Solubility

Soluble - the compound can dissolve in water

slightly soluble - an insignificant amount dissolves
↳ Would still be considered a solid (precipitant)

Insolube - the compound does not dissolve in water

solid (s) gas (g) liquid (l)

aqueous (aq) - when compound is dissolved in water (putting salt in water)

Solubility Rules

H, Li, Na, K, Rb, Cs, Fr
↑

1. All common compounds containing Group 1 or Ammonium are soluble (aq)
   ↳ NH_4^+

Lithium Carbonate — Rule 1 * Li_2CO_3 (aq)

Ammonium sulfide — $(NH_4^+)_2S^{2-}$ (aq)
*Rule 1

2. All Nitrates (NO_3^-), acetates ($C_2H_3O_2^-$), and chlorates (ClO_3^-) are soluble.

Calcium chlorate $Ca^{2+}(ClO_3^-)_2(aq)$ *Rule 2

3. All binary (contains two) compounds with halogens (group 17) with metals are soluble [Except! Silver, Mercury, & Lead.

Calcium Chloride $Ca^{2+}Cl^-_2(aq)$ ↳halogen

Strontium Fluoride $Sr^{2+}F^-_2(aq)$ ↳halogen

Silver Bromide (exception) $Ag^+Br^-(s)$ ↳halogen

4. All sulfates (SO_4^{2-}) are soluble EXCEPT: Ba, Ca, Sr, Pb, Ag, Hg

Barium Sulfate (exception) $Ba^{2+}SO_4^{2-}(s)$

Titanium (III) (charge) Sulfate $Ti_2^{3+}(SO_4^{2-})_3(aq)$

5. Carbonates (CO_3^{2-}), hydroxides (OH^-), oxides (O^{2-}), silicates (silicon), and phosphates (PO_4^{3-}) are insoluble (s).

Calcium hydroxide $Ca^{2+}(OH^-)_{2(s)}$

Sodium Carbonate $Na_2^{+}(CO_3^{2-})_{(aq)}$ *Rule 1

$Sr_3^{2+}(PO_4^{3-})_{2(s)}$ *Rule 5

6. Sulfides (S^{2-}) are insoluble EXCEPT: Ca, Ba, Sr, Mg

Iron(II) sulfide (II = charge) $Fe^{2+}S^{2-}_{(s)}$

Magnesium sulfide $Mg^{2+}S^{2-}_{(aq)}$