NAME……..……..... INDEX NO……..……..

233/3
CHEMISTRY PRACTICAL
JULY/AUGUST 2010
TIME 2 ¼ HOURS

KENYA SECONDARY CERTIFICATE OF SECONDARY EDUCATION

FORM FOUR EVALUATION EXAMINATION

INSTRUCTIONS:

- Answer all the question 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 ¼ hours allowed for this paper.
- All working must be clearly shown where necessary.
- Mathematical tables and electronic calculators may be used.

QUESTION	MAXIMUM SCORE	SCORE
1	21	
2	10	
3	9	

1. a) You are provided with :

   i) 0.5g of a metal carbonate x_2C0_3 labelled solid E.

   ii) Sulphuric (vi) acid labelled as solution N.

   iii) Solution R prepared by dissolving 40g of sodium hydroxide in $400cm^3$ of distilled water and made up to 1 litre.

You are required to determine the value of x in the metal carbonate x_2co_3.

PROCEDURE 1

Fill the burette with sulphuric (vi) acid solution N. Pipette $25.0cm^3$ of solution R into a Conical flask. Add 2 – 3 drops of phenolphthalein indicator. Titrate solution R Against solution N. Repeat the experiment two more times and record your results In table 1 below.

	I	II	III
Final burette reading cm^3			
Initial burette reading cm^3			
Volume of solution N used			

(4 marks)

(i) Calculate the average volume of solution N used. (1 mk)

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(ii) Calculate the number of moles of solution R used. (1 mk)

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(iii) Calculate the number of moles of solution N used. (1 mk)

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(iv) Calculate the number of moles of sulphuric (vi) acid in $100cm^3$ of solution N. (1 mk)

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(v) Determine the molarity of the sulphuric (vi) acid solution N. (1 mk)

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b) **PROCEDURE 2**

Using a measuring cylinder, measure 100cm^3 of solution N into a 250cm^3 beaker. Add all of the 0.5g of solid E into the beaker and swirl the mixture. Wait until the reaction stop. Label this as solution K. Rinse the burette and fill it with solution K. Pipette 25cm^3 of solution R into a conical flask. Add 2-3 drops of phenolphthalein indicator. Titrate solution R against solution K. Record your results in table 2 below.

Table 2

	I	II	III
Final burette reading cm^3			
Initial burette reading cm^3			
Volume of solution k used			

(i) Calculate the average volume of solution k used. (1 mk)

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(ii) Calculate the number of moles of solution K used. (2 mrks)

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(iii) Work out the number of moles of sulphuric (vi) acid in 100cm^3. (1 mk)

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(iv) Determine the number of moles sulphuric (vi) acid that reacted with the 0.5g of the metal carbonate

x_2co_3. (1 mk)

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(v) Determine the relative formula mass of the metal carbonate

x_2co_3. (2 mrks)

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(vi) Work out the value of x in

$^{x}2^{co}3$. (c=12 O=16.0) (1 mk)

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2. You are provided with:

- one small plastic beaker
- $50cm^3$ (or 100ml) measuring cylinder
- 0.2m copper (ii) sulphate solution
- Thermometer ($0\text{-}110^oc$)
- 0.6g zinc powder.

PROCEDURE

1. Put $25.0cm^3$ of 0.2M copper (ii) sulphate solution into a plastic beaker. Using a thermometer measure the temperature of the solution.
2. Transfer all the 0.6g zinc powder into the 0.2M copper (ii) sulphate solution and stir and record the highest temperature reached by the solution.

(i) Record your results in the table below and then answer the questions that follow.

- mass of zinc powder = 0.6g
- temperature of copper (ii)sulphate solution T_1 = ___ ^oc
- Highest temperature of the mixture T_2 = ___ ^oc
- Change in temperature ΔT = ___ ^oc

(4 mrks)

(ii) Write an ionic equation for the reaction between zinc and copper (ii) sulphate solution. (1 mk)

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(iii) Calculate the number of moles of copper (ii) sulphate used in the reaction (cu=63.5) (1 mk)

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(iv) Calculate the amount of heat evolved in the reaction above.
(Specific heat capacity of the solution = 42.kJ kg^{-1} k^{-1})
(Density of solution = 1gcm^{-3}) (2 mrks)

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(v) Hence calculate the amount of heat evolved when 1 mole of copper(ii) ions is displaced in the reaction. (1 mk)

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(vi) State one source of error in the experiment. (1 mk)

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9 MARKS

3. You are provided with solid T. Carry out the experiments in the table below and record your results in the spaces provided.

   A – Put all of T in a boiling tube. All 20cm^3 of distilled water and stir gently filter the product and divide the filtrate into three portions. Retain the residue.

   (i) To the first portion add a few drops of 2M sodium hydroxide solution and then add in excess.

OBSERVATION	INFERENCES

(1 mk)	(1 mk)

(ii) To the second portion add a few drops of ammonia solution 2M, and then add in excess.

OBSERVATION	INFERENCES
(1 mk)	(1 mk)

(iii) To the third portion add a few drops of Barium chloride solution followed by dilute Hydrochloric acid.

OBSERVATION	INFERENCES
(1/2 mk)	(1/2 mk)

B – Dissolve the residue in 2cm^3 dilute hydrochloric acid. Ensure some residue remains undissolved. Decant to get a solution. Divide the solution into two portions.

Carry out the following experiments:

(i)To the first portion add a little sodium hydroxide solution and then in excess.

OBSERVATION	INFERENCES

(1 mk)	(1 mk)

(ii) To the second portion add a little ammonia solution and then in excess.

OBSERVATION	INFERENCES
(1 mk)	(1 mk)