MURANG'A SOUTH SUB-COUNTY MULTILATERAL EXAMINATION 2016
Kenya National Examination Council

233/3
CHEMISTRY
PAPER 3 (practical)
TIME: 2 HOURS

1. You are provided with
   - Solution A, dilute hydrochloric acid
   - Solution B, made by dissolving 0.5g of sodium hydroxide in water and made up to 250cm^3 of solution
   - Solid C, magnesium ribbon
   - Phenolphthalein indicator

   Your are required to:

i) Standardise solution A.
ii) Determine the rate of reaction between solution A and magnesium

PROCEDURE 1

i) Measure exactly 10cm^3 of solution A using a burette and transfer into a 250ml volumetric flask. Top up to the mark using distilled water. Label this solution D.
ii) Drain the remaining solution A in the burette, rinse the burette thoroughly and fill it with solution D.
iii) Pipette 25cm^3 of solution B into a conical flask. Add three drops of Phenolphthalein indicator.
iv) Titrate solution D with solution B. Record your results in the table below. Repeat the procedures (iii) to (iv) to complete the table.

	1	2	3
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume used			

(4mks)

(a) Calculate the average volume used. (1mk)
(b) i) Calculate number of moles of solution B used. (1mk)
ii) Number of moles of solution D in 250cm^3 of solution. (1mk)
iii) Molarity of solution A. (1mk)

PROCEDURE II

i) Cut solid C into equal parts each 2cm.
ii) Using a burette, measure 12cm^3 of solution A, into a clean boiling tube.
iii) Drop one piece of solid C into the boiling tube containing solution A and start the stop watch immediately. Stop the stopwatch when all solid C has just reacted.
Record your results in the table below.
v) Repeat steps (ii) and (iii) above using 10cm^3, 8cm^3, 60cm^3 and 4cm^3 of solution A. Top up each with distilled water to make 12cm^3 of solution and complete the table below.

Volume of solution A(cm^3) (mole/litre)	Volume of distilled water (cm^3)	Concentration of solution A	Time (s)	$^1/_t$(s^{-1})
12	0			
10	2			
8	4			
6	6			
4	8			

(6mks)

a) Plot of a graph of $^1/_t$ (y-axis) against the concentration of solution A. (3mks)
b) From the graph, determine the time taken for the reaction to reach completion when 1.5 moles of solution A are used. (2mks)
c) Comment on the shape of the graph. (1mk)

2. You are provided with solid Q. Carry out the tests below and record your observations and inferences in the spaces provided.

a) Strongly heat a spatula-end full of solid Q in a dry test tube.

Observation	Inference
(½ mk)	(1mk)

b) i) Place the remaining solid Q in a boiling tube. Add 10cm^3 of distilled water. Divide the solution into five portions.

Observation	Inference
(½ mk)	(½ mk)

ii) To the first portion, add aqueous lead (II) nitrate solution.

Observation	Inference
(½ mk)	(½ mk)

iii) To the second portion add dilute nitric (V) acid, followed by barium nitrate solution.

Observation	Inference
(½ mk)	(½ mk)

iv) To the third portion add a few drops of sodium hydroxide until in excess.

Observation	Inference
(1mk)	(1mk)

v) To the forth portion add few drops of aqueous ammonia until in excess.

Observation	Inference
(1mk)	(½ mk)

vi) To the fifth portion add a few drops of hydrochloric acid. Warm the contents.

Observation	Inference
(1mk)	(½ mk)

3. Your are provided with solid R. Carry out the tests below and record your observations and inferences.

a) Place a spatula-end full of solid R in a dry boiling tube and add about 10cm^3 of distilled water. Shake thoroughly and heat to boil.
Divide the solution into five portions.

Observation	Inference
(1mk)	(½ mk)

b) i) Test the first portion with the universal indicator solution provided.

Observation	Inference
(½ mk)	(1mk)

ii) To the second portion add a few drops of acidified potassium manganate (VII) solution

Observation	Inference
(1mk)	(1mk)

iii) To the third portion add a few drops of bromine water.

Observation	Inference
(1mk)	(1mk)

iv) To the forth portion, add half spatula of sodium hydrogen carbonate.

Observation	Inference
(½ mk)	(½ mk)

v) To the fifth portion, in a boiling tube, add 5cm^3 of ethanol followed by a few drops of concentrated sulphuric (VI) acid. Warm the mixture.

Observation	Inference
(1mk)	(½ mk)