



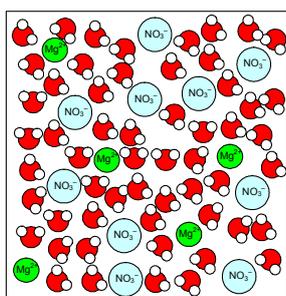
# GROUP 2 – SULFATES & HYDROXIDES

## PART 1 – Testing solubilities

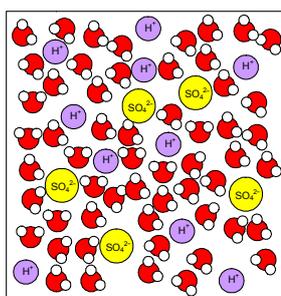
Test the solubility of the Group 2 sulfates and hydroxides. To test the solubility of the hydroxides, add solutions containing each Group 2 ion to a solution containing hydroxide ions. To test sulfate solubility, do something similar with a solution containing sulfate ions.

Solubility trend	Hydroxide	Soluble	Slightly soluble	Insoluble	Ionic equation for formation of any precipitate
	Mg(OH) <sub>2</sub>			!!	$\text{Mg}^{2+}(\text{aq}) + 2\text{OH}^{-}(\text{aq}) \rightarrow \text{Mg}(\text{OH})_2(\text{s})$
	Ca(OH) <sub>2</sub>		!!		$\text{Ca}^{2+}(\text{aq}) + 2\text{OH}^{-}(\text{aq}) \rightarrow \text{Ca}(\text{OH})_2(\text{s})$
	Sr(OH) <sub>2</sub>	!!			
	Ba(OH) <sub>2</sub>	!!			

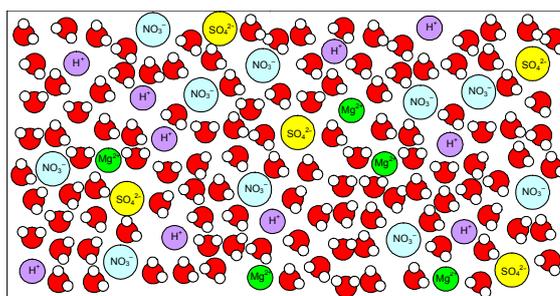
Solubility trend	Sulfate	Soluble	Slightly soluble	Insoluble	Ionic equation for formation of any precipitate
	MgSO <sub>4</sub>	!!			
	CaSO <sub>4</sub>		!!		$\text{Ca}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{CaSO}_4(\text{s})$
	SrSO <sub>4</sub>			!!	$\text{Sr}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{SrSO}_4(\text{s})$
	BaSO <sub>4</sub>			!!	$\text{Ba}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{BaSO}_4(\text{s})$



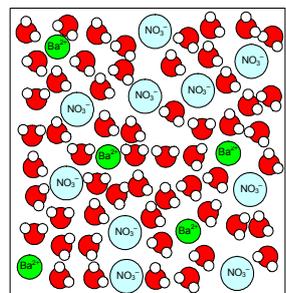
Mg(NO<sub>3</sub>)<sub>2</sub>(aq)



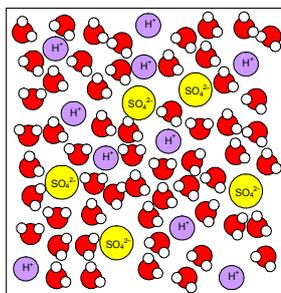
H<sub>2</sub>SO<sub>4</sub>(aq)



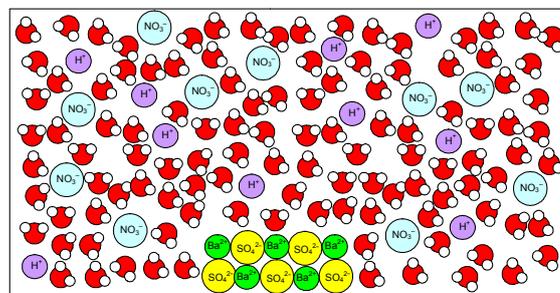
No reaction



Ba(NO<sub>3</sub>)<sub>2</sub>(aq)



H<sub>2</sub>SO<sub>4</sub>(aq)



Reaction takes place:  $\text{Ba}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{BaSO}_4(\text{s})$

### Some uses of these compounds

Compound	Mg(OH) <sub>2</sub>	Ca(OH) <sub>2</sub>	BaSO <sub>4</sub>
Use	Used as cure for indigestion (as a suspension in milk of magnesia – insoluble so not corrosive but does neutralise stomach acid)	Used by farmers to neutralise acidic soil (known as slaked lime)	Used for “barium meals” that allow X-rays of the intestines (patient drinks suspension of BaSO <sub>4</sub> in water – X rays cannot pass through it – it is not harmful as the BaSO <sub>4</sub> is insoluble in water)

### PART 2 – Testing for sulfate ions

Action	Reason
1) Add hydrochloric acid (aq) to the solution being tested.	This removes any other ions that could give a precipitate with barium chloride (aq), e.g. carbonate ions: $\text{CO}_3^{2-} + 2 \text{H}^+ \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
2) Add barium chloride (aq) to the solution being tested.	This produces a white precipitate with $\text{SO}_4^{2-}$ ions. $\text{Ba}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{BaSO}_4(\text{s})$

Sample	O	P	Q
Addition of BaCl <sub>2</sub> (aq)			
SO <sub>4</sub> <sup>2-</sup> ion contained (✓ or ✗)			

	Calcium compounds Magnesium compounds Strontium compounds		Barium compounds
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