

Solubility Rules for Aqueous Solutions

“Sol.” means that more than 3g of the substance dissolves in 100 ml of water. “Ppt.” indicates that the combination forms a precipitate.

Solubility of Aqueous Solutions							
	alkali or NH_4	Ag, Hg, or Pb	Ba, Sr	Ca	Mg	Fe, Cu, Zn	other metals
nitrate (NO_3^-), acetate (CH_3COO^-), chlorate (ClO_3^-), perchlorate (ClO_4^-)	sol.	sol.	sol.	sol.	sol.	sol.	sol.
fluoride (F^-)	sol.	ppt.	ppt.	ppt.	ppt.	ppt.	ppt.
chloride (Cl^-), bromide (Br^-), iodide (I^-)	sol.	ppt.	sol.	sol.	sol.	sol.	sol.
sulfate (SO_4^{2-})	sol.	ppt.	ppt.	ppt.	sol.	sol.	sol.
carbonate (CO_3^{2-}), phosphate (PO_4^{3-})	sol.	ppt.	ppt.	ppt.	ppt.	ppt.	ppt.
oxide (O^{2-})	form OH	ppt.	ppt.	ppt.	ppt.	ppt.	ppt.
hydroxide (OH^-), sulfide (S^{2-})	sol.	ppt.	sol.	sol.	ppt.	ppt.	ppt.
chromate (CrO_4^{2-})	sol.	ppt.	ppt.	sol.	sol.	ppt.	ppt.

Compounds that are Soluble in Water

1. All common salts of the alkali metals (Group IA/1) or ammonium (NH_4^+) are soluble.
2. All common acetates (CH_3COO^-) and nitrates (NO_3^-) are soluble.
3. All binary compounds of a metal plus a halogen (Group VIIA/17) are soluble except for fluorides (F^-) and compounds containing silver (Ag), mercury (Hg), or lead (Pb).
4. All sulfates (SO_4^{2-}) are soluble except for those of barium (Ba), strontium (Sr), lead (Pb), calcium (Ca), silver (Ag), or mercury (Hg).

Compounds that are Insoluble in Water

1. All carbonates (CO_3^{2-}), phosphates (PO_4^{3-}), and oxides are insoluble except for alkalis (soluble compounds rule #1).
2. All hydroxides (OH^-) and sulfides are insoluble except for alkalis (soluble compounds rule #1) and compounds containing calcium (Ca), strontium (Sr), or barium (Ba).
3. All chromates (CrO_4^{2-}) are insoluble except for alkalis (soluble compounds rule #1) and compounds containing calcium (Ca) or magnesium (Mg).

Solubility Curve

