MIGORI SUB-COUNTY MOCK EXAMS

233/3
CHEMISTRY
PAPER 3
PRACTICALS
JULY /AUGUST 2014

CONFIDENTIAL TO SCHOOLS

In addition to the fittings found in a chemistry laboratory, each candidate will require the following chemicals and apparatus;

1. Solutions Q – 90cm^3
2. Solid T_1 – 3.2g weighed accurately (in stoppered container)
3. Pipette (25 cm^3)
4. Pipette filler
5. Burette
6. thermometer
7. 1 label
8. White tile
9. 500cm^3 of distilled water
10. Measuring cylinder (10ml)
11. 250ml volumetric flask
12. 2 conical flask (250 ml)
13. 6 dry test tubes
14. 2 boiling tubes
15. 1 metallic spatula
16. Test-tube holder
17. Solid R in a stoppered container
18. Solid M in a stoppered container
19. Universal indicator paper
20. PH Chart
21. About 1g of sodium carbonate
22. Retort stand(complete)

BENCH SOLUTIONS WITH DROPPERS

1. 2M sodium hydroxide
2. Sodium carbonate solution
3. Sodium sulphate solution
4. Silver nitrate solution
5. Barium nitrate
6. Dilute nitric (v) acid
7. acidified potassium manganate (vii)
8. source of heat

NOTE:

- Solution Q is 0.2M sodium hydroxide
- Solid T_1 is hydrated ethanedioic acid ($H_2C_2O_4.n\ H_20$)
- Solid R and solid N will be provided by the council.

Name…… …..…… Index No:…….

233/3
CHEMISTRY
PRACTICAL
PAPER 3
PRACTICAL
JULY/AUGUST - 2014
TIME: 2 ¼ HOURS

Candidate's Signature ……..……
Date……..

MIGORI SUB-COUNTY JOINT EVALUATION EXAM

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

233/3
Chemistry
Paper 3
2 ¼ Hours

INSTRUCTIONS TO CANDIDATES

- Write your **name** and **indexnumber** 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	22	
2	11	
3	07	
Total		

This paper consists of 6 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. **You are provided with:**
   - Solid T1, 3.2 of hydrated enthanedioic acid $H_2C_2O_4.nH_2O$
   - Solution Q , a 0.2M solution of sodium hydroxide .

You are required to determine:-

(i) Solubility of solid T_1

(ii) The value of n in the formula $H_2C_2O_4.\ nH_2O$

Procedure I

(i) Fill the burette with distilled water

(ii) Place all solid T1 provided in a boiling tube.

(iii) Transfer $4cm^3$ of distilled water from the burette into the boiling tube containing solid T_1. Heat the mixture while stirring with the thermometer to a temperature of 80^oC

(iv) Allow the solution to cool while stirring with the thermometer. Record the temperature at which crystals start to form in table I below.

(v) Add further $2cm^3$ of distilled water from the burette to the mixture. Repeat procedure (iii) and(iv) above and record crystallization temperature complete table I below by adding the volumes of distilled water indicated.

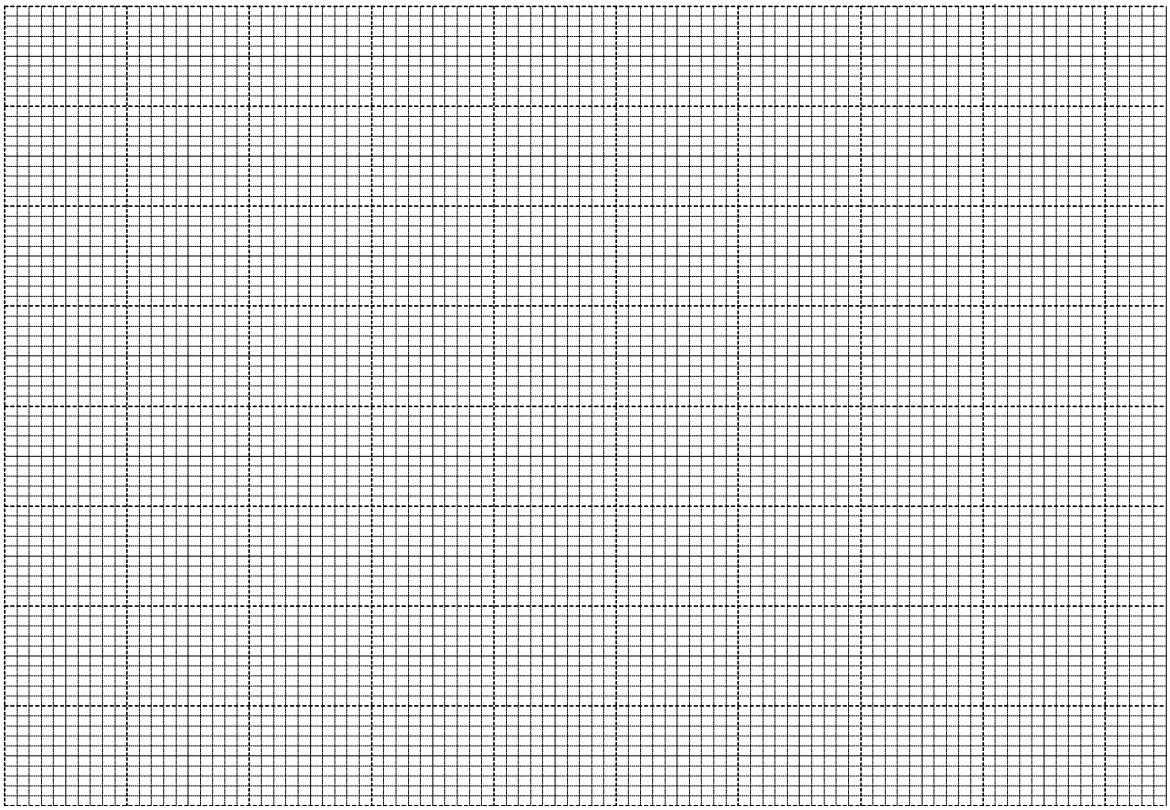
NB: Preserve the contents of the boiling tube for procedure II

TABLE I

Volume of distilled water in boiling tube	Crystallization temperature	Solubility of solid T1 in 100g of water
4		
6		
8		
10		
12		

(b) On the grid provided, plot a graph of solubility of solid T_1(y-axis) against crystallization temperature

(3mks)



(I) From the graph, determine:-

(i) Solubility of T1 at 55^oC (1mk)

(ii) (the temperature at which 70g of T1 dissolves in 100g of water (density of water $1gcm^{-3}$) (1mk)

PROCEDURE II

Transfer the contents of the boiling tube in procedure I to a clean 250ml conical flask. Add 3 drops of phenolphthalein indicator.

Titrate T_2 against Q to an accurate end point. Record your results in table II below.

Repeat the experiment two more times and complete table II below

Table II

	1	2	3
Final burette reading;			
Initial burette reading;			
Volume used			

(4mks)

Calculate :

(a) The average volume of T_2 used. (1mk)

(b) The moles of Qused (1mk)

(c) The moles of T_2 in the volume used (if 2 moles of Q react with 1 mole of T) (1mk)

(d) The concentration of T_2 in mol-1 (1mk)

(e) The concentration of T_2 in g l-1 (1mk)

(f) The value of n in H_2C_2. (2mks)

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

(a) Place all of solid R in a boiling tube. Add about 10cm3 of distilled water and shake thoroughly.

Observations	**Inferences**
(½ mk)	(½ mk)

Divide the mixture in (a) above into five (5) portions of almost equal volumes and carry out the following tests:-

(i) To the first portion, add 2M NaOH solution dropwise till excess.

Observations	**Inferences**
(1 mk)	(1 mk)

(ii) To the second portion, add 2-3 drops of sodium carbonate solution.

Observations	**Inferences**
(1 mk)	(1 mk)

(iii) To the third portion, add 2 – 3 drops of sodium sulphate solution.

Observations	**Inferences**
(1 mk)	(1 mk)

(iv) To the foruth portion, add 2-3 drops silver (I) nitrate solution followed by 2-3 drops of dilute nitric (V) acid.

Observations	**Inferences**
(1 mk)	(1 mk)

(v) To the last portion, add 2 -3 drops of Brium nitrate solution followed by 2-3 drops of dilute nitric (V) acid.

Observations	**Inferences**
(1 mk)	(1 mk)

3. You are provided with solid M. Carry out the following tests and write your observations and inferences.

(a) Place about one third of solid M on a metallic spatula and burn it in a Bunsen burner flame.

Observations	**Inferences**
(1 mk)	(1 mk)

(b) Dissolve all the remaining solid M in about 6cm3 of distill water and divide the resulting solution into three portions.

Observations	**Inferences**
(½ mk)	(½ mk)

(c) To the first portion add 2 drops of acidified potassium manganite (VII) solution wait for 2-3 minutes and then wrie the observation.

Observations	**Inferences**
(1 mk)	(1 mk)

(d) To the second portion add all sodium carbonate provided.

Observations	**Inferences**
(½ mk)	(½ mk)

(e) To the third portion dip universal indicator paper.

Observations	**Inferences**
(½ mk)	(½ mk)

MIGORI SUB COUNTY JOINT EVALUATION EXAM
CHEMISTRY PAPER 3
MARKING SCHEME-2014

PROCEDURE I
Q I (a) TABLE 1
Complete Table
(i) All ten readings (3 Marks)

Condition
- All temperatures readings to be above 25^{o}c but below 80^{o}c. otherwise penalize ½ mk up to a maximum of 1 Mk.
- Correct calculations of ALL (five) Solubilities award 2 Marks
- 3-4 calculations of solubilities awarded 1 Mark only
- 0-2 calculations of solubilities – 0 mark

Decimal point
- temperature values to be written in whole number or to 1d.p used consistently
- if temperature values are written to 1d.p then the decimal point MUST be 0 or 5

Accuracy
- The temperature reading when volume of water used in $4cm^3$ should be used to compare with the teacher's (school) value.
- If within ± 2.0^{o}c then award 1 Mark
- If outside ± 2.0^{o}c award 0 mark

Trend
- The crystallization temperature should show a rise/upward trend. If so, award 1 Mark, otherwise penalize fully.

(b) GRAPH
(i) **Axes/Labels** – ½ Mk when both are correctly given with their units. Otherwise award 0
(ii) **Scale** – ½ mk, if graph drawn covers $^{2}/_{3}$ of the grid provided
(iii) **Plots** – 1 mk
Conditions
- If 5 correct plots are given – 1 mk
- If 3-4 correct plots are given – ½ mk
- If less than three plots are give – 0 mk

(iii) **Curve** 1 mk
Smooth curve passing through all the plots or passing through majority of the points, credit 1 mk. Otherwise penalty fully.

(c) (i) – straight dotted line drawn from temperature axis at 55oc up to the curve and then to the solubility axis, (1/2 mrk)
- correct indication of solubility(1/2 mrk)

(ii) Straight dotted line drwawn from solubility axis at 70g up to the curve and then dropped to the temperature axis, award ½ mk

- correct indication of temperature ½ mk

PROCEDURE II

Complete table…….(1 Mark)

Conditions

- penalize ½ mk fopr inversion
- penalize ½ mk for unrealistic reading of less than 0.1 and above 50, if (less explained)
- penalize ½ mk for wrong arithmetic

N/B penalize once only for ANY or ALL the above.

Decimal place ……..(1 Mark)

- All readings must be recorded to atleast one decimal place used consistently or 2 decimal places used consistently.
- If 2 decimal places are used than the second decimal place Must be a zero or a five otherwise penalize fully.

Accuracy…….. (1 Mark)

- If any of the titre values is within ± 0.1 of school value award 1mk
- If any of the titre values is within ± 0.2 of school value award ½ mk or otherwise penalize fully

Principle of averaging …….. (1 Mark)

N/B – Only consistent values should be averaged

- The values averaged must be shown
- The averaged value should be recorded to atleast 2dp unless it works out to exactly a whole number or 1 dp.

Final answer

- If the averaged value is within ± 0.1 of the school value – award 1mk
- If the average value is outside ± 0.1 but within ± 0.2 – award ½ mk
- If averaging is not done but there are consistent values average for the candidate credit accordingly.

b) Moles of Q = $\frac{0.2 \times 25}{1000}$ ½ mk

1 mk

Answer ½

c) Moles T_2 used = $\frac{ans(b)above}{2}$ ½

1mk

Answer ½

d) The concentration of T in Mol 1^{-1}

$= \frac{Answer(c)above \times 1000}{averagetitrevalue}$ ½

1mk

Answer ½

e) Concentration of T2 in gl^{-1}

$3.2g \rightarrow 250cm3$

$\rightarrow 1000cm3$

$\frac{1000 \times 3.2}{250}$ ½ = Answer ½ 1 mk

f) The value of n in $H_2C_2O_4.nH_20$

R.F.M = $\frac{\text{Ans in (e) above}}{\text{Answer in (d) above}}$ ½

= R.F.M ½

(90+18n) = R.F.M ½

18n = R.F.M

n = $\frac{R.F.M - 90}{18}$ (2Mrks)

= Ans ½

2) (a)

Observation	**Inferences**
Dissolves to form a colourless solution	- Absence of coloured ions (Cu^{2+}, Fe^{2+}, Fe^{3+}) - Soluble colourless salt present

(b) (i)

Observation	**Inferences**
White precipitate which dissolves in excess	- Pb^{2+}, Al^{3+}, Zn^{2+} present - All 3 – award 1 mrk otherwise penalize fully.

(ii)

Observation	**Inferences**
White Precipitate	- Zn^{2+} , Pb^{2+} present – 1 mk - Absence of Al^{3+} - ½ mk

(iii)

Observation	**Inferences**
No white precipitate	- Zn^{2+} present – 1 mk - Pb^{2+} absent – ½ mk

(iv)

Observation	**Inferences**
No white precipitate	- Cl^- absent – 1 mk -

(v)

Observation	**Inferences**
White Precipitate	- SO_4^{2-} Present – 1 mk

3 (a)

Observation	**Inferences**
Melts and burns with yellow/smoky/luminous flame	

b)

Observation	**Inferences**
Dissolves to form a colourless solution	Polar compound – ½ Mk

c)

Observation	**Inferences**
Decolorizes/changes from purple to colourless	

d)

Observation	**Inferences**
Effervescence/bubbles of a colourless gas	COOH or H^+

e)

Observation	**Inferences**
PH = 1.0 or 2.0	Strong acidic solution