Name.....**Index No**.....

School_____ **Sign:** _____ **Date:** _____

233/3
CHEMISTRY PAPER 3
PRACTICAL
JULY 2016
$2\frac{1}{4}$HRS

Kenya Certificate of Secondary Education (K.C.S.E)

Chemistry Practical - Paper 233/3

Instructions to Candidates

i) *Write your **name**, **index number**, **class** and **house** in the spaces provided on this page above.*
ii) *Sign and write the date of the practical examination in the spaces provided on this page above.*
iii) *Answer **ALL** questions in the spaces provided in the question paper after each question.*
iv) *All working **MUST** be clearly shown where necessary.*
v) *Mathematical tables and silent electronic calculators may be used.*
vi) *This paper contains **8** printed pages.*
vii) *Candidates should check the question paper to ascertain that **ALL** the pages are printed as indicated and that no questions are missing.*

For Examiner's Use Only:

Result:

Question	Maximum Score	Candidate's Score
1	25	
2	09	
3	06	
TOTAL	40	

1a). You are provided with:

i) An aqueous hydrochloric acid, solution **BA1**
ii) Solution **BA2** containing **4.8384 g** of a dibasic acid $H_2C_2O_4.2H_2O$ solution in one litre.
iii) An aqueous sodium hydroxide, Solution **BA3**.

You are required to:

i) Standardize solution BA3, sodium hydroxide.
ii) Use the standardized solution BA3 to determine the concentration of solution BA1.

PROCEDURE I

Pipette 25.0cm^3 of Solution **BA3** into a clean 250cm^3 conical flask, add 2 drops of phenolphthalein indicator and titrate against solution **BA2** from the burette. Record your results in Table 1 below and then repeat the titration in order to complete the Table of results.

Table 1.

Titration	**1st**	**2nd**
Final burette reading, cm^3		
Initial burette reading, cm^3		
Volume of solution BA2 (Titre) used, cm^3		

(3mks)

i) Determine the average volume of solution BA2 used (i.e. the average Titre). (1mk)

Calculations:

ii) Calculate the concentration of the dibasic acid Solution BA2 in moles per litre. **(C=12, H=1, O=16)** (1mk)

iii) Calculate the moles of the dibasic acid Solution BA2 used. (1mk)

iv) Calculate the moles of Sodium hydroxide solution **BA3** in 25.0 cm^3. (1mk)

v) Determine the concentration in moles per litre, of the Sodium hydroxide in solution **BA3**. (1mk)

PROCEDURE II

Using a clean 100cm^3 measuring cylinder, measure 40cm^3 of distilled water and place it in a clean 250ml volumetric flask, add 25.0$cm^3$of solution **BA1**. Mix the solution well and then top it to the mark using distilled water. Label it as solution **BA4.**

Pipette 25.0cm^3 of Solution **BA3** into a clean 250cm^3 conical flask, add 2 drops of methyl orange indicator and titrate against Solution **BA4** from the burette. Record your results in **Table 2** given below. Repeat the titration in order to complete Table 2.

Table 2

Titration	**1st**	**2nd**
Final burette reading, cm^3		
Initial burette reading, cm^3		
Volume of solution BA4 (Titre) used, cm^3		

(3mks)

Calculate:

(i) The average volume (Titre) of Solution **BA4** used. (1mk)

(ii) The number of moles of solution **BA3** in 25.0 cm^3. (1mk)

(iii) The number of moles of Solution **BA4** used given that the reaction ratio is 1: 1. (1mk)

(iv) The concentration of Solution **BA4** in moles per litre (1mk)

(v) The concentration ofthe original Solution**BA1** in moles per litre. (1mk)

1b). You are provided with following:

i) 2 M Sulphuric (VI) acids, labeled Solution **BA5**.
ii) 5 pieces of Magnesium ribbon, each 1.5 cm long.
iii) Stopwatch

You are required to determine the rate of reaction of Magnesium and dilute Sulphuric (VI) acid at different concentrations.

PROCEDURE:

i) Using a 100ml measuring cylinder, measure 15.0cm^3 of solution **BA5.**
ii) Measure 20 cm^3 of distilled water and add it to solution BA5**.** Transfer the mixture into a 250ml conical flask and shake well.
iii) Place the **first** piece of Magnesium ribbon into the mixture above and simultaneously start the stop watch / clock. Swirl the reaction mixture flask continuously and record the time taken (t) in seconds for the piece of magnesium ribbon to react and disappear completely in **Table 3** below.

Repeat the procedures above making sure that the total volume of the mixture used is always 35.0cm^3 and complete **Table 3** below.

TABLE 3 (5mks)

Experiment	**1**	**2**	**3**	**4**	**5**
Volume of water (cm^3)	20.0	15.0	10.0	5.0	0.0
Volume of Solution**BA5**(cm^3)	15.0	20.0	25.0	30.0	35.0
Time taken **(s)**					
Rate of reaction $\frac{1}{t}s^{-1}$					

a) Plot a graph of $\frac{1}{t}$(y- axis) against volume of Solution **BA5**. (3mks)

b) From your graph, determine the rate of reaction when volume of Solution **BA5** is 24.0cm^3. (1mk)

2. You are provided with Solid **BA6** which is a mixture of two salts. Carry out the tests below and record your observations and inferences in the spaces provided.

a) Place ALL Solid **BA6** into a boiling tube and add about 15cm^3 of distilled water and shake well. Filter and **keep** the residue. Divide the filtrate into two portions.

i) To the first portion of the filtrate, add aqueous ammonia solution dropwise until in excess.

Observations	Inferences
(1mk)	(1mk)

ii) To the second portion, add 3 drops of acidified barium chloride solution.

Observations	Inferences
(1mk)	(1mk)

b) Place a spatula-endful of the residue into a clean, dry test tube. Heat it strongly and test for any gases produced using both blue and red litmus papers.

Observations	Inferences
(1mk)	(1mk)

iii) To the remaining residue, add dilute Nitric acid to dissolve and keep it for test (iv) below.

Observations	Inferences
(1mk)	(1mk)

iv) To a small portion of the solution of the residue, add two drops of potassium iodide solution.

Observations	Inferences
($^1/_2$mk)	($^1/_2$mk)

c) You are provided with solid **BA7**. Carry out the tests outlined below and write your observations and inferences in the spaces provided.

i. Using a metallic spatula, ignite about one half of solid **BA7** in a non-luminous Bunsen burner flame.

Observations	Inferences
(1mk)	(1mk)

ii. Place the other half of solid **BA7** into a boiling tube, add about $6cm^3$ of distilled water and shake well to dissolve **the entire** solid. Label this solution as solution **BA8** and use portions of it for tests as outlined below.

I. Place about $2cm^3$ of solution **BA8** in a test-tube and add 3 drops of acidified $KMnO_4$ solution.

Observations	Inferences
(1mk)	(1mk)

II. To the remaining **solution BA8** in the boiling tube, add half spatula-endful of solid sodium hydrogen carbonate.

Observations	Inferences
(1mk)	(1mk)

This is the last printed page.