Technical University of Mombasa

Faculty of Applied and Health Sciences

DEPARTMENT OF **PURE AND APPLIED SCIENCES**

DIPLOMA IN ANALYTICAL CHEMISTRY
(DAC 10J)

ACH 2315/ ABT 2315 : CHEMICAL ANALYTICAL METHODS AND BIOCHEMISTRY

SPECIAL/SUPPLEMENTARY: EXAMINATIONS

SERIES: FEBRUARY 2013

TIME: 2 HOURS

INSTRUCTIONS:

You should have the following for this paper

- *Answer booklet*

This paper consists of ***FIVE*** questions.
Answer Question **ONE (compulsory)** and any other **TWO** questions

*This paper consists of **3 PRINTED** pages*

SECTION A: Answer **all** questions

1. Calculate the concentration of Cl^- ions in a solution containing 2.65g of $BaCl_2$ in 250ml solution. (Ba = 137, Cl = 35.5)
   i) ppm
   ii) % w/v
   (4marks)
2. Give any FOUR techniques use din separation of mixtures **(4marks)**
3. Explain the following terms as used in separation techniques
   (i) Retention factor
   (ii) Locating agent
   (4marks)
4. Differentiate between
   (i) Vacuum and gravity filtration
   (ii) Drying and ignition
   (4marks)
5. a) Draw the structure of divinely benzene DUB and explain its importance in ion exchange. **(3marks)**
   b) Give one example of a cationic exchange resin. **(1mark)**
6. State FOUR functions of carbohydrates **(4marks)**
7. State the physiological importance of glycosides **(4marks)**
8. Explain the effects of temperature on enzyme activity **(4marks)**
9. Explain the regulation of enzyme activity in the living system **(4marks)**
10. (i) State the biochemical functions of pyridoxine (vitamin B_6) **(2marks)**
    (ii) List dietary sources of pyridoxine vitamin. **(2marks)**

SECTION B (Choose any **three** questions)

11. a) (i) State THREE properties of a good gravimetric precipitate. **(3marks)**
    (ii) Describe the gravimetric analysis of Ba^{2+} ions in a sample using sulpharic acid as the precursor precipitating agent.
    (7marks)
    b) (i) State FOUR conditions necessary for precipitation in gravimetry **(4marks)**
    (ii) Describe the separation of the dyes in a fountain pen ink using a preparative column.
    (6marks)

12. a) Describe the treatment of water by softening and deionization using ion exchange resins.

(10marks)

b) 20g of hexanedioic acid (HAD) was shaken with a mixture of $100cm^3$ ether and $100cm^3$ water at 25˚C. After titration with standard sodium hydroxide the concentration of the acid was found to be $0.0224moldm^{-3}$ in ether and $0.16moldm^{-3}$ in water.

i) Calculate the distribution coefficient K_D for hexanedioic acid between ether and water.

(2marks)

ii) If log of HAD had been shaken with $50cm^3$ of each solvent at 25˚C . State with reason the value of K_D expected.

iii) If log of HAD was dissolved in $50cm^3$ of ether at 25˚C. Calculate how much of the acid can be extracted with $50cm^3$ of water **(5marks)**

13. a) Differentiate between the following terms

i) Steam and vacuum distillation

ii) Recrystalisation and fractional crystallization. **(4marks)**

b) (i) State and explain four precautions when carrying out sohxlet extraction **(8marks)**

(ii) Describe counter-current solvent extraction. **(4marks)**

c) It is more efficient to extract a component in a mixture using small portions of extracting solvent than large quantity at once of the same volume. Explain.

(4marks)

14. a) State factors affecting enzyme action. **(6marks)**

b) List salient features of active site **(7marks)**

c) Explain competitive inhibition of enzyme activity. **(7marks)**

15. a) Explain the classification of vitamins **(10marks)**

b) State the biochemical functions of vitamin A. **(5marks)**

c) Justify vitamin D is hormone and not a vitamin. **(5marks)**