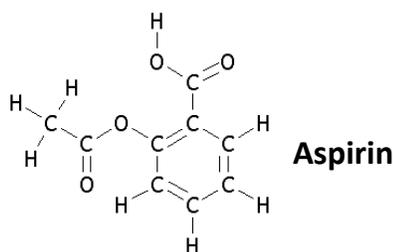
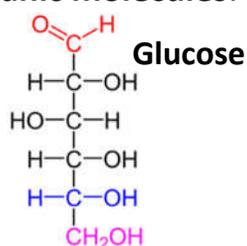
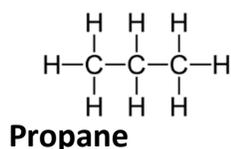


Model 1: Examples of organic molecules:



- Based on what you see in common between these molecules, which element do you think is **always** found in an **organic molecule**? _____
- A hydrocarbon is the simplest type of organic molecule. Based on the name, which **2 elements** do you think are found in a **hydrocarbon**? _____

Model 2: The 3 Types of Hydrocarbons

Alkanes	Alkenes	Alkynes
$ \begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & \\ \text{H} & \text{H} & \text{H} \end{array} $ <p>C₃H₈ =</p>	$ \begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H}-\text{C}-\text{C}=\text{C}-\text{H} \\ & & \\ \text{H} & & \text{H} \end{array} $ <p>C₃H₆ =</p>	$ \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}\equiv\text{C}-\text{C}-\text{H} \\ \\ \text{H} \end{array} $ <p>C₃H₄ =</p>
$ \begin{array}{c} \text{H} & \text{H} \\ & & & & & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & & & & & & \\ \text{H} & \text{H} \end{array} $ <p>C₈H₁₈ =</p>	$ \begin{array}{c} \text{H} & \text{H} \\ & & & & & & & \\ \text{H}-\text{C}-\text{C}-\text{C}=\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & & & & & & \\ \text{H} & \text{H} & & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \end{array} $ <p>C₈H₁₆ =</p>	$ \begin{array}{c} \text{H} & \text{H} \\ & & & & & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}\equiv\text{C}-\text{H} \\ & & & & & & & \\ \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & & \text{H} \end{array} $ <p>C₈H₁₄ =</p>
$ \begin{array}{c} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array} $ <p>C₄H₁₀ =</p>	$ \begin{array}{c} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H}-\text{C}-\text{C}-\text{C}=\text{C}-\text{H} \\ & & & \\ \text{H} & \text{H} & & \text{H} \end{array} $ <p>C₄H₈ =</p>	$ \begin{array}{c} \text{H} & \text{H} \\ & \\ \text{H}-\text{C}\equiv\text{C}-\text{C}-\text{C}-\text{H} \\ & \\ \text{H} & \text{H} \end{array} $ <p>C₄H₆ =</p>

Use the model above to answer the following questions

- What types of bonds (single, double, or triple) are found **between carbon atoms** in...
 - Alkanes: _____
 - Alkenes: _____
 - Alkynes: _____
- Which type of hydrocarbon contains the **most hydrogen atoms per carbon atom** (hint: compare all the 3 carbon molecules in the first row)?

3. **Alkanes** are considered to be **saturated hydrocarbons** while **alkenes and alkynes** are considered to be **unsaturated hydrocarbons**. Using the model as well as your answer to number 2, list 2 characteristics of saturated hydrocarbons and 2 for unsaturated hydrocarbons

Unsaturated Hydrocarbons	Saturated Hydrocarbons

Model 3: Hydrocarbons and their Names

<p>Ethane C_2H_6</p> <pre> H H H — C — C — H H H </pre>	<p>Ethene C_2H_4</p> <pre> H H \ / C = C / \ H H </pre>	<p>Ethyne C_2H_2</p> <p>$H-C\equiv C-H$</p>
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Examine the 3 molecules and their names above.

1. What do they have in common?
2. What is different?
3. What do you think the “Eth” part of the molecular name tells you?
4. What do you think the “ane” part of the molecular name tells you?
5. What do you think the “ene” part of the molecular name tells you?
6. What do you think the “yne” part of the molecular name tells you?

Organic Prefixes

Prefix	Number of Carbon Atoms
meth-	1
eth-	2
prop-	3
but-	4
pent-	5
hex-	6
hept-	7
oct-	8
non-	9
dec-	10

7. Go back and name the 9 molecules on the first page in model 2.

Functional Groups= an atom or group of atoms that *replace hydrogen* within a hydrocarbon and give the organic compound unique characteristics/properties

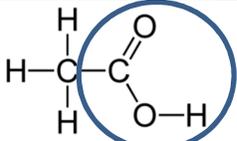
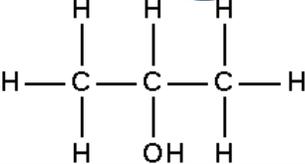
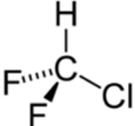
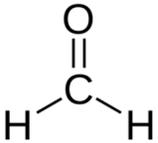
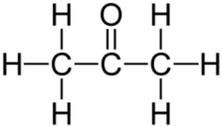
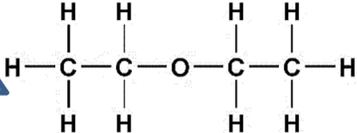
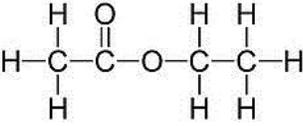
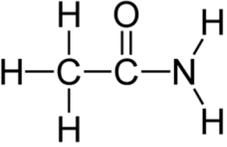
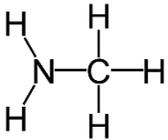
Use the following table when you have more than just a simple alkane, alkene, or alkyne!

Table R
Organic Functional Groups

Class of Compound	Functional Group	General Formula	Example
halide (halocarbon)	—F (fluoro-) —Cl (chloro-) —Br (bromo-) —I (iodo-)	$R-X$ (X represents any halogen)	$\text{CH}_3\text{CHClCH}_3$ 2-chloropropane
alcohol	—OH	$R-OH$	$\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ 1-propanol
ether	—O—	$R-O-R'$	$\text{CH}_3\text{OCH}_2\text{CH}_3$ methyl ethyl ether
aldehyde	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{H} \end{array}$	$\begin{array}{c} \text{O} \\ \parallel \\ R-\text{C}-\text{H} \end{array}$	$\begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_3\text{CH}_2\text{C}-\text{H} \end{array}$ propanal
ketone	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}- \end{array}$	$\begin{array}{c} \text{O} \\ \parallel \\ R-\text{C}-R' \end{array}$	$\begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_3\text{CCH}_2\text{CH}_2\text{CH}_3 \end{array}$ 2-pentanone
Carboxylic Acid	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{OH} \end{array}$	$\begin{array}{c} \text{O} \\ \parallel \\ R-\text{C}-\text{OH} \end{array}$	$\begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_3\text{CH}_2\text{C}-\text{OH} \end{array}$ propanoic acid
ester	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{O}- \end{array}$	$\begin{array}{c} \text{O} \\ \parallel \\ R-\text{C}-\text{O}-R' \end{array}$	$\begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_3\text{CH}_2\text{COCH}_3 \end{array}$ methyl propanoate
amine	$\begin{array}{c} \\ -\text{N}- \end{array}$	$\begin{array}{c} R' \\ \\ R-\text{N}-R'' \end{array}$	$\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$ 1-propanamine
amide	$\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{NH} \end{array}$	$\begin{array}{c} \text{O} \quad R' \\ \parallel \quad \\ R-\text{C}-\text{NH} \end{array}$	$\begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_3\text{CH}_2\text{C}-\text{NH}_2 \end{array}$ propanamide

R represents a bonded atom or group of atoms.

Directions: Using Table R, circle and name the functional group present in the following organic molecules

Structural Formula	Functional Group Present	Uses (just FYI)
	Carboxylic acid	Main active ingredient in vinegar
		Main active ingredient in rubbing alcohol
		Type of "CFC" Used as propellant, refrigerant
		Used to preserve tissues
		Main active ingredient in nail polish remover
		Can be used as part of starting fluid for gas and diesel engines
		Found in many types of fruit, has characteristic flavors and sweet smell of banana or apple. Also used as a synthetic fruit flavoring in foods
		Used in plastics
		Compound that is naturally produced when animal tissues decompose (after death)

*Note: molecules marked with the same shapes are those that may look similar but have different functional groups