

## Naming Hydrocarbons (nomenclature)

### Hydrocarbons

- \_\_\_\_\_ - Organic compounds that contain only carbon & hydrogen
- \_\_\_\_\_ - contain only single covalent bonds
- \_\_\_\_\_ - contain one or more carbon - carbon double bond
- \_\_\_\_\_ - contain one or more carbon-carbon triple bond

## Organic Compounds

- \_\_\_\_\_ **Compounds** - any covalently bonded compound containing carbon (except \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_)

### Saturated & Unsaturated Hydrocarbons

- Saturated hydrocarbons – contain only \_\_\_\_\_ carbon-carbon bonds (\_\_\_\_\_)
- Unsaturated hydrocarbons – contain double carbon-carbon bonds (\_\_\_\_\_) or triple carbon-carbon (\_\_\_\_\_) bonds

## Formulas

- Alkanes =  $C_nH_{2n+2}$
- Alkenes =  $C_nH_{2n}$
- Alkynes =  $C_nH_{2n-2}$

## Nomenclature

- Must memorize prefixes
- To name, look at the formula for the hydrocarbon
- Determine if it is an alkane, alkene, or alkyne
- Use the prefix for the number of carbons
- Add ending (ane, ene, yne)

Prefix	# of carbon atoms
Meth-	1
Eth-	2
Prop-	3
But-	4
Pent-	5
Hex-	6
Hept-	7
Oct-	8
Non-	9
Dec-	10

## Example

- Name  $C_3H_8$

## Mnemonic for first four prefixes



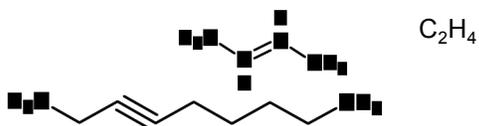
### First four prefixes

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

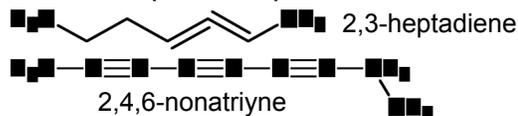
## Numbering carbons

Q- draw pentene

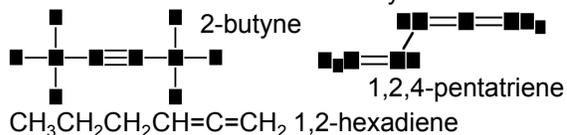
• Q - Name these



## Multiple multiple bonds

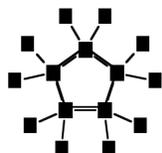


- Give 1<sup>st</sup> bond (1<sup>st</sup> point of difference) lowest #
- include di, tri, tetra, penta, etc. before ene/yne
- Comma between #s, hyphen between #-letter
- You do not need to know ene + yne



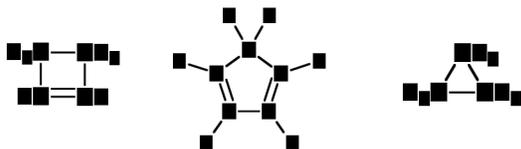
## Cyclic structures

- Cyclic structures are circular
- Have "cyclo" in name



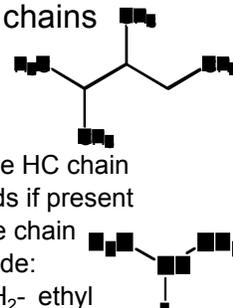
• cyclopentane

Q- Draw these (note: carbons in a double bond should be consecutive- 1 and 2, 5 and 6, etc.):  
cyclobutene 1,3-cyclopentadiene cyclopropane



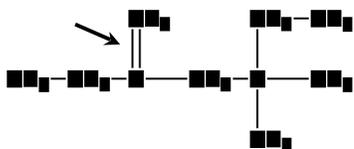
## Naming side chains

- Names are made up of: side chains, root
- 2,3-dimethylpentane
- Root is the longest possible HC chain
- Must contain multiple bonds if present
- Add -yl to get name of side chain
- Common side chains include:  
 $CH_3$ - methyl       $CH_3CH_2$ - ethyl  
 $CH_3CH_2CH_2$ - propyl       $(CH_3)_2CH$ - isopropyl
- Br- (bromo), Cl- (chloro), F- (fluoro), I- (iodo)



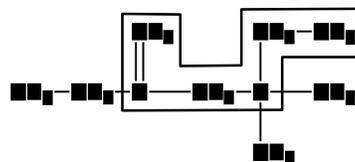
### Naming side chains

Example: name the following structure



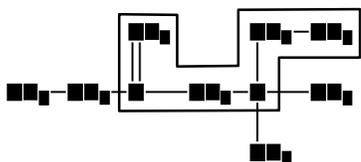
Rule 1: choose the correct ending  
ene

### Naming side chains



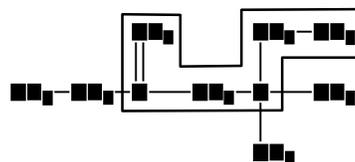
Rule 2: longest carbon chain  
ene

### Naming side chains



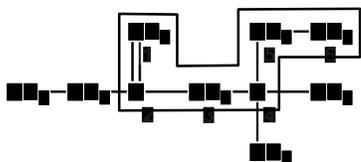
Rule 3: attach prefix (according to # of C)  
1-hexene

### Naming side chains



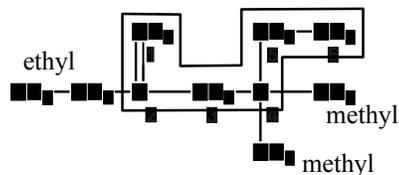
Rule 4: Assign numbers to each carbon  
1-hexene

### Naming side chains



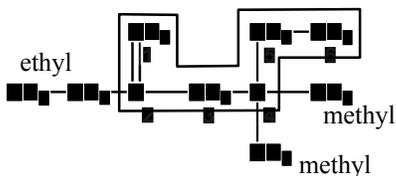
Rule 4: Assign numbers to each carbon  
1-hexene

### Naming side chains



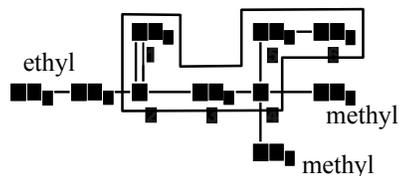
Rule 5: Determine name for side chains  
1-hexene

### Naming side chains



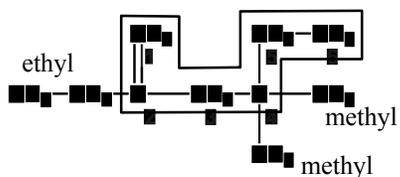
Rule 6: attach name of branches  
2-ethyl-4-methyl-4-methyl-1-hexene

### Naming side chains



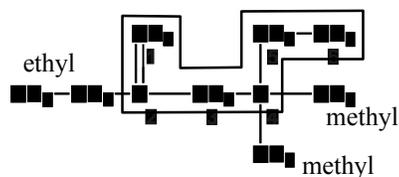
Rule 7: list alphabetically  
2-ethyl-4-methyl-4-methyl-1-hexene

### Naming side chains



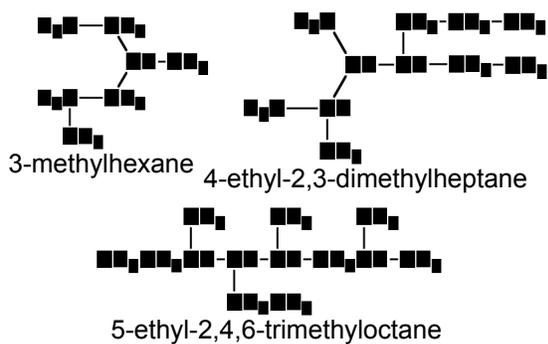
Rule 8,9: group similar branches  
2-ethyl-4-methyl-4-methyl-1-hexene

### Naming side chains



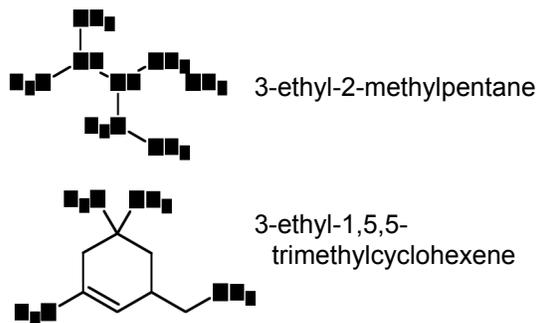
Rule 8,9: group similar branches  
2-ethyl-4,4-dimethyl-1-hexene

### Naming side chains

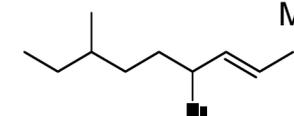


### Naming side chains

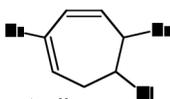
Name the structures below



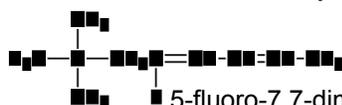
### More practice



4-bromo-7-methyl-2-nonene



2,5-dibromo-6-chloro-1,3-cycloheptadiene



5-fluoro-7,7-dimethyl-2,4-octadiene

### Functional Groups

Class	Functional group
Alcohol	R - OH
Ether	R - O - R'
Aldehyde	$\begin{array}{c} \text{O} \\    \\ \text{R} - \text{C} - \text{H} \end{array}$
Ketone	$\begin{array}{c} \text{O} \\    \\ \text{R} - \text{C} - \text{R}' \end{array}$
Carboxylic acid	$\begin{array}{c} \text{O} \\    \\ - \text{C} - \text{OH} \end{array}$
Ester	$\begin{array}{c} \text{O} \\    \\ \text{R} - \text{C} - \text{O} - \text{R}' \end{array}$
Amine	$\begin{array}{c} \text{R}' \\   \\ \text{R} - \text{N} - \text{R}'' \end{array}$

1		octane
2		2,5-dimethyloctane
3		2,2-dimethyl-3-hexene
4		1,3-diethylcyclopentane

5		4-nonene
6		cyclopropane
7		3,3-dimethylcyclopentene
8		6-ethyl-2-octyne

