NANDI EAST, NANDI SOUTH & TINDERET SUB-COUNTIES JOINT EVALUATION 2016

233/3
CHEMISTRY
PAPER 3
PRACTICAL
JULY / AUGUST 2016
TIME: 2 ¼ HOURS

1. (I) You are provided with:-
- Solution A containing 95g of a mixture of sodium carbonate and sodium chloride per liter of solution.
- Solution B which is 1MHCl.

You are to determine the percentage of sodium carbonate in the mixture.

Proceed as follows:
Pipette 25.0cm^3 of solution A and transfer it to the conical flask. Titrate it with solution B from the burette using 3 drops of methyl orange indicator. Stop titrating when a permanent pink colour appears. Repeat the experiment and complete the table below.

TABLE I

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of **B** used (cm^3)			

(4mks)

(a) Determine the average volume of solution B used. Show your workings. (1mk)
(b) Determine the number of moles of B used. (1mk)
(c) Determine the number of moles of the base used. (1mk)
(d) Calculate the concentration of sodium carbonate in mol dm^{-3}. (1mk)
(e) Determine the mass of sodium carbonate in 1 litre of the solution (Na = 23, C = 12, O = 16) (1mk)
(f) Determine the percentage of sodium carbonate in the mixture. (1mk)

(II) You are provided with the following:-
- Hydrogen peroxide labeled solution D
- Dilute Hydrochloric acid labeled solution B
- Sodium thiosulphate labeled solution C
- Potassium iodide labeled solution E
- Starch solution labeled solution K
- Distilled water in a wash bottle

You are required to determine how the rate of reaction of hydrogen peroxide with potassium iodide varies with the concentration of hydrogen peroxide.

Procedure
Experiment 1
Using a burette, place 25cm^3 of solution D into beaker 1. Into the same beaker, add 20cm^3 of solution B using a 50ml or 100ml measuring cylinder. Shake the contents of beaker 1.
Using a 10ml measuring cylinder, place 5cm^3 of solution C into beaker 2 followed by 5cm^3 of solution E then 2cm^3 of solution K. Shake the contents of beaker 2.
Pour the contents of beaker 2 into beaker 1 and start a stop clock / watch immediately.
Swirl the mixture and let it stand. Note the time taken for the blue colour to appear.
Record the time in the space provided for experiment 1 in the table below.
Clean beaker 1. Repeat the procedure with the volumes of water, solutions B, C, D, E and K as shown in the table for experiments 2 to 5.

(a) Complete the table by computing $\frac{1}{Time}$ Sec-1 (5mks)

Experiment	Volume of water(cm^3)	Volume of hydrogen peroxide, solution D (cm^3)	Volume of dilute sulphuric acid, solution B (cm^3)	Volume of sodium thiosulphate, solutionC (cm^3)	Volume of potassium iodide solution E (cm^3)	Volume of starch solution, solution K (cm^3)	Time (sec)	$\frac{1}{Time}$ Sec-1
1	0	25	20	5	5	2		
2	5	20	20	5	5	2		
3	10	15	20	5	5	2		
4	15	10	20	5	5	2		
5	20	5	20	5	5	2		

(b) Plot a graph of $\frac{1}{Time}$ Sec-1 (y-axis) against volume of hydrogen peroxide used in solution A. (3mks)

(i) From your graph, determine the time that would be taken if the contents of beaker 1 were: 17.5cm^3 water, 7.5cm^3 solution D and 20cm^3 solution B. (2mks)

(ii) How does the rate of reaction of hydrogen peroxide with potassium iodide vary with the concentration of hydrogen peroxide? (1mk)

2. You are provided with liquid P. Carry out the tests on the liquid to determine its content.

(b) Place about 1cm^3 of P in a test tube; drop a piece of magnesium, solid M.

Observations	Inferences
(1mk)	(1mk)

(c) Place a drop of liquid P on the back of your hand and blow over it.

Observations	Inferences
(1mk)	(1mk)

(d) Divide the remaining liquid into two portions.

(i) To the first portion add three drops of acidified potassium chromate (IV). ($K_2Cr_2O_7$)

Observations	Inferences
(½mk)	(½mk)

(ii) To the 2nd portion, add equal volume of ethanoic acid followed by three drops of concentrated sulphuric (IV) acid and boil the mixture.

Observations	Inferences
(½mk)	(½mk)

3. You are provided with solid L. Carry out the tests and record your observations and inferences.

(a) Take a spatula full of solid in a clean dry boiling tube and heat gently then strongly.

Observations	Inferences
(1mk)	(1mk)

(b) Place the remaining solid L in a clean boiling tube and add about 10cm^3 of distilled water. Divide the resulting product into four portions.

Observations	Inferences
(½ mk)	(½ mk)

(i) To the first portion, add 1cm^3 barium nitrate solution.

Observations	Inferences
(1mk)	(1mks)

(ii) To the second portion, add 1cm^3 of nitric (V) acid followed by lead (II) nitrate.

Observations	Inferences
(1mk)	(1mk)

(iii) To the third portion, add excess ammonia solution.

Observations	Inferences
(½ mk)	(½ mk)

(iv) To the fourth portion, add 1cm^3 of potassium iodide solution.

Observations	Inferences
(½ mk)	(½ mk)

(v) To the fourth portion, add a spatula full of sodium hydrogen carbonate powder.

Observations	Inferences
(1mk)	(1mk)