Name: _____ **Date:** _____

Warm-Up: Chemistry of Life - SUBMIT YOUR ANSWERS ONLINE. SEE CLASS WEBSITE

Carbon atoms are the basis of most molecules that make up living things. Many carbon-based molecules are large molecules called polymers that are made of many smaller, repeating molecules called monomers. There are four main types of carbon-based molecules in living things.

- **Carbohydrates** include sugars and starches, and are often broken down as a source of chemical energy for cells. Some carbohydrates are part of cell structure, such as cellulose, which makes up plant cell walls.
- **Lipids** include fats and oils and, like carbohydrates, are often broken down asa source of chemical energy for cells. One type of lipid, called a phospholipid, makes up most of all cell membranes.
- **Proteins** have a large number of structures and functions. Some proteins are needed for muscle movement; another protein, called hemoglobin, transports oxygen in blood. Another type of proteins, called enzymes, speed up chemical reactions in cells.
- **Nucleic acids** are molecules that store genetic information and build proteins. DNA stores genetic information in cells, and RNA helps to build the proteins for which DNA codes.

____ 1. Carbon is unique due to the carbon atom's
Ⓐ bonding properties. Ⓒ ionic compounds.
Ⓑ six outer unpaired electrons. Ⓓ hydrogen bonding strength.

____ 2. Which category of carbon-based molecules includes sugars and starches?
Ⓐ unsaturated fatty acids Ⓒ proteins
Ⓑ phospholipids Ⓓ carbohydrates

____ 3. Fats, oils, and cholesterol are all types of
Ⓐ cell membranes. Ⓒ lipids.
Ⓑ hormones. Ⓓ fatty acids.

____ 4. Proteins are composed of which molecules?
Ⓐ amino acids Ⓒ monosaccharides
Ⓑ fatty acids Ⓓ nucleic acids

____ 5. DNA and RNA are two types of
Ⓐ proteins. Ⓒ lipids.
Ⓑ nucleic acids. Ⓓ carbohydrates.

____ 6. What is unique about carbon?
Ⓐ bonding properties Ⓒ properties as a reactant
Ⓑ ability to bond with oxygen Ⓓ properties as an enzyme

____ 7. Both animal fats and plant oils are made up of glycerol and
Ⓐ phospholipids. Ⓒ polar molecules.
Ⓑ fatty acids. Ⓓ saturated fats.

At the most fundamental level, every process that takes place in an organism depends on chemical reactions. In a **chemical reaction**, substances are changed into different substances by the breaking and forming of chemical bonds. The substances that are present at the start of a chemical reaction, and are changed by the reaction, are called **reactants.** The substances that are formed by a chemical reaction are the **products**.

Chemical bonds must be broken in the reactants and new ones must be formed in the products. Energy must be added to break chemical bonds. In contrast, energy is always released when new bonds form. The amount of energy needed to break a bond, or the amount of energy released when a bond forms, is called **bond energy.**

All chemical reactions require the input of at least a small amount of energy in order for bonds to break in the reactants and for the reaction to start. The energy needed to start a chemical reaction is the **activation energy**. In general, there are two types of energy changes that can occur during a chemical reaction.

• **Exothermic** reaction: An exothermic chemical reaction releases more energy than it absorbs. The bonds that are broken in the reactants of an exothermic reaction have a higher bond energy than the new bonds that form in the products. Energy is usually released as heat or light.

• **Endothermic** reaction: An endothermic chemical reaction absorbs more energy than it releases. The bonds that are broken in the reactants of an endothermic reaction have a lower bond energy than the new bonds that form in the products. The energy that is absorbed makes up for the difference.

____ 8. Chemical reactions change substances into different substances by
Ⓐ conserving matter between the substances.
Ⓑ breaking and forming chemical bonds.
Ⓒ strengthening electrical charges of substances.
Ⓓ changing a solvent into a solute.

____ 9. Identify the reactants in the following chemical reaction: 6HO + 6CO → CHO + 6O
Ⓐ $6H_2O$ and $6CO_2$
Ⓑ $6CO_2$ and $C_6H_{12}O_6$
Ⓒ $6H_2O$, $C_6H_{12}O_6$, and $6O_2$
Ⓓ C6H12O_2 and $6O_6$

____ 10. The double arrows tell you that the following reaction $CO_2 + H_2OH_2CO_3$
Ⓐ takes place very rapidly.
Ⓑ is very unstable.
Ⓒ occurs in both directions.
Ⓓ has high bond energies.

____ 11. What is the term for the amount of energy that needs to be added for a chemical reaction to start?
Ⓐ chemical energy
Ⓑ activation energy
Ⓒ bond energy
Ⓓ reactant energy

____ 12. Which phrase best describes an exothermic chemical reaction?
Ⓐ does not absorb any energy
Ⓑ forms products with higher bond energy than reactants
Ⓒ is in a state of equilibrium
Ⓓ releases more energy than it absorbs