



**NATIONAL OPEN UNIVERSITY OF NIGERIA PLOT 91, CADASTRAL
ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI – ABUJA
FACULTY OF SCIENCES
DEPARTMENT OF CHEMISTRY
2022_2 EXAMINATION QUESTIONS**

COURSE CODE: CHM 311

COURSE TITLE: PETROLEUM CHEMISTRY

COURSE UNIT: 2

INSTRUCTION: Answer question one (1) and any other two questions

Time: 2 hours

QUESTION 1

1. (a) Define the following: (i) Crude oil (ii) Oil window (iii) Biomass (iv) Kerogen (v) Associated gas **(10 marks)**
- (b) Mention the two (2) ways by which primary organic matter can be formed directly. **(4 marks)**
- (c) State the two (2) processes that governs the accumulation of organic matter in sediment. **(4 marks)**
- (d) Discuss fractional distillation of petroleum. **(12 marks)**

QUESTION 2

2. (a) Explain the following stages involved in the evolution of sediments
(i) Diagenesis (ii) Catagenesis (iii) Metagenesis **(12 marks)**
- (b) List the three (3) types of kerogen based on thermal decomposition. **(3 marks)**
- (c) Mention five (5) equipment used in the ICI Process for Producing Synthetic Gas and Ammonia. **(5 marks)**

QUESTION 3

3. (a) Give the full meaning of API and the expression that relates API gravity to specific gravity. What does a low API gravity indicate? **(9 marks)**
- (b) Mention the processes that can be used to reduce the effect of the following compounds or elements in crude oil:
 - (i) the corrosiveness of hydrochloric acids from sodium and magnesium chlorides

- (ii) catalyst poisoning from vanadium and nickel (6 marks)
(c) Mention five (5) parameters that determines the corrosive properties of crude oil. (5 marks)

QUESTION 4

4. (a) Define the following: (i) Steam cracking (ii) Hydro cracking (9 marks)
(b) Define Fluid Catalytic Cracking (FCC) and mention five (5) properties of an FCC catalyst. (11 marks)

QUESTION 5

5. (a) Highlight the reasons for removing carbon dioxide, water vapour and hydrogen sulphide from raw natural gases (6 marks)
(b) List the four (4) major components of a modern FCC catalyst. (6 marks)
(c) Give two (2) reasons for the removal of moisture from natural gas. (4 marks)
(d) Explain why kerogen is insoluble in normal organic solvents. (4 marks)