

233/3
CHEMISTRY
CONFIDENTIAL
PAPER 3
July/august 2014

SUBUKIA SUB-COUNTY JOINT ASSESSMENT

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

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INSTRUCTIONS TO SCHOOLS

The information contained in this paper is to enable the head to the school and the teacher(s) in charge of chemistry to make adequate prepare for this years chemistry practical examinations. NO ONE ELSE should have access to this paper of 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 teacher in charge of chemistry should not perform any to the experiment in the same room as the candidates or make the results of the experiments available to the candidates or give any other information related to the experiments to the candidates. Doing so will constitute an examinational irregularity which is punishable.

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

1. 2.0g Solid V weight accurately
2. A burette.
3. About 0.2g of solid sodium carbonate
4. 200ml glass beaker.
5. A thermometer
6. test tube holder
7. About 1.0g solid W
8. six dry test tubes in a test tube rack.
9. A metallic spatula.
10. About 1.0g Solid X
11. .2 blue and red litmus papers
12. . Two dry boiling tubes
13. About 500cm³ distilled water supplied in a wash bottle.

B Access to.

1. 2M sodium hydroxide solution with a dropper
2. 2M ammonia solution with a dropper
3. Barium nitrate solution. With a dropper
4. Bunsen burner
5. Acidified KMnO₄ solution with a dropper
6. Bromine water with a dropper
7. Universal indicator solution with PH chart 1.0-14.0 range
8. 0.5M H₂SO₄ solution with a dropper.

NOTES:

1. Solid V is KClO₃
2. Solid W is hydrated ammonium aluminum sulphate
3. X Solid malleic acid
4. Bromine water is made taking 2ml. bromine liquid and topping up to one litre with distilled water. **(liquid bromine is very poisonous)**
5. KMnO₄ solution is made by dissolving 1.58g in 400ml. of 2.0M H₂SO₄ then topping up with distilled water to one litre.
6. **Teacher to do experiments and fill table 1**

School..... Candidate's sign.....

Date.....

Subukia Sub-county Joint Assessment

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CHEMISTRY

PAPER 3

(PRACTICAL)

Time: 2 ¼Hours

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided.
2. Sign and write the date of examination in the spaces provided.
3. Answer ALL the questions in the spaces provided in the question paper
4. 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 required.
5. ALL working MUST be clearly shown where necessary
6. Mathematical tables and electronic calculators may be used.

FOR EXAMINER'S USE ONLY

QUESTION	MAXMUM SCORE	CANDIDATE'S SCORE
1	13	
2	14	
3	13	
TOTAL	40	

This paper consist of 10 printed pages

1. You are provided with:

2.0g of solid V

Distilled water

You are required to:

-Find the solubility of the solid V in different volumes of water and temperatures of distilled water.

-Draw the solubility curve for solid V

Procedure

Fill the burette with distilled water; transfer the 2.0g of V into a dry clean boiling tube.

Experiment I

Run from the burette 5.0cm³ of water into the boiling tube containing the solid V. Warm the mixture **till all solid has just dissolved**.

Place a thermometer into the solution, remove the solution from the flame and allow it to cool while stirring with the thermometer. Note the temperature at which the **crystals start to appear** and record this temperature in table 1 below. Retain the mixture.

Procedure II

To the mixture above in the boiling tube used in the experiment I add another 5.0cm³ distilled water from the burette. Warm the mixture till all the solid has just dissolved. Place the thermometer in the solution and cool the solution by **dipping the boiling tube in a beaker of cold water**, stirring with the thermometer. Note and record the temperature at which the crystals start to appear.

Perform experiment III, IV, and V following the procedure as in experiment II.

(Density of water is 1g/cm³)

(6mks)

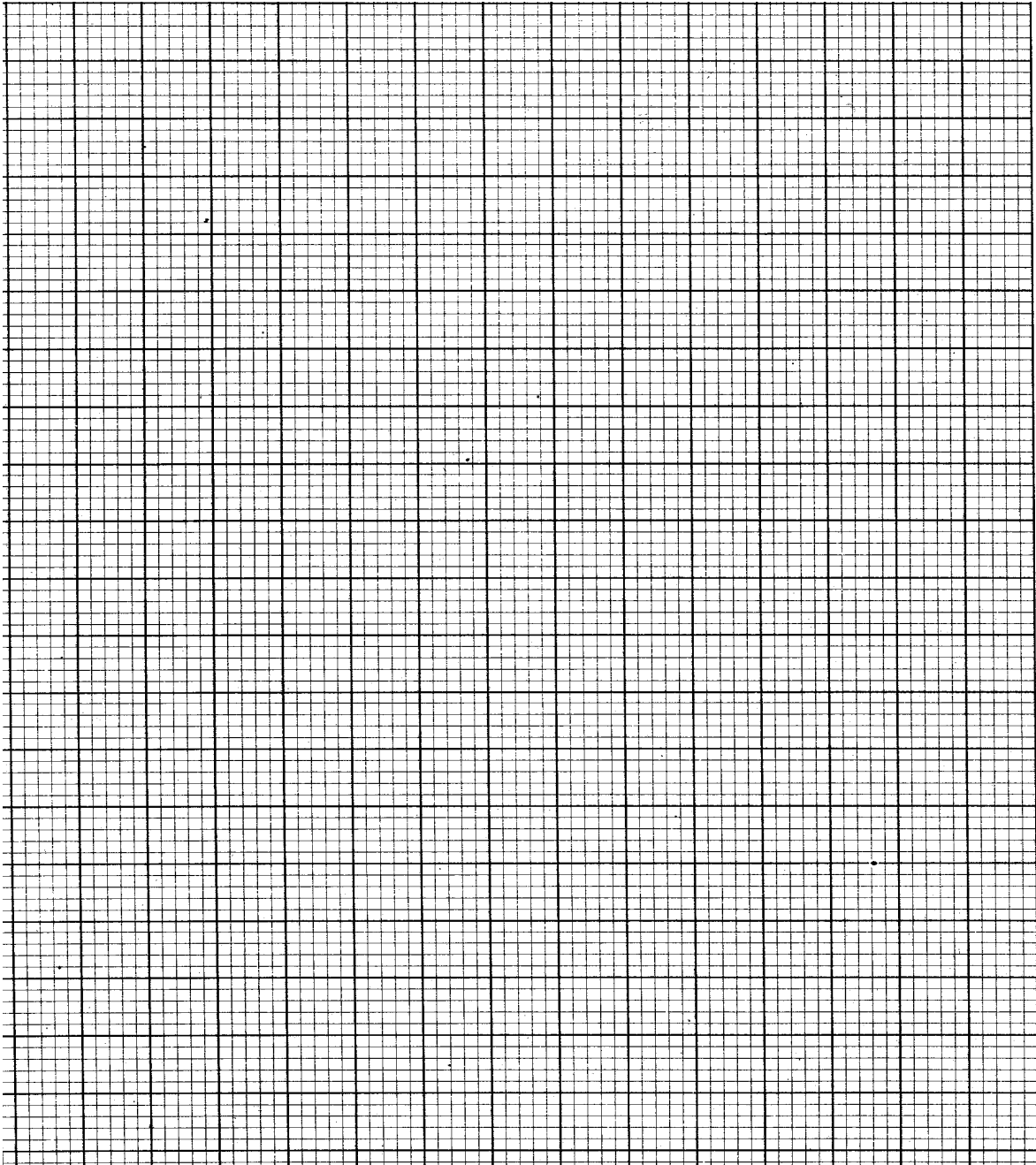
Table 1

(a)

Experiment	I	II	III	IV	V
Total volume of distilled water cm ³	5.0	10.0	15.0	20.0	25.0
Solubility of solid V g per 100g of water					
Crystallization temperature, °C					

(b) On the page provided plot a graph of solubility of V (vertical axis) against crystallization temperature.

(3mks)



(a) What is the relationship between the solubility of V and change in temperature?

(1 mk)

(b) Using your graph, determine the temperature at which 100g of V would dissolve in 100g of water

(1mk)

(c) A solution containing 20g of solid V in 100g of water is cooled from 70 °C at :-

(i) What temperatures will the crystals form first?

(1mk)

(ii) What will be the mass of Solid V deposited if the above solution is cooled to 40°C?

(1mk)

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

[a] Heat a spatula end full of solid W in a boiling tube. Test any gases produced with both red and blue litmus papers.

Observation	Inferences
1mk	1mk

[b]Put spatula end full of solid W in a boiling tube and then add a few drops of sodium hydroxide solution and heat. .Test the gas produced using red and blue litmus papers.

Observation	Inferences
1mk	1mk

[c]Dissolve the remaining solid W in distilled water in a test tube.

Divide the solution into four portions.

Observation	inferences
1mk	1mk

[i]To the first portion add sodium hydroxide solution drop wise till in excess.

Observation	inferences
1mk	1mk

[ii]To the second portion, add ammonium hydroxide drop wise till in excess

Observation	inferences
1mk	1mk

[iii] To the third portion, add a few drops of dilute sulphuric acid.

Observation	inferences
1mk	1mk

[iv] To the fourth portion, add a few drops of barium nitrate solution.

Observations	inferences
1mk	1mk

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

[a] Using a clean metallic spatula, heat a third of solid P in Bunsen burner flame.

Observations	Inferences
1mk	1mk

[b] Dissolve the remaining portion of solid X into a 10cm³ of distilled water in boiling tube. Divide the solution into four portions.

Observation	Inferences
1mk	1mk

[i]To the 1st portion, add 3 drops of acidified potassium manganate(Vii) and warm.

Observation	Inferences
1mk	2mk

[ii]To the 2nd portion, add 2-3 drops of bromine water and warm.

Observation	Inferences
1mk	1mk

[iii] To the third portion, add spatula of sodium carbonate provided.

Observation	Inferences
1mk	1mk

[iv] To the fourth portion, determine the pH of the solution using a universal indicator paper.

Observation	Inferences
1mk	1mk

(a) Graph questions

(b) What is the relationship between the solubility of V and change in temperature?(1mk)

Solubility increases with increase in temp. or vice versa

(c) Using your graph, determine the temperature at which 100g of V would dissolve in 100g of water (1mk)

Showing on the graph 1/2mk then correct reading 1/2mk from the graph

(d) A solution containing 20g of solid V in 100g of water is cooled from 70 °C at :-

(i) What temperatures will the crystals will first? (1mk)

Correct answer 1/2mk , then shown on the graph 1/2mk correctly

(ii) What will be the mass of Solid V deposited if the above solution is cooled to 40°C ? (1mk)

Solubility at 40°C read correctly 1/2mk

Correct ans. Obtained from the difference award 1/2mk

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

[a] Heat a spatula end full of solid K in a boiling tube. Test any gases produced with both red and blue litmus papers.

Observation	Inferences
-red litmus paper turns to blue ✓ ^{1/2} -blue litmus paper remains blue ✓ ^{1/2} -colourless liquid at the cooler part of the testube ✓ ^{1/2}	-NH ₃ /basic gas produced ✓ ^{1/2} -hydrated salt/water of crystallization ✓ ^{1/2}
1 1/2mk	1mk

[b]Put spatula end full of solid k in a boiling tube and then add a few drops of sodium hydroxide solution and heat. .Test the gas produced using red and blue litmus papers.

Observation	Inferences
-colourless gas turns red litmus paper to blue✓	-NH ₄ ⁺ present✓
1mk	1mk

[c]Dissolve the remaining solid K in distilled water in a test tube.

Divide the solution into four portions.

Observations	inferences
-colourless solution formed ✓	-Cu ²⁺ ,Fe ²⁺ ,Fe ³⁺ present ✓

1mk	1mk	1mk	1mk
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[i]To the first portion ,add sodium hydroxide solution drop wise till in excess.

Observation	inferences
-white ppt ✓ ^{1/2} -Soluble in excess ✓ ^{1/2}	-Zn ²⁺ ,Pb ²⁺ ,Al ³⁺ present ✓ ¹
1mk	1mk

[iv]To the forth portion, add a few drops of barium nitrate solution.

observations	inferences
-White ppt formed✓	SO ₄ ²⁻ present✓
1mk	1mk

[ii]To the second portion, add ammonium hydroxide drop wise till in excess

Observation	inferences
-White ppt ✓ ^{1/2} -Insoluble in excess ✓ ^{1/2}	Pb ²⁺ ,Al ³⁺ present✓
1mk	1mk

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

[a]Using a clean metallic spatula, heat a third of solid P in Bunsen burner flame.

Observations	Inferences
-melts ✓ ^{1/2} -burns with sooty/smoky flame ✓ ^{1/2}	$\begin{array}{c} \backslash \quad / \\ C = C \text{ or } -C \equiv C - \\ / \quad \backslash \end{array}$
1mk	

[iii]To the third portion, add a few drops of dilute sulphuric acid.

Observation	inferences
-No white ppt✓	Pb ²⁺ absent✓ OR Al ³⁺ present✓

[b]Dissolve the remaining portion of solid A into a 10cm³ of distilled water in boiling tube. Divide the solution into four portions.

Observation	Inferences
-colourless solution formed✓	-polar compound ✓

1mk	1mk
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[i]To the 1st portion, add 3 drops of acidified potassium manganate(Vii) and warm.

Observation	Inferences
<p>-potassium manganate (Vii) decolourised/potassium manganate(VII) changes from purple to colourless ✓</p> <p style="text-align: right;">1mk</p>	<p>R-OH, ✓^{1/2}</p> <p style="text-align: center;"> $\begin{array}{c} \backslash \quad / \\ \text{C} = \text{C} \\ / \quad \backslash \end{array}$ or $-\text{C} \equiv \text{C}-\checkmark^{1/2}$ </p> <p style="text-align: right;">2mk</p>

[ii]To the 2nd portion, add 2-3 drops of bromine water and warm.

Observation	Inferences
<p>Bromine water decolourised/ Bromine water changes from yellow/brown to colourless ✓</p> <p style="text-align: right;">1mk</p>	<p style="text-align: center;"> $\begin{array}{c} \backslash \quad / \\ \text{C} = \text{C} \\ / \quad \backslash \end{array}$ or $-\text{C} \equiv \text{C}-$ </p> <p style="text-align: right;">1mk</p>

[iii]To the third portion, add spatula of sodium carbonate provided.