

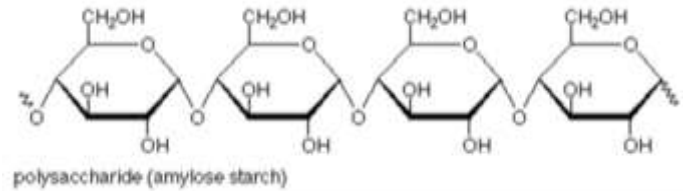
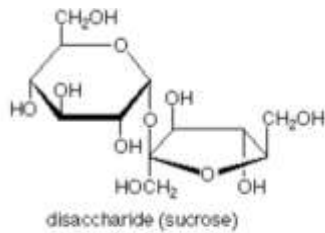
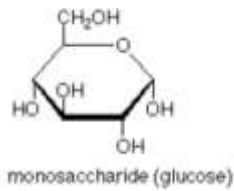
Carbohydrates

Carbohydrates are used by the body for **energy** and **structural support** in cell walls of plants and exoskeletons of insects and crustaceans.

They are made of smaller subunits, or monomers called **monosaccharides**. Monosaccharides have carbon, hydrogen, and oxygen in a **1:2:1 ratio**. Monosaccharides or simple sugars include **glucose, galactose, and fructose**. Although their chemical formulas are the same, they have different structures.



These simple sugars combine to make **disaccharides** (double sugars like sucrose) and **polysaccharides** (long chains like **cellulose, chitin, and glycogen**).



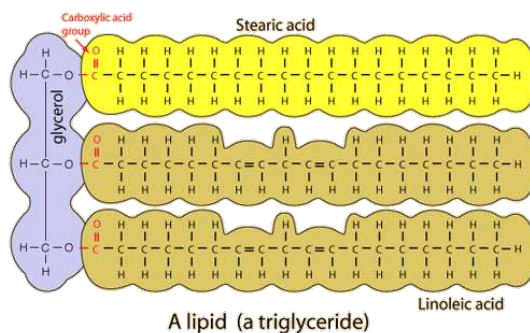
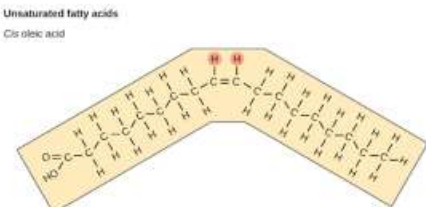
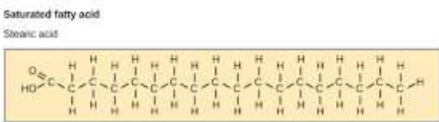
Lipids

Lipids are large, **nonpolar** (won't dissolve in water) molecules. Lipids are used to **store energy**, and can also serve as waxy coverings (cuticle) on plants, pigments (chlorophyll), and steroids.



Lipids have more carbon and hydrogen atoms than oxygen atoms.

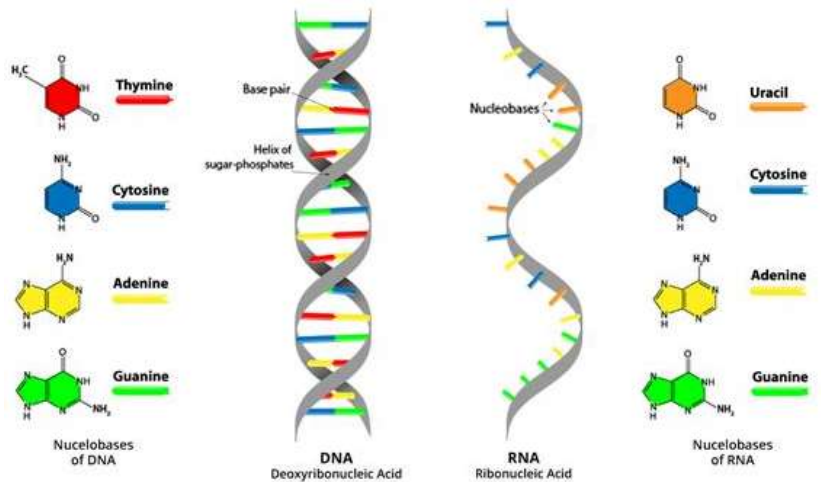
Fats are made of the monomers, like **glycerol** and **fatty acid chains**. The fatty acid chains may be saturated (only single bonds between carbons) or unsaturated (contain at least one double bond). **Unsaturated fatty acids are commonly found in plant oils, while saturated fatty acids are found in animal fats**. One glycerol and 3 fatty acids make up the polymer, **triglyceride**. The cell membrane is made of two layers of a special type of lipid polymer called **phospholipids**. Phospholipids have a "water-loving" hydrophilic head and two "water-fearing" hydrophobic tails.



Nucleic Acids

Nucleic acids carry the **genetic information** in a cell. Nucleic acids such as DNA and RNA contain carbon, hydrogen, oxygen, **nitrogen, and phosphorus**.

The monomers that make up nucleic acids are called **nucleotides**. Nucleotides have 3 parts; a phosphate group, a sugar, and a nitrogenous base. **ATP** is a high energy nucleotide with three phosphate groups that is used for cellular energy. **The sugar component of DNA is deoxyribose, and the sugar component of RNA is ribose.** The four kinds of nitrogenous bases used by DNA include adenine, thymine, cytosine, and guanine. RNA substitutes the base uracil for thymine.

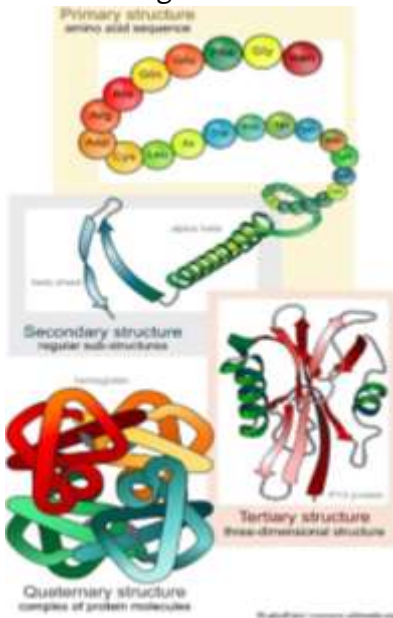


DNA or deoxyribose nucleic acid contains all the **instructions** for making every protein needed by a living thing. **RNA** copies and transfers this genetic information so that proteins can be made.

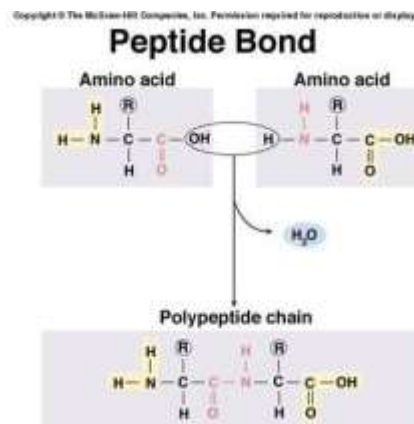
Proteins

Proteins are used to **build cells** and **do much of the work** inside organisms. They also act as enzymes helping to control metabolic reactions in organisms. Proteins are made of carbon, hydrogen, oxygen, and **nitrogen**.

Proteins are made of monomers called **amino acids**. Amino acids contain two functional groups, the carboxyl group (-COOH) and the amino group (-NH₂). The R group differs for every amino acid, organisms use 20 different amino acid. The human body makes 12 of the amino acids needed for survival, and the rest are obtained through consumed food.



Dehydration synthesis (removal of a water molecule) reactions create peptide bonds that link amino acids together to form chains called polypeptides. **Polypeptide chains** join to form proteins that fold into **particular shapes** that help the protein to complete its function.



	CARBOHYDRATES	PROTEINS	LIPIDS	NUCLEIC ACIDS
Elements				
Function				
Monomer				
Example				
Polymer				
Example				
Miscellaneous Important Information				

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