**Biomolecules Summary**

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|  | **Carbohydrates** | **Lipids** | **Proteins** | **Nucleic Acids** |
| **Elements** | Carbon, hydrogen, & oxygenCHO(usually 1:2:1 ratio) | Carbon, hydrogen, & oxygenCHO(and phosphorus (P) for phospholipids) - CHOP | Carbon, hydrogen, oxygen, & nitrogenCHON | Carbon, hydrogen, oxygen, nitrogen, & phosphorusCHONP |
| **Monomer** | Sugar or glucose or monosaccharide or simple sugar or C6H12O6 | Fatty acids & glycerol\*not a true monomerTriglycerides- 3 fatty acids & glycerolPhospholipids- 2 fatty acids & glycerol | Amino acids(20 different types due to a variable “R group”)\* contains an amino and carboxyl group | Nucleotides\* Phosphate group attached to a sugar molecule (ribose in RNA or deoxyribose in DNA) which is attached to a nitrogenous base (adenine, cytosine, guanine, thymine or uracil)  |
| **Structure of monomer** |  | TriglyceridesPhospholipids |  | Nucleotide |
| **Function** | \* Quick energy\* Structural purposes in plants (cellulose cell wall), fungi (chitin cell wall), & insects (chitin exoskeleton) | \* Store energy\* Part of biological membranes (phospholipids) \* Waterproof coverings\* Hormones, such as steroids | \* Control the rate/speed of chemical reactions\* Transport substances into and out of cells\* Help fight disease | \* Store and transmit genetic information\* Code for the production of proteins |
| **Examples** | Monosaccharides: glucose, galactose, & fructoseDisaccharides: sucrose, maltose, & lactosePolysaccharides: plant starch, glycogen (equivalent of starch in animals), cellulose, & chitin | PhospholipidsSteroidsFatCholesterolOil | EnzymesAntibodies | DNARNA |
| **Notes** | \* Polymers are held together by glycosidic bonds\* Made during photosynthesis in the chloroplasts\* Energy is released from sugar in cellular respiration in the mitochondria | \* Saturated fats- has the maximum # of hydrogen atoms attached to every carbon atom. All the carbons are attached to each other with single bonds\* Unsaturated fats- not all carbon atoms are attached to a hydrogen atom\* Polar/hydrophilic head and non-polar/hydrophobic tails in phospholipids\* Synthesized at the smooth endoplasmic reticulum (SER) | \* Amino acids held together by peptide bonds (di- or polypeptide)\* Has a specific shape that can denature (altered shape) when exposed to high temperatures and a significant change in pH\* Synthesized at ribosomes\* Primary structure -unique order of the amino acids joined together\* Secondary structure- coiling and folding of a polypeptide chain that gives the protein its 3-D shape – notably, α) helix and beta (β) pleated sheet\* Tertiary structure- comprehensive 3-D structure of the polypeptide,\* Quaternary structure- refers to the structure of a protein macromolecule formed by interactions between multiple polypeptide chains | \* The 2 types of nitrogenous bases are purines (adenine and guanine) and pyrimidines (thymine and cytosine)\* Nitrogenous bases are held together by hydrogen bonds and nucleotides are held together by covalent or phosphodiester bond\* DNA is in the form of chromosomes which contain genes (which code for protein production)\* DNA is located in the nucleus in eukaryotes and is located in the cytoplasm in prokaryotes  |