SCH3U1

Aqueous Solutions

**Solubility** is a relative term since all solutes will have some solubility in water. Insoluble substances simply have extremely low solubility. The solubility rules are a general set of guidelines used to predict whether an ionic compound will be soluble or insoluble in water.

low high

“insoluble” partial “very soluble”

(< 0.1 g/100mL) solubility (> 1 g/100mL)

# **Factors Affecting Solubility in Water**

**1) The Charge on an Ion**

* as the ionic charge increases, attraction between ions increases
* therefore as charge ↑, solubility ↓
* e.g. chloride salts (Cl-) are more soluble than phosphate salts (PO43-)

**2) Ion Size**

* smaller ions contain shorter bonds
* therefore these bonds are stronger than larger ions with the same charge
* as ion size ↑, solubility ↑
* e.g. solubility at 20oC: LiF 0.27 g/100 g water

KCl 34.7

KBr 53.5

Effect of Temperature on Solubility

* When heating a solvent, the solvent particles move faster and spread apart, creating more space between them.
* This allows more solute to fit between the solvent particles, increasing the solubility.

Effect of Temperature on Solubility

* Gases are less dense than liquid solvents.
* Picture gas molecules trapped within solvent particles, wanting to escape.
* Increased temperature causes solvent particles to spread apart, creating opportunity for gas particles to escape.
* Increase temperature, decrease solubility of a gas.