

Synthesis of Macromolecules

Key Question: How do living systems build or breakdown macromolecules?

Learning Objectives:

* You are expected to construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

* You are expected to use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

Introduction to Organic Compounds

1. Explain why carbon is unparalleled in its ability to form large, diverse molecules.
2. List the four classes of macromolecules, explain the relationship between monomers and polymers, and compare the processes of dehydration synthesis and hydrolysis.

Carbohydrates

3. Describe the structures, functions, properties, and types of carbohydrate molecules.

Lipids

4. Describe the structures, functions, properties, and types of lipid molecules.
5. Describe the health risks associated with the use of anabolic steroids.

Proteins

6. Describe the structures, functions, properties, and types of proteins.

Key Terms:

amino acids	amino group	anabolic steroids	carbohydrate
cellulose	dehydration reaction	waxes	unsaturated
denaturation	disaccharide	enzymes	deoxyribonucleic acid (DNA)
double helix	fat	functional groups	glycogen
hydrolysis	hydrophilic	hydrophobic	triglyceride
isomers	lipids	macromolecules	monomers
monosaccharides	nucleic acid	organic compounds	peptide bond
phospholipids	polymers	polypeptide	polysaccharides
protein	saturated	starch	steroids

Word Roots:

carb-	coal	Example: carboxyl group: a functional group present in organic acids, consisting of a carbon atom double-bonded to an oxygen atom.
di-	two	Example: disaccharide: two monosaccharides joined together.
glyco-	sweet	Example: glycogen: a polysaccharide sugar used to store energy in animals.
hydro-	water	Example: hydrocarbon: an organic molecule consisting only of carbon and hydrogen.
iso-	equal	Example: isomer: one of several organic compounds with the same molecular formula but different structures and therefore different properties.
macro-	large	Example: macromolecule: a large molecule.
mono-	single	Example: monosaccharide: a single unit or monomer of sugar.
sacchar	sugar	Example: monosaccharide: simplest type of sugar.
poly-	many	Example: polysaccharide: many monosaccharides joined together.
tri-	three	Example: triacylglycerol: three fatty acids linked to one glycerol molecule.