CSUS Chemistry 1A Solubility Rules Dr. Mack

The following is a list that complies the general solubility rules for inorganic compounds (salts). There are some rare exceptions that are not covered by this list, they are of no concern to you at this time.

The solubility of most inorganic compounds (cation + anion) will be governed by the first two rules: Either the compound in question falls under the first two rules and is therefore soluble or it does not and is therefore insoluble. Yes, it is just that simple! If you understand the first two rules, you will like likely be able to discern the solubility of a compound.

You may also use deduction to determine the solubility of a compound. If you are given four compounds, one you are told is insoluble, if three of them fall under rule 1 or 2, then the fourth is the precipitate!

Rule:	Soluble Compounds	Exceptions
1	Gr. 1 Cations (Na^+, K^+ etc..) & ammonium (NH_4^+)	none
2	nitrates (NO_3^-), acetates ($C_2H_3O_2^-$), chlorates (ClO_3^-) & perchlorates (ClO_4^-)	none
3	halides (Cl^-, Br^- & I^-) ***not*** F^-	Ag^+, Hg_2^{2+} & Pb^{2+}
4	fluorides (F^-)	Mg^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+} & Pb^{2+}
5	sulfates (SO_4^{2-})	Ca^{2+}, Sr^{2+}, Ba^{2+} & Pb^{2+}

Rule:	Insoluble Compounds	Exceptions
6	carbonates (CO_3^{2-}) phosphates (PO_4^{2-}) oxalates ($C_2O_4^{2-}$) chromates (CrO_4^{2-}) sulfides (S^{2-}) oxides (O^{2-})	Gr. 1 Cations (Na^+, K^+ etc..) & ammonium
	hydroxides (OH^-)	Gr. 1 Cations (Na^+, K^+ etc..) & ammonium, Ba^{2+}, Sr^{2+} & Ca^{2+}

All acids (weak & strong) are soluble

In your reading you may encounter salts that are classified as "slightly soluble". For the purposes of this course, we will consider them to be completely soluble. Later in chem. 1B, you will understand the extent of solubility quantitatively when you learn more about equilibrium.

Please refer to chapter 3 of your text and experiment 3: "Reactions in Aqueous Solutions" for more examples and details.