

Solubility & Ksp

& Nuclear

Ksp

- Ksp - the study of the solubility of insoluble ionic compounds ???
- Ksp - solubility product constant

Writing Ksp Expressions

- $\text{CaF}_2(s) \leftrightarrow \text{Ca}^{+2} + 2\text{F}^-$
- $\text{Mg}_3(\text{PO}_4)_2(s) \leftrightarrow 3\text{Mg}^{+2} + 2\text{PO}_4^{-3}$
- $\text{BaSO}_4(s) \leftrightarrow \text{Ba}^{+2} + \text{SO}_4^{-2}$

Example

- The solubility of CuBr is 2.0×10^{-4} M. What is the value of Ksp?

Example 2

- What is the molar solubility of Ag_2S if the K_{sp} is 1.6×10^{-49} ?

Example 3

- What is the molar solubility of bismuth (III) sulfide if the K_{sp} is 1.1×10^{-73} ?

Example 4

- The pH of a solution of $\text{Fe}(\text{OH})_3$ is 2. What is the molar solubility?
 $K_{\text{sp}} = 4 \times 10^{-38}$.

Will a solid form???

- Compare K_{sp} to Q_{sp}
- $Q > K$ = yes ppt will form
- $Q < K$ = no ppt
- Q is reaction quotient...just like K but not at equilibrium

Example

- Will a ppt form? 50.0 ml of a 0.00025 M Na_3PO_4 solution is mixed with 50.0 ml of 0.0025 M BaCl_2 . K_{sp} of $\text{Ba}_3(\text{PO}_4)_2$ is 6×10^{-39} .

Competing ppt

- NaCl is added to a 50 ml beaker that contains a mixture of 0.00015 M $\text{Pb}(\text{NO}_3)_2$ and 0.00035 M AgNO_3 . What ppt will form 1st? Show your work.