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CHEMISTRY PAPER 3

PRACTICAL

FORM 4

MURANGA EAST 2021
KENYA CERTIFICATE OF SECONDARY EDUCATION (KCSE)

Marking Scheme

	I	II	III
Final reading	12.5	25.0	12.5
Initial reading	0.2	12.5	0.0
Volume used (cm ³)	12.5	12.5	12.5

Marks distributed as follows:

(a) Complete table (1mk)

3 titration done (1 mk)

Incomplete table with 2 titration (½ mk)

Incomplete table with one titration done (0 mk)

- **Penalties**

- Wrong arithmetic

- Inverted table

- Unrealistic titre values (unless explained)

Penalize (½ mk) for each to a maximum of (½ mk)

(b) Decimal place (1mk)

- Accept only 1 or 2 d.p used consistently, otherwise penalize fully.

- Accept inconsistency in the use of zeros as initial burette reading e.g. 0.0, 0.00 or 0.000.

NB decimal place tied to 1st and 2nd rows only.

(c) Accuracy (1 mk)

- Compare candidate's titre value with school value S.V. if one value within ± 0.1 of S.V (1mk)

No value within ± 0.1 of S.V but at least 1 value within ± 0.2 of S.V (0 mk)

(d) Averaging (1 mk)

Values averaged must be shown

If 3 consistent titrations done and averaged = (1 mk)

If 3 titration done, but only 2 are consistent and averaged = (1 mk)

If only 2 titrations done, are consistent and averaged = (1 mk)

Otherwise penalize fully

CALCULATIONS

(a) $\frac{12.5+12.5+12.5}{3} \left(\frac{1}{2}mk\right) = 12.5cm^3 \left(\frac{1}{2}mk\right)$

(b) (i) Moles in $250cm^3 = \frac{0.5}{40} = 0.0125 \text{ moles } \left(\frac{1}{2}mk\right)$

Moles used =

$$\frac{0.0125 \times 25}{250} \left(\frac{1}{2}Mk\right) = 0.00125 \text{ moles}$$

(ii) Moles of acid reacting = $0.00125 \left(\frac{1}{2}mk\right)$ mole ratio 1:1
 250 \longrightarrow ?

$$\frac{0.0125 \times 25}{250} \left(\frac{1}{2}mk\right) = \text{moles } \left(\frac{1}{2}mk\right)$$

(iii) Molarity of solution A
 $10cm^3 = 0.25 \text{ moles}$
 $1000 = ?$

$$\frac{1000 \times 0.25}{10} \left(\frac{1}{2}mk\right) = 25 \text{ moles } \left(\frac{1}{2}Mk\right)$$

PROCEDURE II

TABLE II

Volume of solution A (cm ³)	volume of distilled water	Concentration of solution A(moles/l)	Time(s)	$\frac{I}{t} (s^{-1})$
12	0	2.5	25.5	0.0363
10	2	2.08	34.25	0.0292
8	4	1.67	45.45	0.0220
6	6	1.25	69.44	0.0144
4	8	0.83	120.01	0.0083

Complete table (4mks)

Decimal places (tied to 3rd and 5th column) (1mk)

Accuracy (tied to row (i) to (iv) (1mk)

Trend (gradual increase in time) (1 mk)

Questions


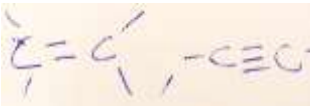
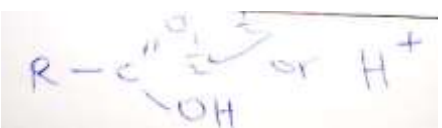

(c) (i) read from graph (1mk)

Value of $\frac{I}{t}$ (1mk)

Correct answer (½ Mk)

	Observation	inference
2. (a)	<ul style="list-style-type: none"> - Colourless liquid condenses at collar parts of test tube - Gas evolved turns red litmus blue - A white residue remain Any 2 (1mk)	<ul style="list-style-type: none"> - Hydrated salt - NH_4^+ ions Any 2 correct ions award (1 mk)
(b) i)	<ul style="list-style-type: none"> - Solid dissolves ($\frac{1}{2}$ mk) to form a colourless solution ($\frac{1}{2}$ mk) 	$\text{Mg}^{2+}, \text{Al}^{3+}, \text{Zn}^{2+}$ Present Any One Or $\text{Cu}^{2+}, \text{Fe}^{2+}, \text{Fe}^{3+}$ absent ($\frac{1}{2}$ mk)
(ii)	white precipitate is formed ($\frac{1}{2}$ mk)	$\text{CO}_3^{2-}, \text{SO}_4^{2-}, \text{Cl}^-, \text{SO}_3^{2-}$ present Any two ions award ($\frac{1}{2}$ mk) Penalize the ($\frac{1}{2}$ mk) for any contradictory ion.
(iii)	A white precipitate form ($\frac{1}{2}$ mk)	SO_4^{2-} ions confirmed ($\frac{1}{2}$ mk)
(iv)	White precipitate ($\frac{1}{2}$ mk) dissolves in excess to form a colourless solution ($\frac{1}{2}$ mk)	$\text{Zn}^{2+}, \text{Pb}^{2+}$ or Al^{3+} Any 3 ions – (1mk) 2 ions ($\frac{1}{2}$ mk) 0 mk for any only one ion
(v)	White precipitate ($\frac{1}{2}$ mk) in excess	$\text{Pb}^{2+}, \text{Al}^{3+}$ present Both ions (1mk) One ion ($\frac{1}{2}$ mk)
(vi)	No white precipitate formed (1 mk)	Pb^{2+} absent or Al^{3+} present ($\frac{1}{2}$ mk)

	Observation	inference
3. (a)	Dissolves form ($\frac{1}{2}$ mk) a colourless homogenous solution ($\frac{1}{2}$ mk)	Polar substance ($\frac{1}{2}$ mk)
(b) (i)	PH value 1 – 3 ($\frac{1}{2}$ mk)	Strong acid present ($\frac{1}{2}$ mk)

(ii)	Purple acidified KMnO ₄ decolorised (1 mk)	 OR -OH present
(iii)	Bromine water decolourised (1 mk)	 OR -OH. Present All three (1mk) Two only (½ mk)
(iv)	Effervescence (½ mk)	 Present
(v)	Sweet smelling Compound formed (1 mk)	 Present (½ mk)

Q 1 (iv) a.

