KCSE 2024

CHEMISTRY PAPER 3

MARKING SCHEME

(a)

Table 1

Piece of Magnesium added	***1***	***2***	***3***	***4***	***5***	***6***
Length of Magnesium added (cm)	***2***	***4***	***6***	***8***	***10***	***12***
Time taken t (second)	***150***	***190***	***225***	***295***	***430***	***500***
Reciprocal of time $\frac{1}{t}$ (S^{-})	***0.00667***	***0.00526***	***0.00444***	***0.00 33***	***0.00233***	***0.002***

Marking points
Complete Table – 1
Decimal point – 1
Accuracy – 1
Trend – 1
Graph:
Straight line graph of best fit
Label of axis = ½
Scale = ½
Plotting = 1
Line = 1

(ii) $\frac{1}{t}$ = 0.00510 √½ From the graph and must be shown. Showing. √½

$t = \frac{1}{0.00510}$ √½ = 196.5 seconds. √½

(iii) $Mg_{(s)} + H_2SO_{4(aq)} \rightarrow MgSO_{4(s)} + H_{2(g)}$ √½
1 : 1 With correct physical state.

(iv) Moles of Mg = $\frac{0.12}{24}$ √½ = 0.005 moles √½ 1mk

Moles of H_2SO_4 used = 0.005 moles (1 : 1)

(v) Increase in length of M of ribbon results in decrease in $\left(\frac{1}{t}\right)$ √½

This is done to gradual decrease in the concentration of the acid.
√½

Table II

Titration	*I*	*II*	*III*
Find burette reading (cm^3)	*15.3*	*30.5*	*45.7*
Initial burette reading	*0.0*	*15.3*	*30.5*
Volume of solution B used (cm^3)	*15.3*	*15.2*	*15.2*

CT = 1
D = 1
AC = 1
PA = 1
TA = 1
5

(c) (i) $\frac{T_1 + T_2 + T_3}{3}$ √½ *= C.A* √½ *1 fall are consistent*

OR

i.e $\frac{15..3 + 15.2 + 15.2}{3}$ √½ *= 15.233 cm^3* √½

(ii) Moles of sodium hydroxide = $\frac{15.233}{1000}$ *x 0.5 = 0.007617*

i.e. Ans in $\frac{c\ (i)\ x\ 0.5}{1000}$ √½ *= C.A.* √½ *1 mk*

(d) (i) Ans in $\frac{c\ (ii)}{2}$ √½ *= C.A.* √½ *i.e. 0.007617 = 0.003809 moles 1 mk*

(ii) Ans. in d (i) x 4 = C.A.
i.e o.003809 x 4 = 0.015236 moles. 1 mk

(e) Ans in b (iv) + Ans. d(ii) √½ *= C.A*
0.005 + Ans. d (ii) = C.A
i.e. 0.005 + 0.015235 = 0.020236 moles. 1 mk

(f) Ans. in $\frac{e\ x\ 1000}{50\ cm^3}$ *cm^3 = C.A.*
i.e. $\frac{0.020236\ x\ 1000}{50} = 0.40472\ M$

2. (a)Observations | Inferences
Dissolves to form colourless solution . √½ Soluble salt or absence of coloured irons
i.e Fe^{3+}, Fe^{2+}, Cu^{2+} √½

(½ mrk) (1 mrk)

(b) (i) Observations | Inferences
No white ppt. √½ | Pb^{2+}, Al^{3+} or Mg^{2+} absent (½ mk) Or
NH^{+}_4, Na^{+}, or K^{+} may be present. √½

(1 mk)

(ii) Observations | Inferences

No white ppt. √½ | NH^+_4, Na^+ √½ or K^+ possibly present. √½ (1 mk)
Or
Pb^{2+} Al^{3+}, Zn^{2+} absent 1 mks

(iii) Observations | Inferences

White ppt. formed. √1 (1 mrk) | CO_3^{2-}, SO_4^{2-} Or Cl^- present. √1 (1 mk)

(iv) Observations | Inferences

White ppt. √ ½ dissolves in excess ammonia √ ½ solution to form colourless solution. (1mk) | Cl^{-1} present. √1 (1 mk)

(v) Observations | Inferences

Golden yellow flame. √1 (1 mk) | Na^+ present. √1 (1 mk)

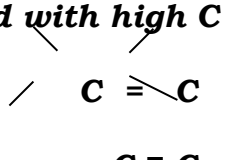
3. (a) Observations | Inferences

Burns with yellow flame sooty /smoky flame. √½ | - Long chain hydrocarbon
- Unsaturated organic compound. √½

Or

- organic compound with high C – H ratio

or



or

(b) Observations | Inferences

Dissolves to form colourless solution. √1 (1 mk) | Polar organic compound/ soluble salt/ soluble compound √1 (1 mk)

(c) (i) Observations | Inferences

Effervescence /bubbles /fizzing. √½ (½ mk) | Presence of H^+ / H_3O^+ , R- COOH. √½

1 mk

(ii) Observations | Inferences

Orange colour remains the same / persists i.e does not change green. √½ *(1 mk)*	*Absence of R –OH.* √½

1 mk

(iii) Observations	*Inferences*
$KMnO_4$ decolourized i.e changes from purple to colourless √1 *(1 mk)*	$C = C$ *Or* $-C \equiv C-$ *Or* *Unsaturated organic compound.* √1 *(1 mk)*