MASENO SCHOOL

Kenya Certificate of Secondary Education 2020

233/3- CHEMISTRY -Paper 3

(PRACTICAL)

DEC. 2020 - 2 ¼Hours

233/3-Chemistry- P3
Wed 16 /12/2020
Time8:00am-Session

THE MASENO SCHOOL MOCK

Name …… **Index Number**……..

Candidate's Signature …… **Date** ……

INSTRUCTIONS TO CANDIDATES

*a) Answer **all** the questions in this question paper.*
b) You are not allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ hours allowed time for the paper.
c) Use 15 minutes to read through the question paper and make sure that you have all the chemicals and apparatus that you may require.
d) Mathematical table and silent electronic calculators may be used.
e) All workings must clearly be shown where necessary.

For Examiner's use only:

Question	Maximum Score	Candidate's Score
1	**17**	
2	**07**	
3	**16**	
Total score	**40**	

QUESTION 1 (17 MARKS)

You are provided with;

i) Solution **A** containing **2g** of sodium hydroxide in **250cm^3** of solution

ii) Solution **B** which is sulphuric (vi) acid

iii) Solid **C**

You are required to;

i) Standardize solution **B**.

ii) Determine the mass of **solid C** that reacts with the standardized solution **B**.

Procedure

- Fill the burette with solution **B**
- Transfer **25cm^3**of solution **B** into a **250cm^3** volumetric flask. Add distilled water up to the mark. Shake the mixture. Label it solution as **D**.
- Drain the burette and rinse it thoroughly
- Fill the burette with solution **A.**
- Pipette **25cm^3** of solution **D** into a conical flask
- Add **2-3** drops of phenolphthalein indicator.
- Titrate solution **A** against **D** until **pink colour** just appears.
- Repeat the above procedure and fill the table 1 below.

Table 1

Experiment	**I**	**II**	**III**
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution A used (cm^3)			

(3marks)

a) Calculate the ;

(i) Average volume of solution A used (show your working) (*1mark)*

(ii) Molarity of sodium hydroxide **solution A** (**Na =23, O=16, H=1**)

(1mark)

(iii) Number of moles of solution A used for titration. *(1mark)*

(iv) Molarity of the original solution B. *(2marks)*

PROCEDURE II

- Rinse the burette thoroughly and fill it with solution B.
- Transfer **50cm^3** of solution into a **100 cm^3** beaker.
- Add all the **solid C** provided to solution B.
- Swirl the mixture until there is no more effervescence.
- Label the mixture as **solution E**.
- Rise the burette thoroughly and fill it with solution E.
- Pipette **25.0cm^3** of solution **A** into a conical flask.
- Add 2 or 3 drops of phenolphthalein indicator
- Titrate solution E against solution A until the solution turns just colourless.
- Repeat the titration and fill the table II below.

Table II

Experiment	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution **E** used (cm^3)			

(3marks)

a) Calculate the ;

(i) Average volume of solution E used (show your working) *(1mark)*

(ii) Moles of sulphuric (vi) acid present in 50cm3 of solution B. *(1mark)*

(iii) Number of moles of solution A used for the titration. *(1mark)*

(iv) Moles of sulphuric (vi) acid in solution E used for the titration. *(1mark)*

(v) Number of moles of sulphuric (vi) acid that reacted with **solid C**. *(1mark)*

b) Given that **1 mole of C** reacts with **1 mole of Sulphuric (VI) acid** and the relative formula mass of C is **106**, calculate the mass of solid C used in this experiment. *(1mark)*

QUESTION 2 (7MKS)

You are provided with **3.0g** of potassium nitrate labeled solid G. You are required to determine the enthalpy change of solution of solid G.

Procedure

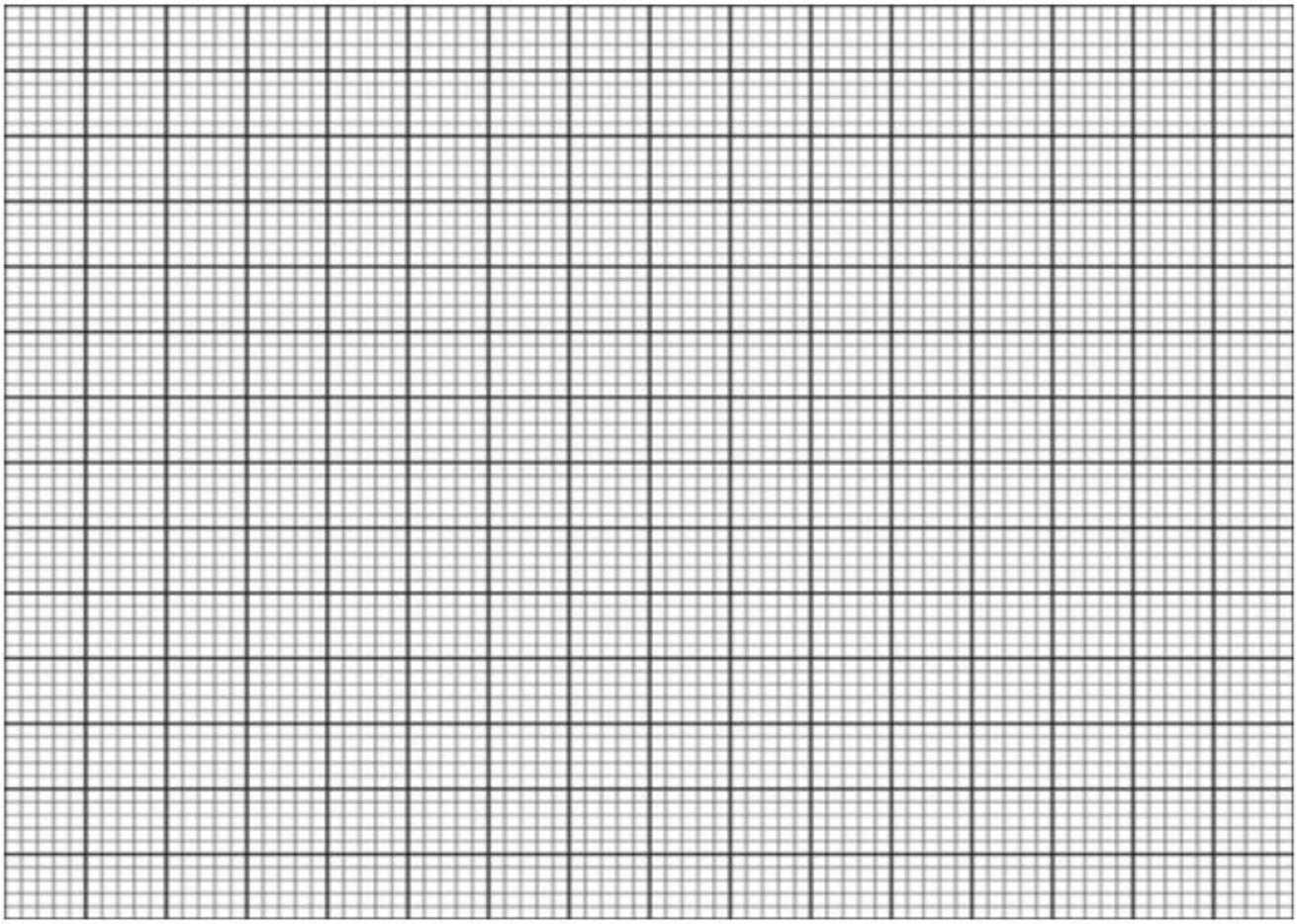
Using a measuring cylinder, place 30cm^3 of distilled water in 100cm^3 plastic beaker. Stir the water gently with a thermometer and take the temperature after every half a minute. Record the readings in the table III below. At exactly 2 minutes add all solid G to water at once. Stir well and take the temperature of the mixture after every half a minute up to the 4th minute. Record your results in the table III below.

(a)

Time in (Min)	**0**	**$^1/_2$**	**1**	**$1^1/_2$**	**2**	**$2^1/_2$**	**3**	**$3^1/_2$**	**4**
Temperature(°C)					X				

(2marks)

(b) On the grid provided plot a graph of temperature against time. (2marks)



(c) On the graph show the change in temperature, $\Delta\mathbf{T}$ ($\frac{1}{2}$mark)

(d) Calculate the molar enthalpy of solution ($\Delta\mathbf{H_{soln}}$). Assume density of solution= 1.0g/cm^3, specific heat capacity of the solution = 4.2jg^{-}K^{-} , K=39.0, N=14.0, O=16.0)
($2\frac{1}{2}$marks)

QUESTION 3:- QUALITATIVE ANALYSIS (16MKS)

A. You are provided with **solid F.**
You are required to identify the cations and anions in the solid.

I. Place all the **solid F** in a boiling tube and add about $10cm^3$ of distilled water. Shake thoroughly and then filter into a clean test tube. Retain both the filtrate and the residue for the subsequent steps.

Observations	Inferences
(1mark)	*(1mark)*

II. Divide the filtrate into 4 portions.

a) To the first portion, add **aqueous ammonia** dropwise till in excess.

Observations	Inferences
(1mark)	*(1mark)*

b) To the 2nd portion add 3 drops of **sodium chloride** solution.

Observations	Inferences
($\frac{1}{2}$mark)	*(1mark)*

c) To the 3rd portion add about 2 drops of **lead (II) nitrate** solution and warm the mixture.

Observations	Inferences
(1mark)	*($\frac{1}{2}$mark)*

III (a) Scrap the residue into a clean test tube, add dilute **nitric (v)** acid until the solid dissolves. Test for any gas produced using the **wooden splint** provided.

Observations	Inferences
(1mark)	*(1mark)*

(b) To 2cm^3 of the resultant mixture, add 2 drops of **potassium iodide** solution.

Observations	Inferences
($\frac{1}{2}$mark)	*($\frac{1}{2}$mark)*

B. You are provided with **solid Z**. Carry out the tests below and record your observations and inferences in the spaces provided.

a) Using a metallic spatula, ignite one half of solid Z in a Bunsen flame.

Observations	**Inferences**
($\frac{1}{2}$mark)	*(1mark)*

b) Place the other half of solid **Z** in a boiling tube. Add about 15cm^3 of distilled water and shake well. Use the solution for the following tests.

i. Place 1cm^3 of the solution in a test tube and determine its pH using universal indicator paper.

Observations	**Inferences**
($\frac{1}{2}$mark)	*($\frac{1}{2}$mark)*

ii. To about $2cm^3$ of the solution in a test tube, add 3 drops of acidified potassium manganate (VII).

Observations	Inferences
(1mark)	*(1mark)*

iii. To $2cm^3$ of the solution in a test tube, add 2 drops of bromine water.

Observations	Inferences
(1mark)	*($\frac{1}{2}$mark)*

THIS IS THE LAST PRINTED PAGE.