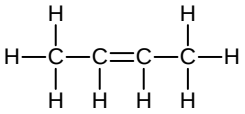
Naming Hydrocarbons

(nomenclature)

Handout: Hydrocarbons: IUPAC names

Drawing structures: it's all good

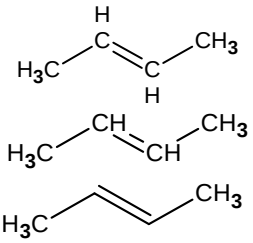
2-butene



$H_3C-CH=CH-CH_3$

This is called the "condensed structure"

$CH_3CH=CHCH_3$



On a test, choose a method that shows all Hs

Using brackets can also shorten some formulas: $CH_3(CH_2)_4CH_3$ vs. $CH_3CH_2CH_2CH_2CH_2CH_3$

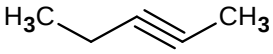
Background: formulas for HCs

- Alkanes= C_nH_{2n+2}, enes= C_nH_{2n}, ynes= C_nH_{2n-2}
- Remember enes, then think of what would happen if bond was single or triple instead.
- Provides some useful information (e.g. for compositional analysis, or to check work)
- Cannot always tell hydrocarbon type based on numbers (e.g. propyne vs. propadiene)

Q - how many hydrogens in each of these:

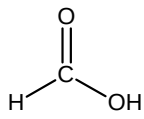
6 carbon alkane

Alkene: $C_{22}H$

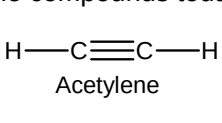


Naming: common vs. IUPAC

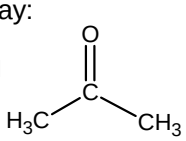
- Common names used in the 1800's are still used for some compounds today:



Formic acid



Acetylene



Acetone

- The International Union of Pure and Applied Chemistry (IUPAC) was established in 1900s
- Frequent revisions to nomenclature
- Systematic method allows an infinite number of compounds to be named given a few rules

Basic names of hydrocarbons

- Hydrocarbon names are based on: 1) class 2) # of C, 3) side chain type and 4) position
- 1) name will end in -ane, -ene, or -yne
- 2) the number of carbons is given by a "Prefix"

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

- Actually, all end in a, but a is dropped when next to a vowel. E.g. a 6 C alkene is hexene

Q - What names would be given to these:

7C, 9C alkane
2C, 4C alkyne
1C, 3C alkene

Mnemonic for first four prefixes

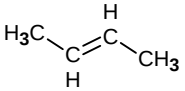
First four prefixes

- Meth- Monkeys
- Eth- Eat
- Prop- Peeled
- But- Bananas

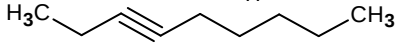
Numbering carbons

Q- draw pentene

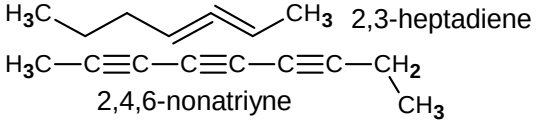
- Thus, naming compounds with multiple bonds is more complex than previously indicated
- Only if 2+ possibilities exist, are #s needed
- Always give double bond the lowest number
- Q - Name these



C_2H_4



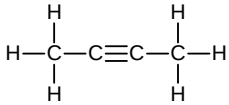
Multiple multiple bonds



2,3-heptadiene

2,4,6-nonatriyne

- Give 1st bond (1st point of difference) lowest #
- include di, tri, tetra, penta, etc. before ene/yne
- Comma between #s, hyphen between #-letter
- You do not need to know ene + yne



$CH_3CH_2CH_2CH=C=CH_2$