**2.3 Carbon Compounds**

**The Chemistry of Carbon**

Carbon can bond with many elements, including \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, and \_\_\_\_ to form the molecules of life.

Carbon atoms have \_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons, allowing them to form strong \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bonds with many other elements.

Living organisms are made up of molecules that consist of carbon and these other elements (H, N, P, S, O).

 Carbon-carbon bonds can be \_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or triple covalent bonds.

**Macromolecules**

Carbohydrates - main source of \_\_\_\_\_\_\_\_\_. Plants, some animals, and other organisms also use carbohydrates for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ purposes.

Lipids can be used to \_\_\_\_\_\_\_\_\_\_\_\_\_ energy. Some lipids are important parts of biological \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and waterproof coverings.

Nucleic \_\_\_\_\_\_\_\_\_\_ store and transmit hereditary, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, information.

Some \_\_\_\_\_\_\_\_\_\_\_\_\_\_ control the rate of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and regulate cell processes. Others form important cellular structures, while still others transport substances into or out of cells or help to fight \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Most macromolecules are formed by a process known as polymerization, in which large compounds are built by joining smaller ones together.

The smaller units, or **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,** join together to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Carbohydrates**

**Carbohydrates** are compounds made up of C, H, and O atoms, usually in a ratio of \_\_\_\_\_\_\_

The breakdown of sugars, such as \_\_\_\_\_\_\_\_\_, supplies immediate energy for cell activities.

Plants, \_\_\_\_\_\_\_\_\_\_\_\_, and other organisms also use carbohydrates for structural purposes.

**Simple Sugars**

Single sugar molecules are also known as **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

Ordinary table sugar, sucrose, is a **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**, a compound made by joining glucose and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ together.

**Complex Carbohydrates**

The large macromolecules formed from monosaccharides are known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Complex Carbohydrates**

Many animals store excess sugar in a polysaccharide called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

When the level of glucose in your blood runs low, glycogen is broken down into glucose, which is then released into the blood.

The glycogen stored in your muscles supplies the energy for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ contraction.

Plants use a slightly different polysaccharide, called \_\_\_\_\_\_\_\_\_\_\_\_\_, to store excess sugar.

Plants also make another important polysaccharide called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which gives plants much of their strength and rigidity.

**Lipids**

**Lipids** are made mostly from \_\_\_ and \_\_\_\_ atoms and are generally \_\_\_\_\_ soluble in water.

The common categories of lipids are \_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_, & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Lipids can be used to store energy, and are important parts of biological membranes.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ synthesized by the body are lipids as well. Many steroids, such as hormones, serve as chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Many lipids are formed when a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ molecule combines with compounds called fatty acids.

If each carbon atom in a lipid’s fatty acid chains is joined to another carbon atom by a \_\_\_\_\_\_\_\_\_\_\_\_\_ bond, the lipid is said to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

If there is at least one carbon-carbon \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bond in a fatty acid, the fatty acid is said to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Lipids whose fatty acids contain more than one double bond are said to be \_\_\_\_\_\_\_\_\_\_\_\_\_

**Nucleic Acids**

Nucleic acids \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hereditary, or genetic, information.

**Nucleic acids** are macromolecules containing \_\_\_\_, \_\_\_\_, \_\_\_\_, \_\_\_\_, and \_\_\_\_.

Nucleic acids are polymers assembled from individual monomers known as \_\_\_\_\_\_\_\_\_\_\_\_\_

**Nucleotides** consist of three parts: a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ sugar, a phosphate group
(–PO4), and a nitrogenous \_\_\_\_\_\_\_.

There are two kinds of nucleic acids: ribonucleic acid (\_\_\_\_\_) and deoxyribonucleic acid (\_\_\_\_). RNA contains the sugar ribose and DNA contains the sugar deoxyribose.

**Proteins**

**Proteins** are macromolecules that contain \_\_\_\_\_ as well as \_\_\_\_, \_\_\_\_, and \_\_\_\_.

Proteins are polymers of molecules called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Proteins perform many varied functions, such as controlling the rate of reactions and regulating cell processes, forming cellular structures, transporting substances into or out of cells, and helping to fight disease.

**Amino acids** are compounds with an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (–NH2) on one end and a carboxyl group (–COOH) on the other end.

Covalent bonds called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ link amino acids together to form a polypeptide.

A protein is a functional molecule built from one or more polypeptides.

**Structure and Function**

Amino acids differ from each other in a side chain called the \_\_\_-group, which have a range of different properties.

More than \_\_\_\_\_\_ different amino acids are found in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

This variety results in proteins being among the most \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ macromolecules.