

The Periodic Table – properties of Group 2 elements – teacher notes

Topic

Periodic Table – Group 2

Timing

20 minutes

Apparatus

- student worksheet
- clear plastic sheet (eg OHP sheet)

Chemicals

- Magnesium nitrate, 0.5 mol dm⁻³
- Calcium nitrate, 0.5 mol dm⁻³
- Strontium nitrate, 0.5 mol dm⁻³
- Barium nitrate, 0.2 mol dm⁻³
- Sodium hydroxide, 1 mol dm⁻³
- Sodium fluoride, 0.5 mol dm⁻³
- Sodium chloride, 0.5 mol dm⁻³
- Potassium bromide, 0.2 mol dm⁻³
- Potassium iodide, 0.2 mol dm⁻³
- Sodium carbonate, 0.5 mol dm⁻³
- Sodium sulphate, 0.5 mol dm⁻³

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 CaF₂ 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: $\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$

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

Strontium

The sulfate and carbonate are insoluble, and a white cloudiness is seen. For the sulfate, 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 sulfate 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 and technical notes

- Read our standard health and safety guidance here <https://rsc.li/3LNbkfo>
- Students must wear suitable eye protection (Splash resistant goggles to BS EN1663).
- Magnesium nitrate, $\text{MgNO}_3 \cdot 6\text{H}_2\text{O}(\text{aq})$, 0.5 mol dm^{-3} . Calcium nitrate, $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}(\text{aq})$, 0.5 mol dm^{-3} , Strontium nitrate, $\text{Sr}(\text{NO}_3)_2 \cdot 0.5 \text{ mol dm}^{-3} \cdot 4\text{H}_2\text{O}(\text{aq})$ and Barium nitrate, $\text{Ba}(\text{NO}_3)_2$, 0.2 mol dm^{-3} , are skin/eye irritants (see CLEAPSS Hazcard [HC059b](#), [HC019b](#), [HC019d](#), [HC011](#)).
- Sodium hydroxide solution, $\text{NaOH}(\text{aq})$, 1 mol dm^{-3} is CORROSIVE (see CLEAPSS Hazcard [HC091a](#)).
- Sodium carbonate, $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, 0.5 mol dm^{-3} is an IRRITANT (see CLEAPSS Hazcard [HC095a](#)).
- Sodium sulfate, Na_2SO_4 , 0.5 mol dm^{-3} , Sodium chloride, $\text{NaCl}(\text{aq})$, 0.5 mol dm^{-3} , Sodium fluoride, $\text{NaF}(\text{aq})$, 0.5 mol dm^{-3} , Potassium iodide, $\text{KI}(\text{aq})$, 0.2 mol dm^{-3} and Potassium bromide, $\text{KBr}(\text{aq})$, 0.2 mol dm^{-3} , are of low hazard (see CLEAPSS Hazcard [HC098b](#), [HC047b](#), [HC089](#), [HC047b](#)).