SOLUTION & COLLIGATIVE PROPERTIES

TYPES OF SOLUTIONS

BRIEF INTRODUCTION OF SOLUTION:-

Definition of Solution

When two or more chemically non-reacting substances are mixed and form homogeneous mixture is called solution.

HOMOGENEOUS MIXTURE:-

When the solution is composed of only two chemical substances, it is termed a binary solution, similarly, it is called ternary and quaternary if it is composed of three and four components respectively.

Solution = solute + solvent

Solute:

Generally, the component present in lesser amount than other component in solution is called solute.

Solvent:

Generally, the component present in greater amount than any or all other components is called the solvent.

* Physical state of solvent and solution is same.

Ex. In a syrup (liquid solution) containing 60% sugar (a solid) and 40% water (a liquid - same aggregation as solution), water is termed as the solvent.

Dilute Solution:

A solution in which relatively a small amount of solute is dissolved in large amount of solvent is called a dilute solution.

Concentrated solution:

A solution in which relatively a large amount of the solute is present is called a concentrated solution.

Saturated solution:

The maximum amount of solute in grams, that can be dissolved in 100 g of a solvent at a particular temperature is called solubility of the solute and such a solution is called saturated solution.

Super saturated solution:

A solution containing more amount of solute than that required for saturation of a given amount of solvent at a particular temperature, is called a supersaturated solution.

* It is unstable system.

SOLUTION AND ITS TYPE: -

TYPES OF SOLUTIONS

S.NO.	SOLUTE	SOLVENT	TYPES OF SOLUTIONS	EXAMPLES
SOLID SOLUTIONS				
1	Solid	Solid	Solid in solid	All alloys like brass, bronze, an alloy of copper and gold, etc.
2	Liquid	Solid	Liquid in solid	Amalgam of mercury with Na, $CuSO_4.5H_2O$. $FeSO_4.7H_2O$
3	Gas	Solid	Gas in solid	Solution of H_2 in Pd, dissolved gases in minerals.
LIQUID SOLUTIONS				
4	Solid	Liquid	Solid in liquid	Sugar solution, salt solution, I_2 in CCl_4
5	Liquid	Liquid	Liquid in liquid	Benzene in toluene, alcohol in water.
6	Gas	Liquid	Gas in liquid	CO_2 in water, NH_3 in water etc.
GAS IN LIQUID				
7	Solid	Gas	Solid in gas	Iodine vapours in air, camphor vapours in N_2.
8	Liquid	Gas	Liquid in gas	Water vapours in air, CHCl3 vapours in N_2.
9	Gas	Gas	Gas in gas	Air ($O2 + N_2$)

Sp. Note: The solution of liquid in gas or solid in gas is not possible because the constituents cannot form a homogeneous mixture.

Properties of a solution

(i) A solution consists of a single phase i.e.; it is a monophasic system.

(ii) A solution is uniform throughout, so it has uniform properties such as density refractive index, etc.

(iii) Size of solute particles in a solution is of the order $10^{-7} - 10^{-8}$ cm.

(iv) The components of a solution cannot be easily separated by physical methods.

(v) The properties of a solution are the properties of its components. **i.e.,** the components do not lose their properties when they form a solution.

(vi) The composition of a solution is not definite but can vary within certain limits.

(vii) Certain properties of solution such as density, viscosity, surface tension, boiling point, freezing point etc. vary with the composition of the solution.