

Candidate's Name:.....

Signature:.....

Random No.						Personal No.		

(Do not write your School/ Centre Name or Number anywhere on this booklet)

545/3

**CHEMISTRY**

**(PRACTICAL)**

**April./May. 2012**

2 hours.

## **THE CHEMISTRY DEPARTMENT**

**SENIOR THREE TEST ONE- 2012**

**CHEMISTRY PRACTICAL**

**Paper 3**

2 hours

### **INSTRUCTIONS:**

Answer **both** questions. Answers are to be written in the spaces provided in this booklet. All your working **must** be in **blue** or **black** ink. Any work done in **pencil** will not be marked **except** drawings.

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

**All working must be clearly shown.**

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

For Examiners' Use Only		
Q.1		
Q.2		
Total		

1. You are provided with the following:

**BA1** which is a solution containing 5.44g of acid, **J** per  $dm^3$  of solution.

**BA2** which is a solution made by dissolving 2.0g of sodium hydroxide to make  $250cm^3$  of solution.

**You are required to determine the ;**

(i) **mole ratio for the reaction between the acid, J and sodium hydroxide.**

(ii) **hence the basicity of acid J.**

**Procedure:**

Pipette 25.0 (or  $20.0cm^3$ ) of **BA2** into a clean conical flask, add 2-3 drops of methyl orange indicator.

Titrate with **BA1** from the burette up to end point. Record your results in table 1.

Repeat the procedure until you obtain consistent results.

**Table 1**

**Results:**

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

Titration number	1	2	3
Final burette reading( $cm^3$ )			
Initial burette reading( $cm^3$ )			
Volume of <b>BA1</b> used ( $cm^3$ )			

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

(a) (i) State the volumes of **BA1** used to calculate average volume

..... $cm^3$

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

(ii) Calculate the average volume of **BA1**

used.....

..... $cm^3$

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

(b) Calculate the;

(i) number of moles of sodium hydroxide that reacted. (05 marks)

( $H = 1$ ;  $O = 16$ ;  $Na = 23$ )

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(ii) number of moles of the acid that reacted. (04 marks)

**(Formula mass of the acid = 36.5)**

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(c) Determine the

(i) reaction mole ratio for the reaction between the acid and **R**. (03 marks)

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(ii) hence basicity of acid, **J**. ( 02 marks)

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2. You are provided with the following:

**BA1** which is a solution containing 0.15 moles per  $dm^3$  of a monobasic acid, **X**.

**BA2** which is a solution made by dissolving  $6.0\text{ g l}^{-1}$  of substance **Y**, which is an impure anhydrous sodium carbonate.

**You are required to determine the percentage impurity of Y.**

**Procedure:**

Pipette 25.0 (or 20.0 $\text{cm}^3$ ) of **BA2** into a clean conical flask. Add 2-3 drops of phenolphthalein indicator.

Titrate with **BA1** from the burette up to end point. Record your results in table 1.

Repeat the procedure until you obtain consistent results.

**Table 1**

**Results:**

Volume of pipette used.....cm<sup>3</sup> ( 1/2 mark)

<b>Titration number</b>	<b>1</b>	<b>2</b>	<b>3</b>
Final burette reading(cm <sup>3</sup> )			
Initial burette reading(cm <sup>3</sup> )			
Volume of <b>BA1</b> used (cm <sup>3</sup> )			

(7 1/2 marks)

(a) (i) State the volumes of **BA1** used to calculate average volume

.....cm<sup>3</sup>

( 1/2 mark)

(ii) Calculate the average volume of **BA1**

used.....

.....cm<sup>3</sup>

(2 1/2 marks)

(b) Calculate the;

(i) number of moles of **Y** that reacted. (4 1/2 marks)

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(ii) concentration of **Y** in **BA2** in moles per litre. (03 marks)

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(iii) mass of **Y** in one litre of **BA2**. (04 marks)

(C = 12; O = 16; Na = 23)

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(c) Determine the percentage impurity of **Y**. (02 marks)

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3. You are provided with the following:

**BA1** which is a 0.15M hydrochloric acid .

**BA2** which is a solution made by dissolving 2.65g of compound **YHCO<sub>3</sub>** to make 500cm<sup>3</sup> of solution.

**You are required to determine formula mass of Y.**

**Procedure:**

Pipette 25.0 (or 20.0cm<sup>3</sup>) of **BA2** into a clean conical flask, add 2-3 drops of methyl orange indicator.

Titrate with **BA1** from the burette up to end point. Record your results in table 1.

Repeat the procedure until you obtain consistent results.

**Table 1**

**Results:**

Volume of pipette used.....cm<sup>3</sup> ( ½ mark)

Titration number	1	2	3
Final burette reading(cm <sup>3</sup> )			
Initial burette reading(cm <sup>3</sup> )			
Volume of <b>BA1</b> used (cm <sup>3</sup> )			

(7 ½ marks)

(a) (i) State the volumes of **BA1** used to calculate average volume

.....cm<sup>3</sup>

( ½ mark)

(ii) Calculate the average volume of **BA1** used.....

.....cm<sup>3</sup>

(2½ marks)

(b) Calculate the;

(i) number of moles of hydrochloric acid that reacted. (1 ½ marks)

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(ii) number of moles of **YHCO<sub>3</sub>** that reacted. (02 marks)

**(1 mole of YHCO<sub>3</sub> reacts with 2 moles of hydrochloric acid)**

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(iii) number of moles of  $YHCO_3$  in  $500\text{cm}^3$  of **BA2**. (03 marks)

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(c) Determine the value of **Y** in  $YHCO_3$ . (5 ½ marks)  
( $H = 1; C = 12; O = 16$ )

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4. You are provided with the following:

**BA1** which is a 0.15M hydrochloric acid .

**BA2** which is a solution containing 13.10g of a hydrated salt,  $Y.nH_2O$  per litre of solution.

**You are required to determine percentage of water of water of crystallization in the hydrated salt.**

**Procedure:**

Pipette  $25.0$  (or  $20.0\text{cm}^3$ ) of **BA2** into a clean conical flask, add 2-3 drops of methyl orange indicator.

Titrate with **BA1** from the burette up to end point. Record your results in table 1.

Repeat the procedure until you obtain consistent results.

**Table 1**

**Results:**



Volume of pipette used.....cm<sup>3</sup> ( ½ mark)

Titration number	1	2	3
Final burette reading(cm <sup>3</sup> )			
Initial burette reading(cm <sup>3</sup> )			
Volume of <b>BA1</b> used (cm <sup>3</sup> )			

(7 ½ marks)

(a) (i) State the volumes of **BA1** used to calculate average volume

.....cm<sup>3</sup>

( ½ mark)

(ii) Calculate the average volume of **BA1** used.....

.....cm<sup>3</sup>

(2½ marks)

(b) Calculate the;

(i) number of moles of hydrochloric acid that reacted. (1 ½ marks)

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(ii) number of moles of **Y.nH<sub>2</sub>O** that reacted. (02 marks)

**(1 mole of Y.nH<sub>2</sub>O reacts with 2 moles of hydrochloric acid)**

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(iii) concentration of **BA2** in moles per litre (03 marks)

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(c) Determine the

(i) value of ***n*** in ***Y.nH<sub>2</sub>O***. (3 ½ marks)

(*H* = 1; *O* = 16; *Y* = 100)

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(ii) the percentage of water of crystallization in the hydrated salt, ***Y.nH<sub>2</sub>O***

(02 marks)

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**END**

