

VII) Quantitative Solubility

A saturated solution is at equilibrium because the rate of dissolving equals the rate of precipitation



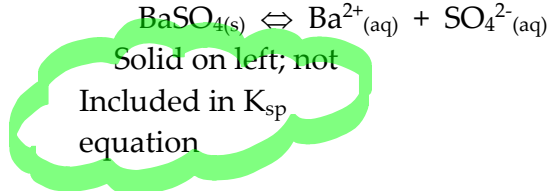
Since equilibrium exists, we can work with an equilibrium constant (K_{sp}). The equilibrium constant for a saturated solution is called a K_{sp} .

Write the K_{sp} equation for $BaSO_4$: $K_{sp} = \frac{[Ba^{2+}][SO_4^{2-}]}{1}$ *BaSO₄(s) is a solid (not included)*

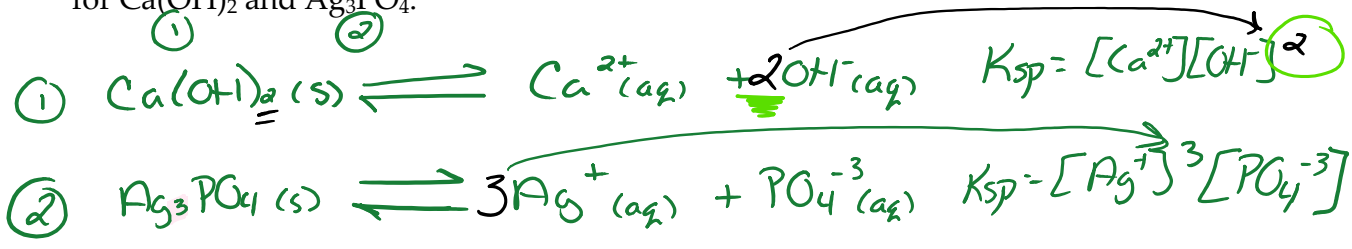
The 'sp' from K_{sp} stands for solubility product.

The word 'product' is mathematical. A product is the result of a multiplication.

K_{sp} equations only contain multiplication (no division) because since the solid is always written on the left of the saturated solution equation, there will never be a denominator for the K_{sp} equation.



Write the saturated solution equations (solid on left) and the respective K_{sp} equations for $Ca(OH)_2$ and Ag_3PO_4 .



Do **soluble** salts have large or small K_{sp} constants? Why? What about **low solubility** salts?

Soluble salts have large ion concentrations, and since K_{sp} is multiplying [ions], soluble salts have a LARGE K_{sp} value.

Low solubility salts have very low ion concentrations, therefore have a very small K_{sp} value.

Notice that the K_{sp} table in the data booklet (p.5) only lists K_{sp} constants for low solubility salts. Notice they are all small values (much less than 1), as they should be.