Name_____ Index No._____ Adm.No_____

Candidate's Signature_____

Date_____ Class_____

233/3
CHEMISTRY
Paper 3
PRACTICAL
JULY 2013
2 ¼ hours

ALLIANCE HIGH SCHOOL
Kenya Certificate of Secondary Education
CHEMISTRY
Paper 3
PRACTICAL
2 ¼ HOURS

Instructions to candidates

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. Answer ALL the questions in the spaces provided in the question paper.
4. You are NOT allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ hours allowed for this paper. This time is to enable you read the question paper and make sure you have all the chemicals and apparatus that you may need.
5. All working MUST be clearly shown where necessary.
6. Mathematical tables and silent electronic calculators may be used.
7. This paper consists of 8 printed pages.
8. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

For Examiner's use only.

Question	Maximum score	Candidate's score
1	17	
2	10	
3	13	
Total	40	

1. You are provided with:
   - 1.60g of **solid A;** a dibasic acid.
   - Solution B containing 4.75g per liter of **salt B.**
   - Aqueous sodium hydroxide, **solution C.**
   - Phenolphthalein indicator.

   You are required to prepare a solution of **solid A** and use it to;
   - determine the concentration of sodium hydroxide, **solution C.**
   - react **salt B** with excess sodium hydroxide and then determine the relative molecular mass of salt **B.**

Procedure I

(a) Using a burette, place 25.0cm^3 of solution **B** in each of the two 250ml conical flasks provided. Using a pipette and pipette filler, add 25.0cm^3 of **solution C** to each of the two conical flasks.(The sodium hydroxide added is in excess). Label the conical flasks 1 and 2.

(b) Heat the contents of the first conical flask to boiling and then let the mixture boil for **5** minutes. **Allow the mixture to cool.**

(c) Repeat procedure (b) with the second conical flask.
While the mixtures are cooling, proceed with procedure II.

Procedure II

(a) Place **all** of **solid A** in a 250ml volumetric flask. Add about 150cm^3 of distilled water, shake well to dissolve the solid and then add water to make up to the mark. **Label this as solution A.**

(b) Place solution **A** in a **clean** burette. Using a pipette and pipette filler, place 25.0cm^3 of solution C in a 250ml conical flask. Add 2 drops of phenolphthalein indicator and titrate with solution A. 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 I burette reading			
Volume of **solution A** used (cm^3)			

(3mks)

Calculate the:-

(i) average volume of solution **A** used:

(ii) Concentration in moles per litre of the dibasic acid in solution A. (2mks)
(Relative molecular **mass of Acid 126**)

(iii) Moles of the dibasic acid used. (1mk)

(iv) Moles of sodium hydroxide in 25.0cm^3 of **solution C.** (1mk)

(v) Concentration of sodium hydroxide in moles per litre. (2mks)

Procedure III

Add 2 drops of phenolphthalein indicator to the contents of the first conical flask prepared in procedure I and titrate with **solution A.** Record your results in Table 2. Repeat the procedure with the contents of the second conical flask and complete the table.

Table 2

	1st conical flask	2nd conical flask
Final burette reading		
Initial burette reading		
Volume of solution A used (cm^3)		

(3mks)

Calculate the:-

(i) average volume of solution A used;

(ii) moles of the dibasic acid used; (1mk)

(iii) moles of sodium hydroxide that react with the dibasic acid. (1mk)

(iv) moles of sodium hydroxide that reacted with 25.0cm^3 of salt **B** in solution **B**. (2mks)

(v) Given that 1 mole of salt B reacts with 2 moles of sodium hydroxide, calculate the;

I. Number of moles of **salt B** in 25.0cm^3 of **solution B**. (1mk)

II. Concentration in moles per litre of **salt B** in **solution B**. (1mk)

III. Relative molecular mass of **salt B**. (2mk)

2. **You are provided with:**

Magnesium ribbon; 2.0M hydrochloric acid labeled **solution L.**
Stop clock/watch.

You are required to determine the rate of reaction between magnesium and hydrochloric acid at different concentrations.

Procedure.

I. Place five test-tubes on a test-tube rack and label them 1,2,3,4 and 5.
Using a 10cm^3 measuring cylinder, measure out the volume of 2.0M hydrochloric acid **solution L** as shown in **table 3** and pour them into the corresponding test-tubes.
- Wash the measuring cylinder and use it to measure the volumes of water as indicated in the table and pour into the corresponding test tubes.

II. Cut out **five** pieces each of exactly **1cm** length of magnesium ribbon.

III. Transfer all of the solution in test-tube 1 into a clean 100cm^3 beaker. Place one piece of magnesium into the beaker and start a stop clock/watch immediately. Swirl the beaker continuously ensuring that the magnesium is always **inside** the solution. Record in the table the time taken for the magnesium ribbon to disappear. Wash the beaker each time.

IV. Repeat procedure III for each of the solutions in the test-tubes 2,3,4 and 5 and complete the table.

(a) **Table 3**

Test-tube Number	1	2	3	4	5
Volume of solution L (cm^3)	10	9	8	7	6
Volume of water (cm^3)	0	1	2	3	4
Time taken in seconds					
Rate of the reactions =1/time (Sec^{-1})					

(3mks)

Table II

(b)(i) Plot a graph of rate of reaction (Y-axis) against volume of solution L.

(3mks)

(ii) Use the graph to determine the time taken for **1cm** long magnesium ribbon to disappear if the volume of the acid used was $7.5cm^3$. (2mks)

(iii) In terms of the rate of reaction explain the shape of your graph. (1½ mks)

3. You are provided with **solid R**. Carry out the tests below and write your observations and inference(s) in the spaces provided.

(a) Place a spatula-endful of **solid R** in a test-tube and heat strongly. Test for any gases produced using a blue and a red litmus paper.

Observation(s)	**Inference(s)**
(1mk)	(1mk)

(b) Place all the remaining solid R into a boiling tube and add distilled water while shaking till the total volume is about $10cm^3$. Filter the solution and keep the residue for test (c) below. Divide the filtrate into four portions.

(i) To the 1st portion add sodium hydroxide drop wise till in excess.

Observation(s)	**inference(s)**
(½mk)	(1mk)

(ii) To the 2nd portion, add ammonia solution drop wise till in excess

Observation(s)	**inference(s)**
(½mk)	(1mk)

(iii) To the 3rd portion, add a few drops of lead (II) nitrate solution.

Observation(s)	inference(s)
(½mk)	(1mk)

(iv) To the 4th portion, add a few drops of Barium nitrate solution.

Observation(s)	inference(s)
(½mk)	(½mk)

(c) Place the residue into a test tube and add dilute nitric (v) acid while shaking till the solid just dissolves. Divide the solution into three portions.

Observation(s)	inference(s)
(1mk)	(½mk)

(i) To the 1st portion, add sodium hydroxide drowse till in excess.

Observation(s)	inference(s)
(½ mk)	(½ mk)

(ii) To the 2nd portion, add ammonia solution dropwise till in excess.

Observation(s)	inference(s)
(½ mk)	(½ mk)

(iii) To the 3rd portion, add three drops of dilute H_2SO_4

Observation(s)	inference(s)
(½ mk)	(1mk)

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