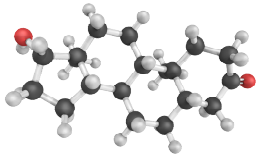
Name: _____ **Date:** _____ **Class Notes**
IPC

Hydrocarbons



Many organic compounds consist of only carbon and hydrogen atoms and are known as hydrocarbons. Hydrocarbons are subdivided into two groups: aliphatic hydrocarbons and aromatic hydrocarbons. The **aromatic** hydrocarbons are a ring made from six carbons and contain three double bonds.

The **aliphatic** hydrocarbons are chains of carbon atoms and contain single, double or triple bonds. Those with only single bonds are known as **saturated** and those with double or triple bonds are called **unsaturated**. Since carbon can form single, double and triple bonds three types of aliphatic hydrocarbons are possible:

- alkanes – only single bonds
- alkenes – one or more double bonds
- alkynes – one or more triple bonds

Hydrocarbons

_____

aliphatic – _____

_____

_____

_____

saturated - _____

unsaturated - _____

Alkanes

_____

The general formula for alkanes is $C_n H_{2n+2}$, where **n** is the number of carbon atoms in the chain.

Naming alkanes is simple, just choose the prefix that indicates the number of carbons in the chain and add the suffix **-ane** to the end.

Examples:

_____ CH_4

_____ C_2H_6

_____ C_3H_8

_____ C_4H_{10}

Alkenes

The general formula for alkanes is $\mathbf{C_nH_{2n}}$, where **n** is the number of carbon atoms in the chain.

To name alkenes, indicate where the double bond is by numbering the carbon chain starting with the end closest to the double bond. Then use a prefix to indicate the number of carbons in the chain and add the suffix **-ene** to the end. For chains that contain two double bonds, list the location of the double bonds and add the suffix **-adiene** to the end.

Examples:

_____ C_2H_4

_____ C_3H_6

_____ C_4H_8

_____ C_5H_{10}

Alkenes are more _____ that alkanes because of the double bond.

Alkynes

The general formula for alkanes is $\mathbf{C_nH_{2n-2}}$, where **n** is the number of carbon atoms in the chain.

To name alkynes, indicate where the triple bond is by numbering the carbon chain starting with the end closest to the triple bond. Then use a prefix to indicate the number of carbons in the chain and add the suffix **-yne** to the end.

Examples:

_____ C_2H_2

_____ C_3H_4

_____ C_4H_6

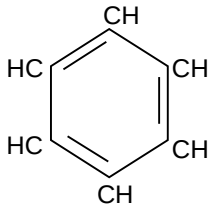
Alkynes are the most _____ because of the triple bond.

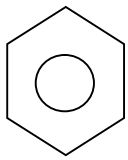
Aromatics

_____

The simplest aromatic is benzene, C_6H_6. Benzene and the other aromatics are usually represented by the skeletal form.

Benzene **C_6H_6**





The benzene molecule can be substituted on in the same manner as the aliphatic hydrocarbons. A hydrogen can be replaced with a functional group, a halide of other benzenes. The carbon that receives the substituent becomes the number one carbon and the other carbons are numbered in sequence 2 through 6. Phenol and toluene are organic solvents that use the classical names instead of the IUPAC naming system.

If there are only two substituents use the traditional naming system referring to the relative positions of the substituents.

ortho - or **o**- for 1,2-distribution
meta - or **m**- for 1,3-distribution
para - or **p**- for 1,4-distribution

If there are three or more groups on the ring, position numbers are assigned to give the minimum sum of numbers.

"Life is like football: it knocks you down hard, then expects you to get back up…and play till the whistle blows."