# Identifying ions: supporting resources

This resource supports the practical video Identifying ions, available here: <rsc.li/3dhnn5B>

### Using the structure strips

Writing about chemistry encourages learners to reflect on their understanding, formulate new ideas and make links between ideas in new ways. Learners also need to practice for longer-answer questions in examinations. Structure strips provide scaffolded prompts and help overcome ‘fear of the blank page’. The learner sticks the strip into the margin of their exercise book or onto an A4 sheet of paper and writes alongside it. Use this long- answer question to consolidate learning after the practical and/or for revision. (Read more at <rsc.li/2P0JDlW>.)

**Long-answer question:**

*A sample of an unknown ionic solution has been collected for analysis. The sample is colourless. Describe a series of qualitative tests that could be used to identify the unknown ions in the sample. In your plan you must include instructions for carrying out the tests and the expected results.*

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| **Identifying ions Structure strip** | **Identifying ions Structure strip** | **Identifying ions Structure strip** | **Identifying ions Structure strip** | **Identifying ions Structure strip** |
| What is a qualitative test and what is it used for? | What is a qualitative test and what is it used for? | What is a qualitative test and what is it used for? | What is a qualitative test and what is it used for? | What is a qualitative test and what is it used for? |
| Describe the hydroxide test for positive ions.What would a positive test result look like?Give an example. | Describe the hydroxide test for positive ions.What would a positive test result look like?Give an example. | Describe the hydroxide test for positive ions.What would a positive test result look like?Give an example. | Describe the hydroxide test for positive ions.What would a positive test result look like?Give an example. | Describe the hydroxide test for positive ions.What would a positive test result look like?Give an example. |
| What is the limitation of the sodium hydroxide test? | What is the limitation of the sodium hydroxide test? | What is the limitation of the sodium hydroxide test? | What is the limitation of the sodium hydroxide test? | What is the limitation of the sodium hydroxide test? |
| Describe the flame test to confirm the positive ion.What would a positive test result look like?Give an example. | Describe the flame test to confirm the positive ion.What would a positive test result look like?Give an example. | Describe the flame test to confirm the positive ion.What would a positive test result look like?Give an example. | Describe the flame test to confirm the positive ion.What would a positive test result look like?Give an example. | Describe the flame test to confirm the positive ion.What would a positive test result look like?Give an example. |
| Describe the series of tests used for negative ions.Describe the carbonate test.What would a positive test result look like? | Describe the series of tests used for negative ions.Describe the carbonate test.What would a positive test result look like? | Describe the series of tests used for negative ions.Describe the carbonate test.What would a positive test result look like? | Describe the series of tests used for negative ions.Describe the carbonate test.What would a positive test result look like? | Describe the series of tests used for negative ions.Describe the carbonate test.What would a positive test result look like? |
| Describe the sulfate test.What would a positive test result look like? | Describe the sulfate test.What would a positive test result look like? | Describe the sulfate test.What would a positive test result look like? | Describe the sulfate test.What would a positive test result look like? | Describe the sulfate test.What would a positive test result look like? |
| Describe the halide test.What would a positive test result look like for chloride, bromide and iodide? | Describe the halide test.What would a positive test result look like for chloride, bromide and iodide? | Describe the halide test.What would a positive test result look like for chloride, bromide and iodide? | Describe the halide test.What would a positive test result look like for chloride, bromide and iodide? | Describe the halide test.What would a positive test result look like for chloride, bromide and iodide? |

### Structure strip: suggested answer content

**Identifying ions Structure strip**

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| What is a qualitative test and what is it used for? | A qualitative test is used to identify the chemical composition of an unknown sample. A positive test result, such as a colour change, will confirm that a particular substance is present.The unknown colourless sample is an ionic solution, so we are going to use a series of qualitative tests to identify the positive and negative ions. |
| Describe the hydroxide test for positive ions.What would a positive test result look like?Give an example. | There are two tests that can be used to determine the positive ion. One of these tests is the hydroxide test:* Add 2 drops of sodium hydroxide to 2 drops of the unknown solution.
* A coloured precipitate will form.
* Observe the colour of the precipitate. This will identify the possible positive metal ion in the unknown solution. For example, a rust coloured precipitate would be a positive result for iron(iii) ions.

There is more than one metal ion that will produce a white precipitate. If a white precipitate is formed and it does not dissolve in excess sodium hydroxide then further tests will need to be carried out to determine whether the unknown solution contains calcium or magnesium.A further test to confirm the positive ion present is a flame test. The flame test could also be used to distinguish between calcium and magnesium.* Dip a pre-soaked splint in the unknown solution.
* Hold it in a roaring blue Bunsen flame.
* Observe the colour of the flame.

The flame colour will identify the positive metal ion present in the unknown solution. For example, a lilac flame would be a positive result for potassium.Now, we will use a series of tests to identify the negative ion. The carbonate test* Put 1 cm3 of the unknown solution into a test tube.
* Put 1 cm3 of limewater into a separate test tube.
* Add a few drops of hydrochloric acid (HCl). If it fizzes then the carbonate ion is present.
* Confirm the presence of carbonate by bubbling the gas through the limewater. If a carbonate ion is present the limewater will turn cloudy.

The sulfate test* Put 1 cm3 of the unknown solution into a test tube.
* Add a few drops of hydrochloric acid HCl and then add barium chloride (BaCl2).
* If a white precipitate appears, then the sulfate ion is present.

The halide test* Put 1 cm3 of the unknown solution into a test tube.
* Add a few drops of nitric acid (HNO3) and silver nitrate (AgNO3).
* If a white precipitate forms then the chloride ion is present. If the precipitate is cream, then the bromide ion is present, if it is yellow then the iodide ion is present.
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| What is the limitation of the sodium hydroxide test? |
| Describe the flame test to confirm the positive ion.What would a positive test result look like?Give an example. |
| Describe the series of tests used for negative ions.Describe the carbonate test.What would a positive test result look like? |
| Describe the sulfate test.What would a positive test result look like? |
| Describe the halide test.What would a positive test result look like for chloride, bromide and iodide? |

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