

## Carbon Chemistry Virtual Lab: How can models of carbon compounds be built? (click off web page) 1pt ec

<http://glencoe.mheducation.com/sites/dl/free/0078741858/365090/E23.html>

**Organic chemistry is the study of the compounds of carbon.** Carbon compounds contain carbon and one or more other elements, such as hydrogen, oxygen, nitrogen, or sulfur. A molecular formula for a compound indicates what elements make up the compound and how many atoms of each element are present in a molecule of the compound. For instance, the molecular formula for methane is CH<sub>4</sub>. This means each methane molecule is made up of 1 carbon atom and 4 hydrogen atoms. A compound like methane that is made up of only carbon and hydrogen atoms is called a hydrocarbon. Straight-chain hydrocarbons are so called because the carbon molecules are bonded together side by side in a line, or "chain." The outermost electrons in an atom form covalent bonds with outermost electrons in other atoms. A single covalent bond is formed when two atoms share the same electron. A carbon atom has four outermost electrons, each of which will form a covalent bond with either another carbon atom or an atom of another element such as hydrogen. A hydrogen atom has one electron, and so will form one covalent bond.

### There are three groups or series of straight-chain hydrocarbons.

The **alkane** series consists of hydrocarbons that have single covalent bonds between each of their carbon atoms.

An **alkene** series hydrocarbon has a double covalent bond (two covalent bonds) between at least two of its carbon atoms. A double bond counts as two bonds, so a carbon atom that has a double bond has only two remaining electrons available to form covalent bonds.

An **alkyne** series hydrocarbon has a triple bond (three covalent bonds) between at least two of its carbon atoms. A triple bond counts as three bonds, so a carbon atom that has a triple bond will have only one electron available to form a covalent bond.

Like a molecular formula, a structural formula indicates the number and kinds of atoms that make up a molecule of a compound.

Additionally, it describes the arrangement of the atoms in the molecule.

For an example of the structural formula for methane, click the formula button. Notice that the number of carbon and hydrogen atoms is the same as that given by the molecular formula CH<sub>4</sub>. The dashes between the letters represent the single covalent bonds between the atoms. In a structural formula, bonds connect two atoms; they do not attach to other bonds.

### In this Virtual Lab you will explore the relationship between molecular and structural formulas of carbon compounds.

**Objectives:** Construct structural formula models of organic compounds.

- Describe the difference between saturated and unsaturated hydrocarbons.
- Distinguish between the alkane, alkene, and alkyne series of hydrocarbons.

**Procedure:** 1. Click the Video button to watch the demonstration. Write at least 4 sentences of observations below:

2. Click the Chemistry button to learn about the structure of basic hydrocarbon molecules. Click the forward and back arrows to page through the information. Click the Close button to return to the activity screen. Click the Molecule menu and select a molecule.

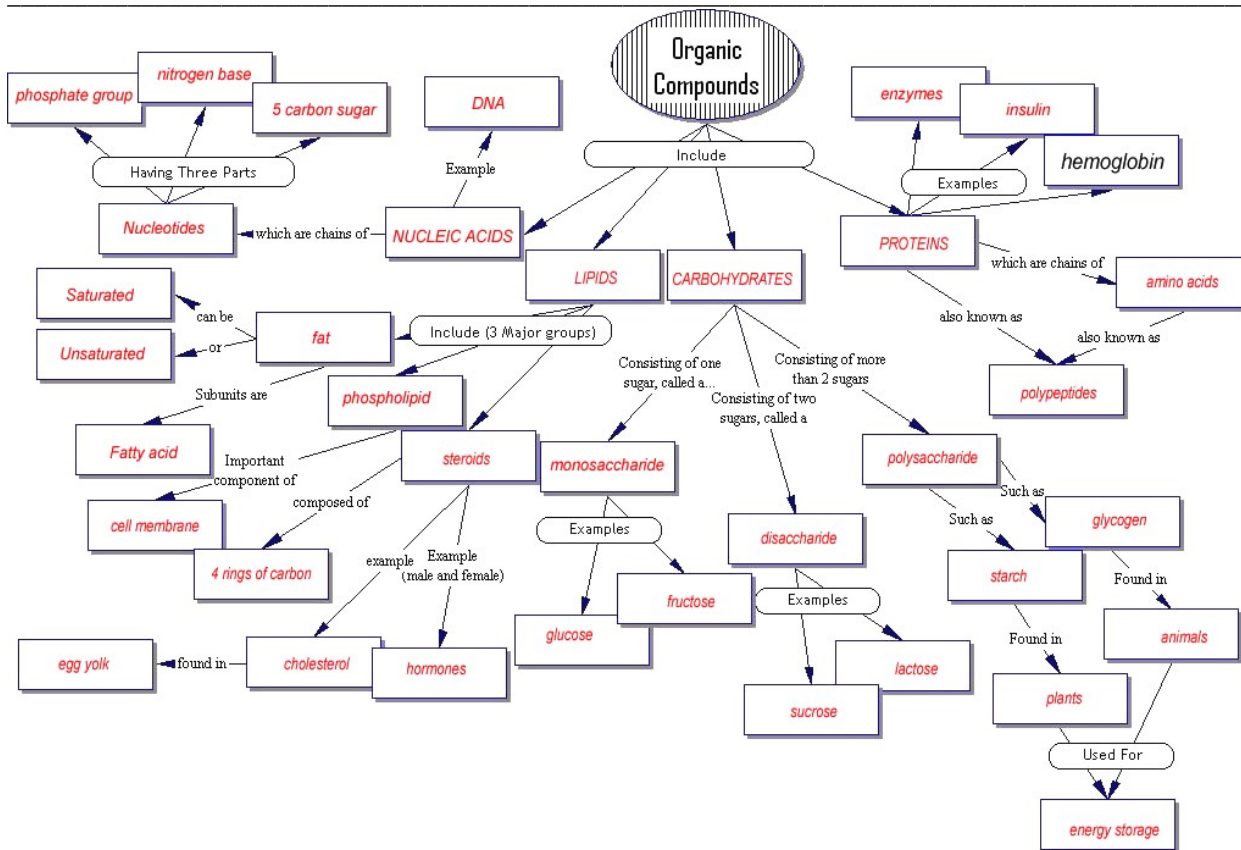
3. Build a structural model of the molecule you chose by clicking atoms and covalent bonds and dragging them to the work area.

4. Click the Check button to check your model. Once your model is correct, record your findings in the table below. Complete 5 models.

	Compound Name	Number of Carbon Atoms	Number of Hydrogen Atoms	Alkane, Alkene, or Alkyne series	Double, triple or single bond	Draw the structure here
1						
2						
3						
4						
5						

5. Complete the Journal questions here:

- 1: What are organic compounds? \_\_\_\_\_
- 2: What are hydrocarbons? \_\_\_\_\_
- 3: What are covalent bonds? \_\_\_\_\_
- 4: Which (if any) of the molecules you built were Alkanes? Alkenes? Alkynes? \_\_\_\_\_
- 5: What is the difference between saturated and unsaturated hydrocarbons? \_\_\_\_\_
- 6: What is the difference between a molecular formula and a structural formula? \_\_\_\_\_



Conclusion:

1. In looking at the above flow chart label the 4 primary groups of organic compounds: \_\_\_\_\_
2. What is a Lipid? \_\_\_\_\_  
 What are the 3 major groups of lipids? \_\_\_\_\_  
 What are the 2 types of fat, and what are their main differences? \_\_\_\_\_
3. What is a carbohydrate? \_\_\_\_\_  
 What are the 3 primary groups of carbohydrates, and what are their basic differences? \_\_\_\_\_
4. What is a protein? \_\_\_\_\_  
 What makes up a protein? \_\_\_\_\_  
 What are some protein examples? \_\_\_\_\_