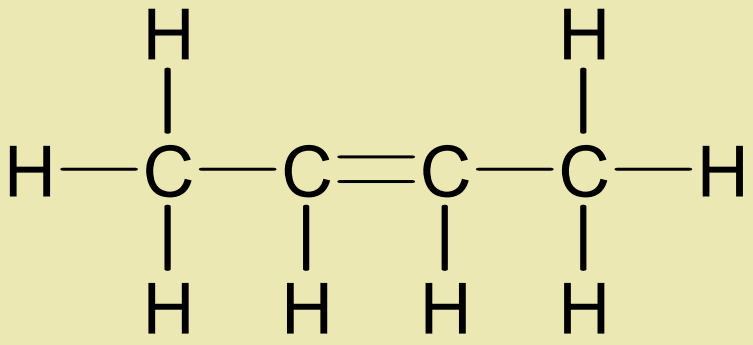
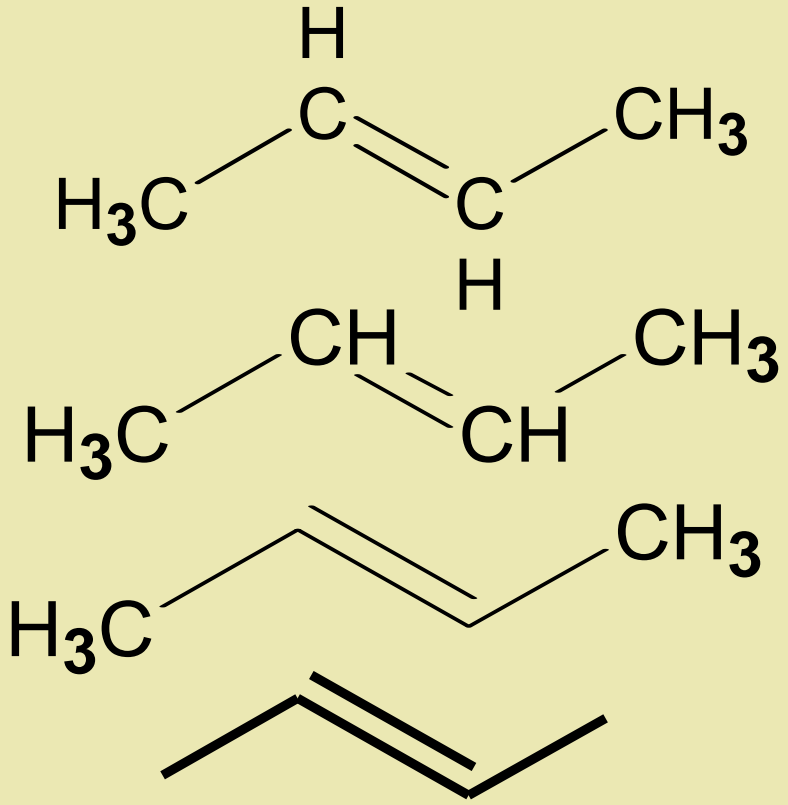
# Naming Hydrocarbons
## (nomenclature)

# 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:

$CH_3CH_2CH_2CH_2CH_2CH_3$ vs. $CH_3(CH_2)_4CH_3$

# Basic Naming of Hydrocarbons

Hydrocarbon names are based on: 1) type, 2) # of carbons, 3) side chain type and 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

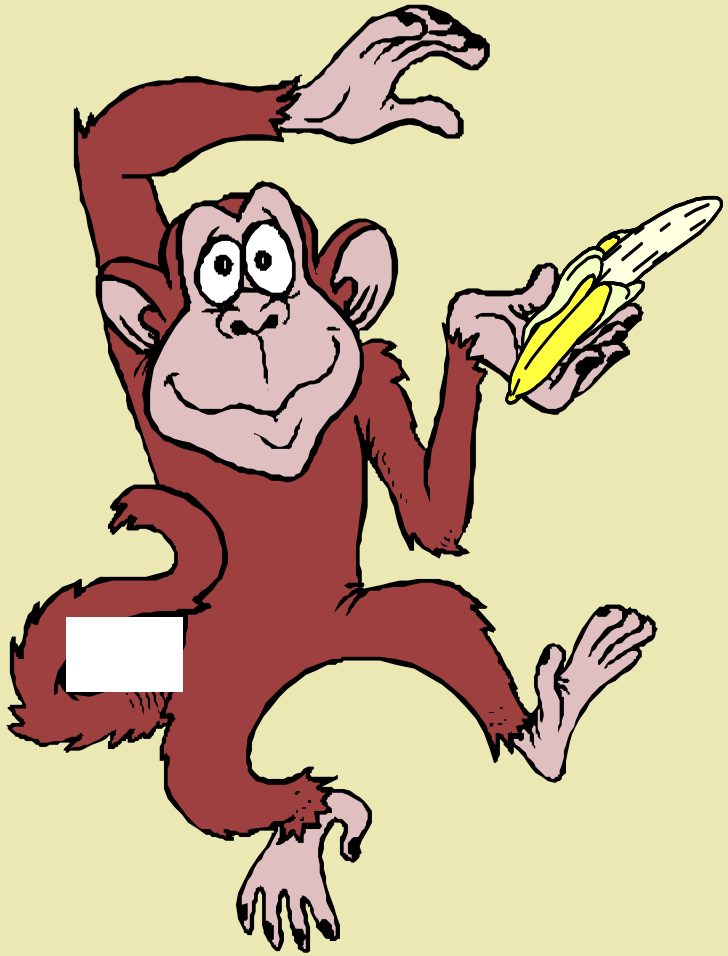
Q - What names would be given to these:

7C, 9C alkane heptane, nonane

2C, 4C alkyne ethyne, butyne

1C, 3C alkene ~~methene~~, propene

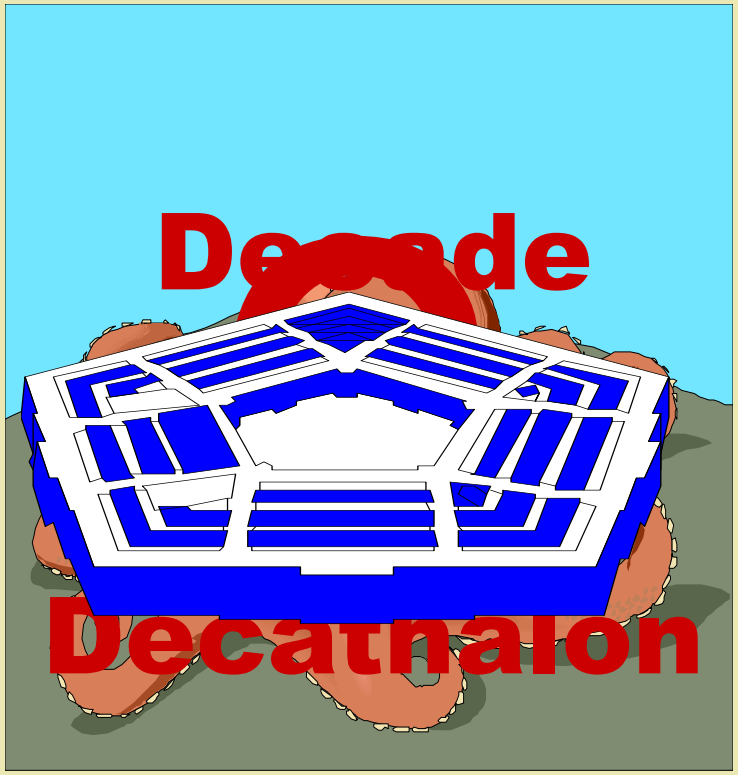
# Mnemonic for First Four Prefixes



First four prefixes

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

# Other Prefixes

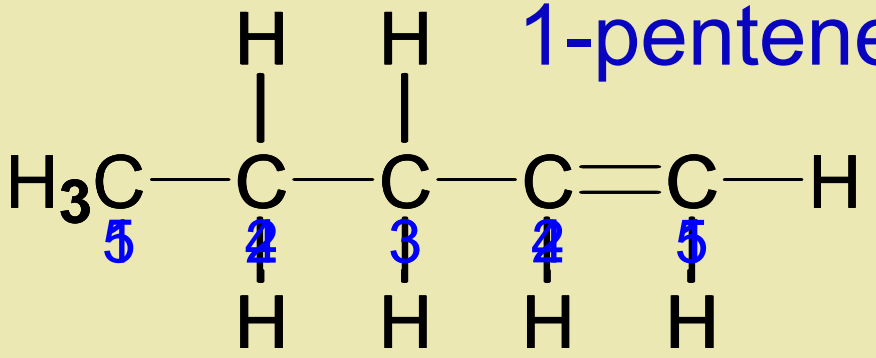



- Pent-
- Oct-
- Dec-
- Hex-, Hept-, Non-

# Numbering Carbons

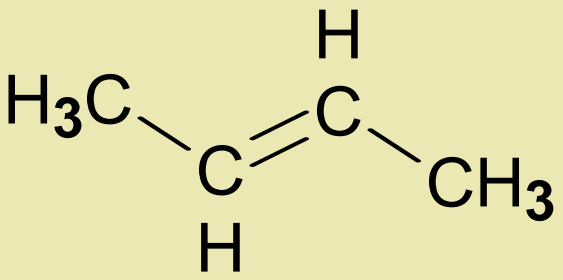
Q- draw 1-pentene

A- Where's the double bond? We # C atoms.



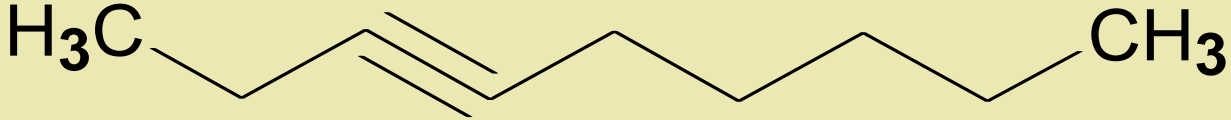

- Naming compounds with multiple bonds is more complex than previously indicated.
- When 2+ possibilities exist, #s are needed.
- Always give double bond the lowest number.
- Q - Name these

2-butene



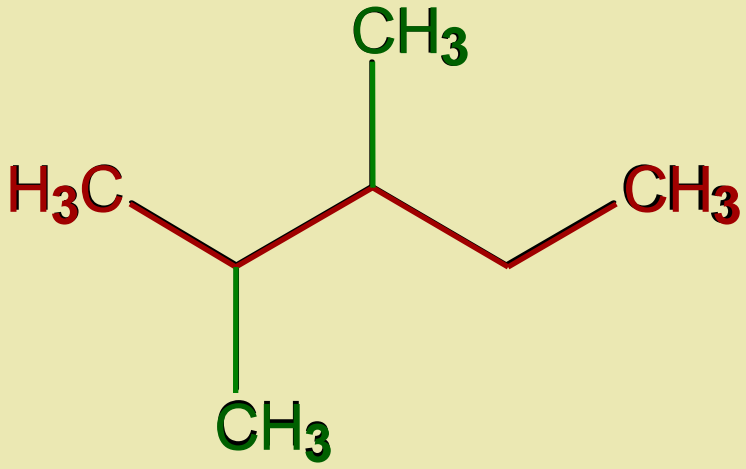

$C_2H_4$

ethene




3-nonyne

# Naming Side Chains




- The names of molecules with branches are based on: side chains, root

  2,3-dimethylpentane

- The "root" or "parent chain" is usually the longest possible hydrocarbon chain.
- The root must include multiple bonds if they are present. If a cyclic structure is present it will be the root even if it is not the longest chain.
- Side chains are also called "side branches" or "alkyl groups". Their names end in -yl.

<u>Common side chains</u> :

$-CH_3$ methyl, $-CH_2CH_3$ ethyl, $-CH_2CH_2CH_3$ propyl

# IUPAC Rules for Naming Hydrocarbons

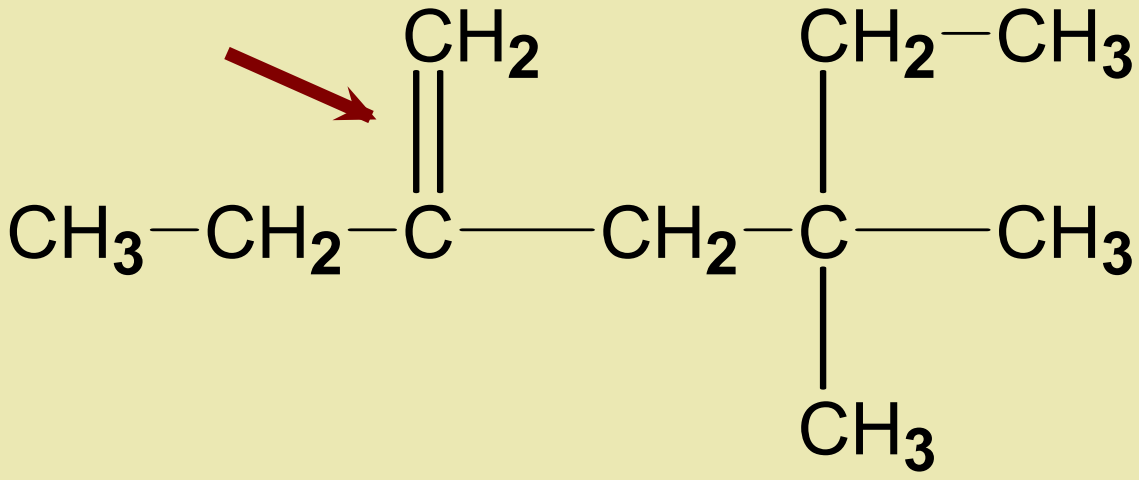
1. Choose the correct ending: -ane, -ene, or -yne
2. Determine the longest carbon chain. Where a double or triple bond is present, choose the longest chain that includes this bond. If there is a cyclic structure present, the longest chain starts and stops within the cyclic structure.
3. Assign numbers to each C of the parent chain. For alkenes and alkynes the first carbon of the multiple bond should have the smallest number. For alkanes the first branch (or first point of difference) should have the lowest #. Carbons in a multiple bond must be numbered consecutively.
4. Attach a prefix that corresponds to the number of carbons in the parent chain. Add cyclo- to the prefix if it is a cyclic structure.

# IUPAC Rules for Naming Hydrocarbons

5. Determine the correct name for each branch ("alkyl" groups include methyl, ethyl, propyl, etc.)
6. Attach the name of the branches alphabetically, along with their carbon position, to the front of the parent chain name. Separate numbers from letters with hyphens (e.g. 4-ethyl-2-methyldecane)
7. When two or more branches are identical, use prefixes (di-, tri-, etc.) (e.g. 2,4-dimethylhexane). Numbers are separated with commas. Prefixes are ignored when determining alphabetical order. (e.g. 2,3,5-trimethyl-4-propylheptane)
8. When identical groups are on the same carbon, repeat the number of this carbon in the name. (e.g. 2,2-dimethylhexane)

# Naming Side Chains

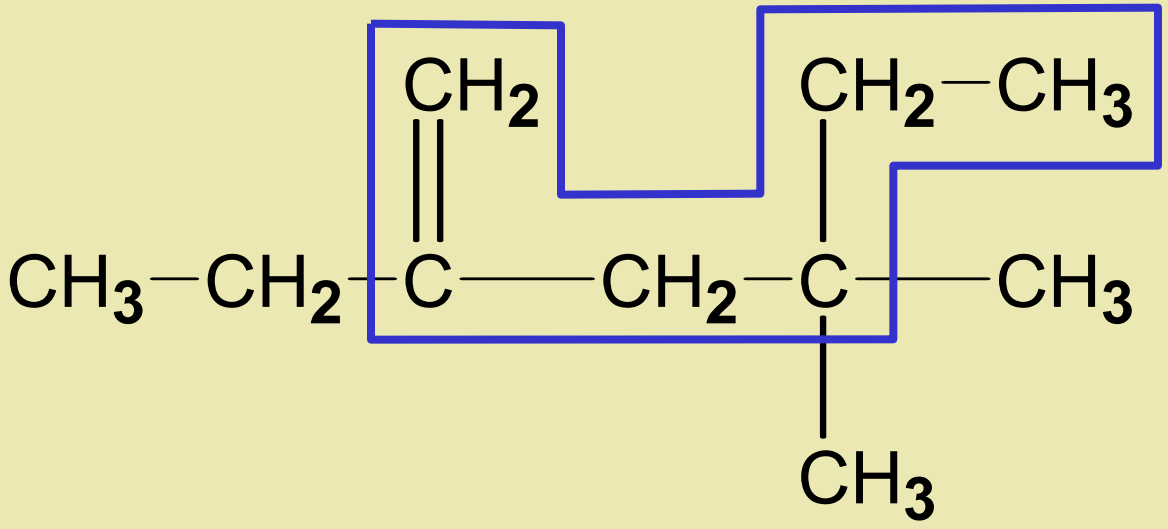
Example: use the rules on this handout to name the following structure




Rule 1: choose the correct ending

ene

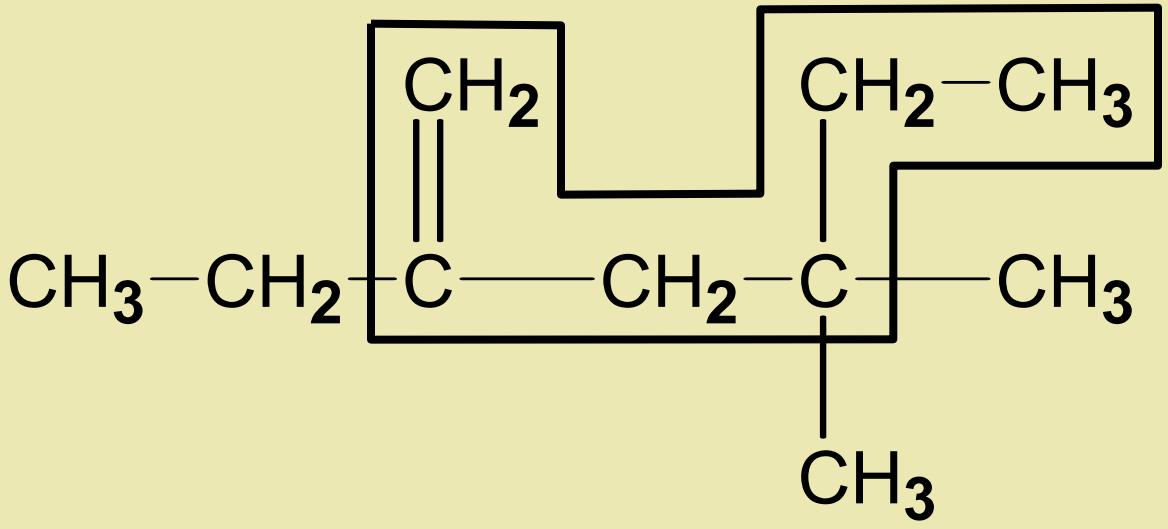
# Naming Side Chains




Rule 2: determine the longest carbon chain

ene

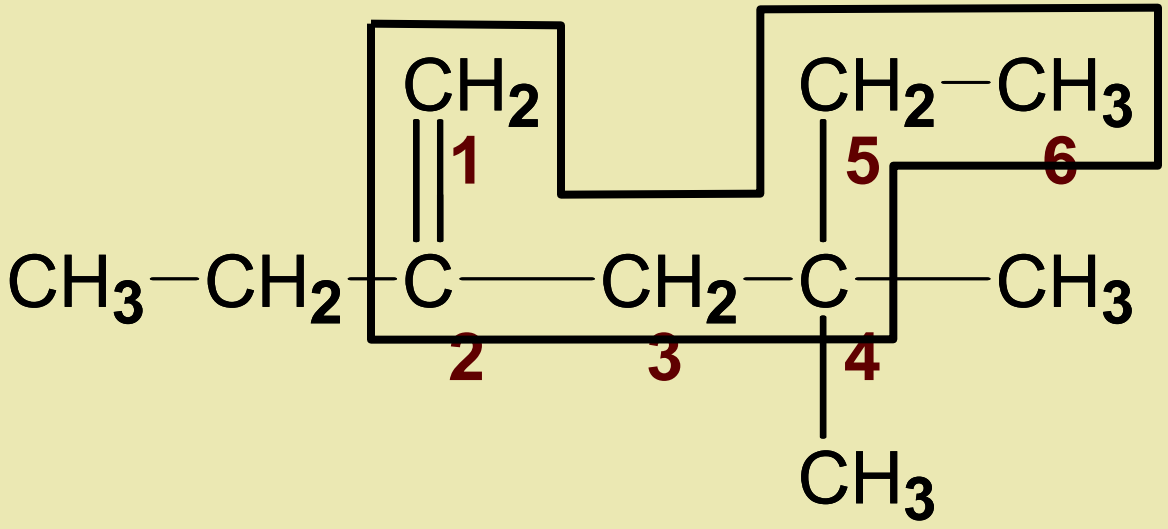
# Naming Side Chains




Rule 3: Assign numbers to each carbon

ene

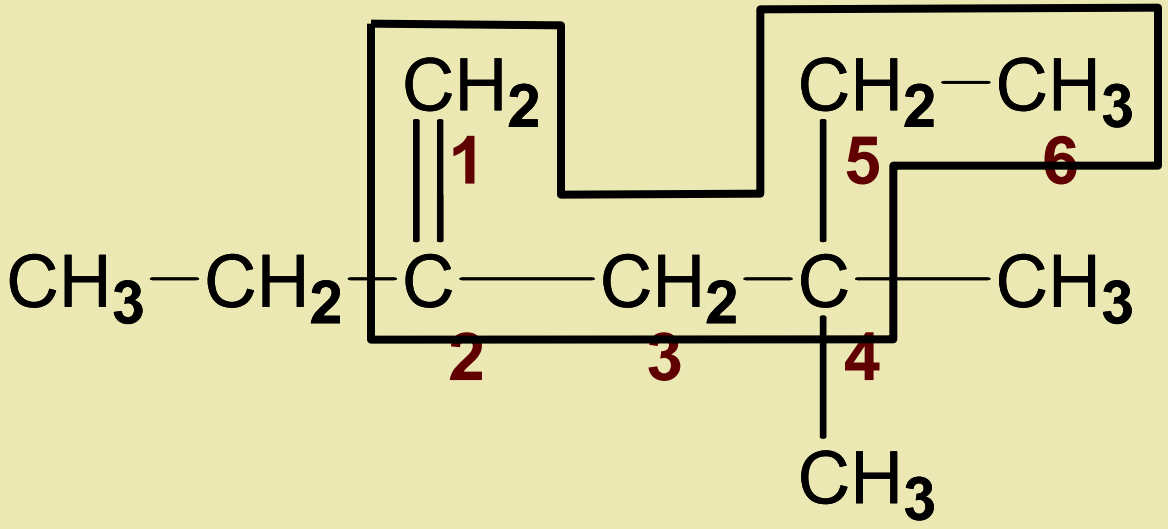
# Naming Side Chains




Rule 3: Assign numbers to each carbon

ene

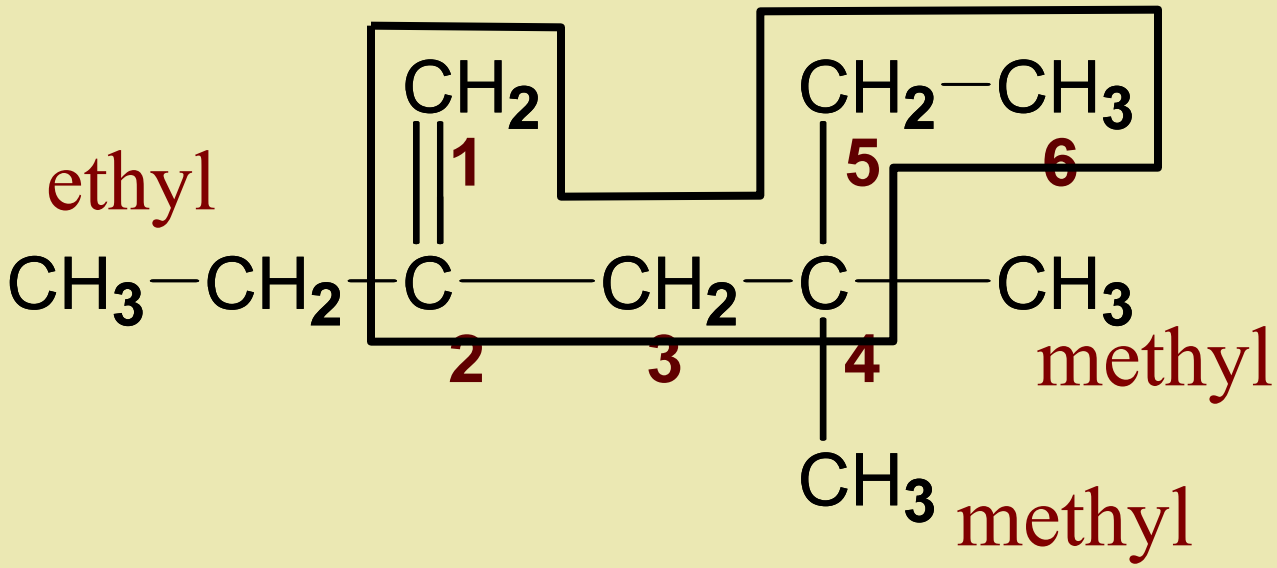
# Naming Side Chains




Rule 4: attach prefix (according to # of Cs)

1-hexene

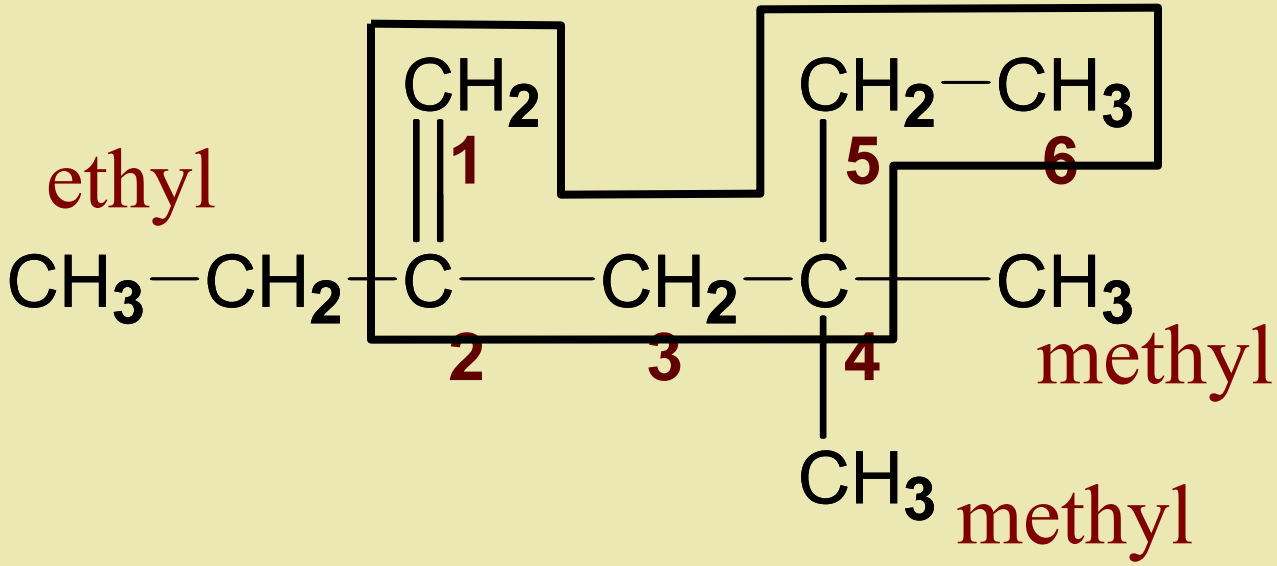
# Naming Side Chains




Rule 5: Determine name for side chains

1-hexene

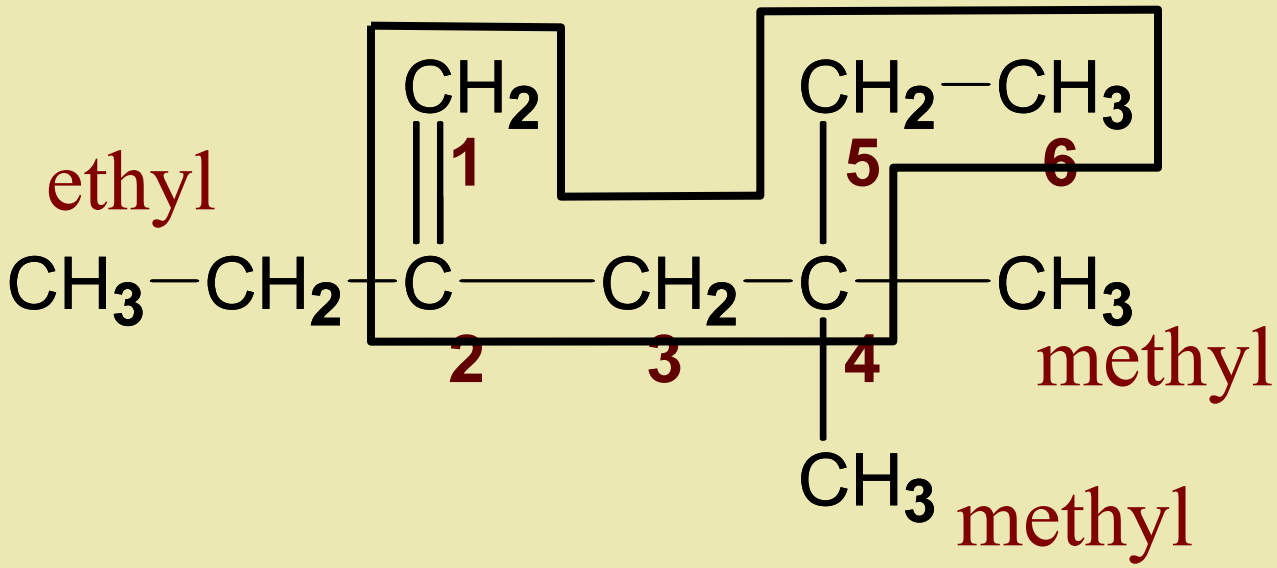
# Naming Side Chains




Rule 6: attach name of branches alphabetically

2-ethyl-4-methyl-4-methyl-1-hexene

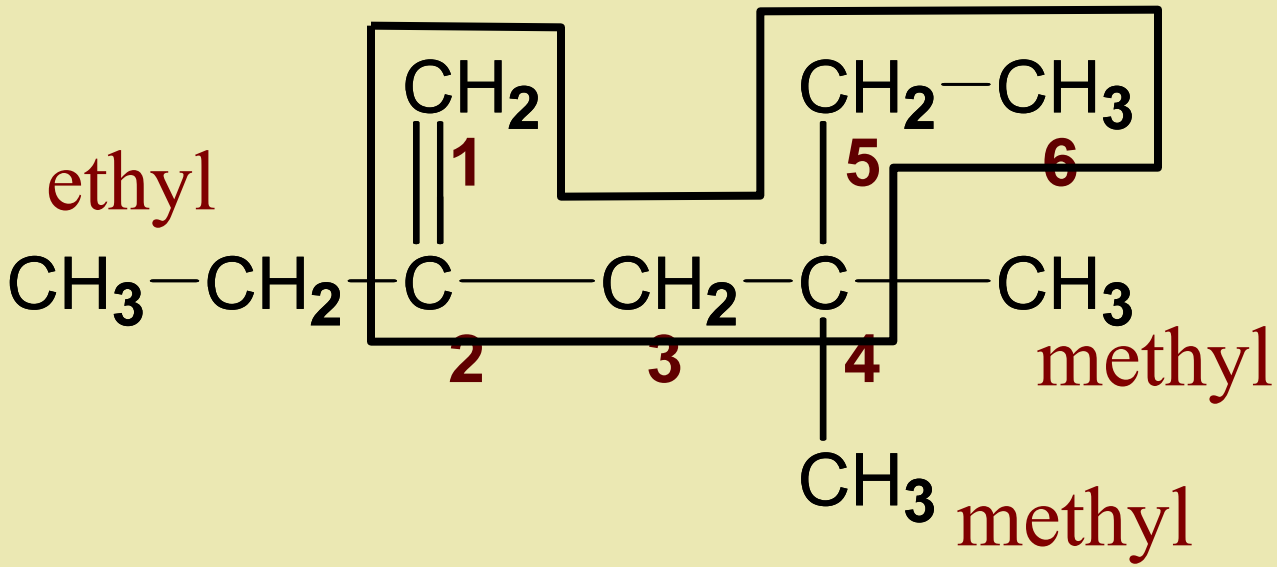
# Naming Side Chains




Rule 7,8: group similar branches

2-ethyl-4-methyl-4-methyl-1-hexene

# Naming Side Chains




Rule 7,8: group similar branches

2-ethyl-4,4-dimethyl-1-hexene

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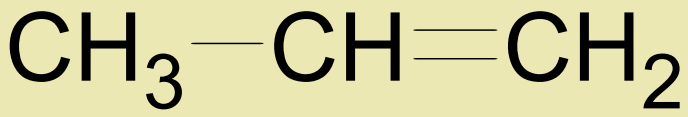
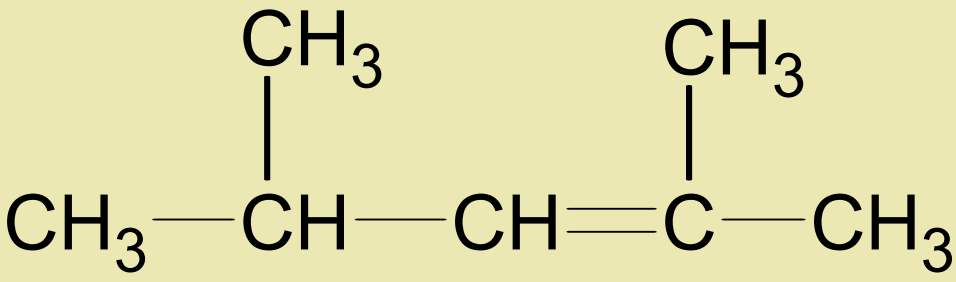
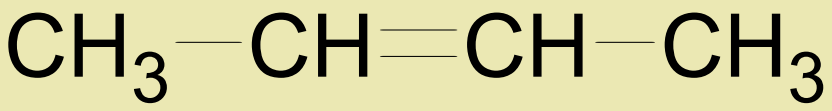


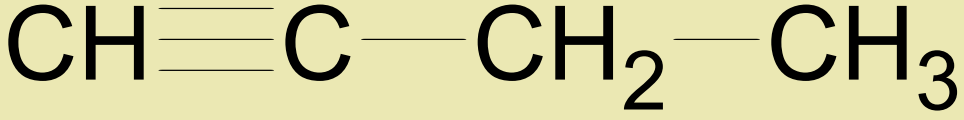
propene



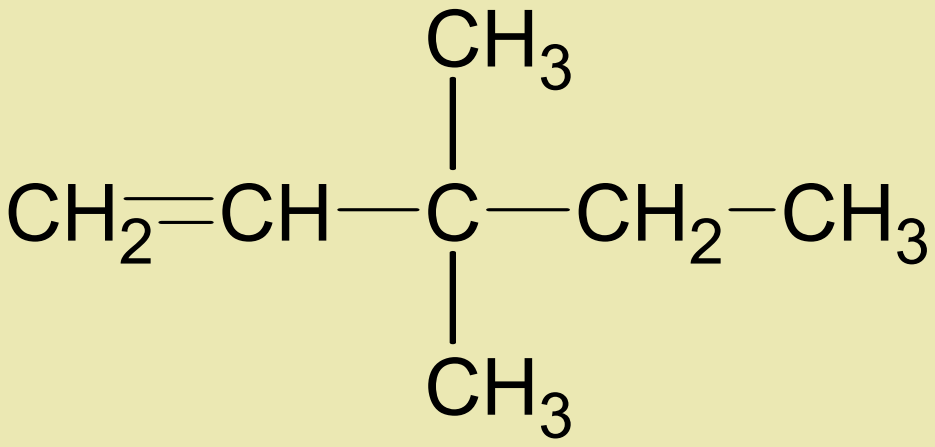
**2,4-dimethyl-2-pentene**



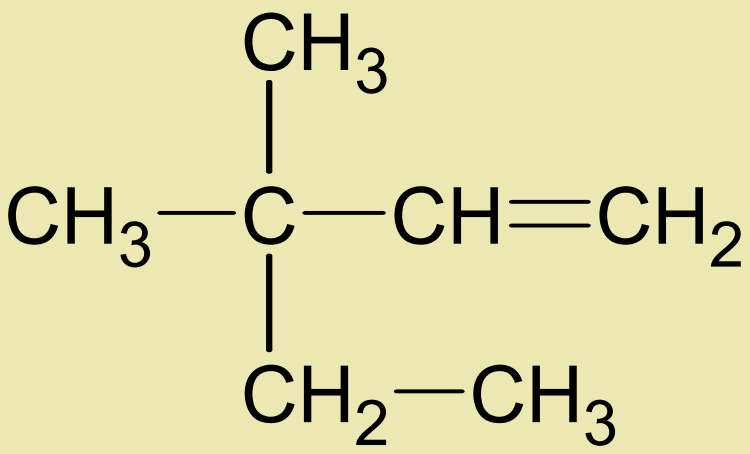
2-butene



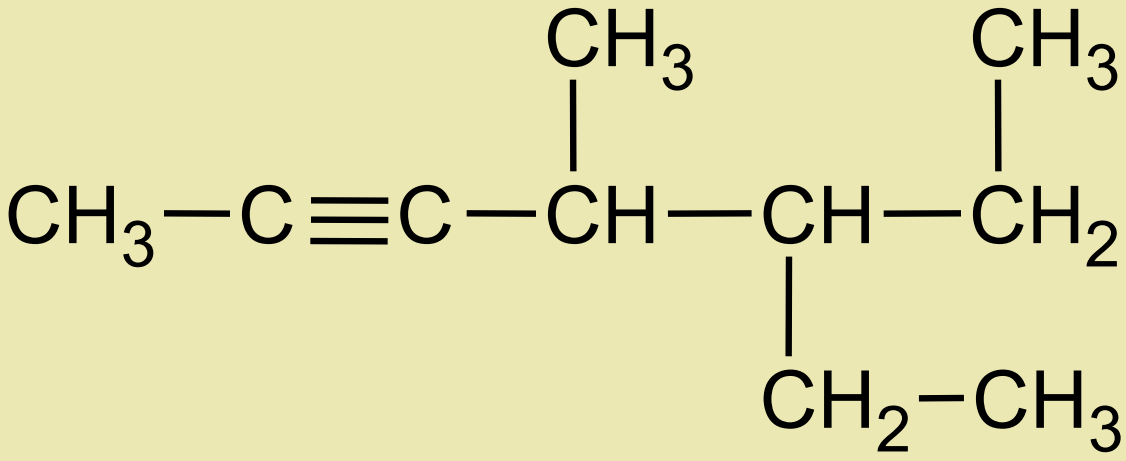
1-butyne



a) 3,3-dimethyl-1-pentene



b) same



c) 5-ethyl-4-methyl-2-heptyne