Name………………………………………………**Index No…….…..Class…………………**

Candidates Signature…………………Date……………………………………

CHEMISTRY PAPER 3 (PRACTICAL)
FORM 4

TIME: 2 $\frac{1}{2}$ HOURS

Instructions to Candidates:

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 to read the question paper and make sure you have the chemicals and apparatus that you may need.

All workings MUST be clearly shown where necessary

Mathematic calculators MUST NOT be used

For Examiner's Use only

Question	Maximum score	Score
1	17	
2	23	
TOTAL SCORE	40	

This paper consists of 6 printed pages

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

1. You are provided with:
   − Solution 0.4 M sodium hydroxide
   − XM hydrochloric acid solution **X**
   − YM Na_2CO_3 solution **Y**

You are required to standardize hydrochloric acid and hence determine the concentration of sodium carbonate.

Procedure I

Using a pipette transfer $25cm^3$ of 0.4M sodium hydroxide into a conical flask. Add 2-3 drops of phenolphthalein indicator and then titrate with hydrochloric acid provided in a beaker from a burette. Shake the conical flask after each additional and note the volume required to neutralize the sodium hydroxide solution. Record your results in the table below.   (4marks)

TITRE	1	2	3
Final burette reading(cm^3)			
Initial burette reading(cm^3)			
Volume of acid used			

a) What is the average volume of acid used.   (1mark)

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b) Compute the number of moles of the acid required to completely neutralize $25cm^3$ of sodium hydroxide solution   (3marks)

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c) What is the molarity of the hydrochloric acid? (1mark)

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Procedure II

Rinse the pipette thoroughly then pipette $25cm^3$ of sodium carbonate into a conical flask. Add 2-3 drops of phenolphthalein indicator. Refill the burette with hydrochloric acid and use it to titrate the contents of the conical flask. Shake the flask after each addition of the acid and note the volume of acid required to neutralize $25cm^3$ the sodium carbonate. Record your results in the table below.

(4marks)

TITRE	1	2	3
Final burette reading(cm^3)			
Initial burette reading(cm^3)			
Volume of acid used			

d) What is the average volume of hydrochloric acid used in the second titration?

(1mark)

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e) Calculate the number of moles of sodium carbonate in $25cm^3$ of solution.

(2marks)

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f) Work out the value of Y. (1mark)

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2. You are provided with about $8cm^3$ of solution **H** and $8cm^3$ of solution **E** to carry out some tests provided below.

Solution **E** is an organic compound. Record your results appropriately in the table below.

a) To about $1cm^3$ of **H** add 3 drops of 2M sodium hydroxide solution.

Observation	Inferences
(2 marks)	$(1\frac{1}{2}$ marks)

b) To about $1 cm^3$ of H add 3 drops of 0.5M barium nitrate solution and keep the mixture.

Observation	Inferences
(2 marks)	$(\frac{1}{2}$ mark)

c) To the mixture in (b) above, add a few drops of 1M hydrochloric acid dropwise till in excess

Observation	Inferences
(2 marks)	(2 marks)

d) To about $1cm^3$ of H add a few drops of acidified potassium dichromate(VI) solution.

Observation	Inferences
(2 marks)	(2 marks)

e) To about $2cm^3$ of E in a test tube add 2-3 drops of bromine water.

Observation	Inferences
(2 marks)	(2 marks)

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f)To about 2cm^3 of E in a test tube add 2-3 drops of acidified potassium manganate (VII) solution.

Observation	Inferences
(1 mark)	(2 marks)

g) Test the remaining solution with both blue and red litmus papers.

Observation	Inferences
(1 mark)	(1 mark)