

RACHUONYO SOUTH SUB-COUNTY JOINT EVALUATION EXAMS

233/3
CHEMISTRY
PAPER 3
PRACTICALS
JULY/AUGUST 2014

CONFIDENTIAL INSTRUCTIONS TO SCHOOLS

- The information contained in this paper is to enable the head of school and teacher in charge of Chemistry to make adequate preparations for this year's chemistry mock practical examination. NO ONE ELSE should have access to this paper or acquire knowledge of its contents. Great care must be taken to ensure that the information herein does not reach the candidates either directly or indirectly.
- The chemistry teacher is NOT expected to perform the experiments
- The apparatus required by each candidate for the chemistry mock practical examination are set out on the next page. It is expected that the ordinary apparatus of a chemistry laboratory will be available.
- The chemistry teacher should note that it is his/her responsibility to ensure that each apparatus acquired, for this examination agrees with specifications on the next page.

In addition to the apparatus and fitting in a chemistry laboratory each candidate will require the following.

1. 4.5 g solid A in a boiling tube (weighed accurately)
2. About 150cm³ solution B
3. about 150cm³ solution C
4. 100ml measuring cylinder
5. Empty 250ml beaker (plastic or glass)
6. 2 labels
7. One burette
8. One pipette
9. Two conical flasks (250ml)
10. Pipette filler
11. A glass rod
12. Mean of timing
13. Filter funnel
14. Four filter papers
15. 250ml volumetric flask
16. 10ml measuring cylinder
17. Two boiling tube
18. Distilled water in a wash bottle
19. 1g solid D in a stoppered container
20. 1g solid L
21. One metallic spatula
22. Test tube holder
23. 1g sodium hydrogen carbonate in a stoppered container
24. Six empty clean test tubes

Access to

- Phenolphthalein indicator supplied with a dropper
- Bunsen burner
- Acidified potassium manganate (VII) supplied with a dropper
- 2M NaOH supplied with a dropper
- 2M aqueous ammonia supplied with a dropper
- Barium nitrate solution supplied with a dropper
- Dilute nitric (v) acid supplied with a dropper
- 0.1M sodium sulphate solution supplied with a dropper

Notes.

1. Solid **A** is oxalic acid.
2. Solution **B** is made by dissolving 12g of sodium hydroxide in about 600cm³ distilled water and the solution made up to one litre.
3. Solution **C** is made by dissolving 10.74 cm³ of concentrated hydrochloric acid (5g 1.18) in about 600cm³ distilled water and the solution made up to one litre.
4. Solid **L** is malleic acid.
5. Solid **D** is a mixture of Zinc sulphate and Lead (II) carbonate in the ratio 1:1.
6. Acidified potassium manganate (VII) is made by adding 3.16g of solid KMnO₄ to 400 cm³ of 2M H₂SO₄ and diluting to one litre using distilled water.
7. Lead (II) Nitrate solution is made by dissolving 15g of Pb(NO₃)₂ in about 500cm³ distilled water and the solution made up to one litre.
8. Barium nitrate solution is made by dissolving 20g of Ba (NO₃)₂ in about 500cm³ of distilled water and the solution made up to one litre.
9. Dilute nitric (v) acid in about 600cm³ distilled water and the solution made up to one litre.

Name..... Index No:.....

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

Candidate's Signature
Date.....

RACHUONYO SOUTH 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	19	
2	15	
3	06	
Total	40	

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.

Question 1

(20marks)

You are provided with;

- Solid **A** in a boiling tube
- Solution **B**, sodium hydroxide
- 0.125M.monobasic acid, solution **C**

You are required to;

- Determine molarity of solution **B**
- Determine solubility of solid **A**

Procedure I

- Using a measuring cylinder ,place 50cm³ of solution **B** into an empty 250ml beaker. Add 100cm³ of distilled water to the solution. Labe this solution as solution **D**.
- Fill the burette with solution **C**
- Using pipette filler, place 25cm³ of solution d into a 250ml conical flask. Add two drops of phenolphathatlein indicator.
- Titrate solution **D** with solution **C**
- Record your results in table 1 . repeat the titration two more times and complete table 1.

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

- (a) (i) Calculate average volume of solution **C** used. (4mks)
(1mk)
- (ii) Calculate moles of solution **C** used in the experiment. (1mk)
- (iii) Calculate moles of solution **D** used. (1mk)
- (iv) Calculate molarity of solution **D** (1mk)
- (v) Calculate molarity of solution **B**. (2mks)

Procedure II

- (i) Using measuring cylinder add 20cm^3 of distilled water to solid **A** in the boiling tube. Using a glass rod, stir the mixture thoroughly for about three minutes.
- (ii) Filter the mixture obtained into a dry 250ml volumetric flask. Label the filtrate solution **A**.
- (iii) Clean the burette and fill it with solution **A**.
- (iv) Using a pipette and pipette filler, place 25cm^3 of solution **D** into a 250ml conical flask. Add two drops of phenolphthalein indicator.
- (v) Titrate solution **D** with solution **A**. record your results in table 2
- (vi) Repeat the titration two more times and complete table 2.

Table 2

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

- (b) Calculate; (4mks)
- (i) Average volume of solution **A** used (1mk)
 - (ii) Moles of solution **D** used (1mk)
 - (iii) Moles of solution **A** used given that 2 moles of solution **A** requires 1 mole of solution **D** for complete neutralization (1mk)
 - (iv) Solubility of solid **A** given that density of the solution formed is $1\text{g}/\text{cm}^3$ and RFM of **A** = 126. (2mks)

2 You are provided with solid **D**. perform the following test and write the observations and inferences.

- (a) Place solid **D** into a boiling tube and add 10cm^3 of distilled water. Shake the boiling tube and filter. Keep the residue for test (b). Divide the filtrate into four portions.

Observation	Inferences
(1mk)	(1mk)

- (i) To the first portion, add sodium hydroxide dropwise until in excess.

Observation	Inferences
(1mk)	(1mk)

(ii) To the second portion, add ammonia solution dropwise until in excess.

Observation	Inferences
(1mk)	(1mk)

(iii) To the third portion, add a few drops of Lead(II) nitrate solution

Observation	Inferences
(½ mk)	(½ mk)

(iv) To the fourth portion, add a few drops of barium nitration solution followed by dilute nitric (v) acid.

Observation	Inferences
(1 mk)	(1mk)

(b) Place the residue into a test tube and add 10cm³ of dilute nitric (v) acid and shake until the solid dissolves.

Observation	Inferences
(½ mk)	(½ mk)

(i) To the first portion, add sodium hydroxide dropwise until in excess.

Observation	Inferences
(1 mk)	(1mk)

(ii) To the second portion, add ammonia solution dropwise until in excess.

Observation	Inferences
(1 mk)	(1mk)

(iii) To the third portion, add a few drops of sodium sulphate solution.

Observation	Inferences
(½ mk)	(½ mk)

3. You are provided with solid L . Carry out the tests below and record your observation and inferences in the space provided.

(a) Heat half spatula of solid L in a non-luminous flame of a Bunsen burner.

Observation	Inferences
(1 mk)	(1mk)

(b) Add 5cm³ of distilled to the remaining solid L and shake well. Divide the solution into two portions.

(i) To the first portion, add a few drops of acidified potassium manganate (VII) and warm

Observation	Inferences
(1 mk)	(1mk)

(ii) To the second portion, add a quarter spatula and fill of sodium hydrogen carbonate.

Observation	Inferences
(1 mk)	(1mk)

**RACHUONYO SOUTH SUB COUNTY JOINT EVALUATION EXAM
JULY/AUGUST 2014
233/3 CHEMISTRY
MARKING SCHEME**

QUESTION 1

PROCEDURE 1

TABLE 1

	i.	ii.	iii.
Final burette reading (cm ³)	20.0	20.0	20.0
Initial burette reading (cm ³)	0.0	0.0	0.0
Volume of solution c used (cm ³)	20.0	20.0	20.0

C.T-1
A.P-1
AC-1
AV-1
F.A-1
5

- a)
- Average volume = $\frac{20.0 + 20.0 + 20.0}{3} = 20.0\text{cm}^3$
 - Moles of solution C = $\frac{0.125 \times \text{titre} \sqrt{1/2}}{1000} = \text{Ans} \sqrt{1/2}$
 - Moles of solution D = $1 \times \text{ans a(ii)} = \text{Ans} \sqrt{1/2}$
 - Molarity of solution D = $\frac{\text{Ans a(iii)} \times 1000 \sqrt{1/2}}{25} = \text{Ans} \sqrt{1/2}$
 - Molarity of solution B
 $M_{\text{conc.}} \times V_{\text{conc.}} = M_{\text{di}} \times M_{\text{di}} \sqrt{1/2}$
Molarity = $\frac{\text{Ans a(iv)} \times 150 \sqrt{1}}{50} = \text{Ans} \sqrt{1/2}$

b) Table 2

	i.	ii.	iii.
Final burette reading (cm ³)	15.8	15.8	15.8
Initial burette reading (cm ³)	0.0	0.0	0.0
Volume of solution c used (cm ³)	15.8	15.8	15.8

C.T-1

D.P- 1

b)

- Average volume of sol A = $\frac{15.8 + 15.8 + 15.8}{3} = 15.8(\text{cm}^3)$
- Moles of solution D used = $\frac{\text{Ans a(iv)} \times 25 \sqrt{1/2}}{1000} = \text{Ans} (\text{cm}^3) \sqrt{1/2}$
- Moles of sol A = $\frac{\text{Ans b(ii)} \sqrt{1/2}}{2} = \text{Ans} \sqrt{1/2}$
- Solubility of solid A
Titre volume = Ans b (iii)
 $100\text{cm}^3 = \frac{100 \times \text{Ans b (iii)}}{\text{Titre}} = \text{moles} \sqrt{1/2}$
Solubility = $\frac{100 \times \text{Ans b (iii)} \sqrt{1}}{\text{Titre}} \times 126$
= $\text{Ans} \sqrt{1/2}$

AC-1

AV-1

F.A-1

2.

No.	Observation	Inference
a)	Colour less filtrate ^{√1/2} white residue ^{√1/2}	Cu ²⁺ , Fe ²⁺ , Fe ³⁺ , ^{√1/2} absent in both filtrate and residue ^{√1/2}
I.	White ppt ^{√1/2} soluble in excess ^{√1/2}	Zn ²⁺ , Pb ²⁺ , Al ³⁺ , ^{√1}
II.	White ppt ^{√1/2} soluble in excess ^{√1/2}	Zn ²⁺ ^{√1}
III.	White ppt ^{√1/2}	SO ₃ ²⁻ ^{√1/2} CO ₃ ²⁻ Cl ⁻
	Effervescence / bubbles of colours less odour less gas ^{√1/2}	CO ₃ ²⁻ ^{√1/2}
	White ppt ^{√1/2} soluble in excess ^{√1/2}	Pb ²⁺ , Zn ²⁺ , Al ³⁺ ^{√1}
	White ppt ^{√1/2} insoluble in excess ^{√1/2}	Pb ²⁺ , Al ³⁺ ^{√1}
	White ppt formed	Pb ²⁺ ^{√1/2}

3.

No.	Observation	Inference
a)	Solid melts and burns with yellow sooty flame √1	$\begin{array}{c} \diagdown \\ \text{C} = \text{C} \diagup \\ \diagup \end{array} \sqrt{1} \quad \text{C} = \text{C} -$
b)	Purple potassium manganate Solution turns colourless √1	$\begin{array}{c} \diagdown \\ \text{C} = \text{C} - \text{C} \equiv \text{C} \\ \diagup \end{array} \sqrt{1} \quad \text{C} = \text{C} - \sqrt{1} \quad \text{R-OH}$
	Effervescence / bubble of colourless gas √1	$\begin{array}{c} \text{O} \\ \\ \text{H}^+ / -\text{C} - \text{OH} \sqrt{1} \end{array}$