

THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

AUGUST - DECEMBER 2015 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF CHEMISTRY

REGULAR PROGRAMME

CHEM 100: INTRODUCTION TO LABORATORY TECHNIQUES

Date: DECEMBER 2015

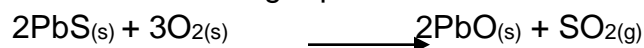
Duration: 2 Hours

INSTRUCTIONS: Answer Question ONE and ANY OTHER TWO Questions

- Q1. a) Define the following terms
- i Distillation. (1 mark)
 - ii End point. (1 mark)
 - iii Boiling point. (1 mark)
 - iv Primary standard. (1 mark)
 - v Recrystallization. (1 mark)
- b) i Define a chemical waste. (1 mark)
- ii Explain FIVE factors considered during disposal of a chemical waste. (10 marks)
- iii What are the FOUR characteristics of chemical waste. (4 marks)
- c) 40ml of H_2SO_4 solution was titrated with 0.215M NaOH. If 30ml of the base was exactly required to exactly neutralize the acid what was the concentration of the acid. (4 marks)
- d) i You want to use a metal clamp to hold flask and you notice that the jaws of the clamp are bare metal. What should you do to ensure a firm holds on the flask? (1 mark)

- ii Give any THREE laboratory safety precautions. **(3 marks)**
- e) Name any TWO types of recrystallization. **(2 marks)**
- Q2. a) i State TWO properties of a pure crystalline organic substance. **(2 marks)**
- ii Describe THREE ways of identifying a pure crystalline substance. **(6 marks)**
- b) List any ONE reason for the following
- i Labeling of chemical waste. **(1 mark)**
- ii Using small amounts of indicator. **(1 mark)**
- iii Volumetric equipment must neither be heated nor filled with hot liquids. **(1 mark)**
- c) List THREE characteristics of laboratory glassware. **(3 marks)**
- d) Explain SIX kinds of glassware used in a chemical laboratory. **(6 marks)**
- Q3. a) i Name the TWO types of balances used to weigh samples in a chemistry laboratory. **(2 marks)**
- ii Name the commonly used balance. What precautions should be taken when weighing a sample with this named balance. **(10 marks)**
- iii Explain THREE modes of weighing mass by use of analytical balance. **(6 marks)**
- iv Give TWO advantage of thin layer chromatography. **(2 marks)**
- Q4. a) Differentiate between the following
- i Mohr pipette and serological pipette. **(2 marks)**
- ii Molarity and Molality. **(2 marks)**
- iii Evaporation and sublimation. **(2 marks)**
- iv Planar chromatography and column chromatography. **(2 marks)**

b) Given the following equation



i Calculate the mass of O₂ that will react with 3.5g of PbS
(Pb = 82, S = 32, O = 16) **(5 marks)**

ii Calculate the theoretical yield of PbO **(5 marks)**

c) You come across two pieces of glass apparatus that are stuck together at the ground glass joint. How would you attempt to separate them without breaking them? **(2 marks)**

Q5. a) Differentiate between steam distillation and vacuum distillation. **(3 marks)**

b) i List FOUR requirements of titration. **(4 marks)**

ii Differentiate between direct titration and indirect titration. (2 marks)

iii 25cm³ of sodium hydroxide solution was neutralized by 23.9cm³ of 0.1M nitric acid. What is the mass of sodium hydroxide used in the reaction. (Na = 23, O = 16, H = 1, N = 14) **(4 marks)**

c) Give FOUR properties of a good standard solution **(4 marks)**

d) List THREE ways of classifying titration analysis methods. **(3 marks)**

END