

# The Periodic Table – properties of Group 2 elements

## Topic

Periodic Table – Group 2

## Timing

20 min.

## Apparatus (per group)

- One student worksheet
- One clear plastic sheet (eg ohp sheet).

## Chemicals (per group)

Solutions contained in plastic pipettes, see 'Apparatus and techniques for microscale chemistry' handout.

- Magnesium nitrate 0.5 mol dm<sup>-3</sup>
- Calcium nitrate 0.5 mol dm<sup>-3</sup>
- Strontium nitrate 0.5 mol dm<sup>-3</sup>
- Barium nitrate 0.2 mol dm<sup>-3</sup>
- Sodium hydroxide 1 mol dm<sup>-3</sup>
- Sodium fluoride 0.5 mol dm<sup>-3</sup>
- Sodium chloride 0.5 mol dm<sup>-3</sup>
- Potassium bromide 0.2 mol dm<sup>-3</sup>
- Potassium iodide 0.2 mol dm<sup>-3</sup>
- Sodium carbonate 0.5 mol dm<sup>-3</sup>
- Sodium sulphate 0.5 mol dm<sup>-3</sup>.

## Observations

### Magnesium

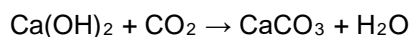
No precipitates should be seen. All the compounds are colourless and soluble at these concentrations.

### Calcium

An immediate white cloudiness is seen with the carbonate ions. No precipitates are seen with chloride, bromide or iodide but a cloudiness is seen with fluoride (due to its high lattice energy CaF<sub>2</sub> is insoluble).

### Calcium hydroxide

This is clear at first but when left for a few minutes the drops become hazy as calcium carbonate is formed by absorbing carbon dioxide from the air:



Calcium sulphate also appears clear (the solubility product is not realised at these concentrations due, possibly, to ion-pairing).

### Strontium

The sulphate and carbonate are insoluble and a white cloudiness is seen. For the sulphate, the precipitate forms slowly.

The halides are all soluble, except for the fluoride. The hydroxide is clear at first but becomes hazy – similar to calcium.

### Barium

The sulphate and carbonate give immediate white precipitates.

The halides are soluble except for the fluoride. The hydroxide is (like calcium and strontium) clear at first, becoming hazy due to the formation of barium carbonate.

## Health & Safety

Students must wear suitable eye protection (Splash resistant goggles to BS EN166 3).

Magnesium nitrate,  $0.5 \text{ mol dm}^{-3} \text{ MgNO}_3 \cdot 6\text{H}_2\text{O}$  (aq), Calcium nitrate,  $0.5 \text{ mol dm}^{-3} \text{ Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$  (aq), Strontium nitrate,  $0.5 \text{ mol dm}^{-3} \text{ Sr}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$  (aq) and Barium nitrate,  $0.2 \text{ mol dm}^{-3} \text{ Ba}(\text{NO}_3)_2$  are skin/eye irritants

Sodium hydroxide solution,  $1 \text{ mol dm}^{-3} \text{ NaOH}$  (aq) is CORROSIVE.

Sodium carbonate,  $0.5 \text{ mol dm}^{-3} \text{ Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  is an IRRITANT.

Sodium sulphate,  $0.5 \text{ mol dm}^{-3} \text{ Na}_2\text{SO}_4$ , Sodium chloride,  $0.5 \text{ mol dm}^{-3} \text{ NaCl}$  (aq), Sodium fluoride,  $0.5 \text{ mol dm}^{-3} \text{ NaF}$  (aq), Potassium iodide,  $0.2 \text{ mol dm}^{-3} \text{ KI}$  (aq) and Potassium bromide,  $0.2 \text{ mol dm}^{-3} \text{ KBr}$  (aq) are of low hazard.

## Credits

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*Health & safety checked May 2018*

Page last updated August 2018

