KENYA NATIONAL EXAMINATION COUNCIL

KCSE 2007

CHEMISTRY
PAPER 3

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23.6.3 Chemistry Paper 3(233/3)

Name ..... **Index No.** ...../.....

233/3
CHEMISTRY
Paper 3
PRACTICAL
Oct./Nov. 2007
$2\frac{1}{4}$ hours

Candidate's Signature.....

Date .....

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

Write your name and index number in the spaces provided above.
Sign and write the date of examination in the spaces provided above
*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 $2\frac{1}{4}$ 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.*
*All working **MUST** be clearly shown where necessary.*
Mathematical tables and electronic calculators may be used.

For Examiner's use only

Question	Maximum Score	Candidate's Score
1	22	
2	11	
3	07	
Total Score	40	

This paper consists of 8 printed pages

Candidates should check the question paper to ascertain that all the pages are printed as indicated and no questions are missing.

1 You are provided with:

- aqueous sulphuric acid labelled solution **A**
- solution **B** containing 8.0 g per litre of sodium carbonate
- an aqueous solution of substance **C** labelled solution **C**.

You are required to determine the:

- concentration of solution **A**
- enthalphy of reaction between sulphuric acid and substance **C**.

A Procedure

Using a pipette and a ***pipette filler***, place 25.0 cm^3 of solution **A** into a 250 ml. volumetric flask. Add distilled water to make 250 cm^3 of solution. Label this solution **D**.

Place solution **D** in a burette. Clean the pipette and use it to place 25.0 cm^3 of solution **B** into a conical flask. Add 2 drops of methyl orange indicator provided and titrate with solution **D**. Record your results in table 1. Repeat the titration two more times and complete the table.

Table 1

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

(3 marks)

Calculate the:

(i) average volume of solution **D** used (1 mark)

(ii) concentration of sodium carbonate in solution **B** (Na = 23.0; O = 16.0; C = 12.0) (1 mark)

(iii) concentration of sulphuric acid in solution **D** (2 marks)

(iv) concentration of sulphuric acid in solution **A**. (1 mark)

B Label six test-tubes as 1, 2, 3, 4, 5 and 6. Empty the burette and fill it with solution **A**. From the burette, place 2 cm^3 of solution **A** into test-tube number 1. From the same burette, place 4 cm^3 of solution **A** in test-tube number 2. Repeat the process for test-tube numbers 3, 4, 5 and 6 as shown in table 2.

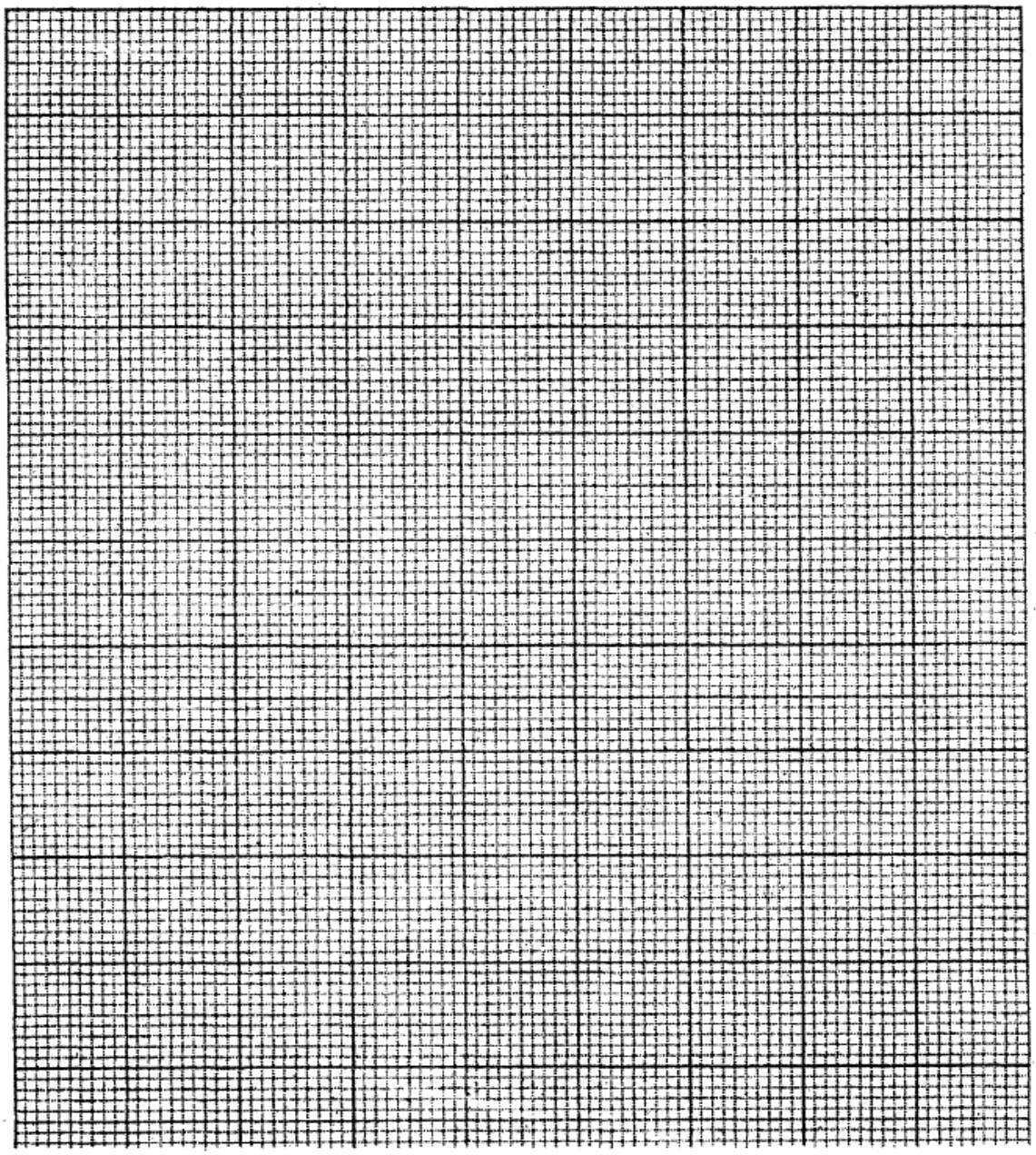
Clean the burette and fill it with solution **C**. From the burette, place 14 cm^3 of solution **C** into a boiling tube. Measure the initial temperature of solution **C** to the nearest 0.5°C and record it in table 2. Add the contents of test-tube number 1 to the boiling tube containing solution **C**. Stir the mixture with the thermometer. Note and record the highest temperature reached in table 2. Repeat the process with the other volumes of solution **C** given in table 2 and complete the table.

Table 2

Test-tube number	1	2	3	4	5	6
Volume of solution **A** (cm^3)	2	4	6	8	10	12
Volume of solution **C** (cm^3)	14	12	10	8	6	4
Initial temperature of solution **C** (°C)						
Highest temperature of mixture (°C)						
Change in temperature, ΔT (°C)						

(6 marks)

(i) On the grid provided, draw a graph of ΔT (vertical axis) against volume of solution **A** used. (3 marks)



(ii) From the graph, determine:

I the maximum change in temperature (1 mark)

II the volume of solution **A** required to give the maximum change in temperature. (1 mark)

(iii) Calculate the:

I number of moles of sulphuric acid required to give the maximum change in temperature (1 mark)

H molar enthalpy of reaction between sulphuric acid and substance C (in kilojoules per mole of sulphuric acid).

Assume the specific heat capacity of the solution is $4.2 Jg^{-1}K^{-1}$ and density of solution is $1.0 g cm^{-3}$ (2 marks)

2 You are provided with solid E. Carry out the tests below. Write your observations and inferences in the spaces provided.

(a) Place one half of solid E in a clean dry test-tube and heat it strongly. Test any gases produced with blue and red litmus papers.

Observations (2 marks)	Inferences (1 mark)

(b) Place the other half of solid E in a boiling tube. Add about 10 cm^3 of distilled water and shake until all the solid dissolves. (Use the solution for tests (i), (ii), (iii) and (iv).)

(i) Place two or three drops of the solution in a test-tube. Add 3 cm^3 of distilled water. Add two drops of universal indicator to the mixture obtained and then determine the P^H of the mixture.

Observations	Inferences
(1 mark)	(1 mark)

(ii) To about 1 cm^3 of the solution in a test-tube, add aqueous ammonia drop-wise until in excess.

Observations	Inferences
(1 mark)	(1 mark)

(iii) To 2 cm^3 of the solution in a test-tube, add three or four drops of solution G (aqueous potassium iodide.)

Observations	Inferences
(1 mark)	(1 mark)

(iv) To about 1 cm^3 of the solution in a test-tube, add four or five drops of barium nitrate solution. Shake the mixture then add about 1 cm^3 of dilute nitric acid and allow the mixture to stand for about 2 minutes.

Observations	Inferences
(1 mark)	(1 mark)

3 You are provided with liquid **F**. Carry out the tests below. Record your observations and inferences in the spaces provided.

(a) Place three or four drops of liquid **F** on a watch glass. Ignite the liquid using a Bunsen burner.

Observations	Inferences
(1 mark)	(1 mark)

(b) To about 1 cm^3 of liquid **F** in a test-tube, add about 1 cm^3 of distilled water and shake thoroughly.

Observations	Inferences
($\frac{1}{2}$ mark)	($\frac{1}{2}$ mark)

(c) To about 1 cm^3 of liquid **F** in a test-tube, add a small amount of solid sodium carbonate.

Observations	Inferences
(1 mark)	(1 mark)

(d) To about 2 cm^3 of liquid **F** in a test-tube, add about 1cm^3 of solution **H** [acidified potassium dichromate(VI)]. Warm the mixture gently and allow it to stand for about one minute.

Observations	Inferences
(1 mark)	(1 mark)