Metallic Bonding - Questions by Topic

Q1.

Metallic bonding is the strong electrostatic attraction between

☒ **A** anions and cations

☒ **B** atoms and delocalised electrons

☒ **C** ions and delocalised electrons

☒ **D** two nuclei and a shared pair of electrons

(Total for question = 1 mark)

Q2.

Magnesium is a metal in Group 2 of the Periodic Table. It reacts with chlorine to form the salt magnesium chloride, $MgCl_2$.

(a) Draw a dot-and-cross diagram for magnesium chloride.

Show outer shell electrons only.

(1)

(b) Magnesium conducts electricity when it is in the solid state. Magnesium chloride conducts electricity when it is molten or dissolved in water but not when it is in the solid state.

Explain these observations.

(3)

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(c) Magnesium chloride can also be made by reacting magnesium oxide with dilute hydrochloric acid.

$$MgO(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2O(l)$$

(i) Write the **ionic** equation, including state symbols, for this reaction.

(1)

(ii) Calculate the minimum volume of 2.00 mol dm^{-3} hydrochloric acid needed to completely react with 2.45 g of magnesium oxide.

(3)

Minimum volume of hydrochloric acid = ... cm^3

(d) A further method for making magnesium chloride is by reacting magnesium carbonate with dilute hydrochloric acid.

$$MgCO_3(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2O(l) + CO_2(g)$$

Calculate the maximum mass of magnesium chloride that could be formed when 2.25 g of magnesium carbonate is added to excess dilute hydrochloric acid.

(2)

Maximum mass magnesium chloride = ... g

(e) Explain why the reaction to make magnesium chloride from magnesium oxide has a higher atom economy than the reaction using magnesium carbonate.

No calculation is required.

(2)

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(Total for question = 12 marks)