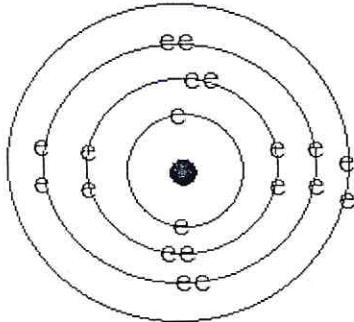


CHEMISTRY I MARKING SCHEME, 2016

SECTION A:

<p>1. a) - Water/moisture - Oxygen/air</p> <p>b) - Painting iron objects - Galvanization of iron (Coating with zinc) - Alloying - Greasing</p>	<p>2. a) Rain, Lakes, Rivers, Surface water, ocean, water cycle.</p> <p>b) - A flocculant such as $\text{Al}(\text{SO}_4)_3$ is put in unclean water to precipitate solid mud particles. - The water is kept in a vessel for decantation - Simple distillation to get pure water - Screening followed by decantation/filtration.</p>
<p>3. a) $100\text{cm}^3 = 0.1\text{dm}^3$ Number of moles = $0.5\text{mol dm}^{-3} \times 0.1\text{dm}^3$ = 0.05 moles</p> <p>b) $\text{H}_2\text{SO}_{4(\text{aq})} + 2\text{NaOH}_{(\text{aq})} \rightarrow \text{Na}_2\text{SO}_{4(\text{aq})} + 2\text{H}_2\text{O}_{(\text{aq})}$ Mass of $\text{Na}_2\text{SO}_4 = \frac{142\text{g} \times 0.05\text{mol}}{2\text{mol}} = 3.55\text{g}$</p>	<p>4. a) An hydrous cobalt chloride paper (blue in color) which turns pink.</p> <p>b) 20.95%.</p> <p>5. a) The Ozone layer absorbs ultra-violet light of the sun and prevents them from arriving on earth to cause cancer to humans.</p> <p>b) Chloro fluoro carbons</p>
<p>6. a) Calcium atom representation</p>  <p>b) $\text{Ca}_{(\text{s})} + \frac{1}{2}\text{O}_{2(\text{g})} \rightarrow \text{CaO}_{(\text{s})}$</p>	<p>7. a) $\text{Na} \rightarrow \text{Na}^+ + e^-$ $\text{S} + 2e^- \rightarrow \text{S}^{2-}$ $\text{Na}^+ + \text{S}^{2-}$ $\text{Na}^+ + \text{S}^{2-} \rightarrow \text{Na}_2\text{S}$ $2\text{Na}^+ + \text{S}^{2-} \rightarrow \text{Na}_2\text{S}$</p> <p>b) Physical property of Na_2S: Has a high boiling point/melting point, solid at room temperature, conducts electricity in molten/aqueous solution.</p> <p>Chemical property of Na_2S: It reacts with water/acids</p>
<p>8. a) - Evolution of colorless gas. - Heat is liberated (evolved) during the reaction.</p> <p>b) $\text{Ca}_{(\text{s})} + 2\text{H}_2\text{O}_{(\text{l})} \rightarrow \text{Ca}(\text{OH})_{2(\text{aq})} + \text{H}_{2(\text{g})}$</p>	<p>9. a) Copper has a higher melting point than Mg.</p> <p>b) Copper has a higher density than Mg.</p> <p>c) Copper is brownish red while Mg is white in color.</p>
<p>10. a) The blue litmus paper turns red.</p> <p>b) Equation of reaction: $\text{SO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_3$</p>	<p>12. a) $\text{C}_4\text{H}_{10} + 13\text{O}_2 \rightarrow 4\text{CO}_2 + 5\text{H}_2\text{O}$</p> <p>b) - Domestic heating - Used in the manufacture of perfumes - used as a natural gas - Used as petrol - Solvent extraction - Used in making basins, plastics e.g. tanks</p>
<p>11. a) Reagent: Lead nitrate solution Observation: When H_2S is bubbled in lead nitrate solution, a black precipitate is formed. There is no black precipitate formed when SO_2 is used.</p> <p>b) Reagent: Ammonia solution Observation: $\text{Cu}(\text{NO}_3)_2$ forms a deep blue precipitate when ammonia solution is added to it. $\text{Fe}(\text{NO}_3)_2$ forms a greenish precipitate when ammonia solution is added to it.</p>	

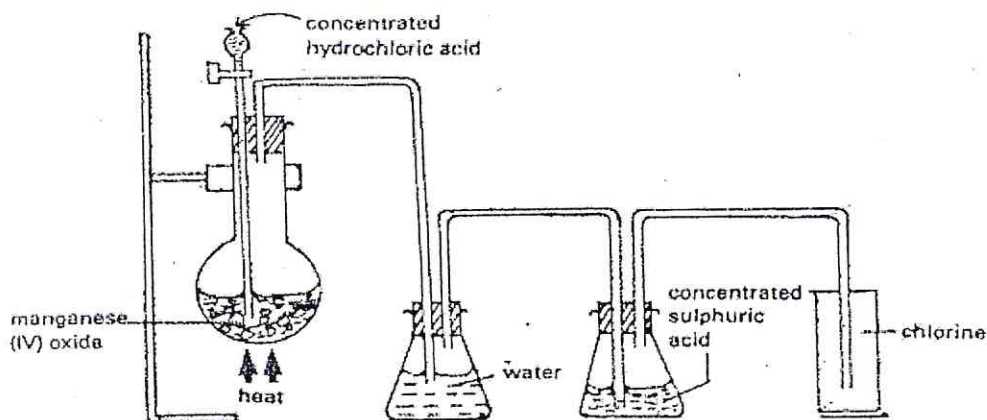
<p>13.</p> <p>a) Silicon dioxide forms a giant structure with covalent bonds. There are no mobile electrons in the structure.</p> <p>b) Silicon dioxide forms a giant structure with covalent bonds. The covalent bonds are continuous to form a macromolecule that is hard.</p>	<p>14. a) Number of moles of Mg in 3g = $\frac{m}{mm} = \frac{3}{24}$</p> <p>= 0.125 moles</p> <p>b) Number of moles of H₂SO₄ = n mg reacted</p> <p>n H₂SO₄ = 0.125 moles</p> <p>$m = \frac{n}{v}$; $v = \frac{0.125}{0.5} = 0.25\text{dm}^3$</p>
<p>15. a) NH₃(aq)</p> <p>b) A strong acid dissociates completely while a weak acid dissociates partially in water to give H⁺ ions.</p>	

SECTION B:

<p>16. a) Number of moles of H₂ gas produced:</p> $\frac{400\text{cm}^3}{2400\text{cm}^3} = 0.0166 \text{ moles}$ <p>b) According to the equation, number of moles H₂ produced = number of moles of zinc that reacted = 0.0166 moles.</p> <p>c) Mass of ZnO in the mixture:</p> $= n \times \text{R.A.M}$ $= 0.0166 \times 65$ $= 1.079\text{g}$ <p>d) $2 - 1.079\text{g}$</p> $= 0.921\text{g}$ <p>e) % composition of ZnO in the mixture</p> $= \frac{0.921}{2} \times 100 = 46.05\%$	<p>17. a) $\text{CuO}_{(s)} + \text{H}_2(g) \rightarrow \text{Cu}_{(s)} + \text{H}_2\text{O}_{(l)}$</p> <p>b) Black color of CuO changes to brownish red color of Cu</p> <p>c) To remove water vapour/to dry the evolved gas mixture.</p> <p>d) i) H₂ is less dense than air</p> <p>ii) A burning splint. H₂ burns to make a pop sound.</p> <p>e) $\text{CuO}_{(s)} + \text{C} \rightarrow \text{Cu}_{(s)} + \text{CO}$</p>
<p>18. a) i) To dry the gas mixture.</p> <p>ii) Upward or downward displacement of air.</p> <p>iii) NH_3 and $\text{H}_2\text{SO}_4 \rightarrow (\text{NH}_4)_2\text{SO}_4$</p> <p>iv) - NH₃ is used to produce fertilizers</p> <p>- NH₃ is used to manufacture polymer materials.</p> <p>- Used to manufacture refrigerators.</p> <p>b) i) $2\text{HNO}_3(\text{aq}) + \text{Ca}(\text{OH})_2(\text{aq}) \rightarrow \text{Ca}(\text{NO}_3)_2(\text{aq}) + \text{H}_2\text{O}_{(l)}$</p> <p>ii) - Chemical fertilizers can pollute water in oceans/lakes so aquatic animals and plants lack respiration</p> <p>- Eutrophication</p> <p>c) 78.084% or 78%</p>	
<p>19.</p> <p>a) 2: 6</p> <p>b) $\text{Li} \rightarrow \text{Li}^+ + \bar{e}$</p> <p>c) $\text{Al} \rightarrow \text{Al}^{3+} + 3\bar{e}$; $\text{Cl} + \bar{e} \rightarrow \text{Cl}^-$, By exchange of valency number of charges</p> <p>Al³⁺ reacts with 3Cl⁻, so the formula is AlCl₃.</p>	

- d) - The compound has a low melting point
 - The compound does not conduct electricity
- e) - To manufacture fertilizers, dyes, explosives, nitric acid and nylon.
 - Used to conserve sperms and as a refrigerant in storage of livestock semen.
- f) - It does not undergo corrosion on exposure to water and other substances
 - It is lighter than other metal conductors of electricity

20. a)



b) - The red litmus paper does not change the red color. After a long exposure to chlorine gas, the red color discharges and the paper becomes white.

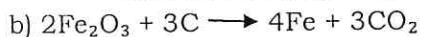


ii) Chlorine is used to disinfect, in treatment of plants, as a bleaching agent, used in the manufacture of insecticides, kills cholera, typhoid and other dangerous germs.

SECTION C

21. a) i) Graphite:
- Conducts electricity
 - Is soft
 - Is black
 - Conducts heat
 - Is greasy in texture
 - Has a very high melting point (3730°C) and boiling point of 4830°C

- ii) Diamond:
- Is hard
 - Has a high melting point
 - Does not conduct electricity
 - Is colorless/transparent
 - Has a tetrahedral structure
 - Has a density of 3.5g.



- c) i) Uses of Graphite
- Used to make pencils
 - Used as a lubricant
 - Used as electrodes in electrolysis
 - Used to make strong fibre for reinforcing
 - Used as a moderator in nuclear piles to slow down the reaction in order not to explode

- Uses of Diamond
- Used to cut metals
 - Glass cutter
 - Drilling devices
 - As an abrasive for smoothening hard material
 - In jewellery

- d) i) - Used in soft drinks/fizzy drinks
- Used in fire extinguishers
 - Used as a refrigerant
 - Used in baking
 - Used in Photosynthesis

ii) Use of CO

- Used to reduce Iron oxide during the extraction of iron.

- Used to prepare CO_2
- Used as a fuel
- Formation of the ozone layer

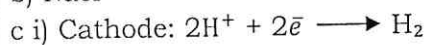
- Danger of CO
- Poisonous to humans when inhaled
- e) Planting trees, reduce emission of CO_2 in industries, dissolving CO_2 in water bodies like oceans, lakes etc., use it as a renewable source of energy.



- ii) - Boil the hard water
- Use of washing soda $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
- Use of $\text{NH}_3(\text{aq})$
- Ion exchange
- Distillation

22. a) Electrolyte is a substance that dissociates into ions when it is in a certain medium solution (aqueous) or molten state

b) NaCl



- ii) Test for gas B: Use a burning splint
Observation: The gas burns with a pop sound.

- d) i) - The anode reduces in size
- The cathode increases in size.

- ii) - Extraction of metals
- Production of chlorine and sodium hydroxide
- Purification of copper
- Used in electroplating

e) i) Zinc will act as the anode

ii) Reagent: NH_3 solution

Observation: CuSO_4 turns into blue precipitate that becomes deep blue in excess ammonia solution.

Zinc Sulphate: turns white precipitate that becomes a colorless solution in NH_3 solution.

END