

Electrolysis [S]

1. The electrolysis of a molten binary salt produces its constituent elements.

a. Define the term *electrolysis*: [2]

b. The electrolysis of molten iron(III) chloride produces elemental iron and chlorine.

i. Write a balanced equation, including state symbols, for the overall process: [3]

ii. Write the half-equation for the anode: [3]

iii. Write the half-equation for the cathode: [3]

2. Fill in the following table for the electrolysis of some molten salts: [28]

Salt	Products Formulae	Half-equations
NaCl		Anode:
		Cathode:
MgBr ₂		Anode:
		Cathode:
FeO		Anode:
		Cathode:
PbCl ₂		Anode:
		Cathode:

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a. Define the term *electrolysis*: [2]

breaking down of a compound [1]

using electricity [1]

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Salt	Products Formulae	Half-equations
NaCl	Na [1] and Cl ₂ [1]	Anode: $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$ [formulae, balance, charges]
		Cathode: $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$ [formulae, balance, charges]
MgBr ₂	Mg [1] and Br ₂ [1]	Anode: $2\text{Br}^- \rightarrow \text{Br}_2 + 2\text{e}^-$ [formulae, balance, charges]
		Cathode: $\text{Mg}^{2+} + 2\text{e}^- \rightarrow \text{Mg}$ [formulae, balance, charges]
FeO	Fe [1] and O ₂ [1]	Anode: $2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$ [formulae, balance, charges]
		Cathode: $\text{Fe}^{2+} + 2\text{e}^- \rightarrow \text{Fe}$ [formulae, balance, charges]
PbCl ₂	Pb [1] and Cl ₂ [1]	Anode: $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$ [formulae, balance, charges]
		Cathode: $\text{Pb}^{2+} + 2\text{e}^- \rightarrow \text{Pb}$ [formulae, balance, charges]