

**KANDARA SUB-COUNTY SECONDARY SCHOOLS FORM 3 2016
JOINT EXAMINATION**

Kenya Certificate of Secondary Education (KCSE)

Chemistry (233/3)

Paper 3 (PRACTICAL)

October 2016

MARKING SCHEME

Q1. Table 1 and Table II

For each table;

a) Complete table (1 mark)

Conditions

- i) One titration (0 mk)
- ii) 2 titrations done (½ mk)
- iii) 3 titrations done (1mk)

Penalties (maximum ½mk)

- i) Wrong arithmetic
- ii) Inverted table
- iii) Burette reading below 1cm³ and above 50cm³ unexplained

NOTE:

Penalise ½mk for any or all the above mistakes maximum penalty is ½mk

b) Decimal place (1mk)

Note; only for row 1 and row 2

Conditions

- i) 1 d.p consistently used row 1 and 2 (1mk)
- ii) Whole numbers with no d.p used consistently (1mk)

Penalties

- Penalise fully (1mk) for any unmet condition
- If in row 2, zero is used consistently eg 0 or 0.0 or 0.00 do not penalise (*accept zeros used in row 2 in any way if at all zeros are used in all titrations*)

c) Accuracy (1mk)

Conditions

- i) If any of the 3 titres is within ± 0.1 of the school value (S.V) (1mk)
- ii) If any of the 3 titres is within ± 0.2 of the S.V (½mk)
- iii) If none of the 3 titres is within ± 0.1 or ± 0.2 of S.V (0 mk)

Penalties

- i) If the candidate takes the average of titres beyond a range of ± 0.2 penalise fully (1mk)
- ii) If the candidate fails to take the average of all the titres within a range of ± 0.2 penalise fully (1mk)
- iii) If the answer got after average is not correct penalise ½mk (NB correct according to candidate's titre)
- iv) If the answer is approximated to less than 2d.p penalise ½mk

e) Final accuracy

(1mk)

Conditions

- i) If candidate's correct average titre is within ± 0.1 of the S.V award (1mk)
- ii) If candidate's correct average titre is within ± 0.2 of the S.V award (½mk)
- iii) Award 0mk for a value beyond ± 0.2 of the S.V.

Procedure I

a) ii) $\frac{8.8 \checkmark 1}{40} = 0.22M \checkmark 1$ or 0.22 moles/litre or 0.22 moles/l

*accept full mark if no units
penalise ½ for wrong units*

iii) $\frac{\text{ac titre (table 1)} \times \text{ans a(ii)} \checkmark 1}{1000} = \text{ans} \checkmark 1$

iv) $\text{NaOH}_{(aq)} + \text{HCl}_{(aq)} \rightarrow \text{NaCl}_{(aq)} + \text{H}_2\text{O}_{(l)} \checkmark 1$
Mole ratio NaOH: HCl = 1:1 $\checkmark \frac{1}{2}$
= ans a(iii) above $\checkmark \frac{1}{2}$

b) $\frac{1000 \times \text{ans (a(iv))} \checkmark \frac{1}{2}}{25} = \text{ans} \checkmark \frac{1}{2}$

Note penalties

- i) Penalise ½mk for wrong units
- ii) Penalise ½mk for molarity approximated to less than 3d.p
- iii) Penalise ½mk for number of moles approximated to less than 4d.p
- iv) Penalise a ½mk for a value altered when used in a successive step

Procedure II

a(ii) $\frac{\text{av. titre (table 2)} \times \text{ans a(ii)(table 1)} \checkmark \frac{1}{2}}{100} = \text{ans} \checkmark \frac{1}{2}$

a(iii) Mole ratio NaOH: HCl = 1:1 $\checkmark \frac{1}{2}$
= ans a(ii) above $\checkmark \frac{1}{2}$

a(iv) $\text{ans a(iii)} \times 4 \checkmark \frac{1}{2} = \text{ans} \checkmark \frac{1}{2}$

a(v) $\frac{\text{ans(b) (table 1)} \checkmark \frac{1}{2}}{10} = \text{ans} \checkmark \frac{1}{2}$

OR

$\frac{\text{ans (b) (table 1)} \times 100}{1000} = \text{ans}$

a(vi) $\text{ans a(v) above} - \text{ans a(iv) above} \checkmark \frac{1}{2} = \text{ans} \checkmark \frac{1}{2}$

a(vii) $2\text{HCl}_{(aq)} + \text{M}_2\text{CO}_{3(s)} \rightarrow 2\text{MCl}_{(aq)} + \text{CO}_{2(g)} + \text{H}_2\text{O}_{(l)} \checkmark \frac{1}{2}$
Mole ratio HCl:M₂CO₃ = 2:1 $\checkmark \frac{1}{2}$
 $\frac{\text{ans a(vi)} \checkmark \frac{1}{2}}{2} = \text{ans} \checkmark \frac{1}{2}$

b) i) ans a(vii) above $\times 106\sqrt{1/2} = \text{ans } \sqrt{1/2}$

ii) ans b(i) above $\times 100\sqrt{1/2} = \text{ans } \% \sqrt{1/2}$
0.6

Note/penalties

i) Penalise $\frac{1}{2}$ mk for wrong units

ii) Penalties $\frac{1}{2}$ mk for number of moles approximated to less than 4 d.p

2. a) i)

Observation	Inference
Solid dissolves $\sqrt{1/2}$ forming colourless solution $\sqrt{1/2}$	Cu^{2+} , Fe^{3+} , Fe^{2+} absent $\sqrt{1}$
<u>Note</u> -Penalise $\frac{1}{2}$ mk if colourless solution is not formed	<u>Note</u> -Penalise $\frac{1}{2}$ mk for any omission or contradictory ion

a) ii)

Observation	Inference
Burns with a yellow flame $\sqrt{1}$	Na^+ present $\sqrt{1}$
<u>Note</u> -Penalise fully (1mk) If smoky /sooty is used	<u>Note</u> -Penalise fully (1mk) for any contradictory ion

a) iii)

Observation	Inference
<u>White ppt formed</u> $\sqrt{1/2}$ with lead (II) nitrate and <u>dissolves</u> with nitric (v) acid $\sqrt{1/2}$	CO_3^{2-} $\sqrt{1/2}$, SO_3^{2-} $\sqrt{1/2}$ present
<u>Note</u> accept effervescence/bubbles for $\frac{1}{2}$ mk	<u>Note</u> Penalise ($\frac{1}{2}$ mk) for any contradictory ion

b) i)

Observation	Inference
White ppt formed $\sqrt{1/2}$ which dissolves in excess $\sqrt{1/2}$	Zn^{2+} present $\sqrt{1}$
	<u>Note</u> Penalise fully (1mk) for any contradictory ion

(ii)

Observation	Inference
White ppt formed $\sqrt{1/2}$ with lead (II) nitrate solution white ppt does not $\sqrt{1/2}$ dissolve with nitric (V) acid	SO_4^{2-} present $\sqrt{1}$
	<u>Note</u> -Penalise fully (1mk) for any contradictory ion

3. a)

Observation	Inference
Solid melts and burns with a yellow <u>sooty/smoky</u> flame ✓1	$\begin{array}{c} \\ \text{C} = \text{C} \\ \end{array}$ ✓1 or $-\text{C} \equiv \text{C}-$
<u>Note</u> -Penalise fully (1mk) if word sooty/smoky is omitted	<u>Note</u> -accept any of the two above for full (1mk) -give 0mk if one is wrong

b) i)

Observation	Inference
Purple acidified potassium Manganate (VII) turns colourless/is decolourised/discolourised ✓1	$\begin{array}{c} \\ \text{C} = \text{C} \\ \end{array}$ ✓1 or $-\text{C} \equiv \text{C}-$
<u>Note</u> -Penalise ½mk if purple colour is not mentioned	<u>Note</u> -Penalise fully (1mk) if any structure is wrong -Accept for (1mk) if only double or triple bonds are drawn at form 3 even if R-OH is not shown