

22/10

Hydrogen Bonds - H atom forms a bond with highly electronegative atoms. eg H-O, H-N, H-F.

Van Der Waal's Interaction - They are weak and occur only when atoms are close together. Even non-polar molecules who have +ve and -ve charges accumulated in certain regions enabling them to stick together.

Hydrophobic Forces - Non polar molecules do not form H-bond and therefore repel water.

IMPORTANCE OF WEAK BONDS

- The formation of all biological molecules backbone are by covalent bonds.
- The cumulative effect of weak bonds is to reinforce the three dimensional structure.
- Weak bonds are not only between molecules but also parts of larger molecule.

SUBSTITUTION OF ELEMENTS AND TOXICITY

Eg: When exposed to Pb for a long time causes cells to absorb the Pb and it replaces the C. But Pb cannot function like carbon which hinders a lot of processes which leads to toxicity.

CARBON AS A BACKBONE OF LIFE

- Carbon atoms can form diverse molecules by bonding to four other atoms.
- Diversity arising from C skeleton:
length, branching, Double bond position, Presence of rings
- C can bond to a lot of functional groups. It is polyfunctional.
- C can form isomers (e.g., enantiomers etc).

WATER FOR LIFE

Water is essential for life to sustain. Every reaction in cells are aqueous reaction.

Hydrogen bonding between H_2O molecules is the basis for water's properties.

Four emergent properties of water:

- Cohesion of water molecules
- Moderation of temperature
- Expansion on freezing
- The solvent of life

- Cohesion and adhesion of water molecules is what causes ascent of sap against gravity.
- Water has specific heat capacity. It's that's how animals survive under a frozen lake. It can moderate temperature. Water also causes evaporative cooling.

HYDROPHILIC AND HYDROPHOBIC SUBSTANCES

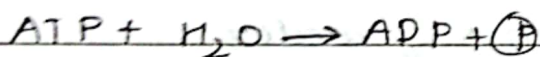
Substances that have affinity for water are called hydrophilic substances and substances that do not have affinity for water are called hydrophobic substances.

Some substances are hydrophilic without dissolving in colloids.

ADENOSINE TRIPHOSPHATE (ATP)

ATP is a nucleoside triphosphate ~~used~~ used in nuclei as a coenzyme. It is called "^{molecular} ~~molecule~~ currency".

ATP drives endergonic reactions by phosphorylation, transferring a phosphate group to some other molecule such as a reaction. ($\text{ATP} \rightleftharpoons \text{ADP}$) (Hydrolysis of ATP)



$$\Delta G = -7.3 \text{ kcal/mol} (-30.5 \text{ kJ/mol})$$

Energy is released when the terminal phosphate bond is broken.

REGENERATION

ATP is regenerated by addition of a phosphate group.

The energy to phosphorylate ADP comes from catabolic reactions in the cell.

The ATP cycle is a revolving doorway through which energy passes during its transfer from catabolic to anabolic pathways.

LIPIDS - PHOSPHO LIPIDS.

- FATS -**
- They are larger molecules assembled from smaller molecules. (16-18 C atoms in length)
 - It is constructed from glycerol^(G) and fatty acids. (1:3). It is called triglycerol.
 - They are hydrophobic. (due to non polarity)

Saturated - no more H can be added.

Unsaturated - one or more double bonds with one less H.

Phospholipids - P is added to the ^{free (3rd)} OH group. (only 2 fatty acids)
 It will have a hydrophilic head and hydrophobic tails, they are arranged in a bilayer with the head being out.
 Phospholipids are amphipathic molecules.