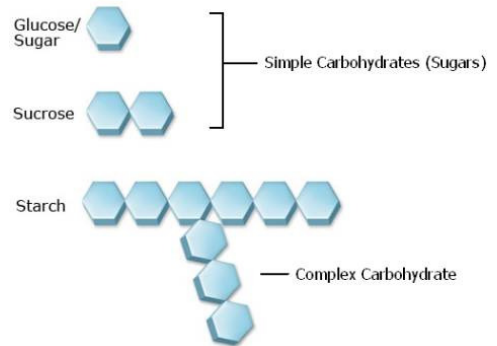


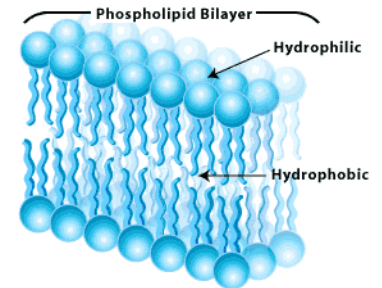
BIOCHEMISTRY

All living things are made up of four major kinds of **biomolecules**: carbohydrates, lipids, proteins, and nucleic acids.

- Carbohydrates**- made up of carbon, hydrogen, and oxygen in a 1:2:1 ratio. Some carbohydrates provide quick energy (simple sugars), while some store energy (like starches and glycogen), and others provide structure (cellulose and chitin). Building blocks of carbohydrates are called monosaccharides, while complex carbohydrates are called polysaccharides. A common ending for carbohydrates is -ose.

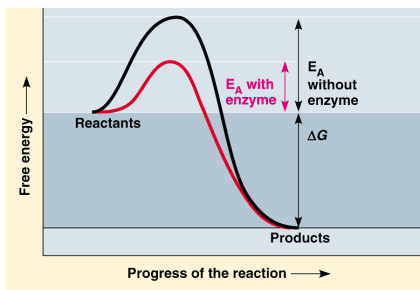
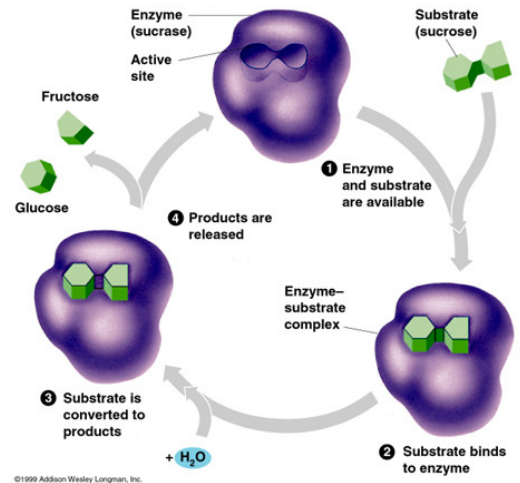


- Lipids**- are made mostly from carbon and hydrogen atoms, and are formed by glycerol and fatty acid chains. Lipids do not dissolve in water, so cells store energy as lipids. (Lipids store more energy than other organic compounds.) Lipids also provide insulation and make up cell membranes (phospholipid bilayer). Lipids include fats, oils, cholesterol (and other steroids), and waxes.

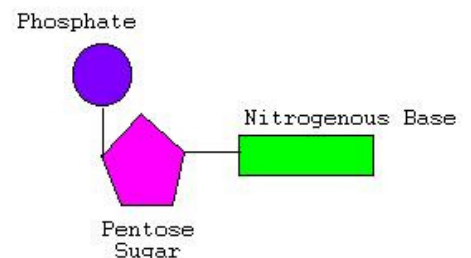


- Proteins**- are made of carbon, hydrogen, oxygen, and nitrogen. The subunits of proteins are called amino acids. Proteins control cell functions, defend the organism, support transport and movement, and provide structure.

- Enzymes** are special proteins that act as catalysts to control the rate of chemical reactions. They lower the activation energy, or energy required for the reaction to proceed. Each enzyme has a specific function that is determined by its shape. Any factor that changes the shape of an enzyme (like temperature or pH) can alter its function. A common ending for enzymes is -ase.



- Nucleic acids**- are made up of subunits called nucleotides (which consist of a sugar, a phosphate, and a nitrogenous base). The two types of nucleic acids are DNA (deoxyribonucleic acid) and RNA (ribonucleic acid). Nucleic acids store information that determines how an organism will grow and develop, and they control the building of proteins in cells.



PRACTICE

1. What do all lipids have in common?
 - a. They produce quick energy
 - b. They are saturated with hydrogen
 - c. They don't dissolve in water
 - d. Their compositions differ only by R- groups

2. A protein-digesting enzyme mixes with cholesterol in the digestive tract. What effect does the enzyme have on the cholesterol?
 - a. Breaks the cholesterol into amino acids
 - b. Breaks the cholesterol into simple sugars
 - c. Converts the cholesterol into energy
 - d. No effect

3. Enzymes speed up a chemical reaction by
 - a. Lowering the amount of energy it needs to get started
 - b. Producing complex carbohydrates
 - c. Changing the shape of the substrate
 - d. Producing heat

4. DNA and RNA are composed of units that are made up of
 - a. Chains of nucleotides
 - b. Chains of simple sugars
 - c. Twisted chains of amino acids
 - d. Three very long carbon-hydrogen chains attached to a glycerol molecule

5. What kind of molecule is an enzyme? Why are enzymes important in a cell?

6. Compare and contrast carbohydrates and lipids.
