



**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)**