International University of Africa

Deanship of graduate studies

Production of Biodiesel from Jojoba Seeds Oil

A thesis submitted in partial Fulfillment of the Requirement for the degree of MSc in Industrial Chemistry

By

Samar Hassan Omer Salih

Supervised By

Dr. Mohamed Mergani Ali

Sudan May-2017

بسم الله الرحمن الرحيم

الآية

قال تعالى :

{ قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ}

سورة البقرة

الأية (32)

DEDICATION

I would like to dedicate

My thesis

To My

Parents, teachers

Sister and Brother

And of Course

To my Beloved Colleague

Acknowledgements

I thank Almighty Allah for giving me the inspiration, patience, time and strength to finish this work. With Allah's will and mercy I have been able to achieve this study.

I wish to express my appreciation and gratitude to my supervisor **D.MOHAMMED MERGANI ALI** who, through his ideas, suggestion and advice improve this project, thanks to him. Not only for this help in general but also for his guidance during the revision process.

My deepest thanks to all the staff in college of pure and industrial science of international university of Africa .Who, in many ways.

Finally, I thank my beloved parents and my beloved brother and sister for their encouragement, support, patience and understanding during the days of writing and revising the project.

List Content

Chapter one: Introduction

Chapter two: Literature review

Chapter three: Materials and Methods

Chapter four: Results and Discussions

Chapter five: Conclusion and Recommendations

List of Figures

List of Tables

List of Schemes

List of Abbreviations

Abbrev.	Name of Abbreviations.	Page
E.P.A	Environment Protection Agency	6
T.L.C	Thin layer chromatography	13
F.A.M.S	Fatty acid methyl ester	15
A.S.T.M	Analytical Standard Test Methods	17
F.F.A	Free Fatty Acids	21
GC-MS	Gas Chromatography Mass Spectrometry	24

Abstract

The study was carried out to extract the oil from jojoba seeds oil (*Simmondisa Chinesis*), the sample was collected for season 2014 – 2015(March) in the region of Arkweit in the south west of Portsudan (west of sudan), and convert this oil to biodiesel and then study physical and chemical properties of them. The characteristic analysis of oil included :(Extraction ratio percentage, Density, Viscosity, Acid value, Iodine value and free fatty acids). Proximate analysis of extracted oil gives (43%, 0.851kg/m^3,25mm^2/s, 1.904mg KOH/100g, 81.28 I_2/100g and 0.95%) respectively. The characteristic analyzed of biodiesel produced included: (Density, Viscosity, Flash point, Calorific value and Sulfur content). Proximate analysis of biodiesel gives (0.876kg/m^3, 6.67mm^2/s and 192^{O}C, 40.57Mj/kg, 0.174(wt/wt) %) respectively. The variables affecting the yield of the biodiesel produced were studied. The variables investigated were methanol: oil molar ratio (4:1 – 9:1), from the result obtained, the best result yield percentage was obtained used methanol: oil molar ratio of (7: 1), NaOH as catalyst (1%) concentration and 65^{o}C ±1for 1 hour. chemical composition of fatty acids methyl ester (FAMEs) in jojoba biodiesel was established by GC – MS analysis.

مستخلص البحث

أجريت الدراسه لاستخلاص الزيت من بزور الجوجوبا ، جمعت العينة من موسم عام 2104 – 2015 (مارس) من منطقة أركويت جنوب شرق مدينة بورتسودان (شرق السودان) . وتحويل الزيت المستخلص الى ديزل حيوي ودراسة الخواص الفيزيائية والكيميائية لهم .تحليل العينات لزيت الجوجوبا شمل (النسبة المئوية للاستخلاص ، الكثافة ،اللزوجة ، الرقم الحمضي ، الرقم اليودي والاحماض الأمينية الحرة) . تقديرات التحاليل للزيت المستخلص والتي أعطت

(43%, 0.851kg/m^3, 25mm^2/s, 1.904KOH/100g, 81.28I_2/100g and 0.95%)

على التوالي. تحليل العينات للديزل الحيوي الناتج شمل (الكثافة ، اللزوجة ، نقطة الوميض ، القيمة الحرارية ومحتوى الكبريت) والتي أعطت

(0.876kg/m^3, 6.67mm^2/s, 192^{O}C, 40.57Mj/kg, 0.174(wt/wt) %) على التوالي

كما تمت دراسة المتغيرات التي تأثر على انتاج الديزل الحيوي ، المتغيرات المقترحة النسبة المولية (نسبة الكحول الى الزيت) في المدى من (4:1 – 9:1) ، من النتائج وجد أن افضل نتيجة كانت عند النسبة المولية (7:1) باستخدام هيدروكسيد الصوديوم كمادة حفازة عند درجة حرارة 65 درجة مئوية لزمن قدره ساعه . المكونات الكيميائية للاحماض الدهنية الاستر ميثيلية في الديزل الحيوي المنتج من زيت الجوجوبا تم تحليلها بواسطة جهاز كروماتوغرافيا الغاز- مطياف الكتلة .