Common Ion Effect

Strong electrolyte:

An electrolyte (ionic compound) that under goes almost 99.99% dissociation.

Weak electrolyte:

A weak electrolyte is an ionic compound that has a low solubility, for generalization we may say ionic compounds that have dissociation less than 50% can be safely called weak electrolytes.

So the implication is that weak electrolytes exist in equilibrium when dissolved in water, hence the Le Chatliers principle is applicable to a system in equilibrium.

If you have a compound like PbI_2 which has a low solubility in water and we try to dissolve it in distilled water and a solution of NaI, the solubility of the compound will be affected by the presence of iodide ions coming from sodium iodide.

	NaI	→	$Na^{+1}_{(aq)}$	+ $I^{-1}_{(aq)}$
	PbI_2	← →	Pb^{2+}	+ $2\ I^{-1}_{(aq)}$
i				
c				
e				

So the common ion here is the iodide ions, PbI_2 is the weak electrolyte, hence the equilibrium of the dissociation of this compound will be affected by the presence of the iodide ions from sodium iodide which is a strong electrolyte. The equilibrium of the dissociation of the weak electrolyte in this case PbI_2 will shift left, which implies the solubility of PbI_2 will be very low.

Solve the following problem

The K_{sp} for the salt cannot be exceeded, so not as much NaCl will be able to dissolve.

What is the molar solubility of PbI_2 in a 0.10 M solution of NaI? K_{sp} for $PbI_2 = 7.9 \times 10^{-9}$.

Definition: Suppression of ionization of a weak electrolyte by the addition of a strong electrolyte having a common ion with the weak electrolyte.

Selective Precipitation

Using Ksp and solubility rules, separate the following ions from its aqueous solution mixture.

You may use common ion effect to bring about the separation, however you should be able to rationalize the procedure adopted, or the chemistry involved.

- An aqueous solution containing Al^{3+} ions and Zn^{2+} ions using Ammonium hydroxide NH_4OH. You may choose a different set of reagents to bring about the same separation.
- Separate a mixture of anions present in a solution containing Iodide ions and sulfate ions.

Selective Precipitation Sample Solved