Name: …… Index No. ……

School: …… Candidate's Sign. …….....

Date: …….....

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SERIES 30 EXAMS

233/3
CHEMISTRY
PRACTICAL
PAPER 3

Chemistry
Practical

INSTRUCTIONS TO THE CANDIDATES:-

- ***Write your name and index number in the spaces provided***
- ***Sign*** *and write the* ***date*** *of examination in the spaces provided*
- ***Answer all the questions in the spaces provided.***
- *Mathematical tables and electronic calculators may be used.*
- *All working* ***MUST*** *be clearly shown where necessary.*
- *Use the first 15minutes of the 2 ¼ hours to ascertain you have all the chemical sand apparatus that you may need.*

For Examiners use Only

QUESTION	MAX. SCORE	SCORE
1	13	
2	10	
3	17	
TOTAL	**40**	

This paper consists of 4 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. ***You are provided with***
   - Hydrogen peroxide solution A

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- Potassium iodide solution B
- Sodium thiosulphate solution C
- Dilute sulphuric acid solution D, Starch solution E

You are required to show:

How the rate of reaction of hydrogen peroxide with potassium iodide varies with concentration of hydrogen peroxide.

Procedure:

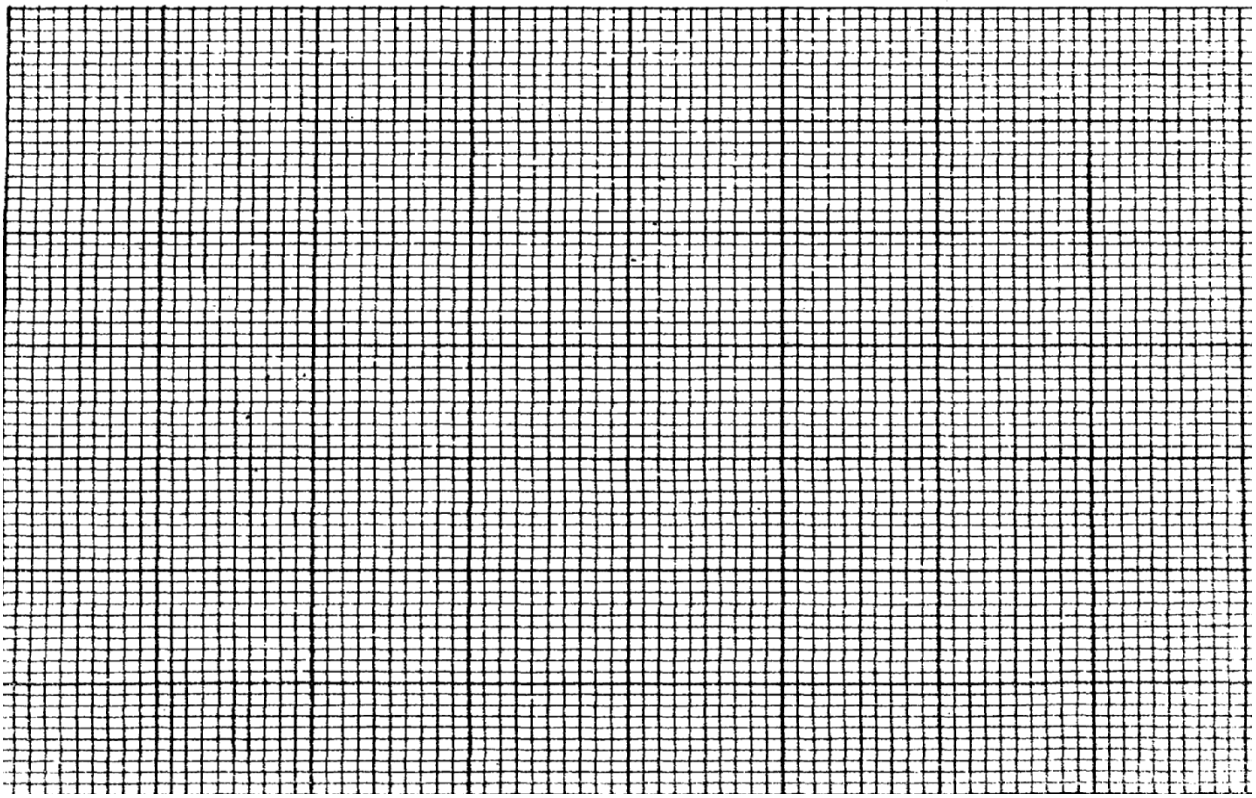
Label 200ml beakers X and Y, using a clean burette, place 30.0cm^3 of solution A into beaker X. Using 10mls measuring cylinder place 5.0cm^3 of solution B into beaker Y, followed by 5.0cm^3 of solution C, 5.0cm^3 of solution D and then 2.0cm^3 of solution E starch and shake the contents. Pour the contents of beaker X into beaker Y and start the stop clock/watch. Note the time taken for the blue colour to appear. Record the time in the space provided in the table below. Clean beaker Y, and repeat the procedure with the volume of water solutions A,B,C,D and E as shown in the table below for experiment 2 to 5.

Table 1

Beaker X			**Beaker Y**				**Time**	
Experiment	**Hydrogen peroxide solution A**	**Water**	**Potassium iodide solution B**	**Sodium thiosulphate solution C**	**Dilute sulphuric (VI) acid D**	**Starch solution E**	**(t) (sec)**	**$\frac{1}{t}$ (sec^{-1})**
1	30	0	5.0	5.0	5.0	2.0		
2	25	5	5.0	5.0	5.0	2.0		
3	20	10	5.0	5.0	5.0	2.0		
4	15	15	5.0	5.0	5.0	2.0		
5	10	20	5.0	5.0	5.0	2.0		

a) Complete the table by computing it. (5mks)

b) Plot a graph of receprical of time $\frac{1}{t}$ sec^{-1} vertical axis against volume of hydrogen peroxide used.(4mks)



c) From your graph determine the time the reaction would take if the volume of hydrogen peroxide used is 18.0cm^3 (2mks)

d) How does the concentration of hydrogen peroxide affect its rate of reaction with potassium iodide. (2mks)

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2. ***You are provided with:***

- Anhydrous sodium carbonate Q
- 1.0M hydrochloric acid solution R
- Thermometer

You are required to determine the molar heat of solution of Q using two procedures.

Procedure 1.

Place 50ml of distilled water in 100ml plastic beaker Note the temperature of the water and record it in table II below Add all the solid Q to the water in the plastic beaker and stir gently with the thermometer and record the final temperature of the solution in the table below. Keep the resulting solution for procedure (II)

Final temperature /^oC (T_2) Initial temperature /^oC (T_1) Temperature change (ΔT)	

a) (i) What is the enthalpy change for the reaction? (assume the density of the solution is 1.0g/cm^3 and specific heat capacity = 4.2Jg-$1K^{-1}$) (2mks)

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Procedure II

Transfer the contents of the beaker into 25ml volumetric flask. Rinse both the beaker and the thermometer with distilled water and add to the volumetric flask.

Add more water to make up to the mark. Label this solution Q. Fill the burette with solution R. Pipette 25mls of solution Q into a conical flask. Add 2-3 drops of methyl orange indicator and titrate with solution R from the burette.

Record your readings in table (III) below. Repeat the titration two or more times. Complete the table below. (4mks)

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

(b) Calculate the average volume of solution R used. (1mk)

(c) Determine the number of moles of solution Q that reacted with solution R (2mks)

(d) Calculate the number of moles of solid Q used in the procedure 1. (1mk)

(e) Calculate the heat of solution of anhydrous sodium carbonate. (2mks)

3. (a) You are provided with solid S. Carry out the tests below. Record your observation and inference in the spaces provided. Put solid S in a clean boiling tube and add about 10mls of distilled water and shake well. Divided into five portions.

Observations	**inference**
(1mk)	(1mk)

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(i) To the first portion add sodium hydroxide dropwise until excess

Observations	**inference**
(1mk)	(1mk)

(ii) To the second portion, add 2M ammonia solution dropwise

Observations	**inference**
(1½mk)	(1mk)

(iii)To the third portion, add 2.0cm^3 of 0.5m Barium chloride followed by 5.0cm^3 of 2M hydrochloric acid.

Observations	**inference**
(1½mk)	(1mk)

(iv) To the fourth portion, add 3 drops of acidified potassium manganate (VII) solution

Observations	**inference**
(1mk)	(1mk)

b) You are provided with solid T. Carry out the tests below to identify the ions present.
Put the whole of solid T into a boiling tube and add about 10mls of distilled water and shake well.
Divided into four portions.

(i) To the first portion, add 2-3 drops of universal indicator NOTE the pH

Observations	**inference**
(½mk)	(1mk)

(ii) To the second portion, add 2.0cm^3 of sodium carbonate solution

Observations	**inference**
(½mk)	(1mk)

(iii) To the third portion add 2-3 drops of acidified dichromate (VI) solution

Observations	**inference**
(1mk)	(1mk)

(iv) To the fourth portion, add 2.0cm^3 of freshly prepared iron (II) solution

Observations	**inference**
(1mk)	(1mk)