KAHURO/MURANG'A EAST JOINT EXAMINATION – 2016

233/3
CHEMISTRY
PAPER 3
(PRACTICAL)
JULY/AUGUST, 2016
TIME: 2¼ HOURS

1. You are provided with:
- 2M hydrochloric acid solution X.
- Magnesium ribbon.
- 0.4M sodium carbonate solution Y.
- Solid A (six pieces of 1cm long magnesium ribbon).

You are required to determine:-
(i) The rate of reaction between hydrochloric acid and magnesium.
(ii) The mass of 1cm of magnesium ribbon.

PROCEDURE I

Using a measuring cylinder, measure 20cm³ take 1 piece of 2M hydrochloric acid, solution X and place it in a clean 100ml beaker. Cut a 1cm piece of magnesium ribbon and place it in the 100ml beaker containing 2M hydrochloric acid and immediately start the stop clock/watch; measure and record the time taken for the magnesium ribbon to react completely with 2M hydrochloric acid in the table below. Retain the resultant solution by transferring it into a 100ml measuring cylinder then adding distilled water to make 100ml of solution, label this solution Z. Reserve solution Z for use in procedure II.
Measure 18cm³ of hydrochloric acid accurately, add 2cm³ of distilled water to make the total volume 20cm³. Transfer the contents into the 100ml beaker,place another piece of 1cm length magnesium ribbon in the beaker then swirl and record the time taken for it to completely react. Repeat this procedure by measuring the volumes of the acid and distilled water as in table I below.
Retain the remaining solution X for question 2.

TABLE I

Experiment	Volume of 2M hydrochloric acid (cm³)	Volume of water (cm³)	Time taken for magnesium ribbon to react completely (sec)	$\frac{1}{Time}$ (sec^{-1})
1	20	0		
2	18	2		
3	16	4		
4	14	6		
5	12	8		

(6mks)

(a) Plot a graph of $\frac{1}{Time}$ against volume of the acid. (3mks)
(b) From the graph determine the time taken for the ribbon to react completely with 17cm³ of 2M hydrochloric acid. (2mks)

PROCEDURE II

Fill the burette with solution Y. Pipette 25cm³ of solution Z into a conical flask.
Add 2 drops of methyl orange indicator. Titrate solution Z with solution Y to complete the titration table II below. (4mks)

TABLE II

	I	II	III
Final burette reading			
Initial burette reading			
Volume of solution Y used.			

Calculate:
(i) Average volume of solution Y. (1mk)
(ii) Number of moles of solution Y used. (1mk)
(iii) Number of moles of hydrochloric acid in 25cm³ of solution Z. (1mk)
(iv) Number of moles of hydrochloric acid present in 100cm³ of solution Z. (1mk)
(v) Number of moles hydrochloric acid present in 20cm³ solution X. (1mk)
(vi) Number of moles of hydrochloric acid that reacted with 1cm of magnesium ribbon. (1mk)
(vii) Mass of magnesium present in 1cm length of magnesium ribbon. (Mg = 24). (1mk)

2. You are provided with solid B. Use it to carry out the tests below. Write your observations and inferences in the spaces provided. Place all solid B in a boiling tube, add about 10cm³ of distilled water and shake thoroughly. Filter the mixture obtained. Retain the residue for tests (b) below. Divide the filtrate into 2 portions.

(a) (i) To portion (i), insert a clean stirring rod and place it on a non-luminous flame of a Bunsen burner.

Observation	Inference
(1mk)	(1mk)

ii) To portion (ii), add about 3 drops of lead (II) nitrate solution, then warm.

Observation	Inference
(1mk)	(1mk)

(b) Dissolve the residue in about 8cm³ of dilute nitric (V) acid solution and divide the resulting solution.

Observation	Inference
(1mk)	(1mk)

(i) To portion (i), add sodium hydroxide solution, dropwise, then in excess.

Observation	Inference
(1mk)	(1mk)

(ii) To portion (ii), add sodium chloride solution and then warm.

Observation	Inference
(1mk)	(1mk)

3. You are provided with solid W. Place it in a boiling tube and about 10cm³ of distilled water and shake. Divide the resulting solution into 3 portions.

Observation	Inference
(1mk)	(1mk)

(i) Use the first portion to determine the pH of the solution.

Observation	Inference
(1mk)	(1mk)

(ii) To the second portion, add about half spatula of sodium hydrogen carbonate.

Observation	Inference
(1mk)	(1mk)

(iii) To the third portion, add about 3 drops of acidified potassium manganate (VII).

Observation	Inference
(1mk)	(1mk)