KISII UNIVERSITY

UNIVERSITY EXAMINATIONS

SPECIAL/SUPPLEMENTARY EXAMINATIONS
SECOND YEAR EXAMINATION FOR THE AWARD OF THE
DEGREE OF BACHELOR OF SCIENCE IN INDUSTRIAL CHEMISTRY
FIRST SEMESTER, 2022/2023
(NOVEMBER/DECEMBER, 2022)

CHEM 226: WATER CHEMISTRY

STREAM: Y2 S1 **TIME: 2 HOURS**

DAY: THURSDAY, 2:00 – 4:00 P.M. **DATE: 24/11/2022**

INSTRUCTIONS

1. ***Do not write anything on this question paper.***
2. ***Answer ALL the questions in section A [Compulsory] and any other TWO Questions from section B.***

QUESTION ONE

a) Discuss the structure of a water molecule with a suitable illustration. (4Marks)

b) Explain what is observed what is observed when a solution of hydrogen chloride gas in methyl benzene and that of water are added to sodium hydrogen carbonate. (4Marks)

c) Explain briefly for advantages and four disadvantages of hard water. (4 Marks)

d) Explain in detail what happens when a blue litmus paper is added to aqueous solution of aluminum sulphate. (6 Marks)

e) i) Explain why C_2H_6 has a lower boiling point than CH_2O though they both have the same molecular mass. (2 Marks)

ii) Write a stoichiometric equation for the reactions of water with sulphur dioxide and magnesium oxide. (2 Marks)

f) Discuss the soap manufacture process. (6 marks)
g) Write down the mechanism for the reaction of silicone chloride and water. (4Marks)
h) Describe the process of cleaning a greasy linen using soap solution. (4 Marks)
i) Explain how water is designed in keeping the temperature in a mammalian body constant. (4 Marks)

QUESTION TWO

Discuss in detail how ion exchange technique is used in the synthesis of deionized water. (15 Marks)

QUESTION THREE

a) Discuss the process of synthesis of commercial detergents stating the essence of each ingredient. (10 Marks)
b) Explain how temporary and permanent hardness in a given water sample can be determined. (5 Marks)

Question four

a) Discuss the intermolecular forces in liquids with suitable illustrations. (9 Marks)
b) Explain three physical properties of water. (6 Marks)

Question five

a) Evaluate the surface activity of a novel surfactant. (5 Marks)
b) Discuss the effects of water pollution on fauna and flora. (10 Marks)