



**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**

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

الآية

قال تعالى :

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

سورة البقرة

الآية (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.

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## List of Abbreviations

<b>Abbrev.</b>	<b>Name of Abbreviations.</b>	<b>Page</b>
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 (*Simmondsia 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<sup>3</sup>, 25mm<sup>2</sup>/s, 1.904mg KOH/100g, 81.28 I<sub>2</sub>/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<sup>3</sup>, 6.67mm<sup>2</sup>/s and 192°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°C ±1 for 1 hour. chemical composition of fatty acids methyl ester (FAMES) in jojoba biodiesel was established by GC – MS analysis.

## مستخلص البحث

أجريت دراسته 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<sup>3</sup>, 25mm<sup>2</sup>/s, 1.904KOH/100g, 81.28I<sub>2</sub>/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<sup>3</sup>, 6.67mm<sup>2</sup>/s, 192<sup>o</sup>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 لزم قدره ساعه . المكونات الكيميائية للاحماض الدهنية الاستر ميثيلية في الديزل الحيوي المنتج من زيت الجوجوبا تم تحليلها بواسطة جهاز كروماتوغرافيا الغاز - مطياف الكتلة .