NAME …… INDEX NO …….

Candidates signature ……...

Date ……

233/3

CHEMISTRY

PAPER 3

(PRACTICAL)

JULY/AUGUST 2019

TIME: 2 ¼ HRS

GATUNDU SOUTH JOINT EXAM **Kenya**

Certificate of Secondary Education

CHEMISTRY PAPER 3 **(Practical)**

JULY/AUGUST 2019

TIME 2 ¼ HOURS

Instructions to candidates

1. Answer all the questions in the spaces provided.
2. You are not allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ hours allocated for this paper. This time is to enable you read the question paper and make sure you have all the chemicals and apparatus you may need.
3. Mathematical tables and electronic calculators may be used.
4. All working must be clearly shown where necessary.

For Examiner's use only

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1		
2		
3		

TOTAL SCORE		

Please turn over

1. You are provided with
   - ⇨ Solution S containing 25.2g per dm^3 of a compound $H_2C_2O_4X.H_2O$.
   - ⇨ Solution W 1.99M sodium hydroxide solution.

   You are required to: -

   a) Prepare a dilute solution sodium hydroxide (solution W)
   b) Determine the value of X in $H_2C_2O_4X.H_2O$.

   PROCEDURE I:

   Using a pipette and pipette filler, place $25cm^3$ of solution W into a $250cm^3$. Volumetric flask shake well.

   Add more distilled water up to the mark. Label this solution Q. Fill a burette with solution S, pipette $25.0cm^3$ of solution Q into a conical flask. Add two drops of phenolphthalein indicator and titrate with solution S. Record your observations in table 1. Repeat two more times and complete the table.

   TABLE I: (4mks)

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution S used (cm^3)			

   Determine the:

   i. Average volume of solution S used. (1mk)

   ii. Concentration of solution Q in moles dm^{-3}. (1mk)

   iii. Concentration of solution S in moles dm^{-3}. (2mks)

iv. The RFM (relative formula mass) of $H_2C_2O_4.XH_2O$. (1mk)

v. The value of x in $H_2C_2O_4.xH_2O$. (1mk)
(H =1, C= 12, O =16)

PROCEDURE II

You are provided with the following: -

- Hydrogen peroxide labelled solution A.
- Dilute sulphuric acid labelled solution B.
- Sodium thiosulphate labelled solution C.
- Potassium iodide labelled solution D.
- Starch solution labelled solution E.
- Distilled water in a wash bottle.

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

EXPERIMENT 1.

- Label two 200ml or 250ml beakers as beaker 1 and beaker 2.
- Using a clean burette, place 25.0cm^3 of solution A 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 D then 2cm^3 of solution E. 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 volume of water solutions A, B, C D

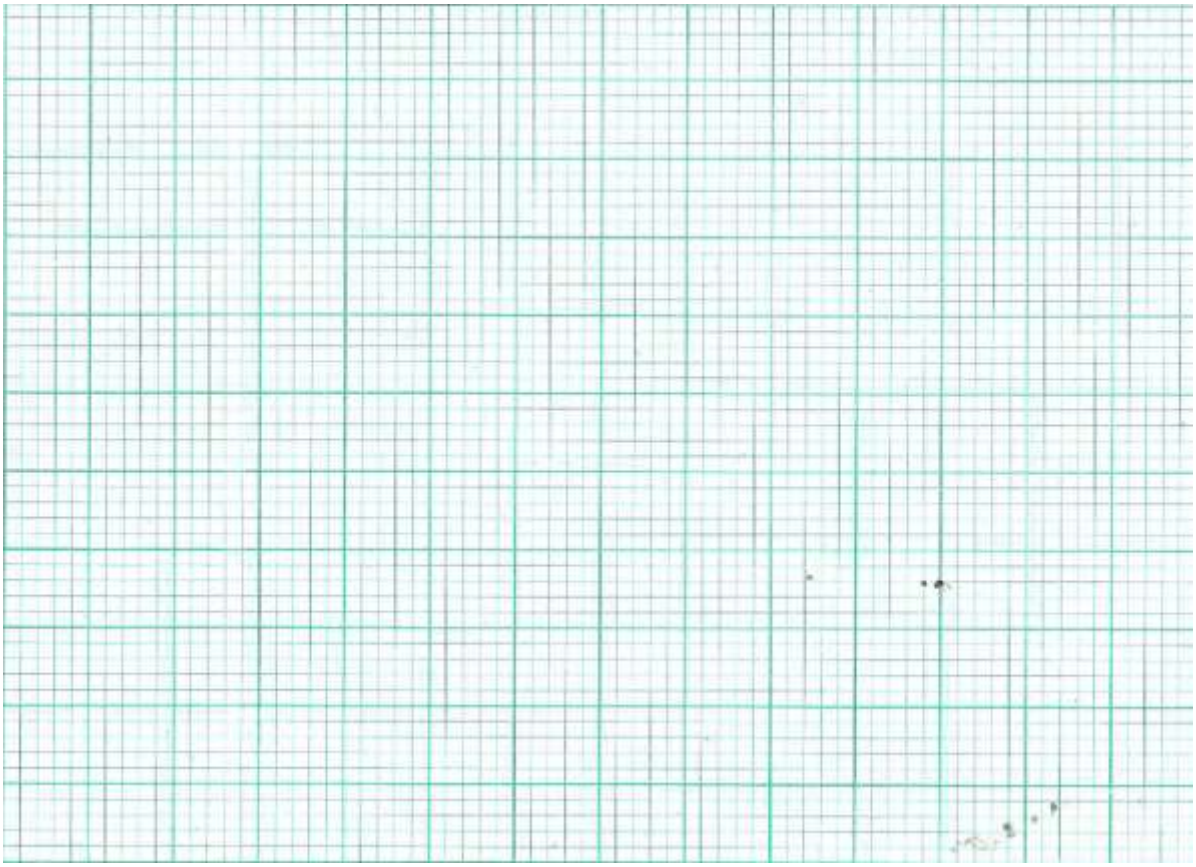
and E as shown in the table for experiments 2 to 5.

Complete the table by computing $\frac{1}{time}$ sec -1. (7½mks)

ent	Beaker 1			Beaker 2				
	e of water (cm^3)	me of hydrogen peroxide solution A (cm^3)	ume of dilute sulphuric acid, solution B (cm^3)	ume of sodium thiosulphate, solution C (cm^3)	ne of potassium iodide, solution D (cm^3)	ume of starch solution, solution E (cm^3)	e (sec)	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		

a)

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



c) 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 A and 20cm^3 solution B. (2mks)

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

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2. (a) Place about half of the solid H in a clean dry test tube. Heat the solid gently and then strongly. Test for any gas produced using both blue and red litmus papers.

Observations	Inferences
	(3½mks)

(b) Dissolve the remaining portion of solid H in about $8cm^3$ of distilled water contained in a boiling tube. Divide the solution into three portions.

(i) To the first portion, add aqueous sodium hydroxide drop wise until in excess.

Observations	Inferences
	(2mks)

(ii) To the second portion, add two drops of solution A (hydrogen peroxide) then add aqueous sodium hydroxide drop wise until in excess.

Observations	Inferences

	(1½mks)

(iii) (a) To the third portion, add 2 – 3 drops of barium chloride solution.

Observations	Inferences
	(1½mks)

(b) To the mixture in (iii) (a) above, add about $2cm^3$ of 2M aqueous hydrochloric acid.

Observations	Inferences
	(2mks)

3. You are provided with liquid F. Carry out the tests below. Record your observations and inferences in the spaces provided.

a) Place three or four drops of liquid F on a watch glass. Ignite the liquid using a Bunsen burner.

vations	nces
	(1mk)

b) To about $1cm^3$ of liquid F in a test tube, add about $1cm^3$ of distilled water and shake thoroughly.

vations	nces
(½mk)	(1mk)

c) To about $1cm^3$ of liquid F in a test tube, add a small amount of solid sodium carbonate.

vations		nces

(1mk)		(1mk)

d) To about $2cm^3$ of liquid F in a test tube, add about $1cm^3$ of acidified potassium dichromate (VI). Warm the mixture gently and allow it to stand for about one minute.

vations	nces
(1mk)	(1mk)