

11 The halogens – 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)
halogens	卤素	_____
halide ions	卤离子	_____
silver nitrate	硝酸银	_____
ammonia	氨	_____
precipitate	沉淀	_____

Recall

From Part 1 you know the **halogens** 卤素 are oxidising agents. Here we look at their **halide ions** 卤离子 (Cl^- , Br^- , I^-) and how to tell them apart.

- A halide ion can **give** an electron, acting as a reducing agent.
- A silver nitrate test identifies which halide is present.

New ideas

Read these first, then do the Practice.

■ 1 Two opposite trends

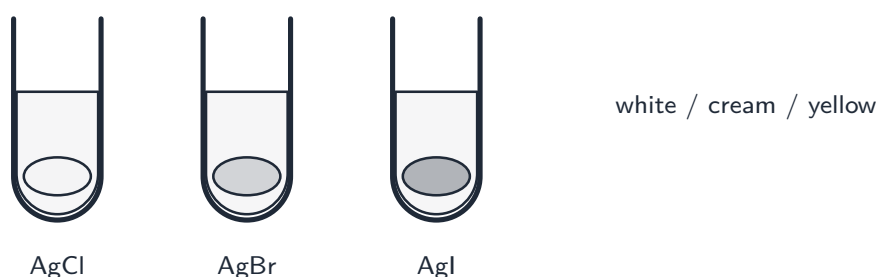
- the **oxidising power** of the halogens **decreases** down the group.
- the **reducing power** of the halide ions **increases** down the group (a larger ion holds its outer electron less tightly).



■ 2 The silver nitrate test

Add **silver nitrate** 硝酸银 solution to a halide, then **ammonia** 氨, and read off the **precipitate** 沉淀:

Halide	Precipitate	In ammonia
Cl^-	white	dissolves in dilute
Br^-	cream	dissolves only in concentrated
I^-	yellow	insoluble



■ 3 With concentrated sulfuric acid

All give the hydrogen halide first; the **stronger reducing agents** are then oxidised:

- chloride → only **HCl** (no redox).
- bromide → also some brown **Br₂** and SO₂.
- iodide → **I₂** plus H₂S and SO₂ (I⁻ is the strongest reducing agent).

Watch out: the two trends are *opposite* — the oxidising power of the *halogens* falls down the group, while the reducing power of the *halide ions* rises down the group.

Practice

Try these in order.

11.1 State the trend down the group in the reducing power of the halide ions. [1]

11.2 Explain why reducing power increases down the group. [2]

11.3 Give the colour of the precipitate formed when silver nitrate is added to (a) Cl^- , (b) Br^- , (c) I^- . [3]

11.4 How could you use ammonia to confirm a white precipitate is silver chloride? [1]

11.5 With concentrated sulfuric acid, chloride gives only HCl , but iodide also gives iodine. Explain why. [2]

11.6 Challenge. A solution gives a cream precipitate with silver nitrate that dissolves only in concentrated ammonia. Identify the halide ion present, and explain how you know. [2]
