جامعة المستقبل
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قسم الادلة الجنائية

المحاضرة الثامنة

Alkene

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Alkene

A. IUPAC Names

We form IUPAC names of alkenes by changing the -ane- suffix of the parent alkane to -ene- . CH_2=$CH_2$is named Ethene, and CH_3CH=CH_2 is named Propene. In higher alkenes, where isomers exist that differ in the location of the double bond, we use a numbering system. We number the longest carbon chain that contains the double bond in the direction that gives the carbon atoms of the double bond the lower set of numbers. We then use the number of the first carbon of the double bond to show its location.

Example:

$$H_3C{-}CH_2{-}CH_2{-}CH{=}CH{-}CH_3$$

2-Hexene

If the double bond is equidistant from each end, number so the first substituent has the lowest number.

$$\begin{array}{l} \quad\quad\quad CH_3 \\ \quad\quad\quad\quad | \\ H_3C\text{-}CH\text{-}CH{=}CH\text{-}CH_2\text{-}CH_3 \end{array}$$

2-Methyl-3-hexene

We name branched or substituted alkenes in a manner similar to the way we name alkanes. The process involves:

1. Numbering the carbon atoms.
2. Locating the double bond.
3. Locating and naming substituent groups.
4. Naming the main (parent) chain.

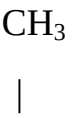
IUPAK Name: $CH_2=CH-CH_2-CH_3$ $CH_2=CH-CH_2-CH_2-CH_3$

1-butene 1-pente

$CH_3CH=CH-CH_3$ $CH_3CH=CH-CH_2-CH_3$

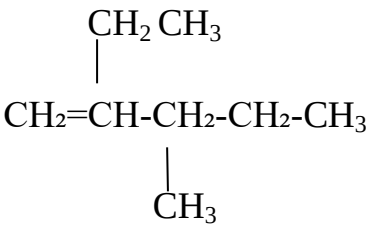
2-butene 2-penten

Another example:



$CH_2=CH-CH_2-CH_2-CH_2-CH_3$ $CH_2=CH-CH_2-CH_2-CH_2-CH_3$

1-hexene 4-methyl-1-hexene

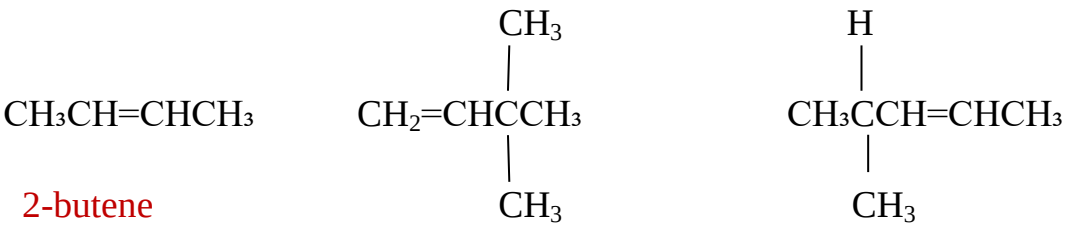


2-Ethyl-3-methyl-1-pentene

B. Common Names

Some alkenes, particularly those with low molecular weight, are known almost exclusively by their common names, as illustrated by the common names of these alkenes:

Structure	IUPAC Name	Common Name
$CH_2=CH_2$	Ethene	Ethylene
$CH_3CH=CH_2$	Propene	Propylene
$(CH3)_2C=CH_2$	2-Methylpropene	Isobutylene



2-butene (cis or trans)

3,3-dimethyl-1-butene

4-methyl-2-pentene (cis or trans)

Alkyne

Nomenclature:

Alkynes are named according to two different systems.

1-In this system, alkynes are considered to be derived from acetylene by replacing one or both hydrogen atoms with alkyl groups.

$H–C\equiv C–C_2H_5$: Ethylacetylene (Common Name) or 1-Butyne (Systematic Name).

$CH_3–C\equiv C–CH_3$: Dimethylacetylene (Common Name) or 2-Butyne (Systematic Name).

$CH_3–C\equiv C–CH(CH_3)_2$: Methylisopropylacetylene (Common Name) or 4-Methyl-2-pentyne (Systematic Name).

2-For more complicated alkynes, the IUPAC names are used.

- ✓ The rules are the same as for naming alkenes, but the ending **-yne** replaces the **-ene**.
- ✓ The **parent chain** is the longest continuous chain that contains the triple bond.
- ✓ The positions of both substituents and the triple bond are indicated by numbers.
- ✓ The triple bond is given the number of the first triply-bonded carbon atom, starting from the end of the chain nearest to the triple bond

Name	Formula
Acetylene	$HC\equiv CH$
Propyne	$HC\equiv CCH_3$
1-Butyne	$HC\equiv CCH_2CH_3$
1-Pentyne	$HC\equiv C(CH_2)_2CH_3$
2-Butyne	$CH_3C\equiv CCH_3$
2-Pentyne	$CH_3C\equiv CCH_2CH_3$
3-Methyl-1-butyne	$HC\equiv CCH(CH_3)_2$
2-Hexyne	$CH_3C\equiv C(CH_2)_2CH_3$
3-Hexyne	$CH_3CH_2C\equiv CCH_2CH_3$

Types of Hybridization:

1. **sp Hybridization:**

o Formed by mixing one s orbital and one p orbital.

o Produces two linearly arranged hybrid orbitals (180° apart).

o Example: Acetylene (C_2H_2), where carbon is sp hybridized.

2. **sp^2 Hybridization:**

o Formed by mixing one s orbital and two p orbitals.

o Produces three hybrid orbitals arranged in a trigonal planar geometry (120° apart).

o Example: Ethylene (C_2H_4), where carbon is sp^2 hybridized.

3. **sp^3 Hybridization:**

o Formed by mixing one s orbital and three p orbitals.

o Produces four hybrid orbitals arranged in a tetrahedral geometry (109.5° apart).

o Example: Methane (CH_4), where carbon is sp^3 hybridized.