be used for great varies of applications (e.g. for membranes or fibers) [1] CA is the most abundant renewable natural polymer material and resource.[2] CuO nanoparticles are important because of their various applications in gas sensors, biosensors, supercapacitor electrodes,batteries,heterogeneouscatalysts,photocatalysis, solar cells, and antimicrobial materials.[3]

Objective

The aim of this study is to prepare PCA/CuO composites at different weight ratio (1%, 2%, 3%, 4% and 5%) by using casting evaporation method.

Results

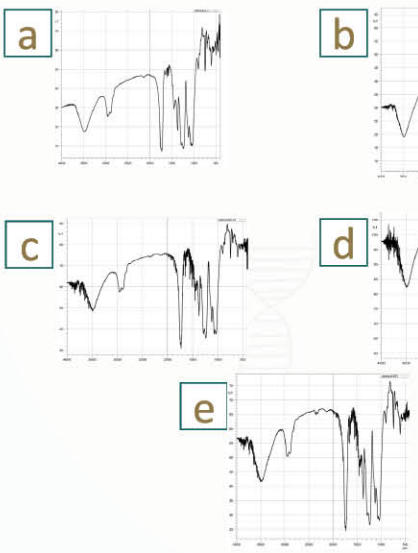

Fig. 1: Show the FTIR spectra of (a) $PCA/CuO_{(1\%)}$, (b) $PCA/CuO_{(2\%)}$, (c) $PCA/CuO_{(3\%)}$, (d) $PCA/CuO_{(4\%)}$, (e) $PCA/CuO_{(5\%)}$,

Discussion

By comparing the IR of composites and the IR of pure PCA [4], we found that the characteristics IR peaks of our composites are matched with the IR peaks of pure PCA. In addition theirs appearance of a distinctive peak at 487 cm^{-1} in our composites which is belong to the CuO vibration[5]. These confirming the formation of our composites. The intensity of the peaks of CuO increases and becomes more clear by increase in the percentage of CuO.

Conclusion

PCA-CuO composites were prepared at different weght ratio. The IR technique was used to confirmed the fabrication of composites. These composites can be used in variety application such as: 3D glasses, , ,polarized sunglasses Food and drug packaging,, anti-cancer agents, antioxidants, vitamins, amino acids, and hormones

Acknowledgments

we grateful to Umm Al-Qura University and the Department of Chemistry. We deep gratitude is due to my supervisor, Dr.Tahani Bawazer and Dr. Dina Katowah for their support, assistance and guidance. Special thanks to our family and friends for their encouragement, care and support.

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Alkene

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Abstract

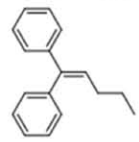
Alkene is an unsaturated compound contain of C=C double bound used in many organic reactions and in scientific laboratories and experiments. Alkene is also used in the preparation of polymers, glass, and polyethylene, We mentioned the most common reactions example oxidation and additions and polymerizations of alkenes and the reaction mechanisms. We also prepared a 1.1-Diphenylpentene alkene compound.

Introduction

- Alkenes are acyclic (branched or unbranched) hydrocarbons having one carbon-to-carbon double bond (C=C) and the general molecular formula CnH2n and have contain less than the maximum possible number of hydrogen atoms per carbon atom, they are said to be unsaturated.
- alkenes are more reactive than alkanes due to the presence of the double bond.
- the carbon atoms in the double bond are sp2 hybridized.
some of which act as organic solvents for use in scientific laboratory experiments.

Objective

1,1-Diphenylpentene



Synthesis 1,1-Diphenylpentene by Wittig reactions:
The olefinic substrates of 1,1-Diphenylpentene were synthesized in good to high yields via Wittig reaction between the benzophenone and the appropriate phosphonium salts.

Results

1H NMR (400 MHz, CDCl3) δ 7.47 – 7.23 (m, 10H), 6.16 (t, J = 7.4 Hz, 1H), 2.17 (q, J = 7.4Hz, 2H), 1.54 (sext, J = 7.4 Hz, 2H), 0.98 (t, J = 7.4 Hz, 3H) ppm; 13C NMR (75 MHz, CDCl3):δ = 143.1, 141.7, 140.5, 130.3, 130.1 (2C), 128.3 (2C), 128.3 (2C), 127.4 (2C), 126.9, 126.8,31.9, 23.4, 14.1 ppm.

Discussion

The percentage yield% of 1,1-Diphenylpentene is 74% .
It is considered a high percentage. But we can make it a better ratio according to the purity percentage during preparation. The reason may be due to an increase in the amount of non-volatile solvents during preparation, or failure to purify the tools, the presence of some dust, or the quantities of materials not being read correctly during preparation.

Conclusion

This scientific research benefits all chemists and chemists in preparing alkenes and their derivatives and contains some famous reactions and laboratory applications.
I hope that my research will be of use to everyone who is reading it now.

Acknowledgments

I would like to formally and sincerely express my gratitude for the amazing work you accomplished with the hard work, I want to give this to my parents who have a lot of stress about make me in the top of view and I would like to thanks our supervisor Dr. Jihan Qurban for her great support which helped us to improve our performance and knowledge, since from beginning to the end of this research.

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Saffron plant and breast cancer

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Chemistry department , Umm Al-Qura University



Abstract

The saffron plant is used as a source of spices and therapeutic medicines to cure or prevent various types of diseases such as cancer, MTTC assay and Bio-autography aided approach were used to assess anti-oxidant activity and anti-cancer properties of crocin (s) against DPPH free radical and breast cancer cell line respectively (1). Nutrients crocin , picrocrocin and safranal were extracted from saffron using high hydrostatic pressure , and the pressure ranges between 100-600 MPa were studied with high temperatures of 30-70 ° C .(2) The results showed a positive effect of stress on extract quality with an increase of 52-63% , 54-85% and 55-62% in nutrient content , and a significant decrease of 25-36% in crocin content was observed with increasing temperature . An optimum pressure-temperature combination of 580 MPa and 50 °C with an extraction time of 5 min (dwell time) was obtained (2).

Introduction

- Saffron is the yellow dye color adds good flavor to food , is produced by drying Myasam and part of the pens in saffron Alsosna (3).
- Breast cancer has implications for excess female mortality due to a lack of safer and more effective treatments , is mainly caused by 85% gene mutations , specifically mutations of the BRCA1 and BRCA2 genes (4).
- The saffron plant has a rich history of being used in various popular medicinal systems . to cure or prevent different types of diseases including cancer (5).
- Crocin molecules are the main component of saffron extract consisting of monoglycosyl esters or diglycosylpolyene of crocetin , which is a family of carotenoids that make up 6-30% of the total dry matter of saffron (6).

Therefore, the current study :

- attempted to isolate and characterize crocin(s) from leaves of Crocus sativus which are considered to be the major and cheaper biowastes of the saffron industry.(1)

Objective

1-Study the effect of saffron plant on breast cancer
2-Prove the best technology to extract the ingredients from the saffron plant

Experiments

One of the best solvents for saffron is water

The extraction process was by means of a high pressure propulsion system
1- Use saffron powder with a granular size less than 250 µm .
2- It was mixed with a 1 : 100 v / w deionized water solvent and packed in low density polyethylene bags .
3- Humidification for 2 hours at 4 ° C .(after hydration, sample bags were subjected to high hydrostatic pressure)
.4- The temperature of the vessel is monitored by two types of K-type thermocouples installed at the top and bottom of the vessel .
5- A control sample was prepared by conducting extraction for 24 h with an initial agitation using magnetic stirrer at 300 rpm for 30 min (13)
6- Various studies have reported the extraction of saffron using different solvents for 10–24 h at 4–25 °C (14) .
Pressure levels were achieved in 32-133 seconds at a gradient of 300 Mpa .

Analysis of the saffron :

1. Spectrophotometric analysis(ISO method)(International Organization for Standardization) .
2.PLC(high-performanceliquidchromatography)analysis.The chromatograms obtained for each samplewere compared with that of the pure crocin(2).

Cell culture :

extract were used for evaluation of the anti-proliferation effect against cancer cells . Human colon adenocarcinoma cells line (HT-29) , procured from National Centre for Cell Science (Pune, India),were used for cytotoxicity evaluation of the saffron extract (2).

Results

Effect of extraction pressure and temperature on crocin content

- As the hydrostatic pressure increased , the cell permeability increased and led to a change in the volume of the system (2).
- With the decrease in volume , the density of the solvent increased , which led to an increase in the solubility and extraction (2).
- The temperature was negatively affected by the extraction of crocin by 25-36%
- Saffron extracted by high pressure was used for analysis with different concentrations (500-3500 µg / ml) for a treatment period of 24-72 hours compared with anti-cancer activity . (13)
- Moreover, the crocin content decreased with the increase in temperature with a highly significant change after 60 °C.
- Temperature decreased the pressure effect as the increase in crocin content with pressure was less at the higher temperatures (2).

Crocetin beta-D-glucosyl ester as a significant antioxidant and anticancer agent

- The antiproliferative activity of crocetin beta-D-glucosyl ester against MCF-7 (Michigan Cancer Foundation-7) cell line has showed statistically significant inhibitory effect in a dose dependent way with IC50 (The half maximal inhibitory concentration) value of 628.36 ± 15.52 mg/ml ($P < 0.001$) (1).

Conclusion

The results of this study could offer an opportunity to use leaves of Crocus sativus as cheap source of crocetin beta-D-glucosyl ester for pharmaceutical industry, this would open up new dimensions to prevent and tackle therapeutically challenging breast cancer cases naturally, economically and elegantly compared to conventional drug therapies. It is recommended here that further invitro and in-vivo vigorous studies regarding dose, safety and toxicity of crocetin beta-D-glucosyl ester molecule needs to be undertaken before they could enter into different phases of clinical trials, as a potential alternative against breast cancer. Further study on the effect of high hydrostatic pressure on structural integrity and other components of saffron is required to be undertaken.

Acknowledgments

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Preparation of Na-p zeolite from kaolin and its application for the remediation of inorganic pollutants

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Abstract

In this review we will learn about zeolite and its properties and kaolin and zeolite has different types, but the purpose of this research is to identify the type of zeolite Na-p. This study shows conclusively how to remove inorganic pollutants The main objective of this research is to identify the method of preparing zeolite from kaolin and then use it as a remover for inorganic pollutants. The characterization is done by using XRD

Introduction

Water contains heavy metals that must be removed to avoid significant risks to the environment and health. Zeolite is used to remove contaminants because zeolite is considered an absorbent[1]. Zeolite is characterized by its high capacity for cation exchange and its high selectivity for some minerals. Among the most famous compounds prepared by zeolite is kaolin, as they play an important role in the manufacture of ceramics and cement, environmental protection and wastewater treatment[2].

Experiment

Materials: kaolin clay , sodium hydroxide. Sodium silicate solution. Preparation of Na-p zeolite 1 Heat treatment of kaolin at a temperature of 700 for 6 hours to obtain methacolinite we take 8.45g of methaquinite and add it in a sodium hydroxide solution leave for 24 hours, then add 80.31g of sodium silicate solution and leave for 24 hours after that we put the mixture In aqueous bath at 100 ° C for 7 hours, then filtered, washed by distillation, and dried at 80 ° C .

Results and Discussion

XRD(X-ray diffraction):

XRD diffraction patterns of Calcinedkaolin and Na-P zeolite are given in Figure 1. The phase analysis showed that the calcined kaolin is decomposed and no trace for the kaolinite structure. Thus, only anatase phase is appeared in the diffraction patterns which originally exists in the crude kaolin.

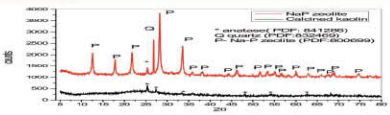

Figure 1. XRD patterns of Calcined kaolin and Na-P zeolite.

After hydrothermal treatment Na-P zeolite is observed with a pure phase. Small quartz single sharp signal is appeared which is common in zeolitization process from kaolin. In addition, the anatase phase still exists in the structure with nearly 95% of its original intensity in calcined kaolin .Table 1.

	Lattice parameters							Max peak Height	
Sample	a	b	c	a	b	g	V/10⁶ pm³	P zeolite	Anatase
Na-P	9.988	9.988	5.016	90	90	90	500	2671	291
Calcined kaolin									308

TABLE 1. Crystal lattice analysis of Na-P zeolite and calcined kaolin.

By experimenting with na-p zeolites to remove heavy metals from water such as cadmium, zinc, copper, nickel, lead , chromium by ion exchange, it will happen by absorbing the surface effect from the reverse-charged sites as the zeolite will have a negative charge and the minerals to be removed will be positive. Ion exchange and heavy metals are removed. Metal removal was done in a different ratio figure 2.

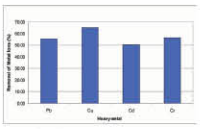

Figure 2. The removal ratio of heavy metals using Na-p zeolite .

Conclusion

Zeolite is a component of aluminio silicate. Na-p zeolites on the environment and is used to treat sewage and surface water and is used as a mineral absorbent. We prepared na-p zeolites by kaolin to remove heavy metals and inorganic compounds from water by ion exchange.

Acknowledgments

I am Grateful to Umm Al-Qura University and the Department of Chemistry. My deep gratitude is due to my supervisor, Dr. Hanan alzhrani, for her support , assistance and guidance . Special thanks to my friends for their encouragement, care and support.

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Preparation of 4A zeolite from Kaolin and its application for removal of organic pollution

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Umm Al-Qura University, Makkah Al-Mukarramah, Kingdom of Saudi Arabia

Abstract

we have a facile preparation of zeolite 4A from kaolin for the adsorptive removal of methylene blue (MB) dye. The formation of highly crystalline and pure phase zeolite 4A with cubic morphology was confirmed by powder X-ray diffraction (XRD) and scanning electron microscope (SEM) analysis. The efficiency of zeolite 4A for abatement of MB was investigated at varying adsorption parameters. The sample was described by several techniques such as statistical optimization for adsorption studies, Adsorption Isotherms Models, and Adsorption Kinetics Models, each of which was analyzed separately by devices such as XRD, and finally the results were monitored

Introduction

The normal zeolite is structure of alumino- silicate that contain pores that contain water and some exchange cations to balanced charge of alumino-silicate [1]. Methylene blue is one of the commonest cationic dyes used in textile, chemical laboratories, staining cells in medical science, and other dyeing industries. However, long-term exposure to MB can trigger serious health issues such as anemia, vomiting, and Hypertension. Kaolin is one of the most abundant and cheap clays widely utilized for numerous applications including the adsorption of water pollutants. The preparation of zeolite 4A from kaolin is carried out in a high-temperature activation of raw kaolin(metakaolinization) followed by reacted with NaOH in a hydrothermal vessel [2].

Experiment

Material:
kaoline, HCL , NaOH and deionized water

Procedure:
1- Prepration oF zeolite4A, 1-1- Calcinde the kaolin for 6hr at high temperature to convert it to Metakolinite, 1-2- add of Metakolinite to soduim hydroxide solution ,appiled thermal treatment for 6hr 90C ,The solution is filtered, dried and cooled
2- add of zeolite to of methyl blue pigment with continuous stirring

Results and Discussion

XRD powder models were prepared for kaolin and zeolite at different temperatures for calcination. The XRD phase identification of raw Ethiopian kaolin was found better with the mineral kaolin, showing the diffraction of the zeolitic materials obtained at different temperatures. The zeolite prepared at 600 ° C shows the formation of 4A zeolite with excess quartz (Q) as impurities. While 4A pure zeolite was prepared at 700 ° C and 800 ° C. Hence, it is recommended to use methacholine prepared from calcination of 700 ° C, due to an economic point of view, to prepare zeolite 4a.

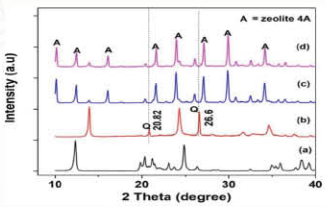

fig 1 (a) raw kaolin, (b), (c), and (d) zeolite materials prepared at 600 °C, 700 °C, and 800 °C calcination temperatures, respectively

The mechanism of MB absorption on zeolite 4A was studied through the first basic analysis. The adsorption process of methylene blue occurred on the surface of 4A zeolite by means of electrostatic interaction forces, hydrogen bonding and coordinated covalent bonds. The absorption rate of zeolite (MB) dye is generally 99.37%. Maximum absorption efficiency of 4A zeolite is found in basic solution above pH (6.86). The statistical improvement of adsorption agents such as zeolite dose, contact time and MB concentrations, was found at constant pH = 8 and temperature (25 ° C). Through this experiment, there was no difficulty in the preparation technique, that is, the steps were clear and comprehensible. The excellent efficiency of the zeolite catalyst is of high value. Thus, the prepared zeolite helped us to remove the organic pollutants (MB stain) in an easy way and with satisfactory results.

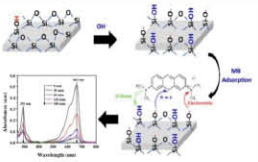

Fig.2 Theplausibleadsorption O mechanism of MB onto zeolite 4A in the alkali solution

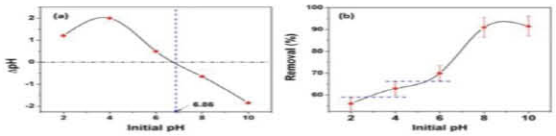

Fig.3 (a)thepointofzero charges of zeolite, (b) the removal (%) of MB at varying pH (with 5% error bar)

Conclusion

In conclusion, 4A zeolite was prepared with a high degree of crystallinity and purity using the appropriate technology to manufacture this type (hydrothermal pressure). The reuse of the prepared zeolite has been demonstrated after cleaning and purification. From the results, it could be evidence that the 4A zeolite prepared from local materials could be used to remove organic contaminants such as MB dye.

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I do thank Allah for the known and uncountable reasons and thank Allah for helping me to complete our graduation project.
A special gratitude we give to our university (Umm Al-Qura) for providing us with the necessary references, we would to express our special thanks to our supervisor Dr. Hanan Alzahrani for her contribution, assistance, encouragement and guidance to facilitate the accomplishment of this project.

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newly Synthesis and characterization of metal complexes of 3-(N- phenyl) thiourea-pentanone-2as ligand

Roayaa omer
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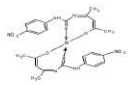

Abstract

Present communication deals with the synthesis of copper and cobalt complexes derived from 3-(N- phenyl) thiourea-pentanone-2 as the ligand. Structure of all the compounds was characterized by elemental, XRD, FTIR, UV-VIS, SEM and 1HNMR spectroanalytical studies. The X-ray diffraction studies indicate that 3-(N- phenyl) thioureapentanone-2 and their complexation with copper and cobalt metals are crystalline in nature. The FTIR spectroscopic data were used to assign the characteristic vibrational frequencies of various groups present in the compounds. Scanning electron Micrograms were used to assign the morphology and particle size of the compounds.

Introduction

Thiourea (Tu) derivatives have a long history as a ligand in coordination chemistry and coordinate to a metal via both sulfur and oxygen.[1] These hard and soft donor atoms provide a multitude of bonding possiblities.[2] Hydrogen bonding behaviors of some thioureas have been investigated and it is found that the intermolecular hydrogen bond between the sulphur and a hydrogen atom on N is common.3 Thiourea derivatives and their transition metal complexes have been known for over a century and are easily synthesized in good yields. Recently metal complexes of thiourea and thiourea analogs have been investigated.4 Metal complex of thiourea, commonly called semi organics, include the advantages of both organic and inorganic part of the complex. A number of thiourea derivatives has been reported to form complexes with copper and cobalt.5 It is revealed from the literature that a number thiourea derivatives have been shown to posses antibacterial, antifungal, antitubercular, antithyroid and insecticidal properties.6 Thus in order to observe the enhanced complexing behavior of thiourea a number of its extended derivatives coupled with the βdiketones have been prepared as the powerful complexion agents. These 3-(N- phenyl) thioureapentanone-2 have been noticed to possess a remarkable capacity to coordinate with the transition metals giving rise to highly colored cheated structure. Hence, in view of the aforementioned importance associated with the chelating behavior of 3-[N-phenyl thiourea-pentanone-2] vis- a- vis to get a deep insight into the complexation behavior, it was our endeavor to synthesize its copper and cobalt complexes followed by their characterization using XRD, SEM, FTIR, 1HNMR and elemental analyses

Objective

The research aims to give an overview of thiourea, its composition, types, different methods of its preparation and its most important applications.

And then shed light on its most important applications, which is its use as a ligand and the preparation of some of its compounds with cobalt and copper.

The compound has been studied is 3-[N-phenyl thiourea-pentanone-2] vis- a-vis to get a deep insight into the complexation behavior, it was our endeavor to synthesize its copper and cobalt complexes followed by their characterization using XRD, SEM, FTIR, 1HNMR and elemental analyses.

Results

Table 1. Physical and Analytical data of the Metal (II) Complexes

Complexes \Molecformula	M.P.(C°).	Yield(%)	Calcd/Found)%			
			C	H	N	S
[Ligand] [C12H10N2OS]	250-251	65	51.4 (50.1)	5.03 (4.9)	14.0 (14.5)	11.4 (11)
[Co (L)(Cl)2] [C12H10N2OSCoCl2]	230-232	58	34.7 (33.9)	3.4 (3.3)	17.1 (16.7)	7.7 (7.1)
[Co (L)(Cl)2] [C12H10N2OSCoCl2]	240-242	56	41.1 (40)	3.7 (3.5)	11.08 (11.04)	8.4 (8.2)

Table 2 -XRD peaks and crystal thickness calculated from Scherer's formula

Compounds	hkl	Lattice parameters	Crystal size
Ligand	33,37,38,41	16.5,14.9,14.7,14.1	463,334,330,290
Cu Complex	2,3,4,6	8.2,8.5,8.2,8.2	440,572,488,524
Co Complex	1,2,3,4	22.3,22.4,22.4,22.3	395,218,599,101

Table 3: IR, UV, and NMR spectroscopic Data of the ligand and Meta (II) Complexes

Ligand/complexes IR (cm-1)		λmax in nm (ε in M-1 cm-1)	1H-NMR (DMSO-d6) (ppm)
Ligand	3470(NH); 3480(=C-H, Sp2); 1598(C=S); 1615(C=O); 1468(C-C, ring structure); 836,749 (sub phenyl)	272(1103),	-CH3 (2.19 -NH (6.80) –Aroma protons (7.95-8.21)
Cu Complex	3330(NH); 3281(=C-H, Sp2); 1600(C=S); 241(9801); 1630(C=O); 1517(C=C) 1490(C-C, ring Structure) 740(M→L); 921,824(sub phenyl)	241(9801), 294(9830) 364(1284)	-CH3(3.10) -NH (6.60) Aromatic Protons (7.96-8.2)
Co Complex	3500(NH); 2944(=C-H, Sp2); 1616(C=S); 1630(C=O); 1533(C=C)1522(C=C, ring structure)(277) 382.4(227.5), 594(M→L); 927,782(sub phenyl)	----------	-CH3 (3.10) -NH (6.60) Aromat protons (7.96-8.2)

Discussion

the XRD pattern of ligand shows sharp and highly intense peaks. Some of the sharp peaks are disappeared when this ligand is attached with copper metal as represented in fig 2(b). Moreover, to in fig 2(c) some additional sharp peaks are observed when ligand is attached to the cobalt metal. All the parameters calculated from XRD are computed in table 2. The crystal size, hkl and lattice parameter for ligand, copper complex and cobalt complex are showing that the samples are simple cubic structure.

The characteristic absorption peaks in the IR spectra of all the complexes are similar, which indicate that the complexes have similar structures.

Absorption at 364 and 371nm with a ε value of 9830 cm-1M -1 indicates ligand to metal charge transfer (LMTC).

In 1H NMR a broad signals between (7.9 and 8.2) ppm.

Indicate that both free thiourea and its complexation with metals cotaining Cu-Tu and Co-Tu are present. It is noted that the peaks for two transition metals Cu and Co bounded with thiourea at 7.66 and 7.96ppm.The signals 7.66 and 7.96 ppm indicates possible Cu-S and Co-S bond formations.

Conclusion

All the studied compounds were synthesized with the chemical reactions. The proposed general structure is also reported. The compounds were characterized by elemental, XRD, FTIR, UV-VIS, SEM and 1HNMR spectro-analytical studies. The X-ray diffraction patterns indicate that the ligand 3-(N- phenyl) thiourea-pentanone-2 and their complexation with copper and cobalt metals are crystalline in nature and show simple cubic lattice structure. The IR spectroscopic data were used to assign the characteristic vibrational frequencies of various groups present in these compounds. Scanning electron Micrograms were used to assign the morphology and particle size of the compounds.

Acknowledgments

In the name of God
the Most Gracious, the Most Merciful Praise be to God for perfection, praise be to God for perfection, and praise be to God always and forever and in every case.Yesterday I started my educational career as a student at Umm Al-Qura University, Department of Chemistry, College of Applied Sciences, and here I am today on the verge of graduation
As it has been said, someone who does not thank people does not thank God, I offer, the graduate: Roya Omar, my thanks and appreciation to Umm Al-Qura University with all its facilities for all the efforts made to complete my educational career throughout my undergraduate years, and I specialize the Department of Chemistry with all its affiliates for the scientific wealth and educational morals provided to me throughout the period of my studies, and I am pleased to extend my thanks and appreciation to Dr. Khadija Mustafa Takroni) who was with me step-by-step to complete this. Research through her guidance, instructions, constructive feedback, and academic support. Thank you very much and the gratitude of God lasts and takes care of it

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Polyvinylalcohol and its Natural Extracts Composites Variable Trends. From Synthesis to Applications. A Review

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Abstract

Polyvinyl alcohol (PVA) is a well-known synthetic polymer, which is nontaxic, PVA has exceptional film developing properties. It can be combined with diverse synthetic and bio-based polymers owing to its excellent film forming and hydrophilic water-soluble properties with outstanding chemical stability. Since PVA has proved to be biocompatible, it has been intensively used in the nanofilms composition and films for many biomedical applications, packaging, those recent studies have been selected which highlight the importance of PVA with natural extract as nanofilms composites and films Because of its various applications and distinctive properties, which may be improved or increased by addition to the natural extract.

Introduction

PVA is a water-soluble synthetic polymer with excellent film-forming, emulufying, and adhesive properties[1], the structural properties of PVA polymers primarily depend on the degree of polymerization and the degree of hydrolysis, ie., the ratio of the two monomers. Due to reactive functional groups on its structure, PVA undergoes chemical changes such as esterification and etherification, crystallization as well as physical changes such as crystallization and ion polymer complexation. Both chemically and physically modified PVA structures have found applications in biomedical, pharmaceutical and industry area[2]. It has been also used in different applications, pharmaceutical industry, contact lenses, and eye drops. PVA itself has substantial tensile strength, flexibility, and hardness and gas and aroma barrier characteristics Compared with any other known polymer[1].

Objective

This review aims to provide a trend and evolution on the methods of PVA/natural extracts composites synthesis as well as its properties and applications.

Results and discission

Through our research, we found that the compound is formed in many different ways and gives distinct properties and applications in various fields, some of which are summarized in the Table. 1:

Table.1. Summarized some of PVA composites and their properties and applications

Extract	Methods	Properties	Application	Ref.
Anthocyani n extract from red cabbage	Electrosp inning	Morphologic al properties	Sensitive detection	1
Caesalpinia ferrea Martius extract of plant	Solvent casting	Antioxidant properties	Food packaging films	2
Cellulose	Solvent casting	Mechanical properties	Food packaging	3
Grapefruit seed (GSE) Curcumin	Solvent casting	Antimicrobial antioxidant	Food packaging	4
Pomegranat e peel extract	Solvent casting	Antimicrobial properties	Wound dressing	5
Azadirachta indica (neem)	Electrosp inning	Antibacterial properties	Biomedical applications	6

Conclusion

PVA-based films were developed by adding natural extract product were uniformly distributed in the polymer matrix to make compatible composite films, Since poly (vinyl alcohol) has proved to be biocompatible and nontoxic, It has many distinctive features, it has been intensively used in the nanofilms composition and films for many biomedical applications, packaging, sensors.

Acknowledgments

First of all, I would like to thank UQU and my department for giving me the opportunity to complete this research with success. Special thanks to my advisor Dr/Dina Faisal katowah Then, I own a great many thanks to my colleagues.

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Polyvinylpyrrolidone and its Natural Extracts Composites Variable Trends. From Synthesis to Applications. A Review.

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Abstract

Polyvinylpyrrolidone (PVP) is a synthetic polymer obtained by radical polymerization of the monomer, N-vinylpyrrolidone. The versatility of PVP with natural extracts can be explained by its varied properties including its solubility in water and in a wide range of liquid media, high resistance to chemicals and heat, and unique properties of wetting, bonding and film formation. All thanks to its biocompatibility, the absence of toxicity and high ability to form inter-polymer complexes, PVP is widely used to design materials for various applications, such as in biomaterials in composition and non-medicinal uses.

Introduction

PVP is a water-soluble and physiologically inert polyamide polymer. It has been attracting more and more attention because of its widespread application in the different field. In the course of their 40-year history, vinylpyrrolidone polymers have been extensively used, especially in the pharmaceutical, cosmetic and food industry as well as for numerous technical applications such as develop different drug delivery systems, such as oral, topical, transdermal, and ocular administration. Besides, PVP is also useful in the delivery of genes and targeted-delivery for drugs . Therefore, PVP results to also be a very versatile polymer [1-2].

Objective

In this work we are going to investigate the importance of PVP and its natural extracts composites, and to learn more about their properties. On other hand study the methods used for the synthesis of PVP/natural extracts and distinguish them from each other and to study their applications in several fields such as : medical, Pharmaceuticals, and industrial.

Methods and results

1.Electrospinning technique helped improve the antioxidant properties of composites, while making them more effective in medical applications and fighting chronic diseases.

2.The Gamma irradiation technique helped improve its antimicrobial properties and increase its efficacy and its use in applying in wound dressing. 3.The evaporation casting technique helped increase the antimicrobial effectiveness and the effectiveness of compounds in medical applications and protect the body from disease. 4. filtration technique has led to a great and important effectiveness in medical and genetic applications, as it helps in the improving of mechanical properties , and the separation of genetic compounds.

Conclusion

Studies have proven that PVP is safe and non-toxic, due its extensive use in the form of nanocomposites with natural extracts in many fields, including the medical field, drug manufacturing, and industrial fields such as the manufacture of cosmetics and many others. which mean is PVP is an important polymer in our daily need .

Acknowledgments

We are grateful to Umm Al-Qura and the department of Chemistry, our thanks and gratitude to our supervisor Dr.Dina Katoaah for her help, support and guidance in our research.

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Recent Trends in Poly Acrylic Acid based Hydrogel Composites in Medical Applications: A Review.

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Abstract

poly acrylic acid-based hydrogels (PAA hydrogels) are non-toxic compounds that have the advantage of easy chemical modification, have excellent swelling properties and they also have anionic properties, all these properties make the PAA hydrogel good candidate to use in medical applications. This review aimed to provide a trend and evolution on the methods of poly acrylic acid (PAA) composites synthesis, properties and its medical applications.[1] The PAA composites have been applied in various medical applications medical applications such as: drug delivery, Antibacterial, Artificial muscles and Tissue engineering[2].

Introduction

Polymers are materials that consist of bonding a large number of building units to bonds of the same type Fig.1, and their properties differ according to their functions. Polymers have become an essential and integral role in everyday uses due to their unique properties as they are essential materials in everyday industrial sectors.[3] The hydrogel is a network of interlocking hydrophilic polymer chains, which sometimes exist as a colloidal gel in which water is the dispersion medium. A three-dimensional solid material resulting from hydrophilic polymer chains that are joined together by cross-links. PAA hydrogel is avariety of monomers, most of them acrylic, are used to prepare hydrogels. Acrylic acid (AA) and its sodium or potassium salts are often used in the industrial production of hydrogels[4].

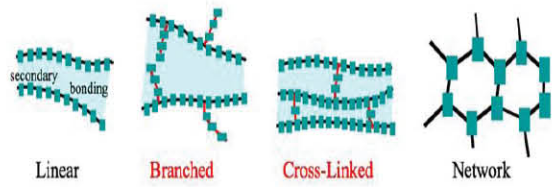

Fig.1. Polymer's structure shapes.

Objective

In this review, the focus is on methods of preparing PAA hydrogels composites as will as its properties and medical applications.

Results and discission

The PAA composites was prepared in various methods, that resulting composites have diverse properties which cause diversity in the applications. Table.1. Summarized some of these composites.

Table.1. Summarized some of PAA composites and their properties and applications

Composites	Methods	Properties	Applications	Ref.
PAA/Iron-oxide	Direct precipitating	Nontoxicity Biocompatibility	Drug delivery of tetracycline hydrochloride	5
PAA/Chitosan/Fe_3O_4	Polymerization	Non toxicity Biocompatibility	Colon and rectal administration of 5-FU.	6
PAA/Poly (L-lactide-co-D, L-lactide)	Crosslinking	Biocompatibility	Bone tissue engineering	7
PAA/poly(ethylene glycol) diacrylate	Crosslinking	Biocompatibility	Artificial muscles	8
PAA/Poly(methacrylic acid)	Crosslinking polymerization	Biocompatibility Diffusion	Different activation energy distribution function for kinetics of drug release	9
PAA/Polyvinylpyrrolidone	Crosslinking	Biocompatibility Low-toxicity	Medical devices such as hemostats, adhesion barriers, wound dressings.	10
PAA/Metronidazole	Crosslinking	Antibacterial	Enhanced Antibacterial Activity	11
PAA/poly(N-isopropyl acrylamide)	Crosslinking	Nontoxicity Antibacterial	Controlled drug release applications	12
PAA/Sodium acrylate	Free radical polymerization	Biocompatibility	Rheological and controlled drug release behaviors	13
PAA/carboxymethyl	Crosslinking , Co precipitation method	Biocompatibility	In vitro controlled release of vitamin B12	14

Conclusion

The current work summarizes a general overview about the chemistry of PAA hydrogels and its hybrid nanocomposite materials from synthesis to various medical applications. Research on PAA hydrogels composets over the years has developed with modification and optimization of synthetic methods and applications. The PAA hydrogels composets have mor important properties which candidate it to use in medical application. Many subsides have been confirm the importance of PAA in the field of medicine, body, antibacterial artificial muscle, tissue engineering and is an important polymer in the field of medicine.

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Yesterday I started my educational career as a student at Umm All-Qura University, College of Applied Sciences,Department of Chemistry, and here I am today on the verge of graduation As it has been said, someone who does not thank people does not thank God,I would like to thank Allah, the almighty for providing me this opportunity and granting me the capability to proceed successfully. My God, I could never have done this without the faith I have in you my thanks and appreciation to Umm Al-Qura University with all its facilities for all the efforts made to complete my educational career throughout my undergraduate years, and I specialize the Department of Chemistry with all its affiliates for the scientific wealth and educational morals provided to me throughout the period of my studies, and I am pleased to extend my thanks and appreciation to Dr. Dina Katowah who was with me step-by-step to complete this. Research through her guidance, instructions, constructive feedback, and academic support, encouragement and unlimited help which made her supervision a great pleasure to me. Thank you very much to everyone who has had a role in progress and development. Thank God, you Gave me with this irreplaceable and invaluable moment.Thank you very much.

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Sensors Based on Polymethylmethacrylate (PMMA) and Their Composites: A Review.

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Abstract

Several important industries depend on polymers , Acrylic polymers are crucial as they have many applications and the most important member in the acrylics family is the polymethyl methacrylate (PMMA) as it is one of the most important most widely used polymers in several applications. The use of PMMA as sensors enters many fields since it has efficient properties such as high sensitivity, rapid response and good mechanical properties.

Introduction

PMMA is a high volume amorphous, transparent and colorless commodity thermoplastic it used in sheet form as a lightweight or shatter-resistant alternative to glass[1].

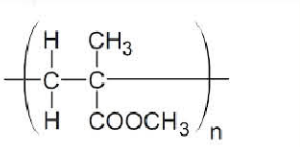

Fig. 1. Show Chemical structure of PMMA

Also is a widely used polymeric material in the fields of aerospace, machinery, medical and architecture industries. The same material can be used as a casting resin or in inks and coatings, among many other uses. It has excellent properties such as small chromatic dispersion, high transmittance, great hardness, good chemical stability and good processing performance. It is considered the most important member of the acrylic[2]. Also PMMA composite used as sensor Because of its distinctive properties such as High sensitivity[3] lightweight, recyclability[4], High biocompatibility[5].

Objective

In this review is to provide an overview of the PMMA include synthesis, unique properties and various sensor applications of PMMA and its hybrid.

Results and descission

The PMMA composites was prepared in various methods, that resulting polymer have diverse properties which cause diversity in the applications. Table.1. Summarized some of these polymer.

Table.1. Summary properties, methods of preparation and applications pf PMMA and its composes.

Polymer	Addition	Method	Properties	Applications	Ref.
PMMA	Graphene oxide	Bulk polymerization technique	High sensitivity	Gas sensor	3
PMMA	3D hybrid MoS_2/AgNPs	Chemical etching Method.	Recyclability	Optical sensors	4
PMMA	_____	Silver nanoparticle	Solution method	Detection of hydrogen peroxide	5
PMMA	Graphene nanoplatelet	Erosion method	High sensitivity	Humidity sensor	6
PMMA	Carbon nanotube	The pyrolysis of acetylene	Fast response	Gas sensors	7
PMMA	Gold nanoparticles	Wet-chemical techniques	Low cost	Optical sensors	8
PMMA	_____	Physical-contact sensor technology	lightweight	Optical sensors	9
PMMA	_____	Capacitor with two electrodes and a dielectric	High sensitivity	Humidity sensor	10

Conclusion

PMMA is widely used in manufacturing sensors having so many applications, it is widely used since it is biocompatible, inert polymer thus won't interfere with the results and the measurements obtained from the sensors based on PMMA, these sensors can have many applications in agriculture, industrial, pharmacological, geological and environmental fields.

Acknowledgments

In the name of ALLAH, the most merciful, gracious and thanks to ALLAH for finishing this work. we would like to thank Umm Al-Qura University and the Department of Chemistry, and we also thank you my supervisor Dr/Dina katowah" for suggesting the point of research, valuable and expert supervision, guidance, helpful critiques, and encouragement throughout the research work and preparation of the thesis. The collection of works presented here was only possible through the dedication and support of a great Talented classmates working for me, with me and around me, over the past few years. So thank you all.

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Synthesis of photocatalysis nanotube g-C3N4 with BiMoO6-Ag for degradation of methylene blue dye and phenol compound

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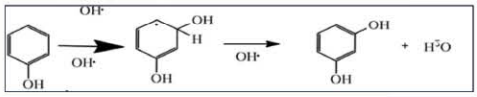
Abstract

Photocatalysis is a promising water treatment technique that can contribute to mitigating the global problem of polluted water(1). One such promising photocatalyst is g-C3N4(2), but poor charge separation efficiency and specific surface area limit its use on a larger scale(3). Here we prepared g-C3N4 in a simple method using thermal polymerization to structure a nanotube to improve its surface properties. We grew melamine crystals with the help of transition metal ions (copper)(4). Then we added silver and bismuth to obtain g-C3N4-BiMoO6-Ag(5). This triple catalyst should have a better response to visible light and more efficient photocatalysis(6). UV-vis spectra is used to test the efficiency of the catalyst in removing organic pollutants such as phenolic compounds and methylene blue dyes (MB)(7). This study presented a simple and low-cost method that will contribute to the introduction of the catalyst into the field of practical application.

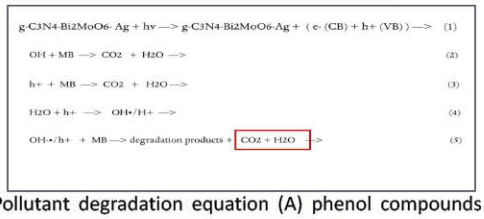
Introduction

Photocatalysis is a promising technology that uses semiconductors as catalysts(8). g-C3N4 is one of the most responsive catalysts(9), but it still needs many improvements(10). In this study we will present a simple preparation method based on transition metal ions (copper) to prepare this catalyst in a nanotube structure(11). Then measure its efficiency in form ternary with BiMoO6 and Ag(12) , for degradation of methylene blue dye and phenol compounds(13) which are degradation as follows:

(A)



(B)

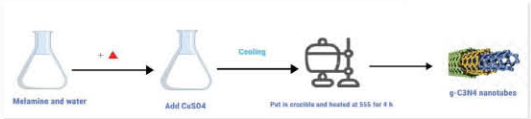


Fig(1): Pollutant degradation equation (A) phenol compounds ,(B) MB dye. (14)

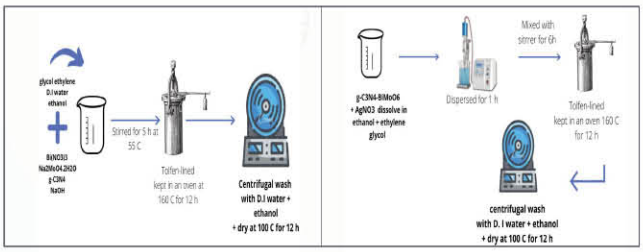
Method

We have 3 parts to prepare

(A) **g-C3N4 nanotube**



(B) **g-CEN4-BiMoO6** (C) **g-C3N4-BiMoO6-Ag**

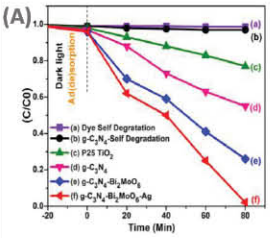


Fig(2): simple design to prepare: (A) g-C3N4 nanotube ,(B) g-C3N3-BiMoO6 ,(C) gC3N4- BiMoO6-Ag . (15)(16)

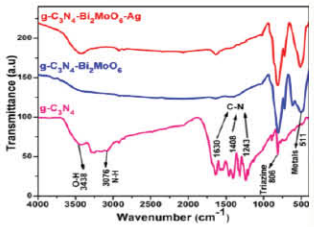
Results and discussion

- The superoxide radical (O2) and hydroxyl radical (OH) plays role in dye degradation to degrade the MB dye into harmless H2O and CO2(17).
- Presenting in the high photocatalytic activity may be due to (1) improved light absorption traps to capability (2) action of both h+/e decrease the recombination rate of electron and hole pairs(18).
- Change the structure from nanosheets to nanotubes for more efficiency(19).

(A)



(B)



Fig(3): (A) degradation rate of MB solution by prepared nanosheet ,(B) FTIR spectra of prepared samples (20)

Conclusion

- The g-C3N4-BiMoO6-Ag catalyst was prepared with a simple, inexpensive strategy(21).
- The catalysts displayed excellent photocatalytic activity due to the unique structure of g-C3N4, with the properties added by bismuth and silver(22).
- The use of copper increased the nitrogen content of the catalyst, which contributed to the N-doping process(23).

Acknowledgments

Thanks for Umm Al-Qura University, represented by the Department of Chemistry, for all the support provided to us, as well as thanks to our supervisor Dr. Razan Snari for her tenderisty and her permanent presence for us. I also thank my friends in the group for the spirit of cooperation

References

SCAN ME

Removal of Cr(VI) from water by 3D ZnO-graphene hydrogel with photocatalytic reduction.

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Abstract

The increase in industrial development and the population has led to an increase in the presence of chromium in water poses a threat to the environment and humans due to toxicity, in this paper a new method synthesized and used for removing Cr (VI) from aqueous solution by ZnO/ graphene hydrogel (rGH) with the three-dimensional (3D) network structure enhanced with photocatalysis, graphene oxide was synthesized by a modified method from Hummers method, rGH prepared thoroughly and then combined with ZnO combination between ZnO and graphene showed high performance in reduction of Cr (VI), high-efficiency removal of Cr (VI) from a solution containing (5 mg/L) in just 30 min, under the condition the adsorption photocatalytic activity was maintained and kept high removing Cr (VI) with high efficiency, The use of ZnO/rGH developed catalyst in the field of water purification, reflected better results with the highly efficient and environmentally friendly method.

Introduction

In order for chromium (VI) to be removed from the water, it must be reduced to Cr (III) which poses the least 100 danger and the least toxic of Cr (VI) [1], therefore, advanced oxidation process using photocatalysts such as using zinc oxide (ZnO) and titanium dioxide (TiO2), the use of an auxiliary catalyst greatly improves the removal process, these materials such as graphene, graphene material has unique and distinctive surface adsorption and has a two-dimensional shape, so the accessible surface area cannot be improved, this makes it prone to aggregation and restocking [2], the use of graphene with photocatalysis gives the advantage of the three-dimensional shape that solves the previous problem and also makes it capable of rapid absorption due to the presence of highly porous structures with sizes up to a micrometer [3], In this work, the composite material (ZnO/rGH) was prepared and the removal efficiency test was performed.

Objective

ZnO with a graphene hydrogel (rGH) to remove chromium (VI) from the water and measuring the efficiency with each reuse.

Methods

Synthesis of ZnO/rGH:



Results and Discussion

- The construction of the graphene hydrogel nameplate is shown by the SEM diagram [Fig. 1-a]. ZnO nanoparticles are dispersed in the 3D channel of the graphene hydrogel, which can break down the clumping of the graphene sheets [Fig. 1-b] [4].

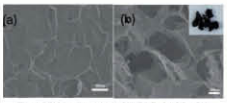

Fig. 1 SEM images of (a) rGH; (b) ZnO/rGO–rGH.

- The adsorption and photocatalytic movement to remove Cr (VI) [Fig 2] [4].

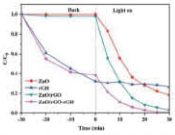

Fig. 2 Comparison of photocatalytic activity of the ZnO, rGH, ZnO/rGO and ZnO/rGO–rGH during removing BPA. (C_0 = 10 mg L^{-1}, [catalyst] = 25 mg).

- The Cr(VI) toxin was further photocatalytic diminished to frame Cr(III) in the mechanism of the photocatalytic reduction of hexavalent chromium is as follows [2] :

$$ZnO + hv \rightarrow h^{+}_{VB} + e^{-}_{CB}$$

$$Cr_2O_7^{2-} + H^{+} + e^{-} \rightarrow Cr^{3+} + H_2O$$

$$H_2O + h^{+} \rightarrow O_2 + H^{+}$$

Conclusion

- The composite material (ZnO/rGH) was synthesized and had excellent performance in adsorption and photocatalysis in removing Cr (VI) from aqueous solutions.
- This work introduces a new composite material (ZnO/rGH) that is easy to apply in treating water from pollutants.

Acknowledgments

We are grateful to Umm Al-Qura University and the Department of Chemistry. our deep gratitude is to my supervisor, Dr. Razan Snari for her support, assistance and guidance. Special thanks to my family and friends for their encouragement, care and support.

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ZnO-GO based polyvinyl alcohol as photocatalyst for degradation of methylene blue in the water treatment process.

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Chemistry department , Umm Al-Qura University

Abstract

This study aims to broaden the adsorbent properties of a photocatalyst, zinc oxide (ZnO) on graphene, by adding polyvinyl alcohol polymer (PVA) and giving it adsorbent properties to cationic dyes. Firstly, ZnO is prepared with graphene oxide to obtain ZnO-GO. Then, polyvinyl alcohol is added to obtain ZnO-GO-PVA. Then, its degradation efficiency can be tested on cationic and anionic dyes. The residual methylene blue dye concentrations are determined by UV-Vis adsorption spectroscopy. ZnO-GO-PVA may become a promising photocatalyst for treating water contaminated with organic dyes.

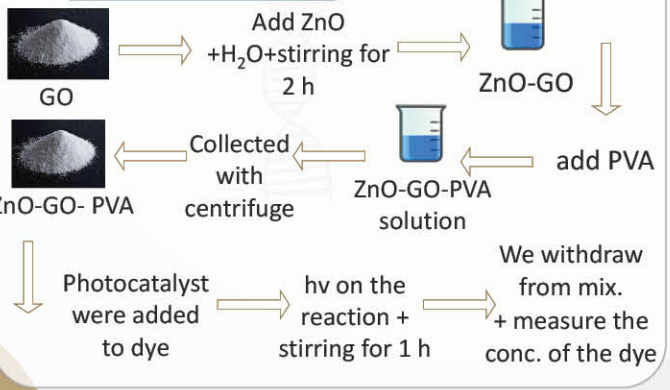
Introduction

- Photocatalysis is an effective process for water treatment. We chose ZnO as a semiconductor for this process because it has an advantage like high photoreactivity.[2] But there has a high band gap,[6] This decreases its efficiency, So we need to add material to lower its band gap, like graphene.
- Graphene was effective just for degradation of anionic dyes not for cationic dyes,[4] So we need to add polyvinyl alcohol, which has a negative charge on its surface that can remove the cationic dye.
- We used graphene oxide instead of GR because of GR has a weak binding with polymer.

Objective

Increase ZnO efficiency as a photocatalyst by combining it with graphene oxide and add polyvinyl alcohol to remove cationic dyes from textile water.

Methods



Results

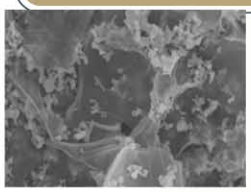
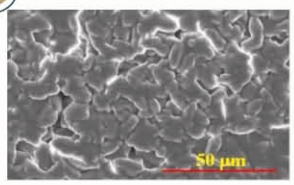


Fig1 : (a) FESEM of ZnO- graphene oxide.



(b) SEM for poly vinyl alcohol.[8]

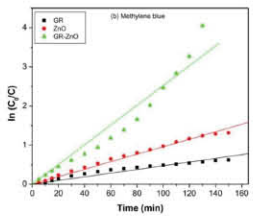
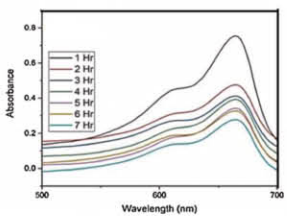


Fig2 : (a) Langmuir-Hinshelwood plot for degradation cationic dye.



(b) Absorption spectra of methylene blue by poly vinyl alcohol .[6]

Adding PVA to ZnO-GO was ideal idea to remove high percentage of cationic dyes .

Conclusion

- We expect high efficiency if we combine Zn-GO with polyvinyl alcohol
- ZnO-GO polyvinyl alcohol can remove even cationic dyes not just anionic
- GO has high surface area which help reaction to be easily .

Acknowledgments

We would like to express our thanks and gratitude to our supervisor in this research, Dr. Razan Snari, for her keenness and support. We had the honor to work and study under her supervision. Much gratitude to our parents, for their love, prayers, care and support for our ambitions and future.

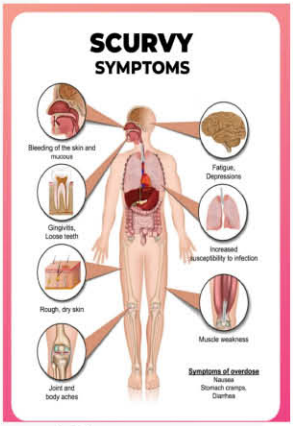
References

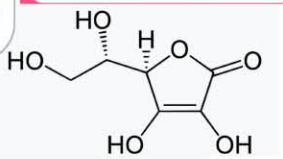
Vitamin C a full study of properties, analysis and problems

Prepared by: Boshra Hussin Almowalad - Rania Mohammed Alamri
Supervisor by Dr. Reem Kamal Shah
Chemistry department , Umm Al-Qura University

Abstract

Vitamin C is one of the water-soluble vitamins found in almost all living things. It is a very essential nutrient for many metabolic reactions in our body, and it is also an important reagent in preparing various substances in the pharmaceutical industry and in the food industry, and plays a great role in activating and reducing the enzyme, oxidative stress and immune function. And it is very important for life because it can protect against various respiratory infections and is able to reduce the risk of cardiovascular diseases in addition to some types of cancer and vitamin C deficiency disease known as scurvy.





Introduction

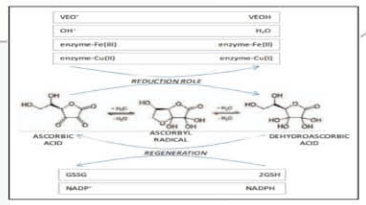
Vitamin C also known as ascorbic acid (AA) is an important nutrient in many multicellular organisms, especially us humans. Vitamin C is used as a reagent to prepare enzyme reagents, fine chemicals and nanomaterials.

Vitamin C consists of ٢ L-isomers that represent the redox system:

Ascorbic acid (vitamin C) in the low state and dehydroascorbic acid (DHA) in the oxidized state. The function of the vitamin throughout the human body is mostly related to the role of vitamin C as it acts as an electron donor.

Vitamin C needs many analytical techniques to detect it in various industrial and pharmaceutical preparations, and it can be detected using high performance liquid chromatography (HPLC), spectrophotometry, electrochemical sensing, fluorometry techniques and other calorimetric methods.

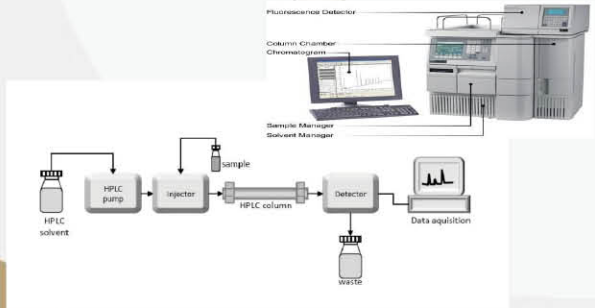




Objective

Testing the Amount of vitamin C taken from a random blood sample using HPLC technique, this is done because they are considered faster and more effective than other detecting methods such as spectrophotometric, enzymatic, titration methods, in addition to that it usually needs no derivatization.

HPLC is considered a sensitive and selective method thus used in both pharmaceutical and cosmetic industries Racz et al. reported in 1990 the use of HPLC for determining ascorbic acid found in fruits and vegetables.it has been used to deep-frozen raspberry cream analysis all together with three chemical methods usually used to analyze vitamin



Results

Table 1: Accuracy of the HPLC method for ascorbic acid determination (N = 3)

Concen-tration (mg/g)	Recover y (%) X	X ±SD	RSD (%)
40	102.43 102.42 102.34	102.39±0.049	0.048
50	102.03 101.89 101.19	101.70±0.450	0.442
60	100.09 100.05 100.07	100.07±0.020	0.020

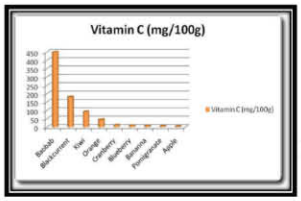


Figure 3. Amount of vitamin C in different sources.

Discussion

Table 1 shows the accuracy of the HPLC method for ascorbic acid determination, where the mobile phase gave a very good response with a retention time of 4 min for ascorbic acid with high accuracy and precision for all the runs performed and Plasma vitamin C concentration below 11 mmol/L (0.2 mg/dL), is an indication of scurvy disease
Fig 3 showed the amount of vitamin C in different sources that is very important to protect aganist scurvy disease

Conclusion

Vitamin C was found to have a crucial role in maintaining a healthy body, it is found in several natural sources and in many synthetic supplements, it's deficiency may lead to very hazardous diseases as the scurvy disease and thus we should maintain the adequate amount of this very important vitamin

Acknowledgments

We extend our sincere thanks to allah for finish this project and Dr. Reem Shah for her utmost effort with us and her constant guidance
for us during the period of research, giving us advice, and for her continuous support

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Synthesis and characterization of unsaturated polyester resin and its uses as anti chemical varnish coatings

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Abstract

Unsaturated polyester resins (UPRc) have attracted a significant attention due to the ease of their synthesis and the wide range of their applications. In the present study, unsaturated polyester resin is prepared by curing unsaturated polyester with styrene. The structure of the prepared unsaturated polyester is investigated by fourier-transform infrared spectroscopy (FT-IR) and proton nuclear magnetic resonance ^{1}HNMR. The prepared polyester resin shows good resistance to almost chemical environments.

Introduction

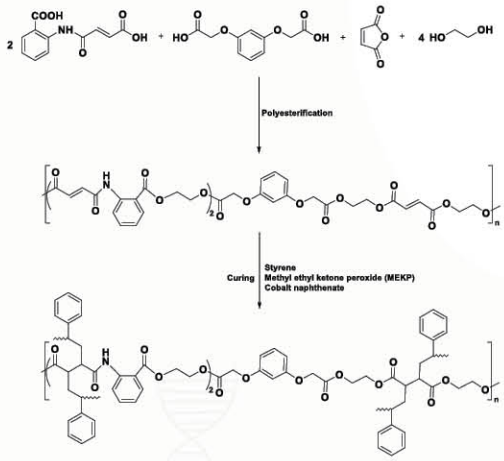
Synthesis of unsaturated polyester resin:

The first step:

The unsaturated polyester (UP) is synthesized by the reaction of 1,3bis(carboxymethoxy)benzene, 2-[3-carboxypropenoylamino)]benzoic acid and maleic anhydride with ethylene glycol.

The second step:

The unsaturated polyester is cured with styrene to give the resin.

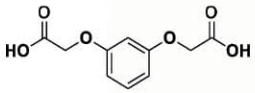


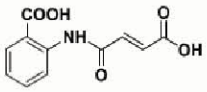
Objective

The aim of this project is to cure the unsaturated polyesters with styrene to improve its chemical resistance to different chemical environments. As a result, the prepared unsaturated polyester resin will use as anti chemical varnish coatings.

Results and discussion

- 1,3-bis(carboxymethoxy)benzene, 2-[3-(carboxy propenoylamino)]benzoic acid, unsaturated polyester and unsaturated polyester resin are successfully prepared.





- The chemical structure of prepared unsaturated polyester is characterized and confirmed by FT-IR and ^{1}HNMR.

- The prepared unsaturated polyester is viscous and soluble in most organic solvents. The physical properties of this polyester such as molecular weight, number of repeating units and viscosity measurements are studied.

- Moreover, cured polyesters is casted to form a film. The chemical resistance of the cured polyester film is determined in different chemical environments. As a result, cured unsaturated polyester resin shows a good chemical resistance to different chemical environments.

Acknowledgments

The authors acknowledge the chemistry school and Umm Al-Qura University for funding this project.

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Hybrid Nanoparticles Performance and Applications

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Abstract

Organic hybrid nanoparticles stay helpful parts in various fields and are a pearl that needs more investigation. Polymeric nanoparticles and liposomes, especially as far as their actual dependability and biocompatibility. The nanoparticles have progressed altogether as far as their readiness procedure and extent of utilizations. The extent of crossover nanoparticle applications has likewise been stretched out past single medication conveyance for anticancer treatment, including combinatorial and dynamic focused on drug conveyances, and conveyances of hereditary materials, immunizations, and symptomatic imaging specialists.

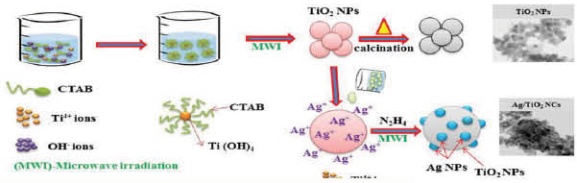
Introduction

Hybrid nanoparticles are constructed from at least two diverse nanoparticles to overcome the limits associated with single-component nanoparticles quality improvement and achievement of multiple functionalities of single nanoparticles. Contain two inorganic and organic components. They are brought together in organic compounds where the molecules interact. Also build hybrid material from organic components of building molecules. The organic units of hybrid nanoparticles are also used for building blocks of polymeric materials. The structures of metal hybrid nanoparticles can be used to catalytic and photochemical reactions in the organic compound. Hybrid nanoparticles remain useful in different fields and are applied in daily activities, either in medical or technological fields. The commercial application of nanoparticle technology in the medical field constitutes the detection of a targeted nucleic acid sequence. The technology is also applied in energy industries as an alternative energy source to meet the globally increasing demand for affordable and environmentally friendly energy .

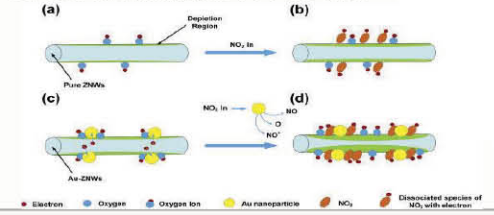
Synthesis

The preparation of hybrid nanoparticle organic compounds takes different methods. This preparation was focus on methods on the bottom approach to the preparation of hybrid nanoparticles and top-down approaches methods of preparation.

- **Top-Down Approaches Preparation Methods**
- **Bottom-Up Approaches to Organic Nanoparticles**
- **Synthesis of Ag-TiO2 by a facile wet chemical method**

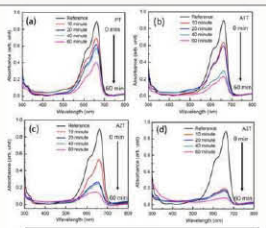


- **Synthesis of ZnO nanowires/Au by a facile one-pot method**

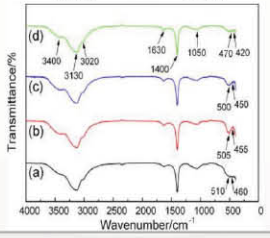


Results

In the preparation of Ag-TiO2 that TiO2 nanoparticles with Ag nanoparticles Sun light-induced photocatalytic behavior of samples.



The composition and functional groups of pure ZNWs and Au-ZNWs were analyzed by the FTIR spectroscopy in the frequency range of 4000–400 cm^{-1} as shown.



Application

There is an unlimited application of hybrid nanoparticles, . Some of the most common application of hybrid nanoparticle compounds includes and are not limited to.

a) Photonics



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b) Photorefractive Materials



c) Photovoltaics

d) Organic Light-Emitting Materials.

e) Molecular Magnetic Materials.

f) Electronic Devices.

Conclusion

There are unprecedented benefits of hybrid nanoparticles, and they remain useful in different fields including technology, medical, and other important fields such as production and photography industries. The preparation methods for these organic compounds remain challenging but worth owing to their unlimited application. The preparation of Ag-TiO2 that TiO2 nanoparticles with Ag nanoparticles attached at higher concentration exhibit superior photocatalytic activity. The other preparation of Pure ZNWs and Au-ZNWs hybrid was prepared by a facile one-pot hydrothermal process. Au nanoparticles were self-assembled onto the surface of ZNWs and the c-axis growth of ZNWs is suppressed by the addition of HAuCl4 in the synthesis of Au-ZNWs hybrid.

acknowledgments

Tank to God who illuminates path science and knowledge and helped us on performance and consummation of this project. we extend our sincere thanks and gratitude to all who helped us from near or far to complete this research. we would also like to thanks the research supervisor Dr. Samar Almehmadi, for the efforts and direction, and instruction constant to us. and we would like to thank Umm Al-Qura University and the Department of Chemistry for giving us the opportunity and learning how to write a scientific paper.

References

Polyamide And Its Derivative- Based Nanocomposite From Synthesis To Application

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Abstract

POSS-polyimide (PI) hybrid nanocomposites were prepared through a two-step approach, diphenyl ether (BAED) and dihydrodromylic acid (PMDA) were used in the preparation of 1-methyl-2-pyrrolidone (NMP) Polycarbonate (PAA). Addition of varying weight ratios of OAPS in NMP during the second step, multiple condensation was performed by thermal simulation. The formation of hybrid nanocomposites was confirmed using FTIR .

Introduction

Hybrid materials containing inorganic and organic components are expected to improve the performance compared to their non-hybrid materials [1]. Polyamides are known for their strength and durability at elevated temperatures (service temperatures can exceed 400 ° C). So they can be used as interlayer electrical insulators in microelectronic applications by simple spin coating techniques. The dielectric constants for most polyamides range from 3.1 to 3.5; Hence, we need to further reduce the dielectric constant of these materials to avoid interference between conductive wires [2]. Among the many engineering polymers, aromatic polymers (PIs) are thermally stable polymers with excellent mechanical strength and thermal stability. These polymers have increased in response to growing technological applications in a variety of fields such as aviation, mobile vehicle engineering, and microelectronics.

synthesis

- Fabrication Of Epoxy/Polyamide Blends Epoxy Resin/Polyamide
- Preparation Of Electroactive Polyimide (EPI) Films
- Preparation Of PI And POSS-PI Nanocomposites

Results

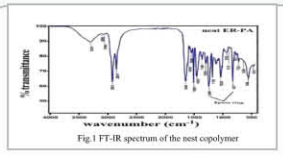
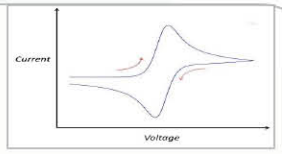
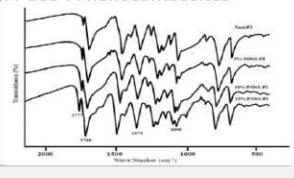


Fig.1 FT-IR spectrum of the nest copolymer



- FTIR analysis we found that the bends obtained at 1609 and 1546 cm- 'correspond to the bending and expansion vibration N - H and CN. All of these peaks that we found are indicative of the presence of amide groups on the epoxy resin
- Cyclic voltammetry (CV) has been widely used to characterize the electrochemical properties of electroactive polymers. In this paper, the polymers were characterized by CV using a three-electrode electrochemical cell
- PI and POSS-PI nanocomposites were prepared by BAED, OAPS and PMDA reaction via a two-step method.Thus Fig3 illustrates the FTIR spectra of different combination POSS-PI nanocomposites

We also observed the
of POSS uptake at 1090 cm-1



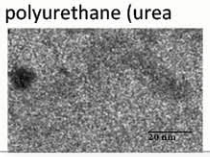
Application

- **Polyamides:**
  - Polyamide 6.6 has a high tensile strength, is able to absorb water and is also resistant to corrosion, so it is used in the garment industry , used also in engineering plastics, for example, in cars.
  - -Manufacture of valve covers.
  - -Manufacture of brake and power steering cabinets.



- **POSS-PI Nanocomposites** :

It has superior properties that allow it to be used as a filler with polymers developed for biomedical applications, for example, dental compounds, drug delivery systems and tissue engineering. It was concluded that the polymer / POSS compounds were biocompatible. Nanocomposites for cardiovascular implantation were developed by co-polymerization of POS monomers with polyurethane (urea carbonate) (POSS-PCU).



Conclusion

- that polyamide Large molecular compounds containing amide groups in the polymer backbone that form strong hydrogen bonds between the chains responsible for the high strength and thermal stability of the polyamide material .
- electrodes, EPI on CRS electrodes and bare CRS was investigated by performing sequential electrochemical corrosion measurements in Saline condition

electrodes might probably be attributed to the redox catalytic property of electroactive aniline trimer (ATs) in the formation of passive

- POSS-PI hybrid nanocomposites were prepared success- fully via condensation polymerization of BAED and PMDA in the presence of OAPS. The resulting POSS-PI nanocomposites exhibited excellent thermal properties, such as high glass transition temperature, thermal stability and flame retardancy.

acknowledgments

First and foremost ,We thank God Almighty for successfully completing the research, then we sincerely thank our supervisor and Dr. Samar Al Mehmadi for her great effort with us and her constant guidance for us during the research period and for giving us advice, her beautiful spirit and her beautiful spirit. Her wonderful treatment of us as one of her daughters. We thank Umm Al-Qura University and the Department of Chemistry for giving us the opportunity to conduct scientific research .

References

Synthesis and spectral characterization of Al (III) curcumin complex

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Chemistry department , Umm Al-Qura University

Abstract

Curcumin has been recognized as a potential natural drug to treat the Alzheimer's disease (AD) by chelating baleful metal ions, scavenging radicals and preventing the amyloid β (Aβ) peptides from the aggregation. In this research, Al(III)–curcumin complexes with Al(III) were synthesized and characterized by liquid-state 1H, 13C and 27Al nuclear magnetic resonance (NMR), mass spectroscopy (MS), ultraviolet spectroscopy (UV) and generalized 2D UV–UV correlation spectroscopy. In addition, the density functional theory (DFT)-based UV and chemical shift calculations were also performed to view insight into the structures and properties of curcumin and its complexes. It was revealed that curcumin could interact strongly with Al(III) ion, and form three types of complexes under different molar ratios of [Al(III)]/[curcumin], which would restrain the interaction of Al(III) with the Aβ peptide, reducing the toxicity effect of Al(III) on the peptide.

Introduction

Curcumin the main yellow bioactive component of turmeric has been known to have the medicinal activity since ancient times and this molecule has been the object of several investigations in the field of biology, medicine and pharmacology over the last decades, such as antioxygenation, antibiosis and antitumor activities and also shown to have a wide spectrum of pharmacological effects including anti-carcinogenic, anti-inflammatory, antioxidant and Alzheimer's prevention From the chemical structure of curcumin {1,7-bis(4-hydroxy-3methoxyphenyl)-1,6- heptadiene-3,5-dione}, it can be said that curcumin has a highly conjugated ß-diketone moiety and can be a powerful natural chelating agent with its safety evaluation even administered at high dose in human . Complexation of curcumin with metals has attrcted much interest over the past years as one of the useful requirements for the treatment of Alzheimer's disease and in vitro antioxidant activity. Moreover, several metal complexes of curcumin have been synthesized, characterized and evaluated for various biological activities These ß-diketoenolate ions form very stable chelate complexes with a great range of metal ions. Among the commonest types of diketo complexes are those with the stoichiometries M(dike)3 and M(dike)2. Tetradiketo complexes M(ß- dike)4 are usually nonrigid

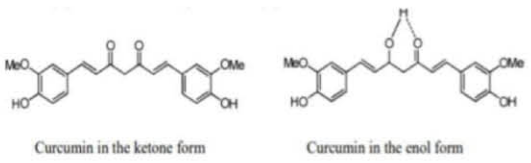

Fig1. Structure of curcumin in the ketone and enol forms.

Objective

1- Study the spectra of the Alumminum curcumin complex

2 -Method for preparing Al(III)- curcumin complexe

3- Application of metal curcumin in non medicinal

Results

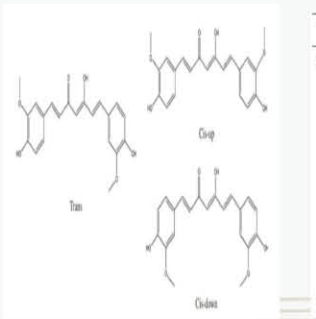

Fig. 1.Three conformers of curcumin. The term "Trans" indicates that two phenol–OCH3 groups are on the opposite flanks of the curcumin backbone and "Cis" indicates that they are on the same flank. "Cis-up" means two phenol–OCH3 groups are toward up the flank of the curcumin backbone, while "Cis-down" toward down the flank of the curcumin backbone .

Table 1: Energy and 13C chemical shift assignments based on experiment and DFT-calculation for curcumin at its various conformers.

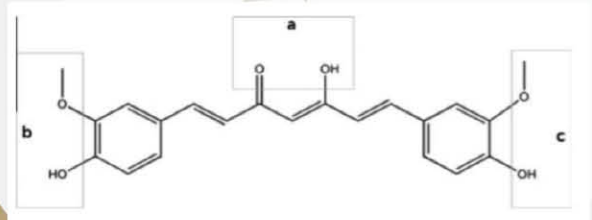

Fig.2. Three chelating metal ion sites of (a), (b) and (c) in curcumin

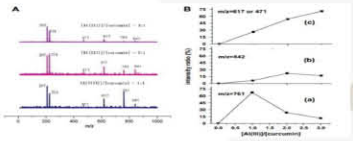

Fig.3. (A) MALDI-TOF mass spectra of Al(III)–curcumin complexes under different molar ratios of [Al(III)]/[curcumin] at 1:1, 2:1, 3:1. (B) Dependence of intensity ratios of m/ z = 761 (a), 841 (b) and 617 or 471 (c) to the total intensity of those four peaks on the different molar ratios of [Al(III)]/[curcumin] .

	Curcumin	[Al(III)]: [curcumin]:	[Al(III)[curcumin]:	[Al(III)]: [curcumin]
Composit	Curcuma	2curcumin+2Al(III) +3OH +3MeOH + Cl	2curcumin+Al(III) +OH +MeOH	curcumin+2Al(III) +4OH +4MeOH +Cl
Molecular formula	$C_{21}H_{20}O_6$	$C_{42}H_{37}O_{18}Al_2Cl$	$C_{43}H_{43}O_{13}Al$	$C_{21}H_{19}O_{14}Al_2Cl$
Molecular weight	368	970	810	652
Mass (m/z)	369 ($368+H^+$)	841(970-cl-2MeOH- CH_2O)	761(810-MeOH-OH)	617(652-Cl), 471(652-Cl-4MeOH-H20)
UV (nm)	398,445(396,446)	445,478(445,455)	432,465(436,451)	445,478(444,453)
^{27}Al NMR (ppm)	—	0.9, 2.5 (6,15)	4.2(30)	1.9,3.5(13,27)

Table 2 : Summary of experimental and theoretical UV,MS and NMR

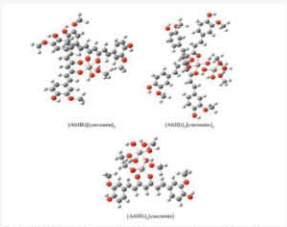

Fig. 4. Three theoretical structural models of complexes of [Al(III)][curcumin]2 ,[Al(III)]2[curcumin]2 and [Al(III)]2[curcumin]. The pink, red, black and gray balls indicate Al(III), oxygen, carbon and hydrogen atoms, respectively. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.

Discussion

The keto-enolic conformer of curcumin in nature is more stable than di-keto conformer
There are three ketoenolic tautomeric conformers of curcumin with lower energy
The energy comparison of those three keto-enolic conformers is listed in referred to the "Trans" energy set at 0.0 J moll . Among those conformers, "Trans" conformer has the lowest energy
The bond connecting the aromatic ring with the dienic backbone could readily rotate, leading to the transition between "Trans" and "Cis-up" conformers with a low rotational energy barrier of ΔE = 48 J mol-1
Curcumin has three possible sites, "a", "b" and "c" chelating metal ions. The 1H NMR signal of enol-H at 16.3 ppm disappeared when Al(III) reacted with curcumin, which suggests that the site of "a" is most likely to join the reaction
Fig. 3A shows the mass spectra of Al(III)–curcumin complexes under different molar ratios of [Al(III)]/[curcumin] with sinapinic acid (SA) as the matrix
The intensity ratio at m/z of 761 increases firstly and then decreases as the molar ratio of [Al(III)]/ [curcumin] increases (Fig. 5B-a). Moreover,
When the molar ratio of [Al(III)]/[curcumin] reaches to 1:1, the intensity ratio at m/z of 761 reaches maximum equal to 67%, which suggests that the corresponding complex is more easily formed at low molar ratio of [Al(III)]/[curcumin], named as [Al(III)][curcumin]2.
The intensity ratio at m/z of 841 also increases firstly, and then decreases (Fig. 5B-b) but slower than that at m/z of 761, therefore corresponding to the formed complex, named [Al(III)]2[curcumin]
when the molar ratio increases from 1:1 to 3:1, the intensity ratio of peak at 471 or 617 increases considerably (Fig. 5B-c), higher than that of other two peaks at 761 and 841, and reaches to 71% as the molar ratio of [Al(III)]/[curcumin] is equal to 3:1, therefore corresponding to the formed complex, named [Al(III)]2[curcumin
.Based on the above analysis, as the molar ratio of [Al(III)]/[curcumin] increases, the complex [Al(III)][curcumin]2 corresponding to m/z of 761 is a dominant component at low molar ratio of [Al(III)]/[curcumin]
The complex [Al(III)]2[curcumin] corresponding to m/z of 471 or 617 is more stable than other two complexes at higher molar ratio of [Al(III)]/ [curcumin] Based on the experimental and calculated results, the most possible stereo structures of those three Al(III)–curcumin complexes by DFT calculation are shown in Fig. 10
The complex components and properties are summarized in Table 3, based on the experimental MS, UV, 27Al NMR results and the theoretical ones

Conclusion

On the basis of detailed experimental and theoretical methods, it is demonstrated that curcumin interacts strongly with Al(III), and forms three types of complexes of [Al(III)][curcumin]2,[Al(III)]2[curcumin]2 and [Al(III)]2[curcumin],implying that curcumin is capable of scavenging Al(III) and preventing Al(III) from the interaction with proteins like Aβ, therefore, weakening the Aβ toxicity and oxidative stress.Curcumin–metal complexes as well as surface functionalized metal nanoparticles with curcumin may pave a new way of using the curcuminoids towards possible drug delivery,therapeutics and excellent anti-oxidants.Moreover, antiarthritic antirheumatic, antimicrobial/antifungal, antiosteoporotic and antiviral activities have been reported for certain metal curcumin complexes ,indicating that these compounds have the potential of becoming "multi-anti" agents in the future like curcumin itself.

Acknowledgments

In the best form we wanted to be, we would like to thank our supervisor for this project, Dr. Faten Abdel Mohsen Al-Jefri, for her help and valuable advice to come up with this project. We thank the faculty who provided us with all the knowledge. Most of all we are all grateful to our families for their endless love, help, support and encouragement. And our friends for their understanding and support for us to complete this project.

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Study of the structure , reactivity and spectral properties of curcumin

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Abstract

Curcumin, a pigment from turmeric, is one of the very few promising natural products that has been extensively investigated by researchers from both the biological and chemical point of view. While there are several reviews on the biological and pharmacological effects of curcumin, chemistry reviews are comparatively scarcer. In this search, we study the curcumin as chemical substance and its spectral properties

Introduction

Curcumin the active yellow pigment obtained from the dried rhizomes of Curcuma longa L, is a popular coloring spice and ingredient of many cosmetics and pharmaceuticals. Curcumin has been generally associated with a large number of biological and cellular activities, including antioxidant, anti-inflammatory, anticarcinogenic, and hypo cholesterol emic properties

Curcumin research has become one of the most favorite subjects for all the branches of chemistry, including organic, inorganic, physical and analytical chemists. In organic chemistry the extraction and synthesis of curcumin and new synthetic derivatives was the main focus of research

Inorganic chemists have used its metal chelating abilities through the β-di-keto group to form new structural entities with modified biochemical activities. Physical chemists have focused on the highly sensitive spectroscopic properties of curcumin to study its interactions with microheterogeneous systems and biomolecules

Analytical chemists have been employing curcumin's unique absorption spectroscopic properties to identify and quantitatively estimate trace elements like for e.g., estimation of boron, as a red colored product.

Other chemistry studies that are useful in understanding the biological activity of curcumin are its chemical reactivity with reactive oxygen species (ROS), addition reactions, degradation and formation of nanoconjugates and formulations

Objective

- Study turmeric compound, to know it uses
- How turmeric interacts with other substances
- Knowledge of compound spectral properties

Results

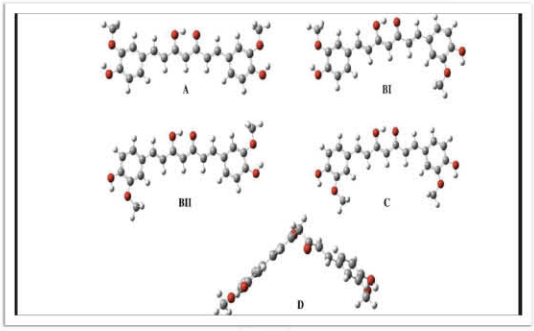

Fig1:structures of Curcumin conformers

Table 1
The total electronic energies (*E*), zero point vibrational energies (*E* + ZPE), thermodynamics quantities (*G*, *H* and S), relative differences *in vacuum*, free energy of solvation (ΔG_{solv}), free energy differences in solution (ΔG_{MeOH}) and relative conformational population *in vacuum* (N_v) and in solution (N_{MeOH})

	E^a	$E + ZPE^a$	G^a	H^a	S^b	ΔE^c	$\Delta (E + ZPE)^c$	ΔG^c	ΔH^c	$\Delta G_{solv}{}^c$	$\Delta G_{MeOH}{}^c$	N_v	N_{MeOH}
*B3LYP/6–31G**													
A	−1263.573127	−1263.201114	−1263.260810	−1263.174611	181.421	0.149	0.169	0.395	0.187	−15.980	0.275	0.224	0.261
BI	−1263.573300	−1263.201363	−1263.260548	−1263.174888	180.289	0.033	0.013	0.559	0.013	−15.880	0.539	0.169	0.167
BII	−1263.573348	−1263.201384	−1263.260562	−1263.174909	180.272	0.000	0.000	0.550	0.000	−15.840	0.571	0.172	0.158
C	−1263.573277	−1263.201358	−1263.261439	−1263.174869	182.202	0.048	0.016	0.000	0.025	−15.860	0.000	0.435	0.414
D	−1263.569078	−1263.194527	−1263.255945	−1263.167534	186.078	4.889	4.303	3.447	4.628	−16.580	2.728	0.001	0.004
*B3LYP/6–311G***													
A	−1263.917090	−1263.547413	−1263.606960	−1263.520864	181.204	0.172	0.190	0.270	0.205	−17.090	0.150	0.234	0.269
BI	−1263.917292	−1263.547693	−1263.606806	−1263.521174	180.226	0.036	0.014	0.367	0.010	−17.010	0.327	0.199	0.200
BII	−1263.917346	−1263.547715	−1263.606806	−1263.521190	180.193	0.000	0.000	0.367	0.000	−16.960	0.377	0.199	0.184
C	−1263.917300	−1263.547707	−1263.607391	−1263.521188	181.430	0.030	0.000	0.000	0.001	−16.970	0.000	0.369	0.347
D	−1263.905684	−1263.536591	−1263.597850	−1263.509566	185.809	7.843	6.980	5.987	7.294	−17.900	5.057	1.5E−5	6.6E−5

[a] a.u.
[b] cal mol^{-1} K^{-1}.
[c] kcal mol^{-1}.

Fig2: Table (1) : The total electronic energies (E), zero point vibrational energies (E + ZPE), thermodynamics quantities (G, H and S), relative differences in vacuum, free energy of solvation (ΔGsolv), free energy differences in solution (ΔGMeOH) and relative conformational population in vacuum (Nv) and in solution (NMeOH)

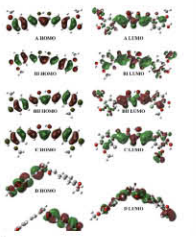

Fig3:Representation of HOMO and LUMO orbital density of Curcumin conformers at B3LYP/6-311G**level.

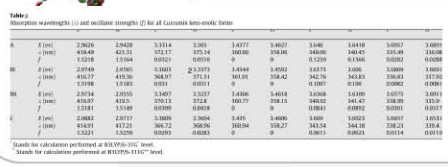

Fig4: Table (2) :Absorption wavelengths (λ) and oscillator strengths (*f*) for all Curcumin keto-enolic forms

Discussion

- From X-ray crystallography the existence, in the solid state, of at least two Curcumin conformers (Fig. 6 A and B types) is known. Previous theoretical calculations report three structures (Fig. 1,A,C and D),
- Curcumin possesses two isomers: di-ketonic and keto-enolic ones which may assume different conformations.
- Curcumin keto-enolic structures (A, BI, BII and C), are completely planar.
- The keto-enolic forms are more stable than the di-keto one (D) as previously observed.
- The most stable keto-enolic species depends on the energy terms taken into account: if(ΔE, ΔE + ZPE) and ΔH are considered BII outcomes the most stable, otherwise, if ΔG term is considered, C results the most stable. The energy gap between these two species is anyway very small.
- The tautomeric equilibrium between the two resonance forms occurs through a transition state with a ΔG* of 0.44 kcal/mol.
- All the structures show two intramolecular hydrogen bonds involving phenolic hydrogen and methoxylic oxygen (H...O 2.07 Å) .
- Allthe keto-enolic structures can coexist in standard conditions (298.75 K, 1 atm) as a consequence of the possible free rotation around the single bond connecting the aromatic ring with the dienic structure .
- The structures A, BI, BII and C show a great similarity (Fig.7); in these structures HOMO and LUMO are delocalized on the entire molecule, being the electronic density distributed both in the dienic part of the molecule and in benzenic one.
- For the di-ketonic structure (D) the last two occupied molecular orbitals (HOMO and HOMO- 1) delocalized on half molecule giving rise to two separated fragments. This accounts for the higher stability of A, BI, BII and C conformers with respect to D, suggesting their ability to chelate metal ions .
- Fig.9 reports 1H NMR spectrum of Curcumin in DMSO; 1H and 13C chemical shift assignments (Tables 4 and 5) are sup- ported by 2D COSY, HSQC and HMBC experiments. The fit between experimental chemical shifts (δ) of Curcumin in DMSO and MeOD for both 1H and 13C (Fig. 9 A and B, respectively) illustrates very small variation due to experimental conditions, suggesting irrelevant solvent affect .

Conclusion

In conclusion in this work we investigate all possible Curcumin conformers in order to establish a reliable starting point to further theoretically explore the complexing ability of Curcumin and its derivatives towards metal ions, all theoretical data determined by means of ΔG values with the exclusion of negligible di-keto form using relatively small basis set, such as B3LYP/6-31G*, which can be satisfactory implied to predict spectroscopic properties for complex organic structures, reducing computational efforts.

Acknowledgments

Dr. Faten Abdulmohsen Aljiffrey Associate prof. Of Physical Chemistry for her help and support for us, and I also thank my colleagues who participated in the research despite the circumstances and the environment surrounding us. Thank you.

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Review of 2-Aminothiazile Derivatives

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Abstract

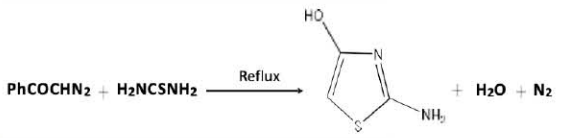
2-Aminothiazole Derivatives is a wide family of antibiotics, which have been used for hundreds of years and showed great efficacy and 2-Aminthiazole has wide information and applications and is of importance at the present time because of its benefits full of benefit and achieving great effects not in a particular country or city but around the world.

Introduction

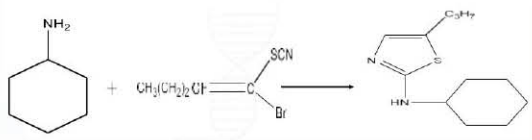
Heterocyclic science is the most interesting part of natural science, which contains sulfur and nitrogen molecules as building blocks. They are known for their biological activity in a wide range and also in terms of dyes such as 2-aminothiazole which itself is a light yellow fluid with the formula $C_3H_4N_2S$ soluble in alcohol and ether, and from a chemical point of view, it is a good inhibitor for alloys and it has a high activity with some chemicals in therapeutic drugs because its efficacy in allergy and analgesics, in anti-cancer drugs and anticoagulants.

Synthesis

Diazoacetophenone was reacted with thiourea to furnish 2-amino-4- phenyl thiazole. The reaction has been affected either by heating an intimate mixture of the reactants on the steam bath, or by refluxing an ethanol solution of the reaction components.

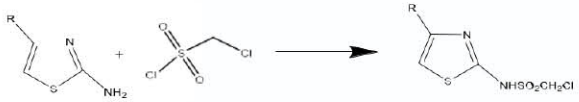


The action of primary amines on halo-thiocyanato alkenes afforded the 2- Amino-1,3-thiazoles, the cyclization taking place with a migration of the sulphur atom on the C=C bond; thus 2- cyclohexylamino-5-propyl-1,3- thiazole was obtained from the condensation of cyclohexy- lamine and (Z)-bromo-1-thiocyanato-1- pentene.



Reaction

2-Amino-4-substituted thiazoles were reacted with chloromethansulfonyl chloride to yield the corresponding C-chloro-N-(2-thiazolyl)methane sulfonamides.

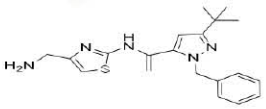


2-Amino-4-substituted thiazoles 3 underwent condensation with different aromatic or heterocyclic aldehydes to give the corresponding Schiff 's thiazole bases, which were used to develop fluorescence chemosensors for detection of Al^{+3} ions at low concentration range.

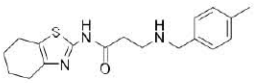


Biological activity

NTDs are known to be caused by a few protozoal, parasitic, bacterial, and viral infections; which greatly affect the poorest countries across the world. and a huge effort is ongoing to find the potential leads against NTDs for therapeutic applications. In this way, the aminothiazole compounds have to be new hope for the prevention of the few NTDs. The aminothiazoles are becoming leads for the inhibition of a diversity of complications.



2-aminothiazole are essential for the effectiveness of the antitumor profiles.



Conclusion

The heterocycles of 2-aminothiazole scaffolds occupy a dominant part in organic/medicinal chemistry with their reactivity and biological activity and mostly act as pharmacophores, 2-aminothiazole-containing molecules with different biological activities. The 4,5,6,7-tetrahydrobenzo[d]thiazole is the most effective derivative of anti- tumor activities.

Acknowledgments

We are grateful to Umm Al-Qura university and the Department of Chemistry and many Thanks to Dr. Munira alrooqi for her guidance in this research, Special thanks to our families and project friends for helping and cooperation.

References

The Review of indole : Synthesis, Derivatives, and Applications

College of Science
chemistry department
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By:
RAGHAD ALHARBI.
BEDOUR ALHARBI
NADA ALSHANBARI



Abstract

The indole is one of the most widespread heterocycles in the naturally occurring and synthetic bioactive compounds including anticancer agents. Due to its biodiversity and versatility, it has been a highly privileged motif for the target-based design and development of anticancer agents. In the last decade, many researchers have reported various indole-based compounds with distinct mechanisms involved in producing potential anticancer activities, indicating the importance of indole motif in the anticancer drug development,In this review, we going to ...

Introduction



Indole A heterogeneous polycyclic organic solid compound, which has a double structure consisting of a ben-zene ring connected with a pentagonal ring, it has a very unpleasant odor and is found in the form of a color-less and lustrous solid powder. Its chemical formula is C8H7N, its molecular weight is 117.15, its melting point is 52 degrees Celsius and its boiling point is 253 degrees Celsius. Indole is found widely in the natural envi-ronment and can be produced by a variety of bacteria. It is found in coal tar and in some etheric oils such as jasmine oil, for example. It is also found naturally in human feces and has a strong fecal odor. It is soluble in hot water, hot alcohol, ether and benzene. It is used as a feedstock in the synthesis of heterocyclic auxins and tryptophan, and it is also used in perfumery and pharmaceuticals. Indole functions to regulate various aspects of bacterial physiology including spore formation, plasmid stability, drug resistance, and biofilm formation.[1]

Heterocyclic compounds have paid enormously to the society in the form of large number of drugs for the treatment of various ailments and have occupied a prominent place in medicinal chemistry due to their varied biological activities [2-3]. Owing to their specific chemical reactivity, they constitute 80% of the drugs which are in therapeutic use. Since past few decades, many heterocyclic compounds have been recognized as poten-tial anticancer agents [3-5]. Around 60% of the medications used for cancer treatment are based on heterocyclic moieties [6]. Although recom-mended quantity of anticancer drug is adequate to kill cancer cells but is generally harmful to the normal tissue and lead to many side effects, which restricts its treatment efficacy [7]

Structure and General Properties of Indole

Indole also named as Benzopyrrole is considered a heterocyclic organic compound which was first isolated in the year 1866, indole has the molecular formula C8H7N, and it is a colourless to white solid having a pleasant smell and found naturally in oils of some flowers as jasmine & orange blossom but it can be synthesized from phenylhydrazine and pyruvic acid.

Indole is found to be the parent precursor of a large number of very important compounds that occur in nature as the indole moiety is embedded in several biological compounds including several essential amino acids and tryptophan. Indole is a bicyclic compound resulting from the fission of 2 aromatic compounds , a benzene ring (6-membered) with a pyrrole ring (5-membered) bearing a nitrogen moiety.

The indole molecule is considered a planar asymmetric rotor which has a Cs symmetry in addition to 29 planar & 13 nonplanar fundamentals Indole crystallizes in the Pna21 space group in the orthorhombic system Physical & Chemical properties: Molecular Weight of indole is 117.15 g/mol ,and he solid colourless to white crystals , he have floral smell when in highly purified form , The Boiling point is 254°C and , Melting point: 52.5°C , The are soluble in hot water,benzene , hot alcohol, toluene and ether , and In soluble in mineral oils and in glycerol. The Density is 1.22 g/cum at 25 °C[8]

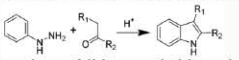
General Synthetic Procedure of Indole

The indole can be Obtained from the 220 to 260 ° C boiling fraction of coal tar or by heating sodium phenyl-glycine-o-carboxylate with NaOH, saturating the aqueous solution of the melt with CO2 and finally reducing with sodium amalgam; Can be prepared also by the reduction of indoxyl, indoxyl carboxylic acid or indigo.

In a method of preparation of indole from N (Beta hydroxyethyl) aniline, a first step consists in esterifying the alcohol function of N (Beta -hydroxyethyl) aniline in an organic medium and at a temperature within the range of 0* to 200*C and a second step consists in subjecting the ester which has been prepared during the first step to thermal cracking at a temperature within the range of 650* to 900*C.[9]

Fischer indole synthesis

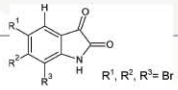
One of the oldest and most reliable methods for synthesizing substituted indoles is the Fischer indole synthe-sis, developed in 1883 by Emil Fischer. Although the synthesis of indole itself is problematic using the Fischer indole synthesis, it is often used to generate indoles substituted in the 2- and/or 3-positions. Indole can still be synthesized, however, using the Fischer indole synthesis by reacting phenylhydrazine with pyruvic acid followed by decarboxylation of the formed indole-2-carboxylic acid. This has also been accomplished in a one-pot synthesis using microwave irradiation.[10]



Several substituted indole-3 derivatives have been found to exhibit remarkable anti-neoplastic proper-ties. Cell proliferation inhibition of human colon cancer (HT-29), human ovarian adenocarcinoma (SK-OV-3), and c-Src kinase activity. Significantly, 3-pyranyl indoles showed good anti-cancer activity against MCF-7 breast cancer cell lines compared to the standard drugs.[11]



Anticancer activity of 1H-indole-2, 3-dione derivatives



Vine et al synthesized a range of substitute 1H-indole-2,3-diones (isatins) and studied their cytotoxicity against the human monocyte-like histiocytic lymphoma (U937) cell line in vitro. SAR studies indicated C5, C6, and C7 substitution greatly enhanced activity with some di- and tri-halogenated isatins giving IC50 values <10 μM. These compounds showed greater selectivity toward leukemia and lymphoma cells over breast, prostate, and colorectal carcinoma cell lines. The most active compound, 10, 11, 12-tribromoisatin

(Figure), was found to be antiproliferative at low micromolar concentrations and also activated the effector caspases 3 and 7 in a dose-dependent manner.These results indicate that di- and tri-substituted isatins may be useful leads for anticancer drug development in the future .[11]

Conclusions

The current review covered topics about indole: firstly we talked about indole in general, how it is prered and its many applications.

secondly we talked about the importance of indole and its role as an anti-cancer drug, and the indole ring is structural as a main scaffold present in various bioactive molecules known to prevent proliferation and invasion of many cells Carcinogenic.

These derivatives arose as a talented nucleus that needed further expansion to gain more power and selectivity. Cytotoxic agents. Several indole derivatives such as 3-indolyl methylene-2-indolinone derivatives containing a pyridine ring can be found to exhibit anti-tumor activity and interesting results were obtained with the halogens, methoxy and dimethylamino groups.

Dipendole derivatives were evaluated against human cancer cell strains and found to be primarily active against Escherichia coli.

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Title: The Review of Indazole

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Chemistry Department
2020/2021

Abstract

The purpose of this study to investigation in one of the most important heterocycles in drug molecules known as a Indazole and its derivatives . Diversely substituted indazole derivatives bear a variety of functional groups and display versatile biological activities; hence, they have gained considerable attention in the field of medicinal chemistry. this study focus on the methods used for synthesis of Indazole and study the characterization of this compound using FTIR , ^{13}C, NMR and X-ray diffraction. On other hand this study highlight on the common application of Indazole compound such as anti anti Alzheimer's, anti Cardiovascular disorders , antihypertensive agents , as anti- obesity , anti- bacterial and other .

Introduction

The nitrogen-containing heterocyclic are important building blocks for many bioactive natural products and commercially available drugs. As pharmacologically important scaffolds, they have attracted considerable attention from chemists. Indazoles are one of the most important classes of nitrogen-containing heterocyclic compounds bearing a bicyclic ring structure made up of a pyrazole ring and a benzene ring [1]

World's largest selling drugs are nitrogen containing heterocycles. It is because of their ubiquitous nature which is key scaffolds of many biological molecules and pharmaceutical products. Thus many chemists from all over the world were motivated and started developing different methods for the synthesis of these heterocycles. One of these which have biological, agricultural and an industrial application is Indazole [2].

Indazole was first defined by scientist Emil Fisher in 1800 as a "pyrazole ring fused with the benzene ring". It has been extensively studied due to its interesting chemical and biological properties. Indazole belongs to the azoles family containing carbon, hydrogen and nitrogen atoms. Indazoles figure 1 are also called as benzpyrazole or isoindazolone heterocyclic organic compounds, possessing two nitrogen atoms. Indazole having aromatic heterocyclic systems as like that of pyrazole molecule and indazoles resembles with pyridine and pyrrole [2].

Indazole derivatives scarcely occur in nature, but this particular nucleus in a variety of synthetic compounds possesses a wide range of pharmacological activities, such as anti-inflammatory, antiarrhythmic, antitumor, antifungal, antibacterial, and anti-HIV activities [1-2]

The purpose of this study to investigation on the biological activity of Indazole compound and derivative's, and study the method used for synthesis of indazole and its application .

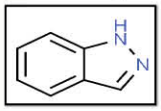


Figure 1: chemical structure of Indazole

Tautomerism of indazoles

Indazole usually contains two tautomeric forms: 1 H-indazole , 2 H indazole and 3 H indazole (Figure 2). Since 1H-indazole is more thermodynamically stable than 2H- and 3 H indazole, it is the predominant tautomer [3]

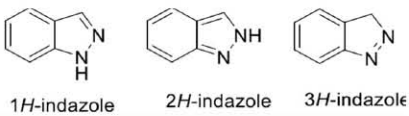


Figure 2 : Tautomerism of indazoles [3]

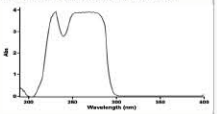
Chemical and physical properties of indazoles

Indazole, also referred to as benzpyrazole or isoindazone, is a heterocyclic aromatic organic compound with a pyrazole ring fused with a benzene ring , is a chemical compound with the formula C7H6N2 and have a Molar mass 118.14 g/mol [4]

1.3. Characterization of Indazoles

1.3.1 UV-Vis spectra of Indazoles

UV-Vis spectra of Indazoles in 1,2-dichloroethane as solvent. Indazoles shows strong absorption with a maximum at 235 nm, and very broad spectra 296 nm [5]



Name	Indazole
SYMBOL name	3D molecule
3D structure	
Molecular formula	$C_7H_6N_2$
Molar mass	118.14 g/mol
Melting point	147 to 149 °C
Boiling point	270 °C

Table 1 Chemical and physical properties of indazoles

Derivatives of indazole

This decade witnessed an unprecedented explosion of research on the diverse biological properties of derivatives sharing an indazole core. Interest in indazoles is huge started by the large number of published articles devoted to their biological activity [6-7]

1. **4,5,6,7-tetrafluoro-3-perfluorophenyl-1H-indazole**
2. **N-[(1-aryl-1H-indazol-5-yl)methyl]amides**
3. **N-(4-(3-amino-1H-indazol-4-yl)phenyl)-N -(2-fluoro-5-methylphenyl) urea**
4. **4-methoxy-6-methyl-1H-indazole-3-carboxylic acid**
5. **(5-tert-butyl-2,3-dihydro-1H-inden-1-yl)-3-(1H-indazol-4- yl)urea**
6. **3-(5-nitrofuryl)-7- (5-nitrofurfuryliden)-3,3a,4,5,6,7-hexahydro-2H-indazole**
7. **1-(3,4-Dichlorobenzyl)-3-(1H-indazol-4-yl)-urea hydrochloride**

Application of Indazoles

The biological and medicinal properties of indazoles have prompted immense research effort aimed at synthetic routes and medicinal functionalization of the nucleus. Indazole derivatives have been reported as anticancer (2,3-diphenyl-2H-indazole) , antibacterial such as (R)-4-(4-fluoro-5-(((1S,2S)-2-(hydroxymethyl)cyclopropyl)buta 1,3-diyn-1-yl)-1H-indazole , anti- obesity such as (6-trifluoromethyl indazoles derivatives) antiprotozoal such as ((3S,3aR)-2-(3-Chloro 4-cyanophenyl)-3-cyclopentyl-3,3a,4,5-tetrahydro-2H-benzo [g] indazole-7-carboxylic acid) ,and anti-al Alzheimer's disease (3-(benzyloxy)-1-(5-[18F]fluoropentyl)-5-nitro-1H-indazole, [8]



Pharmacological application of indazole

Indazoles as anti-cancer

Arán et al. [9] report the synthesis and the cytostatic activity against HeLa Cells of a series of indazole derivatives . The most active compounds were derivatives figure (3) , The good activity of indazolols figure (16) carrying a "benzyl chloride" moiety might be attributed to its enhanced alkylating ability [9]

This compound possesses significant anticancer activity against the carcinosarcoma, colon tumor and melanoma and solid sarcoma

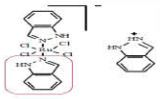


Figure 17 : Indazoles as anti carcinosarcoma, colon tumor

Conclusion

Heterocyclic compound containing Indazoles nucleus plays most important role in the field of medicinal chemistry. It shows wide range of activities for medication purpose.

Accordingly, a large number of Indazoles compounds have been synthesized and evaluated for their different biological activities. The presence of different functionalities on indazole moieties enhances its biological activities. Hence, the preparation of indazole compounds bearing functional groups has gained a significant interest to the organic synthetic chemists. A large effort has been made to develop efficient, new methods for the functionalization of indazoles.

The Indazoles based pharmaceuticals are becoming very important class of therapeutic agents and are likely to replace many obtainable organic based pharmaceuticals in the very near future. The Indazoles based pharmaceuticals be created on a large scale by different research development processes and will become available commercially for therapeutic uses such as anti anti Alzheimer's, anti Cardiovascular disorders, antihypertensive agents , as anti-obesity , anti- bacterial and other .

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Title: A Review on Synthetic Approaches of Benzotriazole and their Derivatives as Antimicrobial Agents

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Supervised by:
Dr. Nuha Halawani
2020/2021

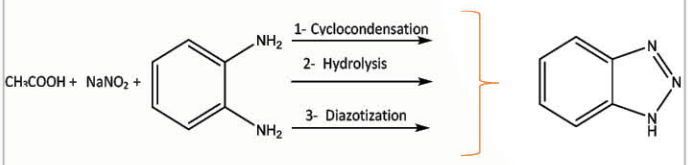
Abstract

Benzotriazole consists of three nitrogen atoms in the first, second and third positions. There are odd pairs of each nitrogen atom. Benzotriazole is part of a heterocyclic ring with a triazol ring embedded in a benzene ring it also showed us biological activity.

Introduction

* The nitrogen-containing heterocycle derivative benzotriazole has three nitrogen atoms in the first, second, and third positions.
* Lone pairs of each nitrogen atom are present in the unshared form. Benzotriazole is part of a fused heterocycle that has a triazole ring fused with a benzene ring.
* Benzotriazole is have a Unique chemical and physical properties. Excellent leaving group strength, electron-donating or electron-withdrawing character, stabilization of -negative charges, and stabilization of radicals are four major properties of the benzotriazole fragment that interact and are responsible for the synthetic flexibility of its derivatives.

Synthesis



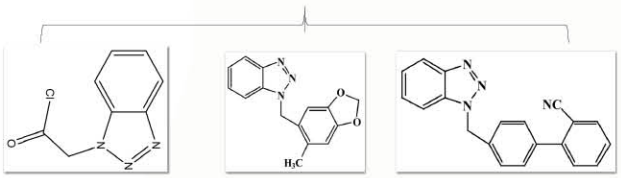
1- The reaction was as simple as mixing the reagents together and heating them.
2- The procedure described above is a direct method that produces higher overall yields than methods requiring several intermediate steps.

Objective

This review is going to display the chemistry of benzotriazole in term of its general properties and synthetic procedure. In addition, the studying of benzotriazole derivatives and their potential applications, in particular as antimicrobal agents

Derivatives and Applications

Benzotriazole derivatives as antimicrobials



* Benzotriazole is used in biological activities as an antimicrobial, bacterial, fungal, and antiviral agent.
* We focus particularly on antimicrobial resistance and its global spread, in particular HIV / AIDS, tuberculosis and malaria epidemics.
* These therapeutic agents carry a wide range of structural differences, and many contain compounds that have a heterocyclic ring as their molecular structure. A survey of this revealed that the heterocyclic compounds carrying benzotriazole as part of the synthesis showed valuable biological activity particularly antibacterial and antifungal activity.
* Benzetriazole derivatives have proven antimicrobial efficacy.

Conclusion

Finally, Benzotriazole aromatic compounds heterocycle derivative benzotriazole. have a Unique chemical and physical properties. o-phenylenediamines is the starting material for the reaction and it is a heterogeneous chemical compound that reacts withe sodium nitrite, and acetic acid to produce benzotriazoles.

Acknowledgments

We would like to extend our sincere gratitude and appreciation to our supervisor Dr. Nuha Ali Halawani for educated us, beaing patience, support us and belief in our abilities. We would also like to thank Umm Al-Qura University and the Department of Chemistry for their support and opportunities.

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A Review on Synthetic Approaches of Benzimidazole and their Derivatives as Antifungal Agents

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2020-2021

Abstract

Benzimidazole is a heterocyclic aromatic organic compound, which gives a basic structural characteristic of six-membered benzene fused to five membered imidazole moiety.
It has an important role in medicinal chemistry and drug development with several pharmacological activities such as analgesic, anti-inflammatory, antivirals and antifungals, which discover novel therapeutic agents.

Introduction

Background

- Benzimidazole is a heterocyclic aromatic organic compound known as 1H-benzimidazole shown in (Fig. 1).
- The structure of benzimidazole is bicyclic which consists of benzene fused with imidazole.
- The first preparation of benzimidazole in 1872 by Hoebrecker by the reduction of 2-nitro-4- methyl acetanilide, The products called anhydro bases compound which is formed by loss of water molecule.

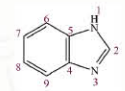

Fig. 1: Benzimidazole structure

Properties

- Benzimidazole contain a hydrogen atom attached to nitrogen in the position 1 readily tautomerize (Fig. 2).
- It is a highly polar compound and classified as aromatic due to the presence of a sextet of π-electrons.
- Benzimidazole can act as both an acid and base.
- Benzimidazole derivatives have vitamin B12 like activity.

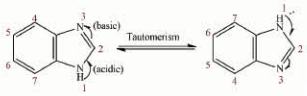

Fig. 2: Tautomeric forms of Benzimidazole

Synthesis

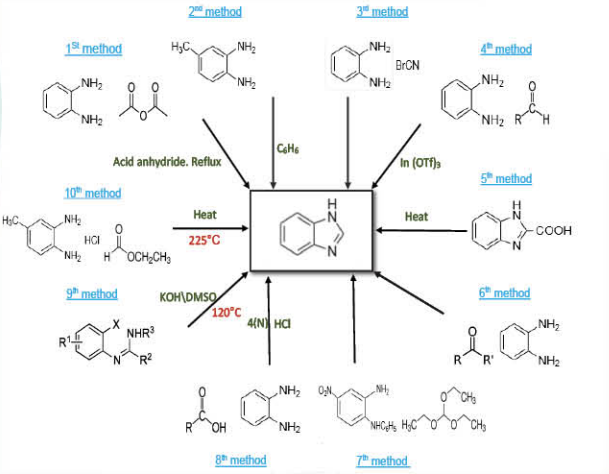

Fig. 3: General Synthetic Method of Benzimidazole

- Benzimidazole compound was prepared by varied methods in various reaction conditions (Fig. 3).
- Most of these methods include the condensation of o-phenylenediamine or its derivatives with compounds contains various function groups.
- Like most simple aromatic amines, the phenylenediamine can be synthesis by electrophilic aromatic nitration, followed by reduction of the introduced nitro group to an amino group.

Objective

- Background about benzimidazole and their properties.
- Synthetic procedures of benzimidazole.
- Biological activities of Benzimidazole and its derivatives as antifungal agents.

Derivatives and Applications

General Derivatives of Benzimidazole

various derivatives of benzimidazole have been synthesized for biological and pharmacological activities. benzimidazole derivatives show various pharmacological activities such as antimicrobial, antifungal, anticancer ... etc.

Benzimidazole Derivative as Antifungal Agent

- **Benomyl (1):** It is used against a group of agricultural fungal diseases, has an inhibitory effect on mites and is used as a bactericide.
- **Carbendazim (2):** is a systemic fungicide with a curative and protective effect that is absorbed through green roots and tissues.
- **Thiabendazole (3):** is a mainly used in the treatment of cutaneous larva migrans.

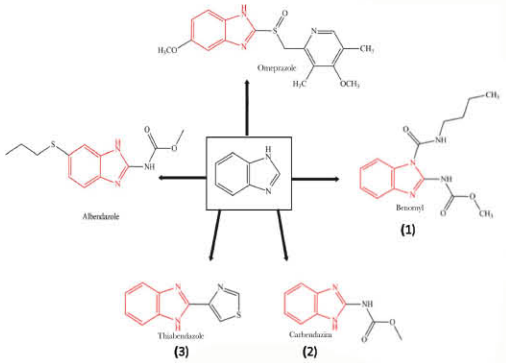

Fig. 4: Benzimidazole Derivatives

Conclusion

- The benzimidazole compound has excellent properties, such as stability, bioavailability, and significant biological activity, which increased its importance. Benzimidazole nucleus is an important pharmacophore in the modern medicinal chemistry research.
- Several-substituted benzimidazole were synthesized by condensation reaction between o-phenylenediamine and various function groups in the presence of various conditions.
- Benzimidazoles are used in many therapeutic applications such as anti-inflammatory, antimicrobial and antifungal agents.

Acknowledgments

We extend our thanks to Umm Al-Qura University, Chemistry department and the supervisor Dr-Nuha Halawani.

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Nanotechnology- use of Brown Algae (Sargassum) in purifying sea water from toxic iron

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Abstract

In this research, natural reagents prepared by nanotechnology from marine algae, known for their ability to absorb heavy elements.
It has been estimated that some important active compounds are present inside algae cells, such as phenols and flavonoids, which play a role in the absorption of toxic elements.

The results show that brown algae can be used to remove a high percentage of pollutants (for example, iron). Thus, it is possible to reduce the concentrations of heavy elements in drinking water by modern, safe, natural and inexpensive methods, thus preserving the health of the population.

Introduction

Water is the basic component of life and it is the most important compound for all living organisms . However, it is vulnerable to pollution due to human, agricultural and industrial activities. One of the most common types of water pollution is pollution with heavy metals such as iron, cadmium and arsenic.

Heavy metal pollution has been monitored using many organisms, including Sargassum, and recent studies have shown that the bio-absorption of toxic elements using certain types of algae or plants is one of those inexpensive and environmentally safe alternative techniques instead of the more expensive traditional methods.
This algae builds protein compounds from amino acids that form chelating compounds around the toxic element and are associated with it, thus absorbing and disposing of it and reducing its damage.

One of the most important goals of this research is to use marine algae that are widespread on beaches and not exploited as a vital way to absorb toxic elements, reduce pollution and convert algae from something neglected to wealth, as well as prove the ability of the algae extract to absorb the iron present in a manner that reaches toxicity on the coasts of the sea.

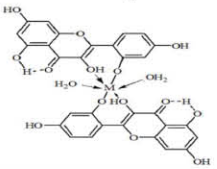

Figure (4): Demonstrates the mechanism of binding to element (M) by phenols in algae cell walls.

Methodology

Samples were collected from the algae Sargassum and divided into two groups.
1- The first group was used freshly to estimate phenols and flavonoids by extracting them using ethanol and hexane, then estimating them using Ciocalteu-Folin's phenol reagent and aluminum chloride method for flavonoids, then using a spectrophotometer to take wavelengths.
2- The second group was dried and milled by nano-core mill, then 4 solutions of $FeCl_3$ were prepared and then a different amount of nano algae powder was placed in each solution. After leaving the previous solutions 1 hour then 2 hours, the measurement was performed by a spectrophotometer with an ammonium thiocyanate reagent.

Results

From the evident results in Table (1), it was found that the nano powders of algae contained High concentrations from natural compounds such as chlorophyll and phenols.

Polyphenolic compounds	Sargassum seaweed	
	Ethanol	Hexane
Total phenolic (mg GAE/g)	1244 ± 0.77	981 ± 1.02
Total flavonoid (mg QE /g)	706 ± 0.30	511 ± 0.22

Table (1): Total phenolic (TP) and total flavonoid (TF) contents and their ratio in sargssum seaweed

Table (2) shows the percentages of absorption of solutions for iron after two hours.

Sargassum concentration (mg)	Removal efficiency (%) of iron	
	Time after (1 hr)	Time after (2 hr)
100	24.1	65.6
150	28.3	68.1
200	35.1	72.2
250	55.4	79.0

Table (2): Removal efficiency (%) of iron using sargassum seaweed

Discussion

Table (1) showed that the algae nanopowder contained high concentrations of phenols and flavonoids and these compounds bonded with iron in the solution and thus this works to gradually reduce the concentration of iron .
As shown in Table (2), when the 250 mg solution, the percentage of element removal from the solution was 79%, which is the highest value as the degree of absorption was very high. This indicates the ability of the microalgae powder to absorb the iron from the contaminated solution. The explanation for this is that the bio-absorption of metal ions by algae arises from the ions arrangement of the different functional groups on the algae cell walls, where the algal cell walls contain sugars, amino acids, carboxylic acids and many other compounds responsible for absorbing and adhering to the toxic element, thus reducing pollution.

Conclusion

1- Working on the use of modern nanomaterial technology science and activating research studies and applied projects to treat drinking water, sewage water, etc using biological treatment with algae.
2 - The use of materials available in the environment such as seaweed in the manufacture of new materials to treat all kinds of water .
3 - Establishment of wastewater treatment plants that depend on algae.

Acknowledgments

Thank God, who helped me to complete this project, in which I gained many experiences and research skills. I must also thank my family who supported and helped me and I am happy to thank the supervisor: (Dr. Hanadi Katouah) for her advice and contribution to me and teach me the correct way to prepare this research , and thanks to the management of the College of Applied Sciences at Umm Al-Qura University that developed this project Within the study plan to bring me the benefit and benefit from learning to write an integrated scientific research.

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Inhibition of copper corrosion using polystyrene solution

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Abstract

Strong THPs that bundle protective layers in a sulfuric acid solution are used to inhibit copper corrosion. The aim of the research is to improve the performance of the coating to protect the copper from corrosion for the longest possible period of time. The cathodic response cycle of the copper station is abnormally inhibited by the layer of absorbed THPs.

Introduction

Polymeric coatings have been used to control the corrosion of copper structures. Polymer coatings consist of materials such as alkyd resins, epoxy esters, polyurethane, and silicone alkyds. Self-healing coatings protect the substrate even if the coating is damaged. With the use of a polystyrene solution, various structures made of metals are protected by increasing their stability and life span through the application of organic polymeric coatings, and it is imperative to design coatings to provide excellent barrier performance, limiting the penetration of aggressive corrosive agents into the metal surface.

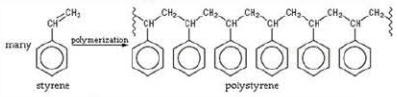

Figure 1 polystyrene structure.

Method

Self-assembly was performed at 298 K. Before adsorption experiments, samples of refined copper (99.99% by weight) were processed into cylinder in the required sizes. Copper samples were taken from absorbed target THPs, electrochemical characterization performed using a CHI660C electrochemical workstation by a three-pole analog system to detect the corrosion resistance ability of THPs on the copper sample in sulfuric acid solution. Dimensions of copper samples studied to estimate weight loss were 3.0 cm x 1.5 cm x 1.5 cm. Copper samples were transferred, rinsed with ethanol, and dried under pressure. Copper samples were dipped in 5 M H2SO4 (250 mL).

Results

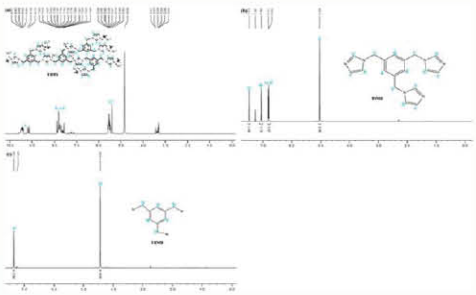

Figure 2. 1H NMR spectra of the studied THP1 (a) and the monomers (b, c).

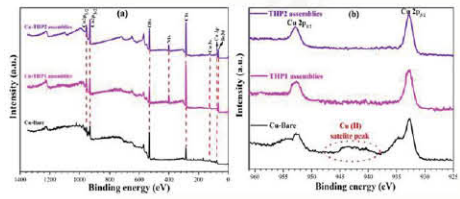

Figure 3 (a), XPS of the "Bare" Cu, the Cu samples covered by the stable THPs assemblies (assembly time, 6 h, at 210 ppm); (b), Cu 2p XPS spectra of the "Bare" Cu without the covered THPs layer, and the Cu samples covered by the stable THPs assemblies (assembly time, 6 h, at 210 ppm).

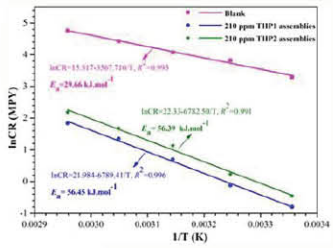

Figure 4 Corrosion rates and anti-corrosion efficiencies achieved from weight loss measurement for the stable THP1 assemblies of various concentrations adsorbed copper specimens in 0.5 M sulfuric acid.

Discussion

The H NMR peaks of THP1 are mainly located in three chemical transition regions due to close chemical environments. The discovery by XPS demonstrates that THPs are absorbed onto the surface of the metal, which may lead to its absorption, it is mainly done due to chemical coordination. The cathodic response cycle of the copper station is abnormally inhibited by the layer of absorbed THPs.

Conclusion

Hyperprivileged ionic topological polymer aggregates are used as claimants for copper corrosion inhibitors. Metallic surface imaging recommends that the warranty film for THPs formed on the surface of copper most often be produced by retaining Cu-N chelates. The additional physically absorbing event may ensure the development of the securing layer of THPs. The cathodic response cycle of the copper station is abnormally inhibited by the layer of absorbed THPs.

Acknowledgments

First of all, I thank God, then thank Dr. Hanadi Kataoua for her assistance and guidance, and I thank Umm Al-Qura University for providing this course.

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Antiviral Activity of Remdesivir Against COVID-19

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Abstract

Coronavirus disease 2019 (COVID-19) is defined as illness caused by a novel coronavirus now called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This research show the clinical outcomes and virological monitoring of four COVID-19 patients who were admitted to the intensive care unit. Using remdesivir as treatment to study its effects and the antiviral activity against COVID-19. Since some of studies have proven its antiviral activity against SARS-CoV and Ebola virus. In most cases, there was a significant decrease in the viral load in the upper respiratory tract.

Introduction

A new HCoV dubbed SARS-CoV-2, was developed in China at the end of 2019, triggering a new disease called COVID-19. Scientists took rapid steps to isolate the virus and conduct gene sequencing, making it feasible to classify treatments. Remdesivir was one of the first to gain attention from clinical applicants. Remdesivir, an adenosine analogue prodrug created by Gilead Sciences. It is effective against RNA viruses with global pandemic potential, include SARS, MERS coronaviruses and Ebola virus. The RdRp sequences of COVID-19 and SARS show more than 80% similarity. Thus, it had been proposed that remdesivir could potentially apply antiviral activities against COVID-19.

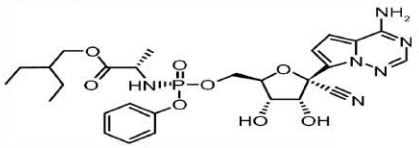
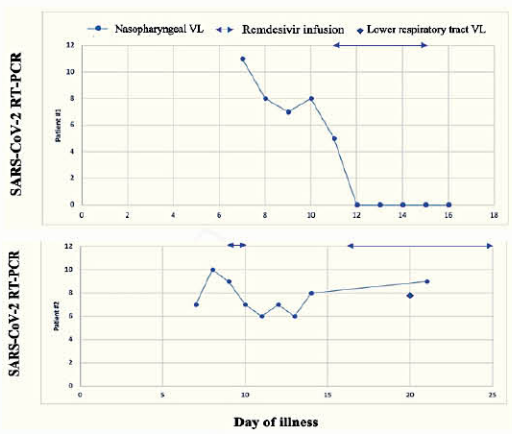


Figure 1. Remdesivir structure.

Method

1- A number of patients diagnosed with COVID-19 and treated with remdesivir.
2- All patients were given a maintenance daily dose of 100 mg for a maximum duration of 14 days.
3- Nasopharyngeal and bronchoalveolar samples were collected and transported to the laboratory within 24 hours.
4- Quantification was done using PCR machine.

Results



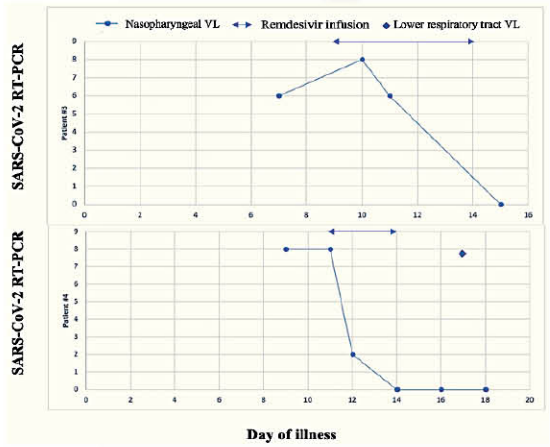


Figure 2. Viral evolution of patients.

Discussion

In this case series of four COVID-19 patients requiring ICU treatment for respiratory distress and treated with remdesivir, two had a favourable recovery outcomes. remdesivir is a likely cause for virus termination, disturbing the positioning of the RNA and thus hampering the movement to the next position. Patients 2 and 4 were elderly with chronic advanced diseases, and they died of multi-organ failure in the ICU on days 25 and 31 of their disease, respectively. Three of the four patients had significant side effects.

Conclusion

In patients with mild to moderate COVID-19, remdesivir show higher rate of recovery and hospital discharge, as well as in patients with advanced disease remdesivir show difficulty of recovery. The mean time to health progress and mortality, on the other hand, did not vary substantially. The cases of the four patients discussed here show that remdesivir infusion can be difficult to administer in most patients with advanced disease.

Acknowledgments

I am grateful to Umm Al-Qura University and the Department of Chemistry. My deep gratitude is due to my supervisor, Dr. Hanadi Ahmed Katouah for her support, assistance and guidance. Special thanks to my family and friends for their encouragement, care and support.

References

Sensitive and selective detection of mercury (II) ions in water using silver nanoparticles (Ag NPs) to prevent toxicity

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Abstract

A simple method for the optical detection of environmentally toxic mercury (II) ions (Hg^{2+}) in drinking water using color sensor thiol terminated chitosan capped silver nanoparticles (Mod-Ch-Ag NPs). The change in color can be observed with addition of Hg ion with the naked eye. The detection limit of Hg^{2+} ion (5ppb) was found using the sensor.

Introduction

Human health is greatly affected with the increasing pollution of the environment by heavy metals such as (cadmium, lead, cobalt, mercury, etc.) Hg^{2+} ions are the most dangerous, toxic, because the Hg^{2+} ion is not compatible degradable or fractured and accumulate in environment. Therefore, it is extremely important to detect mercury in contaminated products, especially in drinking water. Metal nanoparticles have recently gained considerable interest in the application of chemical sensing. Chitosan is a biodegradable natural polymer with many advantages such as low cytotoxicity, biocompatibility. The yellow color of the silver Nano-chitosan coated became colorless with the addition of Hg^{2+} ion.

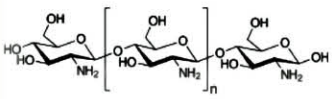


Fig 1. Chemical structure of biopolymer chitosan.

Method

- Preparation of chitosan-coated silver nanoparticles by ($NaBH_4$ mediated reduction of $AgNO_3$) and the spectra record by UV spectrophotometry.
- Preparation of thiol terminated chitosan and the spectra record by FT-IR in range of 800 cm^{-1} to 4000 cm^{-1}.
- Preparation of thiol terminated chitosan capped silver nanoparticles (Mod-Ch-Ag NPs). Also, the spectra record by UV spectrophotometry.

Results

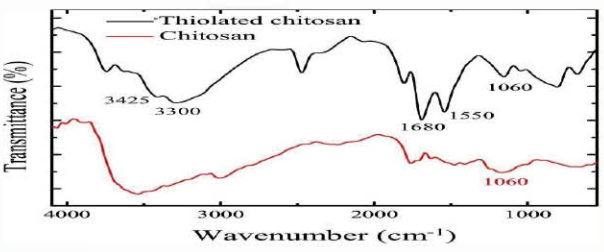


Fig 2. FTIR spectra of chitosan and thiol terminated chitosan.

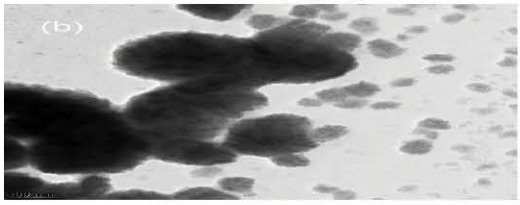


Fig 3.TEM images of Mod-Ch-Ag NPs in presence of Hg2+ .

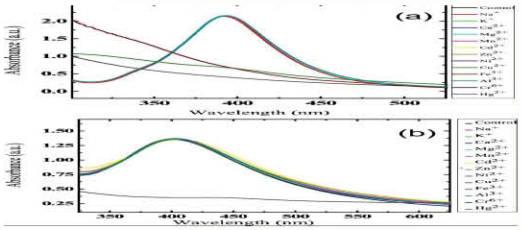


Fig4. UV-vis spectra of (a) Ch-Ag NPs and (b) Mod-Ch-Ag NPs presence of different cation.

Discussion

In this study, the FTIR spectra confirm the presence of an amide group at 1680 cm^{-1} peaks and the signal distortion at 3300 cm^{-1}. TEM measurements obtained after addition of Hg^{2+} ions confirm the presence of deformed nanostructures due to the redox reaction between Ag NPs and Hg^{2+} ions. This interpretation is also supported by the blue shift observed in the UV- vis spectra of the Mod-Ch-Ag NPs solution with the addition of Hg^{2+}.

Conclusion

This work refers to the development of a simple and low-cost detection method using the Mod-Ch-Ag NPs sensor to detect Hg^{2+} ions. The silver nanoparticles were formed by reducing the silver ion with the thiol-terminated chitosan as a stabilizer. This method displays a sensitive and selective detection with a response time of less than 10 seconds.

Acknowledgments

I would like to thanks the research supervisor Dr.Hanadi Katouah, for instruction constant to me and I would like to thank Umm Al-Qura University and the Department of Chemistry.

References

Use flam atomic absorption spectrometer (FAAS) to determine amount of lead in soil sample

Rahmah Al-Otaibi
Supervisor: Dr. Hanadi Ahmed Katouah
Chemistry department , Umm Al-Qura University

Abstract

The study of lead in the soil reflects the extent of contamination of areas with lead. Monitoring of lead levels in soil samples is accompanied by work to explain the links of these results with their causes from human activities, which constitute a source of lead pollution. As previous studies proved that measuring lead concentration in soil using FAAS is a useful method that contributes to identifying the source of lead and spreading community awareness in avoiding exposure to these sources.
Studying using (FAAS) technique is effective and helps to know that lead is a toxic contaminant.

Introduction

Lead is a heavy chemical element and is a cumulative toxic substance that affects multiple systems in the human body and there are large and multiple sources of exposure to lead. The most common laboratory techniques for estimating the amount of lead is (FAAS). It is worth noting that (FAAS) equipment it requires skill to handle inside the laboratory, is widely available with sample collection tools, has relatively low performance costs, consumables are relatively inexpensive, and the sample production capacity may reach several samples per minute.

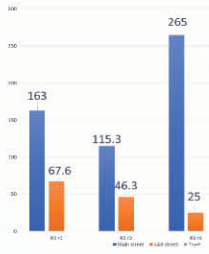


Figure (1), soil contaminated with lead.

Method

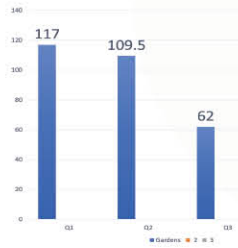
1.Taking three contaminated samples from main streets and secondary streets and from parks.
2.Hollow cathode lamp calibration.
3.The pre-prepared standard solutions and soil sample are passed to FAAS via an automatic injector.
4.The absorption values are shown, given the corresponding concentrations estimated in mg / ml.
5.Then calculate the expansion coefficient to express the concentration in the main solution of the soil sample, then calculate the amount of lead concentration in the soil.

Results



The symbol of the main street	Lead concentration in (ppm)	The symbol of the side street	Lead concentration in (ppm)
R1	163	r1	67.6
R2	115.3	r2	46.3
R3	265	r3	25

Table (1), lead concentration in samples taken from main street (R1, R2 and R3) and side street (r1, r2 and r3).



The symbol of the gardens	Lead concentration in (ppm)
Q1	117
Q2	109.5
Q3	62

Table (2), lead concentration of Samples taken from the gardens.

Discussion

The main reason for the increase in the concentration of lead in the main streets is due to the abundance of traffic, because the traffic is more abundant in the main streets.
It is noted that the three parks that were sampled were not suitable for sitting in them due to the high concentration of lead and because of their proximity to the main streets

Conclusion

1.Study lead in lead.
2.The height dimensions of bullets from residential places.
3.Seek to be far from crowded streets.

Acknowledgments

I am Grateful to Umm Al-Qura University and the Department of Chemistry. My deep gratitude is due to my supervisor, Dr. Hanadi Katouah , for her support , assistance and guidance . Special thanks to my family and friends for their encouragement, care and support.

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Hibiscus sabdariffa and its efficacy in the removal of Rhodamine B dye

Made by Jana Almalky
Under supervision of Dr Hanadi Ahmed Katouha
Chemistry department , Umm Al-Qura University

Abstract

Rhodamine B despite having important applications in textile industry, they also have bad influence on our health so we should try to eliminate them from water effluents and wastewater in order to eradicate these bad effects, here we will use a natural plant widely used in the middle east countries which is the Hibiscus Sabdariffa thus the aim is to remove these harmful dye from the water effleunts hypothetically by adsorbing it on the surface of hibiscus sabdariffa plant

Introduction

Rhodamine B dye is used in many industries as in textiles for its bright color, low cost and extended effect yet it has hazardous effects when throwed in water , several methods were used to remove it from waste waters and one of them is the adsorption method where the dye is adsorbed on the surface of the Hibiscus sabdariffa which is plant widely used in the middle east and has many benefits

Objective

Rhodamine B dye sample was prepared and concentrations from 100 to 600 ppm at a constant dried adsorbent Hibiscus dosage of 10g/L were Put in an orbital shaker operating at 180 rpm until obtaining the equilibrium state in 1 hour ,Centrifugate at 4000 rpm till separation and the absorbance was determined at 554 nm , finally a calibration curve was drawn to obtain the final results.

Results

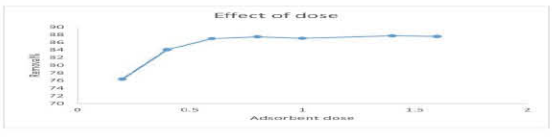

Figure 1 showing the effect of dose on the adsorbed amount of rhodamine B dye on hibiscus sabdariffa

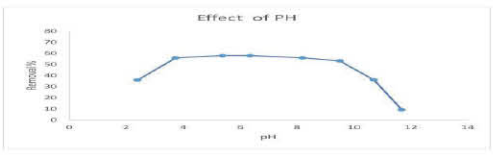

Figure 2 showing the effect of pH on the adsorption of rhodamine B dye on the hibiscus sabdariffa plant

Discussion

Figure 1 show the effect of dose on the adsorption amount of the Rhodamine B dye on the hibiscus sabdariffa and the best dose was found to be equal 0.2 this is because it gives the highest absorbance of rhodamine B which is equals 0.284
Figure 2 shows the effect of pH on the adsorption amount of the dye and the best pH to carry out this adsorption method is 11.69 this is because it gives the highest rhodamine B absorbance amount which is equals 1.088
All if the above was because controlling both the pH and the dose has the ability to enhance the adsorbing efficacy of hibiscus sabdariffa plant

Conclusion

Hibiscus sabdariffa can be used to remove rhodamine B dye as it have great absorbing efficacy with being of low cost and no side effects

Acknowledgments

I would like to thank my dear Dr / Hanadi for her great efforts and her supervision which as a result brought this research to light and i want to thank my parents and friends for supporting me so much.

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Using Chen pi extract for treating type 2 diabetes and obesity

Rawabi Hassan Saigh
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Chemistry department , Umm Al-Qura University

Abstract

Chen pi herb is very effciant in the prevention of hepatic lipid cyst and lipid-related obesity, providing key results that can enhance the management and prevention of type 2 diabetes.
The overall aim of the research is to determine the effect of the lipid-rich nutritional Chen pi extract on obesity, hepatic steatosis and on the development of metabolic syndromes, and finally to provide a guide for the development of nutritional supplements and functional foods enriched with Chen pi.

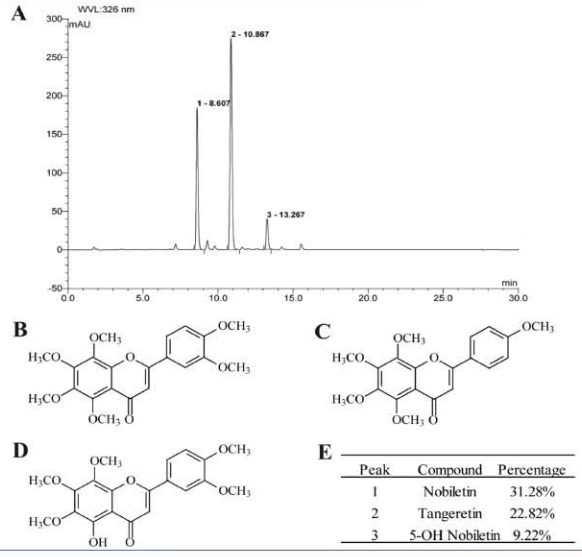
Introduction

Diabetes: a chronic disease that affects the way the body's cells receive glucose or the amount of insulin secreted by the pancreas, leading to an abnormal high or low in the level of sugar in the blood.
Obesity: It is characterized by the accumulation of fat in the body, which leads to a high percentage of fat in the body, and this is a dangerous factor for type 2 diabetes and other diseases.
There are natural herbs for hypoglycemia, such as this is: cinnamon which is a very useful spice for type 2 diabetics and ginger: which is regulates blood sugar, Beth are contains an enzyme effective in fighting diabetes.

Method

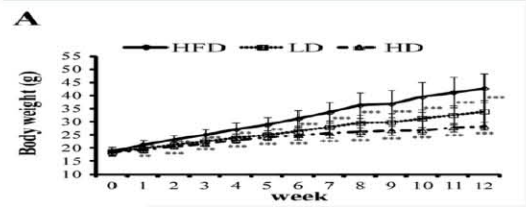
- For sample preparation, chen pi extract was prepared by using Continuous Phase Transition (CPT) extraction method with n-butane as the solvent (0.5 MP a extraction pressure, 50 °C extraction temperature and 30 min extraction time) A linear gradient elution program composed of water (solvent A) and acetonitrile (solvent B) by HPLC.
- Mice body weight measured by Balance.
- Glucose tolerance test by Spectrophotometer .

Results

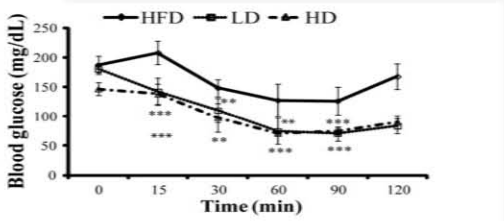


Peak	Compound	Percentage
1	Nobiletin	31.28%
2	Tangeretin	22.82%
3	5-OH Nobiletin	9.22%

- **Fig(1): In Figure shown the HPLC chromatogram of PMFs from chen pi extract.**



- **Fig(2): Chen pi Extract Reduced Diet-Induced Body Weight Gain,**
- **(HFD) is 60% fat calories.**
- **HFD with 0.25% of Chen pi extract (LD).**
- **HFD with 0.50% of Chen pi extract (HD).**



- **Fig(3): Chen pi Extract Improved Glycemic Control and Insulin Resistance.**

Discussion

In the Chen pi extract-treated groups, an increase in 5'-adenosine monophosphate- activated protein kinase (AMPK) activity in the adipose tissue was observed and consequently, its activation led to inhibited release of fatty acids and favoured local oxidation of fatty acid; this reduced the adipose mass and the adipocyte size.
This is evidence of the effect of chen pi extract in improving the level of glucose in the blood, which led to weight loss and the descent of sugar to the normal level.

Conclusion

- Chen pi extract markedly reduced obesity and blood glucose in mice.
- Chen Pi control metabolic parameters such as: insulin sensitivity , Glucose and lipid metabolism.
- The study offers valuable information in understanding the useful effect of chen pi and for the future development of chen pi enriched functional foods and dietary supplements .

Acknowledgments

Thank you very much for your lovely support, Supervisor Dr. Hanadi Ahmed Katouah. I appreciate the time you spent on making the great effort for us. I would also like to thank Umm Al-Qura University, especially the Department of Chemistry .

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Study the effect of pectin as a green inhibitors of mild steel corrosion

Lama.Y. Al-Ghamdi
Supervisor: Dr.Hanadi .A. Katouah
Chemistry department, Umm Al-Qura University

Abstract

Extraction of pectin from lemon peel to use it as a green inhibitor of the corrosion of mild steel in 1M of hydrochloric acid solution (HCl) which is used as a cleaner. Pectin molecules adsorbed on the surface of the mild steel to form protecting layer.

Pectin has been shown to act as a mixed-inhibitor type, the mode of inhibition results from the geometric blocking effect of chemisorbed inhibitive species at the metal surface. The analyzes indicates formation of a compound released during the corrosion reaction between pectin and iron ions Fe^{2+}.

Introduction

Green inhibitors that extracted from nature, such as pectin is used to protect the environment and human health instead of industrials inhibitors to prevent metal corrosion. Pectin is a natural polymer that contains active sites that have a high efficiency in inhibition, natural polymers contain polysaccharides rich in oxygen and nitrogen that form complexes that adsorb and isolate the surface of the metal from the environment.

The inhibition efficiency was increased by increasing the temperature and the activation energy of the corrosion rate decreases with the addition of pectin. The mechanism of corrosion inhibition was based on the thermodynamics adsorption as well as on the kinetics of electrochemical reactions and it is following Langmuir isotherm's adsorption. It acts as an effective inhibitor of corrosion of mild steel.

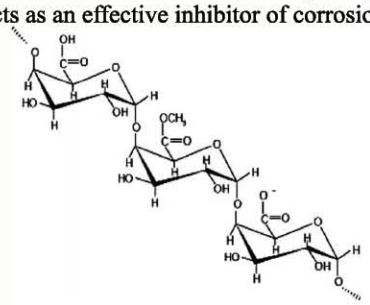

Figure.1 Pectin structure.

Methods

Experiment: five diluted pectin solutions were prepared with final concentrations 0.0, 0.5, 1.0, 1.5 and 2.0 g L-1, then sheets of mild steel were dipped into each solution at different temperatures .

Loss weight measurement: used to estimate the corrosion rate, the inhibitor efficiency, the effect of the inhibitor concentration, the temperature and the isothermal adsorption.

Electrochemical measurements to determine the type of the inhibitor as an anode or cathode or mixed inhibitor, and to measure the corrosion rate and accuracy, and the use of UV-visible spectroscopy to find out the complex formed in the solution, and scanning electron microscope (SEM) as a tool for examination and analysis the sample surface as topography and chemical composition, Electrochemical impedance spectroscopy measurements experiments were undertaken mainly, as an independent and complementary tool to determine corrosion rates in a rapid and accurate way.

Results

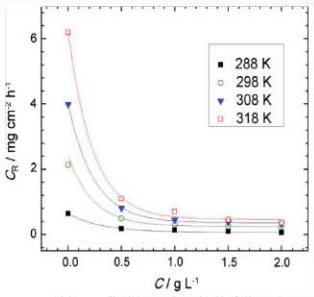

Figure.2 Corrosion inhibition plots.

T (K)	C (g L^{-1})	C_R (mg cm^{-2} h^{-1})	η%
288	0.0(blank)	0.64 ± 0.003	-
	0.5	0.18 ± 0.008	71.4
	1.0	0.13 ± 0.009	79.7
	1.5	0.10 ± 0.100	84.4
	2.0	0.062 ± 0.150	90.3
298	0.0(blank)	2.14 ± 0.001	-
	0.5	0.5 ± 0.004	76.6
	1.0	0.31 ± 0.006	85.5
	1.5	0.25 ± 0.008	88.3
	2.0	0.23 ± 0.009	89.3
308	0.0(blank)	3.99 ± 0.0005	-
	0.5	0.81 ± 0.002	79.7
	1.0	0.45 ± 0.004	86.7
	1.5	0.38 ± 0.005	90.5
	2.0	0.32 ± 0.006	92.0
318	0.0(blank)	6.2 ± 0.0003	-
	0.5	1.1 ± 0.002	82.3
	1.0	0.70 ± 0.003	88.7
	1.5	0.45 ± 0.004	92.7
	2.0	0.36 ± 0.005	94.2

Table.1 Shows the relation between the 4 variables, T, C, C_R, and η % .

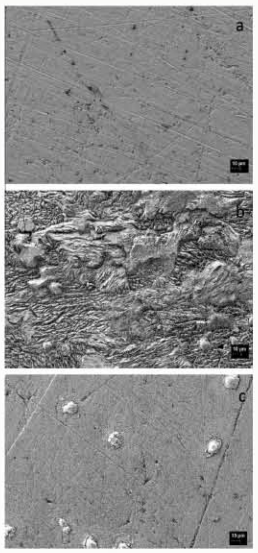

Figure.3 SEM images for (a) unexposed mild steel; (b) exposed in blank solution, and (c) exposed in 1M HCl containing pectin.

Discussion

In table.1 the increase in the inhibition efficiency because of increase the temperature. In figure.1 the decrease in the corrosion rate that observe due to the increased concentration of pectin. In figure.2 the surface appears rough due to the exposure to corrosion in the absence of pectin.

Conclusion

From the relations and the studies that used, the pectin proven as a green inhibitor with an efficiency of up to 94.2%.

Taking advantage of natural waste and green extracts compounds in an industry and other areas of life, because nature contains so many and various green compounds. It is distinguished eco-friendly, low toxic and highly efficient, low costs that does not affect the economy of the country, and one of the resources available in abundance.

Acknowledgments

Grateful to myself for what i have provided in all my university career, my supervisor Dr. Hanadi Ahmed Katouah for her support, assistance, and guidance, to my family who supported and embraced me from the first moment to the last, to my university and all the teaching staff who teach me a lot, and finally thank to everyone who teach me something one day.

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Development of water treatment methods using Ag/TiO2 nanofiber membrane

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Chemistry department, Umm Al-Qura University

Abstract

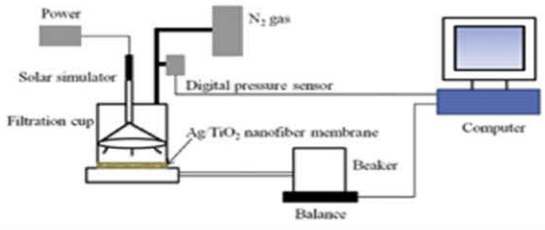
Developing concurrent filtration and solar photocatalytic disinfection using high performance Ag/TiO_2 nanofiber membrane to purify and treat water and reduce the risk of water pollution. Ag/TiO_2 nanofiber membrane achieved 99.9% bacteria inactivation under solar irradiation within 30 min.

Introduction

Water sources are one of the most important resources that make a place habitable. With the presence of many water pollutants, scientists are interested in finding solutions to reduce water pollution and reduce its harmful effects on humans and the environment. The Ag/TiO_2 nanofiber membrane made in this study was used for concurrent filtration and photocatalytic disinfection applications, taking advantage of noble metal, electrospun TiO_2 nanofibers, and membrane filtration. The solar simulator was used to examine membrane performance instead of UV irradiation.

Methods

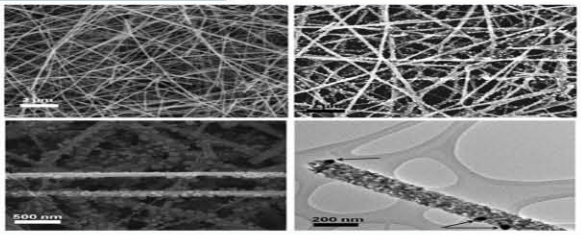
- TiO_2 nanofibers were fabricated using the electrospinning technique and then to coat the TiO_2 nanofibers with Ag nanoparticles.
- Images were taken with a scanning electron microscopy (SEM) and transmission electron microscopy (TEM).
- The flux performance of the Ag/TiO_2 nanofiber membrane was determined using a lab-scale dead-end apparatus.



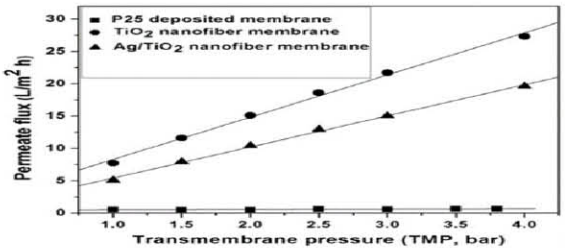
Fieger 1-Lab-scale dead-end apparatus.

- E. coli was chosen as a representative waterborne pathogen, and solar irradiation was provided by a solar simulator.

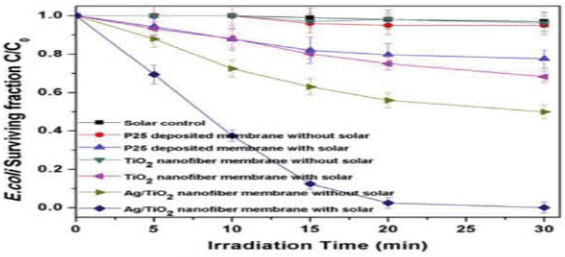
Results



Fieger 2-Characterization of Ag/TiO_2 nanofibers using SEM and TEM.



Fieger 3-Change in permeate flux of P25 deposited membrane, pure TiO_2 nanofiber membrane and Ag/TiO_2 nanofiber membrane.



Fieger 4-Photocatalytic disinfection of E. coli on different membranes.

Discussion

In this work, 99.9% E.coli removal was achieved within 30 min. The Ag nanoparticles on the Ag/TiO2 nanofiber membrane had excellent antibacterial properties. Results confirmed that the Ag deposition could enhance the photocatalytic antibacterial capability of TiO2 nanofiber under solar irradiation.

Conclusion

The Ag/TiO_2 nanofiber membrane demonstrated significantly improved disinfection capability against E.coli under solar irradiation. Meanwhile, the Ag/TiO_2 nanofiber membrane's excellent intrinsic antibacterial capability could significantly reduce bacterial growth. This high-performance Ag/TiO_2 nanofiber membrane can conduct simultaneous filtration and photocatalytic disinfection, as shown in this report. Such outstanding results will soon lead to a wide range of cost-effective water purification applications.

Acknowledgments

Thank God for completing this project. My thanks go to the supervisor Dr. Hanadi Katouah, for the efforts and instruction constant to me. I would like to thank Umm Al-Qura University and the Department of Chemistry for giving us the opportunity and learning how to write a scientific paper.

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Treatment of breast cancer by Diclofenac to avoid the side effects of doxorubicin.

Wed Modhi Alotaibi
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Abstract

Breast cancer is the most common disease in women worldwide. Studies in Saudi Arabia recorded a significant increase in breast cancer incidence which occurred earlier than in Western countries. Doxorubicin (DOX) is a chemotherapeutic drug from anthracycline family and is highly effective in advanced breast cancer. Unfortunately, the toxic effects of DOX affect normal cells as well as cancer cells, which lead to severe heart damage. Many strategies have been investigated to protect the heart against DOX induced cardiotoxicity. Recent studies evaluated the effect of diclofenac (DICLO) as an anti-cancer and avoid the effect sides of (DOX). Therefore, the current study aimed to investigate the potential chemo sensitizing effect of diclofenac on DOX cytotoxicity against the proliferation of human breast cancer cells (MCF-7) as well as elucidating the possible underlying mechanism and the found achieved the desired results from the search.

Introduction

Data from the Saudi Cancer Registry recoded that breast cancer is the most common cancer type in women living in the kingdom, accounting for 25.8% of all cancers in women. Therefore, there are many medicines that have been widely used in clinical treatment of a wide range of cancers such as Doxorubicin (DOX), which is one of the chemotherapeutic drugs called anthracycline that is separated from Streptomyces peuxetus. The cardiotoxicity increased by increasing the cumulative dose of DOX in a patient.In addition, the apoptosis-inducing activity of DOX is mitochondrial-dependent by increasing the ratio of Bax/Bcl-2 and caspase-9. While (DICLO) has been used to reduce side effects of (DOX).

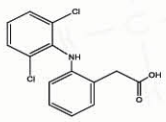

Figure 1.Chemical Structure Doxorubicin.

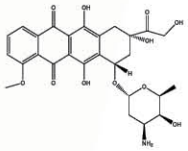

Figure 1.2.Diclofenac Chemical Structure.

Method

1. Assessment of Cytotoxicity Activity measure by microplates reader.
2.Cell Cycle Analysis measure by flow cytometry.
3.Assay of Apoptosis measure by flow cytometry.
4.Assessment of DOX Cellular Uptake: Lysed cells were analyzed by spectrofluorometer.

Results

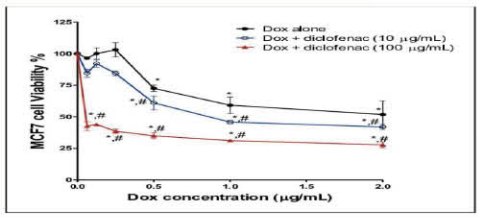

Figure 1.3. A concentration-dependent cytotoxicity curve of DOX with or without Diclofenac co-treatment on the growth of MCF-7 cells .

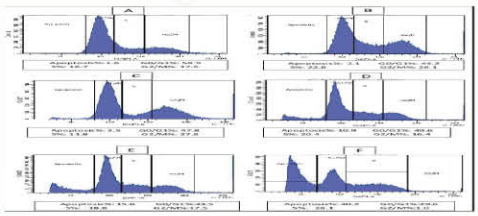

Figure 1.4. Effect of DOX and/or Diclofenac treatment on Cell cycle phase distribution of MCF-7 Cells.

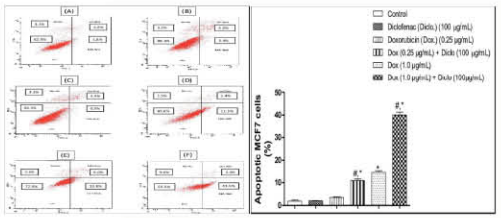

Figure 1.5. Effect of Dox and/or Diclofenac treatment on the induction of apoptosis inMCF-7 Cells by staining with Annexin V FITC-A and Propidium iodide (PI).

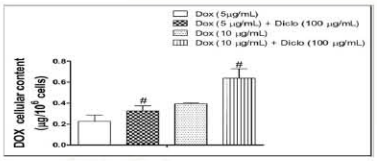

Figure 1.6. Effect of Diclofenac co-treatment on the cellular up take of DOX in MCF-7 cells.

Discussion

The current study showed that the treatment of MCF-7 cells with DICLO (100 µg/mL) significantly enhanced the cytotoxic activity of DOX against the growth of MCF-7 cells compared to DOX-alone. In addition , the cell cycle distribution of the MCF-7 cells treated with DICLO and DOX had a significant increase in the percentage of cells in the apoptotic phase compared with cells treated with DOX alone. The test of apoptosis showed a significant increase in percentages of early apoptosis in the MCF-7 cells treated with DICLO and DOX accompanied by a reduction in the percentage of the living cell, compared with cells treated with DOX alone. The present study indicated significant increases in DOX cellular uptake in the presence of DICLO. There was a 32% and 63% increase in DOX cellular uptake for cells treated with 5 and 10 µg/ml DOX and DICLO, respectively, compared with cells treated with DOX.

Conclusion

DICLO has various potential advantages to be used as an adjuvant to conventional therapies to minimize the adverse effects related to many conventional therapies.

Acknowledgments

I thank God, then I thank Dr. Hanadi for her help and support, and I thank my parents for their support.

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Detection of fructose in aqueous solution by gold nanoparticles (AuNPs)

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Chemistry department , Umm Al-Qura University

Abstract

A new convenient colorimetric sensor for fructose based on anti- aggregation of citrate-capped gold nanoparticles (AuNPs) is presented. 4- Mercaptophenyl boronic acid (MPBA) induces the aggregation of AuNPs, leading to a color change from red to blue. Fructose as a potent competitor has strong affinity for MPBA and a borate ester is formed between MPBA and fructose. There is an obvious color change from blue to red with increasing the concentration of fructose. The anti-aggregation effect of fructose on AuNPs was seen by the naked eye and monitored by UV–vis spectra.

Introduction

Fructose is the sugar that is formed inside all kinds of fruits and some vegetables and the degree of its sweetening is times the sugar cane and is used in sweetening sweets and juices as it is the source of sweetness of honey and gives the same taste that gives sucrose, but fructose is less than sucrose in the production of calories. Metabolism of fructose occurs in the liver, and when you eat sources rich in calories and high in fructose, the liver begins to convert fructose into fat. Therefore it was necessary to find a way to measure the level of fructose by ultraviolet light spectrometer.

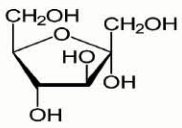

Fig 1. Alpha-D-Fructose

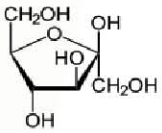

Fig 2. Beta-D-Fructose

Method

Synthesis of gold nanoparticles

- **An aqueous solution of HAuCl4 was heated to boiling with stirring then aqueous sodium citrate was added The color changed from yellow to red.**
- **Add 1 ml of fructose with was to a tube containing MPBA (concentration 1.34 mmol/L). The reaction was incubate at room temperature for 10 min and then the fructose-MPBA solution was mixed with the AuNPs solution (2 mL). The absorption spectrum was recorded at 640 nm.**

Results

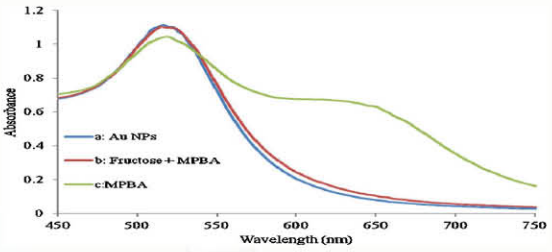

Fig 3 .UV–vis absorption spectra of (a) Au NPs, (b) in the presence of fructose (1 mmol/L) and MPBA (1.34 mmol/L), (c) in the presence of MPBA (1.34 mmol/L)

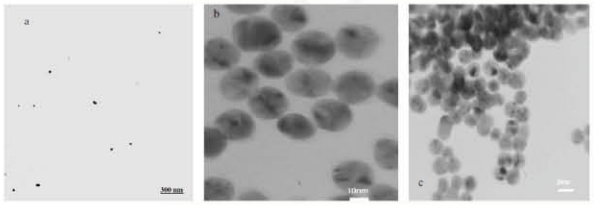

Fig 4 . TEM images of (a) AuNPs, (b) Au NPs in the presence of fructose and MPBA, and (c) Au NPs in the presence of MPBA

Discussion

Preparation of AuNPs showed a distinctive wine-red color with the adsorption peak at 519 nm. These AuNPs were very stable owing to the electrostatic repulsion . Upon the addition of MPBA into the AuNPs solution, a new strong absorbance peak appeared at 640 nm and the solution color clearly changed from ruby red to blue indicating the aggregation of the AuNPs. The TEM image of AuNPs(Fig. 4a), containing MPBA in the presence of fructose revealed uniform monodisperse particles due to borate ester is formed between MPBA and fructose (Fig. 4b), while obvious aggregation of AuNPs occurred in the absence of fructose due to the inter-particle crosslinking (Fig. 4c).

Conclusion

The obvious color change induced by fructose can be easily detected by naked eyes and no complicated and expensive instruments are required. These advantages made this method quite promising for rapid detection of fructose in aqueous solutions and plasma samples.

Acknowledgments

I am Grateful to Umm Al-Qura University and the Department of Chemistry. My deep gratitude is due to my supervisor, Dr. Hanadi Katouah , for her support , assistance and guidance . Special thanks to my mother to support and encourage her.

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A comparison between experimental data and DFT calculations on the structure of formic acid

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Supervisor : Dr. Arwa Alharbi
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Abstract

This project focuses on the computational studies on formic acid and finding the best basis set can be used with B3LYP functional that gives a good agreement with the experimental data that found in literature.

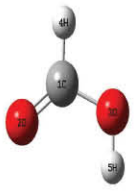
Introduction

The density functional theory method (DFT) with B3LYP functional has been demonstrated to predict excellent geometries and energies and has been used frequently for investigating the electronic structures, thermal isomerization and thermodynamic parameters. The *d*-polarized split-valence basis set (6-31G*) has been proven to predict very accurate geometrical parameters. It was shown that increasing the basis set has a low impact on the accuracy of the predicted geometry. Moreover, it was shown that the 6-31G* basis set has a good accuracy and time cost efficiency.

Objective

The numerous studies on the formic acid compound indicate its importance in all chemical fields. In terms of our research, the main goal was to explore more than one basis set and analyze its effect on the accuracy of the results in order to obtain results that are consistent with the experimental results.

Results



Atom	Experimental	Calculated B3LYP/6-31G	Calculated B3LYP/6-31G(d)	Calculated B3LYP/6-31G(d,p)	Calculated B3LYP/6-31G+	Calculated B3LYP/6-31G+G(d)	Calculated B3LYP/6-31G+G(d,p)	Calculated B3LYP/6-31Tg	Calculated B3LYP/6-31TG(d)	Calculated B3LYP/6-31TG(d,p)	Calculated B3LYP/6-31TGp+	Calculated B3LYP/6-31TG+G	Calculated B3LYP/6-31TG+G(d)	Calculated B3LYP/6-31TG+G(d,p)
Bond length														
C1 - O2	1.225	1.226	1.204	1.204	1.227	1.206	1.206	1.23	1.197	1.197	1.234	1.199	1.198	
C1 - O3	1.41	1.371	1.347	1.346	1.372	1.348	1.347	1.376	1.345	1.346	1.37	1.344	1.346	
C1-H4	-	1.091	1.089	1.089	1.09	1.088	1.088	1.103	1.098	1.098	1.087	1.087	1.087	
O3-H5	-	0.983	0.977	0.972	0.983	0.977	0.974	0.971	0.971	0.97	0.979	0.971	0.97	
Bond angles														
O2-C1-H4	-	125.8	125.4	125.4	125.5	125.1	125.1	130	125.5	125.5	125.4	125.2	125.2	
O2-C1-O3	125	125	125.1	125.1	124.9	125	124.9	117.6	125.2	125.1	124.8	125.2	125.1	
H4-C1-O3	-	109.1	109.3	109.4	109.4	109.7	109.8	112.2	109.1	109.2	109.6	109.5	109.5	
H5-O3-C1	-	111.2	106.6	106.6	112.1	107.8	107.8	110.6	107.7	107.1	112.1	108.5	107.9	

Method of calculations

All calculations were carried out using Gaussian 9 software, the standard for computational research. The calculations were carried out in the gas phase. DFT with B3LYP functional with increasing size of basis sets by considering the polarized and hybrid functions; 6-31G, 6-31G*, 6-31+G, 6-31+G*, 6-31+G**, 6-31G**, 6-311G, 6-311G*, 6-311+G*, 6-311G**, 6-311+G**, and 6-311+G were used to optimize the ground state of formic acid.

Conclusion

The results show that DFT method with B3LYP functional using the 6-31G basis set gives a good agreement with the experimental data published in 1947. The bond length of (C_1-O_3) using 6-31G basis set is 1.226 Å which agrees with the experimental data (1.225 Å). On the other hand, the bond length of (C_1-O_3) using 6-31G* basis set is 1.204 Å.
Even though the *d*-polarized split-valence basis set (6-31G*) has been proven to predict very accurate geometrical parameters, the data obtained in this work show that increasing the basis set by adding polarization does not improve the results.

Acknowledgments

we express our big thanks to the (Department of Chemistry) and special thanks to (Dr. Arwa Wasel Alharbi) and all the faculty and employees of the department for giving the opportunities to all students in the department to learn and know about so many new things and doing a lot of research. Finally, we thank ourselves for being patients, and for our efforts to work as a team. May God fulfills all our dreams.

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Water Purification by Using Silver Doped Titanium Dioxide Nanoparticles

Mada Saaed, Rehab Alzahran , Atheer Alharbi, Noura Turki Alhakami, Ablah karallah Thaqfi, Layla Musim Almasoudi, Fatmah Yahya Saeedi, Zakieh Hussin Alqarhy, Raghad Nasser Al-Malki, Sitah Abdullah Al-Rajhi and Ishraq Mohammed Abbas.

Supervised by Dr Alaa Munshi

Abstract

Nano-silver doped titanium dioxide (nAg/TiO2) were prepared by photochemical reduction of silver nitrate on two commercially available TiO2. Bacteriophage MS2 (ATCC15597-B1) was used as a model virus in this research. Two types of titanium nanoparticles were prepared with silver, P25TiO2 and AATiO2. After comparing them, we found the P25TiO2 is better and faster in inhibiting viruses and purifying the water from the AATiO2 by five times. Among the potential mechanisms for the inhibition of viruses is the production of OH. Methanol and tri-butanol were used with P25TiO2 to produce OH and inhibit MS2, as the alcohols increased the activity of silver that promoted the increase in the production of free hydroxyl radicals and thus increased the rate of removal of MS2 by P25TiO2.

Introduction

Removing viruses and other pathogens from drinking water is vital to maintaining the health and well-being of a community. With multiple aqueous sources, conventional chlorination, despite its high effectiveness in inhibiting virus activity, produces harmful disinfection products. However, these prosses are expensive. Photocatalytic oxidation is being studied as an alternative water disinfection method. Titanium dioxide TiO2 is an attractive photocatalyst for water treatment. The antibacterial properties of TiO2 have been well documented and are attributed to the generation of hydroxyl free radicals (HO). Some studies have investigated the properties of TiO2, but the inactivation rates in most of them were low. Metal doping used to enhance TiO2 photocatalysis by trapping excited electrons to prevent charge recombination. Besides, Ag has been shown an improvement in TiO2 performance. Here we studied the activity of Nano-silver doped titanium dioxide (nAg/TiO2) in water treatment.

Methodology

Nano-silver doped titanium dioxide (nAg/TiO2) were prepared by photochemical reduction of silver nitrate on two commercially available TiO2. Bacteriophage MS2 (ATCC 15597-B1) was used as a model virus in this research. MS2 is immune to chlorine and chloramines as Hepatitis A virus and Poliovirus. It is also more resistant to UV disinfection than other bacteriophages. Dark inactivation of viruses was assessed using undoped P25 TiO2 . nAg/TiO2 nanoparticles synthesized with P25 and 10 wt.% AgNO3. The effect of leached silver was investigated by removing the catalyst particles from suspension after sonication by centrifugation and filtration. The light intensity used in all experiments was 2.5 mW/cm2 as determined by a UV radiometer with a NIST.

Results and Discussion

MS2 dark inactivation removal and deactivation of MS2 by the photocatalysts in the dark is credited to adsorption to the photocatalyst particles by Ag+ released from nAg/TiO2. The concentration of MS2 was measured after 1 min of dark contact in each photocatalytic deactivation experiment and then used as the first concentration of analysis of the deactivation photocatalytic data. The interactions of viral surface amino acids with silver increased the adsorptive removal of MS2 by nAg/TiO2. Ag has a high affinity for sulfur moieties. The -COOH groups on the amino acids interact with Ag. The difference between virus titers with nanoparticles in suspension and nanoparticle free centrifuge supernatant showed that adsorption of MS2 to the nAg/TiO2 or undoped TiO2 surface either deactivates these viruses or inhibits access of the MS2 A protein to the E.coli pili. The mixtures of MS2 and 5.95%nAg/ P25TiO2 were kept in the dark for 24h and re-enumerated to evaluate the potential dark deactivation of stored samples. It was observed a slight change in virus titer during the 24h.

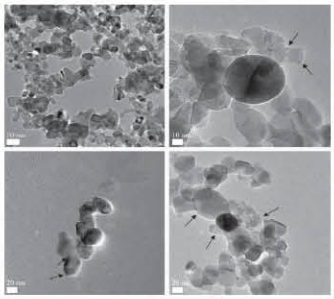

Fig.1 TEM Images of Nano-silver doped titanium dioxide (nAg/TiO_2) .

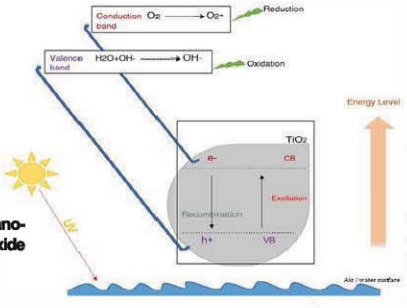

Fig.2 Photocatalytic mechanism of Nano-silver doped titanium dioxide (nAg/TiO_2).

Conclusion

The rapid virus inactivation kinetics of nAg / TiO2 materials in our study indicates that the virus can be effectively inactivated by using a small light reactor and optical disinfection of drinking water at both points. It is important to retain the nAg / TiO2 materials in the treatment system and verify this using a photocatalyst / hybrid membrane system. The photocatalyst is kept in a membrane unit downstream and recycled.

Acknowledgments

We wish to express all our deepest and sincerest gratitude to Dr Alaa M. Munshi. We are deeply indebted to her for her enormous patience, guidance and confidence in our abilities that helped us enhancing our understanding and guided us throughout this work. We would also like to thank Umm Al-Qura University and the Department of Chemistry for all the support and opportunities it has given to us.

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Spectrophotometric determination of pefloxacin by formation of ion-pair complex with bromophenol blue (BPB).

Z.D.Al Mallah , A.M.Alotaibi , E.A.Alsharif , A.S.AlQurashi , Z.S.Albrakai

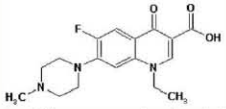
Abstract

Simple, quick and sensitive spectrophotometric method is described for the determination of Pefloxacin. The methods is based on the reaction of this drug with bromophenol blue (BPB) in buffered aqueous solution at pH 2.6 to give highly coloured complex species, extractable with chloroform. The coloured products are quantitated spectrophotometrically at 413 nm. Optimisation of the different experimental conditions is described.. This method was fully validated and exhibited good linearity (10 – 70 µg /ml, R^2= 0.9901), low limits of detection (2.5 µg /ml), RSDs = 1.1%) .The proposed methods are applied for determination of Peflacine tablets and Peflacine ampoules with mean percentage accuracies 99.5 ± 0.99, 99.39 ± 1.05 .

Introduction

Pefloxacin: is a second-generation fluoroquinolone antibacterial agent. It inhibits bacterial DNA gyraseand exhibits a concentrationdependent bactericidal effect.

Molecular Formula:



It is effective as an antibacterial agent against both Gram-positive and Gram-negative organisms . Pefloxacin is partially metabolised in the liver to norfloxacin , which is a primary metabolite, and itself is a potent antimicrobial agent used in human and veterinary practice.

Material and equipments



Double-beam Shimadzu UV- visible spectrophotometer









Drugs pefloxacin

Results and Discussion

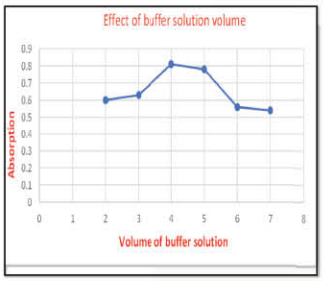


Fig. (6) effect of buffer solution volume on the formation of ion-pair complex.

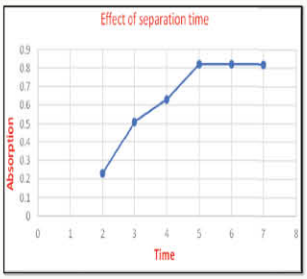


Fig. (7): Effect of separation time on the formation of ion-pair complex.

Conclusion

Parameter	Peflo.
λ_{max} / nm	413
Stability /h	28
pK	3.85
Beer's conc. range /µg ml^{-1}	10-70
Ringbom optimum range /µg ml^{-1}	15-60
Detection limits /µg ml^{-1}	2.3
Quantification limits / µg ml^{-1}	7.6
Molar absorptivity / l mol^{-1} cm^{-1}	4.33 x 10^3
Sandell sensitivity /ng cm^{-2}	0.077
Slope	0.012
RSD % of slope	0.346
Intercept	0.028
Correlation coefficient	0.99
RSD %	1.1
Range of error %	1.45±
Calculated t–values (2.57) ^{a}	1.13
Calculated F- test (5.05) ^{a}	2.78

Acknowledgments

I would like to express my special thanks of gratitude to my professor (Dr. Zakiya Al Mallah)who gave me the golden opportunity to do this wonderful project on the topic (Spectrophotometric determination of with formation of pefloxacin by formation of ion- pair complex with bromophenol blue), which also helped me in doing a lot of Research and i came to know about so many new things I am really thankful to them. Secondly i would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame.

Results and Discussion

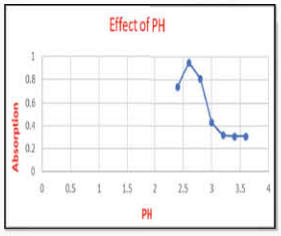


Fig. (4): Effect of pH on the formation of ion-pair complex.

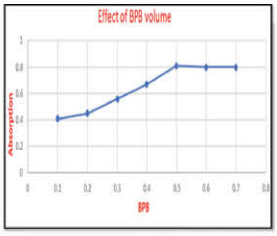


Fig.(5) : effect of BPB volume on the formation of ion-pair complex.

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Title. Spectrophotometric Determination of Chlorine Dioxide in water

Names: Ebtihal Alghamdi , Hala Alshazli, Wasaif Almatrafi and Dr. Sulafa

University Umm AL Qura University

Abstract

Photochemical properties of chlorine dioxide (ClO_2) are reported. Chlorine dioxide has been prepared in situ by the oxidation of sodium chlorite in water using mild oxidizing agent. The purity of ClO_2 was determined by using iodometric titration. In addition, chlorine dioxide was prepared by using electrochemical methods. The chlorine dioxide absorbs in the near-ultraviolet region at 360 nm.

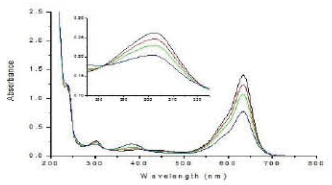

Figure 1. Absorption spectra of the Rhodamine B solution after the addition of ClO_2 solutions. The inset shows the spectral region of ClO_2 from 275 nm to 325 nm. — No ClO_2, — 0.5 mg/L ClO_2, — 1.0 mg/L ClO_2, — 2.0 mg/L ClO_2 .

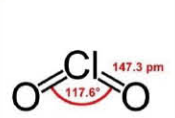

Illustration of ClO_2 structure.

Introduction

Chlorine dioxide is soluble in water and is known to be a powerful antiseptic agent with demonstrated capability to sterilize surfaces. It is safe for human use and has been proposed as a replacement for chlorine in sterilizing drinking water. In recent years, the use of chlorine dioxide as an alternative disinfectant for drinking water has become increasingly attractive. A major disadvantage of halogenated by-products common with chlorination Another advantage is that chlorine dioxide greatly reduces odor and color. [1]. It is widely known that chlorine is the most widely used chemical disinfectant for treating drinking water. The use of chlorine dioxide as an alternative disinfectant to drinking water has increased in many countries. However, the high concentration of chlorine dioxide in drinking water is also harmful to the human body and thus it is extremely important to determine chlorine dioxide in drinking water, and there is a need for a simple, sensitive and selective method for determining chlorine dioxide[2].

Discussion

The chemical and photochemical oxidation of chlorite to chlorine dioxide is a viable route to a bleaching agent. Electroanalytical methods applied to the determination of chlorine dioxide include amperometry, Comparison of platinum and glassy carbon rotating working electrodes exhibited similar behavior at pH = 4. However, at higher and lower pH values (pH = 2-8) the glassy carbon electrode performed better than the platinum electrode because the glassy carbon electrode proved to be fairly insensitive to pH changes [4]. For this reason, the simples way to generate ClO_2 is via photoelectrochemistry with a silicon solar cell.

Conclusion

Our research indicate that photoelectrochemical generation of aqueous solution of chlorine dioxide is entirely feasible using conventional equipment and inexpensive materials. Analysis of chlorine dioxide can be made by absorption spectroscopy by monitoring the product directly or by trapping the gas with different dyes. A range of complementary redox processes is available to complete the circuit under remote conditions.

Objective

We have identified chlorine dioxide as important anti-septic agent that could be produced under photochemical conditions with sunlight as the only energy source. It is not so practical to employ absorption spectroscopy for the routine analysis of ClO_2 because the absorption profile lies in the near-UV (λ_{MAX} = 380 nm) and the molar absorption coefficient is quite low (ε_{MAX} =1,100 $M^{-1} cm^{-1}$). We have used a chemical trap: i. e ., a different coloured dyes that bleaches in the presence of of ClO_2. Because developing countries do not have potable water, so these methods were created in which they used ClO_2 to purify water and make it safe to drink.

Acknowledgments

❑ Umm Al-Qura University.

❑ Dr. Sulafa Nassar is gratefully acknowledged.

Results

Spectroscopic method:

Wheeler et al reported a direct and sensitive method of determining chlorine dioxide (ClO_2) by the oxidation of chlorophenol red (CPR), a pH indicator. Titrimetric and spectrophotometric procedures were presented for the range of 0.05 to 2.5 mg/L (ClO_2). Using four reagents and a laboratory or portable spectrophotometer, the authors have modified the method and have developed procedures for the direct spectrophotometric determination of ClO_2, in water or wastewater for the ranges: 0-0.1 mg/L, 0-0.2 mg/L. and 0-1.0 mg/L [3]. The discoloration reaction between chlorine dioxide and chlorophenol red (CPR) was developed by Wheeler and Loft.

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Sporopollenin interact with inorganic metals

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Supervision: Dr. Fatmah Mohammad Alkhatib.
Chemistry Department, Umm Al-Qura University.
2021-1442

Aim

- The aim of this project is to interact of metal salts such as copper and nickel with the sporpollenin.
  - They can investigation as supports for use some spectroscopic like UV-vis and IR spectroscopy.

by UV-vis and IR spectroscopy.

Introduction

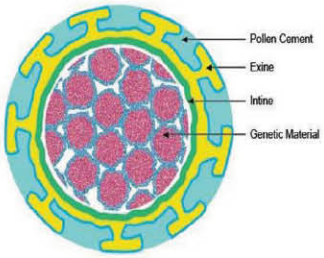

Figure1. Structure of a pollen grain (exine-intine).

- Sporopollenin is the outer layer (exine) of pollen and derived from the spores of Lycopodium clavatum, contain carbon, hydrogen and oxygen, and it has the stoichiometry $C_{90}H_{144}O_{27}$.
- It is stable, inert and has high antioxidant properties.
- The chemical composition of sporopollenin is not Completely.

Experimental



Figure2. the preparation of sporopollenin with metals.

. Preparation of sporopollenin with metals
. Spectroscopic techniques used for the analysis of spore metal complexes.
. Ultraviolet-Visible (UV-Vis) spectroscopy
. Infrared (IR) spectroscopy.

Results

1. UV-Vis Light

Unfortunately, the colour brown of sporopollenin with metals was not helpful when using UV-Vis.
The spectra of the brown sporopollenin masks both the visible and UV part of the spectrum.

2. IR spectroscopy

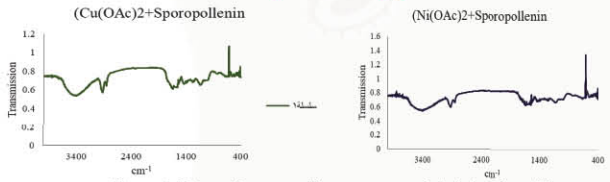

Figure3. IR spectroscopy for copper and nickel salts with sporopollenin.

Discussion

Infrared spectroscopy (IR): used to detect the functional groups of sporopollenin, IR spectrum shows the presence of Hydroxyl groups (OH stretch) in the region of (4000-3400)cm^{-1}, Methylene (CH stretch) is found at (2930 & 2850)cm^{-1}, the sporopollenin spectrum also shows the presence of Carboxyl (O-H stretch) at 2700 cm^{-1}, Ketones (C=O stretch) at 1710 cm^{-1}, Esters (C=O stretch) at 1640 cm^{-1}

Conclusion

- Sporopollenin is a natural polymer extracted from L. clavatum.
- The functional groups such as the hydroxyl groups, ketones and esters, were determined by means of infrared analysis methods.
- There is not good results when used UV-vis, due to the brown colour of sporopollenin.

Acknowledgments

A word of love, appreciation and greetings to my supervisor Dr. Fatmah Al-Khatib, who stood beside us all the time and my gratitude for her kindness and dedication, for her endless support, guidance and encouragement for all the knowledge that she transferred to me and for giving me with all the facilities that were required to complete my project.
we thank the university to give us opportunity for education, and the chemistry department for giving us appropriate place to learn.

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Flavonoids Derivatives

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Umm Al.qura University

Research objective

Review of Flavonoids and their derivatives

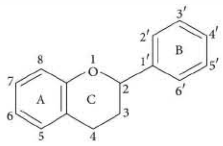
Introduction

Flavonoids are secondary metabolites with low molecular weight secondary that are synthesized by plants, they are considered non essential for the plant survival, unlike primary metabolites.

Over 10,000 different structures of flavonoids have been discovered and their synthesis was found to be evolved early in plants and helps in both plant protection and signalling.

Flavonoids give some fruits and vegetables their colour such as the red and dark blue color of berries and the orange and yellow coloring in the citrus fruits. While in the humans body they can act as vitamins.

they are classified as flavanols, flavanones, flavonols, isoflavones, flavones and anthocyanins.



Biological activity

There are many, but here are some of them:

- Anti carcinogenic bioactivity

effected on the inactivation of the carcinogen, the cell proliferation inhibition , the DNA repair processes enhancement and the reduction of oxidative stress.

- Antifungal bioactivity

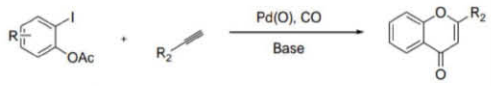
Chloroflavonin is considered the first flavonoid bearing a chlorine moiety and used as an antifungal and produced by special strains of Aspergillus candidus

- Anti bacterial bioactivit.

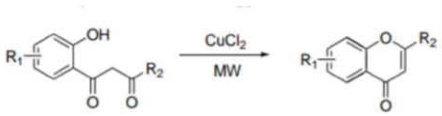
Several flavonoids have possessed a potent antibacterial activity, Their antimicrobial mode of action is due to their ability to inactivate microbial enzymes,adhesins, and cell envelope transportproteins.

Selected synthesis of flavonoid

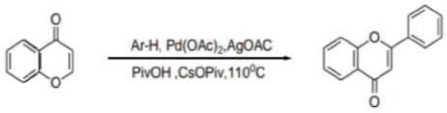
- Silvent free synthesis:



- Photo-Wittig reaction is applied for the synthesis of flavones:



- Construction of flavones through regioselective carbonylative annulation of 2 bromo phenols & terminal alkynes



acknowledgments

At the beginning, I thank God and thank him for completing this educational process with kindness, and for completing this project in the fullest way, then I extend my thanks and appreciation to Dr. Matokah Abualnaja for her good supervision, teaching and constructive criticism during the work of this project, and I extend my thanks to all the teaching staff who helped us And our education.

all the love and appreciation for all those I dealt with in this department, the department of chemistry

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Review of nitroimidazole

Haneen Almename, Shahad Almatrafi, Hind Alotibi, Ebtesam Alsaab and Dr. Matokah Abualnaja.

Research objective

Review of Nitroimidazole derivatives

Introduction

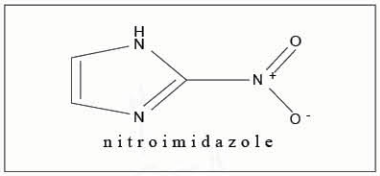

Figure 1. nitroimidazole structure

- Researcher Rhone Poulenc discovered nitroimidazole the end of the 1950s.
- The molecular formula of this compound is $C_3H_3N_3O_2$ with the nitro group at position 5 in the imidazole ring.
- It is a stable group of antibacterial agent that have activity against most gram-negative anaerobic bacteria and many gram-positive anaerobic bacteria.

Biological activity

It is a heterocyclic compound consisting of five members having two nitrogen atoms to which 2sp of hydrogen is hybridized. Imidazole is amphoteric in nature, that is, it acts as an acid and base and is subject to nuclear and electrostatic attack. It is a class of heterogeneous cycles with a ring structure consisting of five members. This system is present in a biological structure such as
histidine and the associated histamine hormone and has many pharmaceutical activities as anti-cancer, anti-bacterial and anti-fungal.

Selected synthesis of nitroimidazole derivatives

1-The Suzuki miura reaction was explored using a variety of (heteroporonic) reaction to prepare the nitroimidazole derivative.

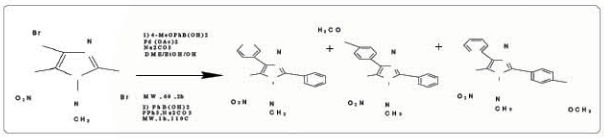

Figure 2. one-pot regioselective bis-Suzuki reaction

2-The 2-bromo and 2-methoxy isotopes of 2d proceeded of 1,5-dimethyl-4-nitro-1 H-amidazole were prepared by using a modification of the pyman and timmis14 method.

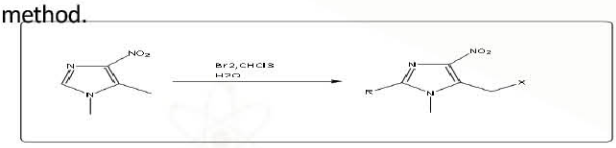

Figure 3. synthesis of 2-bromo and 2-methoxy nitroimidazoles 2f and 2g respectively

Acknowledgment

Thanks and appreciation to our supervisor, Dr. Matokah Abualnaja, for her endless support and guidance for all the knowledge that she conveyed to me.

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Study The Effect Of Potassium Chloride (KCl) On The Dexamethasone Which Is Used As Treatment For Covid-19

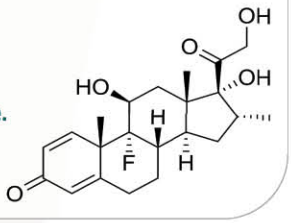
Gharam Salah Aldeen Kaaki
Supervisor : Dr. Hanadi Ahmed Katouah
Umm Al-Qura University

Abstract

Dexamethasone has an effective effect on the treatment of Covid-19, as it supports the respiratory system and helps in the process of breathing easily. One of its side effect is decrease the level of potassium in the blood. Which becomes less than <3.6. That leads to muscle cramps, arrhythmia and fatigue. Supplements such as potassium chloride must be used to reduce the risks.

Introduction

Covid-19 is a zoonotic virus that comes from bats and its beginning in China in 2019 and has spread all over the world and the most important symptoms of it are loss of sense of taste and smell, pneumonia, headache, high fever. Many drugs are taken to treat this disease, including dexamethasone, which is a synthetic corticosteroid that has a long-acting effect that works by inhibiting the inflammatory effect. It has many dosage forms as it can be taken orally, intravenously, or intramuscularly. But it reduces the level of potassium in the blood, which is necessary for muscle health and the regulation of heartbeat.



Figure(1): Dexamethasone structure.

Methods

Blood samples are taken for examination procedures to measure the level of potassium in the blood after using Dexamethasone, they are analyzed by measuring the equipment of the ion selective electrodes (ISE) , which is an electrochemical sensor that responds to potassium ions.

Results

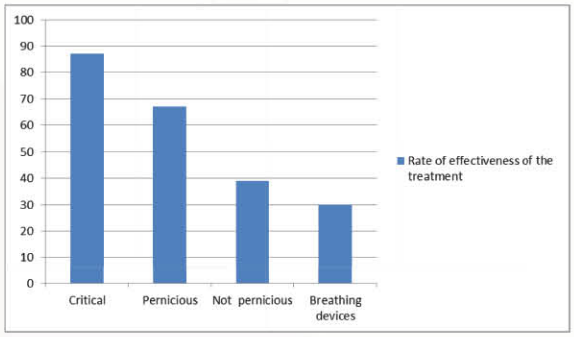


Figure (2): The rate of effectiveness of dexamethasone.

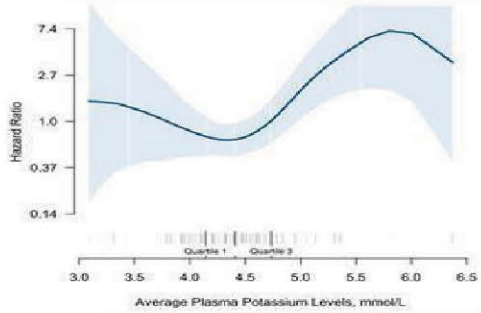


Figure (3): Curve of average plasma potassium level in COVID-19 patients.

Discussion

Figure (2) Dexamethasone treatment is effective for Covid-19 patients, as it increased the recovery rate and reduced the mortality rate.

Figure (3) shows the curve that the rates are different and irregular, and a high rise occurred at the number 3.0, so the normal rate for potassium is between 3.6–5.2 m / L in the blood.

Conclusion

Based on previous research and experience, the results indicate that people with Covid-19 have a low level of potassium in the blood, a condition called (Hypokalemia) and therefore potassium chloride supplement should be used because it helps to regulate the level of potassium in the blood to avoid risks.

Acknowledgments

I thank my parents for their support and encouragement, as well as my colleagues, for they gave me advice and instructions, and I also thank supervised:(Dr.Hanadi Ahmed Katouah) for my help in writing my research correctly and completely, and I also thank the management of the Department of Chemistry at Umm Al-Qura University for the efforts and providing all the necessary needs for the student.

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Posters

الملصقات العلمية

لمشاريع التخرج

قسم الكيمياء

ماجستير

Metal based bioactive compounds: design, synthesis, analytical applications and DNA binding ability of sulfa drug azo dye derivative and its divalent metal complexes

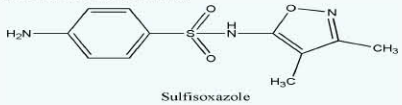
Elaf Alfear and Dr. Hoda El-Ghamry
Chemistry Department, Faculty of Applied Science, Umm Al-Qura University, Makkah, Saudi Arabia

Abstract

The azo dye compound formed from the coupling of sulfisoxazole and salicylaldehyde has been used as a ligand for the synthesis of Cr(III), Zn(II) and Cd(II) complexes. The structures and composition of the isolated complexes have been identified applying alternative spectroscopic and analytical techniques including IR spectra, UV–Visible spectra, SEM as well as thermal analysis. The binding mode of the synthesized ligand and its complexes with SS-DNA have been evaluated and compared with ethidium bromide.

Introduction

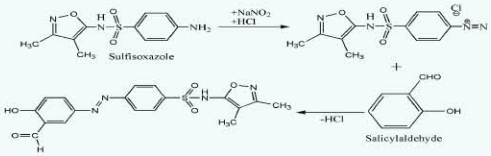
Sulfisoxazole is a weakly acidic antibacterial agent, which has low solubility in water. It is used in the prevention of streptococcal infection in patients with rheumatic fever who are allergic to penicillin. Sulfisoxazole is considered an anti-inflammatory for acute otitis media and acute urinary tract infections. Sulfisoxazole contains several groups with donor atoms in which this compound can form homologous bonds to metal ions.



Sulfisoxazole

Heterocyclic azo dyes derivatives are used to normalize low oxidation states for various transition metal elements. These compounds are distinguished by their biological efficacy and analytical applications. In addition, sulfonamide and azo-sulfonamide derivatives are applicable as potential bonds for many metal ions due to the presence of many potential donor atoms, their flexibility and ability to coordinate in either neutral or patterned form.

Azo dye raection

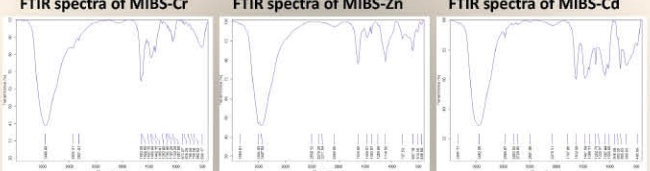


Objective

The current work aims to the synthesis of three metal complexes of an azo dye ligand that are expected to have promising biological and antitumor activities. The target complexes are Cr(III), Cd(II) and Zn(II) complexes. The structures and geometries of the synthesized complexes will be identified applying all the available analytical and spectral tools including IR spectra, UV–Visible spectra, SEM as well as thermal analysis. Hence the DNA binding ability of compounds is the dominant attitude that examined in pharmacology in order to evaluate the anticancer tendency of new compounds, the binding mode of the synthesized compounds with SS-DNA will be studied in a trial to predict the ability of the synthesized compounds to be used as anticancer drug.

Results & Discussion

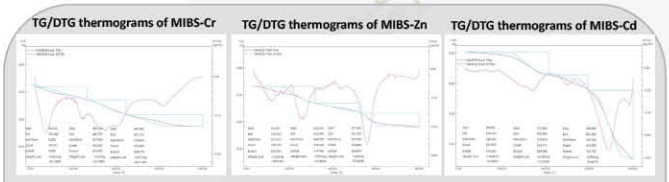
FTIR spectra of MIBS-Cr | FTIR spectra of MIBS-Zn | FTIR spectra of MIBS-Cd



IR spectra (cm^{-1}) for metal complexes

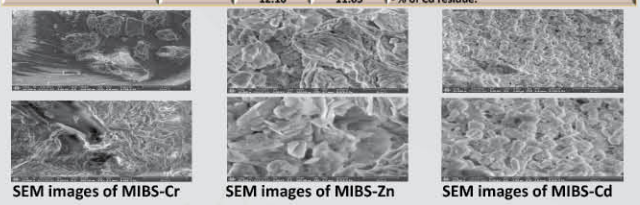
Comp.	ν(OH)	ν(NH)	ν(C=O)	ν(C=N)	ν(N=N)	ν(SO_2)asy ν(SO_2)sym	ν(C-O)	ν(M—O) ν(M—N)
MIBS-Cr	3446	3220	1653	1565(sh)	1385	1357 1157	1252	506 464
MIBS-Zn	3447	3226	1635	1594(sh)	1383	1349 1184(sh)	1258	514
MIBS-cd	3452	3227	1632	1591(sh)	1386	1346 1158	1262	566

TG/DTG thermograms of MIBS-Cr | TG/DTG thermograms of MIBS-Zn | TG/DTG thermograms of MIBS-Cd

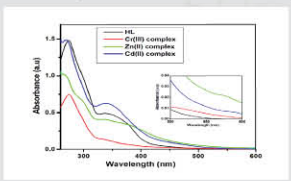


Thermal analysis for metal complexes

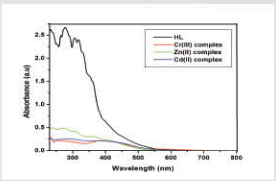
Complex (Mol. Wt.)	Temp. range (°C)	Mass loss % Calcd.	Mass loss % Found	Assignment
MIBS-Cr $[LCrCl_2(H_2O)_3]$ (562.18)	25-115	9.36	9.61	-Loss of 3 coordinated H_2O.
	115-246	10.25	10.14	-Loss of 2 CH_3 + CHO groups
	246-460	28.28	28.38	-Loss of Cl_2 + C_6H_4O
	460-745	18.06	18.18	- Loss of $C_6H_4N_2$
	745	34.02	34.00	- $C_9N_2O_3SCr$ residue
		9.72	9.01	-% of Cr residue
MIBS-Zn $[LZn(SO_4)]$ (561.86)	35-144	5.35	5.36	-Loss of Loss of 2 CH_3 groups
	144-289	11.65	11.78	-Loss of C_6NO
	289-589	22.26	22.60	-Loss of SO_4 + CHO groups
	589-800	Not assigned	5.63	Not assigned
MIBS-Cd $[L_2Cd]\cdot H_2O$ (561.86)	35-114	1.93	1.54	-Loss of 1 lattice H_2O.
	114-369	15.19	15.76	-Loss of 2CH_3 + $C_6H_2N_2O$ moieties
	369-518	8.72	8.49	-Loss of C_3HN_2O
	518-721	47.39	47.29	- Loss of $C_{13}H_8N_2O_3S$ + $C_6H_4N_2O_2S$
	721-800	14.64	15.27	- Further decomposition of ligand leaving Cd residue
		12.10	11.65	- % of Cd residue.



SEM images of MIBS-Cr | SEM images of MIBS-Zn | SEM images of MIBS-Cd



UV-Vis spectra in DMSO of Cr(III) Zn(II) Cd(II) complexes



UV-Vis spectra using nujol mull technique of Cr(III) Zn(II) Cd(II) complexes

Conclusion

Cr(III), Cd(II) and Zn(II) complexes of the azo dye ligand formed from the coupling of Sulfisoxazole and Salicylaldehyde have been successfully synthesized and characterized by different spectral tools including IR spectra, UV–Visible spectra, SEM as well as thermal analysis. Investigation of the results confirmed the formation of the complexes in the molar ratio 1:1 (M:L) for Cr(III) and Zn(II) complexes and 1:2 (M:L) for Cd(II) complex. The binding mode of the synthesized compounds with SS-DNA have been evaluated and compared with Ethidium bromide.

Acknowledgments

First, thank Allah, almighty, for my compromise throughout my work to complete the research successfully.After that, I would like to express my sincere gratitude to the Director of Research Dr. Hoda A. El-Ghamry. She inspired me very strongly. She taught me the methodology of doing research as clearly as possible. My thanks also extended to everyone in the chemistry department, Faculty of Science, Umm Al-Qura University who supplied us with facilities to manage our work in the required time. I am also very grateful for what she has given me where she showed great interest in successfully completing this work. and I thank the one who inspired me, who instilled in me a love of knowledge and a spirit of perseverance and achievement, which sought to be me here today: my dear mother.

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Transition metal complexes based on sulfonamide ligand: Synthesis, spectral characterization, interaction with DNA and medicinal application

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Abstract

The azo dye compound named 3,4-dimethylisoxazol-5-yl-4-((3-formyl-4-hydroxyphenyl)diazenyl)benzenesulfonamide (abbreviated as MIBS) which has been formed from the coupling of sulfisoxazole and salicylaldehyde has been synthesized and its structure has been confirmed applying mass, IR, UV-Vis and ^{1}H-NMR spectra. The synthesized azo dye has been used as a ligand for the synthesis of Cu(II) and Ni(II) complexes. The structures and composition of the isolated complexes have been identified applying alternative spectroscopic and analytical techniques including IR spectra, UV–Visible spectra, SEM as well as thermal analysis. The binding mode of the synthesized ligand and its complexes with SS-DNA have been evaluated and compared with ethidium bromide.

Introduction

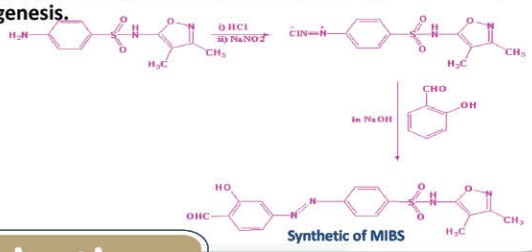
Sulfonamides :

Sulfonamides were the first effective chemotherapeutic agents used for the prevention and cure of bacterial infections in humans, so the synthesis of metal Sulfonamides compounds has gotten a lot of attention. Furthermore, sulfadrugs and their metal complexes have a wide range of uses, including diuretic, antiglaucoma, and antiepileptic medications.

Azo dyes compounds :

Azo dyes are organic compounds that contain two phenyl fragments joined by an azo group (–N = N–) and are made by coupling the diazonium salt of a primary aromatic amine to an electron-donating aromatic compound. Azo dye stuffs have piqued interest for a number of biological applications. They have been classified as xenobiotic compounds that are resistant to biodegradation.

Also, Azo compounds and their metal complexes are known to be involved in a number of biological reactions, such as inhibition of DNA, RNA, and protein synthesis, nitrogen fixation, and carcinogenesis.



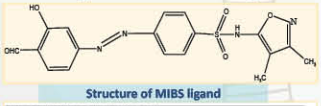
Synthetic of MIBS

Objective

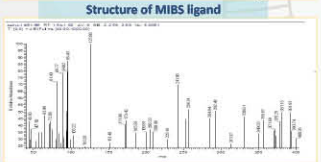
The current work aims to the design and preparation of novel sulfa drug azo dye ligand from the coupling of sulfisoxazole and salicylaldehyde in addition to its Cu(II) and Ni(II) chelates that are expected to have promising biological anticancer activity. keeping in mind the great importance of investigating the interaction of nucleic acids with metal complexes in developing novel reagents for therapeutic applications, the binding mode of the synthesized compounds with SS-DNA will be studied. The biological and anticancer activity of the metal complexes will be evaluated in comparison with that of the free ligand in a trial to evaluate the rule and type of the metal center to control anticancer activity.

Results & Discussion

1. Mass spectrum of MIBS ligand

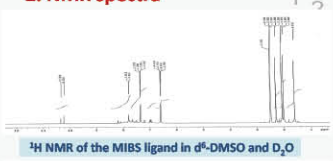


Structure of MIBS ligand

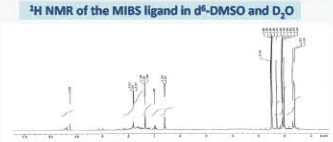


Mass spectrum of MIBS ligand

2. NMR spectra



^{1}H NMR of the MIBS ligand in d^6-DMSO and D_2O



^{1}H NMR of the MIBS ligand in d^6-DMSO

3. FTIR Spectra:

Assignments for diagnostic important bands in IR spectra (cm^{-1}) for MIBS and its Cu(II) and Ni(II) complexes

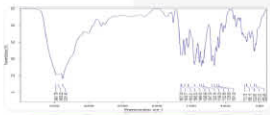


Figure5: IR spectrum of MIBS ligand

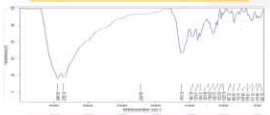


Figure6: IR spectrum of MIBS-Cu

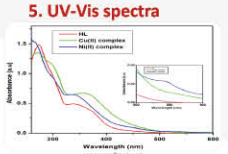
Comp.	ν(OH)	ν(NH)	ν(C=O)	ν(C=N)	ν(N=N)	ν(SO_2)asy ν(SO_2)sym	ν(C-O)	ν(M—O)
MIBS	3450	3231	1651	1593	1381	1347 1162	1323	- -
MIBS-Cu	3445	3213	1618	1592	1378	1343 1154	1262	511 451
MIBS-Ni	3444	3229	1623	1592	1387	1340 1156	1254	585 468

4. Thermal analysis (TG, DTG and DTA techniques)

Assignments for diagnostic important bands in IR spectra (cm^{-1}) for MIBS and its complexes

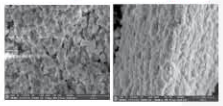
Complex (Mol. Wt.)	Temp. range (°C)	Mass loss % Calcd.	 Found	Assignment
MIBS (400.41)	25-151	7.24	7.2	-Loss of CHO group.
	151-382	38.75	38.48	- Loss of $C_6H_5NO_2S$
	382-800	28.25	28.06	-Loss of C_6H_5NO + OH
	800	25.74	26.13	$C_6H_5N_2$ residue
MIBS-Cu $[LCuCl(H_2O)_2]\cdot H_2O$ (570.46)	26-96	3.15	3.17	-Loss of 1 lattice H_2O
	96-227	14.74	15.13	-Loss of 3 coordinated H_2O +2CH$_2$OH groups
	227-299	11.57	11.83	-Loss of C_6NO group
	299-357	6.22	6.4	- Loss of 1/2Cl_2 group
	357-800	23.85	24.23	- Loss of $SO_2NH + N_2$ + CHO groups
	800	40.27 11.14	39.24 10.85	- $C_6H_6 + C_6H_5CuO$ residue -% of Cu residue
MIBS-Ni $[LNiCl(H_2O)_3]$ (547.59)	33-152	9.88	9.9	-Loss of 3 coordinated H_2O.
	152-399	24.02	23.99	-Loss of 1/2Cl_2 + C_6H_5NO
	399-577	28.33	27.93	-Loss of $C_6H_6NO_2S$.
	577-800	10.41	10.53	- Loss of N_2 + CHO
	800	27.35 10.72	27.83 10.9	- C_6H_5NO residue -% of Ni residue

5. UV-Vis spectra



UV-Vis spectra in DMSO

6. Scanning electron microscopy (SEM)



Conclusion

We succeeded to prepare the azo compound ligand named 3,4-dimethylisoxazol-5-yl-4-((3-formyl-4-hydroxyphenyl) diazenyl) benzene sulfonamide (MIBS) By the reaction of sulfisoxazole diazonium chloride and salicylaldehyde. The structure of the ligand has been confirmed applying alternative spectral and analytical tools. Cu(II) and Ni(II) complexes have been also prepared using MIBS as the ligand. The structures and constitution of the complexes have been also confirmed applying FTIR, UV-Vis, Thermal analysis analysis and Scanning electron microscopy (SEM).

Acknowledgments

At first, I thank Allah that I have reached what I have attained through his success and care. After that, I would like to thank the distinguished research supervisor, Dr. Hoda El-Ghamry, for her keenness and interest in teaching us the research methodology and methods. It was an honor for me to work and study under her supervision. My thanks also extended to everyone in the chemistry department, Faculty of Science, Umm Al-Qura University who supplied us with facilities to manage our work in the required time. I also thank my family for their support and care.

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Design, Synthesis, Spectral Characterization, DNA binding and therapeutic applications of some metal complexes comprising biologically active heterocyclic ligand

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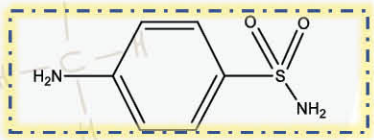
Abstract

The sulfonamide compound formed from the reaction of sulfisoxazole diazonium chloride and salicylaldehyde has been used as a ligand for the synthesis of Co(II), Mn(II) and Fe(III) complexes. The structures and composition of the isolated complexes have been identified applying alternative spectroscopic and analytical techniques including IR spectra, UV–Visible spectra, SEM as well as thermal analysis. The binding mode of the synthesized ligand and its complexes with SS-DNA have been evaluated and compared with ethidium bromide.

Introduction

Sulphonamide-containing compounds and their different derivatives are widely used in medicine because of their pharmacological features like having antibacterial activity. The most common method of sulfonamide synthesis involves a reaction of corresponding aliphatic or aromatic sulfonyl chloride with ammonia or an adequate amine



Sulfonamides chemical structure

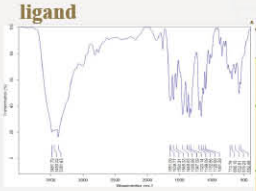
Also, azo dyes, as a very common class of organic ligands, are commonly used among several fields and technologies such as in textiles, paper, leather, plastics, laser liquid crystalline displays, and ink jet printers. Metal complexes of azodyes have been widely studied due to their unusual magnetic properties, novel structural features, and relevance to biological system

Objective

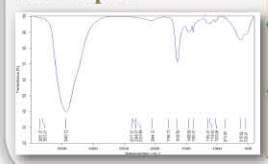
Design and synthesis of new Co(II), Mn(II) and Fe(II) complexes of sulfonamide containing ligand that are expected to act as effective anticancer drug. The anticancer activity of the synthesized complexes will be preliminarily evaluated via studying the binding modes of the synthesized complexes with SS-DNA in comparison to ethidium bromide which is the most famous intercalator DNA binding compound.

Results & Discussion

ligand



Mn complex

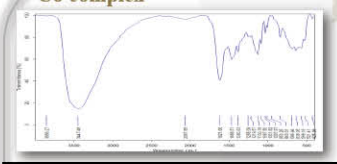


IR spectra

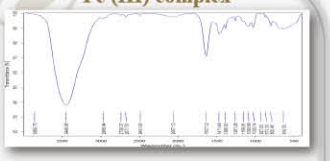
Assignments for diagnostic important bands in IR spectra (cm^{-1}) for MIBS and its complexes

Comp.	ν(OH)	ν(NH)	ν(C=O)	ν(C=N)	ν(N=N)	ν(SO_2)sym ν(SO_2)asym	ν(C-O)	ν(M—O)
MIBS	3450	3231	1651	1593	1381	1347 1162	1323	-
MIBS-Co	3447	3229	1621	1593	1383	1348 1162	1255	568
MIBS-Mn	3440	3230	1638	1589	1384	1341 1153	1280	539
MIBS-Fe	3455	٣٢٢٦	١٦٣٧	١٥٨٩	1386	1315 1159	1261	579

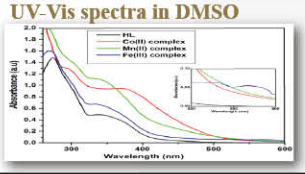
Co complex



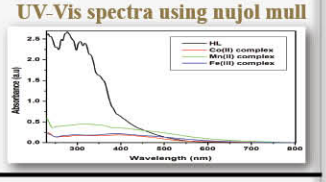
Fe (III) complex



UV-Vis spectra in DMSO

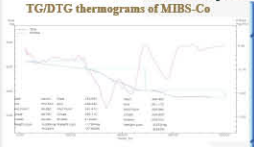


UV-Vis spectra using nujol mull

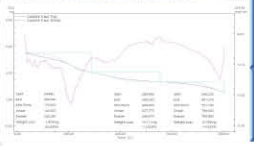


Thermal analysis (TG, DTG and DTA techniques)

TG/DTG thermograms of MIBS-Co

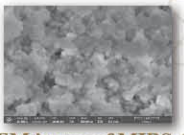


TG/DTG thermograms of MIBS-Fe



Complex (Mol. Wt.)	Temp. range (°C)	Mass loss % Calcd.	Mass loss % Found	Assignment
MIBS-Co [LCo(OH$_2$)$_2$]·H$_2$O (529.02)	23-114	3.39	3.37	-Loss of 1 lattice H_2O
	114-250	6.23	5.80	- Loss of 1 coordinated H_2O +CH_3OH group
	250-366	15.3	15.6	-Loss of C_6H_5NO
	366-472	12.16	11.52	-Loss of 1/2Cl_2 + CHO
	472-800	8.11	8.27	- Loss of N_2 + NH
	800	54.76	54.1	- $C_6H_4O_2S$+ C_6H_5ClO residue
		11.12	11.04	-% of Co residue
MIBS-Mn [LMnCl(H$_2$O)]·1.5H$_2$O (534.83)	33-139	8.41	8.56	-Loss of 2.5 lattice and coordinated H_2O
	139-295	9.43	9.61	-Loss of 1/2Cl_2 + 1 CH_3 group
	295-403	8.23	7.83	-Loss of 1 CH_3 group + CHO
	403-800	Not assigned	17.76	-not assigned
MIBS-Fe [LFeCl$_2$(H$_2$O)$_2$] (562.18)	33-118	6.42	6.19	-Loss of 2 coordinated H_2O.
	118-243	17.09	17.16	-Loss of C_6H_5NO
	243-402	12.61	12.55	-Loss of 1/2Cl_2
	402-800	Not assigned	18.23	-Not assigned

Scanning electron microscopy (SEM)



SEM image of MIBS-Co



SEM image of MIBS-Mn



SEM image of MIBS-Fe

Conclusion

Co(II), Mn(II) and Fe(III) complexes of the sulfonamide ligand formed from the reaction of sulfisoxazole diazonium chloride and Salicylaldehyde have been successfully synthesized and characterized by different spectral tools including IR spectra, UV–Visible spectra, SEM as well as thermal analysis. Investigation of the results confirmed the formation of the complexes in the molar ratio 1:1 (M:L) in which the ligand coordinated the metal center through the aldehyde and deprotonated hydroxyl oxygen atoms. The binding mode of the synthesized compounds with SS-DNA have been evaluated and compared with Ethidium bromide.

Acknowledgments

At first, I thank Allah that I have reached what I have attained through his success and care. After that, I would like to thank the distinguished research supervisor, Dr. Hoda El-Ghamry, for her keenness and interest in teaching us the research methodology and methods. It was an honor for me to work and study under her supervision. My thanks also extended to everyone in the chemistry department, Faculty of Science, Umm Al-Qura University who supplied us with facilities to manage our work in the required time.

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Synthesis of new nanosized bioactive heterocyclic compounds under mild reaction condition

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Abstract

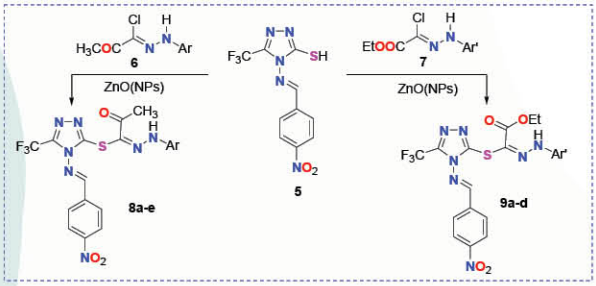
In this context, we synthesized a series of substituted triazoles under mild conditions using ZnO(NPs). The structure of all derivatives was confirmed based on their spectral data (IR, ^{1}H NMR, ^{13}C NMR, Mass and elemental analyses). All new triazole derivatives were investigated for their antimicrobial activity against dermatophytes and the pathogen foodborne bacteria. The results indicated that five derivatives showed excellent activity with two Foodborne pathogenic bacteria: *B. cereus and S. aureus* and one fungal species namely *T. mantigrophytes*. The molecular docking study was performed for the most active derivatives using the receptors of (3m9g) and (4zhs) the co-crystal structures of proteins for a bacteria *(S. aureus)* and a fungal pathogen T. rubrum, respectively.

Introduction

1,2,4-Triazoles and *N*-bridged substituted derivatives revealed various biological activities [1] and have been involved in medicinal chemistry with incorporation into a wide-ranging diversity of medicinally interesting drug candidates [2]. Several 1,2,4-triazole derivates are commercially available as interesting drugs for many diseases as triazolam, alprazolam, etizolam, propiconazole, flutrimazole, etc. The target of many scientists is the synthesis of novel bioactive heterocyclic drugs in short reaction time with high yield. This target can be achieved through using the catalysts, reactions in green solvents or under green heating techniques. Thus, organic reactions proceeded on the surface of nano-sized catalysts to speed up the stimulation process [3]. Moreover, the nanoscale catalysts can be easily isolated from the reaction medium and recycled while maintaining their catalytic activity [4]. The heterogeneous-ZnO nano-catalyst can be readily secluded from the organic reaction mixture and reused many times. Due to the unique and new distinctive properties such as reusability, polar surface, ability to produce pure products and non-corrosiveness, these days, ZnO (NPs) are now widely used as a powerful catalyst for many organic reactions to explore their synthetic benefit and preferably in aqueous solvents or under solvents free conditions [5]. Mild states are used with nanoparticles catalysts to prevent their decomposition [6]. We interested herein to synthesize a new series of triazole derivatives using ZnO(NPs) and investigate their antimicrobial activity against dermatophytes and the pathogen foodborne bacteria.

Results and Discussion

Novel derivatives of 1,2,4-triazole derivatives **9** and **8** were synthesized in excellent yield from the substitution reaction of hydrazonoyl chlorides **7** and **8** with triazole thione derivative **5** in dioxane in the presence of ZnO(NPs) under reflux (Scheme 1).



Scheme 1. Reaction of 4-[(4-nitro-benzylidene)-amino]-5-trifluoromethyl-4*H*-[1,2,4]triazole-3-thiol **5** with hydrazonoyl chlorides **6a-e** and **7a-d**

By similar way, the new derivatives **11**, **15** and **13a-c** were synthesized from the reaction of α-halo-carbonyl compounds using ZnO(NPs) (Figure 1).

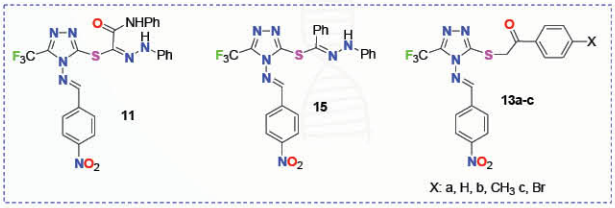


Figure 1. The structure of 1,2,4-triazole derivatives **11**, **13a-c** and **15**

The structure of all derivatives were confirmed based on their spectral data (Mass, IR, ^{1}H NMR, ^{13}C NMR and elemental analyses) as in Figure 2.

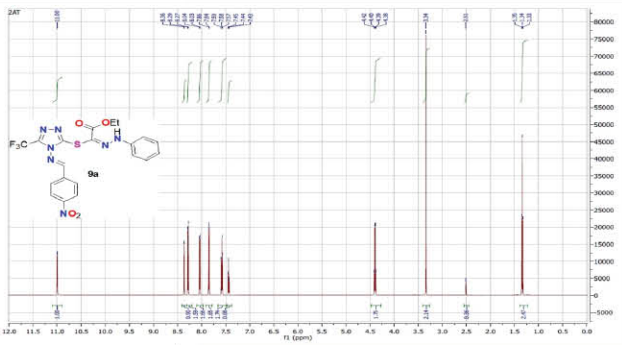


Figure 1. The ^{1}H NMR spectrum of 1,2,4-triazole derivative **9a**

Biological activity

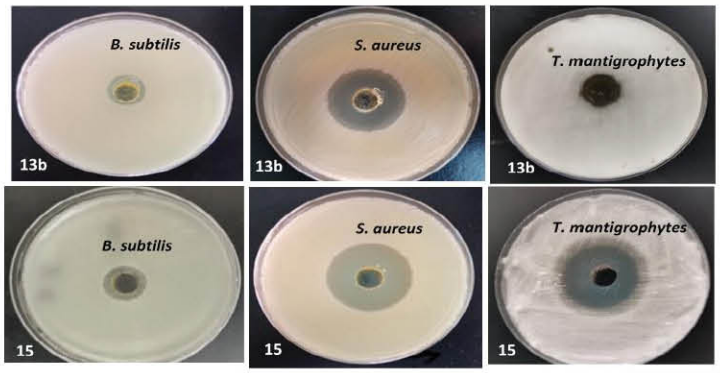


Figure 2. Antimicrobial activity of newly synthesized Triazoles compounds against dermatohytes and the pathogen foodborne bacteria as indicated by clear zone diameter (CZD, mm).

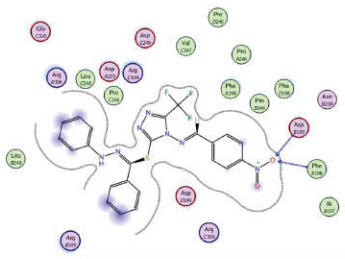


Figure 3. The 2D docked model of compound **15** into the active site of **4zhs**

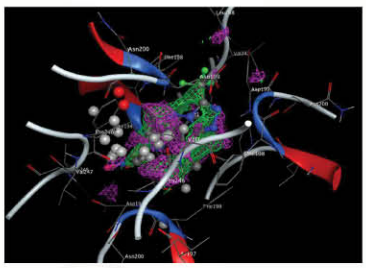


Figure 4. The electrostatic performance of compound **13a** into the active site of **4zhs**

Conclusion

We constructed a series of substituted triazoles under mild conditions using ZnO(NPs). The structure of all derivatives was confirmed based on their spectral data. All new triazole derivatives were investigated for their antimicrobial activity against dermatophytes and the pathogen foodborne bacteria. The results indicated that five derivatives showed excellent activity with two Foodborne pathogenic bacteria.

Acknowledgments

I would like to express my sincere gratitude to my supervisor, Prof. Dr. **Thoraya A. Farghaly** for the continuous support. I would also like to thank **the Department of Chemistry and Research Laboratories Building at the College of Applied Sciences of Umm Al-Qura University** for their assistance in completing this project

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Azole Derivatives Containing Nitrogen and Sulfur: Synthesis, Structure elucidation and antitumor Activity

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Abstract

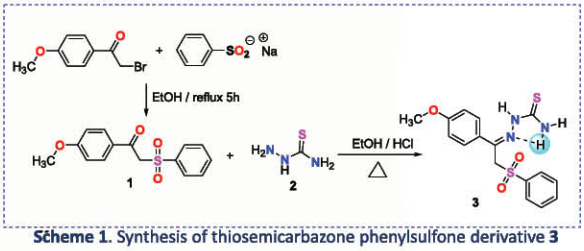
Cancer is one of the main sources of medical anxiety and patient terror, as it is one of the most common causes of death worldwide. Cancer treatment, despite its impressive progress in recent years, faces many problems, including serious side effects that may lead to damage the healthy cells, in addition to the exorbitant prices of these drugs. From these reasons, we interested herein to synthesize a new series of thiazole derivatives carrying 6-methoxyphenylsulfone in their skeleton. The new thiazole derivatives were synthesized from the reaction of thiocarbamide derivatives with α-halo-carbonyl compounds. All spectral data confirmed the proposed structures. The results of anticancer activity against three cell lines indicated that two derivatives have superior activity which more active than doxorubicin, and other compounds are good to moderately active cytotoxic agents. The docking analyses were carried out using Autodock 4.2 and Biovia Discovery Studio 4.5 to dock the target compounds in the CDK_2 enzyme's binding site.

Introduction

Cancer is the leading cause of death globally, with almost 10 million deaths expected by 2020. Breast cancer (2.26 million new cases) was the most prevalent cancer in 2020 [1]. As a result, discovering and developing a drug with novel mechanisms of action has become a major focus for researchers seeking to discover and improve scaffold for potential anticancer effect with higher selectivity and lower toxicity [2]. A variety of drugs based on the heterocyclic framework have been identified and are being tested as chemotherapeutic agents. Many natural products and synthetic medicines contain thiazole derivatives, which have been shown to have important anticancer, anticonvulsant, antimicrobial, antidiabetic, anti-inflammatory, and antioxidant activity [3-5]. Several antitumor drugs and active molecules based on the thiazole scaffold have been discovered [6]. From the above facts, we interested herein to synthesize a novel series of antitumor agents carrying thiazole and phenyl-sulfone in their skeleton.

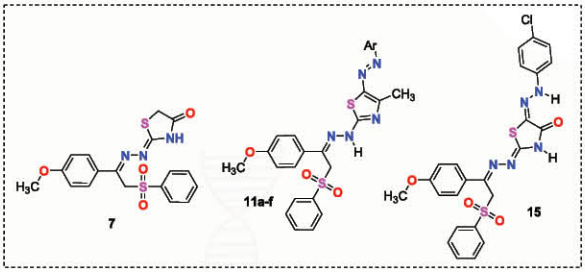
Results and Discussion

The starting thiosemicarbazone derivatives **3** were synthesized from the reaction of thiosemicarbazone **2** with phenylsulfone derivative **1** in ethanol in the presence of HCl as illustrated in Scheme 1.



Scheme 1. Synthesis of thiosemicarbazone phenylsulfone derivative **3**

Thiazole derivatives **7**, **11a-f** and **15** (Scheme 2) were synthesized from the reaction of compound **3** with α-halocarbonyl compounds in dioxane/Et_3N mixture.



Scheme 2. The structure of the new synthesized thiazole derivatives

The structure of all novel derivatives were confirmed based on their spectral data as IR, ^1H NMR, ^{13}C NMR and Mass spectra as for example the Figure 2 for the ^1H NMR of compound **11f.**

Anticancer activity

All synthesized thiazole derivatives were tested for their anticancer activity against three cell lines namely; human prostate carcinoma PC-3, human hepatocellular carcinoma HEPG-2 and breast adenocarcinoma MCF-7 cell lines. Doxorubicin was employed as positive control.

The results indicated that the most potent thiazoles **11b** and **11d** were more active than doxorubicin, and other compounds are good to moderately active cytotoxic agents.

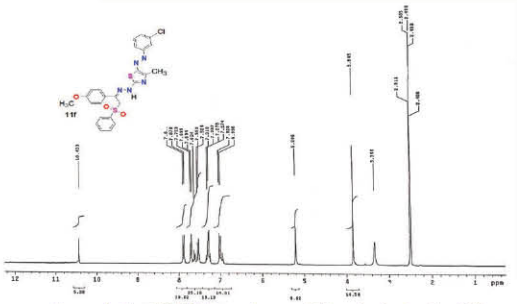


Figure 1. The ^1H NMR spectrum of thiazole derivative **11f**

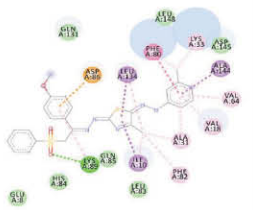


Figure 2. 2D representation of docking of thiazole **11c** against CDK2 enzyme

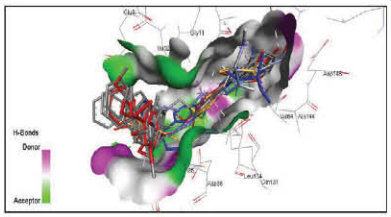


Figure 3. Overlay docking alignment of Roniciclib and all compounds docked into in the active site of CDK_2 kinase (PDB code: 5ive).

Conclusion

A novel series of thiazoles were synthesized, and their antitumor activities were investigated against three human cancer cell lines, PC-3, HEPG-2, and MCF-7. Two compounds (**11b** and **11d**) had significantly more potent antitumor activity than doxorubicin. These results suggest that these thiazole derivatives are promising lead molecules for further development of potent anticancer drugs.

Acknowledgments

My deep gratitude goes first to **Prof. Dr. Thoraya A. Farghaly**, for sharing her great knowledge, her expert guidance and constant encouragement to complete this work during all stages. Further, I would like to thank the **Department of Chemistry and Research Laboratories Building at the College of Applied Sciences of Umm Al-Qura University** for all the assistance and facilities provided in the study and enabled this research to be possible.

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An exhaustive study for designing and synthesizing of novel antibacterial agents based on pyrazole moiety

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Abstract

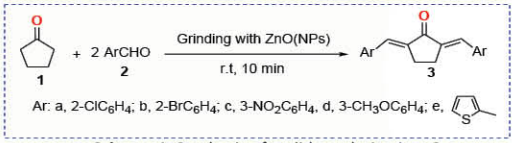
The dry grinding method is one of the green techniques for efficient organic synthesis with numerous advantages, such as: mild reaction conditions, environmental acceptability, simple segregation and refinement as well as the elevated selectivity and efficiency. In addition, organic reactions proceeded on the surface of nano-sized catalysts to speed up the stimulation process. In this context, we synthesized a series of arylidene-cyclopentanones under dry grinding in the presence of ZnO(NPs) within minutes and excellent to good yield. Then, a series of spiro-pyrazole derivatives with different substituents was synthesized *via* cycloaddition reaction of *bis*-arylidene of cyclopentanones and hydrazonoyl chlorides in benzene under reflux. All spectral data confirmed the proposed structures. To examine the efficacy of the synthesized spiro-pyrazoles as anti-bacterial and anti-fungal agents, the molecular docking study was performed using the receptors of (1hn0) and (6y35) the co-crystal structures of proteins for Proteus Vulgaris and Aspergillus Fumigatus, respectively. From the results of this study the antimicrobial activity of spiro-pyrazoles were screened against two species of G+ve bacteria and G-ve bacteria as well as two Fungi strains. Both the molecular docking result combined with the data of antimicrobial activities indicated that all derivatives have excellent to moderate activity with docking score ranging from -6.3421 to -5.5270 kcal/mol (1hn0) and -7.0462 to -6.2965 kcal/mol (6y35).

Introduction

Synthesis of new bioactive heterocyclic compounds in short reaction time with high yield is considered as a target for several pharmaceutical scientists. Thus, organic reactions proceeded on the surface of nano-sized catalysts to speed up the stimulation process [1]. Moreover, the nanoscale catalysts can be easily isolated from the reaction medium and recycled while maintaining their catalytic activity [2]. The heterogeneous-ZnO nano-catalyst can be readily secluded from the organic reaction mixture and reused many times. Due to the unique and new distinctive properties such as reusability, polar surface, ability to produce pure products and non-corrosiveness, these days, ZnO (NPs) are now widely used as a powerful catalyst for many organic reactions to explore their synthetic benefit and preferably in aqueous solvents or under solvents free conditions [3]. Mild states are used with nanoparticle catalysts to prevent their decomposition [4]. On the other side, the grinding method is one of the green techniques for efficient organic synthesis with numerous advantages, such as: mild reaction conditions, environmental acceptability [5], simple segregation and refinement [6], elevated selectivity and efficiency [7]. Spiro-pyrazoles well known with wide range of biological activity as antitumar [8], antimicrobial [9], analgesic agents [10], phosphodiesterase inhibitors [11], aldosterone antagonistic, anabolic, androgenic, anti-inflammatory, progestational and salt-retaining activities [12] (Figure 1).

Results and Discussion

Bis-arylidenecyclopentanone **3a-e** were synthesized with excellent yield under dry grinding using ZnO(NPs) in 10 min. as illustrated in Scheme 1. The size of ZnO(NPs) was confirmed from its XRD analyses (Figure 2)



Scheme 1. Synthesis of arylidene derivatives **3a-e**

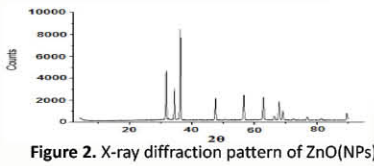
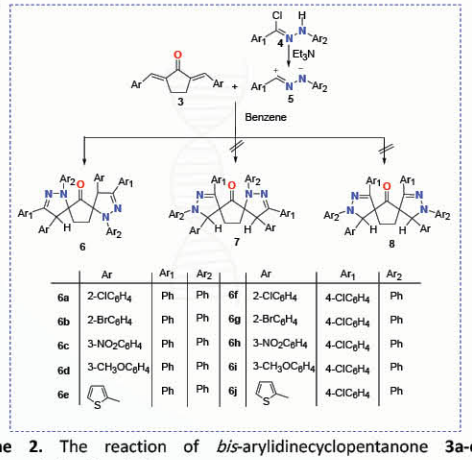


Figure 2. X-ray diffraction pattern of ZnO(NPs)

The formed arylidene derivatives **3** were reacted with hydrazonoyl chlorides **4** to afford the spiropyrazoles **6a-j** (Scheme 2). All spectral data confirmed the proposed structures.



	Ar	Ar1	Ar2		Ar	Ar1	Ar2
6a	2-ClC6H4	Ph	Ph	6f	2-ClC6H4	4-ClC6H4	Ph
6b	2-BrC6H4	Ph	Ph	6g	2-BrC6H4	4-ClC6H4	Ph
6c	3-NO2C6H4	Ph	Ph	6h	3-NO2C6H4	4-ClC6H4	Ph
6d	3-CH3OC6H4	Ph	Ph	6i	3-CH3OC6H4	4-ClC6H4	Ph
6e		Ph	Ph	6j		4-ClC6H4	Ph

Scheme 2. The reaction of *bis*-arylidinecyclopentanone **3a-e** with hydrazonoyl chlorides **4a,b**

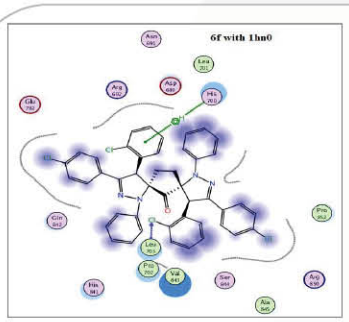


Figure 3. The 2D docked model of compound **6f** into the active site of 1hn0

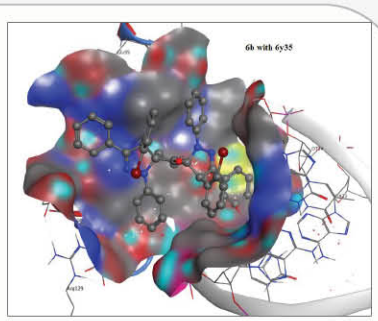


Figure 4. The surface map of compound **6b** into the active site of 6y35

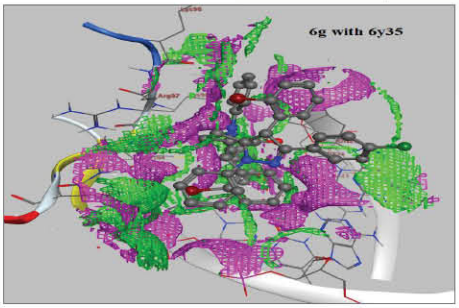


Figure 5. The electrostatic performance of compound **6g** into the active site of 6y35



Conclusion

We have successfully synthesized a series of bis-arylidene derivatives through dry grinding with ZnO(NPs) in 10 min. then using the latter arylidene derivatives to synthesize novel antimicrobial agents of spiro-pyrazole derivatives with different substituents through cycloaddition reaction with hydrazonoyl chlorides in benzene.

Acknowledgments

My sincere thanks to supervisor **Prof. Dr. Thoraya A. Farghaly**, for all her efforts and advice to promote my knowledge and complete this work during all stages.
I also extend my thanks **to the Department of Chemistry and Research Laboratories Building at the College of Applied Sciences of Umm Al-Qura University** for all the assistance and facilities provided to the completion this research work.

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Synthesis of new acetohydrazide complexes for catalytic purposes, characterization, conformation and crystal surface properties

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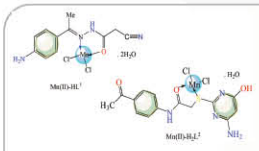
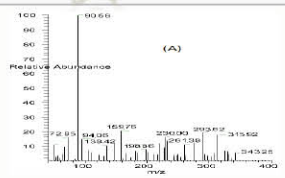
Abstract

Two novel Mn(II) complexes were prepared from new simple ligands. The two complexes were isolated in the form of 1:1 molar ratio *via* coordination mode of neutral bidentate. This formula was suggested based on CHN, mass spectra and EDX analysis. HL^1 ligand coordinated by C=O and C=N groups, while H_2L^2 ligand coordinated by C=O[13] and C-S groups. The tetrahedral geometry was the structural form of two Mn(II) complexes according to electronic transitions assign for $^6A_1g \rightarrow {}^4Eg(4D)$ and $^6A_1g \rightarrow {}^4T_1g(4P)$ transitions. Conductometric titrations were carried out to estimate essential constants for the complex in solution sate. Using DFT/B3LYP method in Gaussian 09 program, we have being optimized the structural forms of the ligands and their complexes. Valence double-zeta polarized basis set (6-31G*) and efficient core potential basis set (SDD) level were the two sets adjusted for optimization of ligands and Mn(II) complexes, respectively.



Structural forms of the two Mn(II) complexes



Mass spectrum of Mn(II)-HL^1

Introduction

There is a growing interest in hydrazide-based compounds and their biological activity-induced coordination compounds [1-3]. Metal complexes have distinctive features that improve their function as therapeutic agents. The ability of metal to form positively charged ions in an aqueous solution is a significant property that conducts for binding with negatively charged biological molecules *via* direct contact [4]. Some of Schiff base complexes have also been used in treatment of iron overload diseases. One application that illustrates the significance of such complexes is their use in the identification and determination of metals and certain organic constituents in pharmaceutical formulations [5-7]. Mononuclear manganese complex that derived from ligand yielded by condensation of 2-hydroxynaphthaldehyde and 2-methoxybenzaldehyde with oxaloyldihydrazide, has been synthesized. The complex suggested to be in a tetrahedral stereochemistry [8]. Schiff base ligand was prepared from 7-chloro-4-quinoline and o-hydroxyacetophenone, which coordinated *via* ONN either as a monobasic bidentate or dibasic tridentate. Such compounds demonstrated elevated antibacterial behaviors [9].

Discussion

The spectrum of Mn(II)-HL^1 complex recorded molecular ion peak at m/z = 343.25, (I= 6%, calcd. 378.11), which assigns for $[(M^+-2H_2O)+1]$ ion. The low intensity of molecular ion peak reflects the stability of the complex. A successive fragmentation process was depicted by various peaks among them the base peak, which displayed at m/z= 90.56 which may assign to $C_6H_5N^+$.

Conclusion

New Mn(II)-complexes were prepared by a simple molar ratio (1M:1L) and by tetrahedral geometry. The two ligand behaved as a neutral bidentate towards the central atom. The molecular and structural formulae of compounds were suggested based on spectral (IR, ^1H NMR, UV-Vis, Mass, XRD, EDX and SEM) and analytical data. Two simple complexes were configured by using Gaussion09 as a standard program to confirm the mode of bonding and the formula of the complexes.

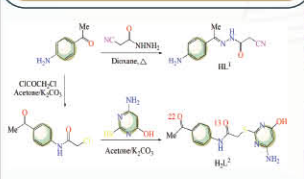
Objective

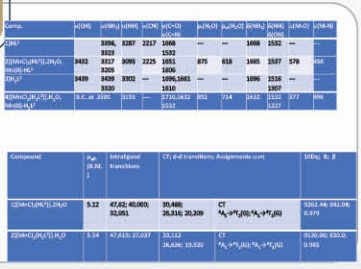
We aimed in this work to synthesize and characterize new organic ligands as (E)-N'-(1-(4-aminophenyl)ethylidene)-2-cyanoacetohydrazide (HL^1) and N-(p-acetyl phenyl)-2-((4-amino-6-hydroxypyrimidin-2-yl)thio)acetamide (H_2L^2). These ligands will be used to synthesize new corresponding Mn(II) complexes. Such new compounds will be characterized by all possible analytical and spectral tools. After that, we choose one complex which has a significant morphology and surface properties to be used as a catalyst in synthesizing essential organic compounds. This aim is based on the history of Mn(II) ion in heterogamous catalysis according to its variable oxidation state which permeate the successful contribution of this element in a catalytic cycle.

Acknowledgments

I gratitude to Umm Al-Qura University .
To my supervisor Prof. Dr. Nashwa El- Metwally, I will remain grateful to you all my life because you contributed to the making of my future, Thank you so much .

Results





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Synthesis and characterization for new hydrazide complexes; the expected perception for these complexes as a drug for diabetes

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Abstract

Two VO(II) complexes have been synthesized from ligands based on cyanoacetohydrazide (H_2L^1 & H_2L^2). Variable analytical and spectral methods have elucidated these complexes as well as their original ligands. IR, ^{1}H NMR, UV-Vis, Mass, EPR, SEM, EDX, XRD and elemental analysis were the practical techniques applied for characterization. Binegative tetradentate mode was suggested within $(VO)_2$-L^1 complex, while neutral tetradentate mode was suggested within $(VO)_2$-H_2L^2 complex.

Introduction

Hydrazones and their complexes have a specific properties that play a significant role in many fields such as pharmaceuticals, enzyme inhibitors, antibacterial, antiviral, antifungal, anti-inflammatory, antioxidant, anti-tuberculosis, anticoagulant, antitumor, anticonvulsant, and antimalarial [1-5]. In analytical chemistry and pharmacology [6,7], they have many significant applications. El-Saied et al., synthesized some recent bivalent complexes from neutral ligand as 2,6-diacetylpyridinemono-(carbohydrazone)[8]. Also, some complexes were synthesized from Schiff base ligand that obtained from 4-formlylantipyrine-N-cyano-acetatehydrazone [9]. In addition, many metal cations which were used as a sensitive complexing agent [10-12] were analyzed using hydrazones. The number of active coordination sites that occur in hydrazones, play an important chelating role in binuclear complexes.

Objective

This research aims to prepare new 2-cyano-N'-(2-cyanoacetyl) acetohydrazide (H_2L^1) and 2-cyano-N-(3,5-dichloropyridin-2-yl)-3-mercapto-3-(phenylamino) -acrylamide(H_2L^2) ligands. These ligands must be elucidated firstly to know their chemical formulae. After that, these two ligands will be used to prepare new VO(II) complexes. These complexes are the target to be used as anti-diabetic agents. This selection is based on the successful role of vanadium in treatment of diabetes. Consequently, these complexes will be firstly characterized to know their molecular and structural formulae. This step was performed by using different tools used for analytical and spectral purposes. We achieved our aim, mostly and we will continue to complete the aim.

Results

Table 1. Analytical properties of the ligands and their VO(II) complexes

Comp. Empirical Formula F.W. Found (Calcd.)	Color	MP (°C)	%Found (Calcd.)					
			C	H	N	S	V	Λ_m*
1) $C_6H_6N_4O_2$, H_2L^1 (166.14)	White	207-208	43.50(43.38)	3.61(3.64)	33.75(33.72)	----	---	--
2) $C_{15}H_{10}Cl_2N_4OS$, H_2L^2 (365.24)	Yellow	178-178	49.14(49.33)	2.70(2.76)	15.45(15.34)		----	--
3) $[(VO)_2L^1].SO_4$. $2H_2O$, $C_6H_{16}N_4O_{14}SV_2$(502.16)	Olive-green	> 300	14.03(14.35)	3.01(3.21)	11.22(11.16)	6.35(6.39)	20.36(20.29)	51.21
4) $[(VO)_2(SO_4)_2\ H_2L^2].2H_2O$, $C_{15}H_{14}Cl_2N_4O_{13}S_3V_2$ (727.27)	Olive-green	> 300	24.59(24.77)	1.77(1.94)	7.48(7.70)	13.31(13.23)	14.12(14.01)	4.76

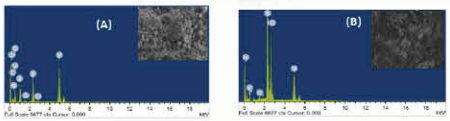

Fig 1. EDX and SEM of $(VO)_2$-L^1 (A) and $(VO)_2$-H_2L^2 (B) complexes

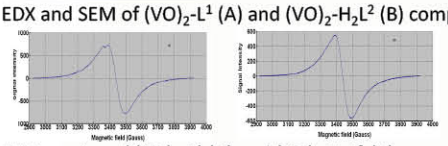

Fig 2. ESR spectra of $(VO)_2$-L^1 (A) and $(VO)_2$-H_2L^2 (B) complexes

Discussion

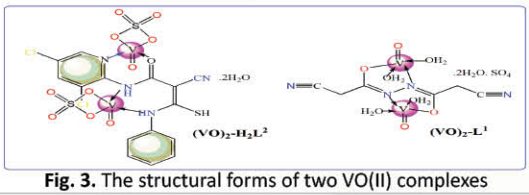

Fig. 3. The structural forms of two VO(II) complexes

Conclusion

Two cyanoacetohydrazide-based ligands (H_2L^1 & H_2L^2) were prepared to be used for synthesizing two corresponding VO(II) complexes. Different techniques which covering analytical and spectral methods were used to characterize all new compounds. Comparative study for IR spectra, the binegative tetradentate mode was suggested within $(VO)_2$-L^1 complex, while a neutral tetradentate mode was suggested within $(VO)_2$-H_2L^2 complex. The two complexes were formed in a square-pyramidal geometry according to VU-Vis spectra as well as EPR spectra. DFT study was implemented under valence double-zeta polarized base set (6-31G*) to optimize their structural forms and extract essential quantum parameters. The exported physical properties indicate the specific characteristics of $(VO)_2$-L^1 complex.

Acknowledgments

I would like to thank my supervisor Prof. Nashwa El-Metwali, the one who support and guide me in this work.

I want to express my gratitude to my family and friends who helped be and encouraged me throughout my life.

Special thanks to all the people who along the way believed in me.

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Synthesis and elucidation for new thiazole complexes, antioxidant assay and detailed computational studies

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Abstract

Two thiazole-based complexes were prepared from Co(II) and Cu(II) ions. The new ligand and its complexes were fully characterized by analytical and spectral techniques. The ligand behaved as a neutral tridentate in its keto-form towards the two central atoms *via* O(8), O(10) and O(18) atoms. This was suggested based on the lower shift of υ(CH=O), $\upsilon(C=O)_{amide}$ and υ(C-O) vibrations. The electronic transitions in Co(II)-HL and Cu(II)-HL complexes displayed *d-d-* transitions belong to $^4T_{1g} \rightarrow {}^4A_{2g}(F)$ & $^4T_{1g}(F) \rightarrow {}^4T_{1g}(P)$ and $^2Eg \rightarrow {}^2T_2g$, in the two complexes, respectively. ESR spectrum of Cu(II)-HL complex displayed g-factor by the following order; $g_{//}(2.1740) > g_{\perp}(2.0935) > 2.0023$, which agrees with octahedral geometry.

Introduction

Owing to their biological properties, heterocyclic compounds are the key structures for the design and synthesis of drugs. One of the most common methods of preparation of heterocyclic compounds [1] is the synthesis of rings by decomposition of suitable linear compounds. Thiazole, due to its numerous medicinal uses, is a strong nucleus. Various biological functions such as antioxidants, analgesics, anti-bacterial, anti-cancer, anti-allergic, anti-hypertensive, anti-inflammatory, anti-malarial, anti-fungicide and anti-psychotic have been demonstrated by thiazoles [2]. The efficacy of pyrazole-based anti-influenza agent was investigated in a promising study of H1V-viral infection treatment [14]. Moreover, herpes simplex viruses (HSV-1) and HIV-1 reverse transcriptase inhibitors were also seen in pyrazole derivatives [3,4]. Synthesis of novel thiazole functionalized as a possible HCV inhibitor was advised by docking using a structurally dependent approach [5]. The value of tri-substituted thiazoles as anti-flavivirus targeting compounds [6,7] was subsequently discussed. Thiazole derivatives have also been identified with antiviral potency against some popular viral diseases.

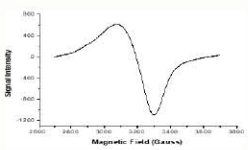
Objective

We intended in this study to synthesize 2-(2-formylphenoxy)-N-(thiazol-2-yl)acetamide ligand to be used for complexation. The step followed the synthesis is the characterization of the compound by all possible techniques which covered analytical and spectral studies. $Co(OAc)_2.4H_2O$ and $CuCl_2.2H_2O$ salts will be used to prepare the complexes. The complexes will be elucidated also by allowed techniques to establish their molecular and structural forms. Also, we intended to make intensive computational studies as a molecular modeling and molecular docking. Molecular modeling will be handled in details to extract essential computational data to confirm the structural forms as well as to predicate significant characteristics. Also, we aimed to execute molecular modeling to evaluate the antioxidant activity of the complexes before the practical examination. This part is still under investigation and we couldn't complete the interpretation of data, but we will complete this part, soon as well as the in-vitro antioxidant activity of the complexes.

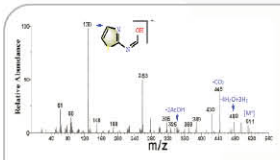
Results



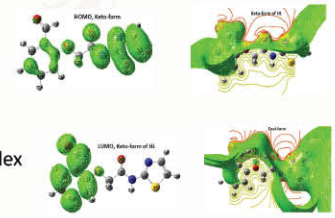
The proposed structures of the complexes



ESR spectrum of Cu(II)-HL complex



Mass spectrum of Co(II)-HL complex



Discussion

Electron paramagnetic resonance is an important tool for further verification of structural forms previously proposed in UV-Vis part. The complex of d^9 system was scanned at υ = 9,435 GHz (DPPH standard, 25°C) . For resolved microstates (ml = 3/2, 1/2, -3/2 &-1/2), four hyperfine splitting lines (S = 1/2, I = 3/2) in the complex were expected, while the lack of resolution caused difficulties in calculations. Hamiltonian g-factor values were calculated and ranked by $g_{//}(2.1740) > g_{\perp}(2.0935) > 2.0023$, which coincides with octahedral geometry that has ground term of ^2A_1g $(d_{X^2-Y^2})$

Conclusion

Thiazole-based ligand was used to synthesize Co(II) and Cu(II) complexes, after isolating the solid products, they were characterized by variable analytical and spectral techniques. The ligand was coordinated in its keto-form *via* tridentate mode of bonding within the octahedral geometry that centered by metal ions. This mode was firstly supported by spectral analysis and finally by the computational data that extract from Gaussian 09 program by applying DFT/B3LYP method under valence double zeta polarized basis set (6-31G*).

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I am very grateful for all the support that Umm Al-Qura University has provided me during my research. I would also like to express my deep gratitude to my supervisor, Prof. Nashwa El-Metwaly for her enthusiastic support, insightful suggestions, and valuable guidance throughout my research. Last but not least, I would like to thank my friends and colleagues who supported me during the development of my research and everyone who helped me even a little.

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Photophysics properties and the effect of inhibit the aggregation of rhodamine 6G containing Cd^{2+}.

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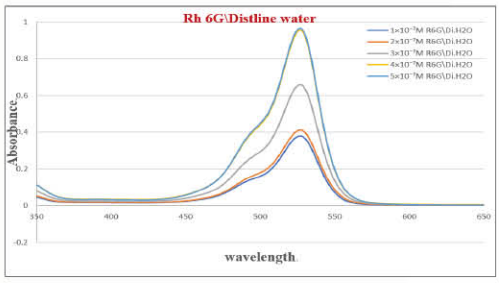
Abstract

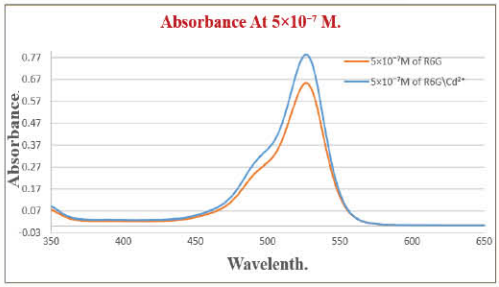
Photochromic materials and fluorescent dyes especially Rhodamine and its derivatives have more attentions in recent years, due to their fascinating spectral properties. In this research the photophysical properties of Rh6G\Cd^{2+} were studied, with a prepare of a new various concentrations of rhodamine 6G solutions in distilled water and by added a various amounts of Cd^{2+}. The cadmium ion induces to form a complexation with Rh6G dye solutions as evidenced by a good absorption spectrum. also, we show increase in the intensity of the absorption spectra as the amount of Cd^{2+} is increased, while the Rh6G concentration is kept constant. In principle, cadmium ion and rhodamine dye show good results with monomer aggregation, this is what became clear to us during the experiments.

Introduction

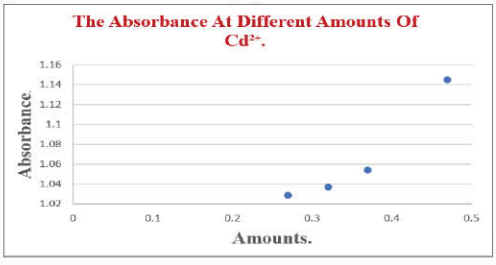
The development of photochromic materials and Fluorescent chemo-sensors have been more attentions in recent years, due to its activity, selectivity and sensitivity in many applications and sciences.
So, there are continuing and evolving needs to detect various types of small molecules at ever lower concentrations. And, Detection of industrial pollutants, explosives material.
In this research it has been chosen fluorescent dyes (rhodamine 6G dye) as our technique of choice to make these measurements, which is one of the best photochromic materials and fluorescent dyes, by virtue of its advantages such as: a good photostability and high yields of fluorescence quantum.
Also, the rhodamine 6G containing transition metal ions exhibit unrivaled OFF–ON fluorescence behavior and intense emission related with the addition of specific ions, existence of these metal ions plays in enhancement the increase lifetime of these complexes and it shows an effect of inhibit the aggregation of the Rh6G.

Result





Solutions.	wavelength nm.	Absorbance
5×10^{-7}M of R6G/ 2% of Cd^{2+}	527	1.029
5×10^{-7}M of R6G/ 3% g of Cd^{2+}	527	1.037
5×10^{-7}M of R6G/ 4% g of Cd^{2+}	527	1.054
5×10^{-7}M of R6G/ 5% g of Cd^{2+}	527	1.145



Objective

The goal of this work is to understand the photophysics properties of Rhodamine 6G\Cd^{2+} that control the aggregation of Rhodamine6G.

Discussion

- There is a direct association between concentration and absorbance, as the absorbance increases with increasing concentration.
- The aggregation process is inhibited at 527 nm, when distilled water is used as a fundamental solvent for Rh6G\Cd^{2+}.
- Whereas Cd^{2+} improves and increases the absorbance for Rh6G solution.
- The higher amount of Cd^{2+}, the higher the absorbance and the smaller the aggregate for Rh6G solutions.

Conclusion

Inclusion of Cd2+ ions into Rhodamine 6G solution has a significant effect on both the photophysics Properties and Structure of Rh6G.The Cadmium ion coordinates some of the Rh6G solution, generating a complex. One outcome of this, is that the presence of the Cadmium ions, even at a low concentration, also has a profound impact on the photophysics of Rhodamine 6G aggregation. When Cd2+ is added to the Rh6G solution it has the effect of suppressing aggregation of the Rh6G, an effect previously observed with Zn2+ ions. The presence of the Cd2+ ions affect the absorption maximum and the wavelength maximum (all at 527 nm) which is a monomer structure. In absorption the cadmium ions, induces increased absorbance as the amount of Cd2+ increases. Further investigation will be required to determine the relative contribution of the different components of the Rh6G/Cd2+ solvent system.

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Development of an HPLC method for determination of caffeine, paracetamol and ascorbic acid in different pharmaceutical formulations

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Abstract

A simple and rapid high-performance liquid chromatography (HPLC) method based on an isocratic mode was developed for the determination caffeine, paracetamol and ascorbic acid concentrations in some common prescription drugs. Both standards and samples solutions were separated using Shodex C8 column (5µm, 150 × 4.6 mm) which was maintained at 40 °C. The mobile phase was methanol and deionised water with 0.1 % formic acid (40:60) with a flow rate of 1.0 mL/min. The retention times of caffeine, paracetamol and ascorbic acid were observed at 2.74, 2.243 and 1.876 min, respectively. The total analysis time was 4 min whereas UV detector was set at 275 nm. The analytical method was validated according to linearity, repeatability and limit of detection for each analyte. The correlation coefficient ranged from 0.9925 to 0.9999. The concentrations of caffeine, paracetamol and ascorbic acid in real samples were 12.13 mg/g, 78.90 mg/g and 15.70 mg/g respectively.

Introduction

Caffeine (1,3,7-trimethylxanthine) as shown in fig. (1) is found naturally in tea, chocolate and coffee and has also been recognized in more than 60 species of plants in the earth. It has been consumed by humans thousands of years ago which goes back to Chinese tea. This compound might not be harmful if it is consumed in moderate quantities. In higher quantities, it may cause toxicity that can lead to death. While the dose of 250 milligrams is shown to give joy and calm, it could cause tension, insomnia and heart palpitations if the dose reaches 500 mg [1].

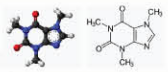


Fig.(1) Caffeine (1,3,7-trimethylxanthine)

The use of paracetamol (N-(4-hydroxyphenyl)ethanamide) (fig. 2), began to expand in 1899 and in the late forties of the nineteenth century, a team of biochemists considered it as a metabolite in human blood. Then, it began to spread and marketed in the United States of America because it turned out to be a safer alternative than aspirin. The first entry to the market of paracetamol was tablets of Panadol (500 mg) and it was sold as a prescription. The side effects of paracetamol are generally considered mild, and because of its safe properties, the use and demand for it has been globally increased. However, it can cause transient liver abnormalities and it can also cause low blood pressure if patients have serious diseases. This occurs due to two deliberate overdoses. This type of diffused drugs can be bought from pharmacies without medical prescriptions, but its usefulness in critical cases is not certain, and there is research based on that [2].

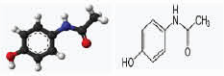


Fig. (2) Paracetamol (N-(4-hydroxyphenyl)ethanamide)

Vitamin C, which is known as ascorbic acid (fig. 3) is an important vitamin for human health through reverse oxidation of ascorbic acid to produce L-dehydroascorbic (DHA), and then it turns into acetic acid in the human body. To know the activity of vitamin C, ascorbic acid and acetic acid must be identified in vegetables and fruits. This vitamin is an antioxidant, and it is soluble in water and works to reduce blood pressure and cholesterol level. The best sources of vitamin C are citrus fruits and juices [3].

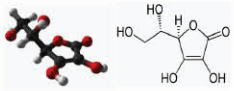


Fig. (3) Structure of ascorbic acid

Methods

The optimized analytical method

HPLC methods by Imma Ferrer and E. Michael Thurman [4] and Althakafy, J. T. et al. [5] were used with some modifications (first analytical method) in order to separate the three compounds but it did not work very well for these specific compounds due to the nature and structure of these different analytes. However, a simple HPLC by Pokhrel, P. et al. [6] was applied with some modifications (second analytical method) which leads to a developed method that can elute these analytes in less than 4 min with an acceptable peak shape.



Fig. (4) HPLC system

The first analytical method:

C18 column (Restek Roc C18, 5 µm, 4.6 × 250 mm), and mobile phase consists of acetonitrile (A) and deionised water with 0.1% acetic acid (B) were used. The gradient elute mode was started by using 90% of B for 2 min, then B content was decreased to 50% at 5 min. After that, 30% of B was reached at 9 min. Finally, 0% of B was achieved at 11 min and held for 1 min before returning to 90% B at 12 min. The flow rate was 1.0 mL/min, and the total analysis time was 12 minutes. The injection volume was 20 µl and the used wavelength ranged from 190 to 272 nm using photodiode array (PDA) detector.

The second analytical method:

C8 column (Shodex 5C8-4D, 5 µm, 4.6 × 150 mm) and mobile phase consisting of 40% methanol (A) and deionised water with 0.1% formic acid 60% (B) were applied. The flow rate was 1.0 mL/min and the total analysis time was 4 min. The injection volume was 20 µl and the oven temperature for the column was 40 °C. The used wavelength for the three analytes was 275 nm.

Results And Discussion

The first analytical method:

When first method was conducted, standard solutions of caffeine, paracetamol and mixture of both were prepared. If each analyte was individually analysed, it would appear at retention time of 5.024 min (fig. 5) for caffeine, and 5.042 min (fig. 6) for paracetamol. If a mixture of both was analysed, one peak showed coelution between the two drugs at retention time of 5.047 min (fig. 7) would be observed. This method did not work very well to separate both of compounds.

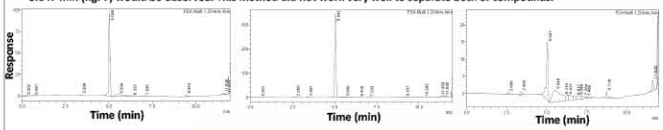


Fig. (5) Caffeine (100 ppm) Fig. (6) Paracetamol (100 ppm) Fig. (7) Mixture of both (100 ppm)

The second analytical method :

The second method was initially developed for the analysis of two compounds caffeine and paracetamol, but it showed an acceptable separation for three compounds including ascorbic acid. If each analyte was individually analysed, it would appear at retention time of 2.733 min (fig. 8) for caffeine, 2.289 min (fig. 9) for paracetamol and 1.869 min (fig. 10) for ascorbic acid. If a mixture of three analytes was analysed, it would clearly separate all of them (fig. 11). After that, real samples (Panadol Extra and Vitamic C) were prepared and analysed as an application for this analytical method (fig. 12). The concentrations of caffeine, paracetamol and ascorbic acid in real samples were 12.13 mg/g, 78.90 mg/g and 15.70 mg/g respectively. Fig. 13 shows calibration curves of all three compounds.

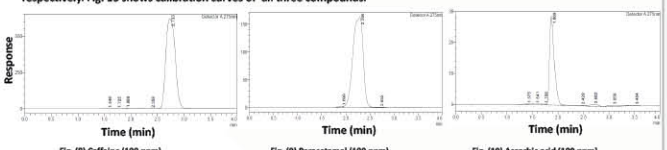


Fig. (8) Caffeine (100 ppm) Fig. (9) Paracetamol (100 ppm) Fig. (10) Ascorbic acid (100 ppm)

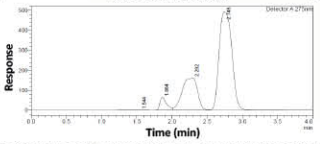
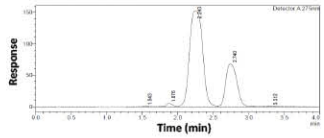


Fig. (11) Mixture of standard solution (caffeine, paracetamol and ascorbic acid - 100ppm)



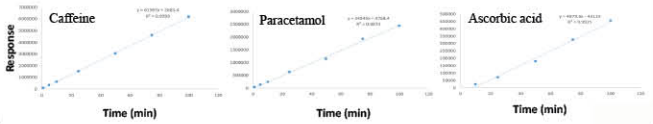


Fig. (13) Calibration curves of caffeine, paracetamol and ascorbic acid

Conclusion

In this project, the concentrations of caffeine, paracetamol and ascorbic acid in real drug samples were measured by a developed and validated HPLC method. The total analysis time is quite short, which allows rapid analysis of many samples. The lowest concentration that can be detected using this method was 0.5 ppm, which can be very useful tool for the analysis of analytes at trace levels. Moreover, this developed analytical method can also be used to separate the three compounds in different matrices such as environmental samples.

Acknowledgments

By presenting this research project to obtain a master's degree in chemistry, I would like to extend my thanks to my supervisor Dr. Jalal Althakafy for all the support and guidance he has given to me. I would also like to thank the Department of Chemistry for giving me the opportunity to acquire new skills and for their efforts in supporting my research project and continuing the educational process despite the difficulties caused by COVID-19.

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Studies on the determination of vitamin C

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1. Abstract

Vitamin C, also known as L-Ascorbic acid is an important water-soluble vitamin, and it can be obtained from an abundant natural source such as vegetables and fruits , The titration was based on the oxidation-reduction reaction. And good results were shown, as five of the fruits were analysed, and the results were as follows orange (5.8mg/10g), strawberry (2.9mg/10g), mandarin (3.2mg/10g), grapefruit (3.4mg/10g) and lemon (5.04mg/10g) , As this method was quick and somewhat good, and thus it could be adopted in measuring ascorbic acid in fruits and vegetables, but some defects were found at the end point of the reaction and the colours of the samples overlapped with it. The second method was the spectroscopic method, the results of which were not somewhat good, and I think that is because ascorbic acid was not extracted in fruits first, as this method is considered important for measuring ascorbic acid .ascorbic acid was supposed to be extracted and then measured, but unfortunately the chemicals were not available to us , The results were somewhat far from the amount of ascorbic acid It was orange(7.7mg/100g), grapefruit(6.8mg/100g), mandarin (1.9mg/100g) and Strawberry (11.7mg/100g) , The method of analysis used was as follows , column: 5C8-4D packed column , (A) The mobile phase consisted of methanol 40% , (B) The mobile phase is distilled water with 0.1% formic acid , flow rate: 1 mL·min−1, total run time: 4min, injection volume: 20 µL , ascorbic acid was detected at 275 nm , the temperature of the oven was 40 ℃ the detector LC-2030 UV detector ,the results were good for standard ascorbic acid, but unfortunately there was no suitable method for extracting ascorbic acid from fruits, hence the work could not be completed.

2. Introduction

Vitamins are important for human body as they are beneficial for the growth and maintaining good health. They can be obtained by the consumption of vegetables and fruits. Many vitamins have different sources and functionality for the human body [1].
Vitamins are rather specific in their function therefore they are required minimally in our diet. Most of the vitamins are acquired from metabolic activation of the food. Although Vitamins have the same general characteristic (categorized as empirical), they in fact have few chemical and functional similarities as some of them function as cofactors, all cofactors are vitamins but not all vitamins are cofactors. and some function as antioxidants, others as hormones, etc. In this report, the attention is paid to the study of different approaches towards determining vitamin C in some fruits [2].
Vitamin C, also known as L-Ascorbic acid, as shown in Fig 1, is an important water-soluble vitamin that is not stored by the body, and it can be obtained from natural sources like vegetables and fruits; however, it can be obtained via the consumption of mineral nutrition products. The recommended daily dose for vitamin C for a healthy adult is 45 mg. Also, it acts as an important antioxidant in the body and its reduced is responsible for several bodily functions, such as assisting in the response of essential enzymes and redox reactions [2].

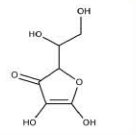


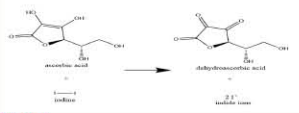
Fig 1: L-Ascorbic acid

The spread of coronavirus disease (COVID-19) as infections have exceeded the barrier of 140 million around the world. This virus is considered to be an acute respiratory infection because it can cause failure of the human respiratory system. Vitamin C plays an important role in mitigating the effect of COVID-19 on the body, especially when the risk is moderate. A simple dose of intravenous ascorbic acid is used, and in some difficult cases, the dose of intravenous ascorbic acid is increased. Some results have shown improvement in human health when taking it. As the vitamin C is available and affordable, it is inexpensive and safe to use [3].

3. Methods

Three methods were used to analyze ascorbic acid (A.A.) in several fruits, which are orange, grapefruit, strawberry, tangerine and lemon.

First: Titrimetric method.
In this experiment fruits were each cut into small pieces and weighed, then they were placed in a mixer, after that they were filtered with a piece of cloth and a metal sieve was employed to keep away the fruit fibers and to complete the filtration step. A.A. was determined by oxidation-reduction titration in which 0.5 M iodine is used to titrate A.A. solution in the presence of 0.5% starch as an indicator. The iodine would oxidize A.A. to dehydroascorbic acid (HAA) as shown below in the scheme 1 .



Second: Spectrophotometric method.
Fruits were cleaned, weighed, cut, blended and filtered using a cloth and a metal sieve. The filtrate were centrifuged for 10 min. Then, 1 mL of the centrifuged sample was mixed with 2 mL of ethanol and centrifuged again for 10 min . Finally, the centrifuged sample was diluted with 30 mL distilled water. The latter solution was placed in a cuvette for absorption measurement. The procedure was applied on standard ascorbic acid as well as real fruit samples. The relationship between different A.A. concentrations, between 100 – 800 ppm. As shown in fig 2.

Third: Chromatographic method.
-Column : 5C8-4D packed column ,
-Mobile phase :
(A) methanol 40% .
(B) distilled water with 0.1% formic acid 60%
-Flow rate : 1 mL/min
-Total run time : 4 min
-Injection volume: 20 µL
-Detector : LC-2030 UV detector
-Oven :temperature was 40 ℃

4. Results And Discussion

1. Determination of vitamin C by titration :
The results were good compared to the quantities of ascorbic acid in the fruits that were analysed. The preparation of the fruit samples should be fast in order not to keep A.A. away from the oxidation factors, present in the air, and to preserve it from contamination inside the laboratory, and a change in colour was found due to not diluting the fruits, as shown in Fig 2. It was found that the concentration of ascorbic acid in orange (5.8mg/10g), strawberry (2.9mg/10g), mandarin (3.2mg/10g), grapefruit (3.4mg/10g) and lemon (5.04mg/10g).



Fig 2: (1) grapefruit before and after titration (2) orange before and after titration (3) strawberry before and after titration.

2. Determination of vitamin C by spectrophotometric :
The results showed that the amount of ascorbic acid varies in the fruits; it was rather small for mandarin and highly different in strawberry samples. It was 7.7 mg/100g in orange, 6.8 mg/100g in grapefruit, 1.9 mg/100g in mandarin and 11.7 mg/100g in strawberry. We expect that if ascorbic acid was extracted [4] at the beginning and then a measurement was taken for it, good results would appear, but the materials were not available to us and try to extract ascorbic acid first and then measure it by spectroscopic methods.

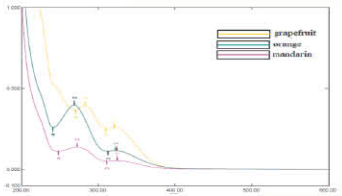
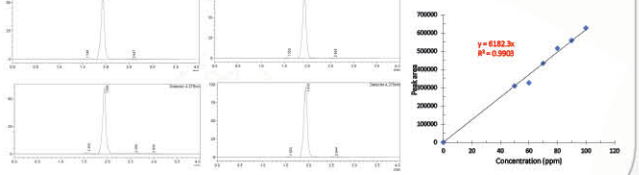


Table 1: The calculated amount of ascorbic acid that presented in different fruits with a literature comparison.

Samples	Absorption at 264 nm (a.u.)	Concentration of ascorbic acid (ppm)	Amount of ascorbic acid (mg/100g)	Literature data (mg /10g)
Orange	0.387	773.93	7.7	4.337 [34]
Grapefruit	0.374	685.60	6.8	4.49 [34]
Mandarin	0.130	197.60	1.9	2.808 [34]
Strawberry	0.618	1173.60	11.7	51.74 [35]

Fig 3: The absorption spectra of grapefruit , orange and mandarin.

3. Determination of vitamin C by HPLC :
An HPLC was used to measure ascorbic acid in fruits, but the materials and chemicals were not available to us to extract ascorbic acid, so an analysis was performed only on standard AA with several concentrations of 50, 60, 70 , 80 , 90 and 100 ppm.



5. Conclusion

The titration was based on the oxidation-reduction reaction. Good results were shown as five of the fruits were analyzed, and the results were 5.8 mg/10g in orange, 2.9 mg/10g in strawberry, 3.2 mg/10g in mandarin, 3.4 mg/10g in grapefruit and 5.04 mg/10g in lemon. As this method was quick and somewhat good, and thus it could be adopted in measuring ascorbic acid in fruits and vegetables, but some defects were found especially the end point of the reaction and the colours of the samples overlapped with each other.The second method was the spectroscopic method, the results of which were not somewhat good, and I think that is because ascorbic acid was not extracted in appropriate way from the fruits first, as this method is considered important for measuring ascorbic acid. Ascorbic acid was supposed to be extracted and then measured, but unfortunately the chemicals were not available to us , The results were somewhat far from the amount that were reported in the literature. The concentration of ascorbic acid was 7.7 mg/100g in orange, 6.8 mg/100g in grapefruit, 1.9 mg/100g in mandarin and 11.7 mg/100g in strawberry. The third method, HPLC, showed good results with standard ascorbic acid, but fruit samples were not entered on it, due to the lack of materials and methods to extract ascorbic acid first and then estimate it.

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7. Acknowledgments

By submitting this report, I will take this opportunity to show my respect and gratitude to my Supervisor, Dr. Hussain Alessa, for all his support and guidance. Also, I would like to thank the chemistry department for giving me the opportunity to acquire new learning skills and for their efforts in supporting the project and continuing the educational process despite the difficulties caused by the corona virus; COVID- 19.



مشاريع تخرج

قسم الفيزياء

كلمة رئيس قسم الفيـزياء

الحمد لله رب العالمين والصلاة والسلام على أشرف الأنبياء والمرسلين سيدنا ونبينا محمد صلى الله عليه وسلم وبـعد..

لقد تبوأ علم الفيزياء مكانة مميـزة ورائدة بين سائر العلوم، حيث يؤدي دوراً أساسياً في حياة البشر وشؤونهم، ويلعب دوراً رئيساً في تطور بقية العلوم. ان علم الفيزياء هو القاعدة الأساسية لمختلف العلوم فهو يقدم التفاصيل العميقة لفهم الأشياء من حولنا بدءاً بالجسيمات الأولية والنواة والذرة والحاسب فائق السرعة، والكواكب، والنجوم، والمجرات.

وقد كانت عناية القسم بالمشاريع البحثية كبيرة جدا حيث إن تطوير مهارات الطلاب البحثية والتقنية أحد أهم أولوية القسم. أن اتقان الطالب للمهارات البحثية والتقنية سوف يسهم في زيادة فرص عمل الخرجين في سوق العمل الأكاديمي أو الصناعي المحلي والعالمي. وكقسم طموح، نحن في طريقنا لتطوير مهارات الطلاب للمنافسة في سوق العمل، وإننا نسير بخطوات كبيرة نحو تحقيق هذا الهدف حيث تنوعت مشاريع التخرج بين النظرية والعملية والطبية لتغطي الاتجاهات العلمية المختلفة لقسم الفيزياء.

د. عمر بن حماد السالمي

كلمة وكيلة رئيس قسم الفيزياء

الحمد لله رب العالمين والصلاة والسلام على أشرف الأنبياء والمرسلين سيدنا ونبينا محمد صلى الله عليه وسلم وبـعد..

يسعى قسم الفيزياء ممثل في شطر الطالبات الى دعم البحث العلمي وتنمية مهارات البحث والاستكشاف عند الطالبات في سبيل الارتقاء بالمستوى العلمي والنشر المتميز في مختلف المجالات العلمية كما ونوعا وذلك تحقيقا لرسالة الجامعة في إنتاج بحوث إبداعية تخدم المجتمع وتسهم في بناء اقتصاد المعرفة.

ومن هذا المنطلق وبتوفيق من الله ثم بدعم المشرفين على مشاريع التخرج استطاع الطالبات تحقيق الهدف المنشود وكانت المواضيع البحثية متنوعة في مجالات فيزيائية مختلفة طبية ونظرية ومواكبة للمواضيع البحثية الحديثة.

د. غادة بنت عبدالرحمن الزايدي

قسم الفيزياء	العـــدد
عدد الملصقات العلمية (طلاب)	2
عدد الملصقات العلمية (طالبات)	15
عدد الطلاب	4
عدد الطالبات	15
عدد المشرفين	6
عدد المشرفات	3

Posters

الملصقات العلمية

لمشاريع التخرج

قسم الفيزياء

بكالوريوس

X-Ray Attenuation Effectiveness of Bi/PMMA and Bi/PMMA -TiO_2/PMMA Nanocomposites

By

Huda Obaid Albakri

Main Supervisor
Dr. Omemh Bawazeer

Co-Supervisor
Dr. Abdul-Wali Ajlouni

Abstract

- This research work aimed to investigate the attenuation yields for different concentrations and arrangements of the nanocomposite films of Bi/PMMA and Bi/PMMA -TiO_2/PMMA versus X-ray tube voltage between 20 to 120 kVp, to be effective as a shielding material.
- An experimental study involving synthesize of different concentrations, different thicknesses, and different arrangements of single layer of Bi/PMMA, and bilayer of TiO_2/PMMA-Bi/PMMA nanocomposite, and then to investigate the attenuation ratios of them.
- The attenuation ratios increase with increasing of Bi and TiO_2 content in the nanocomposite.
- The attenuation ratios for different concentrations and arrangements of nanocomposite films of Bi/PMMA and Bi/PMMA-TiO_2/PMMA has proven to be effective as a shielding material mainly in the range 20-40 kVp which is used in mammography and dental X-ray.

Introduction

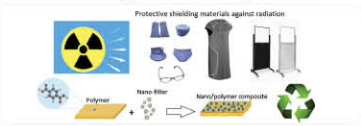
Lead Aprons

- Lead aprons are made of lead sheets inserted into a textile-based apparel structure. Commercially available lead aprons in clinical either 0.5-mm or 0.35-mm lead. Protective shields may have different shapes, including a one-piece, full-body apron; a jacket; or a skirt.
- The lead aprons are effective shields against ionizing radiation due to high ability of lead to attenuate X and gamma-rays.
- Many problems were reported on using lead apron in clinical applications, include toxicity of lead, pain, and defects.
- As a result, of the above-mentioned problems, connected to both lead and lead-free aprons, the door is open to introduce new technical approaches to reduce the risks associated with lead aprons, and enhance the protection of lead-free aprons.
- One of the most promising materials to be used in this field is **the nanomaterials** and **the nanocomposites**, which have the advantages of proper interaction with ionizing radiation, light weight and proper mechanical properties when used with the proper polymer as nanocomposites, these properties that make it an effective radiation shielding.



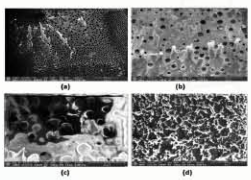
Objective

Study and Evaluate the X-ray Attenuation ratios with different concentrations, different thicknesses, and different arrangements of single layer of Bi/PMMA, and bilayer of Bi/PMMA-TiO2/PMMA nanocomposites, in the X-ray beam voltages 20 – 120 kVp.



Results

(1) Results of Characterization of nanocomposite films using SEM



The mixtures of PMMA with Bi NPs, and PMMA with TiO_2 NPs are homogeneously spread, i.e., all NPs are distributed uniformly inside the PMMA matrices. Fig.1 Show different arrangements, and NP concentrations of single layer nanocomposites films of Bi/PMMA and bilayer nanocomposites films of TiO2/PMMA- Bi/PMMA. The images show a unform distribution of NPs.

(2) X-Ray Attenuation Effectiveness of Nanocomposite Films

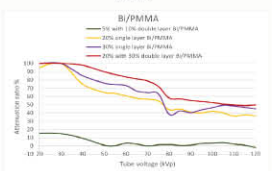


Fig.2: The attenuation ratios of Bi/PMMA nanocomposite versus different energies of X-ray.

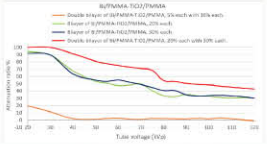


Fig.3:The attenuation ratios of Bi/PMMA-TiO_2/PMMA nanocomposite versus different energies of X-ray.

Discussion

- The attenuation ratio increases with the increasing of Bi content, which agrees completely with the physical principles of interaction of ionizing radiation with matter, which assumes increase of absorption of X-Ray photons with increasing the density of the absorbing material. Increasing the nanomaterial content is equivalent to increasing the density.
- The highest attenuation ratio achieved for all types of nanocomposite films was corresponding to voltages below 40 kVp, which represent the total absorption of X-ray photons due to photoelectric absorption. This is because in this region of energy range the photoelectric effect is the dominates interaction at lower energies. During this interaction, a photon is completely absorbed by the atoms of the material. As the study that done by Nambiar et al. [58] by utilized bismuth oxide with different polymer.
- The minimum achieved attenuation ratios were in the range 80 – 120 kVp, i.e., the attenuation ratios decrease due to dominance of Compton scattering increases and hence the interaction is weakly dependent on the energy of the photon.

Conclusion

1. The attenuation ratios increase with increasing of Bi and TiO_2 content in the nanocomposite and vice versa.
2. The highest attenuation ratio of 100% at 20-30 kVp is corresponding to the double layer film of Bi/PMMA with concentrations 20% with 30%, which decreased to 50% at 120 kVp.
3. For the whole investigated kVp range, the least attenuation ratios achieved, for all samples, were around 120 kVp.
4. The highest attenuation ratio of 100% at 20-30 kVp is corresponding to the double bilayer film of Bi/PMMA-TiO_2/PMMA with concentrations 20% each of them with 30% each of them, which decreased to 42% at 120 kVp.
5. The attenuation ratios for different concentrations and arrangements of nanocomposite films of Bi/PMMA and Bi/PMMA-TiO_2/PMMA has proven to be effective as a shielding material mainly in the range 20-40 kVp which is used in mammography and dental X-ray.

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Assessment and Optimization of Pediatric Radiation Doses and Associated Risk in Brain CT Procedures

By
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Supervised By
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Abstract

This study aims to assess radiation doses and associated cancer and genetic risks received by pediatric patients in CT brain procedures. The three radiological quantities $CTDI_{vol}$, DLP, and ED values are assessed, and the LDRLs for CT procedures, using data retrieved from data of 353 children aged between of 0-15 y aged pediatric patients related to pediatric patients and trials using 10-cm phantoms are suggested. Built on 75 percent of the medians' distribution of the $CTDI_{vol}$, and DLP values, weight assemblage LDRLs values range from 12.29 to 28.72 and from 173.32 to 565.38, respectively.

Age assemblage LDRLs values range from 11.76 to 25.07 and from147.04 to 479.23, respectively. A novel correction on measured effective dose, ED, for pediatric patients has been suggested to achieve a real estimation of the ED received by pediatric patients in CT brain scanning. The scale 10-11 cm should be adopted nationally and internationally for the group age 0-1y. In addition, cancer risk assessment and heredity risk assessment were evaluated. These results represent a very important additional information for optimizing CT procedures, and reducing radiation doses received by the pediatric patients who are highly sensitive to radiation doses. LDRLs were estimated based on age and weight.

Introduction

To date, few studies conducted in Saudi Arabia to estimate the effective dose received by pediatrics in Computed Tomography procedure. Also, adult National DRL's were established, but neither National DRL's nor Local DRL's were established for the pediatric patient.

Compared to adults, children are at a greater risk for developing radiation -associated cancer for several reasons:

1. First, developing and rapidly dividing cells and growing tissues and organs are more sensitive to radiation effects than those that are fully mature.
2. Second, children have a longer life during which radiation-related cancers may evolve.
3. Third, CT scans often were performed not taking into account the smaller size of children.

Objective

This study aims to radiation doses received by pediatric patients in CT brain procedures and to achieve an optimized patient dose to reduce associated cancer and genetic risks.

Results

1. The mean of $CTDI_{vol}$, DLP, and ED of the brain examinations, different four age groups.

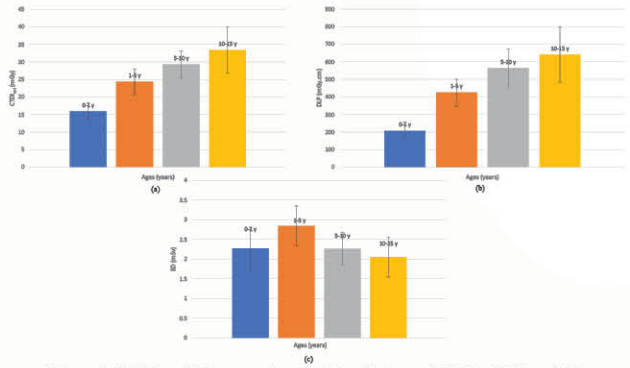

Figure 1. (a), (b), and (c) represents patient dose in terms of $CTDI_{vol}$, DLP, and ED, respectively.

2. Establishment LDRLs

Table 1. Age assemblage LDRLs value corresponding to 50% and 75% of the medians' distribution of the $CTDI_{vol}$ and DLP values.

Age, years	0-1	1-5	5-10	10-15
Median of $CTDI_{vol}$	15.68	24.54	29.62	33.42
50%	7.84	12.27	14.81	16.71
75%	11.76	18.41	22.22	25.07
Median of DLP	196.05	436.84	553.03	638.97
50%	98.03	218.42	276.52	319.485
75%	147.04	327.63	414.77	479.23

Table 2. Weight assemblage LDRLs value corresponding to 50% and 75% of the medians' distribution of the $CTDI_{vol}$ and DLP values.

	(1-10) kg	(10-30) kg	(30 -50) kg	(50-70) kg
Median of $CTDI_{vol}$	16.38	27.74	33.78	38.29
50%	8.19	13.87	16.89	19.15
75%	12.29	20.81	25.34	28.72
Median of DLP	231.09	499.21	636.75	753.84
50%	115.55	249.61	318.38	376.92
75%	173.32	374.41	477.56	565.38

Discussion

A novel correction on measured effective dose, ED, for pediatric patients has been suggested to achieve an actual estimation of the ED received by pediatric patients in CT brain scanning. The international head scale of pediatrics is 10 – 11 cm, the difference between the adopted scale, 16 cm, and the real scale, 10-11 cm, leads to the following:

1. The cross-sectional area of the head of the pediatric is 201 cm^2 for the 16 cm phantom.
2. The cross-sectional area of the pediatric head is 95 cm2 for the real head of 11 cm.
3. A correction of the tabulated k values should be done by equation, i.e.,

$$k(real, 10\ cm) = k\ (16\ cm\ phantom) \times CF$$

4. Where CF is the correction factor between the cross-sectional area 16 cm phantom and the accurate cross-sectional area for different ages, as presented in equation :

$$CF = \frac{\text{the actual cross sectional area for specific age}}{\text{the cross sectional area for 16 cm phantom 201 cm}^2}$$

Conclusion

1. $CTDI_{vol}$, DLP, and ED values are determined.
2. The cancer and heredity risk assessment were evaluated.
3. These results represent a very important additional information for optimizing CT procedures, and reducing radiation doses received by the pediatric patients who are highly sensitive to radiation doses.
4. A novel correction on measured effective dose, ED, for pediatric patients has been suggested.
5. The DRL for CT procedures, using data retrieved from real cases related to pediatric patients and trials using 10-cm phantoms are suggested.

Acknowledgments

Honestly, this acknowledgment cannot go without thanking my supervisors Dr. Abdul-Wali Ajlouni, Dr. Omemh Bawazeer, and Dr. Nassim Assiri, for helping me in developing my technical skills, their works of proofreading and the shared intellectual support, their continuous assistance, suggestions, and recommendations that contributed to the making of this study. I also bear feelings of appreciation to all my study team Marwan Alhazmi, Taghreed Mohammed, Abdulrahman Alsaab, Hassan Jeddawi, and all the people who, in one way or another, have contributed in their efforts and support to make this possible and successful.

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Attenuation Properties of TiO_2/PMMA and Bi/PMMA Nanocomposite corresponding to X-Ray Beams 20 – 120 kVp

BY

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Co-Supervisor: Dr. Omemh Bawazeer

Abstract

In order to replace lead aprons which shows many health risks include toxicity, heavy weight, and cracks. This motivates us to study attenuation effects of some nanocomposites with a final aim to develop a new forms of practical shielding materials, depending on these promising materials to overcome the undesirable properties in lead aprons, and provide proper or better shielding properties against ionizing radiation. An experimental study involving synthesize of different concentrations, different thicknesses, and different arrangements of single layer and bilayer of TiO2/PMMA, and TiO2/PMMA - Bi/PMMA nanocomposite .Results show the attenuation ratios increase with the increasing of NP content, and a 100% attenuation ratios has been achieved at 20-40 kVp X-Ray beams. Based on this result we suggest to expansion the theoretical and experimental research in nanoscience

Introduction

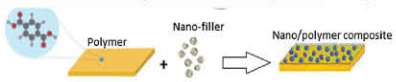
Lead is assumed the best shielding material against gamma ray, but many issues with lead arises, made a need to look for other materials. Introducing new friendly environmental materials becomes an interesting research area.



Nanostructured materials have shown attractive properties for radiological protection applications, particularly as lighter and lead-free aprons for individual protection. Many publications considered using polymeric nanocomposites, i.e., nanoparticles and nanostructures embedded in a polymeric matrix, for shielding purposes against X-rays and g-rays. However, there still a need to evaluate the applicability of polymeric nanocomposites as radiological shielding purposes, to investigate if these nanocomposites attenuate the X-ray and g-rays beams in the same performance as the conventional materials, with other improved specifications as light weight, and low price.

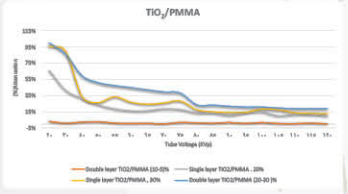
Objective

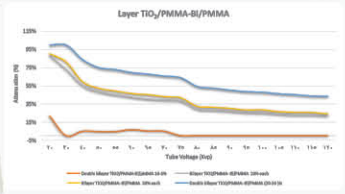
Investigate the attenuation ratios achieved by using different concentrations, different thicknesses, and different arrangements of single layer and bilayer of TiO_2/PMMA, and TiO_2/PMMA - Bi/PMMA nanocomposite, in the X-ray beam voltages 20 – 120 kVp.

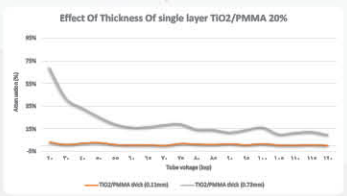


Results

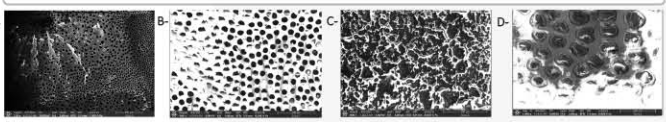
- The attenuation ratios of nanocomposite films of TiO_2/PMMA ,for the double-layer of with TiO_2 concentration 20% with 30%, the attenuation ratio was 100% around 20 kVp. The lowest achieved attenuation ratio was 0 % at 120 kVp, for the double-layer of TiO_2/PMMA nanocomposite with TiO_2 concentration 5% with 10%.
- The attenuation ratios of bilayer and double bilayer of the nanocomposite films of Bi/PMMA-TiO_2/PMMA , the highest attenuation ratio of 100% at 20-30 kVp is corresponding to the double bilayer film with concentrations 20% each of them with 30% each of them, which decreased to 43% at 120 kVp , the least attenuation ratios achieved, for all samples, were around 120 KVp.
- the effect of thickness of nanocomposite films of TiO2/PMMA on the attenuation ratios with TiO2 concentration 20%. The 0.11 mm thickness shows no attenuation for 20 – 120 kVp range, the 0.73 mm shows about 70% attenuation ratios at 20 kVp, and about 15 – 20 % attenuation ratios for 55 – 120 kVp range.







- SEM images show a uniform distribution of NPs.



SEM images A) bilayer of TiO2/PMMA and Bi/PMMA 30% concentration, from Bi side B)single layer TiO_2 30% concentration C) single layer of TiO_2 20% concentration D) bilayer of TiO_2/PMMA and Bi/PMMA 20% concentration, from TiO_2 side

Discussion

- The over-all behaviour of changes in the attenuation ratio with increasing the X-ray tube voltage is almost like all behaviours of all known shielding materials
- The attenuation ratios are increasing with the increase in the concentrations of Bi and TiO2, and vice versa.
- A strange behaviour seen in the range 20 – 40 kVp, the attenuation ratio of the concentration 30% of single layer nanocomposite film of TiO2/PMMA is higher than the attenuation ratio of the bilayer nanocomposite film of TiO2/PMMA - Bi/PMMA with concentration 30% each. This could be attributed to dominance of photoelectric absorption in the X-ray photon low energy ranges 20 – 40 keV.
- The attenuation in the range 80 – 120 kVp is the least and seems as a straight line parallel to the x-axis, i.e., the attenuation of all samples decreases since this interaction is weakly dependent on the energy of the photon. This behaviour is attributed to the increased probability of Compton scattering with increasing photon energy, and hence the weak attenuation by the material.

Conclusion

The attenuation ratios of nanocomposite films of TiO_2/PMMA has introduced a new promising application of low Z materials as a proper shielding material for the 20-40 kVp X-rays used in mammography and dental X-ray. Addition of Bi/PMMA gives a good enhancement in attenuation properties of the nanocomposite films of TiO_2/PMMA as a shielding material. A strange behavior seen in the range 20 – 40 kVp, the attenuation ratio of the concentration 30% of single layer nanocomposite film of TiO2/PMMA is higher than the attenuation ratio of the bilayer nanocomposite film of TiO2/PMMA - Bi/PMMA with concentration 30% each. This could be attributed to dominance of photoelectric absorption in the X-ray photon low energy ranges 20 – 40 keV.

Acknowledgments

My deepest gratitude goes to my supervisor Dr. Abdul-Wali Ajlouni for his guidance and his support throughout this study, and especially for his confidence in me. I would like to sincerely thank Dr Omemah Bawazeer , whose has pushed me to expend the kind of efforts I have exerted to make this work as original as it can be. Thanks to all research team Dr. Zubeda Bi Aga , Dr.Khadel althaqafi , Dr. Merfat Algethami , Dr. Nassim Assiri , Abrar Alsubhi , Emtenan Alotaibi

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Optimization of solid Radioactive waste Management of I-131 Generated in Nuclear Medicine

By
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Abstract

Cancer treatments using Iodine-131 required the patient to stay in isolation rooms for 72 hours after their exposure rates at distance of 1 meter around 18 μSv/h.. An experimental study involving solid medical radioactive waste generated from the nuclear medicine department are collected and stored properly. Surface radioactivity of all radioactive waste packages was measured, one time per week, by Como 170 digital survey meter, in Bq/cm^{2}unit. The study included Fourteen waste packages generated from the nuclear medicine department. Results showed a complete agreement between the experimental results and calculated theoretical exponential decay. The normalized surface activity of all packages reached 0.64% of the initial normalized surface activity by the end of week 8, i.e., more than 99% of the radioactivity of waste packages decayed within eight weeks. The semiempirical equation is retrieved from the experimental results.

Introduction

Nuclear medicine depends mainly on using radioactive materials, and introduce it to patient's body, which result in production of radioactive wastes, resulted from the tools and consumables involved before, during and after introducing the radionuclides to the patient, as well as those related to the eliminations of the patient himself. The treatment using Iodine-131 required the patient to stay in isolation rooms for 2 to 3 days or after their exposure rates at distance of 1 meter around 18 μSv/h. There are special considerations must be done before the patient admit to room. Any part of the room that the patient may touch such is covered with plastic and absorbent Pads. The solid wastes generated from the isolation wards are collected and put in special yellow and black plastic packages, which are designed and fabricated locally for to be used for hazardous materials. are labeled with patients. Each of these waste packages is used to contain any high activity contaminated material used by the patients, including absorbent pads, radioactive-contaminated plastic, leftovers, dishes, cups, plates, forks, knifes, clothing, linens, cover papers, gloves, and empty needles.



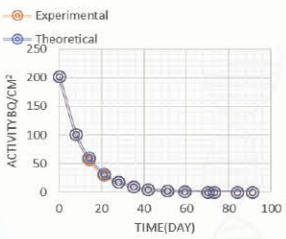
I 131 patient wastes with Labeling of radioactive wastes.

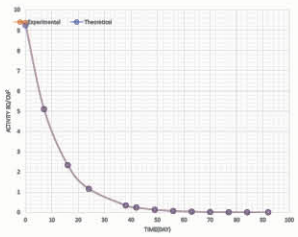


Objective

Optimization and enhancement of the treatment process by developing a model that will help count the decay of Solid I-131 radioactive wastes.

Results





The normalized surface activity of all packages reached 0.64% of the initial normalized surface activity by the end of week 8, i.e., more than 99% of the radioactivity of waste packages decayed within eight weeks. which indicates achieving the value considered within the exemption level by the end of week 8.

The highest surface activity of 202 Bq/cm2, reached the exemption level of 4 Bq/cm2 in day 46. Hence the time needed theoretically and experimentally equals 6 to 7 weeks, which is just 60% to 78% of 10 half-life period of I-131, or 80 days.

The following semiempirical equation is retrieved from the experimental results for I-131 Radioactive waste:4 $(B\,q/cm^2) = A_0 e^{-sx}$

Discussion

Table (2): Normalized Surface Activity, NSA, of all waste packages.

Time/week	NSA	Drop to%
0	1	100%
1	0.537482054	53.74%
2	0.263533937	26.35%
3	0.139956904	13.9%
4	0.071032004	7.10%
5	0.037345959	3.73%
6	0.02332686	2.33%
7	0.013250183	1.32%
8	0.006386664	0.638%
9	0.004962324	0.49%
10	0.001793851	0.179%
11	0.000920898	0.09%
12	0.000507758	0.05%

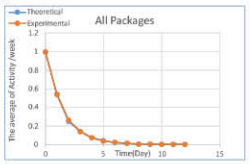


Fig.21: Normalized surface Activity Curve of the average of Fourteen Waste packages.

The normalized surface activity, Fig.21, shows that the exemption level of 4 Bq/cm2 is reached in day 44. The highest surface activity of 202 Bq/cm2, which refers to package 2, Fig.8, shows that the exemption level of 4 Bq/cm2 is reached in day 46. Hence the time needed theoretically and experimentally equals 6 to 7 weeks, which is just 52% to 61% of 10 half-life period of I-131, or 80 days, i.e., there is no need for storage of radioactive waste for a period of 10 half-lives, or 80 days. This confirms the above-mentioned conclusion attained when calculating the exemption level of 1MBq.

Semiempirical model for I-131 Radioactive waste

As this research aimed mainly to develop a simple mathematical model to help the RSOs in nuclear medicine departments in disposal of I-131 radioactive wastes, and depending on the above results, a simple semiempirical formula is suggested to optimize the time of storage and to protect the workers, people, and environment from radioactive waste. This semiempirical formula is retrieved from the normalized surface activity, Fig.21, and expressed in the following equation:

$$4\,(B\,q/cm^2) = A_0 e^{-sx}$$

Conclusion

a. The following semiempirical equation is retrieved from the experimental results for I-131 Radioactive waste: $4\,(B\,q/cm^2) = A_0 e^{-sx}$

Where : $4\,(B\,q/cm^2)$ = ***the exemption level***, **A0**= the measured surface activity,

s*= 0.63/*week, and ***x***= the time in weeks.

b. There is no need for storage of radioactive waste for a period of 10 half-lives, or 80 days.

c. Results showed a complete agreement between the experimental results and calculated theoretical exponential decay.

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I would like to express my deep gratitude to the following people:

-My research supervisors, Dr.Omemh Bawazeer and Dr. Abdul-Wali Ajlouni for their patience guidance, assistance, encouragement and useful comments of this research work. I have been extremely lucky to have supervisors who cared so much about the work. Dr. Merfat Algethami and Dr. Nassim ASSIRI for their advice and constructive recommendations .The Head of Medical Imaging Department Dr. Nouf Abdullah, for giving a great chance and support before and during study. I express deep thanks to my family and my friends for their infinite support , encouragement, patience, prayers, and love. Many thanks to all participants that took part in the study and enabled this research to be possible another, have contributed in their efforts and support to make this possible and successful.

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Preparation and Characterization Highly conductive paper using PEDOT:PSS and the polar solvent DMF

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Abstract

Recently,conductive paper have achieved significant rule in the fieds of electronics taking advantage of their conductive behavior.Herein,we report that the paper made conductive with minimum sheet resistance of 1.30Ω/sq by using the aqueous solution PEDOT:PSS and drop-casted method.Furtheromore,the effect of temperature on the resistance of the sample show that the material exhibit metal-semiconductor transition dependent on the PEDOT:PSS concentration.

Introduction

lately, natural conductive textures have accomplished critical advances within the areas of hardware and wearable materials taking advantage of their conductive behavior the electrically [1-3].Generally, conductive fabrics can be prepared by two methods. The first method involves incorporating conductive filler materials, such as graphite The second method involves designing and manufacturing conductive cotton via conductive polymers with minimal or no metal[4].In this work ,we fabricated conductive paper with high conductivity by using casting-drying method as shown in Fig 1

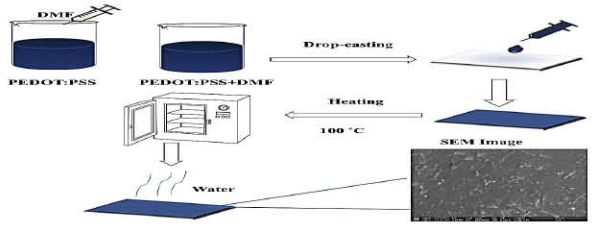

Fig.1 Diagram of the fabrication of conductive paper

Objective

- **Discovering method of fabricating highly electrical conductive paper using PEDOT:PSS solution.**
- **Study the effect of PEDOT:PSS dopant on the sheet resistance of the paper using DMF.**
- **Study the morphological of the untreated and treated paper.**
- **Application of conductive paper.**
- **Compare between the results will obtain in this study and the results from the literature**

Results

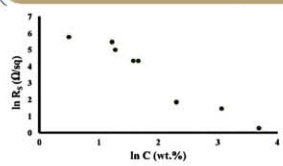

Fig.2 Sheet resistance at different concentration

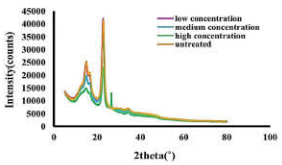

Fig.3 XRD Analysis

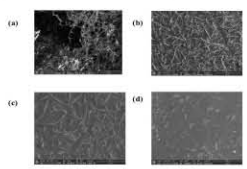

Fig.3 SEM Images



Fig.4 conductive paper as electrode

Discussion

From the **fig.2** we can observe The more polymer concentration were increased we get the less sheet resistance .which means that the material has transformed from Insulation state to condctive state.As we found from the xrd analysis as shown in **Fig 3**., at high concentration a new peak appears, confirming the interaction of the paper with PEDOT: PSS with a degree of crystallinity of 55%. SEM images as shown in **fig** 4 of the untreated paper surface constructed by cellulose fibers. At low concentration (b), PEDOT: PSS coated some area. At medium concentration (c), PEDOT: PSS coated the fiber and also the space between the fibersAt high concentration (d), PEDOT: PSS cover all entire region (the fibers and the space between them). Also,as shown in **Fig 5** we have successfully developed a lightweight textile-based ECG electrode.

Conclusion

In summary, PEDOT:PSS aqueous dispersion was treated with 5 wt% DMF from which prepared conductive paper. through a simple drop casting-drying method which is a safe and cost- effective way for making conductive fabrics. The minimum sheet resistance achieved was 1.30Ω/sq at high concentration of 40 wt.% . This value is as usful for practical applications. Three distinct conductivity regions were observed on the paper coated with PEDOT:PSS , including metal-semiconductor behavior. The XRD and FT-IR results confirm an interaction between PEDOT: PSS and paper.

Acknowledgments

"Those who do not thank people, they do not thank Allah"

Firstly, I would like to express my gratitude to my advisor, Dr. Fahad Alhashmi for the never-ending support in completing my research. His tireless guidance and motivation have assisted me throughout my days in Umm alQura University.

I extend my thanks to my group: Asal, Haifa and manal . I ask God to grant them success and happiness in their life.

I would like to thank and dedicate this project to my mother and my father. Without their continuous love, encouragement, and advices ,I would not have completed this project. I would like to thank my sisters and my brothers for praying and supporting me.

Last but not least, I thank Allah SWT for His countless blessings and help.

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Graphite Based Conductive Cotton Fabrics

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Umm Al-Qura University, Faculty of Applied Science, Department of Physics.

Abstract

Electronic textiles (E-textiles) are fabrics that have ability to conduct electricity when they doped by conductive materials such as graphite, graphene and conductive polymers. They used in the field of electronic devices such as sensors, capacitors and electrochromic devices. In this work, we report the preparation and characterization of conductive cotton fabrics using "brush-coating-drying" method with a graphite dispersion. We found that the sheet resistance decreased from ~10^{14} Ω/□ for pure cotton to 470 Ω/□ for the conductive cotton with 86.12 wt.% graphite. The conductive cotton fabric exhibited feasibility as a bending sensors even after 100 bending cycles.

Introduction

Since technology makes life healthier, and more comfortable, conductive fabrics have achieved important inroads in the field of this technology. These conductive fabrics allow development the flexible and wearable devices such as bending sensors [1], which used in biomedical monitoring applications. Ordinarily, conductive fabrics can be prepared by two methods. The first method involves using conductive polymers [2]. The second method involves using conductive materials, such as nanoparticles, graphene, and graphite. Graphite is a conductive environmental stable material [3]. Cotton is one of the most commonly used in this field due to its high absorbency and flexibility [4]. In this work, we used an effective simply method to fabricate conductive graphite cotton fabrics using "brush-coating-drying" technique as shown in Fig.1.

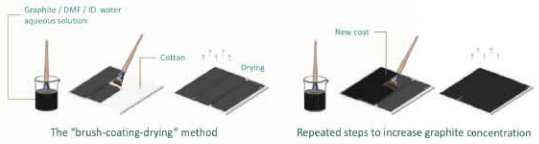

Fig.1 Diagram of "brush-coating-drying" technique.

Objective

- **Using a sample method to fabricate conductive cotton using graphite.**
- **Study the morphological property of untreated and treated cotton**
- **Study the effect of graphite concentration on sheet resistance**
- **Investigate the viability of graphite-based conductive cotton as a bending sensor.**

Results

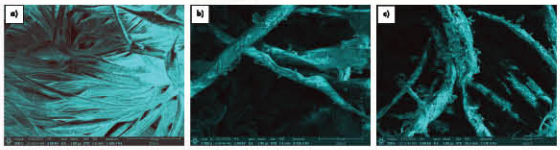

Fig.2 SEM images of **a)** Untreated cotton, treated cotton at **b)** Medium and **c)** High concentration.

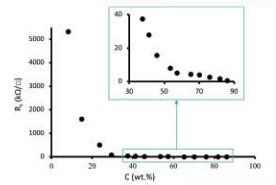

Fig.3 The sheet resistance of treated cottons as a function of graphite concentration with zoom-in

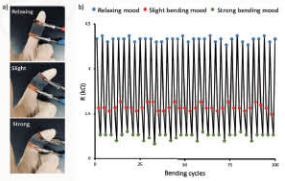

Fig.4 a) Bending mood. b) Regular change in monitoring of the finger bends.

Discussion

SEM images show the graphite covering the fibers and space between them, creating electrical pathways as shown in **Fig.2**. Increases graphite concentration creates more electrical pathways lead to a decrease in the value of sheet resistance. The sheet resistance was investigated shown in **Fig.3** From first glance, it can be seen that the sheet resistance of the conductive samples decreases as the concentration of graphite increases. In **Fig.4** the resistance of the sensor shows the regular change in the monitoring of the repeated finger bends after about 100 bending cycles.

Conclusion

A straightforward method for manufacturing conductive cotton fabric was investigated using graphite powder and the polar solvent DMF. This method is environmentally friendly, low cost and simple. SEM images show that at the higher concentration of graphite, the graphite covering the fibers and the space between the fibers creating more electrical pathways lead to decrease the value of sheet resistance. the conductive cotton fabrics reached a minimum value of sheet resistance of 470 Ω/□ at 86.12 wt.% graphite. Finally, it was concluded from the experimental results that, this conductive cotton fabric can be used in bending sensors.

Acknowledgments

Foremost, thanks God.

I would like to express my sincere gratitude to my supervisor Dr.Fahad Alhashmi for the enduring support, for his patience, motivation, his kindness and incredible effort. I have learned from him a lot, and I am indebted forever to him. I could never have a greater supervisor than Dr.Fahad Alhashmi.

Besides my supervisor, I am also grateful to Dr.Khalid Althagafy for his effort in teaching me research methodology.

My sincere thanks goes to my family for their enduring support of me during this project. My deepest gratitude to my parents, for their love, patience and prayers. They never stopped saying they were proud and believe in me, which kept me going regardless of the challenges. I could never have done all of this without them.

Finally, I would like to thank my friends and my group at Umm Al-Qura University for their kindness and support.

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Preparation of highly conductive cotton wire with graphene

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Dr. Fahad Alhashmi
Umm AlQura University

Abstract

In this project different methods were used to coat a cotton fabric with two different graphene solution to be electroconductive. The conductive cotton fabric resistivity was measured via four-line probe technique and the temperature dependance was studies, moreover the conductive cotton fabric was characterized by SEM, XRD, Raman spectroscopy, FR-IR, TGA, and DTA.

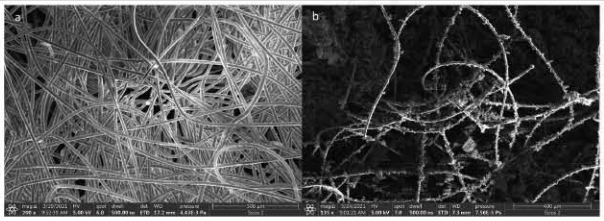

Fig.2 SEM images of a.net cotton sample b. sample with high concentration

Introduction

smart textile aroused intensive attention from scientists due to their magnificent applications and their high degree of stretch and bending, such as Fiber-based power sources, capacitors, and bacteria sensors[1,2]. Textile can not be directly applied in flexible conductive application due to their very low electrical conductivity. The concept behind the smart textile can be established by coating a conductive materials onto the cotton fabric such as carbon material. As we know graphene is a flat monolayer of carbon atoms which is tightly packed into a two-dimensional honeycomb lattice. Researches conclude that graphene is more suitable for E-textiles because it can be conducting and applied as a dye to make electrically conducting fabric. Aqueous dispersions of graphene can be produced very easily using organic solvents such as DMSO and DMF. Smart and E-textiles advantages are low cost, easy preparation, simple and effective coating, so these electroconductive fabrics are expected to have high potential for being used in advanced applications [3]

Discussion

- the concentration of graphene is an important parameter that can affect the conductivity of the sample.
- The treated cotton with graphene sample shows in Raman spectroscopy a similar peaks to the graphene peaks location which confirm the presence of the graphene in the treated cotton sample.
- In FT-IR patterns, the treated cotton peaks are very similar to the graphene peaks with a slight change in intensity which suggest the attachment of graphene on the cotton fabric.

Conclusion

- morphology, structural, electrical properties were affected by the concentration of the graphene.
- SEM images shows the graphene adhesion to the cotton fibers and confirm the presence of conductive areas.
- High concentration of graphene enhanced and increased the conductivity of cotton samples.

Objective

- Replace the metal wires in electrical devices.
- The increasing need to the smart textile applications
- Simple and direct preparation of highly conductive cotton using graphene.
- Discovering the best method and solvent to fabricate a conductive cotton.

Acknowledgments

I would like to express my special thanks of gratitude to Dr.Fahad Alhashmi for his continuous support and encouragement.

Also I would like to thank the research laboratories of faculty of applied sciences for providing the facilities that was required.

Results

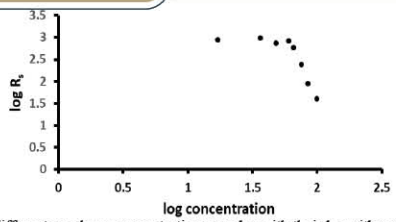

Fig. 1 different graphene concentration samples with their logarithm sheet resistivity.

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Fabrication and Characterization of Conductive Paper using PEDOT:PSS and the polar solvent DMSO

Manal Saeed Al-Thebaiti
Dr. Fahad Alhashmi
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Abstract

In the fields of electronics and wearable textiles, intelligent textiles have made significant strides. Papers for electronic devices are lightweight, inexpensive and environmentally friendly. The purpose of this project is to develop conductive paper using the conjugated polymer PEDOT: PSS and the polar solvent DMSO. We can fabricate our conductive paper using a drop-casting/dipping and drying technique with an aqueous solution of PEDOT: PSS and 5% DMSO. This method is straightforward, efficient in terms of energy consumption, and capable of conducting electricity without using metallic fillers or silica nanoparticles. When the PEDOT:PSS concentrations on the paper is increased, the conductive paper's high conductivity and minimum sheet resistance are investigated. The minimum sheet resistance of conductive paper is **0.87 Ω/sq** at a saturation concentration of **25.41 wt%**.Finally, we will use our conductive paper as an electrode and attach it to ECG sensors, allowing us to record ECG signals.

Introduction

Electrically conductive fabrics are used in various innovative materials, including organic photovoltaics, electrotherapy devices, wearable computers, and solar cells.

The Base fabric materials include cotton, nylon , polyester, and paper that are used as the substrates for fabricating conductive fabrics.

Paper is a many-sided material Its surface properties can easily be control to a desired level by modifying the fibers, adding chemical additives, and surface treatment. Furthermore, cheapness, light weight and easy of processing.

By coating the paper by conductive materials including gold, Copper, Titanium, Silvers, carbon nanotubes, graphite / graphene and conductive polymers.

The effect of CPs on paper properties include high capacitance and conductivity, Low ESR, ability to conduct electricity without any addition of metallic fillers.

PEDOT: PSS is the most extensively researched conductive polymer for use in conductive textiles. PEDOT:PSS as an organic conductor. It is a mixed ion-electron conductor.

SEM, FTIR, Raman, thermal gravimetric analysis TGA, and XRD instruments were used to examine treated and untreated paper morphology, functional groups, structure characterization, thermal analysis, and phase identification, respectively.

The sheet resistances of conductive papers were also investigated as a function of temperature.

Objective

- Fabrication of highly electrically conductive paper using PEDOT:PSS.
- Replacing the expensive elements by alternatives renewable and sustainable as paper where the Papers for electronic devices are lightweight, inexpensive and environmentally friendly.
- Overcoming the difficulties techniques fabrication by simple method without using metal or nanoparticles.
- Exploring the minimum resistance of conductive paper, then can be able to recorded ECG signal as electrodes.

Results

- Cellulose papers are an electrical insulator with high sheet resistance value of 10^{15} Ω/sq [1] after added PEDOT:PSS to the paper we get the minimum sheet resistance of conductive paper is **0.87 Ω/sq** .
- TGA and drTGA thermal analyses of conductive paper showed were most pyrolyzed at 400 °C with a weight loss of approximately -86 %.



Fig. 1: The circuit to measure sheet resistance by four-point probe technique, when apply current measured voltage.

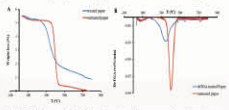

Fig. 2: TGA ana dr TGAfor untreated paper and treated paper.

- When increased the PEDOT: PSS concentrations on the paper showed improve the crystallinity of PEDOT: PSS as demonstrated by XRD and SEM, strong peak at **2 θ = 23.38°**
- FTIR spectra, The effect of PEDOT:PSS on to the paper is stror
- Raman spectra in the wavenumber range of 1,200 to 1,600 cm-1,DMSO can affect to improve the conductivity of PEDOT:PSS by changing the doping states of PEDOT chains from (bi) polarons to neutral states.

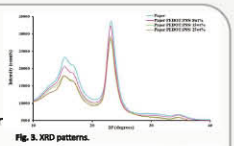

Fig. 3. XRD patterns.

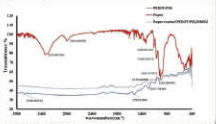

Fig.4. FTIR spectra .

Discussion

Fabrication of Conductive Paper

The polar solvent DMSO with aqueous solution of PEDOT: PSS and 5% DMSO to phase separate the excessive insulating PSS from the PEDOT domain and enhance conductivity.

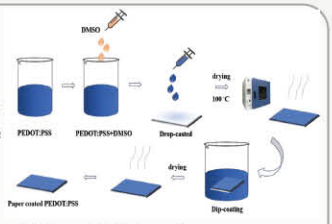

Fig. 5. Diagram of the fabrication of conductive paper.

Conclusion

- Using the conjugated polymer PEDOT:PSS and the polar solvent DMSO, we fabricate a highly electrically conductive paper with metallic behavior by drop casting-drying/dipping technique.
- The minimum sheet resulting of 0.87 Ω/sq was achieved at the saturation concentration of 25.41 wt%.
- Finally, the most intriguingly, conductive paper (CP used to fabricate conducting wires and electrodes for recording ECG signals.

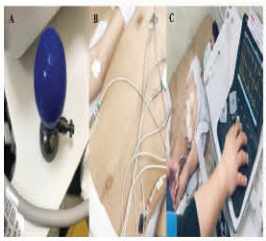

Fig .6. A. Original electrode of the device. B and C, conductive paper/PEDOT:PSS electrodes printed.

Acknowledgments

I'd like to thank God in the beginning for all the blessing that has been given to me.

I dedicate this project to my father and mother who has given me so much support.

I would like to give a special thanks to my advisor Dr. Fahad Alhashmi for all the support and the encouragement during my work on this project.

I'd like to thank University of Umm AL-Qura in Saudi Arabia for their supports this work.

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Physical Values in Digital PET\CT in Improve the Molecular Medical Imaging

By
Maysa Ehsan Taybe
Supervised By
Dr. Sameer Natto

Abstract

The aim of this project is to draw attention to the advantages of a digital Positron Emission Tomography/Computed Tomography (PET/CT) to improve Molecular Medical Imaging.

Introduction

Nuclear medicine is a famous specialty of medical imaging that uses instrumentation and radiopharmaceuticals (radionuclide or radioactive tracer) to study physiological processes and organs function, providing information that cannot be acquired with other medical imaging technologies. It is non-invasive modalities used not only for diagnosis, staging and follow up of various diseases but also for therapy in some conditions.
Positron Emission Tomography (PET) is a type of nuclear medicine procedure that measures metabolic activity of the cells of body tissues. It is a combination of nuclear medicine and biochemical analysis and helps in imaging the biochemical changes taking place in the body through a tiny amount of a radioactive material, that is inserted to the human body during the procedure of the examination. Nowadays, the hybrid imaging like Positron Emission Tomography- Computed Tomogram Scan (PET/CT) and more recently Positron Emission Tomography-Magnetic Resonance Imaging (PET/MRI) scan play a large role in the development of nuclear medicine practice. Hybrid imaging combines two or more imaging modalities to take advantage of the characteristics of each. Therefore, hybrid imaging can simultaneously provide high anatomic detail, metabolic and/or physiological function, enabling more accurate diagnosis, better care pathways, refining treatment regimes, and improving patient outcomes .

Objective

This project aims the ability of digital PET/CT to an improve Molecular Medical Imaging compared with analog PET\CT.

Results

Figure (1) summarizes the PRISMA diagram for study selection procedure: results were obtained from the searches in scholar Google articles (189 studies) Of these results, 159 were did not mect the eligibility criteria and were therefore excluded . Of the 30 studies which appeared to be eligible after the initial screening, a full text search was performed. 12 studies were removed after the full text search review article, ; thus, 18 studies were included in the final analysis of the included studies.
Total of patients were include in the analysis :most patient are referred from oncology department and some patient are referred From another department. All the patients came to molecular department in the scan day to received the radiotracer and start the procedure .



Discussion

- I Alberts and others , A greater number of lesions (both benign and pathological) were revealed by dPET/CT vs aPET/CT (326 vs. 142). they are noticed increase also in benign PSMA-avid lesions (144 vs. 65). [1]
- Tohru Shiga and others, The dose of FDG could be reduced by 60% with the digital Photon Counting PET/CT.[2]
- Chadwick Wright and others, This feasibility trial demonstrates that digital photon counting dPET detector technology enables 10x faster Na18F PET imaging (total dPET imaging time ~ 3 min) with no loss of lesion detectability, image quality or quantitative accuracy.[3]
- David Kersting and others , A significantly higher detection sensitivity for I-124 by digital PET/CT was observed in clinical and phantom settings. The greatly improved time resolution of the digital system (214ps) and a smaller crystal size (3.2 mm) contribute to the superior performance.[4]
- Fuentes-Ocampo F and others , Digital PET/CT offers improved detectability of liver lesions over the analog PET/CT in patients with known or suspected liver metastases.[5]
- Claire Provost and Laurence Champion ,In this study, FDG digital PET/CT exams were equal or superior to MRI alone in the identification of soft tissue sarcoma recurrence and found metastases. This exam could be very useful for biopsy and surgery guidance in soft tissue sarcomas.[6]
- Hiromitsu Daisaki and others, It is suggested that the acquisition duration to obtain the same image quality can be reduced to approximately 1/3, and high quantitative accuracy can be achieved at the same time.[7]
- Marie Meyer and others , There was no significant between-group difference concerning SUVmean and volume of PG (2.7 ± 1.32 vs 2.1 ± 0.44, p = 0.39; and 0.24 ± 0.10 on dPET vs 0.26 ± 0.09 on cPET, p = 0.684, respectively)[8]
- Shirin Hatami and others , The digital scanner has a shorter scan time and lower DLP, requires a lower 18F-FDG dose, and provides improved image quality when compared with the analog scanner. The most impactful difference in scan time, DLP, and 18F-FDG dose were observed in obese and overweight participants.[9]
- Osamu Manabe and others , The SUVmax on DPET was significantly higher than that on CPET (4.1 ± 3.9 vs. 2.5 ± 0.6, p < 0.0001) .Improved photon counting technology in the digital PET/CT can detect the physiological uptake of the pituitary gland. Although incidental FDG uptake on CPET is an unusual finding, the prevalence of physiological uptake in the pituitary gland is high (52.3%) on DPET.[10]
- Bing Bai and others , It is feasible to acquire routine 18F-FDG whole-body scan in less than 10 minutes. Future research include optimizing the scan and reconstruction protocols to further reduce total scan time and/or injected dose.[11]
- Manuel Weber and others , These results suggest that scan time duration or administered tracer activity can be reduced threefold without compromising diagnostic performance. Especially a reduction of administered activity might allow for a lower radiation exposure and better health economics. Larger trials are warranted to confirm our results.[12]
- Sung Hoon Kim and others The reliability of SUV values between scanners showed excellent agreement. Bland-Altman plot analysis of 81 lesions showed an acceptable agreement between scanners for most of the SUVmax and SUVpeak values. No relationship between the SUV values and time delays of dual PET/CT acquisition was found.[13]
- Ian Alberts and others , Overall $n = 100$ lesions were identified in the 2 min and 1 min/bp acquisitions and $n = 98$ lesions in the 30 s/bp acquisitions. Agreement between the three acquisitions with respect to lesion number and tumour-to-background ratio showed almost perfect agreement (K's $\alpha = 0.999$). SUVmax, SUVmean and TBR likewise showed > 98% agreement, with longer acquisitions being associated with slightly higher mean TBR (2 min/bp 7.94 ± 4.41 versus 30 s/bp 7.84 ± 4.22, $p < 0.05$).[14]
- Olivier Delcroix and other, Moreover, digital PET/CT system improved IQ_{MIP}, IQ_{NOISE}, and $IQ_{SHARPNESS}$ whatever the BMI. Lesion detection capability and confidence level were higher for 60, 90, 120 s per bed position, respectively, than for analog-like images.[15]
- Ian Alberts and others, dPET/CT revealed a greater number of PC lesions compared to aPET/CT (326 versus 142) as well as a proportional increase in benign causes of tracer-uptake (144 versus 65). A greater number of scans were noted as pathological for PC on dPET/CT (74/88) compared to aPET/CT (64/88, $p < 0.05$). The PSMA positivity rate for PC was significantly higher in dPET/CT for the lowest PSA values (PSA < 2.0 ng/ml, $p < 0.05$).[16]
- Silvano Gnesin and thers, Digital PET showed an improved background signal-to-noise ratio as compared to conventional PMT-based PET. RCs were comparable between digital and PMT-based PET datasets. Compared to PMT-based PET, digital systems provided comparable image quality with lower TAP (from ~ 40% less and up to 70% less).[17]
- Diego Alfonso López-Mora and othes , All HPT suspected lesions resected and detected only by the digital system ($n = 8$) were < 10 mm (7.5 ± 1.3 mm), while those detected by both systems ($n = 22$) were > 10 mm (13 ± 3.8 mm). SUVmax of HPT lesions was significantly higher than SUVmax of locoregional lymph node independently of the PET/CT system used (4.5 ± 1.9 vs. 2.9 ± 1.3, $p < 0.0001$).[18]

Conclusion

The finally finish from this project , i will spot light for several points that characterized the dPET compared to cPET technology which are output a combination of different technological improvements.
- First, dPET is characterized by an optimized match between scintillator crystal elements, semi-conductor amplification and read-out layer with consequent increased spatial resolution and count rate capacity.
- Second, digital technology contributes to enhance the TOF resolution. In the present dPET generation, TOF has nearly doubled its performance compared to cPET devices (~250 ps in dPET vs. ~500 ps TOF resolution in cPET), with a clear benefit in terms of signal contrast and signal-to-noise ratio(SNR).
- Third , there is a trend in dPET to extend the axial detector ring extension, thus significantly increasing the systems sensitivity. Interestingly, present developments in PET achieved a total-body coverage18. Improved systems sensitivity will be beneficial for patient care in terms of potential reduction of the administered activity (thus resulting in a reduced patient dose exposure) and/or more flexible scan duration increasing patient comfort .
- Fourth, dPET technology might improve the detection of small lesions not only with 18F–FDG, but also with other PET tracers, such as 68Ga-PSMA for the detection of lymph node or bone metastases in patients with prostate cancer, or 68Ga-DOTA for the detection of small liver or peritoneal metastases in patients with neuro-endocrine tumors. With its improved signal recovery and quantification, dPET will still increase its value in cancer diagnosis and staging, as well as in radiotherapy planning or therapy response monitoring.
- Finally, the improved signal recovery available in state-of-the-art dPET compared to cPET will probably impact in the future the European Association of Nuclear Medicine (EANM) and Research Ltd. (EARL) guidelines for 18F-FDG-PET/CT tumor imaging.

Acknowledgments

It is my proud privilege to release the feeling of my gratitude to several person who helped me directly or indirectly to conduct this research project work
I wish to express my deepest gratitude to My Supervisor Dr. Sameer Natto. I will never forget his sincere words, motivation, and positive feedback which really affected me so much during my work on the search project . He has been very supportive all through my study times.
I also very much thankful to Dr. Bothina Abdulshakoor (Head of Radiology Department in AL-Noor Specialist Hospital) and to Dr. Ibrahim Eltayeb (Nuclear Medicine Physician in AL-Noor Specialist Hospital at Radiology Department) for their encouragement, cooperation and help. .

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Radiation Safety in Saudi Hospital

By : Abeer Abdu Saif
Supervisor : Prof. Dr. Sameer Natto

Abstract

High doses of ionizing radiation can lead to adverse health outcomes such as cancer induction in humans. Although the consequences are less evident at very low radiation doses, the associated risks are of societal importance.

Objective

The aim of this project is to prevent any clinically important radiation induced deterministic effect from occurring and limit the risk of stochastic responses by adhering to dose limits that are beneath the threshold levels, and follow the requirements of radiation safety in hospitals.

Acknowledgments

First of all, I thank Allah the Almighty for helping me, then I thank Prof. Dr. Sameer Natto, my supervisor, for help, dedication to education and guidance.
I would like to express my gratitude for medical physics department at Umm Al-Qura University for their great help and support.
Finally I would like to thank everybody who helped me prepare and finish this study.

Introduction

Radiation is energy in the form of rays or high-speed particles emitted by certain nuclides. Nuclides give off radiation in two basic physical forms electromagnetic radiation and particle radiation[1].
Radiation can be classified into ionizing and non-ionizing, depending on how the atomic matter is affected .
There are five main forms of ionizing radiation including particles:
X-Rays and Gamma Rays , Alpha Particles , Beta Particles; and Neutrons. Ionizing radiation, it has so much energy that it can drive electrons out of atoms. Atoms in living organisms may be affected by ionizing radiation, so it poses damage to health by damaging tissue and DNA in genes[2]. Nevertheless, ionizing radiation has a range of helpful applications. We use ionizing radiation, for instance, to treat cancer or sterilize medical devices[1].
In medicine, practically thousands of x-ray and gamma ray investigations are used every day such as CT scanners and nuclear medicine bone scans.
Depending on the type of radiation and how it is used in medical procedures, different international agencies may play a role in regulation, such as:

- The International Atomic Energy Agency (IAEA)
- The International Commission on Radiological Protection (ICRP)
- The Nuclear Regulatory Commission (NRC)
- National Academy of Sciences/National Research Council Committee on the Biological Effects of Ionizing Radiation (NAS/NRCBEIR)
- International Basic Safety Standards (BSS) for ensuring protection of people and the environment

There are a number of organizations within Saudi Arabia responsible for protection from radiation such as King Abdullah City for Atomic Energy and Renewable Energy , the Saudi Food and Drug Authority (SFDA) and Saudi Commission for Health Specialties.
Providing a radiologically safe environment in a medical facility is fundamental[3]. This includes the scope of activities in the quality management process for general radiology imaging systems includes, but is not limited to:

- Quality Assurance (QA) program
- Quality Control (QC) program

Discussion

Radiation safety can be clearly described as the use of effective measures by radiation workers to protect patients, staff, and the general public from excessive ionizing radiation exposure. Human and environmental physical determinants, technological features, and procedural factors all play a role in effective preventive measures. They are a set of instruments and techniques aimed at reducing radiation exposure while delivering high-quality diagnostic images[4]
Instruments for radiation monitoring are used for both area and person monitoring.
The devices that are used to measure radiation levels are known as:
1. Area survey meters such as gas-filled detectors(e.g. a. ionization chamber , proportional counter, Geiger-Müller (GM) counter or solid-state detectors (e.g. scintillator or semiconductor detectors) are both used as survey monitors.
2. Personal dosimeters which are used to record the equivalent doses obtained by people who deal with radiation such as : Film badges , Thermoluminescent dosimeters (TLDs) , Optically stimulated luminescence (OSL) dosimeters and Pocket ionization chambers (pocket dosimeter)[5]
This system of radiological safety is based on three principles: justification, optimization and dose limit.[6]
The Cardinal rules of radiation protection are as follows: time , distance and shielding[4]
The most important criteria are to make sure that any person within the proximity of
the radiological department is exposed to a level of radiation that meets with the
international dose limit
In a controlled area, where staff is working, the radiation level received by the
worker shall not exceed 20 mSv/year.
· In an uncontrolled area, the radiation level received by any person shall not
exceed 1 mSv/year.
· The dose to the embryo/fetus for pregnancy worker should not exceed about 1
mSv during the remainder of the pregnancy.

Conclusion

To ensure the safety of patients and radiation personnel, radiology facilities must
provide an efficient and comprehensive radiation safety program. The management of
the facility is the first step in implementing a successful program. Executives must
have the resources needed to start and manage such a program, they can:

- Delegate operational funds in the budget.
- Supervise the development of policies and procedures.
- Provide the appropriate equipment to begin and continue the program.

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Umm Al-qurra University
Faculty of applied Science
Physics Department

Submitted By: Abrar Hakami – Ahlam Alhasanani
Under supervision
Prof. Yousry Mustafa

Objective

First, We Need To Talk About The Reason Why Renewable Energy Is So Important. The World Today Is Facing An Unprecedented Turning Point Where Climate Change Represents A Real And Imminent Threat To The Prosperity Enjoyed By Many Today And What Millions Aspire To And Work Towards Tomorrow, And Here We Will Talk In This Research Summarizes The Types Of Renewable Energy, Its History, The Mechanism Of Action Of Each Type, And How To Derive Energy, And The Most Prominent Types That Are Used In Our Lives To Bring Energy To Us In Safe Ways.

Introduction

Energy Is The Source Of Security And Destruction In The World, And Its Sources Have Become The Key To Determining Relations Between The Nations Of The World. The Extensive Use Of Traditional Fuels, Which Depend On "Fossil Fuels" For Petroleum And Its Derivatives, Coal And Natural Gas, Has Caused Extremely Serious Damage To Humans, The Environment And All Living Things, Resulted In Unprecedented Environmental Pollution, Global Warming, Acid Rain And Many Disasters. Disasters Has Started And Does Not Know When To End In Addition To The Health Problems And Difficult To Enumerate And Limit. Which Led To The Search For Sources Of Alternative Clean Energy, That Achieves Sustainable Development And Does Not Adversely Affect Human Health And The Environment. This Can Be Achieved In The Reliance On Renewable Sources Of Energy That Are Generate Naturally And Sustainably Without Producing Any Kind Of Harmful Waste .

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Conclusion

In this research we conclude some points and some of the information that led to the production of renewable energy, in order to give security and prosperity to the settlers of this planet.

- Energy Does Things Foe Us, Energy Helps Our Bodies Grow And Our Minds Think, In General ,Energy Can Be Defined As Ability To Produce Change Or Do Work.
- Energy Is Property Of Matter That Can Be Converted Into Work, Heat Or Radiation.
- Energy In Its Various Forms Needs To Be Quantified, The Requires A Scale This Scale Is One Of The Most Commonly Used Energy Units In The U.S The BTU, Is Equivalent To The Energy Required To Raise The Temperature Of One Pound Of Water By One Degree Fahrenheit
- Primary Energies Are Nonrenewable Energy (Fossil Fuels).
- In The Various Forms, Renewable Energy Comes Directly From The Sun Or From Heat Generated Deep Within The Earth.
- Solar Power Is Utilized Through One Of Three Methods : The First Is Solar Thermal System In Buildings, The Second Methods Of Utilization Is Through Photovoltaics, The Third Method Of Utilization Is A Technology Called A Central Solar Power (Csp) System.
- Biomass Is A Renewable Energy Source Based On The Carbon Cycle.
- Wind Power Is A Totally Renewable Energy Source With No Greenhouse Gas Emissions But Due To Its Unpredictability Has Problems Integrating With National Grids.
- Geothermal Power Cost-effective, Reliable, Sustainable, And Environmentally Friendly.
- Ocean Thermal Energy Conversion Used The Temperature Difference That Exists Between Deep And Shallow Waters To Run A Heat Engine.

Synthesis of Al doped Zinc oxide thin films Electrical study

Summarized by Ghada Mohsen Badi Alqathami & Raneem Samir Nafae Alssaeidi
Umm Al Quraa university – Phyisics department

Abstract

We report in this work the structural properties of Zinc oxide films (ZnO-Al) obtained by oxidation of amorphous zinc oxide films pre-deposited by spray pyrolysis. The structure of the ZnO-Al films was investigated by UV-Vis spectrophotometer and X-ray diffraction (XRD) and hall effect analysis, optical analysis reveal that optimized samples are transparent with band gap values arise 3.88 eV, XRD analyses showed that ZnO phase begin to appear at oxidation temperature of 500 °C, hall effect revealed that the films obtained at 500 ° C are N type and have high carrier concentration.

Introduction and objective

Recently enough attention was given to Zinc oxide because of the unusual structure and electronic properties , Metal oxide are more preferable than nano-silver because of cost consideration [1-3] , In fact ZnO and TiO_2 are non-toxic and chemically stable under exposure to high temperature and are capable of photo-catalytic oxidation [4,5]. Zinc oxide system presents homogeneous and stable phases. The ZnO phase crystallizes in the Hexagonal structure with lattice parameters a = 3.249 Å, c = 5.206 Å, (JCPDS: 897-102).
In the present work, we have investigated contribution on the pre-studied zinc oxide films. XRD, UV-Vis spectrograph and hall effect were used to investigate the structural properties ,optical and electrical properties .

Methodology

The ZnO-Al thin films described in this work, were obtained by oxidation of amorphous Al doped zinc oxide layers pre-deposited by spray pyrolysis of $ZnCl_3 \cdot 6H_2O$ (0.03 M)-based aqueous solution and alumina nitrate ($AlNO_3$) added to the respective solution as doping source onto glass substrates heated at 200 °C. The sample is placed in Pyrex tube and thermally treated at 300 °C and 500 °C for 6 h as shown in Fig 1.

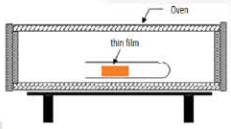

Fig 1: Thermal treatment of thin film

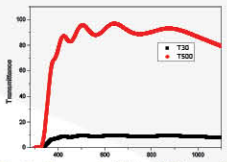

Fig 2: Transmission of Zinc oxide

Results and discussion

Figure2 shows optical transmittance of transparent films around 80% for optimized temperature, in fig 3 the X-ray diffraction patterns shows a crystallized Zinc oxide layers in Hexagonal structure at 500°C with preferential direction along (101) direction of the crystallites. The zinc oxide films have a single ZnO phase having good crystallinity .
Electrical measurements by hall effect analysis show that the obtained zinc oxide films are semiconductor N-type. The carrier concentration is determined by following formula: $U_H = \frac{IB_z}{nqt} = R_H \frac{IB_z}{t}$, with I is the current value is 12 A, B_z is a magnetic field, perpendicular to sample plane, n is a concentration of free carriers, t is a thickness of film, R_H is a hall constant, fig 4 shows the variation of U_H with magnetic field, from the slope $m = \frac{I}{nqt}$, we estimate the concentration of free carriers n.
n=21.8 10^{24} .

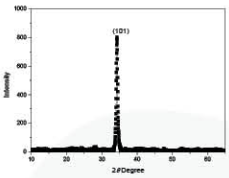

Fig3: X-ray diffraction of Zinc oxide

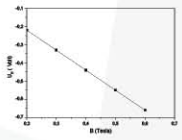
Fig 4: variation of U_H versus B

Conclusion

In this work, we showed that a thermal treatment thin layers of amorphous zinc oxide pre-deposited by spray pyrolysis may be done by a simple and nontoxic technique. We found that 500°C is the best oxidation temperature, favoring the appearance of thin films essentially composed of single ZnO phase, having good transmittance around 80% , the crystallite size is 172 nm and Zinc oxide films are N-type semiconducting material with high concentration of free carriers. Further investigations are needed to understand the effect of the temperature on the growth of the ZnO films.

Acknowledgments

We would like to thank the head of the physics department and doctor Jalel Ouerfelli who supervised us in this project and for his supporting this work .

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[5] Wang ZL. *Mater Sci Eng R 2009;64:33–71.*

Synthesis of Al doped Zinc oxide thin films Structural study

Summarized by Asma Abdullah Al Asmari & Bashaier Hussain Al-moalled - Umm Al Quraa university – Phyisics department

Abstract

We report in this work the structural properties of Zinc oxide films (ZnO-Al) obtained by oxidation of amorphous zinc oxide films pre-deposited by spray pyrolysis. The structure of the ZnO-Al films was investigated by UV-Vis spectrophotometer and X-ray diffraction (XRD), optical analysis reveal that optimized samples are transparent with band gap values arise 3.88 eV, XRD analyses showed that ZnO phase begin to appear at oxidation temperature of 500 °C

Introduction and objective

Recently enough attention was given to Zinc oxide because of the unusual structure and electronic properties , Metal oxide are more preferable than nano-silver because of cost consideration [1-3] , In fact ZnO and TiO_2 are non-toxic and chemically stable under exposure to high temperature and are capable of photo-catalytic oxidation [4,5]. Zinc oxide system presents homogeneous and stable phases. The ZnO phase crystallizes in the Hexagonal structure with lattice parameters a = 3.249 Å, c = 5.206 Å, (JCPDS: 897-102).

In the present work, we have investigated contribution on the pre-studied zinc oxide films. XRD, UV-Vis spectrograph were used to investigate the structural properties and optical properties .

Methodology

The ZnO-Al thin films described in this work, were obtained by oxidation of amorphous Al doped zinc oxide layers pre-deposited by spray pyrolysis of $ZnCl_3 \cdot 6H_2O$ (0.03 M)-based aqueous solution and alumina nitrate ($AlNO_3$) added to the respective solution as doping source onto glass substrates heated at 200 °C. The sample is placed in Pyrex tube and thermally treated at 300 °C and 500 °C for 6 h as shown in Fig 1.

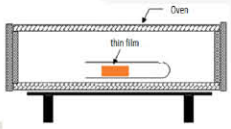

Fig 1: Thermal treatment of thin film

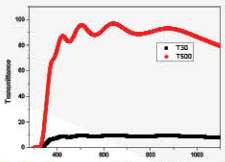

Fig2: Transmission of Zinc oxide

Results and discussion

Figure2 shows X-ray diffraction patterns of crystallized Zinc oxide layers, material which crystallized in Hexagonal structure at 500 °C. This spectrum depicts a preferential direction along (101) direction of the crystallites. the zinc oxide films become more stoichiometric with a dominance of the ZnO phase. At 500 °C, a single ZnO phase having good crystallinity was obtained.

Transmittance measurements show that zinc oxide films are transparent with 80% transparency. The size of the crystallites D in this direction is estimated using the Scherrer method: $D = \frac{k\lambda}{\beta \cos\theta}$ β is the full width at half-maximum (FWHM) of the main peak in the X-ray diffraction, k is a number taken equal to 0.9, λ is the wavelength of the X-ray, (15.48 nm for CuKα1) and θ is the diffraction angle. The dislocation density (δ) is estimated using the following equations: $\delta = \frac{1}{D^2}$, The micro strain (ε) are estimated using the following equations: $\varepsilon = \frac{\beta}{4\tan\theta}$, all results are summarized in table 1.

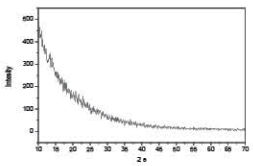

Fig3: X-ray diffraction of amorphous ZnO

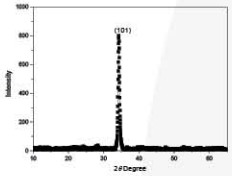

Fig 4: X-ray diffraction of ZnO

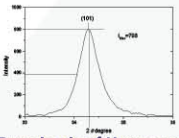

Fig 5: main pic of Hexagonal ZnO

Sample	2θ (deg.)	(hkl)	β (rad)	D (nm)	Dislocation density δ (10^{14} lines/m²)	Microstrain ε (10^{-3})
500°C	34.28	101	0.48	172	3.38	2.445

Crystallite size, dislocation density and micro strain for ZnO thin films at, 550°C

Conclusion

In this work, we showed that a thermal treatment thin layers of amorphous zinc oxide pre-deposited by spray pyrolysis may be done by a simple and nontoxic technique. We found that 500°C is the best oxidation temperature, favoring the appearance of thin films essentially composed of single ZnO phase, having good transmittance around 80% , the cristallite size is 172 nm and Zinc oxide films have low dislocation and microstrain. Further investigations are needed to understand the effect of the temperature on the growth of the ZnO films.

Acknowledgments

We would like to thank the head of the physics department and doctor Jalel Ouerfelli who supervised us in this project and for his supporting this work .

References

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[5] Wang ZL. *Mater Sci Eng R 2009;64:33–71.*

Synthesis of Al doped Zinc oxide thin films Optical study

Summarized by Azouf hussni shishah & Bayan Hassan bukari - Umm All Quraa university – Physisics department

Abstract

We report in this work the optical properties of Zinc oxide films (ZnO-Al) obtained by oxidation of amorphous zinc oxide films pre-deposited by spray pyrolysis. The structure of the ZnO-Al films was investigated by X-ray diffraction (XRD) and UV-Vis spectrophotometer XRD analyses showed that ZnO phase begin to appear at oxidation temperature of 500 °C, optical analysis reveal that optimized samples are transparent with band gap values arise 3.88 eV.

Introduction and objective

Recently enough attention was given to Zinc oxide because of the unusual structure and electronic properties , Metal oxide are more preferable than nano-silver because of cost consideration [1-3] , In fact ZnO and TiO_2 are non-toxic and chemically stable under exposure to high temperature and are capable of photo-catalytic oxidation [4,5]. Zinc oxide system presents homogeneous and stable phases. The ZnO phase crystallizes in the Hexagonal structure with lattice parameters $a = 3.249$ Å, $c = 5.206$ Å, (JCPDS: 897-102).

In the present work, we have investigated contribution on the pre-studied zinc oxide films. XRD, UV-Vis spectrograph were used to investigate the structural properties and optical properties .

Methodology

The ZnO-Al thin films described in this work, were obtained by oxidation of amorphous Al doped zinc oxide layers pre-deposited by spray pyrolysis of $ZnCl_3 \cdot 6H_2O$ (0.03 M)-based aqueous solution and alumina nitrate ($AlNO_3$) added to the respective solution as doping source onto glass substrates heated at 200 °C. The sample is placed in Pyrex tube and thermally treated at 300 °C and 500 °C for 6 h as shown in Fig 1.

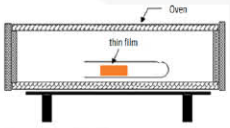

Fig 1: Thermal treatment of thin film

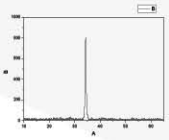

Fig2: X-ray diffraction of Zinc oxide

Results and discussion

Figure2 shows X-ray diffraction patterns of crystallized Zinc oxide layers, material which crystallized in Hexagonal structure at 500 °C. This spectrum depicts a preferential direction along (101) direction of the crystallites. At 300 °C, the formed phase have low transmission, around 10 % (Fig 3). At 500°C, the obtained phase becomes transparent with transmittance value 80% (Fig 3) and. The absorption coefficient α depends on the light-absorbing property of the films. This parameter can be calculated using Beer–Lambert's equation $\alpha(h\nu) = \frac{1}{d} Ln \frac{1}{T}$ where T is the transmittance and d is the film thickness, Absorption coefficient behavior is showed in fig 4. The energy gap (Eg) of the films can be calculated from the Tauc relationship $(\alpha h\nu) = A(h\nu - Eg)^{1/2}$, where A is a constant and $h\nu$ is the incident photon energy, the estimation of Eg value (fig 5) show that Zinc oxide films have a direct and gaps of about 3.88eV.

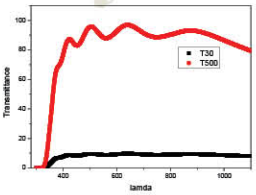

Fig3: Transmission of Zinc oxide

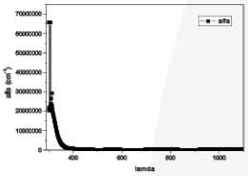

Fig 4: Absorption coefficient

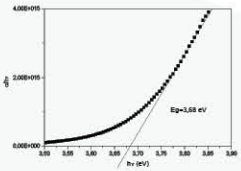

Fig 5: Band gap of Hexagonal ZnO

Conclusion

In this work, we showed that a thermal treatment thin layers of amorphous zinc oxide pre-deposited by spray pyrolysis may be done by a simple and nontoxic technique. We found that 500°C is the best oxidation temperature, favoring the appearance of thin films essentially composed of single ZnO phase, having good transmittance and Zinc oxide films have a direct and gaps of about 3.88eV. Further investigations are needed to understand the effect of the temperature on the growth of the ZnO films.

Acknowledgments

We would like to thank the head of the physics department and doctor Jalel Ouerfelli who supervised us in this project and for his supporting this work .

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Indoor and outdoor Gamma Doserate exposure levels in some building of umm-Qura unversity

Jamil moussa, Ahmed Al-harithi
physics department, college of applied science, Umm al-Qura University, Kingdom of SaudiArabia

Abstract

The idea of monitoring ionization radiation levels indoor and outdoor in selected sites is not new at all, many researchers conducting ionization radiation survey around the globe, Survey taken by the world health organization (WHO) and the international commission on radiation protection (ICRP) shows that residents of temperate climate spends only about 20% of their time outdoor and about 80% indoors and certain materials use for the construction of such buildings (rocks soils) are known to be radioactive. Similar can exist anywhere and toke this responsibility to make these materials visible if they exist by taking readings via Hand Held Scintillation Survey meter (FH 40 G) by Thermo Scientific NaI(Tl) e survey meter that is highly sensitive to gamma radiation. The mean annual equivalent dose rate of the selected sites were computed for indoor and outdoor background radiation level to 0.37mSv/y and 0.724mSv/y respectively, and are in a good proportion below the world wide average dose of 2.4mSv/y.

Introduction

There are two main sources of such exposure: natural background and the medical uses of ionizing radiation. Natural radiation background sources are classified into two categories:-
1external sources of extraterrestrial sources such as cosmic radiation and cosmogenic and radiation of terrestrial origin. radiation in air, earth crust and building materials.
2Internal sources, comprising naturally occurring radionuclides that is taken into a human body.
There are three sources for naturally occurring of radiation
1- Cosmic Radiation
2 cosmogenic Radiation
3 Primordial Radiation –three series
The second includes almost exclusively the diagnostic applications of ionizing radiation in medicine. These medical applications include the use of X-rays and radioisotopes in diagnostic imaging. Both X-rays and radioisotopes are also used for therapeutic purposes, but even though the individual doses for these applications are high, the population exposed is limited These consumer applications, in general, do not contribute significantly to population dose, but since, in Some cases at least, they have been the object of worldwide attention, it is appropriate to record their contribution to the national collective dose. An example of radiation exposure from such a consumer application that has received a great deal of attention in the past is the emission of X-rays from television receivers. International Commission on Radiation Protection (ICRP) in 1990 set a worldwide annual equivalent dose rate limit of exposure to ionizing radiation to 1mSv/y for the protection of human beings and ildlife (ICRP, 1990) while the average effective dose rate limit of 2.4mSv/y was set by the United Nation Scientific Committee on the Effects of Atomic Radiations (UNSCEAR) for most indoor facilities such as research laboratories, conference halls, lecture venues, offices, etc. (UNSCEAR, 2000).
Previous studies have shown that areas with high background radiation are found in Yang jiang, China; Kerele, India as well as in Asia, maximum outdoor measurement was recorded in Malaysia and the maximum indoor measurement recorded in Hong Kong and Iran (Gholami et al., 2011). Indoor background ionizing radiation investigation is also important, because due to changes in lifestyle people spend more time indoors than outdoors. Surveys taken by the World Health Organization WHO and the International Commission on Radiological Protection ICRP show that residents of temperate climates spend only about 20% of their time outdoors and 80% indoors (their homes, offices, schools and other buildings) (Chad-Umoren et al., 2007).

Objective

To Generating dose mapping and Measuring Gamma exposure levels indoor and outdoor at some building of Umm-Al Qura university .

Results and Discussion

The result for the indoor and outdoor mean dose equivalent readings levels in selected sites around physics labs using Hand held Scintillation Survey meter the radiation mean dose equivalent readings listed at tables above The data show that outdoor dose equivalent slightly higher than indoor dose equivalent the lowest indoor recorded value is 0.3897mSv/y where the lowest outdoor value is 0.4295 mSv/y and highest indoor value is 0.504 mSv/y and highest outdoor value is 1.01 mSv/y this is variation resulted from differences in surroundings materials and the average of all indoor values is 0.37 mSv/y and the average of the outdoor is 0.724 mSv/y that's still low compare to the annual levels allowed for the public moreover we found that readings tend to be very close to each other when we took to close point around 1 meter at distance that's showing the role that types of ambient materials play at changing the exposure levels and the outdoor site denoted by blue L at map figures 1.2, and 1.3 above showing the variation in readings we got from measuring rocks at street side is the greatest value at 1.01 mSv/y which exceed the allowed limit by 0.01 mSv/y.

Conclusion

The mean annual equivalent dose rate of the selected sites were computed for indoor and outdoor background radiation level to 0.37mSv/y and 0.724mSv/y respectively, and are in a good proportion below the world wide average dose of 2.4mSv/y. In general all readings are close to each other and they are varying with respect to position in predictable patterns which reflects how safe are areas we have measured.

Acknowledgments

In the name of God, the Most Compassionate, the Most Merciful; Peace and Blessings of Allah be upon his last prophet, Muhammad. First of all, my thanks should go to ALLAH who creates us from nothing. Thanks all praise and glory be to Almighty Allah, I thank Allah for making it possible for me to complete this bachelor program and for giving me the strength to carry on this project and for blessing me with many great people who have been my greatest support in both my personal and professional life. I would like to express my special sincere gratitude and great appreciation to Prof. Taha Alfawwal for his continuous help and providing his expert advice during this study. Finally, I would like to express my deepest gratitude to the current chairman of physics department Dr. Omar Alsalmi, for his gentleness and understanding and all who help me in this project.

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Kingdom of Saudi Arabia
Ministry of Education
Umm Al Qura University
Faculty of Applied Sciences

Installation of Portable whole Body Counter

By
Waleed Al-Otaibi
Hazim Al-Hozali

Abstract

A device used to measure the low level of radioactivity inside a human body , and it usually contains a number of sensitive detectors and shields to block the surrounding radiation and to limit the absorption and retention of radionuclides that are administered for diagnostic or treatment purposes.
There are many types and each type has a backward way of measuring and arranging, and the best of these types is the engineering of the chair. This type is done in an inclined chair and the detector is installed at a certain distance.

Introduction

Nuclear decay, known as radioactive decay, occurs when an unstable atom loses energy by emitting ionizing radiation, and radioactive decay is a random process at the level of individual atoms, since according to quantum theory, it is impossible to predict when a particular atom will decay, in other words the nucleus does not have A radionuclide is a memory, so the probability of its destruction does not increase with the passage of time but rather remains constant regardless of how long the nucleus lasts, and during this unpredictable decay of this unstable nucleus, it randomly decays to form a different nucleus or a different energy state a, the so-called Gamma decay, forming radiation in the form of atomic blocks or high-energy rays, this decay occurs at a steady and predictable rate and is referred to as the half-life.

Objective

Reviewing background for whole body counters and types according the number of detectors and scanning mode. Shielding of the counters, and phantom calibration.

Results and Discussion

many types of whole body counter were studied , it include
Arc geometry ,Chair geometry Scanning with a single detector, Stationary arrays with Multidetector geometries, Scanning with Multi-detector geometries, Compoton Effect, Detection of Radiation, Many of its properties have been studied Pair production, The Radioactivity Decay

Conclusion

The best type of whole body counter is (chair geometry)
I recommend using this type to design portable whole body counter for measuring internal absorbed dose occupational workers in nuclear medicine departments of Makkah city and across over the Kingdom of Saudi Arabia .

Acknowledgments

I would like to express my special sincere gratitude and great appreciation to Prof. Taha Alfawwal for his continuous help and providing his expert advice during this study.

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Umm Al-Qura University

Assessment of the Effectiveness of Radiation Safety Culture

Rahaf k. Al-Thobaiti; Rawyah R. Al-Lahibi; Mannah A. Nawari; Merath O. Altombkti; Norah S. Majnouni

Abstract

A survey was developed to evaluate employee perceptions of the safety culture, by assessing the qualities or traits of a healthy organizational culture for radiological safety in organizations using radioactive sources, and focused on individual responsibility: individual responsibility, questioning attitude, communication, and raising concerns, divided into 14 factors. The survey was made up of 31 questions and was conducted in February 2021 - March 2021. The number of respondents was 200 employees working in radiological Applications. Analysis showed that the thirteen factors did not show any differences on the group length of working. However, if analyzed individually, it turns out the training and qualification factors have different effects on the group of long-term period of working.

Introduction

Establishing a strong safety and security culture is one of the fundamental management principles for an organization dealing with radioactive material. Such a culture influences the organization's structure and style, as well as the attitudes, approaches and commitment of individuals at all levels in the organization.

All activities involving the use of radioactive material require careful attention to safety and security. Safety is aimed at preventing accidents; security is aimed at preventing intentional acts that might harm the facility or result in the theft of nuclear materials.

Objective

Assessing and understanding an organization's safety culture which can lead to understanding how safety performance can be supported and sustained, and to identify vulnerabilities that can lead to a decline in performance and be a cause of failure.

Methodology

The items in the questionnaire were designed to assess the five IAEA safety culture characteristics found in the IAEA's safety culture framework. Safety is a clearly recognized value: Priority is given to safety in documentation, communication, decision making and in the allocation of resources.

Leadership for safety is clear: Management is committed to safety (all levels of management). It includes management involvement in safety and their leadership skills. Outcomes of leadership activities include trust and openness.

Accountability for safety is clear: This safety culture dimension refers to the extent to which accountability and responsibility for safety are clearly defined and understood.

Safety is integrated into all activities: Safety is a part of all activities of the organization and consideration is given to how other factors influence safety such as: trust, teamwork, motivation, stress, workload, working conditions, and satisfaction.

Safety is learning driven: The organization learns from operational experience and uses assessments (internal and external) to improve safety procedures and behaviors.

This survey was conducted in February 2021 - March 2021. Respondents who fill out the questionnaire are required to had attended radiation protection training for new employees as the basic of occupational health and safety knowledge. The questionnaires is distributed via Twitter, LinkedIn, and WhatsApp, with a total seen number above 5000, but the respondents and questionnaire which have been processed are 200 questionnaires.

https://docs.google.com/forms/d/17WSrOYEqfrNzAT4eYoDO1gZoYgceAcHUmL6pmeNEF0o/edit?usp=sharing

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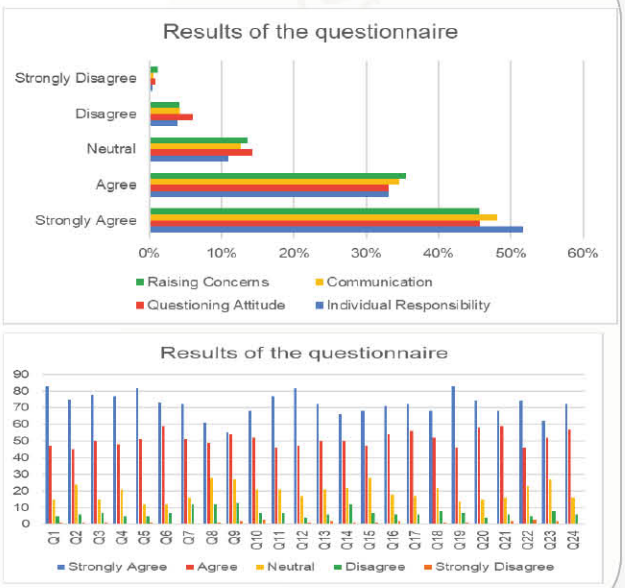
Results



Discussion

The result of significance does not show a trend of relationship between the long-term period of working with value. When viewed from the analysis, the relationship between the long-term period of working with the understanding of the safety culture is very clear.

Different effects on the period length of working group. Based on the analysis, the perception of Training and Qualification factors at the company have different effect because longer the long-term period of working make the training and the qualifications developed.

Conclusion

The questionnaire consisted of 14 factors, leadership, employee involvement, work environment, employee competence, management commitment, procedures, leader attitude, training and qualifications, workers attitude, application and operation, integrated safety, self-assessment, confidence. A total of 200 people working radiological applications were surveyed. The level of perception of the culture of nuclear safety is expressed numerically. Training and Qualification factors have different effects on the period length working group.

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Posters

الملصقات العلمية

لمشاريع التخرج

قسم الفيزياء

ماجستير

Umm Al-Qura University

Assessment of the Effectiveness of Radiation Safety Culture

Rahaf k. Al-Thobaiti; Rawyah R. Al-Lahibi; Mannah A. Nawari; Merath O. Altombkti; Norah S. Majnouni

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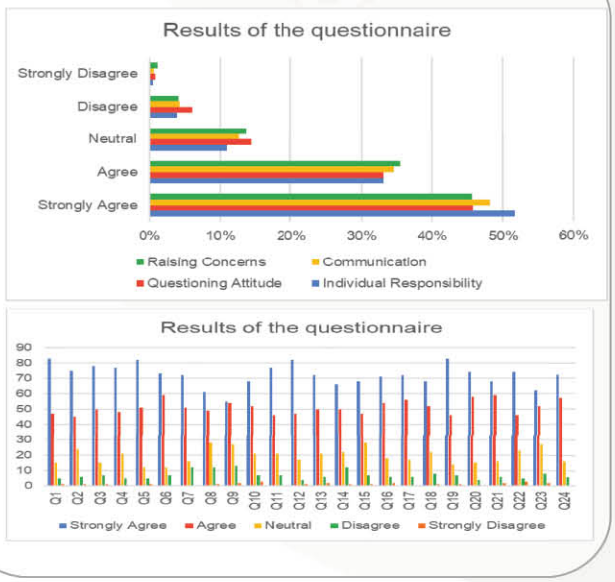

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Umm Al-qurra University
Faculty of applied Science
Physics Department

Submitted By: Abrar Hakami – Ahlam Alhasanani
Under supervision
Prof. Yousry Mustafa

Objective

First, We Need To Talk About The Reason Why Renewable Energy Is So Important. The World Today Is Facing An Unprecedented Turning Point Where Climate Change Represents A Real And Imminent Threat To The Prosperity Enjoyed By Many Today And What Millions Aspire To And Work Towards Tomorrow, And Here We Will Talk In This Research Summarizes The Types Of Renewable Energy, Its History, The Mechanism Of Action Of Each Type, And How To Derive Energy, And The Most Prominent Types That Are Used In Our Lives To Bring Energy To Us In Safe Ways.

Introduction

Energy Is The Source Of Security And Destruction In The World, And Its Sources Have Become The Key To Determining Relations Between The Nations Of The World. The Extensive Use Of Traditional Fuels, Which Depend On "Fossil Fuels" For Petroleum And Its Derivatives, Coal And Natural Gas, Has Caused Extremely Serious Damage To Humans, The Environment And All Living Things, Resulted In Unprecedented Environmental Pollution, Global Warming, Acid Rain And Many Disasters. Disasters Has Started And Does Not Know When To End In Addition To The Health Problems And Difficult To Enumerate And Limit. Which Led To The Search For Sources Of Alternative Clean Energy, That Achieves Sustainable Development And Does Not Adversely Affect Human Health And The Environment. This Can Be Achieved In The Reliance On Renewable Sources Of Energy That Are Generate Naturally And Sustainably Without Producing Any Kind Of Harmful Waste .

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Conclusion

In this research we conclude some points and some of the information that led to the production of renewable energy, in order to give security and prosperity to the settlers of this planet.

- Energy Does Things Foe Us, Energy Helps Our Bodies Grow And Our Minds Think, In General ,Energy Can Be Defined As Ability To Produce Change Or Do Work.
- Energy Is Property Of Matter That Can Be Converted Into Work, Heat Or Radiation.
- Energy In Its Various Forms Needs To Be Quantified, The Requires A Scale This Scale Is One Of The Most Commonly Used Energy Units In The U.S The BTU, Is Equivalent To The Energy Required To Raise The Temperature Of One Pound Of Water By One Degree Fahrenheit
- Primary Energies Are Nonrenewable Energy (Fossil Fuels).
- In The Various Forms, Renewable Energy Comes Directly From The Sun Or From Heat Generated Deep Within The Earth.
- Solar Power Is Utilized Through One Of Three Methods : The First Is Solar Thermal System In Buildings, The Second Methods Of Utilization Is Through Photovoltaics, The Third Method Of Utilization Is A Technology Called A Central Solar Power (Csp) System.
- Biomass Is A Renewable Energy Source Based On The Carbon Cycle.
- Wind Power Is A Totally Renewable Energy Source With No Greenhouse Gas Emissions But Due To Its Unpredictability Has Problems Integrating With National Grids.
- Geothermal Power Cost-effective, Reliable, Sustainable, And Environmentally Friendly.
- Ocean Thermal Energy Conversion Used The Temperature Difference That Exists Between Deep And Shallow Waters To Run A Heat Engine.

Synthesis of Al doped Zinc oxide thin films Electrical study

Summarized by Ghada Mohsen Badi Alqathami & Raneem Samir Nafae Alssaeidi
Umm Al Quraa university – Phyisics department

Abstract

We report in this work the structural properties of Zinc oxide films (ZnO-Al) obtained by oxidation of amorphous zinc oxide films pre-deposited by spray pyrolysis. The structure of the ZnO-Al films was investigated by UV-Vis spectrophotometer and X-ray diffraction (XRD) and hall effect analysis, optical analysis reveal that optimized samples are transparent with band gap values arise 3.88 eV, XRD analyses showed that ZnO phase begin to appear at oxidation temperature of 500 °C, hall effect revealed that the films obtained at 500 ° C are N type and have high carrier concentration.

Introduction and objective

Recently enough attention was given to Zinc oxide because of the unusual structure and electronic properties , Metal oxide are more preferable than nano-silver because of cost consideration [1-3] , In fact ZnO and TiO_2 are non-toxic and chemically stable under exposure to high temperature and are capable of photo-catalytic oxidation [4,5]. Zinc oxide system presents homogeneous and stable phases. The ZnO phase crystallizes in the Hexagonal structure with lattice parameters a = 3.249 Å, c = 5.206 Å, (JCPDS: 897-102).
In the present work, we have investigated contribution on the pre-studied zinc oxide films. XRD, UV-Vis spectrograph and hall effect were used to investigate the structural properties ,optical and electrical properties .

Methodology

The ZnO-Al thin films described in this work, were obtained by oxidation of amorphous Al doped zinc oxide layers pre-deposited by spray pyrolysis of $ZnCl_3 \cdot 6H_2O$ (0.03 M)-based aqueous solution and alumina nitrate ($AlNO_3$) added to the respective solution as doping source onto glass substrates heated at 200 °C. The sample is placed in Pyrex tube and thermally treated at 300 °C and 500 °C for 6 h as shown in Fig 1.

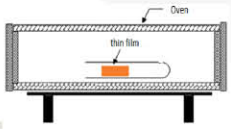

Fig 1: Thermal treatment of thin film

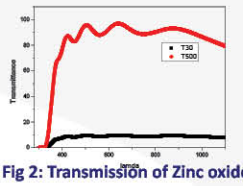

Fig 2: Transmission of Zinc oxide

Results and discussion

Figure2 shows optical transmittance of transparent films around 80% for optimized temperature, in fig 3 the X-ray diffraction patterns shows a crystallized Zinc oxide layers in Hexagonal structure at 500°C with preferential direction along (101) direction of the crystallites. The zinc oxide films have a single ZnO phase having good crystallinity .
Electrical measurements by hall effect analysis show that the obtained zinc oxide films are semiconductor N-type. The carrier concentration is determined by following formula: $U_H = \frac{IB_z}{nqt} = R_H \frac{IB_z}{t}$, with I is the current value is 12 A, B_z is a magnetic field, perpendicular to sample plane, n is a concentration of free carriers, t is a thickness of film, R_H is a hall constant, fig 4 shows the variation of U_H with magnetic field, from the slope $m = \frac{I}{nqt}$, we estimate the concentration of free carriers n.
n=21.8 10^{24} .

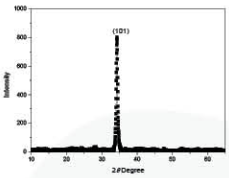

Fig3: X-ray diffraction of Zinc oxide

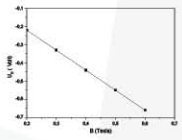
Fig 4: variation of U_H versus B

Conclusion

In this work, we showed that a thermal treatment thin layers of amorphous zinc oxide pre-deposited by spray pyrolysis may be done by a simple and nontoxic technique. We found that 500°C is the best oxidation temperature, favoring the appearance of thin films essentially composed of single ZnO phase, having good transmittance around 80% , the crystallite size is 172 nm and Zinc oxide films are N-type semiconducting material with high concentration of free carriers. Further investigations are needed to understand the effect of the temperature on the growth of the ZnO films.

Acknowledgments

We would like to thank the head of the physics department and doctor Jalel Ouerfelli who supervised us in this project and for his supporting this work .

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[5] Wang ZL. *Mater Sci Eng R 2009;64:33–71.*

Synthesis of Al doped Zinc oxide thin films Structural study

Summarized by Asma Abdullah Al Asmari & Bashaier Hussain Al-moalled - Umm Al Quraa university – Phyisics department

Abstract

We report in this work the structural properties of Zinc oxide films (ZnO-Al) obtained by oxidation of amorphous zinc oxide films pre-deposited by spray pyrolysis. The structure of the ZnO-Al films was investigated by UV-Vis spectrophotometer and X-ray diffraction (XRD), optical analysis reveal that optimized samples are transparent with band gap values arise 3.88 eV, XRD analyses showed that ZnO phase begin to appear at oxidation temperature of 500 °C

Introduction and objective

Recently enough attention was given to Zinc oxide because of the unusual structure and electronic properties , Metal oxide are more preferable than nano-silver because of cost consideration [1-3] , In fact ZnO and TiO_2 are non-toxic and chemically stable under exposure to high temperature and are capable of photo-catalytic oxidation [4,5]. Zinc oxide system presents homogeneous and stable phases. The ZnO phase crystallizes in the Hexagonal structure with lattice parameters a = 3.249 Å, c = 5.206 Å, (JCPDS: 897-102).
In the present work, we have investigated contribution on the pre-studied zinc oxide films. XRD, UV-Vis spectrograph were used to investigate the structural properties and optical properties .

Methodology

The ZnO-Al thin films described in this work, were obtained by oxidation of amorphous Al doped zinc oxide layers pre-deposited by spray pyrolysis of $ZnCl_3 \cdot 6H_2O$ (0.03 M)-based aqueous solution and alumina nitrate ($AlNO_3$) added to the respective solution as doping source onto glass substrates heated at 200 °C. The sample is placed in Pyrex tube and thermally treated at 300 °C and 500 °C for 6 h as shown in Fig 1.

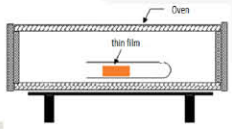

Fig 1: Thermal treatment of thin film

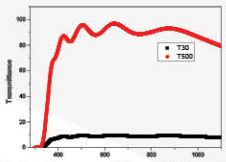

Fig2: Transmission of Zinc oxide

Results and discussion

Figure2 shows X-ray diffraction patterns of crystallized Zinc oxide layers, material which crystallized in Hexagonal structure at 500 °C. This spectrum depicts a preferential direction along (101) direction of the crystallites. the zinc oxide films become more stoichiometric with a dominance of the ZnO phase. At 500 °C, a single ZnO phase having good crystallinity was obtained.
Transmittance measurements show that zinc oxide films are transparent with 80% transparency. The size of the crystallites D in this direction is estimated using the Scherrer method: $D = \frac{k\lambda}{\beta \cos\theta}$ β is the full width at half-maximum (FWHM) of the main peak in the X-ray diffraction, k is a number taken equal to 0.9, λ is the wavelength of the X-ray, (15.48 nm for CuKα1) and θ is the diffraction angle. The dislocation density (δ) is estimated using the following equations: $\delta = \frac{1}{D^2}$, The micro strain (ε) are estimated using the following equations: $\varepsilon = \frac{\beta}{4\tan\theta}$, all results are summarized in table 1.

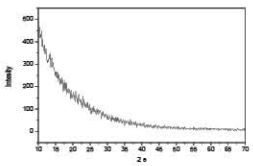

Fig3: X-ray diffraction of amorphous ZnO

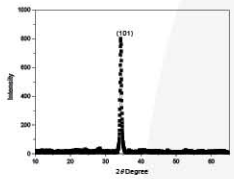

Fig 4: X-ray diffraction of ZnO

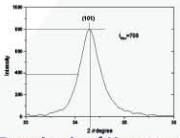

Fig 5: main pic of Hexagonal ZnO

Sample	2θ (deg.)	(hkl)	β (rad)	D (nm)	Dislocation density δ (10^{14} lines/m²)	Microstrain ε (10^{-3})
500°C	34.28	101	0.48	172	3.38	2.445

Crystallite size, dislocation density and micro strain for ZnO thin films at, 550°C

Conclusion

In this work, we showed that a thermal treatment thin layers of amorphous zinc oxide pre-deposited by spray pyrolysis may be done by a simple and nontoxic technique. We found that 500°C is the best oxidation temperature, favoring the appearance of thin films essentially composed of single ZnO phase, having good transmittance around 80% , the cristallite size is 172 nm and Zinc oxide films have low dislocation and microstrain. Further investigations are needed to understand the effect of the temperature on the growth of the ZnO films.

Acknowledgments

We would like to thank the head of the physics department and doctor Jalel Ouerfelli who supervised us in this project and for his supporting this work .

References

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[5] Wang ZL. *Mater Sci Eng R 2009;64:33–71.*

Synthesis of Al doped Zinc oxide thin films Optical study

Summarized by Azouf hussni shishah & Bayan Hassan bukari - Umm All Quraa university – Physisics department

Abstract

We report in this work the optical properties of Zinc oxide films (ZnO-Al) obtained by oxidation of amorphous zinc oxide films pre-deposited by spray pyrolysis. The structure of the ZnO-Al films was investigated by X-ray diffraction (XRD) and UV-Vis spectrophotometer XRD analyses showed that ZnO phase begin to appear at oxidation temperature of 500 °C, optical analysis reveal that optimized samples are transparent with band gap values arise 3.88 eV.

Introduction and objective

Recently enough attention was given to Zinc oxide because of the unusual structure and electronic properties , Metal oxide are more preferable than nano-silver because of cost consideration [1-3] , In fact ZnO and TiO_2 are non-toxic and chemically stable under exposure to high temperature and are capable of photo-catalytic oxidation [4,5]. Zinc oxide system presents homogeneous and stable phases. The ZnO phase crystallizes in the Hexagonal structure with lattice parameters $a = 3.249$ Å, $c = 5.206$ Å, (JCPDS: 897-102).
In the present work, we have investigated contribution on the pre-studied zinc oxide films. XRD, UV-Vis spectrograph were used to investigate the structural properties and optical properties .

Methodology

The ZnO-Al thin films described in this work, were obtained by oxidation of amorphous Al doped zinc oxide layers pre-deposited by spray pyrolysis of $ZnCl_3 \cdot 6H_2O$ (0.03 M)-based aqueous solution and alumina nitrate ($AlNO_3$) added to the respective solution as doping source onto glass substrates heated at 200 °C. The sample is placed in Pyrex tube and thermally treated at 300 °C and 500 °C for 6 h as shown in Fig 1.

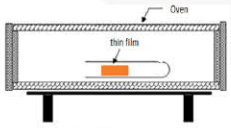

Fig 1: Thermal treatment of thin film

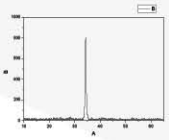

Fig2: X-ray diffraction of Zinc oxide

Results and discussion

Figure2 shows X-ray diffraction patterns of crystallized Zinc oxide layers, material which crystallized in Hexagonal structure at 500 °C. This spectrum depicts a preferential direction along (101) direction of the crystallites. At 300 °C, the formed phase have low transmission, around 10 % (Fig 3). At 500°C, the obtained phase becomes transparent with transmittance value 80% (Fig 3) and. The absorption coefficient α depends on the light-absorbing property of the films. This parameter can be calculated using Beer–Lambert's equation $\alpha(h\nu) = \frac{1}{d} Ln \frac{1}{T}$ where T is the transmittance and d is the film thickness, Absorption coefficient behavior is showed in fig 4. The energy gap (Eg) of the films can be calculated from the Tauc relationship $(\alpha h\nu) = A(h\nu - Eg)^{1/2}$, where A is a constant and $h\nu$ is the incident photon energy, the estimation of Eg value (fig 5) show that Zinc oxide films have a direct and gaps of about 3.88eV.

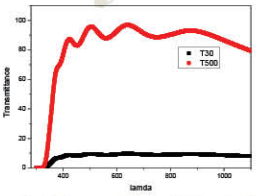

Fig3: Transmission of Zinc oxide

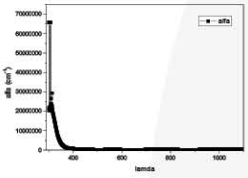

Fig 4: Absorption coefficient

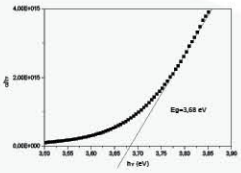

Fig 5: Band gap of Hexagonal ZnO

Conclusion

In this work, we showed that a thermal treatment thin layers of amorphous zinc oxide pre-deposited by spray pyrolysis may be done by a simple and nontoxic technique. We found that 500°C is the best oxidation temperature, favoring the appearance of thin films essentially composed of single ZnO phase, having good transmittance and Zinc oxide films have a direct and gaps of about 3.88eV. Further investigations are needed to understand the effect of the temperature on the growth of the ZnO films.

Acknowledgments

We would like to thank the head of the physics department and doctor Jalel Ouerfelli who supervised us in this project and for his supporting this work .

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[5] Wang ZL. *Mater Sci Eng R 2009;64:33–71.*

Indoor and outdoor Gamma Doserate exposure levels in some building of umm-Qura unversity

Jamil moussa, Ahmed Al-harithi
physics department, college of applied science, Umm al-Qura University, Kingdom of SaudiArabia

Abstract

The idea of monitoring ionization radiation levels indoor and outdoor in selected sites is not new at all, many researchers conducting ionization radiation survey around the globe, Survey taken by the world health organization (WHO) and the international commission on radiation protection (ICRP) shows that residents of temperate climate spends only about 20% of their time outdoor and about 80% indoors and certain materials use for the construction of such buildings (rocks soils) are known to be radioactive. Similar can exist anywhere and toke this responsibility to make these materials visible if they exist by taking readings via Hand Held Scintillation Survey meter (FH 40 G) by Thermo Scientific NaI(Tl) e survey meter that is highly sensitive to gamma radiation. The mean annual equivalent dose rate of the selected sites were computed for indoor and outdoor background radiation level to 0.37mSv/y and 0.724mSv/y respectively, and are in a good proportion below the world wide average dose of 2.4mSv/y.

Introduction

There are two main sources of such exposure: natural background and the medical uses of ionizing radiation. Natural radiation background sources are classified into two categories:-
1external sources of extraterrestrial sources such as cosmic radiation and cosmogenic and radiation of terrestrial origin. radiation in air, earth crust and building materials.
2Internal sources, comprising naturally occurring radionuclides that is taken into a human body.
There are three sources for naturally occurring of radiation
1- Cosmic Radiation
2 cosmogenic Radiation
3 Primordial Radiation –three series
The second includes almost exclusively the diagnostic applications of ionizing radiation in medicine. These medical applications include the use of X-rays and radioisotopes in diagnostic imaging. Both X-rays and radioisotopes are also used for therapeutic purposes, but even though the individual doses for these applications are high, the population exposed is limited These consumer applications, in general, do not contribute significantly to population dose, but since, in Some cases at least, they have been the object of worldwide attention, it is appropriate to record their contribution to the national collective dose. An example of radiation exposure from such a consumer application that has received a great deal of attention in the past is the emission of X-rays from television receivers. International Commission on Radiation Protection (ICRP) in 1990 set a worldwide annual equivalent dose rate limit of exposure to ionizing radiation to 1mSv/y for the protection of human beings and ildlife (ICRP, 1990) while the average effective dose rate limit of 2.4mSv/y was set by the United Nation Scientific Committee on the Effects of Atomic Radiations (UNSCEAR) for most indoor facilities such as research laboratories, conference halls, lecture venues, offices, etc. (UNSCEAR, 2000).
Previous studies have shown that areas with high background radiation are found in Yang jiang, China; Kerele, India as well as in Asia, maximum outdoor measurement was recorded in Malaysia and the maximum indoor measurement recorded in Hong Kong and Iran (Gholami et al., 2011). Indoor background ionizing radiation investigation is also important, because due to changes in lifestyle people spend more time indoors than outdoors. Surveys taken by the World Health Organization WHO and the International Commission on Radiological Protection ICRP show that residents of temperate climates spend only about 20% of their time outdoors and 80% indoors (their homes, offices, schools and other buildings) (Chad-Umoren et al., 2007).

Objective

To Generating dose mapping and Measuring Gamma exposure levels indoor and outdoor at some building of Umm-Al Qura university .

Results and Discussion

The result for the indoor and outdoor mean dose equivalent readings levels in selected sites around physics labs using Hand held Scintillation Survey meter the radiation mean dose equivalent readings listed at tables above The data show that outdoor dose equivalent slightly higher than indoor dose equivalent the lowest indoor recorded value is 0.3897mSv/y where the lowest outdoor value is 0.4295 mSv/y and highest indoor value is 0.504 mSv/y and highest outdoor value is 1.01 mSv/y this is variation resulted from differences in surroundings materials and the average of all indoor values is 0.37 mSv/y and the average of the outdoor is 0.724 mSv/y that's still low compare to the annual levels allowed for the public moreover we found that readings tend to be very close to each other when we took to close point around 1 meter at distance that's showing the role that types of ambient materials play at changing the exposure levels and the outdoor site denoted by blue L at map figures 1.2, and 1.3 above showing the variation in readings we got from measuring rocks at street side is the greatest value at 1.01 mSv/y which exceed the allowed limit by 0.01 mSv/y.

Conclusion

The mean annual equivalent dose rate of the selected sites were computed for indoor and outdoor background radiation level to 0.37mSv/y and 0.724mSv/y respectively, and are in a good proportion below the world wide average dose of 2.4mSv/y. In general all readings are close to each other and they are varying with respect to position in predictable patterns which reflects how safe are areas we have measured.

Acknowledgments

In the name of God, the Most Compassionate, the Most Merciful; Peace and Blessings of Allah be upon his last prophet, Muhammad. First of all, my thanks should go to ALLAH who creates us from nothing. Thanks all praise and glory be to Almighty Allah, I thank Allah for making it possible for me to complete this bachelor program and for giving me the strength to carry on this project and for blessing me with many great people who have been my greatest support in both my personal and professional life. I would like to express my special sincere gratitude and great appreciation to Prof. Taha Alfawwal for his continuous help and providing his expert advice during this study. Finally, I would like to express my deepest gratitude to the current chairman of physics department Dr. Omar Alsalmi, for his gentleness and understanding and all who help me in this project.

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Kingdom of Saudi Arabia
Ministry of Education
Umm Al Qura University
Faculty of Applied Sciences

Installation of Portable whole Body Counter

By
Waleed Al-Otaibi
Hazim Al-Hozali

Abstract

A device used to measure the low level of radioactivity inside a human body , and it usually contains a number of sensitive detectors and shields to block the surrounding radiation and to limit the absorption and retention of radionuclides that are administered for diagnostic or treatment purposes.
There are many types and each type has a backward way of measuring and arranging, and the best of these types is the engineering of the chair. This type is done in an inclined chair and the detector is installed at a certain distance.

Introduction

Nuclear decay, known as radioactive decay, occurs when an unstable atom loses energy by emitting ionizing radiation, and radioactive decay is a random process at the level of individual atoms, since according to quantum theory, it is impossible to predict when a particular atom will decay, in other words the nucleus does not have A radionuclide is a memory, so the probability of its destruction does not increase with the passage of time but rather remains constant regardless of how long the nucleus lasts, and during this unpredictable decay of this unstable nucleus, it randomly decays to form a different nucleus or a different energy state a, the so-called Gamma decay, forming radiation in the form of atomic blocks or high-energy rays, this decay occurs at a steady and predictable rate and is referred to as the half-life.

Objective

Reviewing background for whole body counters and types according the number of detectors and scanning mode. Shielding of the counters, and phantom calibration.

Results and Discussion

many types of whole body counter were studied , it include
Arc geometry ,Chair geometry Scanning with a single detector, Stationary arrays with Multidetector geometries, Scanning with Multi-detector geometries, Compoton Effect, Detection of Radiation, Many of its properties have been studied Pair production, The Radioactivity Decay

Conclusion

The best type of whole body counter is (chair geometry)
I recommend using this type to design portable whole body counter for measuring internal absorbed dose occupational workers in nuclear medicine departments of Makkah city and across over the Kingdom of Saudi Arabia .

Acknowledgments

I would like to express my special sincere gratitude and great appreciation to Prof. Taha Alfawwal for his continuous help and providing his expert advice during this study.

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مشاريع تخرج

العلوم الرياضية

كلمة رئيس قسم العلوم الرياضية

يولي قســـم العلوم الرياضية اولوية لتزويد الطلاب بأساسيات مهارات البحث العلمي بما يتناسب مع مستواهم العلمي وبما تحصلوا عليه من معارف خلال دراستهم لمقررات الخطة الدراسية ويتم ذلك من خلال مقرر المشـــروع البحثي حيث يتعلم ويتـــدرب عمليا على القراءة من المراجع العلمية واعداد وكتابة التقارير القصيرة ومناقشـــة الافكار مع المشرف والعمل ضمن فريق من الطلاب وقد تناولت المشـــاريع البحثية للطلاب في الفصل الدراسي الحالي موضوعات في مجالات التوبلوجي والحلـــول العددية للمعـــادلات التفاضلية والرياضيات التطبيقيـــة والاحصاء الرياضي.

د. عبدالله عوض الاحمري

كلمة وكيلة رئيس قسم العلوم الرياضية

تغذية الفكر هي شمس تشـــرق بطالب العلم في كل حين ، وحصاد العلم هو تاج من نور يضئ نبراس المتعلمين مـــدى الحياة . وها نحن اليوم نتوج بفخر حصاد مشـــاريع تخرج فلذات أكباد طالبات قسم العلوم الرياضية . فبارك الله لكم في علمكم ، وبارك الله لنا فيكم جيلاً يحتذي رؤية 2030 سلماً لنجوم العلم والارتقاء .

د. أمل بنت أحمد العيدروس

قسم العلوم الرياضية	العـــــدد
عدد الملصقات العلمية (طلاب)	4
عدد الملصقات العلمية (طالبات)	12
عدد الطلاب	17
عدد الطالبات	52
عدد المشرفين	4
عدد المشرفات	7

Posters

الملصقات العلمية

لمشاريع التخرج

قسم العلوم الرياضية

بكالوريوس

Title: AN EXPLORATION OF MATHEMATICAL APPLICATIONS IN CRYPTOGRAPHY

Names: Salman Alagili, Emad Althqfy, Nawaf Alhassani and Sultan Alrishi
University: Umm Al-Qura University

Abstract

Cryptography is the science of providing security for information; it has been used historically as a means of providing secure communication between individuals. Message encryption has become very essential to avoid the threat against possible attacks by hackers during transmission process of the message. In this report, we introduced the cryptography techniques with focus on techniques based on number and group theories.

Introduction

Cryptography, the mathematics of encryption, plays an indispensable part in numerous fields, and a vast range of daily activities, such as electronic commerce, bankcard payments and electronic building and so on. Cryptography is the only most important tool that avoids the threat against possible attacks by hackers during transmission process of the message. It is one of the cornerstones of Internet security.

There three main types of Cryptography that concerns how the encryption is completed. The first one is symmetric encryption which uses only one key (a secret key) both to encrypt and decrypt, the other is asymmetric encryption that uses two keys one key encrypts, and the other can decrypt, the last is hash Function which takes any number of data segments and returns a fixed-length string of b it is called the hash value.

Encryption algorithm discuss the strength of encryption and encryption key size. The most common algorithms are Data Encryption Standard (DES), TripleDES, Advanced Encryption Standard, Two-fish and RSA.

RSA.

In this work we focused on RSA. RSA is a public-key encryption algorithm and the standard for encrypting data sent over the internet. Also, we studied The Diffie–Hellman (DH) key exchange method allows two parties that have no prior knowledge of each other to jointly establish a shared secret key over an insecure channel and its relation to affine and cyclic groups.

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Discussion

Worked example for RSA

Step 1: Choose large prime numbers $p \neq q$, for simplicity let P= 7, q =11,

Step 2: Calculate the value of n =p×q= 77,

Step 3: (p-1)×(q-1)=60 → Public key (e) = 13 not factor of (p-1) & (q-1),

Step 4: Choose Private key as d, such that (d×e) ≡(p-1)×(q-1)=1

(d×13)≡60 = 1 → Private key(d) = 37

Step 5 (Encryption): Cipher text (ct) = Plaintext(pt)^e mod n,

ct = $(5)^{13} \equiv 77$ → ciphertext = 26

Step 6 (decryption): pt=(ct)d mod n,

pt = $(26)^{37} \equiv 77$ → Plaintext = 5.

Worked example for DH

Step 1: Select public large prime numbers p and generator g, let p=23, g=7,

Step 2:
- One side chooses a secrete large integer x< p, let x=3, then calculate secret r1 = $g^x \equiv p \rightarrow r1=7^3 \equiv 23 \rightarrow r1 = 21$
- The other chooses a secrete large integer y=6 than calculate secret r2 = $g^y \equiv p \rightarrow r1=7^6 \equiv 23 \rightarrow r2 = 4$
- They exchange r1 and r2

Step 3: both sides calculate shared key k=($r1^y$ OR $r2^x$) ≡ p

k= $4^3 \equiv 23$ Or k = $21^6 \equiv 23 \rightarrow k = 18$

Step 4: k is shared secret that used to encrypt and decrypt data.

Conclusion

RSA and DH work differently but both are used for communicating between different parties. RSA uses two key as private and public key. It has different algorithm compared to DH. But RSA is more secure compared to DH. With DH it is subjected to man-in-the-middle attack since it cannot authenticate two parties. Both algorithms have advantages and disadvantages. In future both algorithms could be modified for better performance. RSA can be combined with ECC to improve the security and performance. DH can be integrated with digital and public key certificates to prevent from attacks.

Objective

Confidentiality of the message: only the authorized recipient should be able to extract the content of the cypher. In addition, obtaining information about the content of the message (such as a statistical distribution of certain characters) should not be possible, once the cryptographic analysis becomes easier .Message integrity: the recipient must be able to determine if the message was altered during transmission . Authentication of the sender: the recipient should be able to identify the sender and verify if it was him who sent the message.

Acknowledgments

We sincerely thank Dr. Mohamed E. Ghoneim, who accompanied us on our journey to complete this research and made clear imprints through his guidance, constructive criticism and academic support.

Results

Learn about cryptography and know some encryption methods, including the RSA method And Asymmetric Encryption And Symmetric encryption Classical Cryptography, and others

LAGRANGIAN AND HAMILTONIAN FORMULATION

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Yousef Atyah Althagafi , Fahd Ali Al Mahrez.
Under the supervision of : Dr. Mohammad Bilal

Abstract

In this project, we study the basics of Lagrangian and Hamiltonian formulation of Newtonian mechanics.

Introduction

The Lagrangian formulation of mechanics is an alternative to the classical form which is based on Newton's laws. The Lagrangian formalism and Hamiltonian formalism are independent under coordinate transformation which is the starting point for general relativity where Cartesian coordinates does not exist.

Objective

The present project is an attempt to study the basics of Lagrangian and Hamiltonian formulation of Newtonian mechanics.

Results

1- Newton's mechanics is easy to apply in Cartesian coordinates.
2- The Lagrange formula helps solve problems in generalized coordinates and Hamilton's formula is an extension of it.

Discussion

In Lagrangian mechanics, the path of the system of particles is obtained by solving the equation of motion, known as Lagrange's equation. The Lagrangian mechanics was further extended by the introduction of scalars through some transformations. This scalar is denoted by H, known as Hamiltonian, counting the double number of variables but make the equation of motion of first-order in contrast to Lagrange's equation which is second-order differential equations.

Conclusion

Newton's mechanics may be difficult to use in Cartesian coordinates, so we resort to the Lagrange's and Hamilton's formulas to work on transforming coordinates and solving problems easily.

Acknowledgments

Our deepest gratitude goes first to Allah, then our sincere appreciation to our supervisor Dr. Mohammad Bilal for his constant encouragement and valuable suggestions that contributed to the success of this project.
We are also thankful to Dr. Abdullah Ahmari, for providing the necessary facilities to doing this project.

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Mathematics Become more easier with MATLAB

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Abstract

In this project, we explain how Matlab can get mathematics more easiear. Learn its features and how can be used to help student in all subject of analysis and algebra

Introduction

MATLAB is a powerful langauge for technical computing. The name MATLAB stands for MATrix LABoratry, because its basic data element is a matrix(array).
MATLAB can be used for math computations, modeling and simulations,data analysis.
MATLAB is widely used in universities and colleges in introductry and advanced courses in mathematics.
In Industry, the software is used in research, development and design.

Objective

At the end of the project, student should be able to do calculations and print out graphs.
-enable the student to learn MATLAB command and how use them to solve many different mathematical subject.

Results

The student can using MATLAB's command in many applications in mathematics . In this project, we show that MATLAB is an effective software to solve many problems in analysis and algebra.

Conclusion

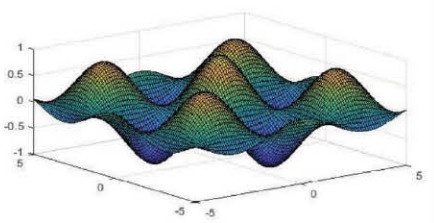

Figure 4.1: Example1.3

```
>z = cos(x).*cos(y).*exp(-sqrt(x.^2+y.^2)/20);
>surf(x,y,z)
```

We believe that MATLAB can play an important role for understanding mathematics. This project presents the innovative approach that the software should be considered as a one of the preliminary courses.

Acknowledgments

We thank the entire faculty and staff of the Mathematics department for the education and support we received throughout all our time in mathematical department.
Profound gratitude to Dr. Wajdi Kallel for proposing the problem, for his most valuable suggestions and criticisms.

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Metrizable Topological Space

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Umm Al-Qura University

Abstract

Metrizable topological space is a topological space that is homeomorphic to a metric space. That is, a topological space (X,τ) is said to be metrizable if there is a metric $d:X\times X\to [0, \infty)$ such that the topology induced by d is τ .We investigate some properties of metrizable space.

Introduction

Maurice Fr´echet in 1905 and in particular in his doctoral dissertation in 1906 considered a distance functional Hausdorff gave the latter the name of metric spaces in 1914. For many years topologists' attention was focused on metric spaces such as Gross, Urysohn, Hilbert and Anderson. One of the most important and frequently used ways of imposing a topology on a set is to define the topology in terms of a metric on the set. Topologies given in this way lie at the heart of modern analysis and called Metrizable topological Space . In this research we will study the metrizable topological space and investigate some properties of it.

Objective

- Review some basic notions and facts of topological space.
- Review some basic notions and facts of metric space and give a number of examples and some properties of metric space.
- Prove that any metric space is topological space, but the converse is not always true.
- Define the metrizable space and give a number of examples.
- Study some properties of metrizable space the such as T_0, T_1, T_2 T_3, T_4 -Space, normal, regular, first countable, second countable, Separable and Lindelof.

Results

Metrizable space is T_0, T_1, T_2, T_3, T_4 -Space, normal, regular, first countable, For metrizable space , separability equivalent to second countability and the same is true of metrizable spaces which are Lindelof.

Discussion

- Any metrizable is T_2 – space.

Since for every distinct points x,y there exist two disjoint open sets U,V such that $x\in U$, $y \in V$.

- Any metrizable space is T_1 and hence T_0 .

Since it is T_2 – space.

- Any metrizable space is Regular.

Since for every nonempty closed set A and $x\notin A$ there exist two disjoint open sets U,V such that $A\subseteq U$, $x\in V$.

- Any metrizable space is T_3 - space.

Since it is T_1-Space and regular.

- Any metrizable space is normal.

Since for every disjoint nonempty closed sets A,B there exist two disjoint open sets U,V such that $A\subseteq U$, $B \subseteq V$.

- Any metrizable is T_4-Space.

Since it is T_1-Space and normal.

- Any metrizable is first countable.

Since for every point there is a countable local base.

- Not every metrizable is second countable.

Since the discrete topological space is metrizable which is not second countable.

Necessary and sufficient conditions for second countability of metrizable space will follow from this theorem [1]

- For a metrizable topological space X, the following are equivalent:

1. X is second countable.
2. X is Lindelof.
3. X is separable.

Conclusion

Metrizable space satisfy every T_i separation property. Furthermore, Metrizable space is fully T_4 , thus fully normal and regular. Also it is first countable but not second countable. Metrizable space is second countable if and only if it is separable or Lindelof.

Acknowledgments

First, all my thanks are to Allah the almighty whom be ascribed all perfection and majesty. I would like to take this opportunity to acknowledgement Umm Al-Qura University and the faculty of science , for providing me all kinds of help during the completion of this work. I would also like to express my acknowledgement to my supervisor Dr. Wafa Alqurashi for his guidance. Last, I am greatly indebted and grateful to my parents, my friends.

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Goodnes Of Fit Test For Skew Normal Distribution

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Abstract

In this project, we study the goodness-of-fit tests for skew normal distribution. We apply two types of goodness-of-fit tests, one is Pearson's χ^2 test and another one is Kolmogorov-Smirnov test. To illustrate the power of the discussed methods, we apply the procedure to simulated and real data sets.

Introduction

Normal distribution is one of the most common continuous distributions. It has a curved bell shape but it skewed. Azzalini (1985) introduced a new class of normal distribution with one extra skewness parameter λ which is the skew normal distribution is more flexible in fitting data especially for skewed data because of these attractive properties of this distribution, it is also useful to develop it goodness of fit tests for skew normal distribution to determine if a given set of data follows a skew normal distribution or not.

Objective

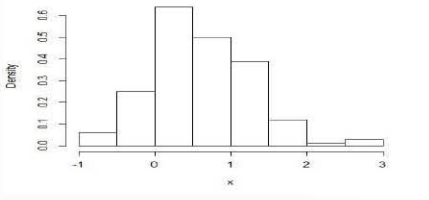
The application of two goodness-of-fit tests are Pearson's χ2 test for Skew Normal Distribution and Kolmogorov-Smirnov test for Skew Normal Distribution.

Discussion

Firstly, we simulate a sample of 200 random variables from a skew normal population with skew parameter λ= 2 using the "sn" package in R. with the following descriptive statistics

N	Mean	Median	Var	SD	Max	Min	Skewness	Kurtosis
200	0.6260	0.5603	0.409739	0.6401086	2.9994	-0.6260	0.5731602	3.979207

To test the following hypothesis:
H_0:The simulate 200 random variables is follow a skew normal population with skew parameter λ=2.
H_a:H_0:The simulate 200 random variables is not follow a skew normal population with skew parameter λ=2.
The histogram of the simulation data is skewed to the right and the data values range between -1 and 3 as the follow



In the following table we applying Pearson's χ^2 test to the sample

Interval	N_i	P_i	N_i*P_i	m_i
(-∞,-0.5]	6	0.02537633	0.152258	5.075266
(-0.5,0]	25	0.1222073	3.055182	24.44146
(0,0.5]	64	0.2607176	16.68593	52.14353
(0.5,1]	50	0.2761071	13.80536	55.22142
(1,1.5]	39	0.1820179	7.0987	36.40359
(1.5,2]	12	0.08807374	1.056885	17.61475
(2,∞)	4	0.04549995	0.1819998	9.09999

the χ^2 test statistic of simulation data is 8.204038 with degree of freedom df=7-1=6 and α=0.05, so the critical value $\chi^2_{(0.05,6)} = 12.59159$.
We note that $\chi^2 < \chi^2_{(0.05,6)}$ we fail to reject the null hypothesis. Hence the simulate data skew normal population with skew parameter $\lambda = 2$.
Secondly, we study the age at which one of the twins first received a cold, with the following data

Subject	1	2	3	4	5	6	7	8	9	10
z_i	13.88	7.79	17.63	12.32	9.59	15.38	13.10	11.54	10.70	14.72

We use the K-S test to test the following hypothesis:
H_0: The ages at which one of twins first received a cold follows a skew normal distribution with parameter(λ=-0.4)
H_a: The ages at which one of twins first received a cold not follows a skew normal distribution with parameter (λ=-0.4)
We find the population mean μ= 14 and the population standard deviation is σ= 3
To find the value of test statistic D, we using the following table

y_i	-2.07	-1.47	-1.10	-0.82	-0.56	-0.30	-0.04	-0.24	-0.61	1.21
P_i	0.032	0.109	0.199	0.281	0.390	0.497	0.605	0.712	0.829	0.943
$\max(\frac{i}{n}-P_i, P_i-\frac{i-1}{n})$	0.068	0.091	0.101	0.119	0.110	0.103	0.095	0.088	0.071	0.057

From the above table we find the value of test statistic D is 0.119 also at $\alpha = 0.10$ and n=10, the critical value D_α is 0.32 Since $D_{statestic} < D_\alpha$ then we fail to reject the null hypothesis. Thus, the age at which one of the twins first received a cold follows a skew normal distribution.

Conclusion

Firstly we conclude the goodness of fit tests illustrate the data in general can be better described by skew normal distributions, secondly we show how the data in the previous two examples followed the skew normal distributions and this what we did in our project.

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θ-Convergence theory of filters and nets

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Abstract

Filters and nets are both very important tools in topology. In this research, we study the concepts of θ-closed sets, θ-limit and θ-adherent point of filters and nets. Some properties are discuss

Introduction

In 1968, N.V.Velicko introduced the concept of θ-Closed set. In 1995, YAALCUM KUCK introduced the concept of θ-limit and θ-adherent points of filter and net . In this research , we study the convergence theory in topology by : the concept of θ-convergence of filters and nets. Also, we study the θ-closed sets. In section 2 and 3 , we study the filters and nets , also, we discuss the convergence theory of filters and nets. In section 4 we study the relation between filters and nets. In section 5, we study the concept of θ-closed sets with some properties are discussed. In section 6, we discuss the θ-convergence theory of filters. In section 7, we discuss θ-convergence theory of nets

Objective

The purpose of this research is to study θ-convergence of filters and nets in order to provide some properties and theories related to them

Discussion

θ-Closed sets: Let (X,τ) be a topological space. and $A \subseteq X$.
A point $x \in X$ is called a θ-adherent point of A if $\forall u \in \tau$, $x \in \mu$, $A \cap cl(u) \neq \emptyset$
The set of all θ-adherent point of A is called the θ-closure of A denoted by θ.cl(A). A is θ-closed iff $A = \theta.cl(A)$. The complement of θ-closed set is θ-open set.
Some Properties of θ-closed set :

(1) $A \subseteq \theta.cl(A)$
(2) X, θ are θ-closed sets in X بتكافلا انه.
(3) If $A \subseteq B$, then $\theta.cl(A) \subseteq \theta.cl(B)$
(4) θ.cl(A) is closed set in X.

Definition: let (X,τ) be a topological space and F be a filter on X .
(i) $x \in \theta.lim(F)$ then $\forall u \in \tau$, $x \in u$,$\exists F \in F$ s.t $F \subseteq cl(u)$
(ii) $x \in \theta.adh(F)$ then $\forall u \in \tau$, $x \in u$, $\forall F \in F$ s.t $F \cap cl((u)) \neq \emptyset$
Some Properties of θ-convergence and θ-accumulates in Filters :

(1) $\theta.lim(F) \subseteq \theta.adh(F)$
(2) $lim(F) \subseteq \theta.lim(F)$
(3) $adh(F) \subseteq \theta.adh(F)$
(4) $\theta.lim(F)$ and $\theta.adh(F)$ are both closed set in X.

Definition: let (X,τ) be a topological space and $S = (S_n : n \in D)$ be a net in X.
(i) $x \in \theta.lim(S)$ then $\forall u \in \tau$, $x \in u$ $\exists n \in D$ s.t $\forall m \in D$,$m \geq n$ then $S_m \in cl(u)$
(ii) $x \in \theta.adh(S)$ then $\forall u \in \tau$, $x \in u$ $\forall n \in D$ s.t $\exists m \in D$, $m \geq n$ then $S_m \in cl(u)$

Some Properties of θ-convergence and θ-accumulates in nets :

(1) $lim(S) \subseteq \theta.lim(S)$
(2) $adh(S) \subseteq \theta.adh(S)$
(3) $\theta.lim(S) \subseteq \theta.adh(S)$ بتكافلا انه.

Conclusion

The convergence theory of filters and nets is one of the most important tools in general topological spaces. The theory of θ- closed sets, θ-convergence of filters and nets which presented in this research by using open neighborhoods are very significant tools to study the topological space. There is still a lot of results for future investigation ,for example: characterization of continuous mapping by θ-convergence theory of filters and nets .

Acknowledgments

We thank God for helping us in for her completing this graduation project, and we are pleased to thank our families for their support and encouragement. We would like to take this opportunity to acknowledge our great appreciation for Umm Al-Qura University, the faculty of science, particularly the mathematical sciences department for providing all kinds of help throughout this project. We wish to express our sincere gratitude to our supervisor Dr.Noha Mohammad Seyam continuous support, immense knowledge and valuable advice .

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A Comparison Study Between Classroom And Online Courses Using Kruskal Wallis Non-Parametric Test.

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Wejdan Al-Alyani.

Abstract

The study with the aim of finding out the effectiveness of classroom courses education for the first semester of 2019 compared to online courses education for the first semester of 2020.

Introduction

The Ministry of Education was able to continue the educational process with complete success during the exceptional circumstances of the Corona "Covid-19" pandemic, which hit the world, and proved its ability and competence in carrying out its mission without interruption in the process of teaching and learning, through the e-learning and distance education systems.
Despite efforts to control the emerging coronavirus in most countries of the world, the crises left by the pandemic are exacerbated in many economic and health issues. It seems that the education file will not survive the effects of the devastating Corona crisis!! In this research, we will show the difference between online learning and attendance education.

Objective

The current study aims to compare between face to faces courses and online classes of their impact on the student's rate in terms of:

- Measuring the quality of the semester GPA.
- Calculating the number of academic hours that the student consumes.
- The extent of the diversity in the examination methods/ Homework's and the methods of submitting them.
- Measuring the ease with which the university student communicates with the lecturer and the classmates.
- Measuring the impact of the environment and the environment on the student GPA.

Methodology

Type and method of study :
Our study classifies this within the descriptive research that monitors , the descriptive research that monitors the reality of the phenomenon and analyzes it according to specific data and variables ,Therefore we adopted a descriptive survey method for the effect of remote or face study using the questionnaire tool, the study adopted the available sample method it was based on this method of surveys, and that the goal of the study , as we mentioned earlier, was to work on examining the preference for remote or face study for 2019,2020 at umm Al-Qura University it is not for generalization , to all university students in the available sample method was chosen after adopting the withdrawal of 13.8 percent from the community to study .They are students of Umm Al-Qura University.

Study concepts and terms:

- Arithmetic Mean:
- Maximum: highest value.
- Minimum: less value.
- Range

The Kruskal Wallis: a non-parameterized test used to detect whether samples follow a certain distribution of the same or not used to compare two or more samples of the same size or different.
The Kruskal Walls test is used when the scores on the dependent variable are within a hierarchical scale or when the ratio scale .The distance scale is not met.

Hypotheses:
The Kruskal Walls test examines the null hypothesis that the distribution of scores in societies for each group is identical and the alternative hypothesis that there are at least two communities that differ from each other in terms of location.

Assumption:
There are several assumptions that must be fulfilled before using the Kruskal Walls test, which are :
1. Randomness in selecting samples from the community.
2. Independence of samples from each other.. Possibility to give ranks of values within each of the samples.

Law Kruskal Walls:

$$H = \frac{12}{N(N+1)} \sum_{j=1}^{K} \frac{Rj^2}{nj} - 3(N+1)$$ (see [3]).

Results

GPA:
GPA for the first semester (2020 and 2019):
•**Descriptive Statistics:**

Variable	Percent	Mean	SE Mean	StDev	Minimum	Median	Maximum	Range
GPA| 2019	100	[illegible]	[illegible]	[illegible]	1.2000	[illegible]	[illegible]	[illegible]
GPA| 2020	100	[illegible]	[illegible]	[illegible]	1.7800	[illegible]	4.0000	[illegible]

From the above table, it turns out that both the Mean and the Median for 2019 and 2020 are very close bout to the student rate, and shows us that the increase in 2020 was of this by a small difference in both the Mean and the Median and Took the highest value.

The ability to retrieve (from the lecture) was good?
Recalling (retrieving) information from lectures that were in 2020 by remote higher than in 2019, in which the threshold was in attendance at the university.
•**Descriptive Statistics**

Year Scholastic	N	Median	Mean Rank	Z-Value
2019	69	4	73.3	1.11
2020	69	3	65.7	-1.11
Overall	138		69.5	

Test

Null hypothesis	H_0: All medians are equal		
Alternative hypothesis	H_1: At least one median is different		
Method	**DF**	**H-Value**	**P-Value**
Not adjusted for ties	1	1.24	0.266
Adjusted for ties	1	1.46	0.227

Results

Semester GPA level
The semester average was good?
•**Descriptive Statistics:**

Variable	Percent	Mean	StDev	Minimum	Median	Maximum	Range	Mode	N for Mode
Semester GPA level| 2019	100	3.014	[illegible]	1.000	4.000	4.000	3.000	4	[illegible]
Semester GPA level| 2020	100	3.188	1.141	1.000	4.000	4.000	3.000	4	41

We note from the above table that the mean for 2020 is 3.188, i.e. (cautiously agreed) that the cumulative rate was good for the semester as well as in 2019, but the mean was slightly lower and equal to 3.014, while they have the same Median value, as they agree that the rate was good for both years and so the Null Hypotheses is achieved.

Level of understanding:
Was your level of understanding and receiving the information good?
•**Descriptive Statistics:**

Variable	Percent	Minimum	Median	Maximum	Range	Mode	N for Mode
Level of understanding| (2019)	100	1.000	4.000	4.000	3.000	4	37
Level of understanding| (2020)	100	1.000	[illegible]	4.000	3.000	4	29

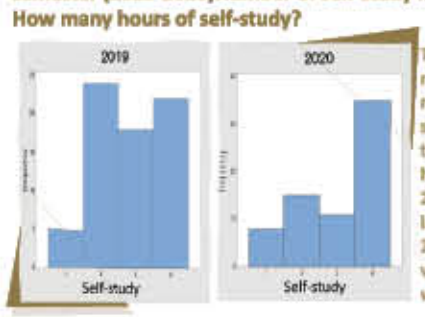
The following table shows us that the absorptive capacity of students in both years is different. It is clear to us that the mediator is equal to 4.00 and the agreement was provided for in 2019, while in 2020 the mediator was lower and the agreement was provided for with caution.

Information acquisition:
Was getting information in this class good?
•**Descriptive Statistics:**

Variable	Percent	Minimum	Median	Maximum	Range	Mode	N for Mode
Information acquisition| (2019)	100	1.000	[illegible]	4.000	3.000	4	27
Information acquisition| (2020)	100	1.000	[illegible]	4.000	3.000	4	36

The following table shows us the Information acquisition in students for 2020 and 2019, where the value of the middleman for them shows us. In 2019 the largest value of the middleman is 4.00, i.e. the students agreed to the information acquisition well, whereas the value of the middleman for 2020 was 3.00, which shows a agree with caution.

Self-study:
semester (2019-2020)Number of self-study hours for the:
How many hours of self-study?



The chart shows us how many hours a week a request spends in self-study, where it is clear that the study was 3-4 hours for 24 votes in 2019 and held the largest values, while in 2020 the most ratio of voting was 5-6 hours a week for 35 votes.

Was it good to get the information in this class?
Obtaining good information in the year 2019 that the study in attendance at the university was greater and higher than obtaining it in the year 2020, which was a remote study.
•**Descriptive Statistics**

Year Scholastic	N	Median	Mean Rank	Z-Value
2019	69	4	74.7	1.52
2020	69	3	64.3	-1.52
Overall	138		69.5	

Test

Null hypothesis	H_0: All medians are equal		
Alternative hypothesis	H_1: At least one median is different		
Method	**DF**	**H-Value**	**P-Value**
Not adjusted for ties	1	2.32	0.127
Adjusted for ties	1	2.66	0.103

The level of duties was somewhat satisfactory?
In 2019, when the study was in attendance at the university, the duties were very satisfactory, but in the year 2020 when the study was remotely, the assignments were not satisfactory to some extent.
•**Descriptive Statistics**

Year Scholastic	N	Median	Mean Rank	Z-Value
2019	69	3	87.5	5.28
2020	69	1	51.5	-5.28
Overall	138		69.5	

Test

Null hypothesis	H_0: All medians are equal		
Alternative hypothesis	H_1: At least one median is different		
Method	**DF**	**H-Value**	**P-Value**
Not adjusted for ties	1	27.86	0.000
Adjusted for ties	1	30.92	0.000

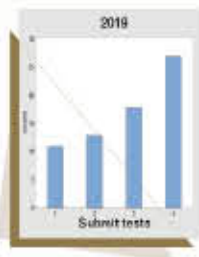
Was Exam Good for Students?
Yes, taking the exams was very good for students, whether the exams were in-attendance or via distance learning
•**Descriptive Statistics**

Year Scholastic	N	Median	Mean Rank	Z-Value
2019	69	3	74.4	1.44
2020	69	3	64.6	-1.44
Overall	138		69.5	

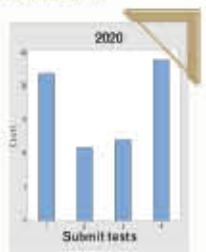
Test

Null hypothesis	H_0: All medians are equal		
Alternative hypothesis	H_1: At least one median is different		
Method	**DF**	**H-Value**	**P-Value**
Not adjusted for ties	1	2.08	0.149
Adjusted for ties	1	2.26	0.132

Presenting tests:
How to apply for a test that was good for students?



In the diagram, the highest number of votes in favor of the agreement was 27 in 2019, while in 2020 the highest number was also 24.



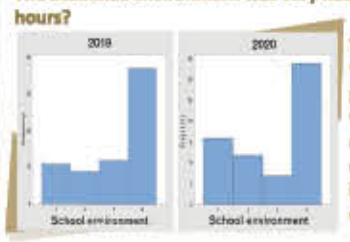
Communication with the Doctor / Lecturer was fast and good?
Yes, communication with doctors in the lectures was good and fast in both years, i.e. in 2019 when the study was attended and 2020 when the study was remote.
•**Descriptive Statistics**

Year Scholastic	N	Median	Mean Rank	Z-Value
2019	69	3	72.8	0.96
2020	69	3	66.2	-0.96
Overall	138		69.5	

Test

Null hypothesis	H_0: All medians are equal		
Alternative hypothesis	H_1: At least one median is different		
Method	**DF**	**H-Value**	**P-Value**
Not adjusted for ties	1	0.92	0.337
Adjusted for ties	1	1.07	0.302

Academic environment:
The academic environment was very healthy during the school hours?



The diagram shows that the number of well-prevailing votes in both years is student agreement on a good educational environment in both online and classroom courses.

Conclusion

In the conclusion of this research, we dealt with several point that benefit students, and the comparison was mad in both: First: In 2019, when the study was in attendance at the university . Second : In 2020, when the study was remote (during the outbreak of the Corona virus). We also presented studies on our topic (A Comparison Study Between Classroom And Online Courses using Kruskal Walls non- parametric test) that clarify the extent of students adaptation to studying remotely and also the extent of the difficulty and ease of studying in both years . Also, some students who achieved and increased their level in studying remotely. And the questionnaire also showed the extent to which much is consistent with the ease of study that was remotely in the year 2020 and that the only problem is the weakness of the Internet and the suspension of the site .. And they also agreed that the environment. The occasion for the study was in the year 2019, when the study was in attendance. This project was completed, and the research was written in cooperation with all group members.

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الحمد لله الذي اعاننا وفقنا لإتمام بحثنا هذا ، نتقدم بجزيل الشكر و التقدير لمشرفتنا د. حصه الزهراني على جهودها المستمرة في ارشادنا منذ بداية البحث حتى نهاية. كما نتقدم بالشكر والعرفان لكل من قام بدعمنا و تشجيعنا من الأهل و الأصدقاء لإتمام هذه المسيرة التعليمية و اسأل الله العلي القدير التوفيق و السداد لنا ولكم والحمد لله رب العالمين.

Studying The Effect of Lock Down Period Using Sign Test In Makkah

Student names: Nawal Althubiani ,Muna Alomari ,Ghaidaa Alhrbi,Azizah Azani
Supervisor name : Dr.Hissa AlZahrani

Umm Al-Qura university , Deprtment of Mathematical Scinences

Abstract

Using the signal test to study the effect of the ban period in Makkah. The research aims to know the impact of family relationships during the ban period, to know the impact of psychological problems during the ban period, to know the impact of physical problems during the ban period, and to know the impact of physical problems during the ban period. Knowing the impact of financial problems during the ban period Using the statistical hypothesis test, we reached an improvement in family, physical, and financial relationships, as for psychological problems increased during the ban period

Introduction

For the period of the ban a major role in treating many diseases that killed millions throughout history and in the absence of a proven treatment or vaccine for the Covid-19 epidemic ,some governments have tended to impose restrictions and measures that include prevention . while studying this resesrch ,we used the non parametric sign test. it is an easy to use and useful test through which we determine whether the ban period has had a positive impact on family ,physical ,psychological and financial relationships

Objective

-knowing the impact of family relations during the ban period
-knowing the impact of psychological problems during the ban period
-Knowing the impact of physical problems during the ban period
-Knowing the impact of financial problems during the ban period

Methodology

non-parametric test covers techniques that do not rely on data belonging to any parametric statistics it includes non-parametric descriptive statistics statistical models inference and statistical tests.[1]
For example is sign test:
The sign test is probably the simplest of all the non parametric method .the sign test is similar to the paired t-test , as it takes the differences between the two related samples of scores.[2]

Uses of sign test non-parametric:
1. The sign test is used because it is from a single sample and the data is ofordinal type.
2. Use of the sign test for the median in the presence of ties the sign test wasdeveloped to examine the median difference of paired samples[3]
3. Use of the sign test to supplement the percentage better statistic. The uti-lization of an accuracy measure such as Percentage Better can be made more10
meaningful if it is supplemented with a statistical test of the significance of theresults[4].

Method:
1. Assigning plus signs to sample data points whose values are greater than andminus signs to ones whose values are less than . Note that values which equalare not consider. Plus signs and minus signs represent right side and left side
2. If the number of plus signs is nearly equal to the number of minus signs , thennull hypothesis Ho is true is in other words, that the proportion of plus signsis significantly different from 0.5 cause to rejecting Ho [5].

Results

In our opinion, the ban affected family relationships, physical and psychological problems, and financial problems
It increased family relationships and increased physical, psychological and financial problems
This is what he supports
Signal test attached to the following picture

1-state the hypotheses and identify the claim:
Hypothesis: the family relationships increase in ban period.
Descriptive Statistics

Sample	N	Median
FAMLY	277	3.8

Test

Null hypothesis	H_0: η = 3
Alternative hypothesis	H_1: η > 3

Sample	Number < 3	Number = 3	Number > 3	P-Value
FAMLY	22	15	240	0.000

2-Make the decision:
the value of the p-value is less than 0.05, then the decision is to reject the zero hypothesis

3-Summarize the results:
There is enough evidence to reject the claim that median not more than 3 , meaning that the family relations increase

1-state the hypotheses and identify the claim:
Hypothesis: the physical problems increase in ban period
Descriptive Statistics

Sample	N	Median
Physical	276	3.4

Test

Null hypothesis	H_0: η = 3
Alternative hypothesis	H_1: η > 3

Sample	Number < 3	Number = 3	Number > 3	P-Value
Physical	68	22	186	0.000

2-Make the decision:
the value of the p-value is less than 0.05, then the decision is to reject the zero hypothesis

3-Summarize the results:
There is enough evidence to reject the claim that median not more than 3 , meaning that the physical problems increase.

1-state the hypotheses and identify the claim:
Hypothesis:the psychological problems increase in ban period
Descriptive Statistics

Sample	N	Median
Psychological	273	3.8

Test

Null hypothesis	H_0: η = 3
Alternative hypothesis	H_1: η > 3

Sample	Number < 3	Number = 3	Number > 3	P-Value
Psychological	48	12	213	0.000

2-Make the decision:
the value of the p-value is less than 0.05, then the decision is to reject the zero hypothesis

3-Summarize the results:
There is enough evidence to reject the claim that median not more than 3 , meaning that the psychological problems increase.

1-state the hypotheses and identify the claim:
Hypothesis:the financial problems increase in ban period.
Descriptive Statistics

Sample	N	Median
financial	274	4

Test

Null hypothesis	H_0: η = 3
Alternative hypothesis	H_1: η > 3

Sample	Number < 3	Number = 3	Number > 3	P-Value
financial	8	8	258	0.000

2-Make the decision:
the value of the p-value is less than 0.05, then the decision is to reject the zero hypothesis

3-Summarize the results:
There is enough evidence to reject the claim that median not more than 3 meaning that the financial problems increase

Conclusion

After the end of the scientific research, the vocabulary dealt with a very important topic in this regard, which is the time "during the outbreak of the Covid-19 virus, it is not home", as we presented important studies on this topic. And statistics showing the extent of the ban. The periods positively affected family relationships, as well as reduced physical problems. Statistics and studies also showed an increase in psychological problems due to isolation, which resulted in the ban saving money and reducing expenses. The re-research project was completed in cooperation with all members of the team and after comprehensive research.

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UMM Al-Qura University

A Statistical Study on Coronavirus Effects in the United Arab Emirates Using Multiple Time Series Model

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Abstract

- The research is conducted to study coronavirus effects in the United Arab Emirates regarding the death rate from May 2020 to February of 2021 using the data collected from the website "Our World in Data".
- Time-series regression model was used to analyze and estimate data and to select a time series model that can forecast the death rate due to coronavirus.
- The R programming is utilized to perform the necessary calculation for selecting the time series model.

Introduction

- On November 2019, coronavirus emerged and soon it became a global pandemic.
- Coronavirus spreads through a person's cough, sneeze and saliva. Common symptoms of the virus include fever, dry cough, difficulty breathing, loss of sense of taste and smell, rash and fatigue, and in other severe cases, it can cause organ failure and death.
- The UAE is considered to be the third Arab country to which the virus has reached. Upon making sure of the correctness of the data analysis, the number of deaths under certain conditions will be forecasted.
- The analysis will provide the reasons for the variation in death rates and the factors that play a role in controlling the spread of the coronavirus.

Objective

• To analyze the impact of the coronavirus on the number of death rate in the United Arab Emirates.
• To build a model that forecast the future values of the number of death rate based on other predictor variables such as positive rate and new tests.

Acknowledgments

First, we thank Allah for helping us complete this project; we are sure that this project would not have been completed without his guidance.
We would also like to thank our supervisor, Dr. Hazar Khogeer, for providing guidance and support during all phases of the project; we are grateful for the time and effort expended by her.

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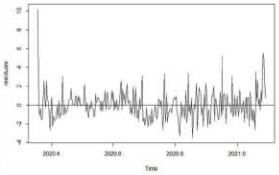
Results

- The data was remedial from any missing values by using the multiple imputation method.
- It was found that some of the predictor variables chosen have multicollinearity relation among them.
- Multicollinearity was solved by removing some independent variables.
- The data points are collected over time order, where the errors exabit some type of autocorrelated structure.

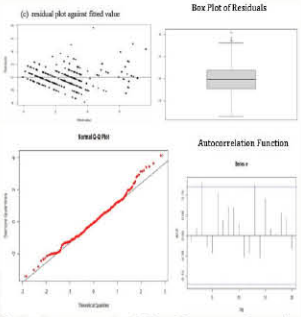


- Residual's autocorrelations are solved by an autoregressive model.
- Two time series regression models with first-order autoregressive were proposed:

$$y_t = \rho y_{t-1} + \beta_0 + \beta_1 x_{t,1} + \beta_2 x_{t,2} + \beta_3 x_{t,3} + a_t, t = 1, \dots, T. \quad [1]$$

$$y_t = \rho y_{t-1} + \beta_0 + \beta_1 x_{t,1} + \beta_2 x_{t-1,1} + \beta_3 x_{t,2} + \beta_4 x_{t-1,2} + \beta_5 x_{t,3} + \beta_6 x_{t-1,3} + a_t \quad [2]$$

- Criteria used in the research are: adjusted $R^2_{a,p}, AIC_p$, and SBC_p . Based on these criteria, it can be concluded that Model [1] is a better fit for the data.
- The chosen model was tested for linear relationship between the explanatory variables and the response variable by F- and t- tests.
- Then adequacy checking of the model's assumptions was investigated. Such as the presence of outliers, deviation from normality distribution, non constant of the error variance, and the fit of the first-order autoregressive regression model.



- The time series regression model chosen was used for forecasting the new death rate.

Conclusion

- The final Time Series Regression Model in this study is as follows:

$$y_t = \rho y_{t-1} + \beta_0 + \beta_1(\text{new test})_t + \beta_2(\text{positive rate})_t + a_t$$

where y_t is the value of y in period t, β_0 is the intercept, β_j is the unknown coefficient, $a_t = \varepsilon_t - \rho\,\varepsilon_{t-1}$, a_t are independent N observation, ρ is an unknown autocorrelation parameter, and ε_t is the random error.

- The model fits the data studied, and it fulfills the conditions and assumptions that confirm its validity. Based on the time series regression model equation and observation from this research, this model can be used to forecast the new death rate based on previously observed values.

Title
Names
University

Magnetohydrodynamics

Fatimah Alghamdi, Asiyah Sobghah, Areej Alsolaymi & Asmaa Aldadi

Advisor: Dr. Abeer H. Bakhsh

Mathematical Sciences Department, Umm Al-Qura University

Abstract

A study of Maxwell's Four Laws describe the electricity, magnetism and the interaction between them, as well as Gauss Law.

Introduction

The basic concept behind MHD is that magnetic fiekds can induce currents in a moving conductive fluid, which in turn polarizes the fluid and mutually changes the magnetic field itself. The set of equations describing MHD is a combination of the Navier - Stokes equations of fluid dynamics and Maxwell's equations for electromagnet ism. In this project, we will look at the effect of magnetic fields and how currents can induce a moving conductive fluid, which in turn polarizes the liquid and mutually changes the magnetic field itself. In the first section, we will mention Maxwell's equations that describe electricity and magnetic fields, In the second section, Gauss's law and the relationship between electric flow across a closed surface and the net charge surface are discussed. In the third section, we mention ferrous fluids and how they are attracted to magnetic fluids and surfactants. In section four, the idealism and resistance of MHD are presented in their simplest forms, and the subject's relationship to the perfect conductor, Reynolds' law of infinite magnetic mumber and lenz's law. In addition, we introduce the subject of magnetorheological fluid and how it works, and some of its applications.

Objective

1- Significance of the four Maxwell's equations.
2- how atime varying magnetic field creates ("induces") an electric field.
3- how to generate magnetic fields.
4- Definition of ferrous fluids.
5- Scientists 'Contribution on Magnetic Liquids.
6- Ferrous fluids and nanoparticles.
7- Curie temperature and its effect on magnetic fluids.
8- Definition Gauss's Law.
9- Knowing the applications of Gauss' law.
10-Explanation of idealism and resistance to MHD, and its relationship to Reynolds' law of infinite magnetic number, and Lenz's law.
11-Definition of the magnetorheological fluid and how it works, i.e. what happens to it when it is exposed to a magnetic field.
12-Explain some applications in a magnetorheological fluid.

Discussion

Among the applications in life in which the magnetic field uses magnetic fluid applications and this is a wide range of applications for MR fluids, expanding with each advancement in fluid dynamics ‹Some of these applications are used aerospace ‹military and defense ‹and in mechanical engineering.

Name	Differential Form
Gauss' Law	$\nabla \cdot \mathbf{E} = \frac{\rho}{\epsilon_0}$
Gauss' Law for Magnetism	$\nabla \cdot \mathbf{B} = 0$
Faraday' Law	$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$
Ampere-Maxwell Law	$\nabla \times \mathbf{B} = \mu_0\mathbf{J} + \mu_0\epsilon_0\frac{\partial \mathbf{E}}{\partial t}$

Conclusion

Maxwell's equations are used to describe electricity, and magnetism and how they affect each other and their effect on water currents. Gauss law, gave a relationship between electric flux through a closed surface and the net charge enclosed by the surface. It is applied to calculate the electric intensity due to different charge configurations. In the ferrous fluid part, we talk about magnetic fluids that are attracted to the poles of the magnets and are made of ferromagnetic nanoparticles

Acknowledgments

The work is done under the assessment of mathematical sciences department. Sincere thanks to our supervisor Dr. Abeer Habib Allah Bakhsh who provided us the knowledge, information and lots of efforts to accomplish this research.

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Title
Names
University

FLUID FLOW SCIENCE

Advisor: Dr. Abeer H. Bakhsh

Ruba saleh alzhrani, Eman Abdullah Al-Kubakbi, Fatimah Fayez Mulla, Khadija Talea Jarrah.

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Abstract

We studied a particle's motion in parallel lines and the way the fluid travels in uniform, volumetric and turbulent flow. Some applications we used in the Reynolds number.

Introduction

Hydrodynamics studies the laws of moving fluids and the effective forces resulting from the movement of these fluids. When neglecting the friction forces resulting from the fluid's friction with the pipe walls, as well as the friction forces resulting from the fluid's friction with each other, it can then be assumed that the fluid flow is ideal and free and thus laws can be used that describe the ideal inhibitor, Which do not have a specific shape and take the shape of a container that contains them as gases and liquids. When a fluid flows through a pipe, it is exposed to resistance caused by friction and viscosity, and if the average velocity of the fluid through the pipe is low, the fluid will flow in parallel lines along the length of the pipe. Its movement, in this case the fluid flow is known as a simple or laminar flow, If the average velocity is increased to a certain value, the particles of the damper will move in an irregular manner and create eddy currents in this case the fluid flow is called as vortex or (turbulent flow).

Objective

The method of fluid flow, explaining the flow of each type, and the Reynolds number.

Governing equations

Ideal gas equation

$$P\,V = nRT$$

Equation for the volume flow rate looks like this

$$Q = \frac{V}{T} = \frac{\text{volume}}{\text{Time}}$$

We can substitute this formula for volume v into the volume flow rate to get the following:

$$Q = \frac{V}{t} = \frac{Ad}{t} = A\,\frac{d}{t}$$

Equation for calculating the Reynolds number is as follows:

$$Re = \frac{\rho \upsilon_s^2 / L}{\mu \upsilon_s / L_2} = \frac{\rho \upsilon_s L}{\mu} = \frac{\upsilon_s L}{\nu}$$

Discussion

Liquids are defined as any liquid or gas that cannot maintain a certain force or intersection when exposed to certain pressure forces and continuously without the condition that it return to its previous state or form, but compressible liquids have the ability to return to their original state. The fundamentals of fluids are the laws of conservation, the law of survival of matter, and the conservation of linear momentum (also known as Newton's second law of motion) Several types of flows have been discussed: streamlined, volumetric and turbulent. Fluidity is achieved by the time dependent motion of a specific particle that creates fluidity. If one of the streamlines forms a closed curve, then this represents a limit that the liquid particles cannot pass through. The flow rate is the amount of liquid flowing in a unit of time through a portion of the tube or waves Among the characteristics of current flow: The flow of fluids per second through any sectional area is constant. For the volumetric flow of a fluid, it is defined as the volume of fluid that passes through a specific sectional area per unit time. Turbulent flow in a liquid is characterized by irregular movement and non-laminated flow. The Reynolds number specifies a number of situations in which the fluids move relative to the solid surface. The Reynolds number is used to build scale models of designs for large machines for various tests.

Conclusion

Stream flow is characterized by the absence of vortices, unlike turbulent flow, and volumetric flow is in large volumes such as tanks. As for turbulence, it is characterized by chaos and change, especially randomness.

Acknowledgments

This work is done under the assessment of mathematical sciences department, Advisor: Dr.Abeer H. Bakhsh.

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Some Special Functions (Gamma and Beta)

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Abstract

This research discusses gamma and beta functions, two functions closely related to one another. The meaning and some properties of gamma and beta functions have been covered in this research. The research also goes over some examples and applications of the gamma and beta functions.

Introduction

Special functions is a branch of mathematics. The mathematical concept of a function appeared in the 17th century. the wide variety of problems that needed a solution resulted in the appearance of special functions. In the 18th and 19th centuries, scientists discovered the elementary functions. They found that some important problems could not always be solved by using only elementary functions. scientists noted that a relatively small number of these special functions appeared in different ways. The most frequently used functions in scientific calculations were given names and notations. that have come into common usage like: Gamma function - first defined in (1729) by Euler- and the Beta function - first studied by Euler and Legendr.

Objective

The purpose of this research is to study gamma and beta functions in order to provide some definitions, properties and theories related to them. Also, the research aims to use gamma and beta functions for solving problems that can only be solved by using them.

Discussion

Some Properties of the Gamma Function

a) $\Gamma(1) = \Gamma(2) = 1$

b) $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$

c) $\Gamma(x+1) = x\Gamma(x) = x!$

d) $\Gamma(1-x)\Gamma(x) = \frac{\pi}{sin(\pi x)}, x \notin \mathbb{Z}$

Some Examples of the Gamma Function

Example 1. find the values of the following:

(i) $\Gamma(5)$

(ii) $\Gamma\left(\frac{3}{2}\right)$

(iii) $\Gamma(-2)$

(iv) $\Gamma\left(\frac{-1}{2}\right)$

(v) $\Gamma(0.37)$

Example 2. Evaluate $\int_0^\infty t\ e^{-2t}\ dt$

Applications of the Gamma Function

Application 1: A particle is attracted toward a fixed-point O with a force inversely proportional to its instantaneous distance from O. if the particle is released from rest, find the time for it to reach O.

Application 2: compute the area A of the curve $y=1-lnx$ in the interval [0,1]

Some Properties of the Beta Function

a) $B(1,x) = \frac{1}{x}$

b) $B(x,y) = B(x,y+1) + B(x+1,y)$

c) $B(x,y) = 2\int_0^{\pi/2} sin^{2x-1}(\theta)\,.\,cos^{2y-1}(\theta)\,d\theta$

d) $B(x,y) = \int_0^\infty \frac{(t)^{x-1}}{(1+t)^{x+y}}dt$

Some Examples of the Beta Function

Example1. Find the value of following:

((i) $B(5,4)$

(ii) $B(-2,-4)$

(iii) $B(\frac{1}{4},\frac{3}{4})$

Example2. Evaluate $\int_0^\infty \frac{1}{1+x^2}dx$

Applications of the Beta Function

Application 1: compute the area A enclosed between the x-axis and one arch of the curve $y = sin^8 x$.

Application 2: : Find length of lemniscate $\rho^2 = a^2 \cos 2\theta$ via the beta function

Conclusion

The results of the research verifies that:

- Gamma and beta are two important special functions, and they are among the most popular functions in mathematics.
- Gamma and beta functions can be used to solve some integrals and applications.
- We can find any values of gamma and beta by using their properties.
- Gamma is a one-variable function.
- Beta is a two-variable function.
- There is a relation between beta and gamma function.

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Some Special Functions (Bessel and Legendre)

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Abstract

This research study the behaver, solution techniques and properties of Bessel and Legendre special functions. Also, this research goes over application of Bessel and Legendre special function and their solution using Bessel and Legendre function properties.

Introduction

In mid 1720 Euler was starting his major industrial dive into the world of calculus. He started talking about lots of our standard special functions. He defined the Gamma and Baseel function. He looked systematically at the elliptic integrals and introduced the zeta function and many others. Around 43 years after discovering the gamma function, Euler found that the beta function was actually a particular combination of gamma functions. For example, Bessel functions are closely associated with problems possessing circular or cylindrical symmetry. Also, the Legendre polynomials are closely associated with physical phenomena for which spherical geometry is important.

Objective

The purpose of this research is to study Bessel and Legendre function in order to provide definitions, some properties, example and application. Bessel and Legendre special functions are used in solving problems that have circular or cylindrical symmetry.

Definition

- Bessel's equation: $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}+(x^2-n^2)y=0$
- Bessel function of the first kind of order (n , -n):

$$J_n(x)=\sum_{r=0}^{\infty}(-1)^r\frac{1}{r!\Gamma(r+n+1)}\left(\frac{x}{2}\right)^{2r+n}$$

$$J_{-n}(x)=\sum_{r=0}^{\infty}(-1)^r\frac{1}{r!\Gamma(r+n+1)}\left(\frac{x}{2}\right)^{2r-n}$$

- Bessel function of the second kind: $Y_n(x)=\frac{(\cos n\pi)J_n(x)-J_{-n}(x)}{\sin n\pi}$
- Legendre polynomials

$$p_n(x)=\sum_{k=0}^{\left[\frac{n}{2}\right]}\frac{(-1)^k(2n-2k)!}{2^n k!(n-k)!(n-2k)!}x^{n-2k}$$

- The Rodrigues' formula

$$p_n(x)=\frac{1}{2^n n!}\frac{d^n}{dx^n}(x^2-1)^n;\ \ n=0,1,2,\ldots.$$

Properties

Some Properties of the Bessel function

- Generating function
- $\frac{d}{dx}[x^n J_n(x)]=x^n J_{n-1}(x)$
- $\frac{d}{dx}[x^{-n} J_n(x)]=-x^{-n}J_{n+1}(x)$
- $\frac{d}{dx}[J_n(x)]=J_{n-1}(x)-\frac{n}{x}J_n(x)$

Some Properties of the Legendre function

- Generating function
- Orthogonal relation
- $P_n(1)=1\,,P_n(-1)=(-1)^n$
- $P_n(-x)=(-1)^n P_n(x)$

Example-Application

- Solve the equation $x^2y''+xy'+(64x^2-16)y=0$
- Find the solution $J_{-\frac{1}{2}}(x)=\sqrt{\frac{2}{x\pi}}\cos x$
- Obtain the general solution of $4y''+9xy=9$
- Express the general solution of$y''+\frac{1}{x}y''-\left(2+\frac{4}{x^2}\right)y=0$

It has been clarified in the research.
Calculate $\boldsymbol{p_3(x)}$ By using Rodrigues' formula
Find the solution$F(x)=x^3+2x^2+3x+1$
Put the discontinuous function $f(x)=\begin{cases}1,x>0\\-1,x<0\end{cases}$
Expand *f(x)* in the from $\sum_{n=0}^{\infty}a_n p_n(x)$ Where

$$f(x)=\begin{cases}0\ where-1<x<0\\1\ where\ 0<x<1\end{cases}$$

Conclusion

Through this research of it can be verified that these two functions are important. Bessel function can be used to find the solution to problems that have circular or cylindrical symmetry also it can be used to solve the Laplace and Helmut equations.
The legend function is related to physical phenomena that deals with spherical geometry. These functions have proven to be useful in calculus, differential equations, and many other applications and problems.

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References

Title
Names
University

Banach Manifold

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Abstract

In this project , we will study the Banach space and Manifolds, To do this, we study some definitions which help us to understand banach space , some theorems , and application.
Then we pass to the Manifolds , we study submanifold and smooth manifold
Finally we study The Banach Manifold.

Introduction

In our research project ،we are trying to study Banach space and manifold
In chapter 1 we study the basic concepts that related to Banach space with it's concept ,and some proposition or lemma ,then we study generally about Banach fixed point Theorem. Finaly, we have mentioned application of banach's theorem to linear equations.
In chapter 2,we study concept of manifold , tobological manifolds , smooth manifold ,submanifold ,and some examples about them.
The last chapter is devoted to study concept of banach manifold ,and the main Theorem.

Objective

1-Simplification the concept of the Banach space and more.
2- Simplification the concept of manifold ,types of it ,and more.
3-Explaine the main theorem of banach manifold.

Results

1- Knowledge of the concept of Banach Space ,examples,and applications in linear equation.
2- Knowledge of the concept of Manifold and some of its types and mentioning some examples.
3- Knowledge the main theorem of Banach Manifold.

Discussion

1- A number of topics were discussed, such as defined Banach and defined manifold and some example, and we presented these concepts clearly.
2- We also discussed Banach manifold and main theorem of it.

Conclusion

The geometry of manifolds and banach space are very important and useful branches in differential geometry , Since it have many important applications in physics and some other branches of sciences. We studied comprehensively some theories , consecpts and exmaples of banach space and manifold. Finally,we discussed banach manifold and the main theorem of it.

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Banach Manifolds

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Abstract

In mathematics, space is a group with distinct properties and is usually accompanied by an additional mathematical structure. In general it is considered a vector space and in particular a Euclidean space can appear as a generalization of the concept of the Euclidean coordinate system. We can also add other important types of radial spaces, such as: Banach space Which is defined as a complete standard space, which means that every Cauchy sequence of the elements of this space ends within the space itself and this is what makes it a closed space. We will also talk about Differential geometry is branch of mathematics that studies the geometry of curves, surfaces, and manifolds Define the manifold as it is a topological space that locally resembles Euclidean space near each point. More precisely, an n-dimensional manifold, or n-manifold for short, is a topological space with the property that each point has a neighborhood that is homeomorphic to the Euclidean space of dimension n. in this project we will study Banach manifold is known as a manifold modeled on Banach spaces. Thus it is a topological space in which each point has a neighborhood homeomorphic to an open set in a Banach space . Banach manifolds are one possibility of extending manifolds to infinite dimensions.

Introduction

In this Research, we will talk about 3 main chapters The first chapter talks about Banach spaces, which are defined as a complete standard space, which means that every Cauchy sequence of the elements of this space ends s within the space itself, and this is what makes it a closed space, this space was named after the Polish mathematician Stephen Banach , we started with the definition of metric space, Norm space and some important theories such as Banach subspace, the fixed-point theory, and Banach algebra, which is known as an associative algebra A over the real or complex numbers that at the same time is also a Banach space, that is, a normed space that is complete in the metric induced by the norm. The norm is required to satisfy some Conditions Which This ensures that the multiplication operation is continuous. In the second chapter will talk about manifold which is defined as a topological space similar to Euclidean space around each point. The chapter spoke about Charts and Compatible Charts and one of the most important definition of manifolds is submanifolds and smooth manifolds and some examples related to them. The last chapter connects the first and second chapters together, to know a theory called Banach manifolds is a manifold modeled on Banach spaces. Thus, it is a topological space in which each point has a neighborhood homeomorphic to an open set in a Banach space. Banach manifolds are one possibility of extending manifolds to infinite dimensions.

Objective

- Know Banach space and learn about theories and examples
- Definition of the topological space to study manifold
- Connect the Banach space and the Manifold together to learn about the Banach and Manifolds

Results

- inner product is subset of normed space and normed space is subset of metric space
- To define Banach space, you must know that it is a complete normed vector space.
- Manifolds is a topological space with the property that each point has a neighborhood that is homeomorphic to the Euclidean space of dimension n.
- Banach manifolds It is a topological space that fulfills some properties

Discussion

1. Every convergent sequences is Cauchy sequence, but the opposite is not true.
2. Every smooth manifold is a topological manifold, but not necessarily the other way around is true.
3. If $(X, \|.\|)$ is a Banach space, then X is a Banach manifold

Conclusion

After we know the relationship between Banach space and manifolds we conclude that Banach manifolds is a manifolds modeled on Banach spaces. Which means that it is a topological space with some characteristics .

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