

Writing formulae and balancing equations

Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · Lab

Name: _____ Date: _____ Class: _____

When two clear solutions are mixed, a solid sometimes appears. This lab tests five pairs of solutions, records what forms and uses the ion charges to name the solid, so you can write full balanced equations and ionic equations from your own observations.

Level: Chemistry grades 9-10 (GCSE · IGCSE · O Level · Class 9-10) · **Curriculum:** HS-PS1-7

Aim

To mix pairs of solutions, identify the precipitates that form, and write balanced and ionic equations for each.

Equipment

- 0.1 mol/dm³ solutions of sodium hydroxide, copper(II) sulfate, iron(III) chloride, magnesium sulfate, calcium chloride and sodium carbonate
- Test tubes, rack, droppers, white card, marker, goggles

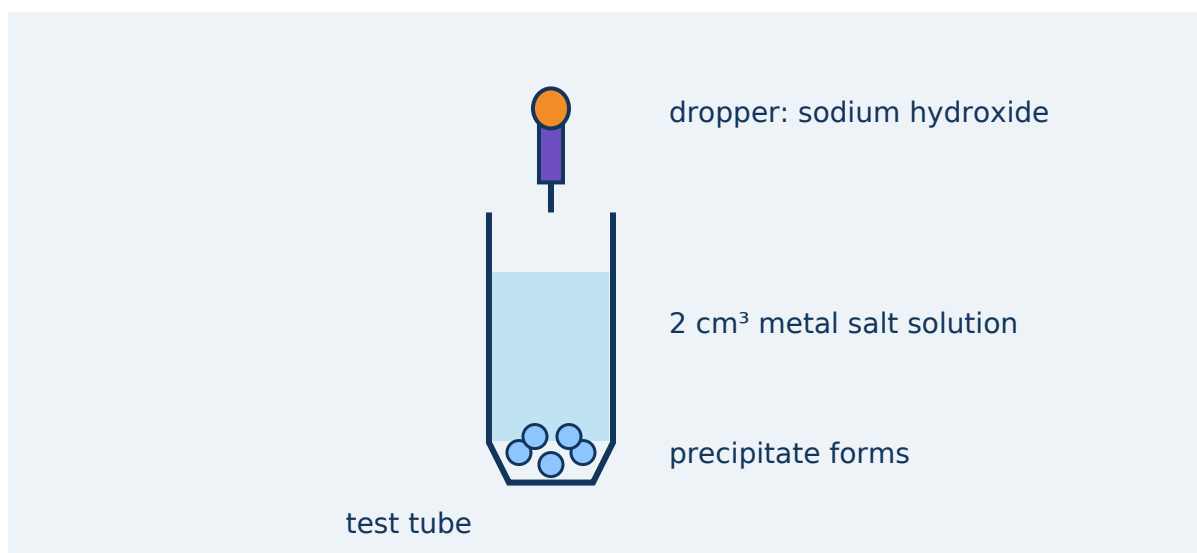
Safety

Safety

Wear goggles. Sodium hydroxide solution can irritate skin and eyes: wash splashes with plenty of water. Copper(II) sulfate is harmful if swallowed. Wash your hands afterwards.

Method

1. Put 2 cm³ of one metal salt solution in a test tube standing in front of a white card.
2. Add 2 cm³ of the second solution with a clean dropper and look for a colour change or solid.
3. Record the colour of any precipitate, then repeat for each pair in the table.
4. Rinse the droppers between solutions so the solutions do not mix.



Adding sodium hydroxide to a metal salt solution.

Results

Sample results from Kofi's group:

Solution 1	Solution 2	Observation
Copper(II) sulfate	Sodium hydroxide	pale blue precipitate
Iron(III) chloride	Sodium hydroxide	red-brown precipitate
Magnesium sulfate	Sodium hydroxide	white precipitate
Calcium chloride	Sodium carbonate	white precipitate
Copper(II) sulfate	Iron(III) chloride	no change, mixed solution stays green-brown

Analysis questions

Question 1 Formulae of the precipitates

Use ion charges to write the formula of each precipitate.

Question 2 Copper equation

Write the balanced equation with state symbols for copper(II) sulfate and sodium hydroxide.

Question 3 Iron ionic equation

Write the full equation for iron(III) chloride and sodium hydroxide, then the ionic equation.

Question 4 Spectator ions

Name the spectator ions in the magnesium sulfate and sodium hydroxide reaction and write

the ionic equation.

Question 5 No reaction

Explain why copper(II) sulfate and iron(III) chloride gave no precipitate.

Question 6 Identify an unknown

An unknown solution gives a red-brown precipitate with sodium hydroxide. Identify the metal ion and the precipitate.

Question 7 Improving reliability

Suggest two ways to make the observations clearer and more reliable.