HOMA-BAY SUB –COUNTY JOINT EVALUATION EXAMS

233 / 3
CHEMISTRY
CONFIDENTIAL
JULY / AUGUST 2014

CONFIDENTIAL TO ALL SCHOOLS FOR CHEMISTRY TEACHERS

The information contained in this paper is to enable the Head of the school and the teacher in charge of chemistry to make adequate preparations for this year's mock chemistry practical examination. **NO ONE ELSE** should have access to this paper or acquire knowledge of its contents. Great care should be taken to ensure that the information contained herein **DOES NOT** reach the candidates either directly or indirectly. The teacher in charge of chemistry should NOT perform any of the experiment in the same room as the candidates nor make the results of the experiment available to the candidates or give any other information related to the experiment to the candidates.

Requirements for candidates

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

1. About 100cm^3 of solution **M**
2. About 80cm^3 of solution **K**
3. One burette 0-50ml
4. One pipette 25ml
5. Two conical flasks 250ml
6. Solid **D** (exactly 4.0g)
7. One thermometer -10 to 110^oC)
8. One measuring cylinder 100ml
9. Two boiling tubes
10. About 0.5g of solid **N**
11. Empty beaker 100ml
12. Filter funnel
13. 3.0g of solid **W** in a stoppered container
14. Six test tubes
15. Test tube holder
16. One blue and one red litmus paper
17. One 10ml measuring cylinder
18. 500ml distilled water in wash bottle

19. Means of labeling
20. Pipette filler

ACCESS TO:

1. Phenolphthalein indicator with a dropper
2. Methyl orange with a dropper
3. Source of heat (Bunsen burner)
4. 2M ammonia solution with a dropper
5. 0.5M Ba $(NO_3)_2$ solution dropper
6. Solution P, sodium carbonate solution with a dropper
7. 2M hydrochloric acid supplied with a dropper

Note

1. Solid **N** is $ZnSO_4$. $7H_2O$
2. Solids **D** and **W** are oxalic acid
3. Solution **K** is prepared by dissolving exactly 6.4g of sodium hydroxide in 400ml of distilled water and make up to one litre by adding more distilled water
4. Solution **M** is prepared by measuring 16.5ml of concentrated hydrochloric acid in 400ml distilled water and dilute it by adding more distilled water to a total volume of one litre

NOTE

The teacher in charge should perform the experiments for questions 1 and 2 and draw the table of the results for table I,II in question one and table in question two respectively. The results should be sent together with the students scripts for marking.

Name of teacher who performed the experiments:……

T.S.C No:……

Date :……

Sign :……..

Name…… ……..… Index No:…….

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

Candidate's Signature……..……
Date: ……

HOMA-BAY 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 **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:
   - 3.0g of dibasic acid H_2X, solid **W**
   - Aqueous Sodium hydroxide solution **K**
   - Aqueous hydrochloric acid containing 7.3g per litre, solution M

You are required to:
Determine the concentration of sodium hydroxide, solution **K** in moles per litre. Work out the concentration of solution **W**

Procedure I
Fill the burette with solution **M**. pipette 25cm^3 of solution **K** and pour into a conical flask. Add 2 drops of phenolphthalein indicator and titrate against solution M from burette. Repeat two more times and complete table 1
Table 1

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

(5mks)

(a)(i) Work out the average volume of solution **M**

(ii) Calculate the concentration of solution **M** in mole per litre (2mks)

(iii) Calculate the number of moles of solution **K** present in one litre of its solution (2mks)

Procedure II
Using a 100ml measuring cylinder, measure 40cm^3 of distilled water and add the whole of solid **W** to the water in a measuring cylinder. Shake to dissolve solid **W** and add more distilled water to make a total volume of 50cm^3 of the solution. Transfer the solution into an empty beaker. Measure accurately 25.0cm^3 of the solution using a 100ml measuring cylinder and then add distilled water to make 100ml of the solution and label it solution **W.** pipette 25.0cm^3 of solution **K** into a conical flask and add two drops of Methyl orange indicator. Titrate against solution W from burette. Repeat two more times and record your results in table II below
Table II

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

(5mks)

(a) What is the average volume of solution W used?

……

(b) Calculate the:

(i) Mole of solution **W** that reacted with solution K(reaction ratio=2:1,2 mole of K react with 1 mole of **W**) (2mks)

(ii) Mole of solution W in $100cm^3$ of solution (2mks)

(iii) Moles per litre of the original solution made when solid **W** was dissolved (2mks)

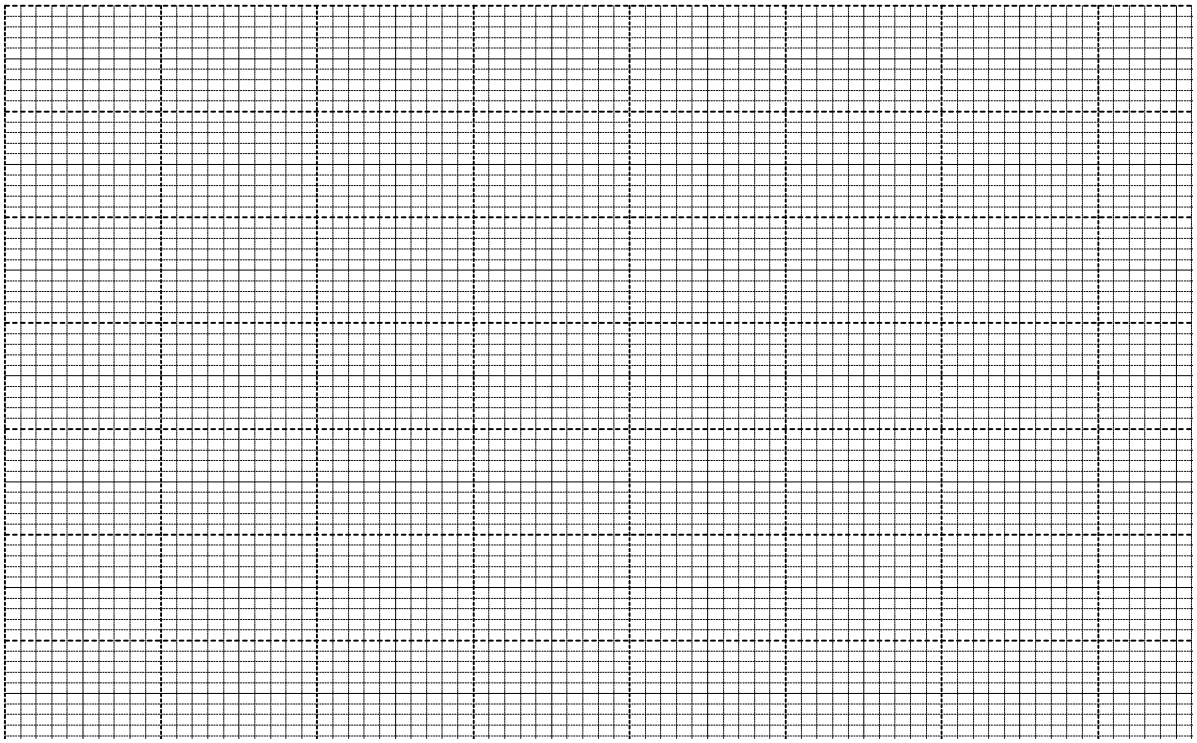
2. You are provided with solid **D** weighed exactly of 4.0g
You are required to determine the solubility of solid **D** at difference temperatures

Procedure

(i) Fill a clean burette of distilled water to a boiling tube containing all the solid provide
(ii) Transfer $4cm^3$ of distilled water to a boiling tube containing all the solid **D** provided
(iii) Heat the mixture while stirring with the thermometer to a temperature of about 80^oC when the entire solid will have dissolved
(iv) Allow the solution to cool while stirring with thermometer. Note the temperature at which crystals start to appear and record the temperature in the table below.
(v) To the same solution, add $2cm^3$ of distilled water from the burette, heat the mixture while stirring with the thermometer to a temperature of about 80^oC when the entire solid will have dissolved.
(vi) Allow the mixture to cool and record the temperature at which crystals first appear in the table below
(vii) Repeat procedure (v) and (vi) three more times and record the temperature in the table
(viii) Complete the table of solubility of solid **D** at different temperatures

Volume of water in boiling tube (cm3)	Temperature at which crystals first appear (oC)	Solubility of solid D in g/100g of water
4		
6		
8		
10		
12		

(a) On the grid provided plot a graph of solubility of solid **D** against temperature (3mks)



(b) Hence determine the mass of solid deposited when solution is cooled from 55^oC to 50^oC (1mk)

(c) Use your graph to determine the temperature at which 80g of solid **D** would dissolve in 100g of water. (1mk)

3. (a) You are provided with solid **N**. Carry out the tests below. Write your observations and inferences in the spaces provided

(i) Heat about one third of solid **N** in a clean dry test-tube. Test the gases produced with both blue and red litmus papers.

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

(ii) Using a boiling tube, dissolve the rest of solid N in about 10cm**3** of distilled water and use the solution for the tests below.

(I) To about $2cm^3$ of the solution, add 5cm3 of solution P (Aqueous sodium carbonate)

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

(II) To $2cm^3$ of the solution, add about $4cm^3$ of aqueous ammonia drop wise until in excess

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

(III) To $2cm^3$ of the solution, add about $4cm^3$ of aqueous barium nitrate

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

(IV) To the mixture obtained in III above, add about $2cm^3$ of dilute hydrochloric acid

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

HOMA-BAY SUB- COUNTY JOINT EVALUATION EXAMS

233/3 CHEMISTRY

PAPER 3

JULY/AUGUST 201

1. Table 1

	I	II	III
FINAL BURRETE RADING (CM^3)	20.0	20.0	20.0
INITIAL BURRETE READING(CM^3)	0.0	0.0	0.0
VOLUMEF SOUTION (CM^3)	20.0	20.0	20.0

CT 1mk

D.P 1mk

Ac ($\pm$ 0.1 of S.V →

1MK, $\pm$ S.V →1/2 MK

P.A 1mk

F.A 1mk

a)i) Average volume $\frac{20.0+20.0+20.0}{3}$ =20.0cm^3

ii)g/dm^3 = Mol /dm^3 x R.m.m

7.3g/dm^3 = Mol/dm^3 x36.5 √1

Mol/dm^3 = $\frac{7.3}{36.5}$ =0.2M√1

iii) $NaOH_{aq}$ = HCL_{aq} ⟶ $NaOH_{aq}$ + H_2O_g

Mole ratio 1:1

Moles of M used

100cm^3 ⟶ 0.2 moles

$20cm^{3+}$ $\longrightarrow$ $\frac{20x0.2}{1000}$ = 0.04 moles√1

Mole of solution M equals moles of solution K

o.004 x 40 = 0.16 √1

Table II

	I	II	III
FINAL BURRETE RADING (CM^3)	12.0	12.0	12.0
INITIAL BURRETE READING(CM^3)	0.0	0.0	0.0
VOLUMEF SOUTION (CM^3)	12.0	12.0	12.0

CT 1mk

D.P 1mk

Ac ($\pm$ 0.1 of S.V →

1MK, $\pm$ 0.2 S.V →1/2 MK

P.A 1mk

F.A 1mk

a) Average volume of solution W

$\frac{12.0+12.0+12.0}{3}$ =12.0cm^3

b)i)Moles of solution W

25cm^3 of solution K HAS 0.004 MOLES

Mole ratio 2:1√1

Moles of solution W = 0.0002 moles √1

ii) Moles of sodium W in 100cm^3

12cm^3 $\longrightarrow$ 0.002 moles √1

100cm $\longrightarrow$ $\frac{100x0.0.002}{12}$ = 0.101667 moles √1

iii) Moles per litter in the original

0.01667 moles in $25cm^3$

$25cm^3$ ⟶ 0.01667√1

$100cm^3$ ⟶ $\frac{1000x0.01667}{25}$ = 0.6668 Mol/dm^3 √1

2. **Table**

Volume of water (cm^3)	**Temperature at which Crystals first appear (^0C)**	**Solubility g/100g of H_2O**
4	70.0	100.00√$\frac{1}{2}$
6	56.0	66.67√$\frac{1}{2}$
8	49.0	50.0√$\frac{1}{2}$
10	40.0	40.0√$\frac{1}{2}$
12	35.0	33.33√$\frac{1}{2}$

Complete table - 1mk (temperature column)

Trend - $\frac{1}{2}$ (temperature reducing)

Decimal place $\frac{1}{2}$ (whole number consistently or one d.p. the number being 0 or 5)

Accuracy - $\frac{1}{2}$ mk $\pm 2^0$ C of school value

Solubility calculations - $\frac{1}{2}$ mk each up to 2 $\frac{1}{2}$ mks

a) Graph -

Labeling of axes ½ mk

Scale (at least ¾ - ½ mk

Plots - 1 mk

Shape (smooth curve) - ½ mk

b) showing on graph - ½ mk

correct reading - ½ mk

c) showing on graph - ½ mk
correct reading - ½ mk

3 i)

I

Observations	**Inferences**
-Blue litmus paper turns √ ½	Mg^{2+} ,Ca^{2+} ,Pb^{2+},Zn^{2+} ma y be present
No effervescent	Award 1mk if at least 3 correct ions mentioned

II

Observations	**Inferences**
White potv ½ soluble √ ½ in Excess	Zn^{2+} present Award the mark for the inference if the observation is scored fully

III

Observations	**Inferences**
White PPT √ ½	SO_3^{2-}, SO_4^{2-},CO_3^{2-},MAY BE PRESENT Award 1mk if all the three ions are correctly mentioned

IV)

Observations	**Inferences**
-While ppt /remains does	SO_4^{2-} Present
not Dissolve✓1	Award only if mentioned in III

N:B In all case, penalize fully if letters of ions are joined , Wrong charges are given , wrong symbols of elements etc

-Penalize fully in case of contradicting ions mentioned