The Molecules of Cells: Chapter Objectives

Introduction To Organic Compounds

3.1 I can explain why carbon is unparalleled in its ability to form large, diverse molecules.

3.1 I can define organic compounds, hydrocarbons, and carbon skeletons.

3.3 I can list the four main classes of macromolecules, explain the relationship between monomers and polymers, and compare the processes of dehydration synthesis and hydrolysis.

Carbohydrates

3.4–3.7 I can describe the structures, functions, properties, and types of carbohydrate molecules.

Lipids

3.8–3.9 I can describe the structures, functions, properties, and types of lipid molecules.

Proteins

3.11–3.14 I can describe the structures, functions, properties, and types of proteins.

Nucleic Acids

3.16 I can compare the structures and functions of DNA and RNA.

Word Roots

de- _ without or remove; **hydro-** _ water (*dehydration reaction:* a chemical process in which two molecules become covalently bonded to each other with the removal of a water molecule)

di- _ two; **-sacchar** _ sugar (*disaccharide:* a sugar molecule consisting of two monosaccharides linked by a dehydration reaction)

carb- _ coal (*carboxyl group:* a functional group in an organic molecule, consisting of an oxygen atom double-bonded to a carbon atom that is also bonded to a hydroxyl group)

glyco- _ sweet (*glycogen:* an extensively branched polysaccharide of many glucose monomers that serves as an energy-storage molecule in animal liver and muscle cells)

helic- _ a spiral (*alpha helix:* spiral shape created by the coiling of polypeptides in a protein's secondary structure); *double helix:* the form of native DNA, composed of two adjacent polynucleotide strands wound into a spiral shape)

hydro- _ water (*hydrocarbon:* a chemical compound composed only of the elements carbon and hydrogen)

-**lyse** _ break (*hydrolysis:* a chemical process in which polymers are broken down by the chemical addition of water molecules to the bonds linking their monomers); **-philos** _ loving (*hydrophilic:* "water-loving": refers to polar, or charged, molecules [or parts of molecules] that are soluble in water.)

-phobos _ fearing (*hydrophobic:* "water-fearing": refers to nonpolar molecules [or parts of molecules]that do not dissolve in water)

iso- _ equal (*isomer:* one of several organic compounds with the same molecular formula but different structures and, therefore, different properties)

macro- _ large (*macromolecule:* a giant molecule in a living organism formed by the joining of smaller molecules)

mono- _ single (*monosaccharide:* simplest type of sugar; **meros-** = part (*monomer:* a chemical subunit that serves as a building block of a polymer)

poly- _ many (*polymer:* a large molecule consisting of many monomers covalently joined together in a chain; *polysaccharide:* many monosaccharides joined together)

quatr- _ four (*quaternary structure:* the fourth level of protein structure; the shape resulting from the association of two or more polypeptide subunits)

terti- _ three (*tertiary structure:* the third level of protein structure; the overall, three-dimensional shape of a polypeptide due to interactions of the R groups of the amino acids making up the chain)

Student Media

Introduction to Organic Compounds
Activity: Diversity of Carbon-Based Molecules (3.1)
Activity: Functional Groups (3.2)
Activity: Making and Breaking Polymers (3.3)

Carbohydrates
Activity: Models of Glucose (3.4)
Activity: Carbohydrates (3.7)
You Decide: Low-Fat or Low-Carb Diets—Which is Healthier? (3.6)

Lipids
Activity: Lipids (3.9)

Proteins
MP3 Tutor: Protein Structure and Function (3.13)
Activity: Protein Functions (3.11)
Activity: Protein Structure (3.14)
BLAST Animation: Alpha Helix (3.14)
BLAST Animation: Protein Primary Structure (3.14)
BLAST Animation: Protein Secondary Structure (3.14)
BLAST Animation: Protein Tertiary and Quaternary Structure (3.14)

Nucleic Acids
MP3 Tutor: DNA Structure (3.16)
Activity: Nucleic Acid Structure (3.16)
Process of Science: Connection: What Factors Determine the Effectiveness of Drugs? (3.16)