



ATOM ECONOMY

- 1 Calculate the atom economy to form copper(II) oxide from copper(II) carbonate. $\text{CuCO}_3 \rightarrow \text{CuO} + \text{CO}_2$

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- 2 Calculate the atom economy to form aluminium from aluminium oxide. $2\text{Al}_2\text{O}_3 \rightarrow 4\text{Al} + 3\text{O}_2$

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- 3 Calculate the atom economy to form iron from iron oxide. $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$

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- 4 Calculate the atom economy to form aluminium chloride from aluminium in this reaction. $2\text{Al} + 3\text{Cl}_2 \rightarrow 2\text{AlCl}_3$

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- 5 Calculate the atom economy to form oxygen from hydrogen peroxide. $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$

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6 Hydrogen (H₂) has many uses, including as the fuel in many fuel cells. It can be made in several ways.

a) Calculate the atom economy to form hydrogen by **method 1**. $\text{CO} + \text{H}_2\text{O} \rightarrow \text{CO}_2 + \text{H}_2$

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b) Calculate the atom economy to form hydrogen by **method 2**. $\text{CH}_4 + 2\text{H}_2\text{O} \rightarrow \text{CO}_2 + 4\text{H}_2$

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c) When choosing which method to use, one factor to consider is the atom economy. In terms of atom economy, which method is preferable. Explain your answer.

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d) Identify five other factors, besides atom economy, that should be considered when choosing whether to use **method 1** or **method 2** to make hydrogen.

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- 3
- 4
- 5

7 Calculate the atom economy to form ethene (C₂H₄) from cracking decane (C₁₀H₂₂), $\text{C}_{10}\text{H}_{22} \rightarrow \text{C}_4\text{H}_{10} + 3\text{C}_2\text{H}_4$

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Area	Strength	To develop	Area	Strength	To develop	Area	Strength	To develop
Done with care and thoroughness			Can work out % atom economy			Importance of high atom economy		
Shows suitable working			Can spot 100% atom economy			Aware of other factors		