

Characteristic tests

Printable revision sheet — Galaxscia

LEVEL 1

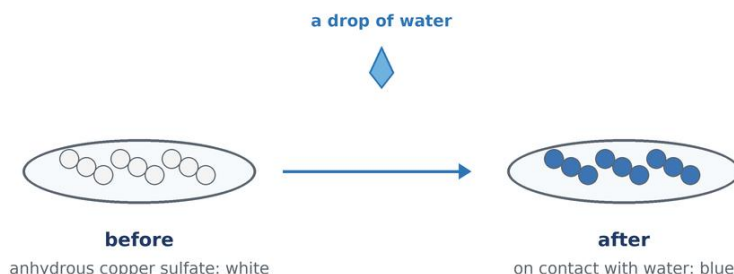
In chemistry, many substances are invisible to the naked eye: some gases are colourless and odourless, some solutions are transparent... To recognise them, chemists use **characteristic tests**. A characteristic test is a simple experiment that gives a precise result (a colour change, a precipitate appearing, a particular reaction) when a given chemical species is present.

Identifying water

To find out whether a liquid contains water, we use **anhydrous copper sulfate**. It is a white solid that turns blue on contact with water.

Example : Anhydrous copper sulfate is white. It is added to a solution. If it turns blue, there is water in that solution.

Test for water



Anhydrous copper sulfate turns blue as soon as it meets water: that is the test for the presence of water.

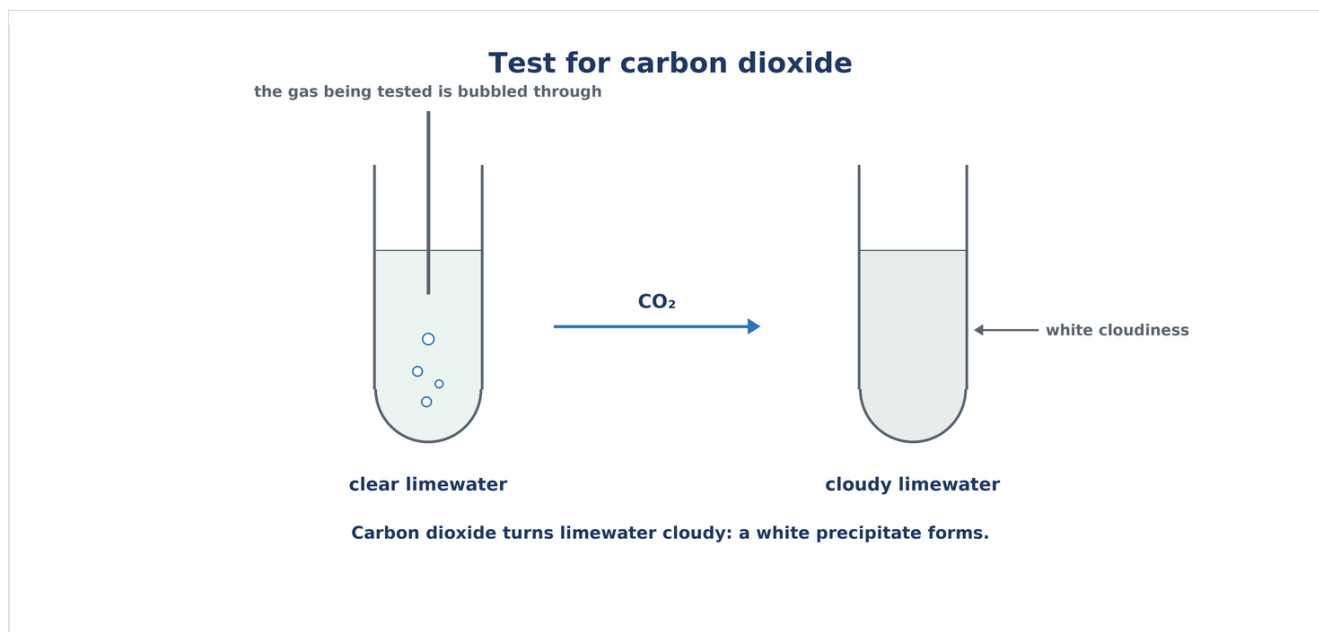
Key points — revision questions

Which test shows the presence of water?

What colour is anhydrous copper sulfate before and after the test?

LEVEL 2

Identifying carbon dioxide



Carbon dioxide (CO_2) is a colourless gas. To show it is present, we use **limewater**, which is colourless. On contact with CO_2 , the limewater turns cloudy (a white precipitate forms).

Note: a precipitate is a solid suspended in a liquid, formed by a chemical reaction

Example Blowing through a straw into limewater, the CO_2 you breathe out turns the liquid milky.

Key points — revision questions

- Which reagent is used to identify carbon dioxide?
- What does "the limewater turns cloudy" mean?
- What is a precipitate?

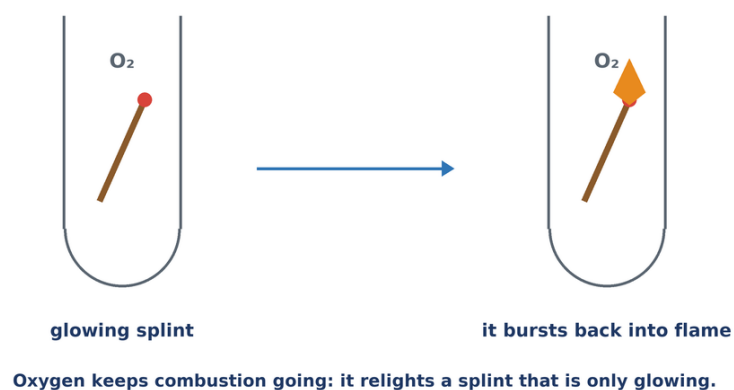
LEVEL 3

Identifying oxygen (O_2).

Oxygen is an oxidising gas (it keeps combustion going). We put a **glowing splint** into the gas to be tested: if it relights brightly, oxygen is present.

Example In a tube filled with oxygen, a glowing splint bursts back into flame.

Test for oxygen

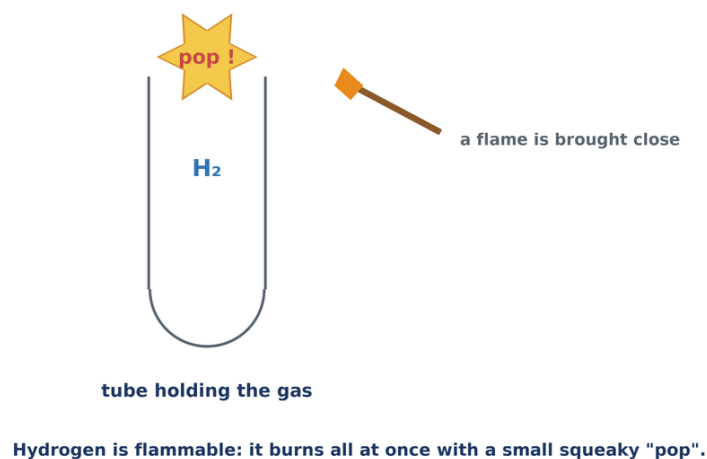


Identifying hydrogen (H_2)

Hydrogen is a flammable gas. We bring **a flame** to the opening of the tube containing the gas: a squeaky "pop" happens if it is hydrogen.

Example Acid is poured onto zinc and a gas is given off. Bringing a lit splint near produces a small "pop": it is hydrogen.

Test for hydrogen



Key points — revision questions

Which property of oxygen is used for its test?

How does the splint react in oxygen?

Which property of hydrogen is used for its test?

Which sound is characteristic of hydrogen being present?

LEVEL 4

Identifying certain ions

Tests for metal ions:

A few drops of **sodium hydroxide (NaOH)** are added to a solution containing metal ions. A characteristic coloured precipitate forms.

Cu^{2+} → blue precipitate

Fe^{2+} → green precipitate

Fe^{3+} → rust/orange precipitate

Zn^{2+} → white precipitate

Al^{3+} → white precipitate

Example If sodium hydroxide is poured into a copper sulfate solution, a blue precipitate appears: these are copper II ions.

Test for the chloride ion (Cl^-):

A few drops of **silver nitrate (AgNO_3)** are added to a solution that may contain chloride ions. **A white precipitate** appears, which darkens in the light.

Example If a solution of dissolved table salt is tested, adding silver nitrate produces a white precipitate that darkens: chloride ions are indeed present.

Test for the sulfate ion (SO_4^{2-}):

A few drops of **barium chloride (BaCl_2)** are added to a solution that may contain sulfate ions. **A white precipitate** forms.

Example : If barium chloride is poured into a copper sulfate solution, **a white precipitate** forms: these are sulfate ions.

Characteristic tests for some ions

Cu²⁺	Fe²⁺	Fe³⁺	Cl⁻	SO₄²⁻
+ sodium hydroxide	+ sodium hydroxide	+ sodium hydroxide	+ silver nitrate	+ barium chloride
				
precipitate blue	precipitate green	precipitate rust	precipitate white	precipitate white

Each ion gives a precipitate of a characteristic colour: the colour of the deposit identifies the ion.

Key points — revision questions

Which reagent is used to show metal ions are present?

Which colour of precipitate corresponds to Cu²⁺, Fe²⁺ and Fe³⁺ ions?

Which reagent is used to show chloride ions are present?

What is special about the chloride ion precipitate?

Which reagent shows sulfate is present?