



International University of Africa



Deanship of Graduate Studies

## **Study of the Recycle and Reuse of Domestic Wastes**

A Thesis Submitted in Partial Fulfillment of the Requirements for the  
Degree of M.Sc. in Industrial Chemistry

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## *Dedication*

*This thesis is dedicated to my parents at first and my family, whom there were motivated me all the time to see me successful and prepotent, by supporting and encouraged me invariably, Thanks a lot.*

## **Acknowledgement**

First and foremost, I thank God for the numerous blessings he has bestowed upon me throughout. Thanks to my supervisor Prof/ BabikerKramaAbdalla, for his advices and support. Thankful extended to Industrial researches and consultancy center (IRCC) / ahead of laboratories Mr. MdohamedHussein Ali andSalma Abdelkhalig, Thanksalot for my friend MohammedGummaElshafie for helping and encourage me.

## Abstract

Due to the modern trend in the field of bio-energy and replace it as an alternative to non-renewable energy, this study comes to illuminate light on biofuel production process from the waste cooking oil and reducing the harmful impact by protecting the environment from emission resulting comes from the production and use of diesel oil such as ( $\text{CO}_2$ ,  $\text{CO}$ ,  $\text{H}_2\text{S}$ ), in addition to the added value of the oil. Ease of production and cheap raw materials.

It produced by using trans-esterification process by using methanol mixed with Potassium hydroxide as catalyst, and then the mixture added to the oil in the magnetic stirring for two hour at  $60\text{ C}^\circ$ . It was separated in separator funnel by gravity. Lastly, bio-fuel was collected from the top layer and washed with hot water to give high purity. The glycerin from the bottom as by-product.

Laboratory analysis for biodiesel was obtained some results, the flash point is  $115\text{ C}^\circ$  and this useful for storage and transportation without cooling or holding in specific containers and this reversal for flash point of diesel oil which it has flash point  $60\text{ C}^\circ$  lowers, it has viscosity 6 cp and density  $0.88\text{ g/cm}^3$ , in addition to the little amount of sulphated ash content which ensure the safety engine for a long time.

## الخلاصة

نظراً للتوجهات الحديثة في مجال الطاقة الحيوية المتجددة وإحلالها كبديل للطاقة غير المتجددة تأتي هذه الدراسة لتتير الضوء على عملية إنتاج الوقود الحيوي من الزيت الراجع من الطعام لما له من أثر في حماية البيئة من إنبعاث الغازات الناتجة من عملية إنتاج وإستخدام الديزل البترولي مثل (  $CO$  ,  $CO_2$  ,  $H_2S$  ) بالإضافة الي القيمة المضافة للزيت الراجع ، كما يفضل إستخدامه كبديل للديزل البترولي لسهولة إنتاجه ومن مواد خام مهمة وغير مكلفة لضررها البالغ بالبيئة.

تم إستخدام عملية الأسترة (Trans-esterification Process) في إنتاج الوقود الحيوي باستخدام الميثانول المخروط مع هيدروكسيد البوتاسيوم المستخدم كعامل حفاز ثم يضاف الخليط إلى الزيت في الخلاط المغنطيسي عند درجة حرارة ٦٠ م° لمدة ساعتين وبعد ذلك يتم الفصل في القمع الزجاجي لنتحصل على الوقود الحيوي في الجزء الاعلى والجلسرين في الاسفل كنتاج ثانوي كما أن الفصل يعتمد على الجاذبية ، للحصول على نقاوة عالية من الديزل الحيوي يتم غسله بالماء الدافئ على عدة مراحل حتى نتحصل على طبقة نقية من الماء في الاسفل.

حللت عينات في المختبر و تم الحصول علي نتائج منها درجة اشتعال عالية تساوي (١١٥)م° وهذا يجعل ترحيله و تخزينه سهل من غير تبريد على عكس الديزل البترولي لان درجة حرارة اشتعاله قليلة (٦٠)م° ، كما وجدت درجة لزوجته (٦)س ب ، وكثافته (٠.٨٨) جم/سم<sup>٣</sup> بالإضافة الى انه يحتوى على كمية رماد (Sulphated Ash) بسيطة جدا مما يضمن سلامة المحرك لفترة اطول.

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