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CHEMISTRY (PRACTICAL)
FORM FOUR
1ST TERM 2016
2 1/4 HRS.

Kenya Certificate of Secondary Education
CHEMISTRY (PRACTICAL) PP3
FORM FOUR 1ST TERM EXAMINATION 2016

Instructions

- Write your name and your class in spaces provided
- Answer all the questions in the spaces provided .
- You are NOT allowed to start working with the apparatus for the first 15 minutes of the 2 ½ hours allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemical and apparatus that you need.
- Mathematical tables and electronic calculators may be used
- All working must be clearly shown where necessary
- Candidates may be penalized for not following the instructions given in this paper

For Examiner's Use Only

Questions	Maximum score	Candidates score
1	22	
2	10	
3	08	

This paper consists of 6 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. **You are provided with;**
- sulphuric (VI) acid solution A
 - Sodium hydroxide solution B

You are required to;

Determine the enthalpy of reaction between solution **A** and solution **B**.

- a) Using a clean burette, place 5.0cm³ of solution **A** into each of six test tubes provided.
- b) A 50ml or 100ml measuring cylinder, place 20cm³ of solution **B** into 100ml plastic beaker. Measure the temperature of solution **B** and record it in the table 1 below.
- c) To the solution **B** in the beaker, add sulphuric (VI) acid solution **A** from one of the test tubes. Stir the mixture with a thermometer and record in the table below the maximum temperature reached. Continue with step (d) immediately.
- d) Add sulphuric (VI) acid solution **A** from another test tube to the mixture obtained. In (c) above, stir and record the maximum temperature reached in the **table 1**. Continue adding the sulphuric (VI) acid solution **A** from each of the other four test tubes, gently stirring the mixture and recording the maximum temperature each time and complete the **table 1**.

Volume of sulphuric (VI) acid solution A	0	5	10	15	20	25	30
Maximum temperature reached (°C).							

(4 marks)

- i) On the grid provided, plot a graph of temperature (vertical axis) against volume of sulphuric (VI) acid added. (3 marks)

- ii) Using the graph, determine the:
I: volume of sulphuric (VI) acid, solution that reacted completely with 20cm³. (1 mark)

- II: Temperature change for the reaction. (1 mark)

- III: Energy change for the reaction. (Assume the density of the solution is 1g/cm³, specific heat capacity = 4.2J/g/K) (2marks)

Procedure 2

Using a measuring cylinder, add 25 cm³ of sodium hydroxide solution **B** into a 250ml volumetric flask. Add distilled water to make up to the mark. Label this as solution **D**. Using a pipette and pipette filler, place 25cm³ of solution **D** into a 250ml conical flask. Add 2 drops of phenolphthalein indicator and titrate with solution **C** from the burette. Record your results in the table 2 below. Repeat the titration two more times to complete the table.

Table 2

	I	II	III
Final burette reading			
Initial burette reading			
Volume of solution C used (cm ³)			

- a) Calculate the average volume of solution **C** used. (4 marks)
(2 marks)
- b) Calculate the number of moles of hydrochloric acid in the average volume of solution **C** used. (1 mark)
- c) Calculate the number of moles of sodium hydroxide in 25cm³ of solution **D**. (1 mark)
- d) Determine the number of moles of sodium hydroxide in 250cm³ of solution **D**. (1 mark)
- e) Calculate the number of moles of sodium hydroxide in 25cm³ of solution **B**. (1 mark)

f) Calculate the number of moles sodium hydroxide in 20cm³ of solution **B**. (1 mark)

g) Calculate the molar enthalpy of neutralization of sodium hydroxide. (1 mark)

2. You are provided with solid **E**. Carry out the following tests on **E** and record your observations and inferences in the spaces provided.
Place a spatula of solid **E** into a boiling tube and add 10cm³ of distilled water. Shake the mixture thoroughly. Divide the solution into four equal portions.

a) To the first portion add Sodium Hydroxide solution dropwise until in excess.

Observations	Inferences
(1mark)	(1 mark)

(ii) To the second portion, add Ammonia solution dropwise until in excess.

Observations	Inferences
(1mark)	(1 mark)

(iii) To the third portion add about 1cm³ of Lead (II) Nitrate solution then warm.

Observations	Inferences
(1 mark)	(1 mark)

(iv) To the fourth add 1cm³ of barium nitrate. (Keep the mixture obtained for the test (v) below).

Observations	Inferences
(1 mark)	(1 mark)

- (v) To the mixture obtained in (iv) above add 2cm³ of dilute nitric (V) acid.

Observations	Inferences
(1 mark)	(1 mark)

3. (II) You are provided with substance **K**. Carry out the tests below and record your observations and inferences in the spaces provided below.

- a) Scoop a little of solid **K** with a clean metallic spatula and place it at the hottest part of a non-luminous flame.

Observations	Inferences
(1 mark)	(1 mark)

- b) Add about 10cm³ of distilled water to the remaining solid **K** in a boiling tube. Divide the resulting mixture into 4 portions.

- i) To the first portion add 3 drops of acidified potassium manganate (VII).

Observations	Inferences
(1 mark)	(1 mark)

- (ii) To the second portion add 3 drops of Bromine water and warm.

Observations	Inferences
(1 mark)	(½ mark)

- (iv) To the 4th portion add Sodium Carbonate.

Observations	Inferences
(1 mark)	(½ mark)

- (iii) To the 3rd portion add 3 drops of universal indicator and determine the pH of the solution.

Observations	Inferences
(½ mark)	(½ mark)