

DEDICATION

To my

Husband

To my

Family

Acknowledgement

I would like to express my deep appreciation for my supervisor Professor Nafie Abdellatif for supervising this research and for his continuous guidance during the course. Also my thanks are extended for my co-supervisor Professor M. Ali Hussein for his kind assistance and support.

I have also benefited by advice and guidance from prof Adam who also always kindly grants me his time even for answering some of my unintelligent questions about beam lines and chemical catalysis issues.

Many thanks go in lap research to Ustaz Babicker and to Sffa.

Also thank Mohamed's family for accepting me as a member of the family, warmly. Furthermore, to Haj Awadalla with his thoughtful support, thank you.

*Special thanks to my husband **M.osman** for his unlimited patience and lovely caring for our children during the course.*

Thanks to everyone who assisted willingly to make this research a reality.

Yasmeen Hafiz

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Abstract

In this research study, a simple and active photo-catalysis system was assembling. It consists of a UV monochromatic light

source, quartz cell (which is transparent to UV) to hold the sample and magnetic stirrer. The functions of the light source are: (i) to achieve photo activation of the chemical reactions (ii) to obtain certain chemical yields (iii) removing toxic phenol out of water. The later was achieved by adding a semiconductor material to stimulate the chemical reactions of materials as they interact with the applied light, simulation of the state existence the phenol in wastewater. The semiconductors were Iron Oxide and Zinc Oxide with different weights. In this work laser light producing 532 nm with BBO non-linear crystal producing UV laser with 266nm, and a LED of $\lambda = 375$ nm were used. Absorption spectra of samples were recorded before and after irradiation. The influence of the interacted material weights, diameter of the monochromatic light, exposure time were studied. The later parameters were investigated to optimize conditions needed to completely remove phenol. It is shown from this study that phenol removal is increased when increasing weight of the stimulating material (semiconductor), exposure time, and light beam diameter. It is shown that the best result was attained at 30 minutes exposure time, 600 mg of the Fe_2O_3 and 2.3 cm diameter of light. The samples which were exposed to laser irradiation showed less efficiency as compared to those exposed to light emitted diode irradiation. This is due to the higher power of LED (1watt) as compared to the 6mW of the laser power.

المستخلص

فى هذا البحث تم تجميع منظومه بسيطه وفعاله تتكون من مصدر ضوئى احادى الطول الموجى فى المنطقه الفوق البنفسجيه من

الطيف و خلية كوارتز لامرار الاشعه فوق بنفسجيه ومحرك مغنطيسى
لأحداث تنشيط ضوئى للتفاعلات الكيمائيه, وتوجيه سير التفاعل
الكيمائى ضوئيا للحصول على نواتج محدده من التفاعل الكيمائى
وازالة نواتج اخرى ومنع حدوثها, وقد كان الهدف من العمل هو
ازالة مادة الفينول السامه من الماء وذلك بأضافة مادة من اشباه
الموصلات كمحفز للتفاعل الكيمائى محاكاة لحالة وجود الفينول فى
الماء الملوث .

تم استخدام مادتي اكسيد الحديد واكسيد الزنك كأشباه موصلات للتحفيز
الضوئى وبأوزان مختلفه.
تم استخدام نوعين من المصادر الضوئيه فى المنطقه فوق البنفسجيه
احدهما متشاكه , بطوله الموجى 266 نانومتر وهو التوافقيه الثانيه
الناتجه من ليزر الثنائى ذى الطول الموجى 532 نانومتر
بأستخدام بلوره بصريه غير خطيه من مادة BBO. والمصدر الثانى
هو الثنائى الباعث للضوء ذى الطول الموجى 395 نانومتر.
سجلت اطياف الامتصاص لعينات من الفينول والماء ومادة شبه الموصله
قبل وبعد التشعيع وتم دراسة اثر وزن ماده شبه الموصله واثر
قطر حزمة المصدر الضوئى واثر زمن تعريض ماده للضوء على شدة
امتصاص الفينول , وذلك من اجل الحصول على افضل قيم للمعاملات
التي تحدث ازالة كامله للفينول وذلك عند اختفاء حزمة الامتصاص
الاساسيه له فى الطيف المسجل .

بينت نتائج هذه الدراسه انه بزيادة وزن ماده المحفز (شبه
الموصل) وزيادة زمن تعريض ماده المحفز للضوء , وينقصان
قطر شعاع الضوئى أحادى اللون المحفز , تزداد فعالية ازالة الفينول
السام من الماء.

بينت النتائج كذلك ان افضل قيم للمعاملات التي حدثت عندها
ازالة تامه للفينول ,كانت عند زمن تشعيع 30دقيقه بالثنائى الباعث
للضوء , 600 ملجرام من وزن مادة اكسيد الحديد ,2.3 سنتمتر
قطر الشعاع.

اعطت النتائج المتحصله من التشعيع بالليزر كفاءه اقل من تلك المتحصله
بالتشعيع بالثنائى وذلك نسبة الى ال قدره الواطئه لليزر (6mW) م مقارنة
ب قدرة الثنائى ((1W)