SEPARATES ONLY - GCSE Chemistry required practical activity:

Identifying Ions

Student sheet

Identify the ions in a single ionic compound using chemical tests

You will analyse a range of known ionic compounds.

The methods you will use are:

- flame testing
- addition of acids
- addition of barium chloride
- addition of silver nitrate.

You will then apply the knowledge you gain to identify the ions in an unknown compound.

Risk assessment

- Safety goggles should be worn throughout.

Method

You are provided with the following:

- Bunsen burner
- test tubes and test tube rack
- teat pipette
- nichrome wire mounted in handle
- limewater
- 0.4 M dilute hydrochloric acid
- 0.1 M barium chloride solution
- 0.4 M dilute nitric acid
- 0.05 M 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’.

Read these instructions carefully before you start work.

Flame Tests

1. Pour around 1 cm depth of each of the **labelled chloride solution**s into five test tubes in the rack.
2. Dip the nichrome wire into the first solution. Then hold the tip of the wire in a blue Bunsen burner flame.
3. Record your observation in **Table 1** (at end of this worksheet).
4. Clean the wire carefully.
5. Repeat steps **2–4** for each of the other four solutions.
6. Empty and clean the test tubes.

7.

Carbonate test

1. Pour around 1 cm depth of each of the **labelled sodium solutions** into five test tubes in the rack.
2. Place 2 cm depth of limewater in a sixth test tube.
3. Add 1 cm depth of **dilute hydrochloric acid** to each sodium salt in turn.

   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.
4. Record your results in the first blank row of **Table 2** (at end of this worksheet).
5. Empty and clean the test tubes.

Sulfate test

1. Pour around 1 cm depth of each of the **labelled sodium solutions** into five test tubes in the rack.
2. Add a few drops of **dilute hydrochloric acid** to each solution. Then add 1 cm depth of **barium chloride** solution.
3. Record your observations in the second blank row of **Table 2**.
4. Empty and clean the test tubes.

Halide test

1. Pour around 1 cm depth of each of the **labelled sodium solutions** into five test tubes in the rack.
2. Add a few drops of **dilute nitric acid** to each solution. Then add 1 cm depth of **silver nitrate** solution.
3. Record your observations in the third blank row of **Table 2**.

Unknown

1. Repeat the flame, carbonate, sulfate and halide tests on the unknown salt solution.

2. Use your results from:
   - **Table 1** to identify the positive metal ion in the unknown compound
   - **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					