

Honors Biology Chapter 3: Macromolecules PPT

Notes

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

- Diverse molecules found in cells are composed of carbon bonded to other elements
 - Carbon-based molecules are called _____
 - By sharing electrons, carbon can bond to four other atoms
 - By doing so, it can branch in up to four directions

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

- Methane (CH₄) is one of the simplest organic compounds
 - Four covalent bonds link four hydrogen atoms to the carbon atom
 - Each of the four lines in the formula for methane represents a pair of shared electrons

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

- Methane and other compounds composed of only carbon and hydrogen are called _____
 - Carbon, with attached hydrogens, can bond together in chains of various lengths

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

- A chain of carbon atoms is called a _____
 - Carbon skeletons can be branched or unbranched
 - Therefore, different compounds with the same molecular formula can be produced
 - These structures are called _____

3.3 I can list the four main classes of macromolecules.

- There are four classes of biological molecules
 - _____
 - _____
 - _____
 - _____

3.3 I can explain the relationship between monomers and polymers

- The four classes of biological molecules contain very large molecules
 - They are often called _____ because of their large size
 - They are also called _____ because they are made from identical building blocks strung together

- The building blocks are called _____

3.3 I can explain the relationship between monomers and polymers

- A cell makes a large number of polymers from a small group of monomers
 - Proteins are made from only _____ acids, and DNA is built from just four kinds of nucleotides
- The monomers used to make polymers are universal

3.3 I can compare the processes of dehydration synthesis and hydrolysis.

- Monomers are linked together to form polymers through _____, which remove water
- Polymers are broken apart by _____, the addition of water
- All biological reactions of this sort are mediated by _____, which speed up chemical reactions in cells

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

- Carbohydrates range from small sugar molecules (monomers) to large polysaccharides
 - Sugar monomers are _____, such as glucose and fructose
 - These can be hooked together to form the polysaccharides

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

- Monosaccharides are the _____ for cellular work
 - Monosaccharides are also used as raw materials to manufacture other organic molecules

3.5 I can describe the structures, functions, properties, and types of carbohydrate molecules.

- Two monosaccharides (monomers) can bond to form a _____ in a dehydration reaction
 - An example is a glucose monomer bonding to a fructose monomer to form sucrose, a common disaccharide

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

- _____ are polymers of monosaccharides
 - They can function in the cell as a storage molecule or as a structural compound

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

- _____ is a storage polysaccharide composed of glucose monomers and found in plants
- _____ is a storage polysaccharide composed of glucose, which is hydrolyzed by animals when glucose is needed
- _____ is a polymer of glucose that forms plant cell walls
- _____ is a polysaccharide used by insects and crustaceans to build an exoskeleton

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

- _____ are water insoluble (_____, or water fearing) compounds that are important in energy storage
 - They contain twice as much energy as a polysaccharide
- _____ are lipids made from glycerol and fatty acids

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

- Fatty acids link to glycerol by a dehydration reaction
 - A fat contains one glycerol linked to three fatty acids
 - Fats are often called triglycerides because of their structure

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

- Some fatty acids contain double bonds
 - This causes kinks or bends in the carbon chain because the maximum number of hydrogen atoms cannot bond to the carbons at the double bond
 - These compounds are called _____ because they have fewer than the maximum number of hydrogens
 - Fats with the maximum number of hydrogens are called _____

3.9 I can describe the structures, functions, properties, and types of lipids molecules.

- _____ are structurally similar to fats and are an important component of all cells
 - For example, they are a major part of cell membranes, in which they cluster into a bilayer of phospholipids
 - The hydrophilic heads are in contact with the water of the environment and the internal part of the cell
 - The hydrophobic tails band in the center of the bilayer

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

- _____ are lipids composed of fused ring structures
 - _____ is an example of a steroid that plays a significant role in the structure of the cell membrane
 - In addition, cholesterol is the compound from which we synthesize sex hormones

3.11 I can describe the structures, functions, properties, and types of protein molecules.

- A _____ is a polymer built from various combinations of 20 amino acid monomers
 - Proteins have unique structures that are directly related to their functions
 - _____, proteins that serve as metabolic catalysts, regulate the chemical reactions within cells

3.11 I can describe the structures, functions, properties, and types of protein molecules.

- _____ proteins provide associations between body parts and _____ proteins are found within muscle

- _____ proteins include antibodies of the immune system, and _____ proteins are best exemplified by the hormones
- _____ proteins serve as antenna for outside signals, and _____ proteins carry oxygen

3.12 I can describe the structures, functions, properties, and types of protein molecules.

- Amino acid monomers are linked together to form polymeric proteins
 - This is accomplished by an enzyme-mediated dehydration reaction
 - This links the carboxyl group of one amino acid to the amino group of the next amino acid
 - The covalent linkage resulting is called a _____

3.13 I can describe the structures, functions, properties, and types of protein molecules.

- A polypeptide chain contains hundreds or thousands of amino acids linked by peptide bonds
 - The amino acid sequence causes the polypeptide to assume a particular shape
 - The shape of a protein determines its _____

3.13 I can describe the structures, functions, properties, and types of protein molecules.

- If for some reason a protein's shape is altered, it can no longer function
 - _____ will cause polypeptide chains to unravel and lose their shape and, thus, their function
 - Proteins can be denatured by changes in salt concentration and pH

3.14 I can describe the structures, functions, properties, and types of protein molecules.

- A protein can have four levels of structure
 - _____
 - _____
 - _____
 - _____

3.14 I can describe the structures, functions, properties, and types of protein molecules.

- The _____ of a protein is its unique amino acid sequence
 - The correct amino acid sequence is determined by the cell's genetic information
 - The slightest change in this sequence affects the protein's ability to function

3.14 I can describe the structures, functions, properties, and types of protein molecules.

- Protein _____ results from coiling or folding of the polypeptide
 - Coiling results in a helical structure called an alpha helix
 - Folding may lead to a structure called a pleated sheet

- Coiling and folding result from hydrogen bonding between certain areas of the polypeptide chain

3.14 I can describe the structures, functions, properties, and types of protein molecules.

- The overall three-dimensional shape of a protein is called its _____
 - Tertiary structure generally results from interactions between the R groups of the various amino acids
 - Disulfide bridges are covalent bonds that further strengthen the protein's shape

3.14 I can describe the structures, functions, properties, and types of protein molecules.

- Two or more polypeptide chains (subunits) associate providing _____
 - Collagen is an example of a protein with quaternary structure
 - Its triple helix gives great strength to connective tissue, bone, tendons, and ligaments

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

- _____ and _____ are composed of monomers called _____
 - Nucleotides have three parts
 - A five-carbon sugar called ribose in RNA and deoxyribose in DNA
 - A phosphate group
 - A nitrogenous base

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

- DNA nitrogenous bases are adenine (A), thymine (T), cytosine (C), and guanine (G)
 - RNA also has A, C, and G, but instead of T, it has uracil (U)

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

- A nucleic acid polymer, a polynucleotide, forms from the nucleotide monomers when the phosphate of one nucleotide bonds to the sugar of the next nucleotide
 - The result is a repeating _____ with protruding nitrogenous bases

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

- Two polynucleotide strands wrap around each other to form a DNA _____
 - The two strands are associated because particular bases always hydrogen bond to one another
 - A pairs with T, and C pairs with G, producing _____
- RNA is usually a single polynucleotide strand

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

- A particular nucleotide sequence that can instruct the formation of a polypeptide is called a _____
 - Most DNA molecules consist of millions of base pairs and, consequently, many genes

- These genes, many of which are unique to the species, determine the structure of proteins and, thus, life's structures and functions