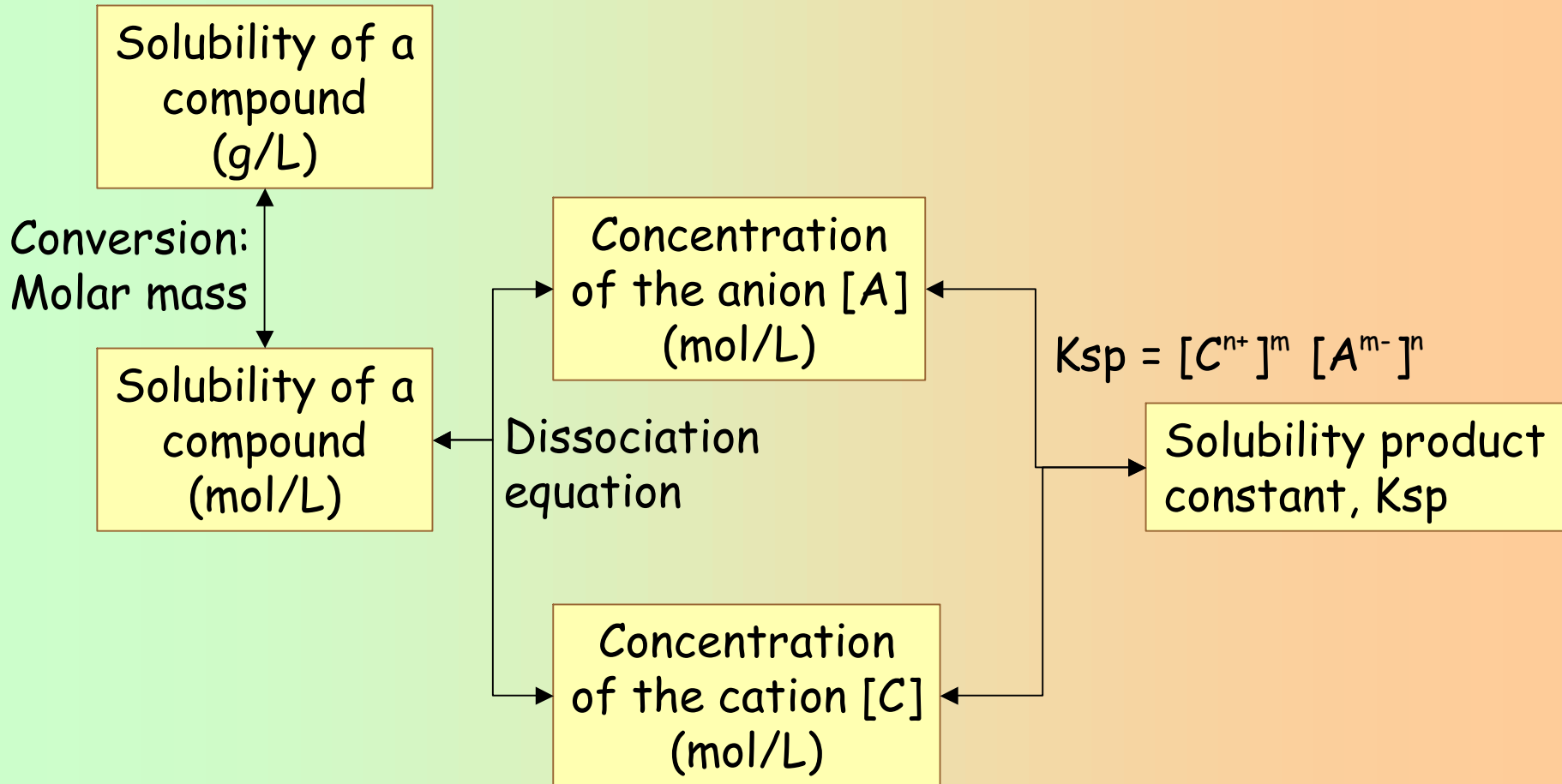
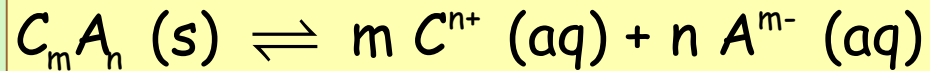


Ksp and Solubility

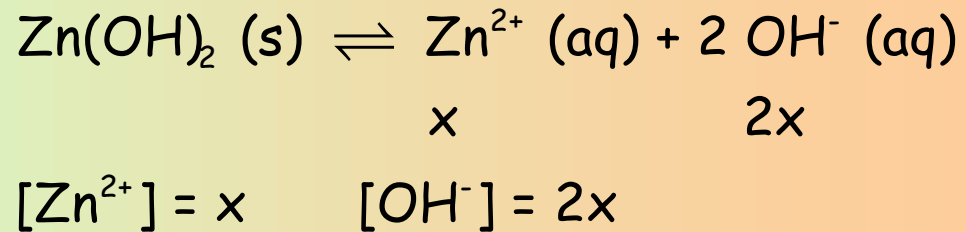
Relationship between Kps and Solubility



K_{sp} and Solubility

Exercise. The solubility product constant of zinc hydroxide, Zn(OH)₂, is $4.5 \cdot 10^{-17}$. Determine the mass of hydroxide that can be dissolved in 50 mL of water. The molar mass of zinc hydroxide is 99.4 g/mol.

The solubility of zinc hydroxide is x (in moles per liter)



The value of x

$$K_{sp} = 4.5 \cdot 10^{-17} = [\text{Zn}^{2+}] [\text{OH}^-]^2 = (x) \cdot (2x)^2 = 4 x^3$$
$$x = \left(\frac{4.5 \cdot 10^{-17}}{4} \right)^{1/3} \rightarrow x = 2.24 \cdot 10^{-6} \text{ mol/L}$$

The mass of solute

$$m = 50 \cdot 10^{-3} \text{ L} \cdot \frac{2.24 \cdot 10^{-6} \text{ mol}}{1 \text{ L}} \cdot \frac{99.4 \text{ g}}{1 \text{ mol}} = 1.11 \cdot 10^{-5} \text{ g Zn(OH)}_2$$