MAKUENI COUNTY CLUSTER PREPARATORY EXAMINATION 2016

233/3
CHEMISTRY
Paper 3
Practical
July/ August 2016.
Time: 2 ¼ Hours

1. You are provided with:
- 1.8g of dibasic acid H_2X labeled solid P.
- Solution Q containing 1.0g of sodium hydroxide in 250 cm^3 of the solution.
- Phenolphthalein indicator.

You are required to:
- Prepare 250.0cm^3 of solution using solid P.
- Determine the value of X in the formula H_2X

Procedure:
Place all solid P in 250cm^3 beaker. Add about 100cm^3 of distilled water to the beaker. Swirl until all the solid dissolves. Transfer the solution into a 250cm^3 volumetric flask. Top up with distilled water to the mark and label it solution P. Using a measuring cylinder transfer about 100cm^3 of the solution P into a 250cm^3 beaker, preserve the rest in the volumetric flask for procedure II.

Pipette 25cm^3 of solution Q into a clean conical flask. Add 2- 3 drops of phenolphthalein indicator to the 25 cm^3 solution in the conical flask. Fill the burette with solution P from the beaker. Titrate until the pink colour disappears. Repeat two more times and record the results in the table below.

Table1.

	1	2	3
Final burette reading			
Initial burette reading			
Volume of solution P used (cm^3)			

(4 marks)

a) Calculate the average volume of solution P used. (1 mark)
b) Calculate the molarity of solution Q (Na = 23.0, O = 16.0, H = 1.0). (2 mark)
c) How many moles of sodium hydroxide were pipette. (1 mark)
d) How many moles of the acid, solution P reacted with 25.0 cm^3 of solution Q. (2 marks)
e) How many moles of H_2X were present in 1.8g of solid P. (2 marks)
f) Determine the value of X in the formula H_2X (H = 1) (2 marks)

B) **Procedure II**
You are provided with:-
- Acidified potassium manganate VII, solution L.
- Solution P dibasic acid H_2X
- A stop watch / clock.
- Thermometer.

You are required to determine how the rate of reaction of potassium manganate VII, solution L with the dibasic acid, solution P varies with change in temperature.
Using a 10cm^3 measuring cylinder, place 2.0cm^3 of solution L portions into FIVE test tubes on a test tube rack.
Clean the measuring cylinder and use it to place 10.0cm^3 of solution P into a boiling tube. Prepare a water bath by placing about 200cm^3 of water in beaker and start heating it. Insert a thermometer in solution P in the boiling tube and place the boiling tube in the warm water bath till the solution P attains temperature of 40^{0}C. Remove the boiling tube from the water bath and add the first portion of solution and the same time start a stop watch. Record the time taken for the purple colour of the mixture to decolourise in table II below. Repeat the experiment by using 10.0cm^3 of solution P at temperature on 50^{0}C, 60^{0}C, 70^{0}C and 80^{0}C. Record the times in table II.

Complete the table by computing –

a) **Table II**

Temperature of solution.				
Time for colour to decolourise (sec)				
–				

(5 marks)

b) Plot a graph of – (y axis) against temperature (3 marks)

c) From the graph determine the time taken to decolourise the mixture if the mixture is at a temperature of 65^0C.

(2 Marks)

d) How does the rate of reaction of potassium manganate (VII) with oxalic acid vary with temperature? (1 mark)

2. You are provided with solid D, carry out the tests below. Write your observations and inferences in the spaces provided.

a) Using a boiling tube, dissolve all solid D in about $20cm^3$ distilled water, label this as solution D. Divide the solution obtained into three portions of about $2cm^3$. Retain the remaining solution for use in question 2 a. (iv).

i) To the first portion add aqueous sodium hydroxide dropwise until in excess.

Observation	Inferences
(1mark)	(1mark)

ii) To the second portion add aqueous ammonium hydroxide dropwise until in excess.

Observation	Inferences
(1mark)	(1mark)

iii) To the third portion add a few drops of potassium iodide.

Observation	Inferences
(½ mark)	(½ mark)

iv) Using a clean boiling tube dissolve all solid M in about $10cm^3$ distilled water. To about $2cm^3$ of solution, add few drops of solution D. Heat the contents of the test tube strongly.

Observation	Inferences
(1mark)	(1mark)

b) You are provided with solid T. carry out the tests below. Write your observations and inferences in the spaces provided.

i) Place about one third of solid T on a metallic spatula and burn it using a Bunsen burner.

Observation	Inferences
(1mark)	(1mark)

ii) Place the remaining of solid T in a test tube. Add about $6cm^3$ of distilled water and shake the mixture well. (retain the mixture for use in test C)

Observation	Inferences
(1mark)	(1mark)

c) i) To about $2cm^3$ of the mixture, add a small amount of solid sodium hydrogen carbonate.

Observation	Inferences
(1mark)	(1mark)

ii) To about $1 cm^3$ of the mixture add $1.0cm^3$ of acidified potassium chromate (VI) and warm.

Observation	Inferences
(1mark)	(1mark)

iii) To about $2cm^3$ of the mixture add two drops of acidified potassium manganate (VII).

Observation	Inferences
(1mark)	(1mark)