IUPAC NOMENCLATURE FOR ALIPHATIC COMPOUNDS

The International Union of Pure and Applied Chemistry (IUPAC) has put forward a system of nomenclature which relates the name of the compounds to its molecular structure. In this system, every name consists of a root, a suffix and as many prefixes as necessary.

Root

The root is generally an aliphatic hydrocarbon. All aliphatic compounds are regarded as being derived from this root hydrocarbon by

- the replacement of hydrogen atoms by alkyl or functional group;

- the introduction of multiple bonds (i.e. double, triple covalent bonds).

The systematic name of a compound is formed from the root hydrocarbon by adding a suffix and prefixes to denote the substitution of the hydrogen atoms.

Suffixes

A suffix is added to the root to indicate the presence of the principal substituent, which is usually also the principal functional group in the molecule. Compounds having the same functional groups, such as those belonging to the same homologous series, would carry a common suffix at the end of their names. The following are some examples:

alk-anes, alk-enes, alk-ynes, alk-anols, alk-anoic acids, akyl alkan-oat (esters), -amides, alkan-als (aldehydes), alkan-ones (ketones), -amines, etc.

Prefixes

Cyclic compounds can be indicated by adding the prefix 'cyclo-' to the names of the corresponding aliphatic compounds, e.g. cyclohexane and cyclopentane. Prefixes are also used to indicate the presence of substituted alkyl or functional groups other than the principal group, as well as the positions of these substituent in the carbon chain.

Alkoxy prefix. In the case of ethers, which have the general formula of R–O–R', where R and R' may be the same or different alkyl radials, the prefix alkoxy is used.

This prefix, –OR', is composed of the name of the simpler alkyl group in the molecule with the –yl ending replaced by –oxy. The alkoxy prefix is then followed by the name of the corresponding alkane of the other alkyl group in the molecule. For example, $CH_3OC_2H_5$ is methoxy-ethane and $C_2H_5OC_2H_5$ is ethyloxyethane.

Rules for naming more than one prefix. When more than one of the same substituent group is present, the multiplying prefixes, such as di- for two, tri- for three, tetra- for four are used. If more than one prefix is needed, they are placed in alphabetical order. Multiplying prefixes do not affect this order. For example, $ClCH_2CHBr_2$ is bromochloroethane.

Basic Rules for naming Organic Compounds

Aliphatic organic compounds can be named by following these basic rules:

1. Take the longest continuous carbon chain as the root hydrocarbon and name it according to the number of carbon atoms it contains, adding the appropriate suffix to indicate the principal substituent group.
2. Number the carbon atoms in the root hydrocarbon from the end which will give the lowest number to the suffix, and then the prefix(es).
3. Indicate the other substituents by prefixes preceded by numbers to show their positions on the carbon chain.

4. When two different alkyl groups are substituted to one organic compound, they should be named based on the one that came first alphabetically. For example:

