

Name....., Index No...../.....

School..... Candidates' signature.....

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Chemistry

Paper 3

March 2013

Time: 2 ¼ hrs

CROSS COUNTRY JOINT REGISTRATION EXAM – 2013

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

INSTRUCTIONS TO CANDIDATES:

Read the questions carefully

Follow the instruction for each procedure carefully

You are not allowed to start working with the apparatus for the first 15 minutes of 2 ¼ hrs allowed for this paper. This time will enable you read the question paper and make sure you have all chemicals and apparatus that you may need.

All working must be clearly shown.

Mathematical tables and electronic calculators may be used.

For examiners' use only:

Question	Maximum score	Candidates score
1	15	
2	11	
3	14	
TOTAL SCORES	40	

This paper consists of 4 printed pages. Candidates should check carefully to ascertain that all the pages are printed as indicated and no questions are missing.

1. *You are provided with;*

- Solution D₁ containing 3.65g/l of hydrochloric acid.
- Solution D₂. Sodium hydroxide.
- Sodium D₃, containing 6.3g/l of a dibasic acid, H₂X.2H₂O

Procedure I:

- Pipette 25.0cm³ of solution D₁ into conical flask. Add 2 drops of Phenolphthalein indicator and titrate against solution D₂ in the burette. Repeat this until three concordant readings are obtained. Record your results in the table.

Expl	1	2	3
Final burette reading			
Initial burette reading			
Vol. of soln. D ₂ used (cm ³)			

1. (a) Determine the average volume of solution D₂ used. (*Show your working.*) (1mk)

(b) Calculate the concentration of hydrochloric acid, solution D₁ in moles per litre

(H = 1, Cl=35.5) (2mks)

(c) (i) Write a balanced chemical equation for the reaction (2mks)

(ii) Calculate morality of D₂

(3mks)

Procedure II.

(i) Pour out solution D₂ from burette

(ii) Rinse burette with D₃.

(iii) Fill burette with D₃.

- Pipette 25.0cm³ of solution D₂ into a conical flask. Titrate this against solution D₃ from burette

using Phenolphthalein indicator. Repeat this until 3 constant readings are obtained. Record your results.

Exp	1	2	3
Final burette reading			
Initial burette reading			
Vol. of solution D ₃ used			

II. (a) Calculate the average volume of D₃ used (show your working)

(1mk)

(b) Given the equation for the reaction as ;



Calculate the relative formula mass of the dibasic acid, H₂X.2H₂O.

(3mks)

(c) Determine the value of X in H₂X.2H₂O

(3mks)

2. You are provided with solid P_2O in a test-tube. You are required to determine the freezing point of solid P_2O .

PROCEDURE

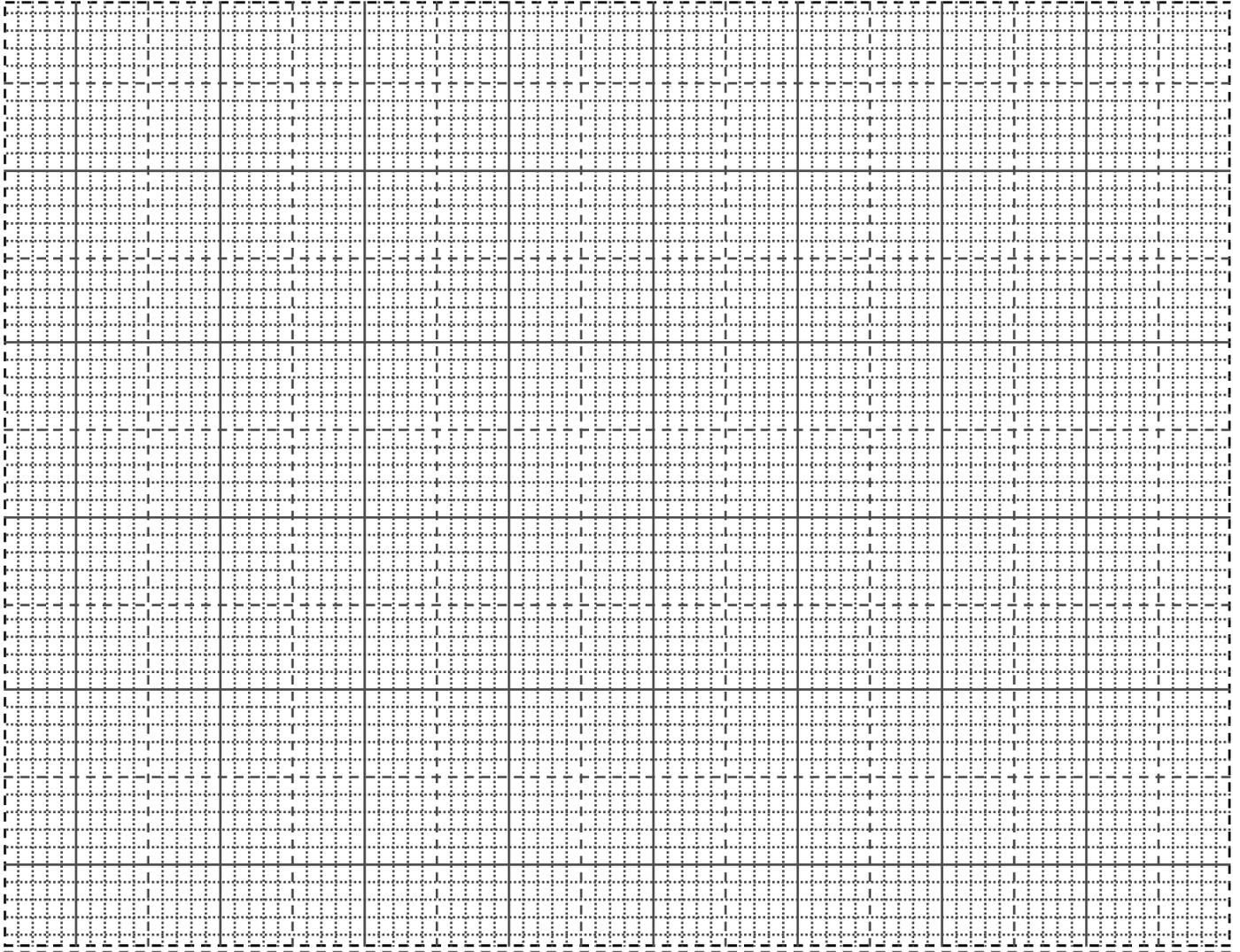
- (i) Place 100 cm^3 of tap water in a 200 ml glass beaker.
- (ii) Heat the water to near boiling.
- (iii) Use a test-tube holder to immerse the test-tube containing solid P 20 into the hot water. Ensure that half of the test-tube is immersed.
- (iv) Continue heating the water until the solid starts to melt.
- (v) Insert a thermometer into the liquid being formed in the test-tube. Take down the temperature when the solid melts. Record the temperature taken as shown in the table III
- (vi) Remove the test-tube from the water immediately start a stop watch or the clock.
- (vii) Record the temperature of the contents of the test-tube after every half-minute and complete the table.
- (viii) Dip the thermometer into the hot bath to clean it then wipe it with some tissue paper.

Time in (min)	0	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$
Temperature (0°C)										

(4mks)

(a) Plot a graph of temperature against time

(4mks)



Use your graph to:

(i) Determine the freezing point of solid P_2O

(1mk)

(ii) Explain whether P_2O is a pure or an impure substance.

(2mks)

3. You are provided with solid V. Carry out the tests described below on it. Record the observations and inferences in the spaces provided.

(a) Place a half endful of solid V on a clean metallic spatula and ignite it with a non luminous flame.

Observations	Inferences
(1 mark)	(1 mark)

(b) (i) Place a half endful of solid V in a test tube. Add about 6cm³ of distilled water, shake well and divide into two equal portions for the tests below.

Observations
(2 mark)

- (ii) To the 1st portion, add two drops of acidified potassium dichromate (vi) solution.

Observations	Inferences
<p style="text-align: center;">(2 marks)</p>	<p style="text-align: center;">(2 mark)</p>

- (iii) To the second portion, add a quarter spatula endful of sodium hydrogen carbonate solid.

Observations	Inferences
<p style="text-align: center;">(2 mark)</p>	<p style="text-align: center;">(2 mark)</p>

- (a) Place 4cm³ of ethanol in a test tube, add two drops of concentrated sulphuric (vi) acid then add the remaining amount of solid V. Warm the mixture carefully. Shake well and pour the mixture into 10cm³ of cold distilled water in a boiling tube. Note any smell.

Observations	Inferences
(1 mark)	(1 mark)