

## Solubility and the Ksp

### The Quantitative Aspect of Solubility

A substance is considered soluble if its solubility is greater than **0.1 mol/L**.

This is not an arbitrary cut off. It was picked because most substances have solubilities either much greater or much less than this number.

Sodium chloride is a very soluble salt. This means that there is a strong tendency towards disorder and dissociated ions.

### Solubility and Equilibrium

1) The **rate of dissolving** depends on 2 factors:

- \_\_\_\_\_
- \_\_\_\_\_

2) The **rate of crystallization** (or precipitation) depends on:

- \_\_\_\_\_
- \_\_\_\_\_

3) The factors which determine the solubility of a **solid in a liquid**:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

4) The factors which determine the solubility of a **gas in a liquid**:

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

### **K<sub>sp</sub>**

- Is just another equilibrium constant
- In any water solution in equilibrium with a slightly soluble (insoluble) ionic compound, the product of the concentrations of its ions, raised to a power equal to its coefficient in the solubility equation is a constant = **K<sub>sp</sub>** = the solubility product constant
- K<sub>sp</sub> has a fixed value at a given temperature, independent of the concentrations of the individual ions.
- The K<sub>sp</sub> of a substance is the equilibrium constant for a substance dissolving in a solvent and crystallizing back out.



$$\text{K}_{\text{sp}} = [\text{Ba}^{2+}]^3 [\text{PO}_4^{3-}]^2$$