**Carbohydrates**

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| **Monomer** | Monosaccharides |
| **Molecular Formulas** | **General:** CH2O**Triose:** C3H6O3**Pentose:** C5H10O5**Hexose:** C6H12O6 |
| **Common Functional Groups** | **Carbonyl:** https://encrypted-tbn1.gstatic.com/images?q=tbn:ANd9GcRBw0Yz_tPAgdq_vw7x8spoopWhjkiOAe4f0qkNwgBEZ9laZacxQ0Qzlrs9Jw **-Ketone:** http://upload.wikimedia.org/wikipedia/commons/thumb/4/40/Ketone-group-2D-skeletal.svg/1024px-Ketone-group-2D-skeletal.svg.png **-Aldehyde:**http://t2.gstatic.com/images?q=tbn:ANd9GcTM95CbrXv-OG5JxY1hC65b3BJjjvgr0k_Y5Hhvy6BisIFcU-8-**Hydroxyl:** http://www.livingintherealworld.net/healthy/wp-content/uploads/2011/07/hydroxylfunctional.png |
| **Disaccharide:** 2 covalently bound monosaccharides GLU + GLU = Maltose GLU + GAL = Lactose GLU + FRU = Sucrose | **Polysaccharide:** polymer, many covalently bound monosaccharides |
| **Type of Reaction to form bond between Monomers** | **Dehydration Synthesis**: water molecule removed (-OH from one, -H from the other)**This type of bond is called:** glycosidic linkage**These bonds are named based on:**- alpha or beta orientation of the hydroxyl groups on the anomeric carbon atoms- the two carbon atoms that bind the oxygen holding the molecules together, C-1 and C-4, respectively |
| **Type of Reaction to Break bond between Monomers** | **Hydrolysis**: Addition of a water molecule, -OH to one monomer and -H to the other, to sever the bond between them |
| **Functions of polysaccharides** | **1)** Storage (energy, parts for synthesis of other molecules)**2)** Structure |
| **Structural polysaccharides (glucose)** **(type of bond, distinct features, digestible by humans?)** | **1) Cellulose**: beta- 1, 4 linkage, straight shape, plant cell walls, paper, cotton, not digestible in organisms without proper gut microbes**2) Chitin**: beta- 1, 4 linkage, straight shape, arthropod exoskeletons and fungi cell walls, have an N-acetyl group attach to each monomer, not digestible in organisms without proper gut microbes |
| **Storage polysaccharides (glucose)** **(type of bond, distinct features, digestible by humans?)** | **1) Starch**: alpha- 1, 4 linkage, used in plants to store glucose, helical shape, digestible-2 forms: amylose (unbranched), amylopectin (branched, attachments 1-6 linkages)**2) Glycogen**: alpha- 1, 4 linkage, used in humans to store glucose, highly branched (attachments 1-6 linkages), helical shape  |
| **Linear structure of B-Glucose**  | **Ring Structure of B-Glucose**   |