

## Chapter 3 Summary

### Carbons place in the living world

- Carbon is central to life because most biological molecules are built on a carbon framework; carbon's outer shell has four of the eight outer-shell electrons necessary for maximum stability in most elements. Carbon atoms are thus able to form stable, covalent bonds with a wide variety of atoms, a capacity that allows carbon to serve as the central element in the large, complex molecules that make up living things

### Functional Groups

- Groups of atoms known as functional groups can confer special properties on carbon-based molecules, thus altering the molecules function

### Carbohydrates

- Carbohydrates are formed from the building blocks or monomers of simple sugars. These monomers can be linked to form larger carbohydrate polymers (polysaccharides, or complex carbohydrates) Four polysaccharides are critical in the living world: starch, the nutrient storage form of carbohydrates in plants; glycogen, the nutrient storage form of carbohydrates in animals; cellulose, a ridged structure carbohydrate produced by plants and other organisms; and chitin, a tough carbohydrate that forms the external skeleton of arthropods

### Lipids

- The defining characteristic of all lipids is that they do not readily dissolve in water. No one structural element is common to all lipids
- Among the most important lipids are: triglycerides, composed of a glyceride and three fatty acids; steroids, which have a core of four carbon rings; phospholipids, composed of two fatty acids, glycerol, and a charged phosphate group; and waxes, which are composed of a single fatty acid linked to a long-chained alcohol

### Protein

- Proteins are a diverse group of biological molecules composed of the monomers called amino acids. Sequences of amino acids are strung together to produce polypeptide chains, which then fold up into working proteins. Important groups of proteins include enzymes, which hasten chemical reactions, and structural proteins
- The primary structure of a protein is its amino acid sequence; this sequence determines a protein's secondary structure—the form a protein assumes after having folded up. The tertiary structure is the larger scale three dimensional shape that a protein assumes; the way 2 or more polypeptide chains come together to form a protein's quaternary

structure. The activities of proteins are determined by their final folded shapes

- Lipoproteins are combinations of lipids and proteins
- Glycoproteins are combinations of carbohydrates and proteins

#### Nucleic Acids

- Nucleic acids are polymers composed of nucleotides. The nucleic acid DNA (deoxyribonucleic acid) is composed of nucleotides that contain a sugar (deoxyribose), a phosphate group, and one of four nitrogen-containing base. DNA is a repository of genetic information. The sequence of its bases contains the information for the production of the huge array of proteins produced by living things .