NAME:…… **INDEX NO:……**

SCHOOL:…….. **DATE:…….**

SIGN:……..

CHEMISTRY
PAPER 3
(PRACTICALS)
TIME: 2 ¼ HOURS

INSTRUCTIONS TO CANDIDATES

(a) Write your name and Index number in the spaces provided in the question paper.
(b) Sign and write the date of examination in the spaces provided above.
(c) Answer ALL questions in the spaces provided on the question paper
(d) You are NOT allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ hours allowed for this paper. This time is to enable you to read the question paper and make sure you have all the apparatus and chemicals that you may need.
(e) All working MUST be clearly shown where necessary
(f) Mathematical tables and electronic calculators may be use.

FOR EXAMINERS USE ONLY.

QUESTIONS	MAXIMUM SCORE	CANDIDATES SCORE
1	21	
2	09	
3	10	
Total Score	40	

This paper consists of 8 printed pages.
Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

1. You are provided with :

   i) Solution A which is 2.0M hydrochloric Acid (HCL)

   ii) Solution B, which is 0.1 M sodium thiosulphate ($Na_2S_2O_3$)

   iii) Solution C which is monobasic alkali of 0.1 M concentration

   You are required to:

   i) Find the effect of change of temperature on the rate of reaction between sodium thiosulphate, solution B and hydrochloric Acid, solution A.

   ii) Prepare a dilute solution of hydrochloric acid, solution A

   iii) Write an ionic equation for the reaction between hydrochloric acid solution A and the alkali solution C.

Procedure I

Using a measuring cylinder measure 10 cm^3 of solution B into a clean 100 cm^3 glass beaker. Place it together with its content on a white piece of paper with a cross(X) written on it with bold blue print. Measure the temperature of the solution and record it as shown in the table below.

Using a clean measuring cylinder, measure 5 cm^3 of solution A. add it to the contents of the beaker containing solution B and immediately set on the stop watch. Record the time it will take for the cross (X) to become invisible when viewed above the reaction mixture in the beaker.

Wash the glass beaker used and repeat the experiment at the temperature indicated in the table below by warming sodium thiosulphate solution B to the stated temperature before adding hydrochloric Acid, solution A.

Table I

Experiment number	1	2	3	4	5	6	7	8
Volume of hydrochloric Acid, solution A (1 cm^3	5	5	5	5	5	5	5	5
Volume of sodium thiosulphate solution B(cm^3)	10	10	10	10	10	10	10	10
Temperatuiure (^{0}C) of sodium thiosulphate, solution B	Room temp.	30	35	40	45	50	55	60
Time in seconds								
Reciprocal of time $\left(\frac{1}{t}\right)$ seconds								

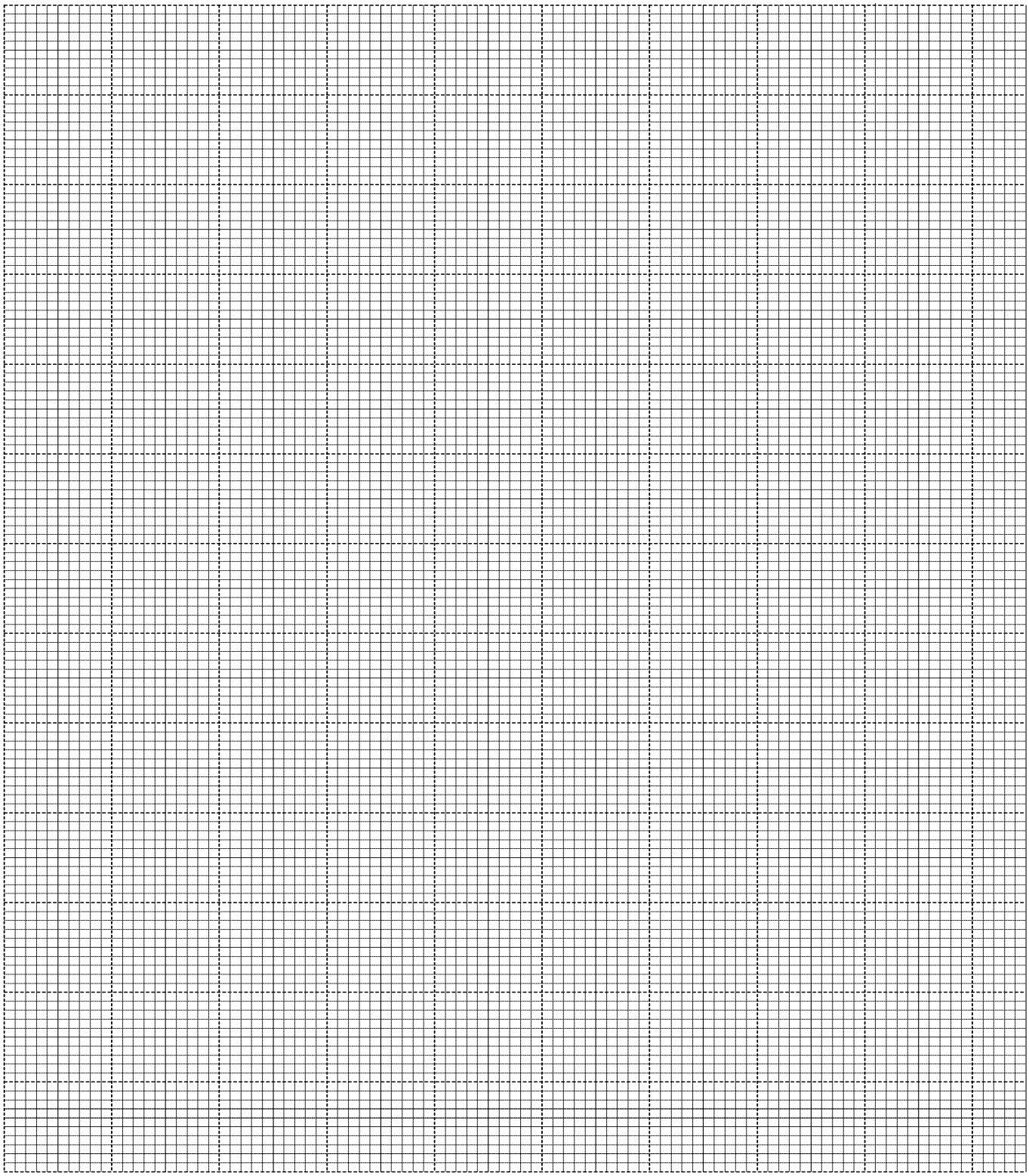
(5mks)

Note:

Sodium thiosulphate solution reacts with dilute hydrochloric acid to form a yellow precipitate of colloidal sulphur as shown in the equation below.

$Na_2S_2O_{3(aq)} + 2HCl_{(aq)} \quad S_{(s)} + SO_{2(g)} + 2NaCl_{(aq)} + H_2O_{(l)}$

a) On the grid provided, plot a graph of reciprocal of time $\left(\frac{1}{t}\right)$ against temperature(3 marks)



b) Comment on the effect of change in temperature on the reaction between sodium thiosulphate, solution B and hydrochloric acid, solution A.

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c) Use your graph to determine:

i) The time taken by the reaction when the temperature is 58^0C.

ii) The temperature at which the rate of the reaction is 0.045 sec^{-1}

Procedure II

Using a clean measuring cylinder, place 12.5 cm^3 of solution A in 250ml volumetric flask. Add 200 cm^3 of distilled water and shake. Add distilled water upto the mark. Label this solution D. Fill a burette with solution D. Using a pipette and a pipette filler, place 25.0 cm^3 of solution C into a 250 ml conical flask. Add two drops of phenolphthalein indicator and titrate with solution D until the pink colour disappears. Record your results in table II. Repeat the titration two more times and complete the table.

Table II

I		II	III
Final Burette Reading(cm^3)			
Initial Burette Reading(cm^3)			
Volume of solution D (cm^3)			

d) Calculate:

i) The average volume of solution D used. (1 mark)

ii) Moles of hydrochloric Acid, solution D used. (1 mark)

iii) Moles of Alkali solution C used. (1 mark)

e) Write ionic equation for the reaction between hydrochloric acid, solution A and Alkali, solution C.

2. You are provided with solid E. carry out tests below. Record your observations and inferences in the spaces provided.

a) Put about one half of solid E in a dry test-tube and heat it strongly. Test for any gas produced.

Observation	Inferences

(2 marks) (1mk)

b) Dissolve the rest of the solid E in 10 cm^3 of distilled water in boiling tube. Divide solution into 3 portions.

i) To a first portion in test-tube, add aqueous sodium hydroxide dropwise until in excess.

Observation	Inferences

(1 mark) (1 mark)

ii) To the second portion in test tube, add aqueous ammonia solution dropwise until in excess

Observation	Inferences

(1 mark) (1 mark)

iii) to the third portion in a test-tube, add lead(ii) Nitrate solution and then warm the mixture.

Observation	Inferences

(1 mark) (1 mark)

3. You are provided with solid F. Carry out the test below. Write your observations and inferences in the spaces provided.

a) Place about ½ (half) of solid F on a metallic spatula and heat over a Bunsen burner flame,

Observation	Inferences

(1 mark) (1 mark)

b) Place the remaining solid into a boiling tube. Add about 10 cm^3 of distilled water and shake well to dissolve.

Observation	Inferences

(1 mark) (1 mark)

c) Divide the solution in (b) above into four portions. To the first portion, in a test-tube, add 3 drops of universal indicator.

Observation	Inferences

(1 mark) (1 mark)

d) to the second portion in a test-tube, add a spatulafull of sodium hydrogen carbonate

Observation	Inferences

(1 mark) (1 mark)

e) To the third portion, add 3 drops of acidified potassium manganate (vii)

Observation	Inferences

(1 mark) (1 mark)