Exercise walk-through

Identification of ions and gases ▪ 12.5

eXercise

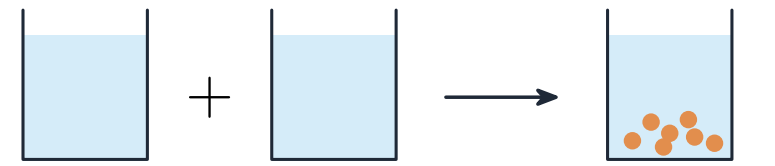
You must be able to

- give the test and result for common anions (carbonate, halides, sulfate, nitrate)
- give the cation tests with sodium hydroxide / aqueous ammonia
- give the gas tests and flame-test colours

Method — Key tests

- **chloride:** dilute HNO_3 + silver nitrate $\rightarrow$ white precipitate.
- **sulfate:** dilute HNO_3 + barium nitrate $\rightarrow$ white precipitate.
- **CO :** turns limewater milky. **H :** squeaky pop. **O :** relights a glowing splint.
- **flame:** Li red, Na yellow, K lilac, Cu blue-green.

Method — Key tests



Two solutions mixed give a precipitate — many cation/anion tests

Practice 2.1 ▪ 2 marks

Give the test and result for carbon dioxide gas.

Solution 2.1

Worked steps

bubble it through limewater (M1); the limewater turns milky (A1).

Practice 2.2 ▪ 1 mark

State the flame colour given by a potassium ion.

Solution 2.2

Worked steps

lilac (purple) B1.

Exam-style 3.1 ▪ 1 mark

A white precipitate forms when dilute nitric acid and silver nitrate are added. The ion present is:

A sulfate

B carbonate

C chloride

D nitrate

Solution 3.1

Method: Key tests

A sulfate

B carbonate

C chloride ✓

D nitrate

Worked steps

C. Silver nitrate (with nitric acid) gives a white precipitate with chloride.

Exam-style 3.2 ▪ 1 mark

A solution gives a light blue precipitate with sodium hydroxide that dissolves in excess aqueous ammonia to a deep blue solution.
(a) Name the cation present.
(b) Describe the test for a sulfate ion and its result.

Solution 3.2

Method: Key tests

Worked steps

(a) copper(II), Cu^{2+} B1.
(b) add dilute nitric acid then barium nitrate M1; a white precipitate confirms a sulfate A1.

Exam-style 3.3 ▪ 2 marks

Describe the test for hydrogen gas and its positive result.

Solution 3.3

Worked steps

hold a lighted splint at the mouth of the tube M1; a ‘squeaky pop’ shows hydrogen A1.