Chemistry Study Materials for Class 11
(NCERT Based Notes of Chapter- 12)
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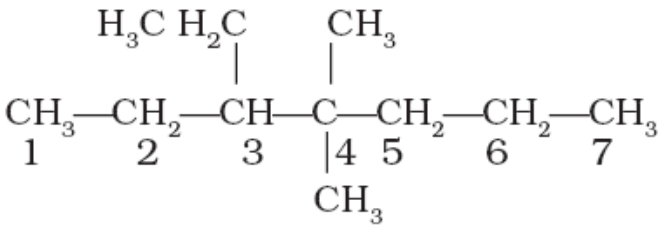
SOME BASIC PRINCIPLES AND TECHNIQUES

Rules for naming branched chain alkanes:

IUPAC recommenced the following rules for naming a branched chain alkane.

1. Select the longest continuous chain of carbon atoms. This chain is called parent chain or root chain. If there is more than one such chain, the chain that contains maximum number of branches is selected as the parent chain. Also identify all the branches or substituents.
2. Number the carbon atoms of the parent chain in such a way that the branched carbon atoms get the lowest possible numbers.
3. The names of alkyl groups attached as branches are then prefixed to the name of the parent alkane and position of the substituents is indicated by the appropriate numbers.
4. If different alkyl groups are present, they are listed in alphabetical order. In alphabetical order, the prefixes iso- and neo- are considered to be the part of the fundamental name of alkyl group. The prefixes sec- and tert- are not considered to be the part of the fundamental name.
5. If two or more identical substituent groups are present then their numbers are indicated by prefixes like di (for 2), tri (for 3), tetra (for 4), penta (for 5) etc and the numbers are separated by commas. The number and word are separated by a hyphen. (The IUPAC name is written as a single word).

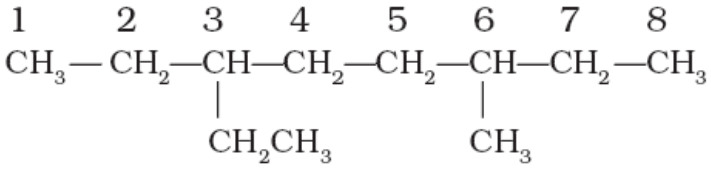
   For example:



3-Ethyl-4,4-dimethylheptane

6. If the two substituents are found in equivalent positions, the lower number is given to the one coming first in the alphabetical listing.

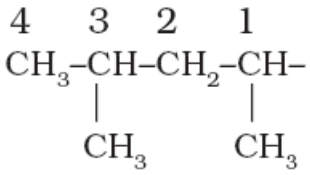
   For example:



   The above compound is *3-ethyl-6-methyloctane* and not 6-ethyl-3-methyloctane.

7. While naming the branched alkyl groups, the carbon atom of the branch that attaches to the root alkane is numbered 1.

   For example:



   1,3-dimethyl butyl-

IUPAC nomenclature of compounds containing functional groups

For naming organic compounds containing functional group, the following rules are used:

1. Select the longest continuous chain containing the functional group.
2. Number the carbon atoms in such a way that the carbon to which the functional group is attached should get the lowest possible number. In the case of functional groups containing carbon atom like –CHO, -CN, - COOH, -$CONH_2$, -COX. -COOR etc. the numbering should start from the carbon atom of the functional group. (i.e. carbon atom of these groups should be numbered as 1). (But for ketones, the functional group –CO- should get the lowest possible number).

3. The name of the functional group is indicated by the following suffix or prefix.

Functional group	Name of compound	Suffix/Prefix	IUPAC name
-OH	Alcohol	-ol	Alkanol
$-NH_2$	Amine	-amine	Alkanamine
-X	Halo compound	Halo-	Haloalkane
-CHO	Aldehyde	-al	Alkanal
>CO	Ketone	-one	Alkanone
-COOH	Carboxylic acid	-oic acid	Alkanoic acid
-O-	Ether	Alkoxy-	Alkoxy alkane
-CN	Nitrile	-nitrile	Alkane ntrile
$-NO_2$	Nitro compound	Nitro-	Nitroalkane
-C=C-	Alkene	-ene	Alkene
-C≡C-	Alkyne	-yne	Alkyne
-COOR	Ester	-oate	Alkyl alkanoate
$-CONH_2$	Acid amide	-amide	Alkanamide
-COX	Acid halide	-oyl halide	Alkanoyl halide
-SO3H	Sulphonic acid	-sulphonic acid	Alkanesulphonic acid

In the case of suffixes, the ending –e of the corresponding alkane is replaced. E.g. IUPAC name of the alcohol CH_3-OH is methanol (methane + ol). But for nitriles, the –e of the corresponding alkane is retained.

E.g. IUPAC name of CH_3-CH_2-CN is Propanenitrile.

In the case of alkenes and alkynes, the suffix –ane of the alkane is replaced by –ene and –yne respectively. (i.e. word root + ene or yne). For naming alkenes or alkynes, the numbering is done in such a way that the double or triple bond should get the lowest possible number.

Some examples are:

Compound	IUPAC Name
CH_3-CH_2-CH=CH_2	1-Butene
CH_3-CH=CH-CH_3	2-Butene
CH_3-CH_2-C≡C-CH_3	2-Pentyne
CH_3-CH_2-CH_2-CH_2-CH_2-C≡CH	1-Heptyne
CH_3-CH_2-OH	Ethanol
CH_3-CH_2-CHOH-CH_2-CH_2-CH_3	3-Hexanol or Hexan-3-ol or Hexanol-3
CH_3-CH_2-CH_2-CHO	1-Butanal or Butanal
HCHO	Methanal
CH_3-CO-CH_3	Propanone
CH_3-CO-CH_2-CH_2-CH_3	2-Pentanone or Pentan-2-one
CH_3-CH_2-CH_2-CO-CH_2-CH_2-CH_2-CH_3	4-Octanone or Octan-4-one
HCOOH	Methanoic acid
CH_3-COOH	Ethanoic acid
CH_3-CH_2-CH_2-COOH	1-Butanoic acid or butanoic acid
CH_3-CH_2-Cl	Chloroethane
CH_3-CH_2-CHBr-CH_3	2-Bromobutane
CH_2Cl-CH_2-CH_2-CH_2-CH_3	1-Chloropentane
CH_3-CH_2-CH_2-NO_2	1-Nitropropane
CH_3-CH_2-CH_2-CN	Butanenitrile
CH_3-CH_2-CH_2-CH_2-CH_2-CN	Hexanenitrile
CH_3-O-CH_3	Methoxymethane
CH_3-CH_2-O-CH_3	Methoxyethane
CH_3-CH_2-CH_2-O-CH_2-CH_3	Ethoxypropane
CH_3-CH_2-NH_2	Ethanamine
CH_3-CH_2-CHNH_2-CH_3	2-Butanamine or Butan-2-amine
CH_3-CH_2-$COOCH_3$	Methylpropanoate
CH_3-CH_2-$COOCH_2$-CH_3	Ethylpropanoate
CH_3-CH_2-COCl	Propanoylchloride
CH_3-CH_2-CH_2-CH_2-COBr	Pentanoylbromide
CH_3-CH_2-CH_2-$CONH_2$	Butanamide
CH_3-$CONH_2$	Ethanamide

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