Scientific practice

solutions

electrolytic solutions

Ionic dissociation occurs when the addition of a solvent or energy in the form of heat causes molecules if crystals of a substance to break down into ions.

Osmotic effects.

spontaneous net movement of solvent molecules through a semipermeable membrane

tonicity

hypotonic

lower ions concentration, high solvent concentration lower osmotic pressure

hypertonic

higher ion concentration, higher solute concentration, lower solvent concentration, higher osmotic pressure

isotonic

equal osmotic pressure. and solute/solvent concentrations.

Ideal Solutions

an ideal solution is a solution which has a enthalpy of solution equal to zero NOTE: bonds forming releases heat energy. FR: the concentration of water in a typical cell is 55molar.

concentration measurements

molar/molarity/molar concentration

concentration of solute in a solution in terms of moles of solute per volume of solution

molality

concentration of solute in a solution in terms of moles of solute per mass of solvent.

Other measures.

%w/w weight of solute per weight of (solvent?)

%w/v weight per volume.

%v/v volume per volume.

osmolarity

concentration of solute as total number of solute particles per litre (?)

osmolality

Concentration of solute as total number of solute particles per kilogram.

####osmol number of solute particles which contribute towards the osmolarity of the substance.

##Life Molecules

Basic list

- Carbohydrates (2%)
- Lipids (2.5%)
- Proteins (15%)
- Nucleic Acids (RNA 20% E. Coli < 10% mammalian DNA is functional)
- Inorganic ions (3% Salts, 1% small metabolites)
- water (70%)

Water

general properties

covalent bonds. dipole moment.

hydrogen bonds.

many hydrogen bonds are formed which together gain considerable strength.

Hydrogen bonds are typically up to $ angstroms in length, which a strength of 2-10kcal/mol.

Solvation of ionic and polar solutes

$Coulomb's\ law : F = k\frac{q_1 q_2}{Dr^2}$

Where D is a measure of solvent polarity.The higher the polarity, the greater the ability to stabilise charges. water forms solvations shells around each ion.

Solvation of apolar groups and molecules (the hydrophobic effect)

free amphipathic molecules will associate in water to form hydrophobic internal environments. molecules (amphipathic molecules contain both polar and a polar groups)

Examples

fatty acids form micelles (globules) and bilayers in water.

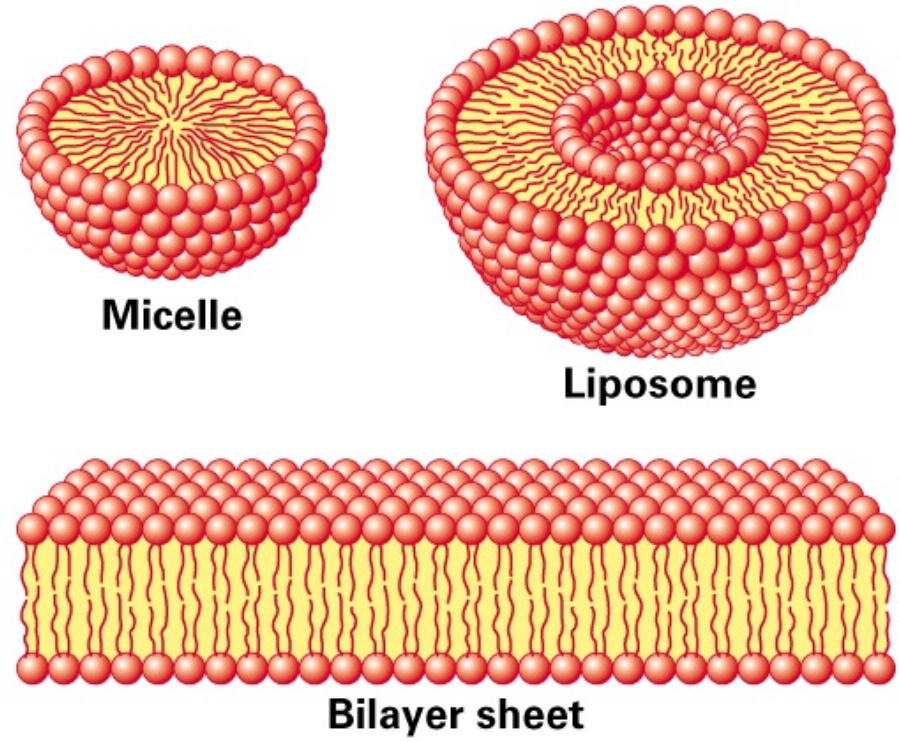

Figure 1: hydrophobicEffect