



# Technical University of Mombasa

Faculty of Applied and Health Sciences

**DEPARTMENT OF PURE AND APPLIED SCIENCES**  
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF  
TECHNOLOGY IN APPLIED CHEMISTRY  
**BTAC**

**ACH 4406: FUEL CHEMISTRY**

SPECIAL/SUPPLEMENTARY EXAMINATION

OCTOBER 2013 SERIES

2 HOURS

Instructions to candidates:

This paper consist of **FIVE** questions

Answer question **ONE** (compulsory) and any other **TWO** questions

## Question ONE

- Differentiate between cracking and reforming process in a petroleum refinery **(2marks)**
- State atleast TWO reasons for carrying out cracking in a petroleum refinery **(2marks)**
- State THREE problems associated with mineral salts if present in crude oil during refining. **(3marks)**
- With the aid of a diagram outline the crude oil desalting process **(13marks)**
- Citing examples, classify fuels according to state **(4marks)**
- Describe FOUR properties for utilization of Residual fuel oil. **(6marks)**

## Question TWO

a) Define the following terms

- (i) Kerosene
- (ii) Gasoline
- (iii) Coal Tar
- (iv) Cracked stocks

**(4marks)**

b) Explain FOUR liquid fuel production processes.

**(10marks)**

c) Describe the formation of the following

- (i) Petroleum Coke
- (ii) High temperature coke
- (iii) Low temperature coke

**(6marks)**

## Question THREE

a) Compare and contrast fossil fuels and nuclear fuels as a source of energy in chemical processing industry.

**(6marks)**

b) Explain:-

- (i) Three important qualities of a satisfactory gasoline **(6marks)**
- (ii) Two important requirements of a good quality leaded gasoline **(2marks)**

c) List Two unleaded additives used to improve octane rating of a petroleum gasoline

**(2marks)**

d) Explain why plate forming is carried out in a hydrogen atmosphere **(4marks)**

## Question FOUR

- a) With the aid of balanced chemical equations illustrate how sulfur is retained in fluidized bed combustion of coal. **(10marks)**
- b) Describe TWO broad types of oil **(4marks)**
- c) Explain the following fuel properties
- (i) Fire point
  - (ii) Pour point
  - (iii) Dropping point
  - (iv) Cloud point
- (4marks)**
- d) List two methods of determining heating value of fuels **(2marks)**

### **Question FIVE**

- a) Explain why the specific gravity of crude oil alone is not sufficient to classify oils **(3marks)**
- b) What would be a more accurate way to classify crude oil? **(3marks)**
- c) Explain briefly why crude oils need to be refined before using them as fuels. **(4marks)**
- d) Explain the main mode of characterization of petroleum fractions? **(3marks)**
- (i) What are their advantages **(2marks)**
  - (ii) What are their limitation. **(2marks)**
- e) Explain very concisely the importance of isomerization in the petroleum refining operations. **(3marks)**