

Reaction Stoichiometry and Gas Curves

<https://gemini.google.com/app/fbf993cb40696834>

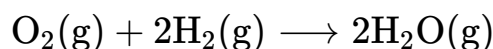
Response: To determine which curve corresponds to $\text{O}_2(\text{g})$, $\text{H}_2(\text{g})$, and $\text{H}_2\text{O}(\text{g})$, we analyze the stoichiometry and initial/final concentrations from the graph:

1. Identifying the Product, $\text{H}_2\text{O}(\text{g})$:

- At $t = 0$, the concentration of curve **A** starts at 0 mol dm^{-3} and increases over time.
- Therefore, curve **A** represents the product, $\text{H}_2\text{O}(\text{g})$.
- The concentration of $\text{H}_2\text{O}(\text{g})$ reaches 2 mol dm^{-3} when the reaction finishes.

2. Identifying the Reactants, $\text{O}_2(\text{g})$ and $\text{H}_2(\text{g})$:

- Both curves **B** and **C** start at an initial concentration of 2 mol dm^{-3} .
- Based on the stoichiometry of the reaction:



To form 2 mol dm^{-3} of $\text{H}_2\text{O}(\text{g})$:

- $\Delta[\text{H}_2] = -2 \text{ mol dm}^{-3}$
- $\Delta[\text{O}_2] = -1 \text{ mol dm}^{-3}$
- **For $\text{H}_2(\text{g})$:**
 - Initial concentration = 2 mol dm^{-3}
 - Final concentration = $2 - 2 = 0 \text{ mol dm}^{-3}$
 - Curve **B** starts at 2 and decreases to 0 mol dm^{-3} , so curve **B** represents $\text{H}_2(\text{g})$.
- **For $\text{O}_2(\text{g})$:**
 - Initial concentration = 2 mol dm^{-3}
 - Final concentration = $2 - 1 = 1 \text{ mol dm}^{-3}$
 - Curve **C** starts at 2 and decreases to 1 mol dm^{-3} , so curve **C** represents $\text{O}_2(\text{g})$.

3. Conclusion:

- $\text{O}_2(\text{g}) \rightarrow \mathbf{C}$
- $\text{H}_2(\text{g}) \rightarrow \mathbf{B}$
- $\text{H}_2\text{O}(\text{g}) \rightarrow \mathbf{A}$

The correct representation of $\text{O}_2(\text{g})$, $\text{H}_2(\text{g})$, and $\text{H}_2\text{O}(\text{g})$ respectively is **C, B, A**.

Correct Option: (5)
