Name…… …….… Index No:…….

233/3
CHEMISTRY
PAPER 3
PRACTICAL
TIME: 2 ¼ HOURS

Candidate's Signature……..……
Date: ……

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

233/3
Chemistry
Paper 3
2 ¼ hours

INSTRUCTIONS TO 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 in the question paper.
- 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 chemicals and apparatus you need.
- All working **must** be clearly shown where necessary.
- Mathematical tables and electronic calculators may be used.

For examiners use only

Question	Maximum Score	Candidate's Score
1	12	
2	7	
3	21	
TOTAL	40	

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

1. You are provided with:
Aqueos hydrochloric acid, solution A
Solution B containing 6.3g of dibasic acid $H_2C_2O4.2H_2O$ per litre
Aqueous sodium hydroxide, solution C
Phenolphthalein indicator

You are required to;-

(i) Standardize the sodium hydroxide solution C
(ii) Use the standardized solution C to determine the concentration of A
(iii) React the hydrochloric acid, solution A with metal M and determine the mass of 6cm of metal M

Procedure I
Fill the burette with solution B
Pipette 25.0cm^3 solution C into a conical flask. Add 2 drops of phenolphthalein indicator. Titrate solution B against solution C.

Record your results in table I below. Repeat the procedure and fill the table below
Table I

	I	II	III
Final burette reading (cm^3)			
Initial burette reading(cm^3)			
Titre volume (cm^3)			

(3 ½ mks)

(a) What is the average volume of solution B used (1mk)
…….

(b) Calculate:
(i) the concentration of the dibasic solution B in moles per litre (1mk)
(C=12,H=1,O=16)

(ii) the concentration of the Sodium hydroxide solution C in moles per litre (1mk)

Procedure II
Using a 100cm3 measuring cylinder, measure 90cm3 of distilled water and place it into a 250cm3 beaker and then 1dd 10cm3 of solution A

Mix the solution well and label it D
Fill a burette with solution D
Pipette 25.0cm3 of solution C into a conical flask
Titrate using phenolphthalein indicator

Table II

	I	II	II
Final burette reading (cm3)			
Initial burette reading (cm3)			
Volume of tire volume (cm3)			

(3 ½ mks)

(a) What is the average volume of solution D used? (1mk)

……

(b)(i) Calculate the concentration of the diluted hydrochloric acid, solution D in moles per litre(1mk)

(ii) Determine the concentration of the original hydrochloric acid, solution A in moles per Litre (1 ½ mks)

Procedure III

Measure exactly 6cm of metal M provided.

Measure 49cm3 of solution A and transfer into a clean boiling tube

Wrap the boiling tube with tissue paper

Measure the temperature of this solution and record in table III below

Simultaneously place the metal M into solution A in the boiling tube and start the stopwatch.

Record the temperature of the contents in the boiling tube after every 3o seconds in the table below

Time	0	30	60	90	120	150	180	210	240	270	300
Temp (°c)											

(2mks)

(i) Plot a graph of temperature against time . (3mks)

(ii)From the graph, determine the highest temperature change (1mk)

(iii) Calculate the heat of reaction in this experiment (1mk)

(iv) Given that the molar heat of reaction between metal M and solution A is -1600kJmol^{-1}, determine the number of moles of metal M used (1mk)

(v) Determine the mass of metal M used in this experiment (RAM=24) (1mk)

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

a) Place all of solid E into a boiling tube. Add about 12cm3 of distilled water and shake thoroughly. the mixture into another boiling tube. Retain the filtrate for use in 2(b) below. Dry the residue using pieces of filter papers

(i) Transfer half of the dry residue into a dry test tube. Heat the residue strongly and test any gas produced using a burning wooden splint

Observations	Inferences
1mrk	1mrk

(ii) Place the other half of the reside in a dry test-tube. Add 3cm3 of 2M hydrochloric acid. Retain the mixture for test (iii) and (iv) below

Observations	inferences
(½ mk)	(½ mk)

(iii) To 2cm^3 of solution obtained in a(ii) above, add 2cm^3 of Potassium Iodide solution

Observations	inferences
(½ mk)	(½ mk)

(iv) To another 2cm^3 of solution obtained from a(ii) above, add 4cm3 of aqueous ammonia drop wise till in excess

Observations	Inferences
(½ mk)	(½ mk)

(b) Divide the filtrate obtained into 5 portions

(i) To the first portion of the filtrate obtained in (a) above, add 3cm^3 of aqueous ammonia (excess)

Observations	inferences
(½ mk)	(½ mk)

(ii) To the second portion of the filtrate add 2 drops of sodium sulphate solution provided

Observations	Inferences
(½ mk)	(½ mk)

(iii) To the third portion of the filtrate, add 2 drops of Barium nitrate solution provided

Observations	Inferences
(½ mk)	(½ mk)

(iv) To the fourth portion of the filtrate, add 2cm3 of hydrochloric acid provided

Observations	Inferences
(½ mk)	(½ mk)

(v) To the fifth portion of the filtrate add two drops of Lead (II) nitrate solution and heat to boil

Observations	inferences
(½ mk)	(½ mk)

3. (I) You are provided with solid F. Carry out the tests below and record your observations and inferences in the spaces provided

(a)(i) Using a metallic spatula, heat half of solid F in a non-luminous burnsen burner flame for some time then remove when it ignites

Observations	Inferences
(1mk)	(1mk)

(ii) Put a half spatula endful of solid F into a boiling tube. Add about $10cm^3$ of distilled water and shake vigorously

Observations	inferences
(½ mk)	(½ mk)

(b) Divide the resulting solution form a(ii) above

(i) To the first portion, dip a piece of universal indicator paper and determine its PH

Observations	inferences
(½ mk)	(½ mk)

(ii) To the second portion, add two drop of acidified potassium Manganate (VII) solution and shake vigorously

Observations	Inferences
(½ mk)	(½ mk)

(c) Put half spatula end ful of solid F into a boiling tube and add 5 drops of ethanol followed by 2 drops of concentrated sulphuric (VI) acid. Warm the mixtures

observations	inferences
(½ mk)	(½ mk)

(II) You are provided with liquid G. Use it to carry out the following tests and record your observations and inferences below.

Divide the liquid into (three portions)

(i) To the first add 2 drops of acidified Potassium Manganate (VII) solution

Observations	Inferences
(½ mk)	(½ mk)

(ii) To the second portion, dip both red and blue litmus papers provided

Observations	Inferences