

# **WJEC Chemistry GCSE**

## **Specified Practical 4**

## Identifying Unknown Substances

[Methods are taken from <u>AQA Chemistry GCSE Practical handbook</u> and the <u>Royal Society of Chemistry</u>]

**England Specification** 









### **Identifying Ions**

#### Aim

Use of chemical tests to identify the ions in unknown single ionic compounds covering the ions from flame tests and sulphates.

### **Equipment List**

- 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
- 0.4 M known labelled cation salt solutions: LiCl, NaCl, KCl, CaCl2, CuCl2
- 0.4 M known labelled anion salt solutions: Na2CO3, Na2SO4, NaCl, NaBr, Nal
- 0.4 M salt solution labelled 'unknown'.

### 1. Flame Tests for Metal Ions

#### Method

- 1. Pour 1 cm<sup>3</sup> of each known chloride solution into 5 test tubes.
- 2. Clean the nichrome wire by dipping it in dilute hydrochloric acid.
- 3. Dip the nichrome wire into solution and hold the tip in a blue Bunsen flame.
- 4. Record the colour of the flame.
- 5. Repeat for the following solutions and make sure to clean the wire after each test.
- 6. Pour 1 cm<sup>3</sup> of the unknown salt solution into a test tube.
- 7. Dip the nichrome wire into solution and hold the tip in a blue Bunsen flame.
- 8. Record the colour of the flame, you should be able to compare results with the known chloride with the matching colour flame.

#### Results

- Lithium (Li<sup>+</sup>) crimson flame
- Sodium (Na<sup>+</sup>) yellow flame
- Potassium (K<sup>+</sup>) lilac flame
- Calcium (Ca<sup>2+</sup>) orange-red flame
- Copper (II) (Cu<sup>2+</sup>) green flame
- See diagram for other common chemicals.



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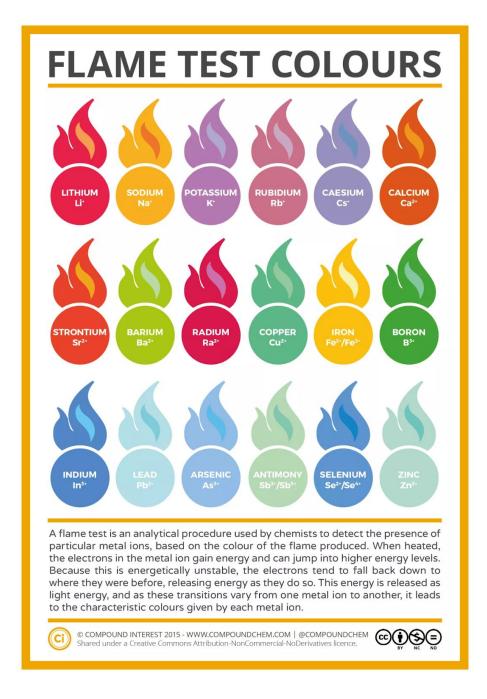


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### 2. Test for Carbonate lons (CO<sub>3</sub><sup>2</sup>-)

#### Method

- 1. Place a 2 cm<sup>3</sup> of lime water in a clean test tube.
- 2. Add a little dilute hydrochloric acid to the unknown solution.
- 3. If you see bubbles, transfer the gas produced to the limewater using a delivery tube.
- 4. Repeat this process for the known sodium solutions to identify carbonate ions.

### **Results**

- Bubbles produced and lime water goes cloudy if present.

### 3. Test for Sulphate lons (SO<sub>4</sub><sup>2-</sup>)

### Method

- 1. Add 10 drops of dilute hydrochloric acid to the unknown solution in a test tube.
- 2. Add a 2 cm<sup>3</sup> barium chloride solution.
- 3. Pour 1 cm³ of the known sodium solutions into separate test tubes.
- 4. Add 5 drops of dilute hydrochloric acid and then 2 cm<sup>3</sup> of barium chloride.

### Results

- White precipitate formed if present.







### 4. Test for the Halide lons (Cl<sup>-</sup>, Br<sup>-</sup>, l<sup>-</sup>)

### Method

- 1. Add 10 drops of dilute nitric acid to the unknown solution in a test tube.
- 2. Add a 1 cm<sup>3</sup> silver nitrate solution to the test tube with the unknown solution.
- 3. Pour 1cm3 of the know sodium solutions into separate test tubes.
- 4. Repeat steps 1 and 2 for which of the solutions.
- 5. Record colour of precipitate formed in each test tube.

### Results

- Chloride white precipitate produced
- Bromide cream precipitate produced
- lodide yellow precipitate produced