

Chapter 3 - *The Molecules of Cells*

EXAM REVIEW

There are four main classes of macromolecules. Most are polymers, assembled from smaller monomers in a process called *dehydration synthesis*. Hydrolysis breaks the polymers back down to monomers. State whether each of the following relates to dehydration synthesis (D) or hydrolysis (H). {Web/CD Activity 3C}

- _____ 1. Connects monomers to form a polymer.
- _____ 2. Produces water as a by-product.
- _____ 3. Breaks up polymers, forming monomers.
- _____ 4. Water is used to break bonds between monomers.
- _____ 5. Joins amino acids to form a protein.
- _____ 6. Glycerol and fatty acids combine this way to form a fat.
- _____ 7. Occurs when polysaccharides are digested to form monosaccharides.
- _____ 8. -H and -OH groups form water.
- _____ 9. Nucleic acid breaks up to form nucleotides.
- _____ 10. Water breaks up, forming -H and -OH groups on separate monomers.

Carbohydrates – Review carbohydrate structure and function by filling in the blanks in the following story. {Web/CD Activity 3C, D, and E}

Carbohydrates are in a class of molecules ranging from the simplest sugars, called _____ to giant molecules called _____ built of many sugars. Carbohydrates are the main fuel molecules for cellular work.

Plants make their own carbohydrates, but humans, like all animals, must obtain them from plants or other animals. Imagine eating a piece of whole-wheat bread spread with strawberry jam. It contains a mixture of carbohydrates, along with other macromolecules like _____ and _____. Much of the carbohydrate in the bread itself is in the form of a polysaccharide called _____, which is simply a chain of _____ monomers. The monomers were linked together in the wheat plant in a process called _____. As the glucose units joined, _____ was produced as a by-product. When you swallow a bite of

bread, digestive juices in the intestine separate the monomers in the opposite reaction, called _____ . In the intestine, this is actually a two-step process. Secretions from the pancreas first break the starch down to maltose, a type of carbohydrate called a _____ , which consists of two glucose monomers. Secretions from the walls of the intestine complete the process, breaking each maltose molecule down to two individual glucose molecules.

Lipids – Review the structures and functions of lipids by completing the following statements. {Web/CD Activity 3F}

1. _____ means that hydrogen has been added to unsaturated fats.
2. _____ is a steroid common in cell membranes.
3. A _____ is similar to a fat; found in cell membranes.
4. A fat molecule is composed of _____ and three fatty acids.
5. _____ is when lipid-containing deposits block blood vessels.
6. Female and male hormones are examples of _____.
7. Animal fats are said to be _____.
8. A _____ is a large molecule whose main function is energy storage.
9. Unsaturated fats contain more _____ bonds than saturated fats.
10. _____ are grouped together because they do not dissolve in water.

Proteins – Everything a cell does involves proteins. Seven classes of proteins are discussed in Module 3.11. Match each of the classes with one of the descriptions below. {Web/CD Activity 3G}

- _____ 1. Hemoglobin carries oxygen in the blood.
- _____ 2. A protein in muscle cells enables them to move.
- _____ 3. Antibodies fight disease-causing bacteria.
- _____ 4. Collagen gives bone strength and flexibility.
- _____ 5. Insulin signals cells to take in and use sugar.
- _____ 6. Proteins in seeds provide food for plant embryos.
- _____ 7. A protein called sucrose promotes the chemical conversions of sucrose into monosaccharides.

Nucleic Acids – Nucleic acids are the fourth group of macromolecules discussed in this chapter. Review their structure and functions by matching each of the phrases on the right with a word or phrase from the list on the left. Answers may be used more than once. {Web/CD Activity 3I and 3J}

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| a. Phosphate group | _____ | 1. Sugar in RNA |
| b. deoxyribose | _____ | 2. Overall structure of DNA |
| c. A, T, C, G | _____ | 3. Short for ribonucleic acid |
| d. DNA | _____ | 4. Passed on from parent to offspring |
| e. Nucleotide | _____ | 5. Nitrogenous bases of RNA |
| f. A, U, C, G | _____ | 6. Sugar in DNA |
| g. Double helix | _____ | 7. Nitrogenous bases of DNA |
| h. Ribose | _____ | 8. Short for deoxyribonucleic acid |
| i. Nitrogenous base | _____ | 9. DNA works through this intermediary. |
| j. RNA | _____ | 10. Nucleotide is sugar, phosphate, and this. |
| | _____ | 11. Sugar of one nucleotide bonds to this of next nucleotide |
| | _____ | 12. Monomer of nucleic acids |

Short Answer – Specific enzymes in your intestine enable you to break down starch and use the glucose molecules produced by the process. But you cannot break down cellulose. Explain why, in terms of both carbohydrate structure and protein shape.