

12 Identifying ions and gases – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)		
ion	_____	_____	_____
cation	_____	_____	_____
anion	_____	_____	_____
precipitate	_____	_____	_____
hydrogen	_____	_____	_____
pop	_____	_____	_____
oxygen	_____	_____	_____
carbon dioxide	_____	_____	_____
limewater	_____	_____	_____
ammonia	_____	_____	_____
litmus	_____	_____	_____
chlorine	_____	_____	_____
flame test	_____	_____	_____
lithium	_____	_____	_____
sodium	_____	_____	_____

English	Write it 3 times (English)		
potassium	_____	_____	_____
copper(II)	_____	_____	_____
sodium hydroxide	_____	_____	_____
iron(II)	_____	_____	_____
calcium	_____	_____	_____
carbonate	_____	_____	_____
chloride	_____	_____	_____
silver nitrate	_____	_____	_____

Recall

An **ion** is a charged particle:

- a **cation** is positive (e.g. Na^+);
- an **anion** is negative (e.g. Cl^-).

Many tests work by forming a coloured **precipitate** (an insoluble solid).

New ideas

Read these first, then do the Practice.

■ 1 Tests for gases

Gas	Test	Result
hydrogen	a lit splint	squeaky pop
oxygen	a glowing splint	it relights
carbon dioxide	bubble through limewater	turns milky
ammonia	damp red litmus paper	turns blue
chlorine	damp litmus paper	bleached white



hydrogen

lit splint:
squeaky pop



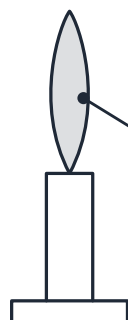
oxygen

glowing splint:
relights

■ 2 Flame tests

A **flame test** identifies some metal cations by the colour they give a flame:

Cation	Flame colour
lithium (Li^+)	red
sodium (Na^+)	yellow
potassium (K^+)	lilac (purple)
copper(II) (Cu^{2+})	blue-green



coloured flame

wire + sample

■ 3 Tests for cations

Add aqueous **sodium hydroxide** and look at the precipitate that forms:

Cation	Precipitate with sodium hydroxide
copper(II) (Cu^{2+})	light blue
iron(II) (Fe^{2+})	green
iron(III) (Fe^{3+})	red-brown
calcium (Ca^{2+})	white



add sodium hydroxide



coloured precipitate

■ 4 Two anion tests

- carbonate** : add dilute acid → it fizzes and gives carbon dioxide.
- chloride** : add dilute nitric acid, then **silver nitrate** → a white precipitate.

Watch out: keep the gas tests apart – hydrogen → a **lit** splint pops; oxygen → a **glowing** splint relights; carbon dioxide → limewater turns **milky**. In a flame test, sodium is **yellow** and potassium is **lilac** – don't confuse them.

Practice

Try these in order.

12.6 Describe the test for hydrogen gas, and its result.

[2]

12.7 A compound gives a yellow flame in a flame test. Which metal ion does it contain?[1]

12.8 Sodium hydroxide solution is added to an unknown solution and a red-brown precipitate forms. Name the ion present. [1]

12.9 Describe the test for the chloride ion (Cl^-), and the result. [2]

12.10 How would you show that a gas is carbon dioxide? [1]

12.11 Challenge. An unknown solution gives a **green** precipitate with sodium hydroxide, and a **white** precipitate when dilute nitric acid then silver nitrate are added. Name the cation and the anion present. [2]