

Name Index Number

233/3
CHEMISTRY
Paper 3
(PRACTICAL)
Oct./Nov. 2015
 $2\frac{1}{4}$ hours

Candidate's Signature

Date



THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education
CHEMISTRY
Paper 3
(PRACTICAL)
 $2\frac{1}{4}$ hours

02325220

Instructions to Candidates

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) Answer **all** the questions in the spaces provided in the question paper.
- (d) You are **not** allowed to start working with the apparatus for the first 15 minutes of the $2\frac{1}{4}$ 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 that you may need.
- (e) All working **must** be clearly shown where necessary.
- (f) KNEC mathematical tables and silent electronic calculators may be used.
- (g) **This paper consists of 8 printed pages.**
- (h) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (i) **Candidates should answer the questions in English.**

For Examiner's use only

Question	Maximum Score	Candidate's Score
1	19	
2	13	
3	08	
Total Score	40	



1 You are provided with:

- 2.0 g of substance A, labelled solid A.
- Solution B, 0.05 M hydrochloric acid.
- Methyl orange indicator.

You are required to determine the:

- solubility of substance A in water.
- relative formula mass of substance A.

PROCEDURE I

- Place 200 cm³ of tap water in a 250 ml beaker and keep it for use in step (vi).
- Place **all** of substance A in a dry boiling tube.
- Using a burette, measure 10.0 cm³ of distilled water and add it to the substance A in the boiling tube.
- While stirring the mixture in the boiling tube with a thermometer, warm the mixture using a Bunsen burner, until the temperature rises to 65°C. Stop warming the mixture.
- Allow it to cool while stirring with the thermometer.
- When the temperature drops to 60°C, start the stop watch/clock, place the boiling tube in the beaker with tap water prepared in step (i) above
- Continue stirring and record the temperature of the mixture after two minutes, then thereafter record the temperature of the mixture after every one minute interval and complete table 1. Retain the mixture with the thermometer inside for use in procedure II below.

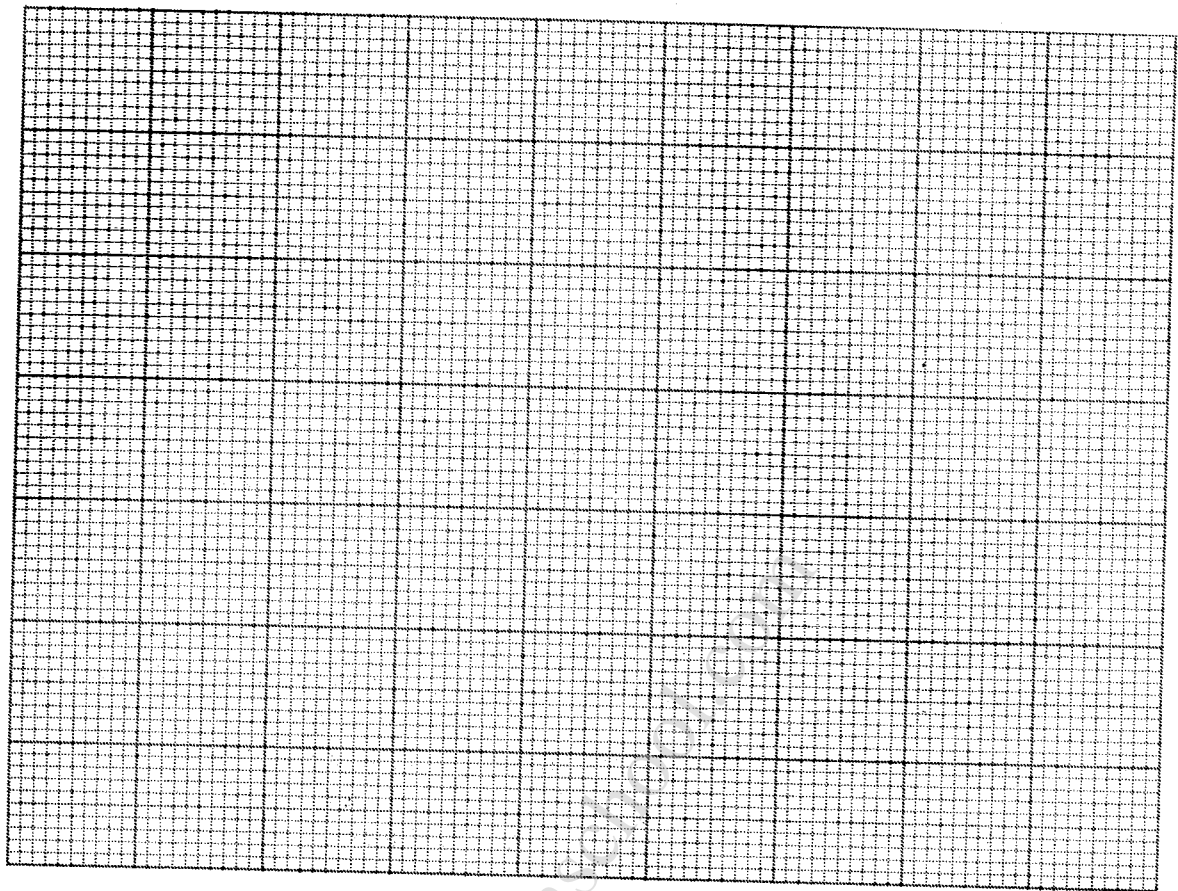
Table 1

Time (minutes)	0	2	3	4	5	6	7	8	9	10
Temperature (°C)	60									

(4 marks)

On the grid provided, plot a graph of temperature (vertical -axis) against time.

(3 marks)



(a) Using the graph, determine the temperature (T_s) when 2.0 g of substance A dissolves completely in 10.0 cm³ of distilled water. (1 mark)

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(b) Calculate the solubility of substance A in grams per 100 g water at temperature, T_s . (2 marks)

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PROCEDURE II

Using a funnel, transfer all the mixture obtained from Procedure I into a 250 ml volumetric flask. Rinse the boiling tube and the thermometer with about 20 cm³ of distilled water and add the rinses into the volumetric flask. Repeat the rinsing two more times. Add about 100 cm³ of distilled water to the volumetric flask. Shake until all the solid dissolves. Add more distilled water to the mark. Label this as solution A. Fill the burette with solution A. Using a pipette and pipette filler, place 25.0 cm³ of solution B, into a 250 ml conical flask. Add three (3) drops of the indicator provided and titrate using solution A. Record your readings in table 2 below. Repeat the titration two more times and complete the table.

Table 2

	I	II	III
Final Burette Reading			
Initial burette Reading			
Volume of solution A (cm ³) used.			

(3 marks)

(a) Calculate the:

(i) average volume of solution A used.

(1 mark)

.....

(ii) number of moles of hydrochloric acid, solution B used.

(1 mark)

.....

.....

(b) Given that two moles of acid react with one mole of substance A, calculate:

(i) number of moles substance A used.

(1 mark)

.....

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(ii) concentration of solution A in moles per litre; (1 mark)

.....
.....

(iii) concentration of solution A in g per litre; (1 mark)

.....
.....

(iv) relative formula mass of substance A. (1 mark)

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.....

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- 2 You are provided with solid C. Carry out the following tests and record your observations and inferences in the spaces provided.

Place **all** the solid C in a boiling tube. Add about 15 cm³ of distilled water and shake until all the solid dissolves. Use 2 cm³ portions of the solution in a test-tube, for **each** of the tests in (a), (b), (c), (d), (e) and (f).

- (a) Add aqueous sodium hydroxide dropwise until in excess.

Observations	Inferences
(1 mark)	(1 mark)

- (b) Add aqueous ammonia dropwise until in excess.

Observations	Inferences
(1 mark)	(1 mark)

- (c) Add 2 to 3 drops of solution D, aqueous sodium carbonate.
(Retain the remaining solution D for use in question 3)

Observations	Inferences
(1 mark)	(2 marks)

- (d) Add 2 to 3 drops of dilute hydrochloric acid.

Observations	Inferences
(1 mark)	(1 mark)

- (e) Add 2 or 3 drops of aqueous barium chloride.

Observations	Inferences
(1 mark)	(1 mark)

- (f) Add 2 or 3 drops of solution E, aqueous lead (II) nitrate.

Observations	Inferences
(1 mark)	(1 mark)

- 3 You are provided with substance L. Carry out the following tests and record your observations and inferences in the spaces provided. Use about 2 cm³ portions of substance L in a test-tube for each of the tests, (a), (b), (c) and (d).

- (a) Add 2 or 3 drops of bromine water.

Observations	Inferences
(1 mark)	(1 mark)

- (b) Add about 1 cm³ of acidified potassium dichromate (VI). Warm the mixture.

Observations	Inferences
(1 mark)	(1 mark)

- (c) Add about 1 cm³ of solution D, aqueous sodium carbonate provided.

Observations	Inferences
(1 mark)	(1 mark)

- (d) Add the piece of magnesium ribbon provided.

Observations	Inferences
(1 mark)	(1 mark)

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