

Solutions

Each answer shows the steps, then the **result**.

2.1

- bubble the gas through **limewater**
- limewater turns **milky**

2.2

- potassium ion flame: **lilac** (purple)

3.1 C

- nitric acid + silver nitrate → white ppt: **chloride**
- A is barium nitrate; B fizzes with acid; D gives no ppt

3.2

(a)

- light blue ppt that dissolves in excess ammonia: **copper(II)**, Cu^{2+}

(b)

- add dilute nitric acid then **barium nitrate**
- a **white precipitate** confirms a sulfate

3.3

- hold a **lighted splint** at the mouth of the tube
- a **squeaky pop** shows hydrogen

3.4

(a)

- cream ppt with silver nitrate: **bromide**, Br^-
- gas turning damp red litmus blue: **ammonium**, NH_4^+
- **S** is **ammonium bromide**, NH_4Br

(b)

- the gas is **ammonia**, NH_3
- $\text{NH}_4^+ + \text{OH}^- \rightarrow \text{NH}_3 + \text{H}_2\text{O}$

(c)

- it rules out **carbonate**
- a carbonate would **fizz** with dilute acid, and no gas was seen

(d)

- CO_2 : limewater turns **milky**

- H_2 : lighted splint, **squeaky pop**
- O_2 : glowing splint **relights**

(e)

- the acid **removes carbonate**, which would ppt with silver nitrate
- without it a carbonate would give a **false positive** for a halide