

12 Identifying ions and gases – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
ion	离子	_____	_____	_____
cation	阳离子	_____	_____	_____
anion	阴离子	_____	_____	_____
precipitate	沉淀	_____	_____	_____
hydrogen	氢气	_____	_____	_____
pop	爆鸣声	_____	_____	_____
oxygen	氧气	_____	_____	_____
carbon dioxide	二氧化碳	_____	_____	_____
limewater	石灰水	_____	_____	_____
ammonia	氨气	_____	_____	_____
litmus	石蕊	_____	_____	_____
chlorine	氯气	_____	_____	_____
flame test	焰色试验	_____	_____	_____
lithium	锂	_____	_____	_____
sodium	钠	_____	_____	_____

English	中文	Write it 3 times (English)		
potassium	钾			
copper(II)	铜			
sodium hydroxide	氢氧化钠			
iron(II)	铁			
calcium	钙			
carbonate	碳酸盐			
chloride	氯化物			
silver nitrate	硝酸银			

Recall

An **ion** 离子 is a charged particle:

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

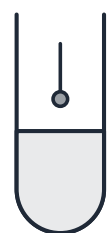
Many tests work by forming a coloured **precipitate** 沉淀 (an insoluble solid).

New ideas

Read these first, then do the Practice.

■ 1 Tests for gases

Gas	Test	Result
hydrogen 氢气	a lit splint	squeaky pop 爆鸣声
oxygen 氧气	a glowing splint	it relights
carbon dioxide 二氧化碳	bubble through limewater 石灰水	turns milky
ammonia 氨气	damp red litmus 石蕊 paper	turns blue
chlorine 氯气	damp litmus paper	bleached white



hydrogen

lit splint:
squeaky pop



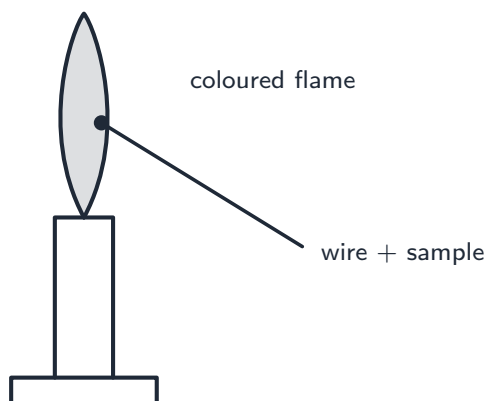
oxygen

glowing splint:
relights

■ 2 Flame tests

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

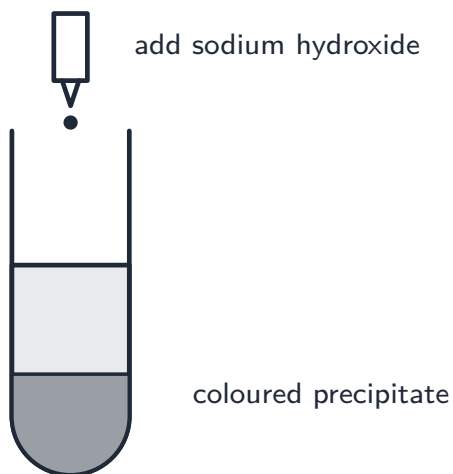
Cation	Flame colour
lithium 锂 (Li^+)	red
sodium 钠 (Na^+)	yellow
potassium 钾 (K^+)	lilac (purple)
copper(II) 铜 (Cu^{2+})	blue-green



■ 3 Tests for cations

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

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



■ 4 Two anion tests

- **carbonate** 碳酸盐: add dilute acid → it fizzes and gives carbon dioxide.
- **chloride** 氯化物: add dilute nitric acid, then **silver nitrate** 硝酸银 → 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]