

Topic Review Guide: Biologically Important Molecules, Part 1

To Think About: How do molecules and atoms from the environment build new molecules? In what ways do the subcomponents of biological molecules and their sequences determine the properties of those molecules? What interactions between molecules affect their structure and function?

Watch:

First: [Mr. Andersen's "Water: A Polar Molecule" video](#)

Next: [Mr. Andersen's "Polymers" video](#)

Then: [Mr. Andersen's "Carbohydrates" video](#)

And: [Mr. Andersen's "Lipids" video](#)

Read:

First: Chapter 2, pages 20-26: Mader, *Biology*, 9th ed. (2007).

Then: Chapter 2, pages 27-31: Mader, *Biology*, 9th ed. (2007).

Then: Chapter 3, pages 36-45: Mader, *Biology*, 9th ed. (2007).

Supplementary Resources: Click the links below for more information to help you learn more about this lesson.

- Austin Community College: [Dissociation of Water](#)
- US Geological Service: [Properties of Water](#)
- Sumanas, Inc.: [Properties of Water \(animation\)](#)
- Crash Course Biology: [That's Why Carbon is a Tramp](#)
- Crash Course Biology: [Water—Liquid Awesome](#)
- Crash Course Biology: [Biological Molecules—You Are What You Eat](#)
- BioNinja (for IB students, but a good resource): [Chemical Elements and Water](#)
- BioNinja (for IB students, but a good resource): [Carbohydrates, Lipids and Proteins](#)
- Kimball's Biology Pages: [Hydrogen Bonding](#)

Listen and Look: Here is a list of key terms and concepts you will hear about and see during these podcasts and chapter readings. Get to know them! Be able to connect them to one another using a concept map.

Don't just simply define the terms—you must understand the relationships among and between them!

KEY TERMS

Polarity	Polar	Monomer	Polymer
Hydrophobic	Hydrophilic	Van der Waals interactions	Ionic bonding
Cohesion	Organic	Inorganic	Hydrophobic interaction
Covalent bond	Hydrogen bond	Hydrolysis	Dehydration synthesis (condensation)
Macromolecule	Carbohydrate	Monosaccharide	Disaccharide
Polysaccharide	Lipid	Nonpolar	Amphipathic
Phospholipid	Triglyceride fat	Saturated fat	Unsaturated fat

Recall and Review: Use the lecture in the videos and your textbook reading to help you answer these questions in your notebook.

1. **Create** a t-chart that illustrates the difference between cohesion and adhesion of water molecules. **Explain** why each of these properties are significant to living things.
2. **Create** four cartoons that illustrate the properties of water that deal directly with hydrogen bonding.
3. Using a graphic organizer, **explain** how water's high specific heat, high heat of vaporization and expansion upon freezing affect both aquatic and terrestrial ecosystems.

4. **Describe** how carbon skeletons may vary, and explain how this variation contributes to the diversity and complexity of organic molecules.
5. **Explain** how the letters of the alphabet are similar to monomers of a polymer.
6. **Explain** why the shape of a molecule is critical to determining its function.
7. **Draw** an example of two monomers forming a polymer through dehydration synthesis (condensation).
8. **Explain** the phrase “you are what you eat” in the context of dehydration synthesis and hydrolysis.
9. **Create** a graphic organizer that illustrates the structural and functional differences between the three types of carbohydrates.
10. **Identify:**
 - a. the biological process that produces carbohydrates such as glucose, fructose and cellulose
 - b. where this process occurs and in what types of organisms
11. **Describe** the hydrocarbon tail of a fatty acid. **Explain** why hydrocarbons are excellent sources of energy.
12. **Draw** a sketch of a saturated fatty acid and an unsaturated fatty acid, side by side. **Explain** how their respective structures influence their behavior in living cells.
13. **Explain** why the amphipathic quality of a phospholipid is ideal for the construction of cell membranes.
14. A friend of yours decides that they are going to cut *all* fat from their diet. **Explain** why such behavior could be detrimental to your friend’s health.

Learn More: For more examples of biologically important molecules, use the links below:

- Kimball’s Biology Pages: [Carbohydrates](#)
- Kimball’s Biology Pages: [Fats](#)
- NobelPrize.org Chirality Game: [learn about “handedness” of molecules](#)
- University of California: [Atoms, Molecules, Water, pH](#)