Biomolecules Review

ORGANIC MOLECULES

Organic molecules are the molecules which exist in all living things. They are life's building blocks. All things are formed from these organic molecules. There are four categories of organic molecules: Carbohydrates, lipids, proteins and nucleic acids.

1. How are organic molecules related to all living things? _____

2. Name four categories of organic molecules which form the basis of all living things.
   a. _____ c. _____
   b. _____ d. _____

Organic molecules have four common characteristics. First, they are all carbon based, meaning they all contain carbon. They are formed from just a few elements which join together to form small molecules which join together, or bond, to form large molecules. The third characteristic of all organic molecules is that each is kind of organic molecule is built from a single type of building block. For example, the building block of carbohydrates is sugar, the building block of lipids is fatty acids, the building block of protein is amino acids and the building block of nucleic acids is the nucleotide. When these building blocks are joined together, they form a large molecule (polymer), just as bricks joined together form a wall. For example, sugars join together form a carbohydrate.

3. All of the organic molecules are based on which element? _____

4. How are the building blocks of organic molecules like bricks? _____

CARBOHYDRATES

Carbohydrates are the most common organic molecule because they make up most plant matter. They are made from carbon, hydrogen and oxygen. Their building block a single sugar called a monosaccharide. Sugars (monosaccharides) consist of carbon rings. When two monosaccharides, or sugars, combine, they form a disaccharide (di = two). When more than two monosaccharides join together, a polysaccharide (poly = many) is formed.

5. What is a monosaccharide? _____

6. What is a disaccharide? _____

7. How does a polysaccharide differ from a disaccharide? _____

There are three classes of carbohydrate polysaccharides. The first is starch. Starch is a carbohydrate used in food storage in plants. Potatoes, pasta and rice are rich in starch. Starches are very valuable because they provide a quick form of energy for the body. The second is glycogen. Glycogen is used for food storage in animals. The third is cellulose. Cellulose is used for structural support in plants (stems, leaves).

8. Which involves food storage in plants? _____

9. Which involves food storage in animals? _____

10. What is cellulose used for? _____

11. Why would an athlete have a big pasta dinner the night before a race?

Glue this page into your notebook

Sugars can be detected in foods through a simple lab test. To find out if a food contains starch, iodine (a reagent) is placed on the food. A food containing starch will turn black when in contact with iodine. A test for simple sugars involves mixing the food with a liquid blue reagent called Benedict's solution and then heating the mixture. If the food is positive for simple sugars, the heating process will cause the benedict's solution to turn red, orange, or green.

What reagent is put into food to identify the presence of starch? _____

LIPIDS

Lipids are a class of organic molecules which includes fats and oils, and has the function of long-term storage of energy in the body. The building block of lipids is the fatty acid, which is a chain of carbons with hydrogen attached to each side. Saturated fats have two carbons attached to each carbon (except the one at the end). Saturated fats are unhealthy fats like butter and Crisco. Unsaturated fats are missing at least one hydrogen and are kinked in shape. The unsaturated fats are healthy, and include oils.

List the 2 examples of lipids.

a. _____ b._____

Lipids are soluble (dissolve) in oil but are insoluble (don't dissolve) in water. When mixed with water, the lipid will float on top to form a separate layer. To test for the presence of lipids in food, the sample is placed on a piece of brown or newspaper, and then the paper is held up to the light. A test that is positive for lipids will have a oily spot that is translucent, or clear, on the paper.

What does soluble mean? _____

Explain the solubility of lipids.

How would you test for lipids, and what is a positive result?

PROTEINS

Proteins are organic molecules that form muscles, transport O2 (hemoglobin), and act as hormones and enzymes. Most importantly, proteins determine how our bodies look and function. Their building block is the amino acid. Proteins are made of amino acids combined through a dehydration link called a peptide bond. When groups of amino acids are joined together, a protein is formed.

What are 2 of the functions of proteins?

a._____

b._____

What is the building block of proteins? _____

What is the name of the bond that joins amino acids? _____

NUCLEIC ACIDS

The fourth class of organic molecules is the nucleic acids. This class involves the genetic materials, DNA and RNA. DNA is the blueprint of life because it contains instructions on how to make proteins in the body. Each individual's DNA is unique, which means that each individual has a unique set of proteins. That is why each of us looks and behaves differently. RNA is a copy of DNA. Because DNA can't leave the cell's nucleus, and because proteins are constructed outside of the nucleus in the cytoplasm, the RNA is necessary to carry the instructions from DNA to the cytoplasm where the protein is made.

What are the two types of nucleic acids?

a. _____ b_____

What is the role of DNA?