

Chemical Reactions

Reactants and products, types of reaction, conservation of mass and balancing equations.

Name _____ Date _____ Class _____

Learning objective: I can describe chemical reactions using word equations and conservation of mass.

✓ I can spot a chemical change ✓ I can name types of reaction ✓ I can use conservation of mass

1 Key ideas Use the word bank.

Word bank:

gas

melted

endothermic

rearranged

reactants

exothermic

products

- 1 In a chemical reaction the starting substances are called _____ and the new substances are called _____.
- 2 In a reaction, atoms are _____, not created or destroyed.
- 3 Signs of a reaction include a colour change, fizzing (a _____ given off) or a change in temperature.
- 4 A reaction that gives out heat is _____; one that takes in heat is _____.

2 Chemical or physical change? Tick **chemical** if a new substance is made, or **physical** if not.

	CHEMICAL	PHYSICAL
1 Ice melting	☐	☐
2 A candle burning	☐	☐
3 Iron rusting	☐	☐
4 Salt dissolving in water	☐	☐
5 Baking a cake	☐	☐
6 Water boiling	☐	☐
7 Magnesium burning in air	☐	☐

Chemical Reactions

3 Types of reaction Match each reaction type to an example.

1 combustion

☐

A magnesium + copper sulfate → magnesium sulfate + copper

2 oxidation

☐

B hydrochloric acid + sodium hydroxide → sodium chloride + water

3 thermal decomposition

☐

C methane + oxygen → carbon dioxide + water

4 displacement

☐

D copper carbonate → copper oxide + carbon dioxide

5 neutralisation

☐

E iron + oxygen → iron oxide

Conservation of mass: the total mass of the products equals the total mass of the reactants.

4 Mass calculations Show your working.

1 4.8 g of magnesium reacts with 3.2 g of oxygen. Mass of magnesium oxide = ? [1 mark]

2 12.8 g of copper reacts with 3.2 g of oxygen. Mass of copper oxide = ? [1 mark]

3 11.2 g of iron reacts with 6.4 g of sulfur. Mass of iron sulfide = ? [1 mark]

4 Calcium carbonate (10.0 g) is heated in an open tube. Afterwards, 5.6 g of calcium oxide is left. What mass of carbon dioxide escaped? [1 mark]

Chemical Reactions

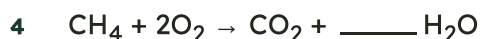
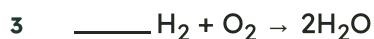
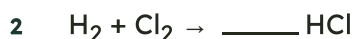
5 Explain it

- 1 When magnesium burns in an open crucible, the mass of solid goes **up**. Explain why. [2 marks]

- 2 A student says, 'Mass is lost when wood burns because the ash is lighter.' Explain why mass is not really lost. [2 marks]

6 Balance the equations (Year 9)

Write the missing number so there are the same number of each type of atom on both sides.



7 Describe

Describe **three** things you might observe when a piece of magnesium ribbon is added to dilute hydrochloric acid, and say what each tells you. [3 marks]

8 Energy in reactions

- 1 Give **one** everyday example of an exothermic reaction and **one** of an endothermic reaction. [2 marks]

- 2 Why is burning fuel a chemical change but melting wax is not? [2 marks]

Answer Key

Chemical Reactions

Question	Answers
1 Key ideas	1 reactants / products; 2 rearranged; 3 gas; 4 exothermic / endothermic
2 Chemical or physical change?	1 Physical ; 2 Chemical ; 3 Chemical ; 4 Physical ; 5 Chemical ; 6 Physical ; 7 Chemical
3 Types of reaction	1 C ; 2 E ; 3 D ; 4 A ; 5 B
4 Mass calculations	1. 8 g 2. 16 g 3. 17.6 g 4. 4.4 g
5 Explain it	1. Magnesium combines with oxygen from the air to form magnesium oxide, so the extra mass is the oxygen that has been added. 2. The wood reacts with oxygen to make gases (carbon dioxide and water vapour) that escape into the air; if these were collected, the total mass would be the same.
6 Balance the equations (Year 9)	1 2; 2 2; 3 2; 4 2
7 Describe	Look for: • Fizzing/bubbles – a gas (hydrogen) is produced • The magnesium gets smaller and disappears – it is used up as a reactant • The tube gets warm – the reaction is exothermic
8 Energy in reactions	1. Exothermic: burning fuels, hand warmers, respiration, neutralisation. Endothermic: thermal decomposition, photosynthesis, sports cold packs (dissolving ammonium nitrate), citric acid with sodium hydrogencarbonate. 2. Burning makes new substances (carbon dioxide and water) and cannot easily be reversed; melting wax makes no new substance and is reversed by cooling.

Teaching note: dissolving and changes of state are physical changes because no new substance is made and they are easily reversed. The balancing questions are extension work for Year 9.