''बेटी बचाओ, बेटी पढ़ाओ''

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

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Course - B.Pharm(3rd sem)

Session - Physical Pharmaceutics –
(Solvation and Association – Part I)

AcademicDaystartswith–

- Greeting with saying **'Namaste'** by joining Hands together following by 2-3 Minutes Happy session, Celebrating birthday of any student of respective class and **National Anthem**

SOLVATION AND ASSOCIATION

SOLVATION

Sometimes, the solvation process is referred to as dissolution. The rate of solvation, a kinetic process, is used to measure it. It is the attraction and interaction of solute or ion molecules with solvent molecules. An object's solubility in a specific solvent indicates that the object's molecules or ions disperse and surround themselves with solvent molecules.

Solvation complexes are made up of a solute's molecule or ion and a solvent. Rearranging solvent and solute molecules into solvation is the process of solvation. Complexes to properly disperse the solvent's solute molecule population.

The solution process Influenced by dipole-dipole, van der Waals, and hydrogen

bonding forces interactions between induced dipoles and interactions between induced dipoles). Depending on the molecular makeup and characteristics of the solvent and solute, one or more of these forces may be at work. Instead of dissolving, insoluble solute molecules interact with other solute molecules.

The solvent to split apart and become solvated, such as the solvation of functional groups on an Ion-exchange resin's exterior. In actuality, solvation is the interaction between a solute and a solvent. This causes the solute species in the solution to stabilize.

A solute is solved by hydration is the word for water. Conceptually, solvation differs from solubility. The dynamic equilibrium state reached when the rate of dissolving and the rate of precipitation are quantified as solubility. The distinction is made clearer when the units are taken into account. The common dissolving rate measurement unit is mol/sec.

A concentration is expressed in terms of solubility units as mass per volume (mg/mL), moles per liter, etc. How well a solute works depends on how similar the solvent and solute are. Is soluble in a solvent.

Solvation is an interaction of solute with the solvent which leads to stabilization of the solute species in solution.

Solvation

Solute + solvent solution

In solvation state, a solute ion in a solution is surrounded by solvent molecule.

Solvation involves bond formation, hydrogen bonding, van der Waal forces etc.

ASSOCIATION

In a chemical reaction known as association or ion association, ions with opposing electrical charges combine in a solution to create a unique chemical compound. According to the number of ions that they associate with, ions are

divided into three categories: ion pairs, ion trios, etc. Ion pairs are also categorized based on the type of interaction, such as contact, either common or separate solvents are used. The primary element that influences the severity of the solvent's dielectric constant is determined by ion association. Ion partners have been by using vibrational spectroscopy to characterize. Association means joining or addition.

When the same molecules of one of the component in a solution interact then this phenomenon is termed as association.

There are three types

1 Fully solvated

2 Solvent share and solvent separated

3 Contact

The ion pair is said to be fully solvated when both ions have a full primary solvation sphere. Solvent-shared ion pairs are those in which the cation and anion share about one solvent molecule. Finally, when the ion pair is known as a contact ion pair because the ions are in contact with one another. In touch ion pair, the ions still retain the majority of their solvation shell, and this solvation shell has a nature that is not widely known. Metal cations are found in aqueous solution and other donor solvents. The principal solvation shell is surrounded by 4 to 9 solvent molecules, however the Most of the time, the nature of anion solvation is unknown.

An outer-sphere complex is another term for a solvent-shared ion pair. In co-ordination chemistry, the term "outer sphere complex" is frequently used to describe a complex between a solvated metal cation and an anion. A contact ion pair can also be referred to as an inner sphere complex. The proximity of the ions to one another is the primary distinction between these three types: As Fully solvated >, the order of proximity is prohibited. Solvent sharing Contact.

When ion pairs are fully solvated and share a solvent, the interaction is largely electrostatic, but some covalent character in the link between an ion pair in contact. There are also cations and anion present.

One cation and two anions or one anion and two cations can combine to form an ion triplet. It is possible to construct higher aggregates. The association of three species occurs in ternary ion associates. Intrusion ion pair is a different type that has also been identified.

THE FACTORS INFLUENCING SOLUBILITY OF DRUGS

The majority of solid solutes are much more soluble when the temperature is higher. A change in the physical state of the solid analogs (melting) occurs when a solid dissolves in a liquid. The bonds holding the molecules of the solid together must be broken by heat. At the same time, heat is released as fresh solute-solvent bonds develop.

Following factors affected solubility of drugs

1 Nature of solute and solvent

2 Temperature

3 Pressure

4 Surface area

Nature of solute and solvent

If solute have same nature as solvent and solvent have same nature as solute for example solute have polar and solvent have polar then the solubility increases and they different in nature then solubility decreases. So we can say that the solubility of drugs is directly proportional to nature of solute and solvent

Temperature

Solubility of directly depend temperature with the increase in temperature the

process of solution absorbs the energy and thus the solubility will get increase.

If the process of solution release the energy with increase in temperature then it will decreases solubility.so we can say that solubility of drugs is directly depend upon the temperature of solute solvent solution.

Pressure

With variations in pressure, liquids and solids hardly ever vary in solubility. The pressure of the gas in contact with the liquid is significant when analyzing the solubility of gases in liquids. More gas dissolves in liquids when the gas pressure is higher. For instance, the soda bottle is sealed after being pressurized with a lot of carbon dioxide. When the bottle's cap is removed, the liquid's pressure drops to 1 atm, and the soda fizzes. The carbon dioxide that was dissolved in the soda is what is fizzing. As a result, carbon dioxide is less soluble at lower pressures**.**

DIFFUSION PRINCIPLES IN BIOLOGICAL SYSTEMS

From places of high concentration to areas of lower concentration, matter diffuses along energy gradients. The size of the concentration gradient, particle size, and temperature all affect the rate of diffusion. The selectively permeable cell in biology two unique forms of diffusion are produced by membranes: osmosis for the diffusion of water, and dialysis for the solute diffusion

- **Next Topic-**

➢ Physical Pharmaceutics-I (Diffusion principle in biological system – Part II)

- **Academic Day ends with-**

National song 'Vande Mataram’

Reference :

1 Dr. Hajare A. Ashok A text book of physical pharmaceutics niraliprakashan first edition july 2018