Name…… **Index No……/…….**

School…… **Date ……..…**

Candidate's Signature…….

233/3
CHEMISTRY
Paper 3
PRACTICAL
Time: 2 ¼ HourS

INSTRUCTIONS TO CANDIDATES

1. Write your name, Index number, School and date of examination in the spaces provided.
2. Answer ALL the questions in the spaces provided in the question paper.
3. You are Not allowed to start working with the apparatus for the first15 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 chemicals and apparatus that you may need.
4. All working Must be clearly shown where necessary.
5. Mathematical tables and silent electronic calculators may be used.

FOR EXAMINER USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1	10	
2	12	
3	18	
Total Score	40	

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

1. You are provided with:

- Solution J, aqueous hydrochloric acid of concentration 0.10 M.
- Solution K, a solution of sodium hydroxide contaminated with a salt. The total solute concentration is 6g/ litre.

You are required to find the percentage purity of the sodium hydroxide in solution K.

Procedure

a) Rinse out and fill the burette with solution K.

b) Rinse the pipette and using it with a pipette filler, transfer 25.0 cm^3 of solution J into a clean conical flask. Add 3 drops of phenolphthalein indicator into solution J in the conical flask.

c) Titrate solution J with solution K from the burette until a permanent colour change appears.

d) Record your burette reading in table 1 below.

e) Repeat the procedure two more times and complete the table 1.

TABLE 1

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

(4mks)

Determine the:

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

ii) Number of moles of HCL in 25.0 cm^3 of solution J (1mk)

iii) Number of moles of sodium hydroxide in the average litre calculated in (i) above. (1mk)

iv) The mass of sodium hydroxide in 1 litre of solution K.
(Na = 23.0,) = 16.0, H= 1.0)

v) The percentage purity of sodium hydroxide in K. (1mk)

2. You are provided with:

Exactly 9.45g of solid C

0.02M potassium manganate (vii), solution D

1.0 M aqueous sulphuric (vi) acid.

You are required to:

a) Prepare an aqueous of solid C

b) Determine the rate of reaction between acidified potassium manganate (vii) and the aqueous solution of solid C at different temperatures.

Procedure

Place all the solid C into a clean 250 ml. Volumetric flask. Add about 100ml of distilled water to the solid. Swarl carefully until all the solid dissolves. Add more distilled water to the mixture upto the mark. Label this solution C.

Place 2 cm^3 of solution D into a 250ml beaker. Using a 100ml. measuring cylinder, add 50 cm^3 of 1.0M sulphuric (vi) acid to the beaker containing solution D. Warm the mixture to about 65^0V .

Stop warming and allow the mixture to cool.

When the temperature is exactly 60^0C, add 15 cm^3 of solution C and start a stop watch immediately. Stir the mixture and measure the time taken for colour of the mixture to change from purple to colourless. Record the time (in Seconds) in a table 2 below.

(Also record the temperature at which the mixture becomes colourless)

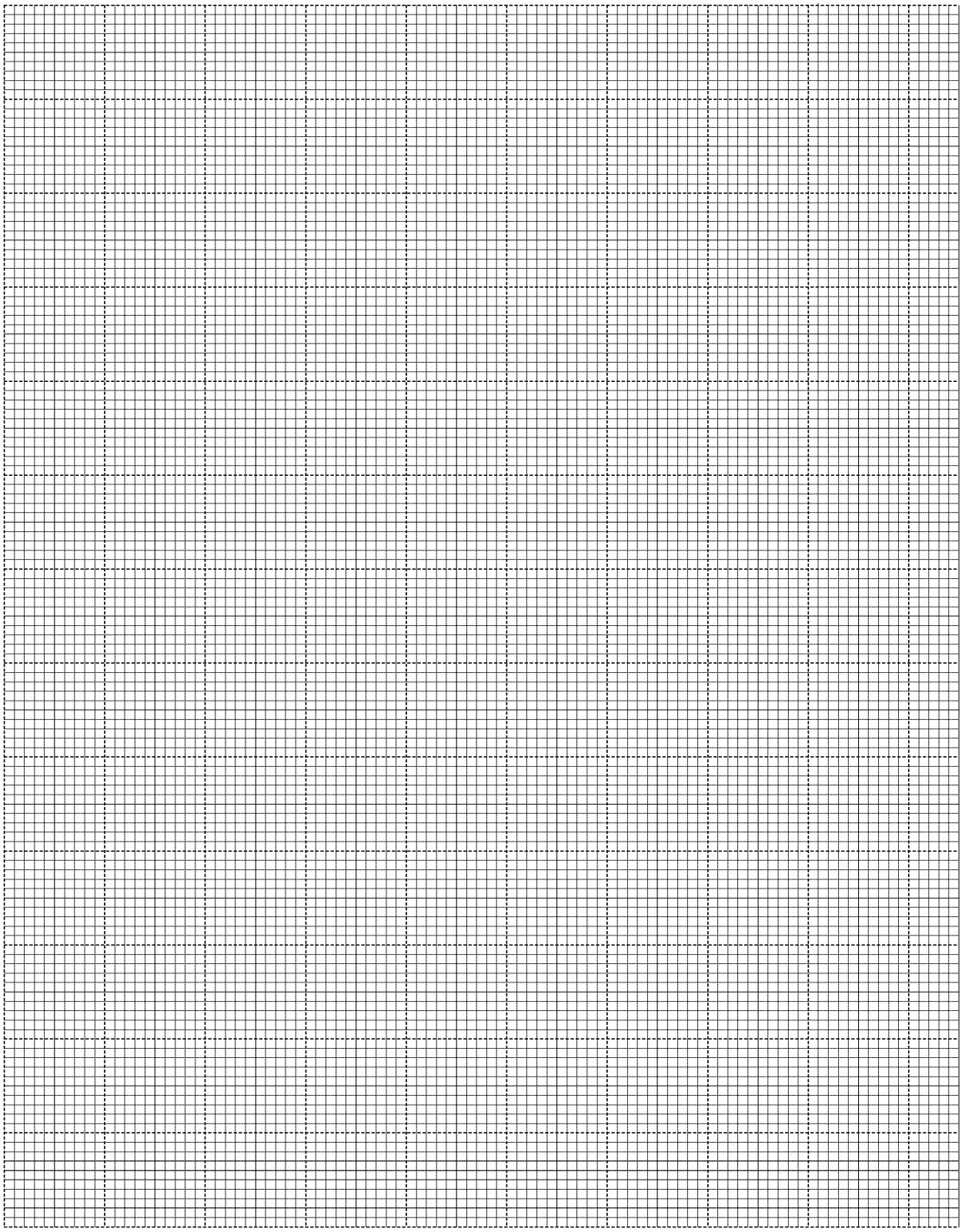
Clean the beaker and repeat the procedure at temperatures, 55^0C, 50^0C instead of 60^0 C

Calculate $\frac{1}{Time}$ and complete table 2

Note: Spare some solution D for use in question 3 b (ii) I

Temperature before mixing (^{0}c)	60	55	50	45
Temperature when the solution becomes colourless (^{0}c)				
Time (Seconds)				
1/t (Sec^{-1})				

a) Plot a graph of 1/time (Y – axis) against the temperature at the point when the solution become colourless. (3mks)



b) From your graph, Determine the time that the reaction would take if the temperature at which the solution becomes colourless is 42.5 ^{0}C

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c) Explain the shape of your graph (1mk)

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3. a) You are provided with solid N. Carry out the tests below. Write your observations and inferences in the spaces provided.

i) Heat about one third of Solid N in a clean dry test – tube. Test the gases produced with both blue and red litmus papers.

Observations	Inferences
2 mks	1mk

ii) Using a boiling tube, dissolve the rest of solid N in about 10 cm^3 of distilled water and use the solution for the tests below.

I to about 2 cm^3 of the solution, add 5 cm^3 of solution P (Aqueous sodium carbonate)

Observations	Inferences
1 mk	1mk

II To 2 cm^3 of the solution, add about 4 cm^3 of aqueous ammonia dropwise until in excess..

Observations	Inferences
1 mk	1mk

III To 2 cm^3 of the solution, add about 4 cm^3 of aqueous barium nitrate.

Observations	Inferences
1 mk	1mk

IV) To the mixture obtained in III above, add about 2 cm^3 of dilute hydrochloric acid.

Observations	Inferences
1 mk	1mk

b) You are provided with solid Q. Carry out the tests below. Write your observations and inferences in the spaces provided.

i) Place a half of solid Q on a metallic spatula and ignite it over a Bunsen burner flame.

Observations	Inferences
1 mk	1mk

ii) Place the remaining portion of solid Q in a boiling tube. Add about $6cm^3$ of distilled water and shake. Divide the solution formed into three portions.

I) To the first portion, two drops of solution D

Observations	Inferences
1 mks	1mk

II) To the second portion, add a small amount of solid sodium hydrogen carbonate.

Observations	Inferences
1 mks	1mk

III) To the third portion , add 2 drops of universal indicator and determine the pH of the solution.

Observations	Inferences
1 mks	1mk

END