Name ..... ADM. .....

FORM 3 CLASS .....

CHEMISTRY

Paper 3 Date .....

Time : 2¼ Hours

CHEMISTRY

Paper 3

Time : 2¼ Hours

INSTRUCTIONS TO CANDIDATES

- Answer all questions on the space provided
- All working **Must** be clearly shown

For Examiner's Use Only

Question	Maximum score	Candidate's score
1	17	
2	13	
Total score	**30**	

1. You are provided with;

- Solution A 0.2MNaOH
- Solution B Hydrochloric acid
- Solution C sodium Carbonate solution

You are required to standardize hydrochloric acid using solution A and hence determine the morality in moles per liter of solution C sodium carbonate

Procedure I

Using a pipette transfer 25cm^3 solution A into conical flask add 2 to 3 drops phenolphthalein indicator then titrate with hydrochloric acid provided in a beaker from burette. Shake the conical flask after each additional and note the volume required to neutralize sodium hydroxide solution. Record your results in the table below.

Titre	I	II	III
Final burette readings (cm^3)			
Initial burette readings (cm^3)			
Volume of the acid used (cm^3)			

a) What is the average volume of solution B? (5mks)

***CT*✓**
D✓
A±0.1✓
±0.2✓½
PA✓
FA✓

Average = 25.1cm³

b) Calculate the number of moles of solution B required to complete neutralize solution A. (3mks)

Moles of NaOH ≡> $\frac{25.0 \times 0.2}{1000}$
= 0.005moles✓

Moles of acid, moles ratio 1:1✓

= 0.005 x 1
= 0.005moles✓

c) Calculate the molarity in moles per liter of solution B hydrochloric acid. (1mk)

$\frac{0.005 \times 1000}{25}$✓½
= 0.2M✓½

Procedure II

Rinse the pipette thoroughly then pipette 25cm^3 of solution C sodium carbonate into clean conical flask then add 2 to 3 drops of phenolphthalein indicator. Refill the burette with solution B and use it to titrate content of the conical flask. Shake the flask after each addition of the acid solution B and note the volume of the acid required to neutralize 25cm^3 of sodium carbonate solution C.
Record your results in table below

Titre			
Final burette readings (cm^3)			
Initial burette readings			
Volume of solution B used			

d) Calculate average volume of solution B used. (5mks)

Volume average = 12.5cm³ CT✓
A±0.1✓
± 0.2✓½
D✓
PA✓
FA✓

e) Calculate the number of moles of solution C in 25cm^3 of the solution. (2mks)

Moles of the acid = $\frac{12.5 \times 0.2}{1000}$
= 0.0025moles✓

Moles of carbonate, moles ratio 1:2✓½

= $\frac{0.0025}{2}$ = 0.00125moles✓½

f) Calculate the molarity of solution C in Mole per liter. (1mk)

= $\frac{0.00125 \times 1000}{25}$

=0.05M

2. You are provided with solid D. Carry out tests below and record your observation and inferences in the table below.
   a) Describe the appearance of sold D. (2mks)

White/ colorless✓
Crystalline solid✓

b) Take a boiling tube, add all solid D and add about 10cm^3 of distilled water. Shake the mixture

Observations	Inference
Solid dissolved forming a colorless solution✓ (1mk)	**Soluble salt ✓** **Absences of colored ions** (1mk)

c) Divide the solution obtained above into five portions. To the first portion add drops of lead (ii) Nitrate solution.

Observations	Inference
No white precipitate✓ (1mk)	**SO_4^{2-}** **Co_g^{2-}** **Cl-** **So_4^{2-}** (2mk) **absent. Each ion✓½**

d) To the second portion add 3 drops of barium Nitrate.

Observations	Inference
No white precipitate (1mk)	**So_3^{2-}** **Co_3^{2-}** **So_4^{2-}** **absent all 3=✓** **2=✓½** **1=0** (1mk)

e) To the third portion add few then excess drops of ammonia solution.

Observations	Inference
White precipitate✓½ **Insoluble in excess✓½** (1mk)	**Pb^{2+}** **Al^{3+}** **Mg^{2+}** **Ba^{2+}** **Present. each ion✓½** (2mk)

f) To the fifth portion, add drops of hydrochloric acid then boil the mixture.

Observations	Inference
No effervescence✓ **While precipitate that dissolves on boiling ✓** (2mk)	**Pb^{2+} present✓** (1mk)

g) Give the formula of the anion acid cation present in substance D.

Cation **Pb^{2+}** (1mk)

Anion **No_3^-** (1mk)

<u>Assumption</u>

The only **soluble salts of lead is lead (iii) Nitrate**