بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

Ain Shams University
Faculty of Science
Chemistry Department

Trimetallic catalyst supported on modified alumina for upgrading and hydrotreating of petroleum fractions

Thesis Submitted for

Ph.D. Degree of Science in Physical Chemistry

By

Asmaa Ismail Hussein Zahran

(B.Sc. Microbiology-Chemistry, 2011)

(M.Sc. Physical Chemistry, 2016)

To
Chemistry Department
Faculty of Science
Ain Shams University
Cairo, Egypt

2020

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First and foremost, praise and thanks be to the almighty ALLAH for his limitless help and guidance and peace is upon his prophet.

Acknowledgement

First and foremost, my gratitude goes to Allah, who gives me the strength and wisdom to do my research in an acceptable style.

Thanks, are also due to Egyptian Petroleum Research Institute (EPRI), for financial support and facilities offered which enabled the author to carry out this work.

I owe a well-deserved debt of deep gratitude to prof. Dr. ***Mohamed A. Mekewi*** *Professor of Physical Chemistry, Department of Chemistry, Faculty of Science; Ain shams University, for giving me the honor of working under his supervision, and for his interest and following up the progress in the work and continuous support.*

Deep thanks and gratitude are due to prof. Dr. ***Hoda S. Ahmed****, Prof of Petroleum Refining, Egyptian Petroleum institute for support, great patience, professional guidance and strong confidence in my doing everything best. I wish for her a great success and a good health all of her life.*

I wish also to thank Dr. ***Ahmed M. El Naggar,*** *Associate Professor in* Applied Physical Chemistry, *Refining Division, Egyptian Petroleum Research Institute (EPRI), for his intelligent supervision, consistent motivation, extraordinary patience and exceptional freedom throughout the work on this dissertation. I owe a lot of my success to him.*

My gratitude goes to Dr. ***Wael A. Aboutaleb,*** *Associate Professor in* Applied Physical Chemistry, *he continuously trained me to become a better researcher, also for his guidance, valuable proposals, constructive criticism, encouragement, and for his invaluable suggestions for improving the manuscript.*

I would like to express my deepest gratitude and appreciation to my husband for his love, understanding, and patience during my study, and to my brothers and sisters for invaluable help, continual encouragement and their motivation over years.

Finally, and to all of those, I would really like to say: "There are no words to match my gratitude".

Asmaa Ismail Zahran

بسم الله الرحمن الرحيم

قالوا سبحانك لا علم لنا الا ما علمتنا انك انت العليم الحكيم

صدق الله العظيم
(سوره البقره ايه 32)

Aim of the work

The main goal of this research work is to improve the quality of petroleum fractions via removing sulfur, nitrogen and aromatic compounds. Removal of these compounds is designated via three techniques:

1- Adsorption via some polymer-based blends

2- Catalytic hydrotreatment

3- Combined method of both adsorption and hydrotreating process.

In first technique, imidazole and imidazole derivatives blended polystyrene will be used as a novel adsorbents for removing contaminated compounds from petroleum fractions especially nitrogen compound which aimed to avoided ammonia formation during hydrotreating and also enhancement the HDS process.

In second technique synthesis of developed catalysts composed of ternary metal oxides supported on various structures for use in improving quality of petroleum fraction(s)

In third technique combined methods of both adsorption and hydrotreating processes aimed to generate high quality of petroleum fractions (heavy vacuum gas oil and a diesel oil).Thus, overall quality of sulfur and aromatic compounds disposal from the presented feedstock(s), in this study, will be increased.

Abbrev.	Description
HVGO	Heavy vacuum gas oil
HT	Hydrotreating
WPS	Waste polystyrene
ADS	Adsorptive desulfurization
HDS	Hydrodesulfurization
HDN	Hydrodenitrogenation
HDA	Hydrodearomatization
OECD	Organization for Economic Cooperation and Development
Btu	British thermal units
EIA	Energy Information Administration
LHSV	Liquid hourly space velocity
CTC	Charge transfer complex formation
LUMO	Lowest unoccupied molecular orbital
HOMO	Highest occupied molecular orbital
DMDS	Dimethyldisulfide
H_2O_2	Hydrogen peroxide
EPA	Environmental protection agency
TEM	Transmission electron microscopy
SEM	Scanning electron microscopy

BET	Brunauer-Emmett-Teller
XPS	X-ray photoelectron spectroscopy
TPR	Temperature-programmed reduction
XRD	X-ray diffraction
FT-IR	Fourier-transform Infrared
ppm	Part per million
HYD	Hydrogenation pathway
SO_X	Sulfur Oxides
Non-OECD	Non-Organization for Economic Cooperation and Development
SOPC	Suez Oil Petroleum Company
GPC	Gel permeation chromatography
$C_3H_4N_2$	Imidazole
$C_{20}H_{37}NaO_7S$	Dioctyl sulfosuccinate sodium surfactant
C_8H_8	Styrene monomer
$CH_3C_3H_3N_2$	Methylimidazole
$C_7H_{12}N_2$	Butylimidazole
BJH	Barrett, Joyner and Halenda method

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