TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF MEDICAL SCIENCES

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN PHARMACEUTICAL TECHNOLOGY

APM 2210: ANALYTICAL PHARMACEUTICAL CHEMISTRY

SPECIAL/ SUPPLIMENTARY EXAMINATIONS

SERIES: SEPTEMBER 2018

TIME: 2HOURS

DATE: Pick DateSep2018

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **THREE**Section(s). AttemptAll questions in section A and B and any two questions in section C.

Do not write on the question paper.

SECTION A   (40 marks) Answer All questions

1. The company you work for has acquired a large consignment of sodium carbonate as raw material for export to China International Pharmaceutical Company of China but unfortunately it is contaminated with sodium bicarbonate.

As the pharmaceutical analyst in charge of quality control you are required to assay a sample and provide a report to the management on the actual purity of the consignment.

You have been provided with the following;

Burette

Pipette (25.0 ml)

Conical flasks (3 x 250 ml)

Funnel

Retort stand

White tile

0.1M HCl (aq)

Methyl orange indicator

Phenolphthalein indicator

 [Na = 23, Ca = 40, O = 16, C = 12, H = 1]

Procedure

Pipette 25.0 ml of the provided solution mixture into a conical flask and titrate with 0.1M HCl standard solution using phenolphthalein indicator until the end point. Add 2-3 drops of methyl orange indicator and continue titrating until the new end point. Repeat the pipetting and the titration process three more times.

Results

Below is a table of results.

	Titration No.	trial	1	2	3
Phenolphthalein indicator stage	Final burette reading (cm^3)	9.70	9.50	9.60	10.00
	Initial burette reading (cm^3)	0.00	0.00	0.00	0.00
	Titre (cm^3)				

Methyl orange	Final burette reading (cm^3)	31.00	31.00	31.00	32.00
indicator stage	Initial burette reading (cm^3)	9.70	9.50	9.60	10.00
	Titre (cm^3)				

Tasks

A. Calculate the average volume of acid used in **(2 marks)**

   I.   Phenolphthalein titration stage

   II.   Methyl orange titration stage

B I. Write an ionic equation for the reaction which take place between the mixture and HCl in the phenolphthalein titration **(2 marks)**

  II. Explain your answer in 2 a) above. **(1 marks)**

C. I. Write an ionic equation for the reaction which take place between the mixture and HCl in
.   the methyl orange titration **(2 marks)**

   II. Explain your answer in 3 a) above. **(1 marks)**

D. Calculate the volume of acid that reacted with **(3 marks)**

   I.   Sodium carbonate in the mixture

   II.   Sodium hydrogen carbonate in the mixture

E. Calculate in mol/dm^3 the concentration of **(5 marks)**

   I.   Sodium carbonate in the mixture

II.   Sodium hydrogen carbonate in the mixture

F. Calculate in the mass concentration (g/L) of   **(5**
marks)

   I.   Sodium carbonate in the mixture

   II.   Sodium hydrogen carbonate in the mixture

G. Calculate in the % proportion of   **(4**
marks)

   I.   Sodium carbonate in the mixture

   II.   Sodium hydrogen carbonate in the mixture

2 Define the following as employed in volumetric analysis: -   **(4**
marks)

a) Factor

b) Gram equivalent weight of a reducing agent

c) Normality

d) Molarity

3. Describe the preparation of 500 ml of 0.08 mol/dm^3 sulphuric acid from concentrated acid of specific gravity1.84 and is 95% pure.

      (5 marks)

(S=32, O=16, H=1)

4. A solution is labeled 1x 10^{-3} mol/dm^3 $MgCl_{2(aq)}$. Calculate the concentration of Cl^- ions in

a) ppm

b) mol/dm^3

c) %w/v

d) N

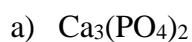(Mg = 24, Cl = 35.5)

      (4marks)

5. Briefly differentiate between quantitative and qualitative analysis as applied in pharmaceutical analysis.

(2 marks)

SECTION B (40 marks). Answer All questions

1. Calculate the equivalent weights of the following compounds

(2marks)
   a) $Ca_3(PO_4)_2$
   b) $NaHCO_3$

[Na = 23, C = 12, O = 16, H =1, Cl =35.5, Ca = 20 , P = 15, S = 32]

2. a) Explain how an acid base indicator works   (4 marks)

   b) Give any five (4) examples of indicators used in acid – base titrations   (4 marks)

   c) Sketch the following titration curves indicating the position of the end point for: (4 marks)
      i)   Titration of a weak base with a strong acid
      ii) Titration of a weak acid with a strong base

3. Describe the procedure of preparing standard solution
   I.   from a primary standard substance   (6 marks)
   II. from stock solution by dilution   (5 marks)

4. Describe the following titration techniques   (15 marks)
         i)   Blank titration

ii) Direct titration

iii) Indirect titration