



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

**SCHOOL OF BIOLOGICAL, PHYSICAL, MATHEMATICS AND ACTUARIAL
SCIENCES**

UNIVERSITY EXAMINATION FOR THE DIPLOMA IN SCIENCE

1ST YEAR 2ND SEMESTER 2024

MAIN CAMPUS

COURSE CODE: PDW 2224

COURSE TITLE: APPLIED CHEMISTRY & BIOLOGY II

EXAM VENUE:

STREAM: Diploma in Science

DATE:

EXAM SESSION:

TIME: 2:00 HRS

Instructions:

- 1. Answer question 1 (Compulsory) in Section A and ANY other 2 questions in Section B.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

SECTION A: COMPLUSORY (40 MARKS)

Question 1

1. What is the equilibrium constant expression for the following reaction;
 $\text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons \text{NO}_2(\text{g})$ and given that the reactants and products have each a concentration of 0.25 M, determine the value of K_c . [4 marks]
2. State any **THREE** types of chemical bonding. [3 marks]
3. Define the following terms; [10 marks]
 - i. Homologous series
 - ii. Le Chatelier's principle
 - iii. Solubility
 - iv. Buffer
 - v. Effluents
4. Distinguish between anaerobic and aerobic processes. [4 marks]
5. Describe any **FIVE** good laboratory practices. [10 marks]
6. Briefly describe the **THREE** types of salts. [3 marks]
7. Differentiate between aliphatic and aromatic hydrocarbons. [3 marks]
8. A gas X occupying a 2.0 L flask at 760 mmHg is allowed to expand to a volume of 6000 mL. Calculate the final pressure in atm. [3 marks]

SECTION B: Answer Any Six questions

Question 2 (10 Marks)

- a) Define an acid and a base in terms of the following theories;
 - i. Arrhenius [2 marks]
 - ii. Lewis [2 marks]
- b) Calculate the pH of a solution of NaOH containing 8 g in 250 cm³. [4 marks]
- c) What does the term water pollution mean? [2 marks]

Question 3 (10 Marks)

- a) Briefly describe the **FOUR** main units of concentrations. [8 marks]
- b) Distinguish between molarity and molality. [2 marks]

Question 4 (10 Marks)

- a) Differentiate between Charles law and Boyles law. [4 marks]
- b) Describe any **THREE** water treatment methods [6 marks]

Question 5 (10 Marks)

- a) State any **FIVE** physicochemical parameters of water quality. [5 marks]
- b) State the **FIVE** kingdoms for living organisms. [5 marks]

Question 6 (10 Marks)

- a) Define the term solubility. [2 marks]
- b) State the **FOUR** biological parameters of water quality. [4 marks]
- c) Describe any **TWO** best practices to prevent corrosion in materials. [4 marks]

Question 7 (10 Marks)

- a) Define the following terms; [10 marks]
 - i. Corrosion
 - ii. Chemical safety
 - iii. Metalloids
 - iv. Hazardous chemicals
 - v. Quantum number

Question 8 (10 Marks)

- a) Describe any **FOUR** chemical properties of water. [8 marks]
- b) Water is abundant in life. State any **TWO** of its sources in the environment. [2 marks]

Question 9 (10 Marks)

- a) Describe the **FIVE** classes of microorganisms. [5 marks]
- b) State any **FIVE** examples of water pollutants. [5 marks]

Question 10 (10 Marks)

- a) Organic compounds are mainly classified into **TWO**, namely? [2 marks]
- b) Discuss the **FOUR** factors that affect the position of a chemical equilibria. [8 marks]