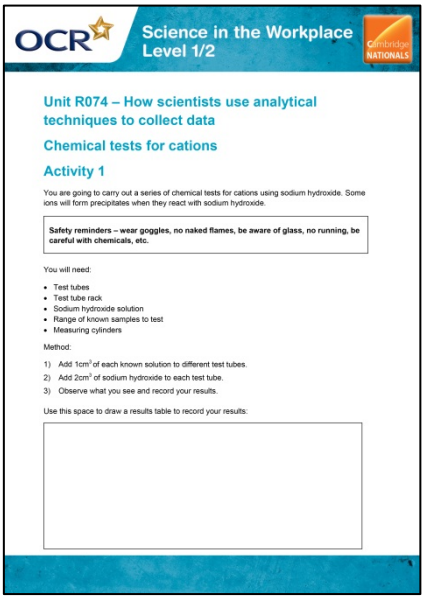
Unit R074 – How scientists use analytical techniques to collect data

Chemical tests for cations

Instructions and answers for teachers

The activities below cover LO4: Be able to identify cations and anions in samples.


OCR Science in the Workplace Level 1/2

Unit R074 – How scientists use analytical techniques to collect data

Chemical tests for cations

Activity 1

You are going to carry out a series of chemical tests for cations using sodium hydroxide. Some ions will form precipitates when they react with sodium hydroxide.

Safety reminders – wear goggles, no naked flames, be aware of glass, no running, be careful with chemicals, etc.

You will need:

- Test tubes
- Test tube rack
- Sodium hydroxide solution
- Range of known samples to test
- Measuring cylinders

Method:

1) Add 1cm^3 of each known solution to different test tubes.
2) Add 2cm^3 of sodium hydroxide to each test tube.
3) Observe what you see and record your results.

Use this space to draw a results table to record your results:

Associated files:

Chemical tests for cations (activity)

Activity – approx. 1 hour

This activity offers an opportunity for English skills development.

This activity offers an opportunity for maths skills development.

Following a standard (risk assessed) procedure with sodium hydroxide and cations, learners carry out precipitation tests on known samples of cations (aluminium, copper, iron (II), iron (III), lead), record their results and observations.

Activity

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Method:

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3) Observe what you see and record your results.

Use this space to draw a results table to record your results:

You will be provided with some solutions containing unknown cations. Carry out tests on them to identify the cations present. Record your results in a table you draw in the following space.

Teacher Tips

The table below shows known cations samples and expected results:

Cation	Expected observations	Ionic equation
Aluminium ($Al^{3+}(aq)$)	Colourless precipitate, $Al(OH)_3(s)$	$Al^{3+}(aq) + 3OH^-(aq) = Al(OH)_3(s)$
Copper ($Cu^{2+}(aq)$)	Blue (jelly-like) precipitate of $Cu(OH)_2(s)$	$Cu^{2+}(aq) + 2OH^-(aq) = Cu(OH)_2(s)$
iron (II) ($Fe^{2+}(aq)$)	Green gelatinous precipitate of $Fe(OH)_2(s)$	$Fe^{2+}(aq) + 2OH^-(aq) = Fe(OH)_2(s)$
iron (III) ($Fe^{3+}(aq)$)	Rust-brown gelatinous precipitate of $Fe(OH)_3(s)$	$Fe^{3+}(aq) + 3OH^-(aq) = Fe(OH)_3(s)$
lead ($Pb^{2+}(aq)$)	White precipitate $Pb(OH)_2(s)$ dissolves in excess NaOH(aq)	$Pb^{2+}(aq) + 2OH^-(aq) = Pb(OH)_2(s)$

Ensure that test tubes are cleaned thoroughly before carrying out the tests.

For the known tests give the learners labelled samples of the substances above.

For the unknown tests, give the students samples of the above substances labelled as ‘A’, ‘B’ and ‘C’.