PRESIDENT'S OFFILE

REGIONAL ADMINISTRATION AND LOCAL GOVERMENT

ARUSHA REGION MOCK EXAMINATION

CHEMISTRY 2A MARKING GUIDE

CamScanner

## TABLE OF RESULTS

| EXPERIMENT NO. | PILOT | 1 | 2 | 3 |
|---|---|---|---|---|
| Final volume ($cm^3$) | 20.20 | 40.20 | 20.20 | 40.10 |
| Initial volume ($cm^3$) | 0.00 | 20.20 | 0.10 | 20.20 |
| Volume used ($cm^3$) | 20.20 | 20.00 | 20.10 | 19.90 |

T = 02
D = 01
A = 02
(5)

Volume of pipette used = $20cm^3$ 01

Average volume = $\left(\frac{V_1 + V_2 + V_3}{3}\right) cm^3$

$= \frac{20.00 + 20.10 + 1990}{3}$

∴ Average volume = $20.00cm^3$ 01

a) $20.00cm^3$ of acid R was required to neutralize $20.00\ cm^3$ of the base S 01

b) Yellow to red/Pink/orange 01

c) Conc. of R in $mol/dm^3$

Conc. of R = $\frac{mass\ (g)}{Volume\ (dm^3)}$ 01

$= \frac{3.65g}{1dm^3}$

$= 3.65\ g/dm^3$ 01

Then molarity = $\frac{Conc.\ (g/dm^3)}{Molar\ mass}$

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$$= \frac{3.65\ g/dm^3}{36.5\ g/mol}$$

$$= 0.1\ mol//dm^3$$ 01

d) $X_2CO_{3(aq)} + 2HCL_{(aq)} \rightarrow 2XCL_{(aq)} + CO_{2(g)} + H_2O_{(l)}$ 1 Mark

IONIC EQUATIONS

$X_2CO_{3(aq)} + 2HCL_{(aq)} \longrightarrow 2XCL_{(aq)} + CO_{2(g)} + H_2O_{(l)}$ ½

$2X^+_{(aq)}CO^{2-}_{3(aq)} + 2H^+_{(aq)}CL^-_{(aq)} \rightarrow 2X^+_{(aq)}2CL^-_{aq} + CO_{2(g)} + H_2O_{(l)}$ ½

$$CO^{2-}_{3(aq)} + 2H^+_{(aq)} \longrightarrow CO_{2(g)} + H_2O_{(l)}$$ 01

2

e) Data given

Molarity of acid $(Ma) = 0.1\ m$

Volume of acid $(Va) = 20.00 cm^3$

Volume of base $(Vb) = 20.00\ cm^3$

Number of moles of acid $(na) = 2$ 1 Mark

Number of moles of base $(nb) = 1$

Molarity of base $(Mb) = ?$

from

$$\frac{MaVa}{MbVb} = \frac{na}{nb}$$

$$M_b = \frac{M_a V_a n_b}{V_b n_a} \quad \text{---} \quad 01$$

$$= \frac{0.1\,m \times 20.00\,cm^3 \times 1}{20.00\,cm^3 \times 2} \quad 01$$

$$= 0.05\,m$$

∴ Molarity of base = 0.05 m 01

Then

From concentration = $\frac{\text{mass (g)}}{\text{Volume } (dm^3)}$ of Malic

$$= \frac{2.65\,g}{0.5\,dm^3}$$

Concentration of $X_2CO_3 = 5.3\,g/dm^3$ 01

$$\text{Molarity} = \frac{\text{Conc. } (g/dm^3)}{\text{Molar mass } (g/mol)}$$

$$= \frac{5.3\,g/dm^3}{0.05\,mol/dm^3}$$

$$= 106\,g/mol \quad 01$$

∴ The molar mass of $X_2CO_3 = 106\,g/mol$

Then $X_2CO_3 = 106$

$2x + 12 + (16 \times 3) = 106$ 01

$2x + 60 = 106$

$\frac{2x}{2} = \frac{46}{2}$

$X = 23$

Atomic mass of element $X = 23$ 01

Element X is Sodium (Na) 01

r2

a) EFFECTS OF CONCENTRATION ON THE RATE OF CHEMICAL REACTION. 2 marks

b) TABLE OF RESULTS

| EXPERIMENT | E ($cm^3$) | F ($cm^3$) | G ($cm^3$) | Time (S) | 1/t ($sec^{-1}$) |
|---|---|---|---|---|---|
| 1 | 10 | 20 | 0 | 38 | 0.03 |
| 2 | 10 | 15 | 5 | 50 | 0.02 |
| 3 | 10 | 10 | 10 | 88 | 0.01 |
| 4 | 10 | 5 | 15 | 186 | 0.005 |

8 marks

C) 1/t represents the rate of chemical reactions — 1Mark
~~2 marks~~

D) $Na_2S_2O_{3(aq)} + 2HCl_{(aq)} \longrightarrow 2NaCl_{(aq)} + H_2O_{(l)} + S_{(s)} + SO_{2(g)}$ 1Mark

$Na^+_{(aq)} S_2O^{2-}_{3(aq)} + 2H^+_{(aq)} 2Cl^-_{(aq)} \rightarrow 2Na^+ 2Cl^-_{(aq)} + H_2O_{2(l)} + S_{(s)} + SO_{2(g)}$ 1Mark

$S_2O_3^{2-}{}_{(aq)} + 2H^+_{(aq)} \longrightarrow S_{(s)} + SO_{2(g)} + H_2O_{(L)}$ 1M
~~2 marks~~

E) Sulphur precipitates 2 marks

F) i) Manufacture sulphuric acid
ii) Vulcanization of rubber
iii) Manufacture of gunpowder 2 marks
iv) Manufacture of medicine etc

H) Increase the concentration increase the rate of chemical reaction. 2 marks

THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

SUBJECT NAME ..... INDEX NUMBER .....

THE GRAPH OF $\frac{1}{T}(s^{-1})$ AGAINST VOLUME OF $S_2O_3^{2-}$ ($cm^3$) 01 mark

