

### Water H<sub>2</sub>O - solvent of life

Water is the dominant component of virtually all living organisms, and most biochemical reactions

one oxygen and two hydrogen (connected via covalent bonds)

allows chemical reactions to occur inside living organisms

necessary for the formation of certain biological structures

polar molecule that can form hydrogen bonds - tetrahedral shape (because of four pairs of electrons on outer shell)

**gas** → does not form hydrogen bonds

**solid** → molecules are held in a rigid state by hydrogen bonds

**liquid** → hydrogen bonds continually break and form as water molecules move

**Evaporation** Living systems use the evaporation of water, which disrupts hydrogen bonds, to dissipate excess heat that would otherwise cause problems.

**Adhesion** the attraction of water molecules to other molecules of a different type

**cohesion** the capacity of water molecules to resist coming apart from one another when placed under tension

**surface tension** water molecules stick to one another

### Macromolecules

**Macromolecules:** (=Polymers) Function: energy storage, structural support, transport, protection and defense, regulation of metabolic activities, means for movement / growth / development, heredity

**Proteins** The functions of proteins include support, protection (e.g., skin surface), catalysis, transport, defense, regulation, movement, signaling, and storage

**Carbohydrates** contain carbon bonded to hydrogen and oxygen atoms and have the general formula (C<sub>1</sub>H<sub>2</sub>O<sub>1</sub>)<sub>n</sub>. act as energy storage and transport molecules and structural components

**nucleic acids** A polymer made up of nucleotides, specialized for the storage, transmission, and expression of genetic information. DNA and RNA are nucleic acids.

**lipids** Nonpolar, hydrophobic molecules that include fats, oils, waxes, steroids, and the phospholipids that make up biological membranes



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