
GCSE Chemistry Required Practical activity 7: Identifying Ions (chemistry only)

Student sheet

Required practical activity	Apparatus and techniques
Use of chemical tests to identify the ions in unknown single ionic compounds covering the ions in sections. (Chemistry only)	AT 1, AT 8

Identify the ions in a single ionic compound using chemical tests

In this investigation you will analyse a range of known ionic compounds by flame testing and the addition of acids, barium chloride and silver nitrate. You will then apply the knowledge you gain to identify the ions in an unknown compound.

Learning outcomes
1
2
Teachers to add these with particular reference to working scientifically

Method

You are provided with the following:

- Bunsen burner
- test tubes and test tube rack
- teat pipette
- nichrome wire mounted in handle
- limewater
- 0.4M dilute hydrochloric acid
- 0.1M barium chloride solution
- 0.4M dilute nitric acid
- 0.05M silver nitrate solution
- Known labelled solutions: chlorides of lithium, sodium, potassium, calcium and copper
- Known labelled solutions: sodium salts containing carbonate, sulfate, chloride, bromide and iodide
- Salt solution labelled 'unknown'.

Risk assessment

Safety goggles must be worn throughout.

You should read these instructions carefully before you start work.

- Flame Tests:** Pour around 1cm depth of each of the **labelled chloride solutions** into five test tubes in the rack. Dip the nichrome wire into the first solution, and then hold the tip of the wire in a blue Bunsen burner flame. Clean the wire carefully between tests and test the other four solutions in the same way. Record your observation in **table 1** on the back of this sheet. Empty and clean the test tubes.
- Carbonate test:** Pour around 1cm depth of each of the **labelled sodium solutions** into five test tubes in the rack. Place 2cm depth of limewater in a sixth tube. Add 1cm depth of **dilute hydrochloric acid** to each sodium salt in turn. **If** (and only if) you see bubbles, **quickly** use the teat pipette to transfer the gas produced to the limewater. Your teacher may show you how to do this. You will need to take several pipettes of the gas to get a change in the limewater. Record your results in the first blank row of **table 2**. Empty and clean the test tubes.
- Sulfate test:** Pour around 1cm depth of each of the **labelled sodium solutions** into five test tubes in the rack. Add a few drops of **dilute hydrochloric acid** to each solution, followed by 1cm depth of **barium chloride** solution. Record your observations in the second blank row of **table 2**. Empty and clean the test tubes.
- Halide test:** Pour around 1cm depth of each of the **labelled sodium solutions** into five test tubes in the rack. Add a few drops of **dilute nitric acid** to each solution, followed by 1cm depth of **silver nitrate** solution. Again, record your observations in **table 2**.
- Unknown:** Repeat tests 1 to 4 on the unknown salt solution. Use your results from **test 1** and **table 1** to identify the positive metal ion in the unknown compound, and your results from **tests 2, 3 and 4** and **table 2** to identify the negative non-metal ion.

Table 1. Possible flame colours are green, crimson, lilac, yellow, red

metal ion	lithium	sodium	potassium	calcium	copper
flame colour					

Table 2. Possible outcomes are carbon dioxide release OR white, cream or yellow precipitates OR no reaction

non-metal ion	carbonate	sulfate	chloride	bromide	iodide
carbonate test					
sulfate test					
halide test					