1.7

Physical or chemical change

Name _____ Class _____ Mark _____ / 19

What you are practising

I can sort changes into physical or chemical by what happens to the particles.

Worked example: magnesium burning in air
Bright light, white powder left. Magnesium atoms join with oxygen atoms to make new particles: a new substance, so **chemical change**.
magnesium(s) + oxygen(g) → magnesium oxide(s)

Physical: change of state or mixing. Same particles.
Chemical: new substances form. Particles change.
Equations: reactants → products, never "=". (s) solid, (l) liquid, (g) gas, (aq) aqueous.

Sort, model and write

1 Write **P** (physical) or **C** (chemical) in each box. **[5]**

☐ boiling	☐ photosynthesis	☐ dissolving	☐ oxidation
☐ respiration	☐ rusting	☐ evaporation	☐ baking
☐ digesting	☐ condensation	☐ freezing	

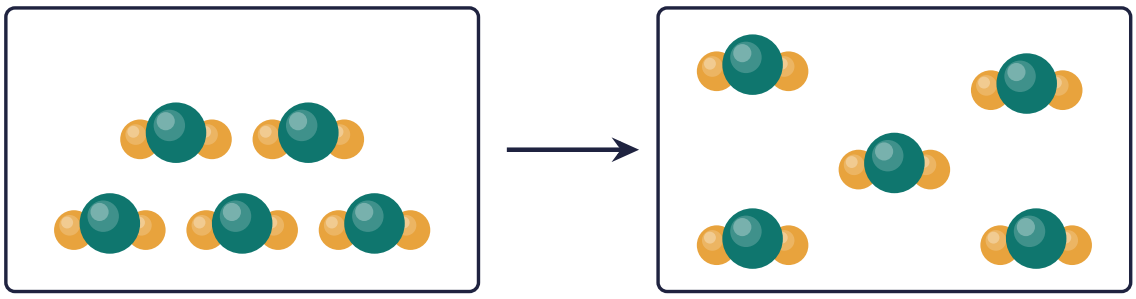
2 Complete the sentences. Use each word once. **[4]**

change **burns** **formed** **difficult** **boiling** **same** **movement** **state**

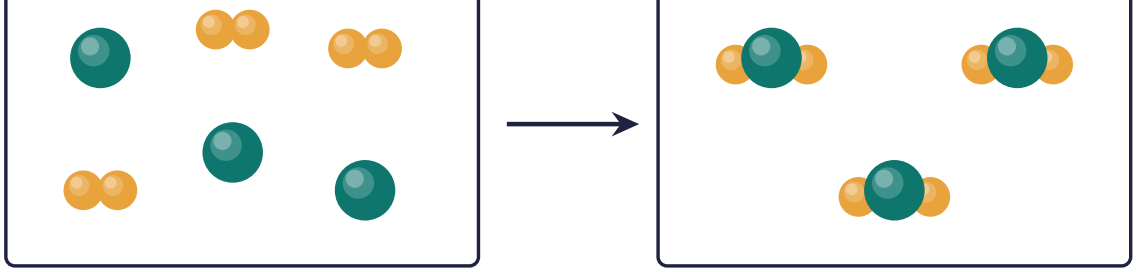
In a physical change the _____ and arrangement of the particles change, but the particles themselves stay the _____. Changes of _____, such as melting, freezing or _____, are physical changes. In a chemical change the particles _____ and one or more new substances are _____. When wood _____ in air there is a chemical change. A chemical change is usually _____ to reverse.

3 One circle = one atom. Physical or chemical? Give the evidence. **[2]**

A **before** **after**



B **before** **after**



4 Solid calcium is added to hydrochloric acid. It fizzes. Calcium chloride solution and hydrogen gas are made. Write the word equation with state symbols. **[2]**

5 Give two signs of chemical change from question 4 and the worked example. **[2]**

Explain

A When salt dissolves in water the salt seems to disappear. Explain why dissolving is a physical change. **[2]**

Who is right?

B **Ana:** "Boiling water gives off bubbles of gas, so it is a chemical change." **Sam:** "It is a physical change." Who is right, and why? **[2]**

Answers

Sort, model and write [15]

1 **[5]** One mark for every two correct (round down).
Physical (P): boiling, dissolving, evaporation, condensation, freezing.
Chemical (C): photosynthesis, oxidation, respiration, rusting, baking, digesting.

2 **[4]** One mark for every two correct words, in this order:
movement, **same**, **state**, **boiling**, **change**, **formed**, **burns**, **difficult**.

3 **[2] A: physical (1).** The same particles before and after; only their arrangement and movement change (they spread out, like a change of state).
B: chemical (1). The particles before are not the particles after: atoms have joined to make new particles, a new substance. The same atoms are there before and after (3 large, 6 small): they are rearranged.

4 **[2]** calcium(s) + hydrochloric acid(aq) → calcium chloride(aq) + hydrogen(g)
Correct reactants and products either side of an arrow **(1)**; all four state symbols correct **(1)**. No mark for the equation if an equals sign is used.

5 **[2]** Any two, one mark each: fizzing or bubbling, so a gas is given off; light given off; a new substance with a different colour or texture (the white powder).

Explain [2]

The salt particles and the water particles stay the same; the salt particles just spread out between the water particles **(1)**. No new substance is formed, so it is a physical change: the salt is still there and can be got back by evaporating the water **(1)**.

Who is right? [2]

Sam **(1)**. The bubbles are steam: water particles that have changed state from liquid to gas. They are still water particles, so no new substance is formed. Gas bubbles are only a sign of a chemical change when a new gas is made **(1)**.

How to revise this

Look at the two rules on page 1: particles stay the same, or particles change. Cover them. Write them out from memory with two examples of each. Check against page 1. Repeat only the ones you missed.