**Alkenes and Alkynes** 

## **Naming Alkenes**

- These are straight open chains of hydrogen and carbon made up of at least one carbon-carbon **double bonds**.
- Alkenes are considered to be unsaturated.

## **IUPAC Names**

Examples:  $2 C = \underline{eth}ene \quad C_2H_4 \quad 7 C = 1$  $3 C = \underline{prop}ene \quad C_3H_6 \quad 8 C = 1$ 

 $7 \text{ C} = \underline{\text{hept}}_{ene} \text{ C}_7 \text{H}_{14}$  $8 \text{ C} = \underline{\text{oct}}_{ene} \text{ C}_8 \text{H}_{16}$ 

• The general formula for the series is



| 12 |                                                                              |                                                                |
|----|------------------------------------------------------------------------------|----------------------------------------------------------------|
| į  | Naming Alkenes                                                               | Drawing                                                        |
|    | Alkene                                                                       | es                                                             |
|    | <ol> <li>Identify the base number of carbons.</li> </ol>                     | 1) Start by drawing the base chain. Draw the                   |
| 1  | 2) Use the appropriate IUPAC prefix with                                     | number of carbons as indicated by the                          |
| 1  | the ending 'ene.'                                                            | prefix.                                                        |
| 1  | 3) Use numbers to identify the location(s)                                   | 2) Add the double bond as indicated by the                     |
| 5  | of the double bonds. Number the carbon                                       | number before 'ene.'                                           |
|    | so that the double bond has the lowest possible                              | 3) Add any side chains as indicated.                           |
|    | number. This takes precedence over the need                                  | 4) Saturate the remaining carbons with                         |
| J. | to get the lowest possible side chain. The number                            | hydrogen.                                                      |
| ł  | will appear directly before the 'ene' suffix                                 | nyurogen.                                                      |
|    |                                                                              |                                                                |
|    | separated by hyphens.                                                        |                                                                |
| 1  | 4) Name any additional side chains as you would                              |                                                                |
| 5  | in an alkane.                                                                |                                                                |
|    |                                                                              |                                                                |
|    | Example: $\begin{vmatrix} H \\ H \\ H \\ C \\ H \\ H \\ H \\ H \\ H \\ H \\$ | Example: 3,5-dimethylhex-2-ene                                 |
|    | н−−с−−с−−с−−н                                                                |                                                                |
|    |                                                                              | Answer:                                                        |
|    | ннн н                                                                        | CH 3                                                           |
| 1  |                                                                              | сн <sub>3</sub> —сн —с́с —сн <sub>2</sub> —сн —сн <sub>3</sub> |
|    |                                                                              | $cH_3 - cH = cH_3 - cH_2 - cH_2 - cH_3$                        |
|    | Answer: pent-2-ene                                                           | CH <sub>3</sub>                                                |
| •  |                                                                              |                                                                |
|    |                                                                              |                                                                |

## Naming Alkynes

- These are straight open chains of hydrogen and carbon made up of at least one carbon-carbon **triple bonds**.
- Alkynes are considered to be unsaturated.

## **IUPAC Names**

| Examples:            |          |                       |             |
|----------------------|----------|-----------------------|-------------|
| 2 C = <u>eth</u> yne | $C_2H_2$ | 7 C = <u>hept</u> yne | $C_7H_{12}$ |
| 3 C = propyne        | $C_3H_4$ | 8 C = <u>oct</u> yne  | $C_8H_{14}$ |

• The general formula for the series is



| Naming Alkynes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Drawing                                                                                                                                                                                                                                                                             |  |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| <ul> <li>Alk</li> <li>1) Identify the base number of carbons.</li> <li>2) Use the appropriate IUPAC prefix with<br/>the ending 'yne.'</li> <li>3) Use numbers to identify the location(s)<br/>of the triple bonds. Number the carbon<br/>so that the double bond has the lowest possible<br/>number. This takes precedence over the need<br/>to get the lowest possible side chain. The number<br/>will appear directly before the 'yne' suffix<br/>separated by hyphens.</li> <li>4) Name any additional side chains as you would<br/>in an alkane.</li> </ul> | <ol> <li>Start by drawing the base chain. Draw the number of carbons as indicated by the prefix.</li> <li>Add the triple bond as indicated by the number before 'yne.'</li> <li>Add any side chains as indicated.</li> <li>Saturate the remaining carbons with hydrogen.</li> </ol> |  |  |  |  |
| Example:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Example: 5-methylhept-2-yne                                                                                                                                                                                                                                                         |  |  |  |  |
| НН НН<br>       <br>H-C-C-C <sub>≡</sub> C-C-C-H<br>       <br>НН НН                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Answer: CH₃<br>I<br>CH₃-C <u>=</u> C-CH₂-CH-CH₂-CH₃                                                                                                                                                                                                                                 |  |  |  |  |