



I. Cells (prokaryotic, eukaryotic)

The common, smallest unit of all living things is the cell, which is composed of a collection of large, complex organic and inorganic molecules, ions and molecular structures termed the protoplasm. Biomolecules are primarily constructed from only a few chemical elements - C, H, O, N, S and P. Cells consist mainly of water.

II. Biochemical functional groups

- A. Structures - Lewis structures, geometry
- B. Electronic properties - polar, nonpolar
- C. Reaction properties - acid/base, nucleophile, electrophile

III. Amino acids, peptides and proteins

- A. Amino acids - molecules with a chiral carbon bonded to H, a carboxylate group, an amino group, and one of 20 characteristic organic side groups
- B. Peptides- small linear polymers of amino acids (< 50)
- C. Proteins (Enzymes)- large linear polymers of amino acids
 - 1. Primary, secondary, tertiary, quaternary structure
 - 2. Structural, globular and membrane proteins

IV. Nucleotides and nucleic acids

- A. Nucleotides are composed of phosphate, purine or pyrimidine bases, and ribose or 2-deoxyribose
- B. Nucleic acids are linear polymers of nucleotides

V. Carbohydrates

- A. Monosaccharides - polyhydroxyaldehydes or polyhydroxyketones with many stereoisomers
- B. Polysaccharides - polymers of monosaccharides (branched)

VI. Lipids

- A. Diverse structures which have the following properties: insoluble in water; soluble in organic solvents such as alcohol, ether or acetone; amphipathic (membranes)
- B. Examples - fatty acids, phosphatides, cholesterol