



END OF YEAR MOCK EXAMINATION

SECONDARY THREE

PURE CHEMISTRY (ANSWER KEY)

Paper 1

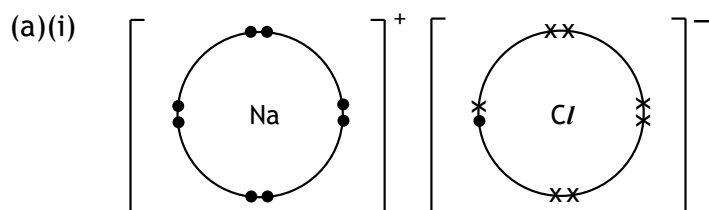
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Paper 2

Question 1

- (a) AgNO_3 , MgSO_4 (any one)
- (b) Pb
- (c)(i) AgNO_3 and NaCl
- (c)(ii) $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{AgCl}(\text{s})$

Question 2



- (a)(ii) NaCl exists as a giant ionic lattice with strong electrostatic forces between Na^+ and Cl^- ions while Cl_2 has a simple molecular structure, where there are weak intermolecular forces of attraction between Cl_2 molecules. [1]

More energy is required to overcome the strong ionic bonds in sodium chloride than the weak intermolecular forces of attraction between Cl_2 molecules. [1]

- (b) Ionic compounds conduct electricity in aqueous state, whereas covalent compounds do not. A circuit is set up using 2 carbon electrodes (or any other inert electrode) dipped in the respective solutions. The electrodes are then connected to a battery and a light bulb/ammeter. [1]

In an ionic compound, the free-moving ions act as mobile charge carriers, and the bulb will light up. [1]

In a covalent compound, there are no free-moving electrons or ions to act as mobile charge carriers to help conduct electricity and the bulb will not light up. [1]

Question 3

- (a) A: Fe/ iron
B: $\text{Fe}(\text{NO}_3)_2$ / iron(II) nitrate
C: Cu / copper
D: $\text{Fe}(\text{OH})_2$ / iron(II) hydroxide
- (b) $\text{Fe}(\text{s}) + 2\text{H}^+(\text{aq}) \rightarrow \text{Fe}^{2+}(\text{aq}) + \text{H}_2(\text{g})$
- (c) Green precipitate turns red-brown when left to stand.

Question 4

- (a) MnO_4^- : +7
 MnO_4^{2-} : +6
- (b)(i) $\text{Mn}(\text{NO}_3)_2 \rightarrow \text{MnO}_2 + 2\text{NO}_2$
- (b)(ii) Light pink solid turns brown.

Question 5

- (a) 11.8 %
- (b)(i) $\text{NH}_3(\text{aq}) + \text{H}_2\text{O}(\text{l}) \rightleftharpoons \text{NH}_4^+(\text{aq}) + \text{OH}^-(\text{aq})$
- (b)(ii) It conducts electricity as it contains free-moving NH_4^+ and OH^- ions, that act as mobile charge carriers.
- (c) 21.2 %
- (d)(i) CO_3^{2-}
- (d)(ii) The reaction of aqueous barium chloride forms either barium sulfate or barium carbonate precipitate. Since the precipitate dissolves [1] after the addition of dilute nitric acid, it shows that the precipitate is barium carbonate; and hence the contaminant contains carbonate ions [1].