(i) Nature of Solute and Solvent → Like dissolve like is the general rules for the solubility.
- polar solutes are highly soluble in polar solvent (H_2O), and non-polar solutes are insoluble in water.
Eg: glucose, and sugar are soluble in water, while I_2 is insoluble.

(i) Temperature (T) → Solubility of solid solute or Temp ↑ with increasing Temperature solubility of solid solute increases.

(ii) Pressure (P) → No effect because solid is Incompressible.

Factors affecting the solubility of a gas in a liquid →

(i) Nature of Solute and Solvent →
non-polar gases like H_2, O_2 & N_2 dissolve in H_2O in small amount while CO_2, HCl, NH_3 are highly soluble in water because they are polar in nature. O_2, CO_2, N_2 are more soluble in C_2H_5OH than H_2O.

(ii) Effect of Temp →

gas + liquid ⇌ Solution + Heat

for Exothermic rxn solubility of gas in liquid decreases with increasing Temp

for Endothermic rxn

gas + solvent + Heat ⇌ Solution

solubility increases with increasing Temp

(iii) Effect of Pressure → with increasing pressure solubility of gas in liquid increases i.e P ∝ solubility

This fact can be explained on the basis of Henry's law —

Henry's law → The solubility of a gas dissolved in given volume of liquid at constant Temp(T) is directly proportional to pressure of the solution in equilibrium.

i.e $m \propto P_g$ / $m = K_H P_g$

where K_H is a constant which is called Henry's constant. K_H - value depends upon the nature of the gas.

Dr. L.K Jha
Dept. of chemistry

Key Point of Solution :→ B. M. College

Mass % of a Component = $\frac{\text{Mass of the component in solution} \times 100}{\text{Total mass of solution.}}$

Mole fraction(x_A) = $\frac{n_A}{n_A + n_B}$, Molarity = $\frac{\text{no. of moles of solute}}{\text{Volume of soln in litre}}$

$M = \frac{n}{V}$, Molality(m) = $\frac{\text{no. of moles of Solute}}{\text{wt of solvent (in kg)}}$

Normality = $\frac{\text{no. of gram equivalent of solute}}{\text{Volume of solution (in litre)}}$

$N = \frac{w}{E \times V}$ or, $N = \Delta n \times M$ where M = Molarity, Δn = valency factor

Relation b/w Molarity and Molality →

$M = \frac{m \times d}{\left(1 + \frac{m M_2}{100}\right)}$ where m = molality, d = density, M_2 = molecular mass of Solute.

Relation b/w molality and Molefraction :→

$$\text{molality} = \frac{1000 \times \text{molefraction of solute}}{\text{molefraction of solvent} \times \text{molar mass of solvent}}$$

$$\Rightarrow m = \frac{1000 \times x_1}{x_2 \times M_{solvent}}$$

Remember this for Solving Numericals Problems

Relation b/w Molarity (M) and Molefraction →

$$M = \frac{1000 \times d \times x_{solute}}{x_{solvent} \times M_{solvent} + x_{solute} \times M_{solute}}$$

Solubility → The amount of a solute present in 100 grams of the saturated solution at a given Temperature is called solubility.

Solubility of a solute in a liquid depends upon the following factors :→ (i) Nature of the solute (ii) Nature of solvent (iii) Temperature of the solution (iv) Pressure (in case of gas P). (A) Solubility of solid in liquid →

P.T.O