

Representing chemical reactions

Learning objectives

- 1 Recall the definitions of reactants and products.
- 2 Compare and contrast the features of word and symbol equations.
- 3 Interpret chemical formulas to balance symbol equations.

Introduction

Chemical reactions can be represented using word equations or balanced symbol equations. Word equations show the names of the reactants and the products separated by an arrow. Balanced symbol equations give more detail, showing the reactants and products, how they are bonded together and how mass is conserved by balancing the equation. Symbol equations also give detail about whether a substance is a solid, liquid, gas or is in solution (aqueous) through the presence of state symbols: (s), (l), (g) or (aq).

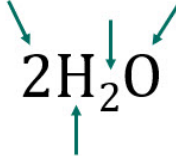
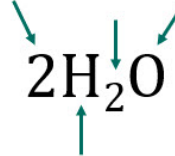
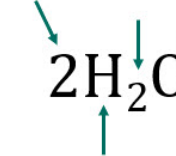
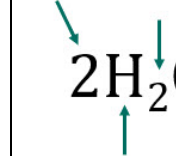
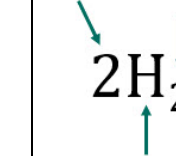
Instructions

1. Stick the structure strip in the margin of your exercise book/paper.
2. Follow the prompts in the structure strip and use your knowledge to write a summary of representing chemical reactions. Reflect on what you already know about representing chemical reactions. Where have you seen the key words before? If you'd like more support, what other sources could you use to find the information, e.g. a textbook, online?
3. Answer the extension question to apply your knowledge of representing chemical reactions to a new context. You could use examples from everyday life.

Key words

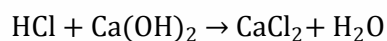
Use these key words and phrases in your responses:

- balanced symbol equation • word equation • reactants • products • chemical formula • conservation of mass • balancing number
- Balancing number: a number added before the formula of a compound to ensure that the equation follows the law of conservation of mass.
- Conservation of mass: no atoms are lost or made during a chemical reaction, so the total mass of products equals the total mass of reactants.

Structure strip Representing chemical reactions	Structure strip Representing chemical reactions	Structure strip Representing chemical reactions	Structure strip Representing chemical reactions	Structure strip Representing chemical reactions
Define the terms 'reactants' and 'products' in a chemical equation.	Define the terms 'reactants' and 'products' in a chemical equation.	Define the terms 'reactants' and 'products' in a chemical equation.	Define the terms 'reactants' and 'products' in a chemical equation.	Define the terms 'reactants' and 'products' in a chemical equation.
Explain why symbol equations must be balanced. Use the key words above to support your answer.	Explain why symbol equations must be balanced. Use the key words above to support your answer.	Explain why symbol equations must be balanced. Use the key words above to support your answer.	Explain why symbol equations must be balanced. Use the key words above to support your answer.	Explain why symbol equations must be balanced. Use the key words above to support your answer.
Both word equations and symbol equations can be used to represent chemical reactions. Compare the equations below. What information does each equation give you? copper carbonate → copper oxide + carbon dioxide $\text{CuCO}_3(\text{s}) \rightarrow \text{CuO}(\text{s}) + \text{CO}_2(\text{g})$	Both word equations and symbol equations can be used to represent chemical reactions. Compare the equations below. What information does each equation give you? copper carbonate → copper oxide + carbon dioxide $\text{CuCO}_3(\text{s}) \rightarrow \text{CuO}(\text{s}) + \text{CO}_2(\text{g})$	Both word equations and symbol equations can be used to represent chemical reactions. Compare the equations below. What information does each equation give you? copper carbonate → copper oxide + carbon dioxide $\text{CuCO}_3(\text{s}) \rightarrow \text{CuO}(\text{s}) + \text{CO}_2(\text{g})$	Both word equations and symbol equations can be used to represent chemical reactions. Compare the equations below. What information does each equation give you? copper carbonate → copper oxide + carbon dioxide $\text{CuCO}_3(\text{s}) \rightarrow \text{CuO}(\text{s}) + \text{CO}_2(\text{g})$	Both word equations and symbol equations can be used to represent chemical reactions. Compare the equations below. What information does each equation give you? copper carbonate → copper oxide + carbon dioxide $\text{CuCO}_3(\text{s}) \rightarrow \text{CuO}(\text{s}) + \text{CO}_2(\text{g})$
Part of a balanced symbol equation is shown below. Describe what this tells you, using the arrows to guide you. 	Part of a balanced symbol equation is shown below. Describe what this tells you, using the arrows to guide you. 	Part of a balanced symbol equation is shown below. Describe what this tells you, using the arrows to guide you. 	Part of a balanced symbol equation is shown below. Describe what this tells you, using the arrows to guide you. 	Part of a balanced symbol equation is shown below. Describe what this tells you, using the arrows to guide you. 

Extension question

A learner is trying to balance a chemical equation, but they have made a mistake in their working. They have been using a tally chart to help them work out the number of atoms of the reactants and products in the equation. The reactants and products are hydrogen, chlorine, calcium and oxygen. The learner has incorrectly balanced the equation:



Here is their tallied working:

Element	Reactants	Products
H	III	II
Cl	I	II
Ca	II	I
O	II	I

Look carefully at the equation and tally chart. What mistake has the learner made? Write an explanation about where they went wrong and correct the equation.