KITUI COUNTY MOCK
END OF TERM II FORM FOUR EXAMINATION, 2017
Kenya Certificate of Secondary Education (K.C.S.E)
233/3
CHEMISTRY
PAPER 3
MARKING SCHEME

1.

a)

	I	II	III
Final burette reading	37.2	37.2	37.2
Initial burette reading	0.0	0.0	0.0
Volume of solution D used (cm^3)	37.2	37.2	37.2

(4 marks)

Complete table – 1 mark

Decimal – 1 mark

Accuracy – 1 mark

Principle of averaging – 1 mark

Final accuracy - 1 mark

i) $\frac{37.2+37.2+37.2}{3}$ ½ $= 37.2\,cm^3$ ½ (1 mark)

ii) R.F.M of Na_2CO_3 = 106

Concentration of Na_2CO_3 ¿ $\frac{8}{106}$ ½

¿ $0.075\,M$ ½ (1 mark)

iii) Moles of Na_2CO_3 ¿ $\frac{25 \times 0.075}{1000}$ ½

¿ 0.001875

Moles of HCl = 0.001875 x 2

= 0.00375✓½

Concentration of HCl = $\frac{0.00375 \times 1000}{37.2}$ ½

¿ $0.1008\,M$ ½ (2 marks)

iv) 0.1008 x 10 ✓½= 1.0008 M ✓½

OR

$\frac{0.1008 \times 250\,½}{25} = 1.008\,M$ ✓½ (1 mark)

b)

Volume of solution A (cm^3)	2	4	6	8	10	12	14
Volume of solution C (cm^3)	14	12	10	8	6	4	2
Initial temperature of solution C (°C)	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Highest temperature of solution C (°C)	23	25.5	28.0	29.5	26.5	24.5	
Change in temperature AT (°C)	2.5	5.0	7.5	9.0	6.5	4.5	

(6 marks)

Complete table – 2 mark

Decimal – 1 mark

Accuracy – 1 mark (tied to initial Temperature) ±2°C to school value

Trend – 1 mark (tied to highest Temperature)

1) Continuous rise followed by continuous drop or
2) Continuous rise followed by a constant followed by a continuous drop.

i) Graph (3 marks)

Labeling of axes – ½ mark

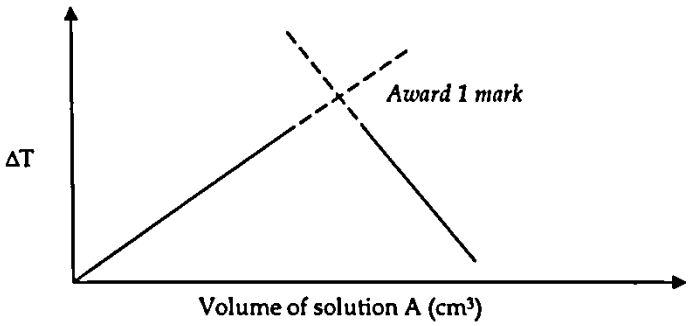
Scale – ½ mark

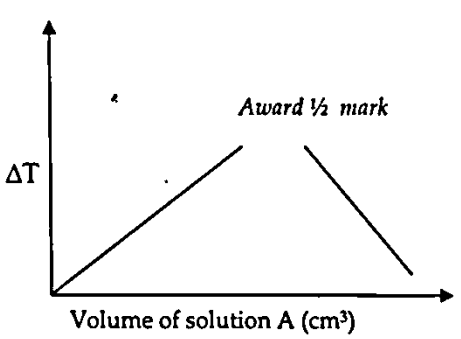
Plotting – 1 mark

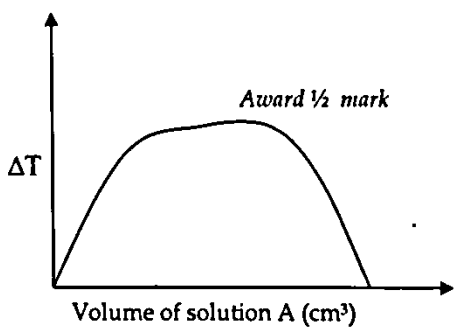
Line / shape – 1 mark

NOTE

- The first line is best line of fit passing through origin otherwise penalize fully, i.e. award zero.
- The lines must be extrapolated, otherwise penalize ½ mark
- The shape is







ii) I $\Delta t = 9.5 \pm 0.1^{o}C$ ✓½ (½ mark)

II Maximum volume of A = 7.6cm^3±0.1 ✓½ (½ mark)

iii) I Moles of sulphuric acid = $\frac{7.6 \times 1.008}{1000}$ ½

¿ $0.0076608\ moles$ ½ (1 mark)

II Heat evolved = 16 x 4.2 x 9.5 ✓½

= 638.4 joules ✓½ (1 mark)

Molar Heat = $\frac{638.4}{0.0076608}$ ½

¿ $83.333\ KJ/mol$ ½ (2 marks)

2.

	Observations	**Inferences**
a)	Dissolves ✓½forming a colourless solution ✓½ (1 mark)	Soluble salt/ substance ✓½ Fe^{3+}, Fe^{2+} Cu^{2+} absent ✓½ (1 mark)
b)	No bubbles/effervescence ✓1 (1 mark)	CO_3^{2-}, HCO_3^-, SO_3^{2-} absent 3 mentioned -1 marks 2 mentioned - ½ mark 1 mentioned - 0 mark (1 mark)
c)	White precipitate ✓1 (1 mark)	Cl^-, ✓½, SO_4^{2-} ✓½ Present Penalize ½ mark if the ion is one (½ + ½ mark)
d)	No white precipitate ✓1 (1 mark)	Cl^- ✓1 Present Penalize fully (1 mark)
e)	White precipitate ✓½which dissolves in excess ✓½ (1 mark)	Al^{3+} ✓½, Zn^{2+} ✓½ present (1 mark) Penalize ½ mark if Pb^{2+} is mentioned or any other contradictory ion
f)	Bubbles / effervescence ✓1 (1 mark)	H^+ / H_3O^+ / R-COOH present for any one mentioned (1 mark)

3.

a) White / Colourless ✓½ crystalline solid ✓½

	Observations	**Inferences**
b)	Burns with yellow flame ✓½ (1 mark)	– C=C– / –C ≡ C– present ✓½ for both otherwise award 0 mark (1 mark)
c) i)	$KMnO_4$ decolorizes / purple $KMnO_4$ turns colourless ✓1 (1 mark)	– C=C– / –C ≡ C– present ✓1 for both otherwise award 0 mark (1 mark) Penalize fully if ROH mentioned or any other contradictory ion
(c) (ii)	Bubbles/ Effervescence (1 mark)	H^+ / H_3O^+ / R-COOH present ✓1 for nay one mentioned. (1 mark)