Systematic Method of Naming Open Chain Hydrocarbons

Learning Outcomes:

Students will be able to:

1. explain the necessity of a systematic method of naming chemical compounds;
2. give the IUPAC names of alkanes;
3. give the IUPAC names of alkenes;
4. give the IUPAC names of alkynes.

Necessity of Systematic Names:

During the early days of organic chemistry, there was no systematic method of naming the organic compounds. In most cases, compounds were named in accordance with their origin. For example, methane was called marsh gas and methyl alcohol as wood spirit. Sometimes, the Latin name of the source was the basis for naming organic compounds. Thus, lactic acid derived its name from the Latin word *'lac'* which means milk. Formic acid was so named because it was obtained by the distillation of red ants (Latin, formica means red ants). These names were called common names or trivial names.

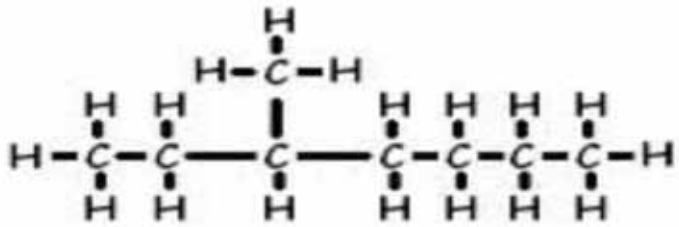
A name assigned to an organic compound by the discoverer and has no structural relevance is called a Common or Trivial name

By the end of nineteenth century, the number of known organic compounds had increased dramatically. Hence, the traditional methods of naming the organic compounds became inadequate. Therefore, in 1892, an international meeting of chemists was held in Geneva to lay down basic rules for the naming of organic compounds. After that, modifications were introduced in those rules as the need arose and the modified system was known as I.U.P.A.C (International Union of Pure and Applied Chemistry) which is still applicable.

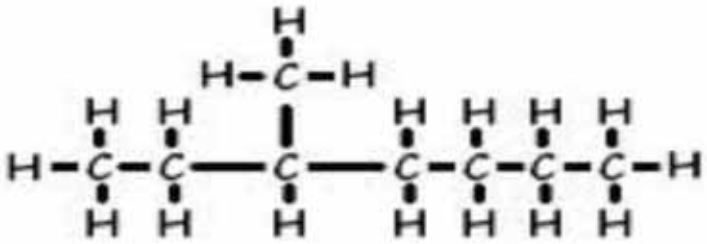
IUPAC Nomenclature of Alkanes:

Rules for naming Alkanes:

1. Select the longest continuous chain of carbon atoms, whether straight or branched, and it is considered to be the parent alkane.



2. Number the carbon atoms of the longest selected chain from that direction which gives lower number to the branches of the chain.



3. Position of each branch is indicated by the number of carbon atom to which it is attached.

4. If same branches appear more than once, add the prefixes di-, tri-, tetra- etc before the name of the branch.

5. Write first the branches, indicating the number of the carbon to which it is attached, in alphabetical order and then the name of the parent alkane to complete the name.

Practice Problem # 1

Practice Problem # 2

Nomenclature of Alkenes:

Rules for naming alkenes:

1. Select the longest possible, continuous chain of carbon atoms, including the carbon atoms containing the double bond.

2. Number the chain from that direction which gives lower number to the double bond.

3. If double bond gets same number from either direction, then assign the number to the chain from the direction that gives lower number to the branch.

4. Write first the branches, indicating the carbon number to which they are attached and then the parent alkene, indicating the number of the carbon containing double bond.

Practice Problem # 1

Practice Problem # 2

Nomenclature of Alkynes:

Rules for naming alkynes:

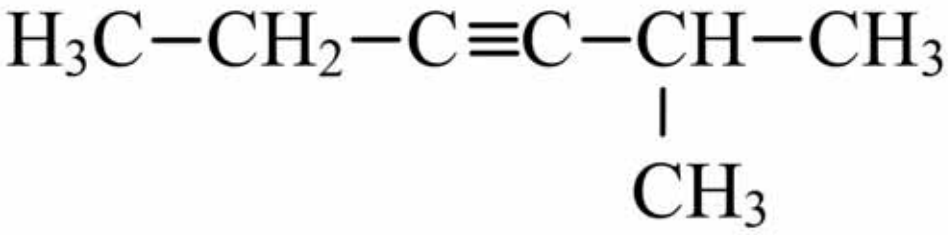
1. Select the longest possible, continuous chain of carbon atoms, including the carbon atoms containing the triple bond.

2. Number the chain from that direction which gives lower number to the triple bond.

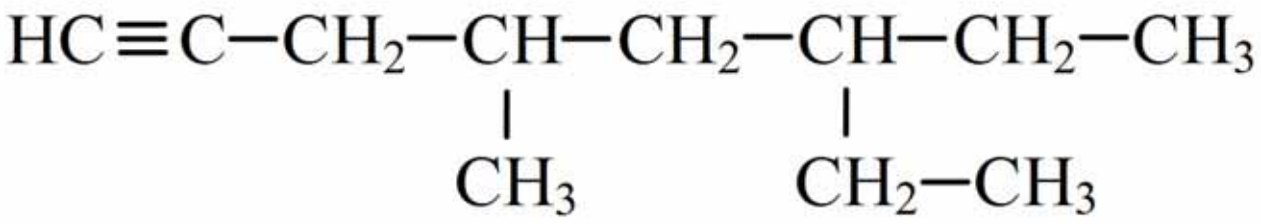
3. If triple bond gets the same number from either direction, then assign the number to the chain from the direction that gives lower number to the branches.

4. Write first the branches, indicating the carbon number to which they are attached and then the parent alkene, indicating the number to the carbon containing triple bond.

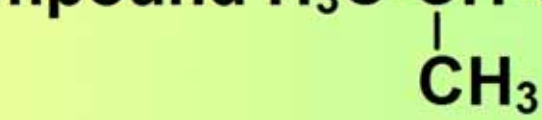
Practice Problem # 1



Practice Problem # 2




Multiple Choice
Questions

1. The correct systematic name of the given compound 

A. 2-methyl propane
B. isobutane
C. 1,1-dimethyl ethane
D. trimethyl methane

2. Which of the following is the structural formula of 2 ,2-dimethyl propane?

A. $H_3C\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_3$

B. $H_3C\text{-}CH_2\text{-}CH(CH_3)\text{-}CH_3$

C. $H_3C\text{-}C(CH_3)_2\text{-}CH_3$

D. $H_3C\text{-}CH(CH_3)\text{-}CH_3$

3. Which of the following is the structural formula of a 3-hexene?

A. $H_3C\text{-}CH_2\text{-}HC{=}CH\text{-}CH_2\text{-}CH_3$

B. $H_3C\text{-}HC{=}CH\text{-}CH_2\text{-}CH_2\text{-}CH_3$

C. $H_2C{=}CH\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_3$

D. $H_3C\text{-}CH_2\text{-}C(CH_3){=}CH\text{-}CH_3$