[from:- Dr. A. K. Gupta. (chemistry)]

* Solubility :-

The amount of solute in gram dissolved in 100 gram(ml) of the solvent to form saturated solution at a given temperature, is called solubility.

factors affecting the solubility of a solid in a liquid :-

1). Nature of solute & solvent :-

Ionic compounds dissolved in polar solvent like H_2O.

eg - NH_3, $H_2S(l)$, $SO_2(l)$ etc.

Non-polar compounds like naphthalene, anthracene etc dissolved in non-polar solvents (organic solvents).

2). Effect of temperature :-

The solubility of sugar, urea, NaCl, $NaNO_3$, KCl, KNO_3 etc in H_2O increases with increase in temp^{re}.

If the temperature is increases more, heat is absorbed and reaction proceeds in forward direction and more solute gets dissolved. (Endothermic process)

The solubility of $Na_2CO_3 \cdot H_2O$, Li_2CO_3, KOH etc in H_2O decreases with increase in temperature. (Exothermic process)

3). Effect of Pressure :-

Pressure doesn't have any significant effect on solubility of solid in liquid.

* Factors affecting the solubility of gas in liquid.

1) Nature of the gas :-

The most soluble gases are those which chemically react with the liquid solvent.

Gases like H_2, N_2, O_2 etc dissolved only slightly in H_2O.

Gases like CO_2, NH_3, HCl etc. are highly soluble in H_2O.

2). Nature of the liquid solvent :-

Solubility of O_2, N_2, CO_2 etc is greater solubility in ethanol than in H_2O.

Solubility of NH_3, H_2S etc is greater solubility in H_2O than in ethanol.

3). Effect of temperature :-

The solubility of gas decreases with the increase in temperature because dissolution of gas is exothermic.

4). Effect of pressure :-

The solubility of a gas in liquid increases with the increase in pressure.

* Henry's law :-

The mass of gas that dissolved in a given volume of liquid at constant temperature is proportional to the pressure of gas in equilibrium with the solution provided the gas does not undergo any chemical change during the dissolution.

i.e.

$$m \propto p$$

or

$$m = K \cdot p$$

where,

m = mass of the gas dissolved in a given volume of liquid

P = partial pressure of the gas at equilibrium

K = Henry's constant.

In other way -

Henry's law may also be defined as -

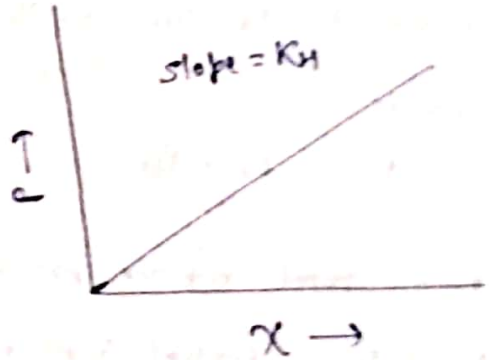
The partial pressure of the gas above the solution is proportional to its mole fraction in the solution.

Thus,

$$P \propto X$$

$$\therefore P = K_H X$$

Where, K_H = called Henry's law constant.



The value of K_H depends upon temperature, nature of the solvent and nature of the gas.

* Applications :-

(1) CO_2 gas in sodawater sealded under high pressure.

(2) In lungs, the partial pressure of O_2 is high. Haemoglobin combines with O_2 to form oxyhaemoglobin. In tissue, the partial pressure of O_2 is low. oxyhaemoglobin gives out O_2 to be utilized for cellular activities.

[from: Dr A. K. Gupta (Chemistry)]