

Chemistry Study Materials for Class 11

(NCERT Based Notes of Chapter- 12)

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SOME BASIC PRINCIPLES AND TECHNIQUES

Nomenclature of organic compounds containing more than one functional groups (Poly functional compounds)

Here one of the functional groups is chosen as the principal functional group and the compound is named on that basis. The remaining functional groups (called subordinate functional groups) are named as substituents using the appropriate prefixes. The choice of principal functional group is made on the basis of order of preference. The order of decreasing priority for some functional groups is:

-COOH, -SO₃H, -COOR (R=alkyl group), -COCl, -CONH₂, -CN, -CHO, >CO, -OH, -NH₂, >C=C<, -C≡C-

The groups like alkyl (-R), phenyl (C₆H₅-), halogens (F, Cl, Br, I), nitro (-NO₂), alkoxy (-OR) etc. are always prefix substituents.

For example if a compound contains both alcoholic and aldehydic groups, it is named as hydroxyalkanal, since here aldehydic group is the principal functional group and -OH group is the subordinate functional group. The prefix names of some functional groups are as follows:

| Functional group | Prefix name |
|--------------------|------------------|
| -OH | Hydroxyl- |
| -NH ₂ | Amino- |
| -X | Halo- |
| -CHO | Formyl- |
| >CO | Oxo- |
| -COOH | Carboxy- |
| -O- | Alkoxy- |
| -CN | Cyano- |
| -NO ₂ | Nitro- |
| -COOR | Alkoxy carbonyl- |
| -CONH ₂ | Carbamoyl- |
| -COX | Halocarbonyl- |

While numbering the carbon chain, the principal functional group should get the lowest possible number. Some examples are:

| Compound | IUPAC Name |
|---|---|
| $\text{CH}_3\text{-CHOH-CH}_2\text{-CO-CH}_3$ | 4-Hydroxy-2-pentanone |
| $\text{CH}_2\text{Cl-CH}_2\text{-CHBr-CH}_2\text{-CH}_2\text{OH}$ | 3-Bromo-5-chloropentan-1-ol <i>or</i> , 3-Bromo-5-chloro-1-pentanol |
| $\text{CH}_3\text{-CH}_2\text{-CO-CH}_2\text{-CH}_2\text{-CHO}$ | 4-Oxohexanal |
| $\text{CH}_3\text{-CHNH}_2\text{-CH}_2\text{-COOH}$ | 3-Aminobutanoic acid |
| $\text{CH}_3\text{-CH}_2\text{-CHCl-CH}_2\text{-CO-CH}_2\text{-COOH}$ | 5-Chloro-3-oxo-heptanoic acid |

If a compound contains more than one same functional group, their number is indicated by adding the numeral prefixes di, tri, etc. before the suffix. In such cases the full name of the parent alkane is written before the suffix. However, the ending –ne of the parent alkane is dropped in the case of compounds having more than one double or triple bonds.

When both double and triple bonds are present, the double bonds are given the lowest numbers. Here first give the suffix of the double bond (-en) and then that of the triple bond (-yne) [the ending –e of the suffix –ene is avoided].

Examples:

| Compound | IUPAC Name |
|--|-------------------------------------|
| $\text{CH}_2\text{OH-CH}_2\text{OH}$ | Ethane-1,2-diol (Ethylene glycol) |
| $\text{CH}_2\text{OH-CHOH-CH}_2\text{OH}$ | Propane-1,2,3-triol (Glycerol) |
| CHO-CHO | Ethane-1,2-dial (Glyoxal) |
| COOH-COOH | Ethane-1,2-dioic acid (Oxalic acid) |
| $\text{CH}_3\text{-CO-CH}_2\text{-CO-CH}_3$ | Pentane-2,4-dione |
| $\text{CH}_2\text{=CH-CH=CH}_2$ | 1,3-Butadiene or Buta-1,3-diene |
| $\text{CH}\equiv\text{C-CH}_2\text{-C}\equiv\text{CH}$ | 1,4-Pentadiene or Penta-1,4-diene |
| $\text{CH}_2\text{=CH-CH}_2\text{-C}\equiv\text{CH}$ | Pent-2-en-4-yne |
| $\text{CH}\equiv\text{C-CH=CH-C=CH}_2$ | Hexa-1,3-dien-5-yne |

(The names given in the bracket are the common names)
