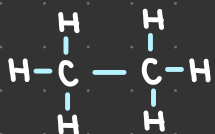


Hydrocarbons

Hydrocarbons are compounds that contain only carbon and hydrogen

Alkanes: each carbon atom has 4 single bonds



Ethane

Alkenes: 2 carbon atoms are joined by a double bond



Ethene (ethylene)

Alkynes: 2 carbon atoms are joined by a triple bond



Ethyne (acetylene)

Alkanes

Unbranched alkanes are named by the number of carbons in the chain ($\text{C}_n\text{H}_{2n+2}$)

1. CH_4 (methane)
2. C_2H_6 (ethane)
3. C_3H_8 (propane)
4. C_4H_{10} (butane)

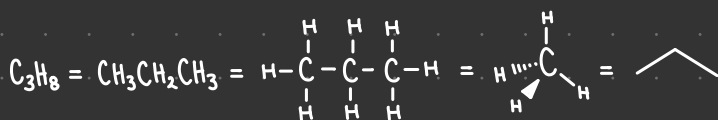
Alkanes with 5 or more carbons are named by adding the suffix **-ane** to the respective numerical multiplier (removing the terminal -a)

C_5H_{12} { Pent~~a~~: 5 → Pentane // C_6H_{14} { Hex~~a~~: 6 → Hexane

When carbon makes 4 bonds, it adopts the tetrahedral geometry. In this geometry, only 2 bonds can occupy a plane simultaneously, the other 2 bonds point in back or in front of this plane

Solid wedges are used to represent bonds pointing out of the plane (toward the viewer)

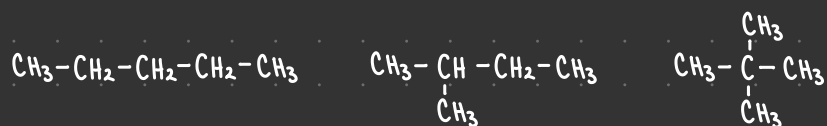
Dashed wedges are used to represent bonds pointing behind the page (away from the viewer)



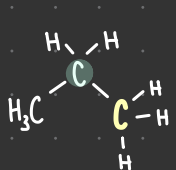
various representations of **PROPANE**

Branched alkanes are derived from linear alkanes, but their structure is branched with one or more **alkyl groups**

For C_5H_{12} , there are 3 constitutional isomers

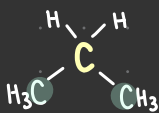


Carbons can be classified as primary (1°), secondary (2°), tertiary (3°) or quaternary (4°)



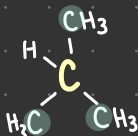
1° carbon

1 carbon directly attached



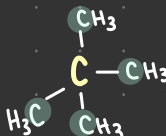
2° carbon

2 carbons attached



3° carbon

3 carbons attached

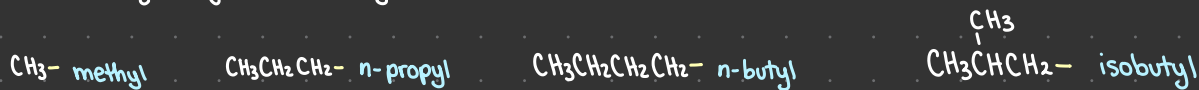


4° carbon

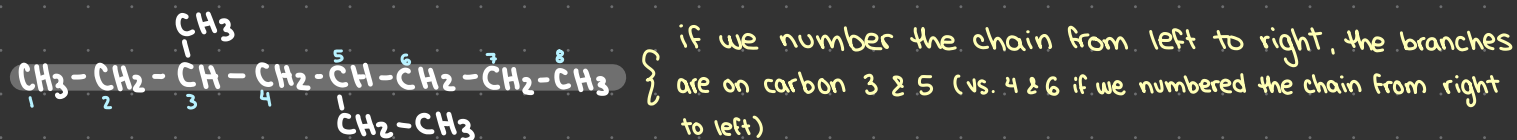
4 carbons attached

An alkyl group is formed by removing one hydrogen from the alkane chain

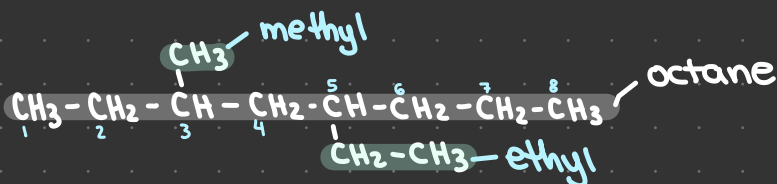
C_nH_{2n+1} { change -ane to -yl }



To name branched alkenes, find the longest continuous chain. This is the parent chain. Number the carbons in the parent chain { start at the end that results in the lowest # being assigned to the branches



The atoms attached to the parent chain are called substituent. Use a prefix to indicate the appearance of more than one of the same substituent (e.g. bi-, tri-, tetra-, etc.). Different substituents are listed in alphabetical order.



5-ethyl-3-methyloctane

Commas are used to separate multiple numbers. Hyphens are placed between a number and the substituent's name. The name of the parent chain is placed after the last substituent.

Alkenes

Class of hydrocarbons with at least one carbon-carbon double bond (C_nH_{2n})

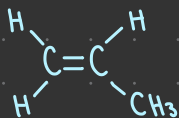
Alkyne

Class of hydrocarbons with at least one carbon-carbon triple bond (C_nH_{2n-2})

Alkenes and alkynes are named by identifying the longest chain that contains the double or triple bond

Number the chain (assigning the lowest number to the double or triple bond)

- use the **-ene** suffix for alkenes
- use the **-yne** suffix for alkynes

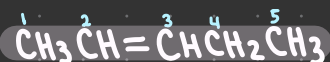


Propene



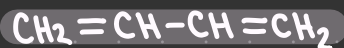
Propyne

If the double or triple bond is NOT terminal, the assigned number should precede the "ene" or "yne" suffix with a dash



pent-2-ene

For multiple double or triple bonds, add the appropriate prefix (di-, tri-, tetra-)



1,3-butadiene

For compounds containing both double and triple bonds, the "ene" suffix precedes the "yne"



3-penten-1-yne