Your notes

KS3 Science: revision notes

C2.2 Changing substances

Contents

1. Physical and chemical changes
2. Conservation of mass and equations
3. Oxidation and reduction
4. Acids with metals, and testing for gases
5. Key terms
6. Quick questions
7. What to do next

Physical and chemical changes

- In a **physical change**, no new substance is made and the change is usually easy to reverse (melting, dissolving).
- In a **chemical change**, new substances are made and it is usually hard to reverse (burning, rusting, cooking).
- Signs of a chemical reaction: a colour change, fizzing (a gas is made), a temperature change, a solid forming in a liquid (a **precipitate**), light, or a smell.

Conservation of mass and equations

- Atoms aren't created or destroyed in a reaction, only rearranged. So the total mass of the **reactants** equals the total mass of the **products**.
- If a gas escapes from an open container, the mass seems to go down; if a substance gains oxygen from the air, the mass goes up.
- A **word equation** shows **reactants** → **products**: magnesium + oxygen → magnesium oxide.
- A balanced symbol equation has the same number of each type of atom on both sides: $2Mg + O_2 \rightarrow 2MgO$. To balance an equation, change the big numbers in front of the formulae, never the small numbers inside them.

Oxidation and reduction

- **Oxidation** is gaining oxygen, as in burning (**combustion**) and rusting. **Reduction** is losing oxygen.
- Magnesium burns with a bright white flame to make magnesium oxide, a white powder. Its mass increases because it gains oxygen.
- Burning a fuel: fuel + oxygen → carbon dioxide + water.
- Carbon can remove oxygen from some metal oxides: iron oxide + carbon → iron + carbon dioxide. The iron oxide is reduced.

Acids with metals, and testing for gases

- Acid + metal → salt + hydrogen. For example, magnesium + hydrochloric acid → magnesium chloride + hydrogen.
- Hydrogen: a lit splint makes a squeaky pop.
- Oxygen: it relights a glowing splint.
- Carbon dioxide: it turns limewater milky.

Key terms

Physical change	A change where no new substance is made.
Chemical change	A change where new substances are made.
Reactant	A substance that reacts at the start of a reaction.
Product	A substance made in a reaction.
Conservation of mass	The total mass stays the same in a reaction.
Word equation	An equation that shows the names of the reactants and products.
Balanced equation	A symbol equation with the same number of each atom on both sides.
Oxidation	Gaining oxygen.
Reduction	Losing oxygen.
Combustion	Burning a substance in oxygen.
Precipitate	A solid that forms when two solutions react.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Which of these is a chemical change?
2. Which of these is a sign of a chemical reaction?
3. 12 g of magnesium reacts with 8 g of oxygen. What mass of magnesium oxide is made?
4. What is conservation of mass?
5. When magnesium burns in an open crucible, why does its mass increase?
6. What is the test for hydrogen?
7. What is the test for oxygen?
8. What is made when magnesium reacts with hydrochloric acid?

Answers

1. Burning wood
2. Bubbles of gas are given off
3. 20 g
4. The total mass of the reactants equals the total mass of the products

Your notes

5. It gains oxygen from the air
6. A lit splint makes a squeaky pop
7. It relights a glowing splint
8. Magnesium chloride and hydrogen

What to do next

Practise 14 questions on this topic

Try 4 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

Your notes