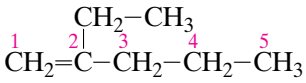
Systematic Names of Alkenes

The rules for naming a simple alkene are similar to those for naming an alkane. The parent hydrocarbon is the longest continuous chain of carbon atoms *that contains the double bond*.

pentene hexane

The carbon atoms in the chain are numbered so that the first carbon atom in the double bond has the lowest number.



1-pentene

The position number and name of the alkyl group are placed in front of the double-bond position number. This alkyl group has two carbon atoms, an ethyl group. It is on the second carbon atom of the parent hydrocarbon.

2-ethyl-1-pentene

If there is more than one double bond, the suffix is modified to indicate the number of double bonds: 2 = *-adiene*, 3 = *-atriene*, and so on.

1,4-pentadiene

The procedure for naming alkenes can be summarized as follows.

Alkene Nomenclature

Use the rules for alkane nomenclature on page 721, with the following exceptions.

1. **Name the parent hydrocarbon.** Locate the longest continuous chain that *contains the double bond(s)*. If there is only one double bond, add the suffix *-ene* to the prefix corresponding to the number of carbon atoms in this chain. If there is more than one double bond, modify the suffix to indicate the number of double bonds. For example, 2 = *-adiene,* 3 = *-atriene,* and so on.
2. **Add the names of the alkyl groups.**
3. **Number the carbon atoms in the parent hydrocarbon.** Number the carbon atoms in the chain so that the first carbon atom in the double bond nearest the end of the chain has the lowest number. If numbering from both ends gives equivalent positions for two double bonds, then number from the end nearest the first alkyl group.
4. **Insert position numbers.** Place double-bond position numbers immediately before the name of the parent hydrocarbon alkene. Place alkyl group position numbers immediately before the name of the corresponding alkyl group.
5. **Punctuate the name.**

Chemistry in Action

Carbon Allotropes

Carbon occurs in several different bonding patterns, called *allotropes,* which have very different properties. Diamond is a colorless, crystalline solid form of carbon, in which each atom is tetrahedrally bonded to four others in a network fashion. This three-dimensional bonding makes diamond the hardest material known.

Graphite is a soft, black, crystalline form of carbon that is a fair conductor of electricity. The carbon atoms in graphite are bonded together in layers. Within each layer, each atom is bonded to three other carbon atoms. But because adjacent layers are held together only by very weak London dispersion forces, graphite is very soft.

Diamond and graphite have been known for thousands of years. In the mid-1980s, a new solid allotropic form of carbon known as a *fullerene,* or, informally, "Buckyball," was discovered in the soot that forms when carbon-containing materials are burned with limited oxygen. The structure of a fullerene consists of a near-spherical cage of carbon atoms. The most stable fullerene is C_{60}, the structure of which resembles the design of a soccer ball.