Organic Compounds and Nomenclature

Organic compounds – carbon containing compounds EXCEPT oxides of carbon, and compounds containing the carbonate ion.

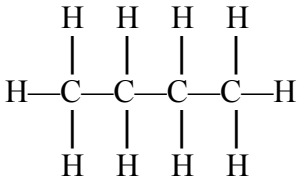
HYDROCARBONS

- contain hydrogen and carbon only.
- are non-polar
- are usually found deep inside the Earth, usually as deposits of natural gas and petroleum – fossil fuels.

Representing a Hydrocarbon:

Molecular formula. Ex: C_4H_{10}

Structural formula. Ex:



Condensed Structural formula. Ex:

$CH_3CH_2CH_2CH_3$

Hydrocarbon Prefixes:

Number of Carbon atoms	Root Word
1	meth-
2	eth-
3	prop-
4	but-
5	pent-
6	hex-
7	hept-
8	oct-
9	non-
10	dec

(I) Alkanes:

- saturated hydrocarbons (filled to capacity with H atoms)
- have the general formula C_nH_{2n+2}

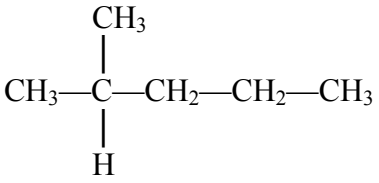
Straight-chain alkanes

- named ---ane Ex: methane CH_4

Branched alkanes

- Have lower boiling and melting points than their straight-chain counterparts.
- Naming: 1. Find the parent chain (longest continuous chain)
  2. Number the carbons in the parent chain starting with the end nearest to a branch.
  3. Name the branch using the prefix with the end –yl

  Ex:



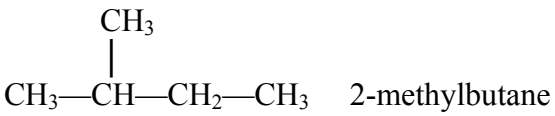
2-methylpentane

Conformations:

- C-C bonds rotate around their axes to give conformations, which differ only in their bond rotations.

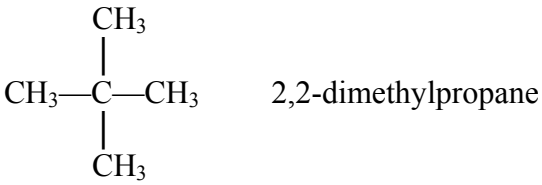
Structural Isomers:

- Have the same molecular formulas but their atoms bond in different orders.
  Ex: C_5H_{12}



pentane

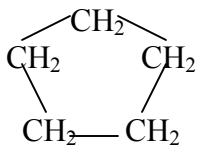
2-methylbutane



2,2-dimethylpropane

Cycloalkanes:

- The ends of the carbon chain close to form a ring.
- General formula is C_nH_{2n}
- Name is cyclo-----ane
  Ex: cyclopentane



II. Alkenes

- Have one or more double bonds between the carbon atoms
- Are unsaturated
- General formula C_nH_{2n}
- Are named ----ene

Ex: ethene (ethylene) $CH_2{=}CH_2$

Ex:

$CH_2{=}CH—CH_2—CH{=}CH_2$ 1,4-pentadiene

III. Alkynes

- Have one or more triple bonds
- Are unsaturated
- General formula C_nH_{n-2}
- Are named –yne

Ex: propyne $CH{\equiv}C—CH_3$
2-Butyne $CH_3—C{\equiv}C—CH_3$

OTHER ORGANIC COMPOPUNDS:

Hydrocarbon derivatives:

- Contain hydrogen and carbon as well as additional atoms or groups of atoms.
- Are classified depending on their **functional groups.**
- Can be given the general formula R-group where R is the hydrocarbon chain and the group is a particular functional group.
  Ex: R-OH is the general format for alcohols.