

Source: [KBiologyMasterIndex](#)

1 | Bio-Molecules Quiz Review

#disorganized

1.1 | Paul's Review Sheet

... is here

1.1.1 | Carbohydrates

- Set 1, carbs. See Luke De's video + [KBhBIO101Carbs](#)
 - *Glucose vs. fructose* — both monosaccharides, one is a 6-carbon ring and one is a 5-carbon ring
 - *Mono vs. di. vs. polysaccharide* — carbohydrates made out of a single, double, and multiple monomer (single-unit) carbohydrates
 - *Starch vs. glycogen vs. cellulose* — lots of alpha glucose in less branches, lots of alpha glucose in more branches, lots of beta glucose in organized lattice respectively.
 - Starch — plant food reserve
 - Glycogen — animal energy reserve
 - Cellulose — cell wall in plants
- Set 2, lipids. See Luke De's video + [KBhBIO101Lipids](#)
 - *Triglyceride vs. fatty acid vs. phospholipid* see [KBhBIO101StructuresofCarbs](#)
 - Glycerol => a fatty acid
 - Triglyceride => three of 'em above
 - Phospholipid => two fatty acid + phosphate head
 - *Saturated vs unsaturated fatty acids* see also [KBhBIO101StructuresofCarbs](#)
 - Saturated Fats => no double bonds in the carbon chain of fatty acids — think! butter
 - Unsaturated Fats => double bonds in the carbon chain of fatty acids — think! olive oil
- Identify functional groups
 - Amino acid groups — see [KBhBIO101AminoAcids](#)
 - carboxyl — $\text{O}=\text{C}-\text{R}-\text{OH}$
 - carboxylic acid — $\text{H}-\text{O}-\text{C}=\text{O}$ (left side of backbone)
 - carbonyl — $\text{C}=\text{O}$ — part of carboxyl
 - amide — $\text{RC}(=\text{O})\text{NR}'\text{R}''$ (frequently shown in side chains of amino acids — see Amine)
 - amino/amine — H_3N^+ (right side of backbone)
 - hydroxyl — OH group. Need I say more?
 - ester — take a carboxylic acid and replace the hydrogen with a $\text{R}-\text{O}$ group #ASK
 - ether — $\text{R}-\text{O}-\text{R}$ structure. Commonly shown as an alcohol group ($\text{H}-\text{O}-\text{C}$) as part of the carboxyl
- Monomers vs Polymers [KBhBIO101StructuresofCarbs](#)
 - Monomer — single molecule (such as a monosaccharide) that could be chained together to make polymers
 - Polymers — complex molecules built from monomers
 - Building polymers — dehydration reaction — taking out water molecules
 - Destructing polymers — hydration reaction — adding in water molecules

1.1.2 | Cell Structures

- Prokaryotic vs. Eukaryotic
 - Prokaryotic cells — often in single-cellular cells, has a cell wall, and contained in capsules
 - Eukaryotic cells — in multicellular cell elements, contains a plasma membranes and nucleus
- Compare and contrast a typical animal cell with a typical plant cell. Be able to label diagrams of each. (See... problem set 1)
 - Animal Cell
 - No cell wall
 - No chloroplast
 - Has Cytoplasm
 - Has Ribosomes
 - Has Mitochondria
 - No plastids — organelle pigments
 - Has Cilia — Hair-like items on the outer surface
 - Plant Cell
 - Has cell wall
 - Has chloroplast — photosynthesis
 - Has cytoplasm
 - Has Ribosomes
 - Has Mitochondria
 - Has plastids — organelle pigments
 - Mostly has no Cilia
- Endosymbiotic theory
 - Endosymbiotic theory states that organelles within our current eukaryotic cells — the mitochondria and chloroplasts — are originally prokaryotic cells in their own right. This is because they divide independently through binary fission, and also contains circular DNA that is independent of the main cell itself.
- Organizing organelles based on membranes #ASK
 - Membranous organelles — possess own plasma => regulates own macromolecule consumption, hormones, etc. Perhaps original prokaryotic cells
 - Endoplasmic reticulum => forms the network of transferring proteins and other elements
 - Golgi body/Golgi apparatus => packs, sorts, and modifies proteins and other elements throughout the cell
 - Non-membranous organelles — does not possess own plasma => mostly part of the cytoskeleton of a cell
 - Ribosomes => protein synthesizer in the cell
 - Centrosome => forms flagella, cilia, and handles cells divisions
 - Lysosomes => digesting large nutrients and changing them to what cells could process and work on energy metabolism
 - Mitochondria => store ATP and extract energy from ATP
 - Vacuoles => storing water, nutrients, waste
 - Plastids => creates colours displayed in the chromoplasts
- Cell Components. Basically all of these exist only in Eukaryotic cells
 - chloroplast and mitochondria
 - Chloroplast — found in plants + does photosynthesis
 - Mitochondria — found in animals + store ATP and extract energy from ATP
 - cell wall and plasma membrane

- Cell Wall — found in plants => surround the cell: hard
- Plasma membrane — found in animals => surround the cell: soft [\[KBhBIO101Lipids\]](#)
- rough endoplasmic reticulum (ER) and smooth ER
 - Rough ER — covered by ribosomes and folds [\[KBhBIO101Proteins\]](#)
 - Smooth ER — not covered by ribosomes and makes [\[KBhBIO101Lipids\]](#)
- cytosol, cytoplasm and cytoskeleton
 - Cytosol => liquid found inside cells; the “cytoplasm” floats within it
 - Cytoplasm => all the stuff within the cell
 - Cytoskeleton => complex network of proteins + fibres that organize the rest of the cell
- nucleus and nucleolus
 - nucleus => centre of the cell, stores DNA
 - nucleolus => largest part of the nucleus that makes ribosomes
- lysosomes and food vacuoles
 - Lysosomes => vesicles that contains enzymes that breaks down biomolecules
 - Food Vacuoles => vesicles that stores food and other resources
- cytoskeleton and microtubules
 - Cytoskeleton => complex network of proteins + fibres that organize the rest of the cell
 - Microtubules => Polymers of tubulin protein that provides the main structure of eukarotic cells
- flagella and cilia
 - Flagella => a bacteria’s tail — allow them to move and also act as an sensory organ. longer than a cilia, and moves in sinusoidal pattern.
 - Cilium => a cell’s “hair” — provides sensory and communications functions. Motile cilia could move about to “grab” things, and non-motile cilia can’t move. more abundant than the flagella, and moves in circular pattern if they do move, and moves in circular pattern if they do move
- Ribosomes and Golgi apparatus
 - Ribosomes => synthesizes proteins
 - Golgi apparatus => packs, modifying, and moving proteins

1.1.3 | Plasma Membrane Structure + transport

- Lipid structure and substructures: [\[KBhBIO101Lipids\]](#)
- Functions of cell membrane
 - Phospholipid structures [\[KBhBIO101StructuresOfLipids\]](#)
 - Transmembrane proteins [\[KBhBIO101CellTransport\]](#)
 - Hydrophobic + hydrophilic parts of a phospholipid [\[KBhBIO101StructuresOfLipids\]](#) + [\[KBhBIO101FluidMosaic\]](#)
- Passive + active transport [\[KBhBIO101CellTransport\]](#)
- Cell transport process
 - Simple diffusion (#ASK same thing as passive transport + osmosis)=> non-polar molecules needed “fall in”
 - Facilitated diffusion => specific polar molecules go along the gradient to get into the cell through transporter proteins
 - Phagocytosis => take a piece of the membrane with you to form a vesicle to introduce large solid elements, recycling the membrane after done — “cell eating”
 - Pinocytosis => take a piece of the membrane with you to form a vesicle to introduce large area of the “outside” in — fluid and solid and all, recycling the membrane after done — “cell drinking”
 - Endocytosis => Phagocytosis + Pinocytosis
 - Exocytosis => opposite of endocytosis

- Defining...
 - Isotonic => inside and outside have the same level of “osmolarity”: probability for osmosis to happen through a semipermeable membrane
 - Hypertonic => inside has less osmolarity than the outside: water/other elems will flow out of the cell
 - Hypotonic => outside has less osmolarity than the inside: water/other elems will flow into the cell

1.1.4 | **Proteins Structures and Function**

- Overall structure, monomers/building blocks, functions, and examples of proteins => [\[KBhBIO101Proteins\]](#)
- “peptide” => a chain of amino-acids
- Polymerization via dehydration
 - Take two amino acids, take the H-O out of the alcohol, take the H out of the Amine. Fill the hole with the other one
- Protein structure
 - Primary structure, secondary structure => [\[KBhBIO101Proteins\]](#)
 - Amino acids, N & C terminus => [\[KBhBIO101AminoAcids\]](#). N terminus (Amine), C terminus (Carboxylic.)
 - Secondary structure — H bonds between H-O, H-N
 - Tertiary structure => see the [\[KBhBIO101Proteins\]](#) articles
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1.2 | Helpful review items

Bonding in organic compounds, a review.

Common nonpolar bonds

Carbon-carbon
Carbon-hydrogen
Carbon-sulfur

Common dipole interactions

Carbon-nitrogen $\delta^+ - \delta^-$ Carbon-oxygen $\delta^+ - \delta^-$
Nitrogen-oxygen $\delta^+ - \delta^-$ Hydrogen-oxygen $\delta^+ - \delta^-$

Common ionic interactions

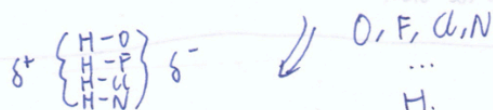
they come from acid-base interactions.

However, sometimes they are permanent. Look at the amino acid chart for those.

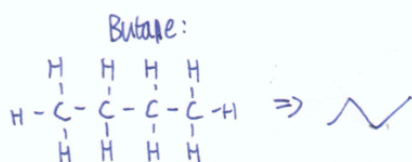
Why hydrogen bonding is excellent

Hydrogen bonding allows stronger dipole-dipole bonds than dipole-dipole bonds. They are still good ol covalent bonds.

These bonds basically combines Hydrogen w/ the most electronegative atoms.



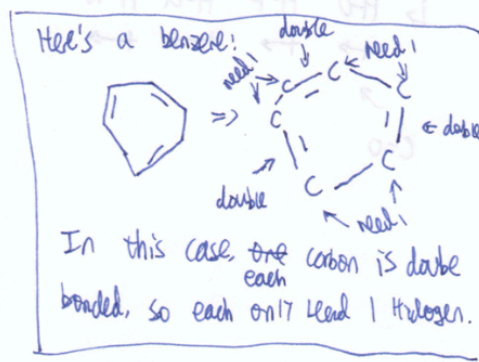
Reading a line-angle representation.



In this type of representations, start with a line. End the line at every carbon.



Now, it is assumed that carbon is not going to just be happy with $\text{C}-\text{C}-\text{C}-\text{C}$.



So, we still the missing orbitals with hydrogen.

need 2 $\text{C}-\text{C}-\text{C}-\text{C}$ need 3
need 3 need 2

Figure 1: Screen Shot 2020-10-09 at 11:58:55 AM.png