

**MERU SOUTH JOINT EVALUATION TEST (GSET)***Kenya Certificate of Secondary Education***CHEMISTRY**

233/3

Paper 3

**July/August 2015**

1. You are provided with  
 Solution G containing 6.4g/l of a dibasic acid G.  
 Solution J containing 0.98g per litre of solid J  
 Sodium hydroxide solution H  
 You are required to
- ✓ Determine concentration of sodium hydroxide solution H.
  - ✓ Determine relative molecular mass of solid J.

Procedure I

Place solution G in a clean burette

Using pipette and pipette filler place 25.0cm<sup>3</sup> of solution H in a 250cm<sup>3</sup> conical flask.

Add 2 drops of phenolphthalein indicator and titrate with solution G

Record your results in table 1. Repeat the titration to complete the table.

<b>Table 1</b>	I	II	III
Final burette reading cm <sup>3</sup>			
Initial burette reading cm <sup>3</sup>			
Volume of solution G used cm <sup>3</sup>			

Calculate

- (i) Average volume of solution G used. (1 mark)
- (ii) Concentration in moles per litre of the dibasic acid in solution G. (1 mark)  
 (Relative molecular mass of G = 126)
- (iii) Moles of the dibasic acid used. (1 mark)
- (iv) Moles of sodium hydroxide that reacted with the dibasic acid. (1 mark)
- (v) Concentration of sodium hydroxide in moles per litre. (1 mark)

**PROCEDURE II**Using a measuring cylinder place 25cm<sup>3</sup> of solution J in a conical flask. Using a pipette and pipette filler add 25cm<sup>3</sup> of solution H. Into solution J in the conical flask (NaOH is added in excess)

Add 2 drops of phenolphthalein indicator to the contents of the conical flask and titrate with solution G

Record your results in table 2.

Repeat the procedure two more times to complete the table 2 below.

<b>Table 2</b>	I	II	III
Final burette reading cm <sup>3</sup>			
Initial burette reading cm <sup>3</sup>			
Volume of solution G used cm <sup>3</sup>			

(4 marks)

Calculate :

- (i) Average volume of solution A used. (1 mark)
- (ii) Moles of the dibasic acid used. (1 mark)
- (iii) Moles of sodium hydroxide that reacted with the dibasic acid. (1 mark)
- (iv) Moles of sodium hydroxide that reacted with 25.0cm<sup>3</sup> of J in solution. (1 mark)
- (b) Given that 1 mole of J reacts with 2 moles of sodium hydroxide, calculate.
  - (i) Number of moles of B in 25cm<sup>3</sup> of solution B. (1 mark)
  - (ii) Concentration in moles per litre of solid B in solution B. (1 mark)
  - (iii) Relative molecular mass of B. (1 mark)

## MERU SOUTH FORM FOUR JOINT EXAMINATION

Kenya Certificate of Secondary Education

CHEMISTRY

Paper - 233/3 Marking Scheme

**TABLE 1** . . . . . (5 marks)

Distributed as follows.

(a) Complete table . . . . . (1 mark)

Penalise wrong arithmetic, inverted table and burette readings beyond 50cm<sup>3</sup> unless explained or burette readings below 0.1 cm<sup>3</sup>

For each penalise ½ mark to a maximum of ½ mark

(b) Decimal . . . . . (1 mark)

(Tied to 1st and 2nd rows only)

Conditions

Accept either 1 or 2 dp used consistently

If 2dp and 2nd d.p should be 0 or 5

Accept inconsistency in the use of zero i.e. 0.0, 0.00

(c) Accuracy . . . . . (1 mark)

Compare the students readings with teacher's values (S.V)

If at least one reading ± 0.1 to S.V. . . . . 1

- If not with ± 0.2 of S.V. . . . . 0 mark

mark

If any reading is within ± 0.2 of S.V. . . . . ½ mark

If none of the reading is within ± 0.2 of S.V. . . . . 0 mark

(d) Principle of averaging . . . . . (1 mark)

Values averaged must be ± 0.2 of each other otherwise award 0 mark

One titration done . . . . 0 mark

Answer must be given to at least 2.d.p

If values averaged are inconsistency . . . . 0 mark

If there is wrong arithmetic in the table used credit the correct value.

Final accuracy . . . . . (1 mark)

Compare candidates correct average titre with S.V and award as follows.

- If within ± 0.1 of S.V. . . . . (1 mark)

- If not within ± 0.1 is S.V. . . . . (1 mark)

Calculations

$$\text{ii) } \frac{6.4}{126} = 0.051 \text{ M}$$

$$\text{iii) } \frac{0.051 \times \text{titre}}{1000} = \text{Correct ans}$$

$$\text{iv) Mole ratio - Acid : base} = 1 : 2 \\ = \text{Ans (iii)} \times 2 = \text{Correct Ans}$$

$$\text{iv) } \frac{\text{Ans (iv) above} \times 1000}{25} = \text{Correct ans}$$

TABLE II . . . . . (5 marks)

To be marked as table 1

Calculation

$$\text{ii) } \frac{0.051 \times \text{titre}}{1000} = \text{Ans}$$

$$\text{iii) Ans (ii)} \times 2 = \text{Correct ans}$$

$$\text{iii) Ans (iv) procedure 1} - \text{Ans (iii) above} \\ = \text{Ans}$$

$$\text{b i) } \frac{\text{An (iv) above}}{2} = \text{Ans}$$

$$\text{ii) } \frac{\text{An b (i) above} \times 1000}{25} = \text{Ans}$$

$$\text{ii) } \frac{0.98}{\text{Ansb (ii) above}} = \text{Ans}$$

$$\text{2. } \frac{0.98}{\text{Ansb (ii) above}} = \text{Ans}$$

2.

OBSERVATION		INFERENCE
a)	Colourless filtrate ✓½ white residue ✓½	P. Contains a ✓½ soluble - and insoluble salt ✓½ <b>2 marks</b>
b) i)	No yellow ppt formed ✓1	Pb <sup>2+</sup> absent ✓1 <b>2 marks</b>
	ii) White ppt : ✓½ ppt dissolve in excess ammonia solution ✓½	Ag <sup>+</sup> present ✓1 <b>2 marks</b>
c)	Bubbles // Effervescence fizzing ✓1	CO <sub>3</sub> <sup>2-</sup> ✓1 present <b>2 marks</b>
	i) White ✓½ ppt soluble in excess ✓½	Zn <sup>2+</sup> , Al <sup>3+</sup> , Pb <sup>2+</sup> present All 3 ✓1 <b>Only 2 ✓½</b> <b>Only 1 - 0 mark</b> <b>2 marks</b>
	ii) White ppt, ✓½ soluble in excess ✓½	Zn <sup>2+</sup> present <b>2 marks</b>

3.

	OBSERVATIONS	INFERENCE
a)	Dissolve to form a colourless solution	-Polar compound ✓1 // soluble organic compound <b>2</b>
i)	Blue litmus turn paper turn to red ✓½ Red litmus paper remain red ✓½	H <sup>+</sup> // H <sub>3</sub> O <sup>+</sup> // Acidic solution ✓1 <b>2</b>
ii)	pH 5 ✓1	Weakly ✓1 acidic reject weak acid. ✓1 <b>2</b>
iii)	Potassium managanate (VII) is decolourised ✓1 // Potassium manganate VII turn from purple to colourless	✓½ R - OH ✓½ <b>2</b>