Colloidal electrolytes

Colloidal electrolytes are solutions of salts in which one ion has been replaced by a heavily hydrated, polyvalent micelle, carrying an equivalent sum total of electrical charges and also serving as an excellent conductor of electricity. Alternatively colloidal electrolytes are those electrolytes that are partially associated and that form conducting when dissolved in water.

Dyes, various indicators, gelatin, salts, soaps, detergents etc. are the examples of colloidal electrolytes.

In general, substances with high molecular weights and containing long carbon chains, which are capable of producing the ordinary ion, are colloidal electrolytes.

Classification of Surface active agents or colloidal electrolytes

The colloidal electrolytes are divided into three classes.

(1.) Colloidal electrolyte with active anion:

examples are, soaps ($RCOO^-Na^+$), synthetic detergents etc.

(2.) colloidal electrolytes with active cations:-

examples are; salts with high molecular weights such as alkyl ammonium salts, pyridinium halides.

(3) Colloidal electrolytes with both cations and anions active.

Examples: Such colloidal electrolytes are insoluble.

Properties: The colloidal electrolytes show the phenomena of sols.

(i) They have main properties of electrolytes and colloidal particles, Soaps are typical colloidal electrolytes. eg., alkali salts of higher fatty acids form alkali cations and fatty acid anions of large size.

The cations have of large size, behave as colloidal particles.

$(C_nH_{2n+1})NBr \rightleftharpoons (C_nH_{2n+1})N^+ + Br^-$

Alkyl ammonium bromide. — Alkyl ammonium cation (Colloidal) — Anion.

$C_{17}H_{35}COONa \rightleftharpoons C_{17}H_{35}COO^- + Na^+$

Sodium stearate (soap) — stearate anion (Colloidal) — cation.

(ii) Colloidal electrolytes give colloidal solutions with large electrical conductance.

(iii) Colloidal electrolytes cannot be regarded as macromolecules as they are individual molecules of giant size aggregates.

(iv) Solutions of colloidal electrolytes have lesser osmotic pressure than expected. It is due to the fact that number of particles decreases as a result of aggregation of several ions to form a single micelle. The charge of the micelle

(iv) the num. of electrical charges, hence their conductance remains high.

(v) colloidal electrolytes differ from Coacervate colloids, because latter are unstable whereas former are stable

(vi) Soap solution behaves like normal electrolyte as regard surface tension decreases continuously from that of pure water.

(vii) Micellization is an important property of association colloids.

Importance of colloidal electrolytes: Primary colloidal electrolytes function as excellent detergent and emulsifying agents. The detergent action depends on their ability to reduce water repellent dirt and oily particles into the micelle cluster. Water insoluble oils are solubilized in soap solutions and subsequently deposited uniformly on fabrics.