**WAKISSHA JOINT MOCK EXAMINATIONS** Balikitenda Alex 70

**MARKING GUIDE**

**Uganda Certificate of Education**

**CHEMISRTY 545/2**

1. (a) A mixture of two or more metals. Uniform ✓ Uniform mixture of one metal with one metal or other substances. Usually metals or carbon.

   (b) (i) Aluminium copper and magnesium ✓, Manganese

   (ii) Copper and zinc ✓

   (c) (i) Copper Allow Cu ✓

   (ii) Used in making aircraft ✓ - space satellites - Making bicycle parts - Engine cylinders

   05

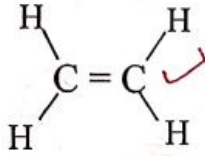
2. (a) By lowering a lighted splint into the gas jar containing the gas. ✓
   It burns with a pop sound. ✓ A lighted splint is lowered into a gas jar containing gas ✓ it burns with a pop sound.

   (b) $Ca_{(s)} + 2H_2O_{(l)} \longrightarrow Ca(OH)_{2(aq)} + H_2(g)$. ✓ Allow exploder.

   (c) Manufacture of Margarine ✓ ~~Hb~~ - Hardening of oil (hydrogenation of oil)

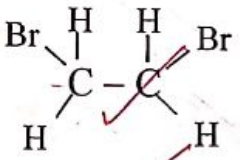
   04

3. (a) (i) Ethene ✓



   or $H_2C{=}CH_2$ Rej: $CH_2{=}CH_2$ ✓

   (b) (i)



   or $H_2C(Br)-CH_2(Br)$ or $\begin{matrix} CH_2Br \\ | \\ CH_2Br \end{matrix}$ ✓

   05

   (ii) To confirm Unsaturation / the presence of a double bond. ✓ Rej Lumine water

   (iii) Acidified Potassium magnate (VII) Solution ✓ Allow ~~Acid~~ Potassium manganate (VII) solution

4. (a) (i)

| | | |
|---|---|---|
| Elements | Mg | N |
| | 0.72 | 1-0.72 = 0.28 |
| Moles | $\frac{0.72}{24}$ | $\frac{0.28}{14}$ ✓ |
| | 0.03 | 0.02 |
| Ratio | $\frac{0.03}{0.02} = 1.5$ | $\frac{0.02}{0.02} = 1$ ✓ |
| | 1.5 x 2=3 | 1 x 2 = 2 ✓ |

   The empirical formula is $Mg_3N_2$ ✓

   06

   (ii) $3Mg_{(s)} + N_{2(g)} \longrightarrow Mg_3N_{2(s)}$ ✓

   (b) (i) Using a wash bottle of concentrated hydrochloric acid, dense white fumes are observed. ✓ ✓



- Using moist red litmus paper, it turns blue.

(ii) Magnesium hydroxide ALLOW $Mg(OH)_2$. ½

5. (a) (i) bubbles of a colourless gas and the solution fade. colourless formed

(ii) $2HOCl_{(aq)} \xrightarrow{light} 2HCl_{(aq)} + O_{2(g)}$

(b) (i) Effervescence Allow bubbles

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

05

6. (a) Sodium sulphate and dilute hydrochloric acid Accept $NaHSO_3$

OR ,, sulphuric acid

(b) (i) $Na_2SO_{3(s)} + H_2SO_{4(aq)} \rightarrow Na_2SO_{4(aq)} + H_2O_{(g)} + SO_{2(g)}$

Allow $SO^{2-}_{3(s)} + 2H^{+}_{(aq)} \rightarrow H_2O_{(g)} + SO_{2(g)}$

04½

(ii) By bubbling the gas through conc. sulphuric acid. Rej Conc

7. (a) (i) Evaporation Rej transpiration

(ii) Condensation precipitation

(iii) $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$

(b) (i) The colour changes from white to blue Allow white powder turns to blue crystals.

(c) (i) Hygroscopic Allow Hygroscopy

(ii) Sulphuric acid Concentrated $CuO, CaCl_2, CuSO_4$(anhydrous), ethanol, $CaO, NaNO_3, KOH, NaOH, P_2O_5, FeCl_3$ Rej formula.

06

8. (a) The amount of product formed per unit time. – Amount of reaction per unit time

(b) - Temperature Decrease in the amount of reactants per unit time. –

- Concentration of the particles/ions/molecules in solution – pressure – catalyst – surface area

(c) (i) Reaction Z

(ii) To speed up the process of decomposition/ provides a surface over which decomposition occurs. – Increases the rate of rxn.

05

9. (a) (i) Reaction in which heat is given off to the surrounding Rxn that proceeds with evolution of heat.

(ii) Cooking – lighting.

(b) (i) Presence of oxygen. or Air

(c) (i) Zinc

(ii) Zinc is more reactive than iron hence prevents oxygen from reacting iron. Zinc is more electropositive than iron.

05

10. (a) (i) To lower the melting point of the electrolyte.

(b) (i) Carbon,(ii) it cannot be attacked by chlorine. or Cannot react with chlorine

(c) $2Cl^{-}_{(aq)} - 2e \rightarrow Cl_{2(g)}$ or $2Cl^{-}_{(l)} \longrightarrow Cl_{2(g)} + 2e$

04½

## SECTION B

11. (a) (i) Sodium stearate. or potassium stearate

(ii) Calcium stearate / Magnesium stearate.

(b) (i) $Ca^{2+}$ and $Mg^{2+}$ ions Accept names.

(ii) $Ca^{2+}_{(aq)} + Na_2Y_{(aq)} \rightarrow CaY_{(s)} + 2Na^{+}_{(aq)}$

Soap (Soap) scum

(c) (i) Sodium Carbonate / Aqueous ammonia, permutit, Calcium hydroxide

(ii) $Na_2CO_{3(aq)} + Ca^{2+}_{(aq)} \rightarrow 2Na^{+}_{(aq)} + CaCO_{3(s)}$ or $Ca^{2+}_{(aq)} + 2St^{-} \rightarrow CaSt_{2(s)}$

$Mg^{2+}_{(aq)} + 2St^{-}_{(aq)} \rightarrow MgSt_{2(s)}$

(d) Soap contains two parts, the polar end and non-polar end, when soap is added to water, the polar part dissolves in water while the non-polar floats on the water surface. When the greasy fabric is put into a soap solution, the non- polar of soap enters the grease. In the process, the grease is broken into small particles and carried off into the solution. 15

(e) (i) Contains Calcium for teeth and bone development. -prevent lead poisoning

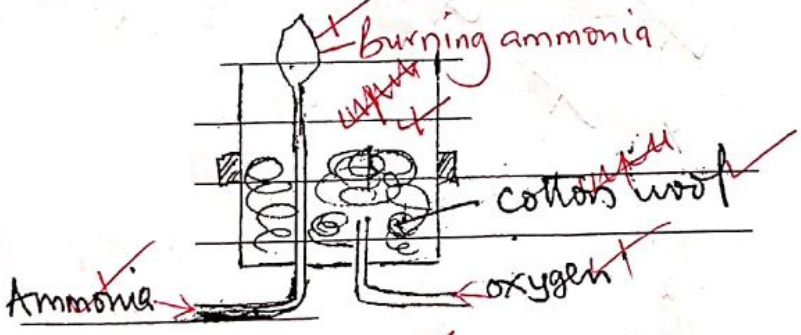
(ii) It waste soap. used in formation of shells in marine animals.

-Formation of scum, -formation of fur in Kettles.

12. (a) Ammonia is manufactured through direct combination of nitrogen and hydrogen in the ratio of 1:3 respectively. The two gases are made to react at a temperature of $450^0C$ to $500^0C$ and a pressure of 250 atmosphere in the presence of iron as a catalyst.

$3H_{2(g)} + N_{2(g)} \rightleftharpoons 2NH_{3(g)}$

(b) (i)




15

(ii) $4NH_{3(g)} + 3O_{2(g)} \rightarrow 2N_{2(g)} + 6H_2O_{(l)}$

(c) Dissolve the copper (II) sulphate in water and divide the resultant solution into 2. To the first portion add aqueous ammonia drop wise until in excess, a blue precipitate which dissolves to form a deep blue solution confirms the presence of copper (II) ions.

To the second portion add nitric acid followed by barium nitrate solution, a white precipitate confirms the presence of the sulphate ions.

13. (a) The heat change when one mole of $H^+$ ions react with 1 mole of $OH^-$ ions to form 1 mole of water.

(b) (i) On Graph paper

(ii) $1000cm^3$ of solution contains 2 moles of NaOH

$\therefore 50cm^3$ of solution contained $\frac{50 \times 2}{1000} = 0.1$ moles.

(iii) $50cm^3$

(c) $NaOH_{(aq)} + HCl_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$

The mole ratio as per the equation is
$1HCl : 1NaOH$.
Therefore moles of HCl that reacted = 0.1 moles
But 50 $cm^3$ of the solution had 0.1 moles of HCl
$\therefore 1000cm^3$ of the solution will contain.

$$\frac{1000 \times 0.1}{50} = 2M$$

$\therefore$ The molarity of $HCl$ is 2 moles/$dm^3$

From the graph, 0.1 moles are neutralized with the production of 5.6kJ of heat.

$\therefore$ If 1 mole is neutralized then $\left(\frac{5.6 \times 1}{0.1}\right)$kJ moles.
will be produced = 56KJ/ mole.

14. (a) Place Potassium manganite (VII) crystals in a flat bottomed flask fitted with a delivery tube. Add concentrated hydrochloric acid by means of a funnel. Effervescences occurs and the gas is given off by the equation.

$2KMnO_{4(s)} + 16HCl_{(aq)} \rightarrow 2KCl_{(aq)} + 2MnCl_{2(aq)} + 5Cl_{2(g)} + 8H_2O_{(l)}$

The gas is passed through a wash bottle containing water to remove acid spray.
Pass the gas through concentrated sulphuric acid to dry collect the gas by downward delivery.

(b) (i) The colourless solution turns red due to the displacement of Bromine.

$2KBr_{(aq)} + Cl_{2(g)} \rightarrow 2KCl_{(aq)} + Br_{2(l)}$

(ii) When chlorine is bubbled through water, it forms ~~two acids~~ The greenish yellow gas dissolves a pale yellow solution

$H_2O_{(l)} + Cl_{2(g)} \rightarrow HOCl_{(aq)} + HCl_{(aq)}$

The hypochlorous acid is unstable therefore it bleaches the flower, hence the blue colour of the flower turns colourless. bleaching of the flower occurs.

$HOCl_{(aq)} + dye \rightarrow HCl_{(aq)} + (dye+O)_{(s)}$

(iii) The grey Iron glows red hot and Iron reacts with chlorine forming Iron (III) Chloride ~~forming chloride~~ which appears as black crystals.

$2Fe_{(s)} + 3Cl_{2(g)} \rightarrow 2FeCl_{3(s)}$

**END**

15

15

(ii) A Graph of heat change against the volume of hydrochloric acid