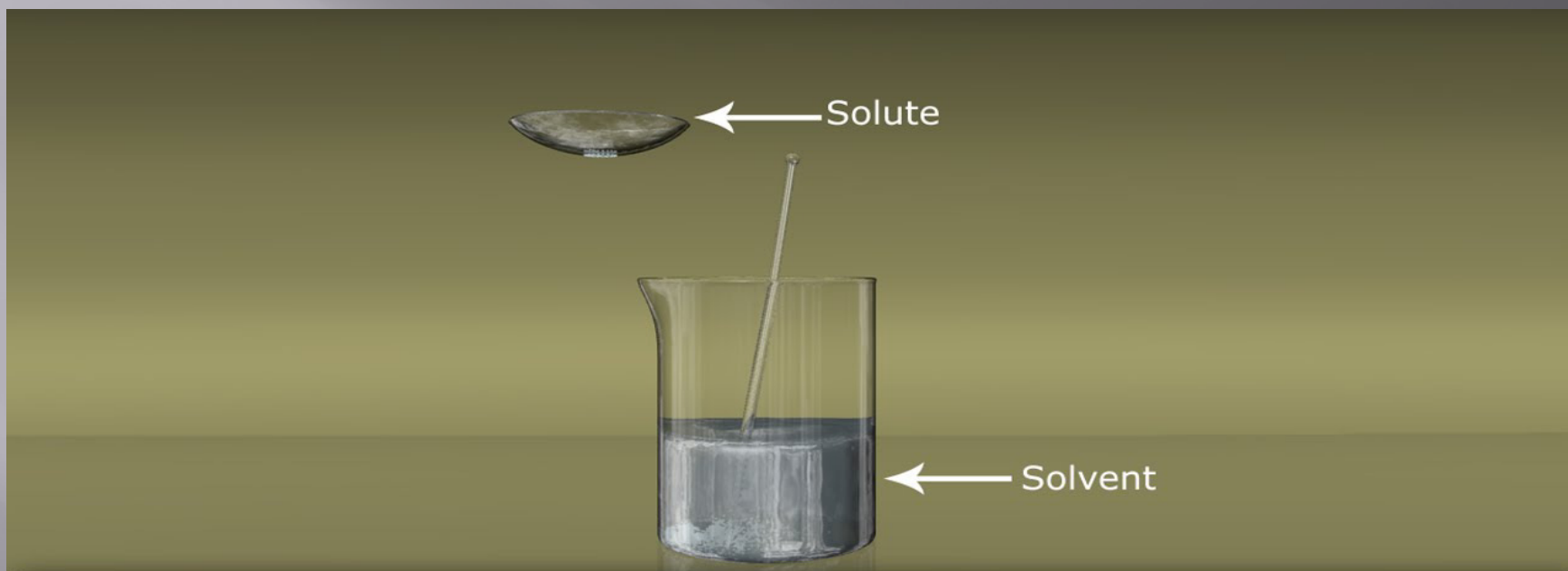


SOLUBILITY



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DEFINITION

- ▣ Solubility is the ability of a solid, liquid, or gaseous chemical substance (referred to as the *solute*) to dissolve in *solvent* (usually a liquid) and form a *solution*.

SOLUBILITY PRODUCT

- ▣ It is applicable to the sparingly soluble salts.
- ▣ It is the maximum product of the molar concentration of the ions (raised to their appropriate powers) which are produced due to dissociation of the compound.

FACTORS AFFECTING SOLUBILITY

- ▣ TEMPERATURE
- ▣ PRESSURE
- ▣ FORCES AND BONDS

TEMPERATURE

- ▣ The solubility of a given solute in a given solvent typically depends on temperature. For many solids dissolved in liquid water, solubility tends to correspond with increasing temperature. As water molecules heat up, they vibrate more quickly and are better able to interact with and break apart the solute.
- ▣ The solubility of gases displays the opposite relationship with temperature; that is, as temperature increases, gas solubility tends to decrease.

PRESSURE

- ▣ Pressure has a negligible effect on the solubility of solid and liquid solutes, but it has a strong effect on solutions with gaseous solutes.
- ▣ Gaseous substances are much influenced than solids and liquids by pressure. When the partial pressure of gas increases, the chance of its solubility is also increased. A soda bottle is an example of where CO_2 is bottled under high pressure.

POLARITY

- ▣ Solubility is “Like dissolves like.”
- ▣ This statement indicates that a solute will dissolve best in a solvent that has a similar chemical structure.
- ▣ For example, a polar solute such as sugar is very soluble in polar water, less soluble in moderately polar methanol, and practically insoluble in non-polar solvents such as benzene. In contrast, a non-polar solute such as naphthalene is insoluble in water, moderately soluble in methanol, and highly soluble in benzene

EFFECT OF TEMPERATURE ON SOLUBILITY OF PRECIPITATE

- ▣ Solubility of the most inorganic salt will be increased by increasing in the temperature.
- ▣ Solubility of some salt/substances is influenced by temperature is small but with others it is more.
- ▣ It gives advantage if the precipitation process is carried out in hot solution because impurities are dissolved & filtered out.
- ▣ Example :
 - ▣ Solubility of AgCl – At 10 degree Celsius = 1.72g/l
At 100 degree Celsius = 21.10g/l
 - ▣ Solubility of BaSO₄ – At 10 degree Celsius = 2.2g/l
At 100 degree Celsius = 3.9 g/l

EFFECT OF ACIDS ON SOLUBILITY OF PRECIPITATE

- ▣ Solubility of a salt will be increased by decrease in the pH value or increasing acidity.
- ▣ Anion of the salt should be conjugate of the weak acid .
- ▣ When slightly soluble salt BA & weak acid HA is taken, then at the equilibrium equation will be :-



- ▣ Due common ion effect equilibrium reaction of salt shifts toward right side & more will convert into B⁺ & A⁻ & solubility will increase.

EFFECT OF SOLVENT ON SOLUBILITY OF PRECIPITATE

- ▣ Most of the inorganic solvent are more soluble in water because it shows dipole moment & attract cations as well as anions .
- ▣ These cations and anions will be converted into hydrated ions due to water.
- ▣ Solubility of the most inorganic salts will be decreased by addition of methyl, ethyl or n-propyl alcohols.
- ▣ Example :- addition of 20% ethanol into PbSO_4 converts PbSO_4 practically insoluble & precipitant.

THANK YOU