

Halides

4.8.3.4 · Chemical analysis · revision notes

Halide ions (chloride, bromide and iodide) are identified with silver nitrate solution after adding dilute nitric acid; the colour of the silver halide precipitate tells you which ion is present. This is in GCSE Chemistry only (not Combined Science).

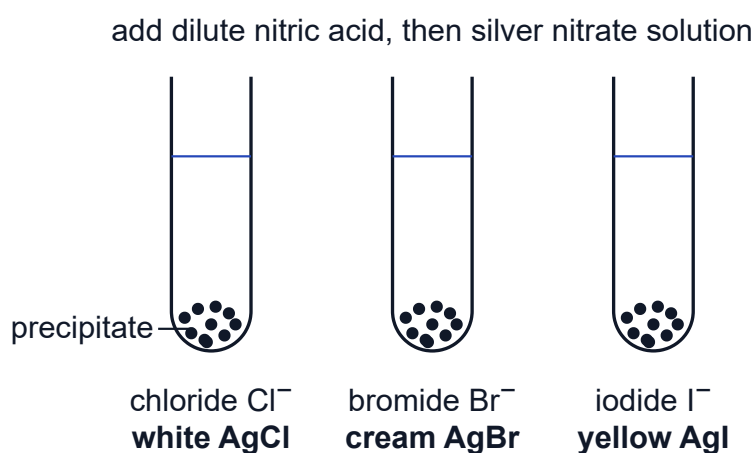
Key facts

- Test: dilute nitric acid, then silver nitrate solution
- $\text{Cl}^- \rightarrow$ white precipitate (AgCl)
- $\text{Br}^- \rightarrow$ cream precipitate (AgBr)
- $\text{I}^- \rightarrow$ yellow precipitate (AgI)
- Nitric acid removes carbonate ions, which would also form a precipitate
- Never use hydrochloric acid: it adds chloride ions

Notes

The test

- Halide ions are the negative ions of Group 7 elements: chloride Cl^- , bromide Br^- and iodide I^- .
- Make a solution of the sample. Add a few drops of **dilute nitric acid**, then a few drops of **silver nitrate solution**.
- A silver halide **precipitate** forms. Its colour identifies the halide ion:
- Chloride:** **white** precipitate of silver chloride.
- Bromide:** **cream** precipitate of silver bromide.
- Iodide:** **yellow** precipitate of silver iodide.



Colour of the silver halide precipitate: white, cream, yellow.

Why dilute nitric acid?

- The acid reacts with any carbonate ions and removes them. Carbonate ions would otherwise also form a precipitate with silver nitrate, giving a false positive.
- Do **not** use hydrochloric acid: it contains chloride ions, so you would always get a white precipitate of silver chloride.

Equations

- Example: $\text{NaBr(aq)} + \text{AgNO}_3\text{(aq)} \rightarrow \text{AgBr(s)} + \text{NaNO}_3\text{(aq)}$

How to answer each type of question

Describe the test for a halide ion and give the result

2 to 3 marks

Grade 4

1. Add dilute nitric acid to a solution of the sample.
2. Add silver nitrate solution.
3. Give the colour of the precipitate for the ion in the question.

Example. Describe a test to show that a solution contains bromide ions. Give the result.

Model answer. Add dilute nitric acid (1), then silver nitrate solution (1). A cream precipitate forms (1).

Don't lose marks

- ✗ Using hydrochloric acid instead of nitric acid.
- ✗ Mixing up the colours: bromide is cream, iodide is yellow. Use the spec words.
- ✗ Giving a colour without saying that a precipitate forms.
- ✗ Writing 'chlorine' instead of 'chloride'. The test identifies halide ions, not halogen molecules.

More tips

Memory tricks

- Down Group 7, the precipitate gets darker: chloride white → bromide cream → iodide yellow.
- Silver nitrate goes with nitric acid: nitrate ions do not form a precipitate, so they cannot confuse the result.
- Order of adding: 'nitric first, then silver'.

Exam technique

- Name both reagents: dilute nitric acid AND silver nitrate solution.
- In 'identify the compound' questions, name the metal ion and the halide ion, e.g. 'sodium bromide'.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3**Recall the silver halide precipitate colours**

Chloride white, bromide cream, iodide yellow.

Grade 4**Describe the test for halide ions**

Add dilute nitric acid, then silver nitrate solution, to a solution of the sample.

Grade 5**Identify a compound from two ion tests**

Combine the metal ion test result with the halide test result, e.g. lilac flame + yellow precipitate → potassium iodide.

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