

Candidate's Name

Signature

Random No.					Personal No.		

545/3

CHEMISRY

(PRACTICAL)

PAPER 3

2 Hours

Uganda Certificate of Education

CHEMISTRY PRACTICAL

Paper 3

2 hours

INSTRUCTIONS TO CANDIDATES:

Answer **both** questions. Answers are to be written in the spaces provided in this booklet. Use **blue** or **black** ink ball pen only. Any work done in **pencil** will not be marked except drawings.

You are **not** allowed to use reference books (i.e. text books, booklets on qualitative analysis etc)

All working must be clearly shown.

Mathematical tables and silent non-programmable calculators may be used.

For Examiners' use only			
Q. 1			
Q. 2			
Total			

1. You are provided with the following solutions:

P is a solution of metal carbonate, M_2CO_3

Q is a solution of hydrochloric acid.

You are required to prepare solution BA1 and BA2 and use to determine the relative atomic mass, M in M_2CO_3

Procedure 1:

Measure 25cm^3 of P into a 100cm^3 measuring cylinder and top up to a 100cm^3 mark using distilled water. Transfer the resultant solution into a beaker and label it BA1.

Measure 25cm^3 of solution Q into a 100cm^3 measuring cylinder and top up to a 75cm^3 mark using distilled water. Transfer the solution to a beaker and label it BA2.

Procedure II

Pipette 20.0 (or 25.0cm^3) of **BA1** into a clean conical flask. Add 2-3 drops of methyl orange indicator and shake the mixture.

Titrate the mixture with **BA2** from the burette until the end point.

Repeat the titration until you obtain consistent results.

Record your results in the table below.

Results:

Volume of pipette used = cm^3 ($\frac{1}{2}$ mark)

<i>Experiment number</i>	1	2	3
<i>Final burette reading (cm^3)</i>			
<i>Initial burette reading (cm^3)</i>			
<i>Volume of BA2 used (cm^3)</i>			

($4\frac{1}{2}$ marks)

Volume of **BA2** used in calculating average volume

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

.....

Average volume of **BA2** used

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

.....
 cm^3

Questions:

- (a) Write the equation for the reaction between M_2CO_3 and hydrochloric acid

(1½ marks)

.....
.....

- (b) Calculate the;

- (i) Number of moles **BA2** that reacted
(Concentration of hydrochloric acid = 0.05 moles per litre)

.....
.....
.....
.....
.....
.....
.....
.....

- (ii) Number of moles of the metal carbonate per litre of solution **BA1**

.....
.....
.....
.....
.....
.....
.....
.....

- (c) Determine the;

- (i) Relative formula mass of M_2CO_3
(500cm³ of solution contains 0.99379g of M_2CO_3)

.....
.....
.....
.....
.....
.....

-

 (ii) Relative atomic mass of M in M_2CO_3
 ($C = 12; O = 16$)

2. You are provided with substance **T**, which contains **two** cations and **one** anion. You are required to carry out the following tests on **T** to identify the cations and the anion in **T**. identify any gas(es) that may be given off and record your observations and deductions in the table below; (32 marks)

	Tests	Observations	Deductions
(a)	Heat a spatula end-ful of T strongly in a dry test tube.		
(b)	To two spatula end-fuls of T , in a boiling tube, add dilute nitric acid drop wise until the solid has just dissolved. Then add dilute sodium hydroxide solution drop wise until in		

	excess. Filter and keep both the filtrate and the residue.		
(c)	To the filtrate, add dilute nitric acid drop wise until the solution is just acidic. Divide the acidic solution into three parts.		
	(i) To the first part of the acidic solution, add dilute sodium hydroxide solution drop wise until in excess.		
	(ii) To the second part of the acidic solution, add dilute ammonia solution drop wise until in excess.		
	(iii) To the third part of the acidic solution, add dilute sulphuric acid.		
(d)	Transfer the residue into the test tube and then add dilute nitric acid until the solid has dissolved. Divide the resultant solution into three portions. (i) To the first portion of the solution, add dilute sodium hydroxide drop wise until in excess.		
	(ii) To the second portion of the solution, add dilute ammonia solution drop wise until in excess.		
	(iii) To the third portion of the solution, add		

	few drops of dilute sulphuric acid.		
--	-------------------------------------	--	--

(e)Identify the;

- (i) Cations in **T**.....and.....
- (ii) Anion in **T**.....

CONFIDENTIAL

Great care should be taken that the information given below does not reach the candidates either directly or indirectly.

INSTRUCTIONS FOR PREPARING APPARATUS

N.B: the Head teacher must ensure that the teacher responsible for preparing the apparatus hands in his/her trial results properly sealed in a separate envelope and firmly fastened (attached) to the candidates' scripts envelope(s)

- 1. The description of the reagents and chemicals specified below does not necessarily correspond with the description in the question paper.*
- 2. In addition to the fittings, apparatus and substances ordinarily contained in a chemistry laboratory, each candidate will require the following;*

1 burette (50cm³)

1 pipette (25cm³ or 20cm³)

2 conical flasks.

2 measuring cylinders

6 test tubes

1 filter paper.

*2 beakers labeled **BA1** and **BA2***

200cm³ of distilled water.

*50cm³ of solution **P***

*50cm³ of solution **Q***

***P** is a solution made by dissolving 7.95g of anhydrous sodium carbonate in one litre of solution.*

***Q** is a solution made by dissolving 12.9cm³ of concentrated hydrochloric acid in one litre of solution.*

Methyl orange indicator.

***T** is a mixture of MgCO₃ and PbCO₃ in the ratio of 1:1 respectively.*