

CHE 213 Alkene Nomenclature

1. Find the longest continuous C chain that includes the C=C. The number of C's in this chain gives the root name. Use cyclo prefix if the longest chain is a ring.
2. Number the C chain so that the double bond will be designated with the lowest number rather than a substituent (i.e., C=C has a higher priority than a substituent).
 - If there are two options with the same number of C's, choose the numbering which gives the lower number for a substituent at the first instance of difference.
3. Indicate the position of the double bond and the substituents by number location. Substituents and their locations precede the location of the double bond and the root name.
 - C=C involves sequentially numbered C's, but only the lower number is noted.
 - If a substituted ring, the C=C is between C1 & C2 and is not overtly designated by number location. (For an unsubstituted ring, there is no number location needed.)
4. Disubstituted Alkenes: If applicable, indicate *cis* or *trans*; alternatively the E or Z designation (see below) may be used.
 - Note: If one of the C's of the double bond is bonded to two identical groups, there are no stereoisomers.

Use *cis* prefix if both substituents are on the same side of the double bond.

Use *trans* prefix if the substituents are on opposite sides of the double bond.

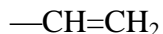
5. Tri- and tetrasubstituted Alkenes. Use the E or Z designation by applying the Cahn-Ingold-Prelog Rules to assign priorities to the atom substituents bonded to the double bonded C's:
 - a) The higher the atom's atomic number, the higher its priority.
 - b) For tie breaking, proceed until meet an atom of higher priority, or if the same atoms, the one bonded to more higher priority atoms; a multiple bonded atom counts as the same number of single bonds.
e.g. 1) isopropyl group > ethyl group
e.g. 2) -CHO > -CH₂OH > -CH₂CH₃.
 - c) Considering each doubly bonded C separately, note its higher priority substituent atom (or group).
 - d) If the higher priority substituents of both C's are together on the same side of the double bond, use (Z) for *zusammen* (together). Use (E) for *entgegen* (opposite) if they are on opposite sides of the double bond.

6. Special substituent groups with a double bond:

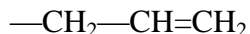


methylene

over



vinyl

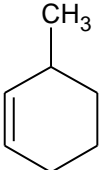
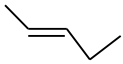
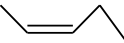


allyl



isopropylidene

Alkene Nomenclature Examples

$ \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{C}-\text{CH}=\text{CH}_2 \\ \\ \text{CH}_3 \end{array} $ <p>3,3-Dimethyl-1-butene OR 3,3-Dimethylbut-1-ene</p>	 <p>3-Methylcyclohexene</p>
 <p><i>trans</i>-2-pentene OR (E)-2-pentene</p>	 <p><i>cis</i>-2-pentene OR (Z)-2-pentene</p>
$ \begin{array}{c} \text{H} \qquad \qquad \text{CH}_3 \\ \diagdown \quad \diagup \\ \text{C}=\text{C} \\ \diagup \quad \diagdown \\ \text{H} \qquad \qquad \text{CH}_2-\text{CH}_3 \end{array} $ <p>2-Methyl-1-butene OR 2-Methylbut-1-ene Note, no cis/trans</p>	$ \begin{array}{c} \text{CH}_3 \\ \\ \text{H}_2\text{C} \qquad \text{CH}_3 \\ \diagdown \quad \diagup \\ \text{C}=\text{C} \\ \diagup \quad \diagdown \\ \text{H}_3\text{C} \qquad \text{CH}_2-\text{CH}_2-\text{CH}_3 \end{array} $ <p>(E)-3,4-Dimethyl-3-heptene OR (E)-3,4-Dimethylhept-3-ene</p>