29.6.3 Chemistry Paper 3 (233/3)

Name ..... **Index Number**...../.....

233/3
CHEMISTRY
Paper 3
PRACTICAL
Oct./Nov. 2008
$2\frac{1}{4}$ hours

Candidate's Signature .....

Date.....

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

Instructions to candidates

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 silent electronic calculators may be used.

For Examiner's use only

Question	Maximum Score	Candidate's Score
1	22	
2	09	
3	09	
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:

- solid **A**
- 2.0M hydrochloric acid, solution **B**.
- 0.1M sodium hydroxide.

You are required to determine the enthalpy change ΔH, for the reaction between solid **A** and one mole of hydrochloric acid.

Procedure A

Using a burette, place 20.0cm^3 of 2.0M hydrochloric acid, solution **B** in a 100ml. beaker. Measure the temperature of the solution after every half-minute and record the values in table 1. At exactly 2½ minutes, add **all** of solid **A** to the acid. Stir the mixture gently with the thermometer. Measure the temperature of the mixture after every half-minute and record the values in table 1. **(Retain the mixture for use in procedure B)**.

Table 1

Time (min)	0	½	1	1½	2	2½	3	3½	4	4½	5
Temperature (°C)						X					

(5 marks)

(i) Plot a graph of temperature (Y-axis) against time. (3 marks)

(ii) Using the graph, determine the change in temperature, ΔT. (1 mark)

(iii) Calculate the heat change for the reaction (Assume that the specific heat capacity of the mixture is $4.2jg^{-1}K^{-1}$ and the density of the mixture is $1g/cm^3$).

(2 marks)

Procedure B

Rinse the burette thoroughly and fill it with sodium hydroxide. Transfer **all** the contents of the 100ml. beaker used in procedure **A** into a 250ml. volumetric flask. Add distilled water to make up to the mark. Label this solution **C**. Using a pipette and **a pipette filler**, place 25.0 cm^3 of solution **C** into a 250ml. conical flask. Add two or three drops of phenolpthalein indicator and titrate against sodium hydroxide. Record your results in table 2. Repeat titration two more times and complete table 2.

Table 2

	I	II	III
Final burette reading			
Initial burette reading			
Titre (cm^3)			

(3 marks)

Calculate the:

(i) average volume of sodium hydroxide used. (1 mark)

(ii) the number of moles of:

I sodium hydroxide used (1 mark)

II hydrochloric acid in $25cm^3$ of solution **C** (1 mark)

III hydrochloric acid in $250cm^3$ of solution **C** (1 mark)

IV hydrochloric acid in $20.0cm^3$ of solution **B** (1 mark)

V hydrochloric acid that reacted with solid **A**. (1 mark)

(c) Calculate the enthalpy of reaction between solid **A** and one mole of hydrochloric acid (show the sign of ΔH). (2 marks)

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

(a) Place **all** of solid **D** in a clean dry test-tube and heat it strongly until no further change occurs. Test any gases produced with both blue and red litmus papers. Allow the residue to cool and use it for test (b).

Observations	**Inferences**
(2 marks)	(1 mark)

(b) Add about $10cm^3$ of 2M hydrochloric acid to the residue and shake for about three minutes. **Keep the mixture for test (c).**

Observations	**Inferences**
(1 mark)	(1 mark)

(c) (i) Place about $1cm^3$ of the mixture in a test-tube and add aqueous ammonia dropwise until in excess.

Observations	**Inferences**
(1 mark)	(1 mark)

(ii) To the rest of the mixture, add **all** of solid **E** provided and shake the mixture well.

Observations	Inferences
(1 mark)	(1 mark)

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

(a) Place about one third of solid **F** on a **metallic** spatula and burn it using a Bunsen burner.

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

(b) Place the remaining of solid **F** in a test-tube. Add about $6cm^3$ of distilled water and shake the mixture well. **(Retain the mixture for use in test (c).**

Observations	Inferences
(1 mark)	(1 mark)

(c) (i) To about $2cm^3$ of the mixture, add a small amount of solid sodium hydrogen carbonate.

Observations	Inferences
(1 mark)	(1 mark)

(ii) To about $1cm^3$ of the mixture, add $1cm^3$ of acidified potassium dichromate (VI) and warm.

Observations	Inferences
(1 mark)	(1 mark)

(iii) To about $2cm^3$ of the mixture, add two drops of acidified potassium manganate (VII).

Observations	Inferences
(1 mark)	(1 mark)