

ORGANIC CHEMISTRY

• Points to remember in Nomenclature

Examples of Compound containing different functional groups with common / trival names.

| No. of carbon atoms | Prefix | -CHO (Aldehyde) | -COOH(-ic acid) | -COCl.(-yl chloride) | -CONH ₂ (Amide) |
|--|---------|--|--|--|---|
| 1 | Form | HCHO Formaldehyde | HCOOH Formic acid | HCOCI Formyl chloride | HCONH ₂ Formamide |
| 2 | Acet | CH ₃ CHO Acetaldehyde | CH ₃ COOH Acetic acid | CH ₃ COCl Acetyl chloride | CH ₃ CONH ₂ Acetamide |
| 3 | Propion | CH ₃ CH ₂ CHO Propion aldehyde | CH ₃ CH ₂ COOH Propionic acid | CH ₃ CH ₂ COCl Propionyl chloride | CH ₃ CH ₂ CONH ₂ Propionamide |
| 4 | Butyr | CH ₃ CH ₂ CH ₂ CHO n-Butyraldehyde | CH ₃ CH ₂ CH ₂ COOH n-Butyric acid | CH ₃ CH ₂ CH ₂ COCl n-Butyryl chloride | CH ₃ CH ₂ CH ₂ CONH ₂ n-Butyramide |
| 5 | Valer | CH ₃ CH ₂ CH ₂ CH ₂ C HO n-Valeraldehyde | CH ₃ CH ₂ CH ₂ CH ₂ C OOH n-Valeric acid | CH ₃ CH ₂ CH ₂ CH ₂ COCl n-Valeryl chloride | CH ₃ CH ₂ CH ₂ CH ₂ CO NH ₂ n-Valeramide |
| 3C+1 Double bond | Acryl | CH ₂ =CH-CHO Acrylaldehyde | CH ₂ =CH-COOH Acrylic acid | CH ₂ =CH-COCl Acryl chloride | CH ₂ =CH-CONH ₂ Acrylamide |
| 4C + 1 Double bond (at 2 nd Carbon. atom) | Croton | CH ₃ -CH=CH-CHO Crotonaldehyde | CH ₃ CH ₂ = CH-COOH Crotonic acid | CH ₃ CH ₂ =CH-COCl Crotonyl chloride | CH ₃ CH ₂ = CH-CONH ₂ Crotonamide |

| No. of carbon atoms | Prefix | $-\text{CN}(-\text{O nitrile})$ | $-\text{N} \equiv \text{C}(\text{Oisonitrile})$ If Suffix isocyanide is used than. Carbon atom of $-\text{NC}$ not counted. If suffix carbyl amine is used. Carbon atom of $-\text{NC}$ not counted. If O-isonitrile is used \rightarrow Carbon atom of $-\text{NC}$ counted | $-\text{COOR}$ Ester |
|--|---------|---|---|--|
| 1 | Form | $\text{H}-\text{C} \equiv \text{N}$ Formonitrile | $\text{H}-\text{N} \equiv \text{C}$ Formoisonitrile | HCOOCH_3 Methyl formate |
| 2 | Acet | $\text{CH}_3\text{C} \equiv \text{N}$ Acetonitrile | $\text{CH}_3-\text{N} \equiv \text{C}$ Acetoisonitrile | $\text{CH}_3\text{COOCH}_3$ Methyl acetate |
| 3 | Propion | $\text{CH}_3\text{CH}_2\text{C} \equiv \text{N}$ Propionitrile | $\text{CH}_3\text{CH}_2\text{N} \equiv \text{C}$ Propionisonitrile | $\text{CH}_3\text{CH}_2\text{COOCH}_3$ Methyl propionate |
| 4 | Butyr | $\text{CH}_3\text{CH}_2\text{CH}_2\text{C} \equiv \text{N}$ n-Butyronitrile | $\text{CH}_3\text{CH}_2\text{CH}_2\text{N} \equiv \text{C}$ n-Butyroisonitrile | $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_3$ Methyl n-butyrate |
| 5 | Valer | $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C} \equiv \text{N}$ n-Valeronitrile | $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{N} \equiv \text{C}$ n-Valeroisonitrile | $\left[\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{COOCH}_3 \\ \\ \text{CH}_3 \end{array} \right]$ Methyl isovalerate |
| 3 C + 1 Double bond | Acryl | $\text{CH}_2 = \text{CH} - \text{C} \equiv \text{N}$ Acrylonitrile | $\text{CH}_2 = \text{CH}-\text{NC}$ Acrylisonitrile | $\text{CH}_2 = \text{CHCOOCH}_3$ Methyl acrylate |
| 4C + 1 Double bond (at 2 nd Carbon. atom) | Croton | $\text{CH}_3\text{CH} = \text{CH} - \text{C} \equiv \text{N}$ Crotononitrile | $\text{CH}_3-\text{CH}=\text{CH}-\text{NC}$ Crotonoisonitrile | $\text{CH}_3\text{CH}=\text{CHCOOCH}_3$ Methyl crotonate |

Secondary suffix of some common functional groups (IUPAC)

A secondary suffix is added to the primary suffix to indicate the nature of the functional group present in the organic compounds. Secondary suffix of important functional groups are given below in their decreasing order of seniority.

| | Class | Name | Suffix | Prefix |
|-----|--|----------------------|--|------------------------------------|
| 1. | $R-COOH$ | Alkanoic Acid | - oic acid (carboxylic acid) | carboxy |
| 2. | $R-SO_3H$ | Alkane sulhonic Acid | - sulphonic acid | sulpho |
| 3. | $R-C-O-C-R$ $\begin{array}{c} \quad \\ O \quad O \end{array}$ | Alkanonic Anhydride | - oic anhydride (carboxylic anhydride) | ----- |
| 4. | $R-COOR$ | Alkyl alkanoate | - oate (carboxylate) | alkoxy carbonyl or alkanoyl oxy |
| 5. | $R-C-X$ $\begin{array}{c} \\ O \end{array}$ | Alkanoyl halide | -oyl halide (carbonyl halide) | halo carbonyl |
| 6. | $R-C-NH_2$ $\begin{array}{c} \\ O \end{array}$ | Alkanamide | - amide (carboxamide) | carbamoyl |
| 7. | $R-C \equiv N$ | Alkanenitrile | - nitrile (carbonitrile) | cyano |
| 8. | $R-C-H$ $\begin{array}{c} \\ O \end{array}$ | Alkanal | - al (carbaldehyde) | formyl / oxo |
| 9. | $R-C-R$ $\begin{array}{c} \\ O \end{array}$ | Alkanone | - one | oxo |
| 10. | $R-OH$ | Alkanol | - ol | hydroxy |
| 11. | $R-SH$ | Alkanethiol | - thiol | mercapto |
| 12. | $R-NH_2$ | Alkanamine | - amine | amino |

IUPAC system of nomenclature

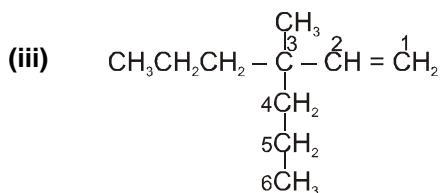
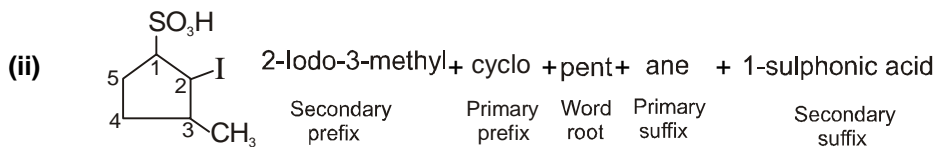
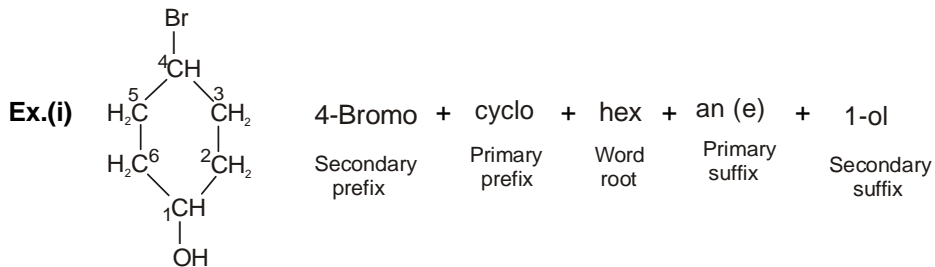
The IUPAC name of any organic compound consists of maximum five parts in the following sequence.

Secondary prefix + Primary prefix + Word root + Primary suffix + Secondary suffix

The following examples illustrate the use of word root, primary suffix and secondary suffix in naming of organic compounds.

| Organic compounds | Word root | Primary suffix | Secondary suffix | IUPAC name |
|--------------------|-----------|----------------|------------------|----------------|
| CH_3CH_2OH | Eth | an(e) | ol | Ethanol |
| $CH_3CH_2CH_2NH_2$ | Prop | an(e) | amine | Propanamine |
| $CH_3CH_2CH_2COOH$ | But | an(e) | oic acid | Butanoic acid |
| CH_3CH_2CN | Prop | an(e) | nitrile | Propanenitrile |
| $CH_2 = CHCHO$ | Prop | en(e) | al | Propenal |
| $HC \equiv CCOOH$ | Prop | yn(e) | oic acid | Propynoic acid |

The following examples illustrate the use of word root , primary prefix and secondary prefix in naming of organic compounds.



Position of double bond will be indicated as no. 1, Hence name will be 3-Methyl-3-propylhex-1-ene

Common and IUPAC Names of Some Organic Compounds

| S.No. | Compound | Common names | IUPAC name |
|-------|------------------------------------|-------------------|--------------------------|
| 1. | CH ₃ CH=CH ₂ | Propylene | Propene |
| 2. | | Isobutylene | 2-Methylpropene |
| 3. | H ₃ C-C≡CH | Methyl acetylene | Propyne |
| 4. | | Isobutyl chloride | 1-Chloro-2-methylpropane |

| | | | |
|-----|--|--|-----------------------|
| 5. | $\begin{array}{c} \text{CH}_2 - \text{Br} \\ \\ \text{CH}_2 - \text{Br} \end{array}$ | Ethylene dibromide | 1, 2-Dibromoethane |
| 6. | $\text{CH}_2 = \text{CH} - \text{Cl}$ | Vinyl chloride | Chloroethene |
| 7. | $\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_3 \\ \\ \text{OH} \end{array}$ | Isopropyl alcohol | Propan-2-ol |
| 8. | $\text{CH}_2 = \text{CH} - \text{CH}_2 - \text{OH}$ | Allyl alcohol | Prop-2-en-1-ol |
| 9. | $\begin{array}{c} \text{CH}_2 - \text{CH} - \text{CH}_2 \\ \quad \quad \\ \text{OH} \quad \text{OH} \quad \text{OH} \end{array}$ | Glycerol or Glycerine | Propane-1, 2, 3-triol |
| 10. | $\text{CH}_3 - \text{CHO}$ | Acetaldehyde | Ethanal |
| 11. | $\text{CH}_3 - \text{CO} - \text{CH}_2\text{CH}_3$ | Ethyl methyl ketone | Butanone |
| 12. | $\text{CH}_3 - \text{COOH}$ | Acetic acid | Ethanoic acid |
| 13. | $\begin{array}{c} \text{COOH} \\ \\ \text{COOH} \end{array}$ | Oxalic acid | Ethanedioic acid |
| 14. | $\begin{array}{c} \text{O} \\ \\ \text{H}_3\text{C} - \text{C} - \text{COOH} \end{array}$ | Pyruvic acid | 2-Oxopropanoic acid |
| 15. | $\text{CH}_3 - \text{COCl}$ | Acetyl chloride | Ethanoyl chloride |
| 16. | $\text{CH}_3 - \text{CONH}_2$ | Acetamide | Ethanamide |
| 17. | $\text{CH}_3 - \text{NH}_2$ | Methylamine | Methanamine |
| 18. | $\text{CH}_3 - \text{CN}$ | Methyl cyanide or Acetonitril | Ethanenitrile |
| 19. | $\text{CH}_3 - \text{N}^+ \equiv \text{C}^-$ | Methyl isocyanide or Methyl carbylamine | Methane isocyanide |

| | | | |
|-----|---|---------|---------------------------|
| 20. |  | Toluene | Methylbenzene or Toluene● |
|-----|---|---------|---------------------------|