Topic: **Intro to Organic Chemistry**

Objective: What is Organic Chemistry?

Organic Chemistry:

- Organic chemistry is the study of how chemistry interacts with biological processes to allow life to exist on planet Earth. Without organic chemistry, none of us would be here.
- Organic chemistry is also one of those "love it" or "hate it" courses, and has been the turning point for many college students that were planning on medical or other life science careers. It usually is nicknamed "O-chem", and saying that either generates smiles or grimaces from people you talk too.
- That being said, we will only scratch the surface of organic chemistry over the next week or so. In college, organic chemistry is a full YEAR (two semesters), including weekly 4+ hour labs. It is one of the most anticipated (dreaded?) courses in many college students' education.
- Scared yet? Don't be, but there is a reason we keep this topic until the end of the year. You'll need to fall back and use ALL of your learned chemistry knowledge to date to tackle the wonderful (and daunting!) world of organic chemistry. Stick with me; we'll get 'er done!

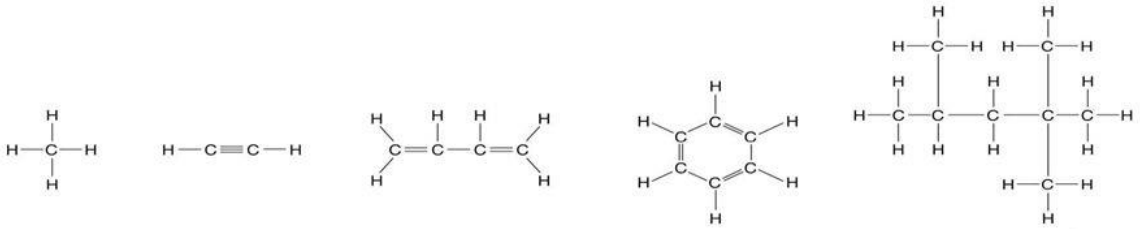
Topic: **Studying Organic Chemistry**

Objective: What makes Organic Chemistry so special?

Organic Chemistry:

- **Organic** chemistry deals with the **chemistry** of **carbon** and **compounds** of carbon, most usually hydrocarbons (carbon and hydrogen compounds.)

The Chemistry of Carbon



Methane Acetylene Butadiene Benzene Isooctane

Carbon has 4 valence electrons, allowing it to bond to 4 other atoms

Carbon forms strong covalent bonds

Carbon bonds easily with other carbon atoms, hydrogen, oxygen, nitrogren, sulfur, and phosphorous =

Organic Compounds -

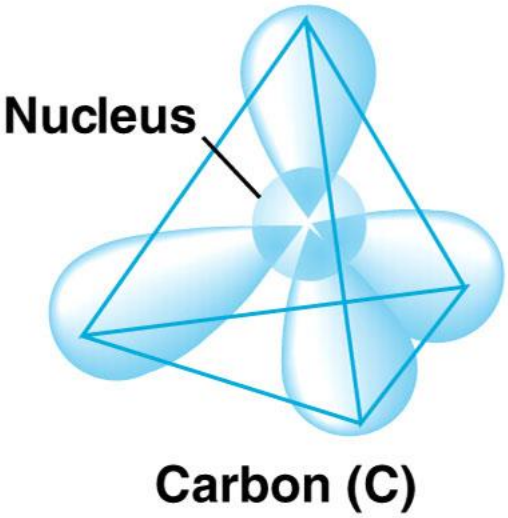
Organic compounds interact to perform the basic functions of life

Topic: **Carbon Compounds**

Objective: What are the properties of Carbon Compounds?

Properties of Carbon Compounds:

- Carbon forms **four** covalent **bonds** that may be **single**, **double**, or **triple**. Carbon has four unpaired electrons in its ground state. The four unpaired **electrons** want to be as far **apart** from each other as possible, lending carbon to have a natural **tetrahedral** shape for bonding.



1. Most **organic** compounds are **nonpolar**, or weakly polar. As such, most organic compounds are held together by weaker London Dispersion Forces and therefore have:
   i. Low melting and boiling points;
   ii. High vapor pressures (volatile).

2. There are ***millions*** of known organic compounds, compared to about 60,000 known inorganic compounds. As diverse as life is, the number of organic compounds created by life may be as diverse.

3. Most **organic** compounds are **insoluble** in water, or immiscible (unmixable) in water.

4. Organic compounds easily undergo **combustion** with oxygen. Combustion is a form of reaction where a **hydrocarbon** (C & H) reacts with **oxygen** to form the products of **carbon dioxide** and **water**. One component of gasoline is the hydrocarbon octane, C_8H_{18}, here combusting with oxygen.

$$2\ C_8H_{18(l)} + 25\ O_{2(g)} \rightarrow 16\ CO_{2(g)} + 18\ H_2O_{(g)}$$

5. Organic compounds **decompose** with heat in anoxic (without oxygen) conditions to the elemental components. Fossil fuels (petroleum, coal) formed this way over millions of years.

6. Organic reactions are much more complex than inorganic reactions, and require a much longer time and more complex mechanisms to occur.