

بسم الله الرحمن الرحيم

## استهلال

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صدق الله العظيم

**Dedication**

I dedicate this dissertation to my parents , sisters , and brothers .

## **Acknowledgment**

First I want to thank allah for giving me the strength to finish this thesis. I had some hard times, whenever I was down; allah gave me the hope and power to continue in this research successfully.

Many thanks for my supervisor D. Elfateh Ahmed Hassan for his supervision, advice and guidance from the early stage of my master thesis as well as providing me with great experiences through out this work.

I am grateful to my dear colleagues inside and outside the university who helped me in pursuing my work for their friendship and support.

المستخلص

في هذه الدراسة تم استخلاص زيت بذور النيم بنسبة عالية (44.37%) باستخدام الهكسان كمذيب , و حددت خواصه الفيزيوكيميائية . بسبب المحتوى العالي لزيت بذور النيم من الاحماض الدهنية تمت معالجته بالميثانول في وجود حمض الكبريتيك المركز (بنسبة وزنية 2% من وزن الزيت) كعامل حفاز في درجة حرارة 60م° .

استخدم الزيت المعالج الناتج ذو المحتوى الحمضي المنخفض (1.8%) لاجراء تفاعل الاكسدة لانتاج الديزل الحيوي .

تم اختبار جودة البيوديزل الناتج بتقدير بعض العوامل مثل الكثافة , اللزوجة , الرقم الحمضي , الرقم السيتاني , و مقارنتها بالمواصفات القياسية للديزل الحيوي , اشارت النتائج الي ان الخواص المؤثرة في الديزل الحيوي كوقود مثل نقطة الوميض و الرقم السيتاني ممتازة للاستخدام في الماكينات و تطبيقات الوقود الاخرى . لكن اللزوجة العالية و الاحماض الدهنية تؤدي لانخفاض الجودة . و هذا يمكن تحسينه بتخفيض محتوى الاحماض في المادة الاولية (زيت بذور النيم) الي اقل من 1% , و من ثم يصبح زيت النيم مصدر جيد لانتاج الديزل الحيوي .

## Abstract

In this study Neem oil was extracted using normal hexane and giving high yield (44.37), then physico-chemical properties were determined. Due to high free fatty acid content of Neem oil (6.6), acid pretreatment process was carried out using methanol in the presence of 2% w/w H<sub>2</sub>SO<sub>4</sub> as an acid catalyst at 60°C. Then the resulting treated oil with low free fatty acid content (1.8) undergo alkaline transesterification to produce biodiesel.

Biodiesel quality was tested by determining some parameters such as density, viscosity, free fatty acid (FFA) , cetane index and flash point and comparing it to (ASTM D6751). Results showed that the effective properties of biodiesel as fuel such as flash point and cetane index were excellent for engines and other fuel applications. But high viscosity and high FFA content of biodiesel indicate low quality which can be improved by lowering the FFA content in the feedstock to less than 1% . Therefore Neem oil provides biodiesel production feedstock.

## **Table of Contents**

<b>Subject</b>	<b>Page No</b>
استهلال	I
Dedication	II
Acknowledgement	III
Abstract	IV
المستخلص	VI
Table of content	Vi
List of tables	VIII
List of Figures	IX
<b>Chapter One</b>	
Introduction	
1.0 Introduction	1
1.1 Taxonomical Classification of Neem	3
1.2 Origin and Distribution of Neem	4
<i>1.3 Botanical Description of Neem</i>	4
1.4 The Uses of Neem	5
1.4.1 Neem and Environmental Protection	5
1.4.2 Pest Management Prospects	5
1.4.3 Neem and Agriculture	6
1.4.4 Pharmaceutical Uses	7
1.4.5 Industrial Uses	7
1.5 Objectives	11
<b>Chapter Two</b>	
<b>Materials and Methods</b>	
2.0 Experiments	12
2.1 Collection and Purification of Neem Seeds	12
2.2 Neem Oil Extraction	12
2.3 Biodiesel Production:	13

2.3.1 : Acid Pretreatment	13
2.3.2 Alkaline Transesterification	13
2.4 Analysis of Neem Oil and Produced Biodiesel	14
2.4.1 Density	14
2.4.2 Vescosity	14
2.4.3 Free Fatty Acid Content:	14
2.4.4 Iodine Value:	15
2.4.5 Saponification Value:	15
2.4.6 Color	16
2.4.7 Peroxide Value	16
2.4.8 Flash and Fire Point	16
2.4.9 Cetane Index for Biodiesel	17
2.4.10 FT.IR Spectroscopy	17
<b>Chapter Three</b>	
<b>Results and Discussion</b>	
3.0 Results and discussion	18
3.1 Extracted Neem and Biodiesel percetages	18
3.2 Comarison between Neem oil and biodiesel with respect to ASTM standards	19
3.3 Infra red study	22
Conclusion	25
Recommendations	25
References	61

## List of Tables

<b>Table</b>	<b>Page No</b>
3.1 Item percentages of oil and Biodiesel	18
3.2 comparison between properties of Neem oil , produced Biodiesel , and ASTM standards of Biodiesel	20

## **List of Figures**



<b>Figure</b>	<b>Page No</b>
3.1 IR Spectral of Neem oil	23
3.2 IR Spectral of biodiesel	24