

Name: _____

Date: _____

Chemistry 11 - Lewis Structure Building Lab

Objectives:

- 1) To build and observe three-dimensional particle models.
- 2) To name shape and polarity of the particles.
- 3) To draw 2D & 3D Lewis Structures.
- 4) To draw organic chemistry style structures.
- 5) To find out more about an organic compound.

Materials:

Model Kit

Pencil

Pen

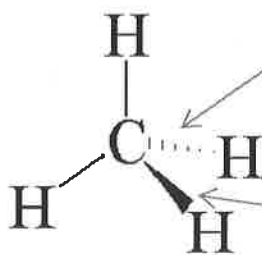
Data Booklet

Procedure:

Closely follow the directions in the 'Drawings & Interpretations' section of the lab.

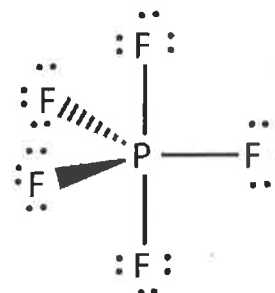
Drawings & Interpretations:

3D Style Sketches:



A dashed triangular shaped bond like this represents the bond going back into the page.

A solid triangular shape bond represents the bond coming out of the page



Usually, when orientating a model before drawing, get as many bonds into the same plane as possible (the plane of your paper). For example, in the PF_5 drawing above, three bonds are in the same plane (instead of one or two), then the sketch was made. For CH_4 above, two bonds were in the same plane when the sketch was drawn (instead of just one).

Therefore, before drawing your sketches, orient your model to get as many bonds in the same plane (the plane of your paper) as possible.

For each of the structures on the following page, build the structure with the model kit, sketch the 3D style drawing, and comment on shape & polarity:

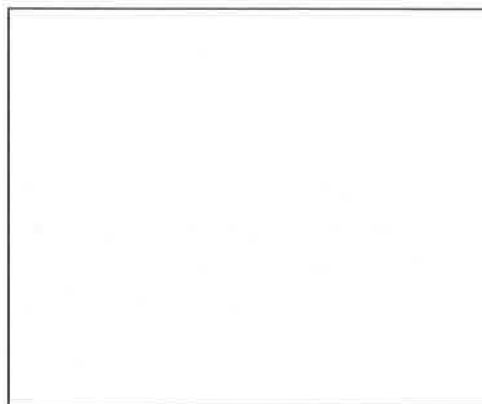
1) H₂O



Shape(s): _____

Polarity: _____

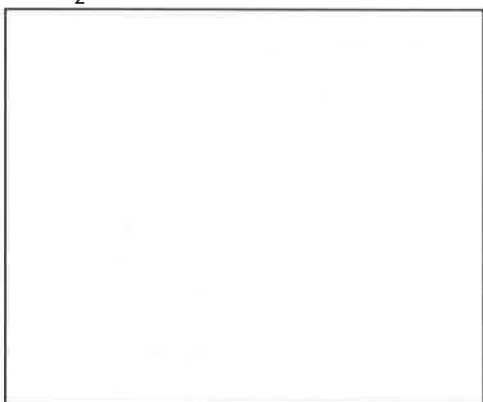
2) NH₃



Shape(s): _____

Polarity: _____

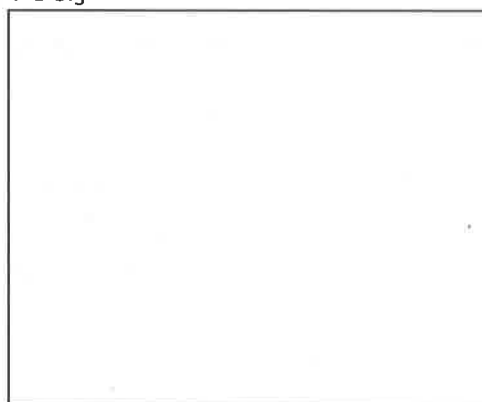
3) CBr₂



Shape(s): _____

Polarity: _____

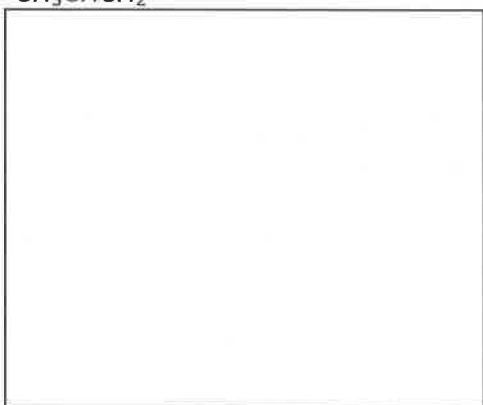
4) POCl₃



Shape(s): _____

Polarity: _____

5) CH₃CHCH₂



Shape(s): _____

Polarity: _____

6) CH₂CHCOOH



Shape(s): _____

Polarity: _____

Organic Chemistry

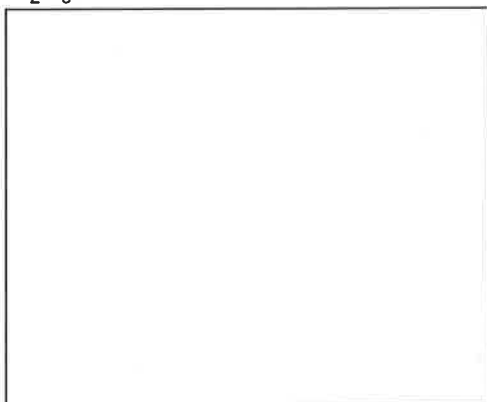
Organic Chemistry is the study of carbon containing compounds. Organic compounds are/were part of living organisms. Organic Compounds are named using an international organized naming system (IUPAC). We will learn some basics of this naming system.

Alkanes are compounds consisting solely of carbon and hydrogen, and all single bonds. The carbons are in a chain arrangement.

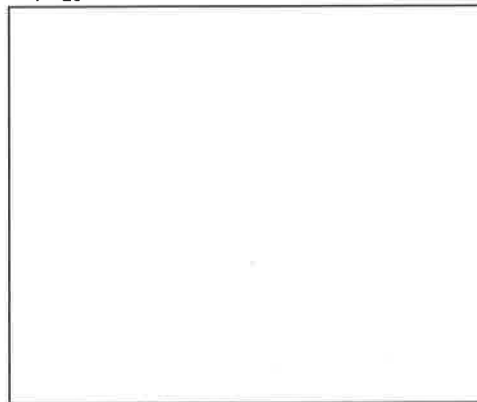
| Name | Molecular Formula |
|---------|---------------------------------|
| methane | CH ₄ |
| ethane | C ₂ H ₆ |
| propane | C ₃ H ₈ |
| butane | C ₄ H ₁₀ |
| pentane | C ₅ H ₁₂ |
| hexane | C ₆ H ₁₄ |
| heptane | C ₇ H ₁₆ |
| octane | C ₈ H ₁₈ |
| nonane | C ₉ H ₂₀ |
| decane | C ₁₀ H ₂₂ |

Methane's structure is on page 1 of this lab. For each of the following structures, build the structure with the model kit, and then sketch the 2D style Lewis drawing:

7) C₂H₆

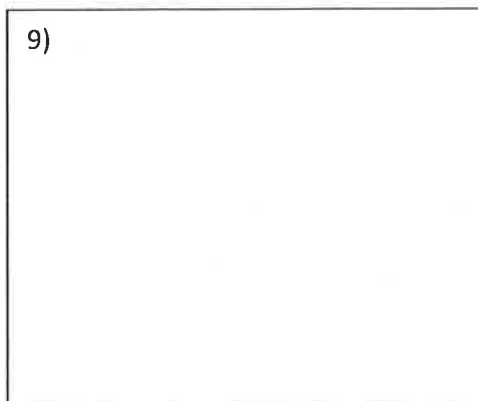


8) C₄H₁₀



Structural Isomers have the same chemical formulas, but a different structure. Can you model and then draw C₄H₁₀ in another way (so that the carbon is not just a chain)?

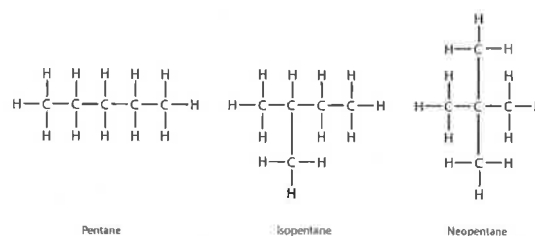
9)



This C₄H₁₀ structural isomer is named

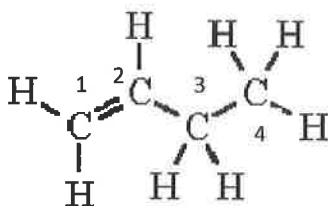
isobutane

Here are the three structural isomers of pentane:

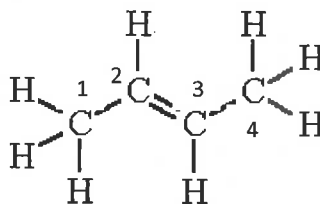


Alkenes are very similar to alkanes, but have a carbon-carbon double bond somewhere on the carbon chain. For example, 1-butene has a double bond between the first & second carbons, whereas 2-butene has a double bond between the second & third carbons.

1-butene

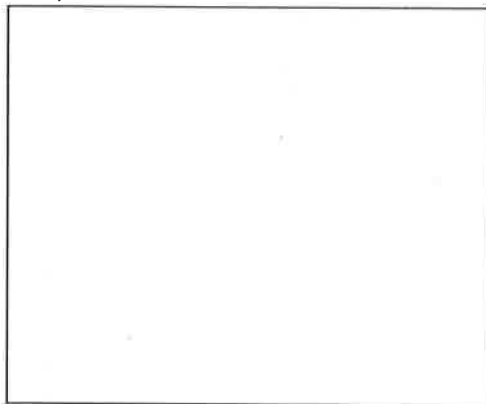


2-butene

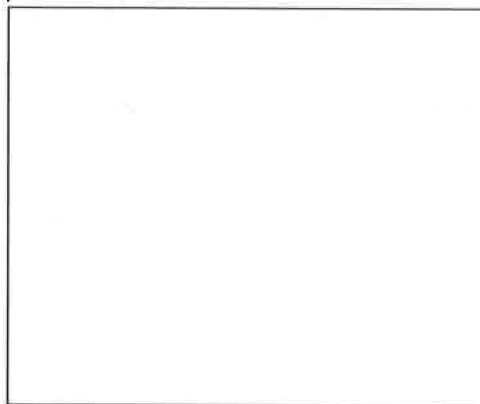


Draw sketches below for:

10) Propene

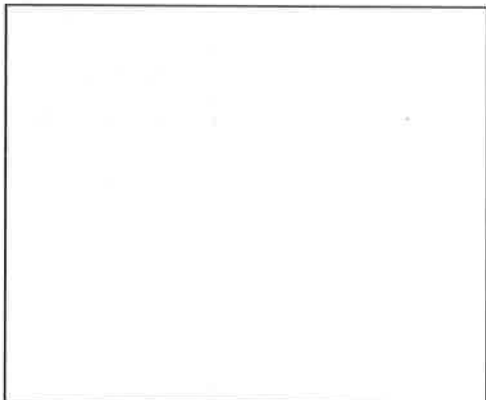


11) 2-Pentene

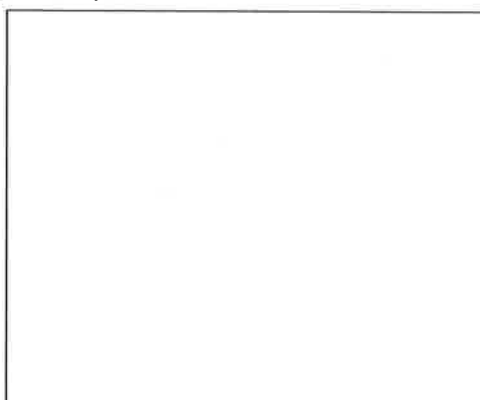


Alkynes have a carbon-carbon triple bond in one location of the chain. Below, draw a sketch for:

12) Ethyne

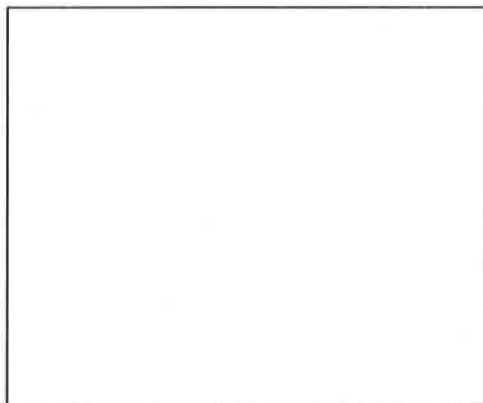


13) 4-octyne

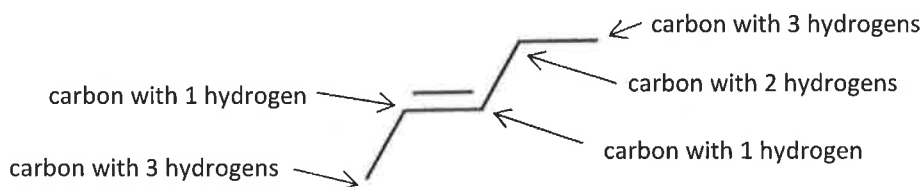


A **benzene** ring is a ring of six carbons, with alternating single and double bonds. Each carbon is also bonded to one hydrogen. The formula is C_6H_6 . Draw benzene below:

14) C_6H_6



Because there are so many carbons and hydrogens in many organic substances, neither are drawn in the structures. For example, here is how 2-Pentene (#11 from last page) is drawn:



Can you draw the following substances using this new method?

15) 3-heptyne



16) Benzene



Benzene has two resonance structures, so every carbon-carbon bond is actually 1.5 bonds. Thus, benzene is actually drawn like this:



Questions: Answer the questions below on this page, and attach an extra page if necessary.

To answer the following questions, first pick one **organic** substance that was drawn in the lab out of: ethane, butane, isobutene, propene, ethyne (also known as acetylene), or benzene

Do not copy out what you find - state it in your own words. If you don't understand it, ask for help.

- 1) Give the name and chemical formula of the substance you chose.
- 2) Draw it as a 2D Lewis Structure, using the method where carbon & hydrogen is not shown.
- 3) State some properties of the substance.
- 4) State some uses of the substance.