

**Solubility Rules:**

- chlorides, iodides and bromides (soluble except silver, mercury and lead)
- fluorides (soluble except group 2 metals, manganese and lead)
- oxides (*insoluble* except calcium and barium)
- sulfates (soluble except barium, strontium and lead)
- carbonates, phosphates and hydroxides (*insoluble*)
- sulfides (*insoluble* except group 2 metals)

1. Write the following as formulae and indicate whether or not each will be soluble in water.

- |                     |                            |
|---------------------|----------------------------|
| (a) nickel fluoride | (d) silver sulfide         |
| (b) lead (IV) oxide | (e) mercury (II) hydroxide |
| (c) gold iodide     | (f) barium sulfate         |

2. An unknown ionic substance forms a precipitate with hydroxide and carbonate but not with sulphate or oxide. Deduce the cation, and give reasons.

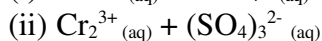
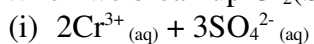
3. Write balanced ionic equations for the following:

- solid magnesium bicarbonate plus nitric acid
- chlorine gas plus sodium metal
- zinc metal plus sulfuric acid solution
- potassium carbonate solution plus hydrochloric acid
- silver nitrate solution plus ammonium phosphate solution

4. State two things you might observe if a lump of calcium carbonate was placed in a beaker of hydrochloric acid.

**BONUS QUESTIONS**

A) When we break up  $\text{Cr}_2(\text{SO}_4)_3$  (aq) into its ions, do we write it like (i) or like (ii)?



Explain why.

B) Explain how the *process* of NaCl dissolving in water is different to HCl dissolving in water.