

Organic Chemistry

Organic Chemistry is the chemistry of carbon compounds. All organic compounds contain carbon as the 'backbone'.

Hydrocarbons: Organic compounds that contain carbon and hydrogen ONLY.

Every compound can be represented by a formula.

Molecular Formula – Exact ratio of atoms

E.g. C₄H₁₀

Empirical Formula – Simplest ratio of atoms

E.g. C₂H₅

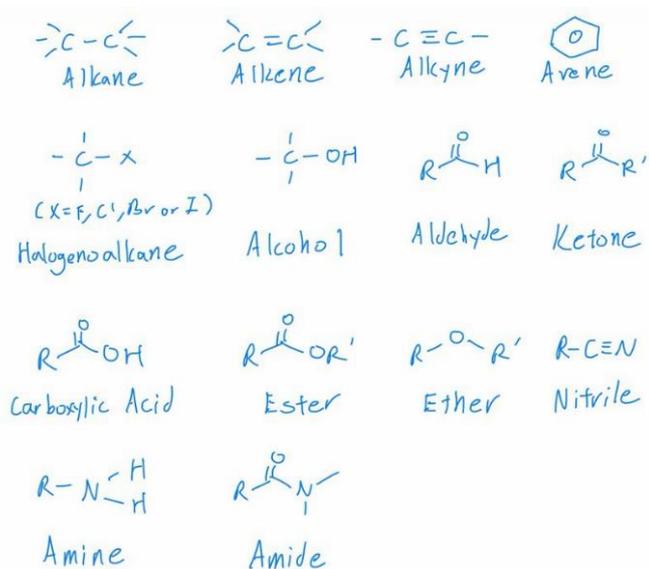
Structural Formula – Formula that displays the exact structure of the molecule

E.g. C₄H₁₀

Displayed Formula – Formula that displays the exact structure **with all bonds drawn** of the molecule

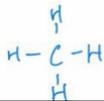
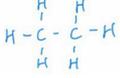
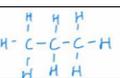
E.g. C₄H₁₀

Functional Groups: Patterns of structure found in molecules with specific chemical properties



Homologous Series

E.g. Homologous Series of Alkane

Name	Structural Formula	Molecular Formula	Mr	B.P.
Methane		CH ₄	16	Increases Down the Homologous Series
Ethane		C ₂ H ₆	30	
Propane		C ₃ H ₈	44	
Butane		C ₄ H ₁₀	58	
Pentane		C ₅ H ₁₂	72	

Homologous Series is a group of organic compounds which:

- Can be represented by a general molecular formula
- Have the same functional group
- Similar chemical properties
- Show gradual change in physical properties
- Successive members differs by -CH₂- unit

Sample Question: Explain how the above table shows the molecules are in the same homologous series.

Answer:

Steps in drawing an organic compound from the name:

1. From the parent, find out the number of carbons in the main carbon chain. Draw the main carbon chain first (just the carbons bonded)
2. From the suffix, find the major functional group and note the position of the functional group. Number the carbons drawn from left to right or right to left. Draw in the major functional group on the correct position.
3. From the prefix, find the minor functional groups and note their positions. Draw the minor functional groups, following the same numbering of the carbons.
4. Draw in all the remaining hydrogens. Make sure every carbon has 4 bonds!

E.g. How to Draw Organic Compound from the Name

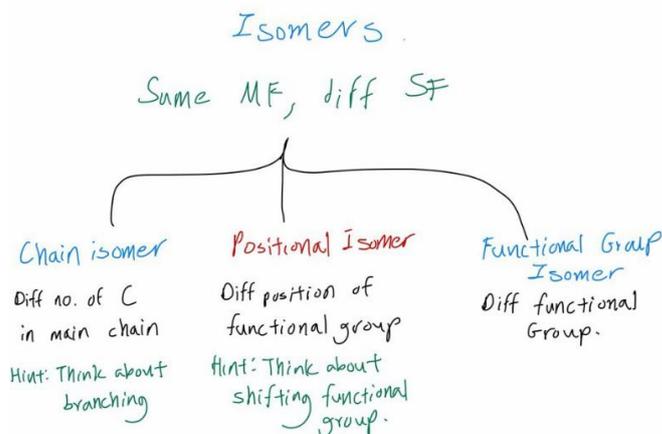
2-methylbutane

4-ethylheptane

3,4-dimethylheptan-1-ol

Isomerism

Isomers: Molecules with the same molecular formula but different structural formula



Steps in drawing isomers

1. Draw the straight-chain version of the longest possible carbon chain
2. Think about shifting the functional group first (positional isomer). Keep doing this until you start producing structures that are the same.
3. Think about branching (chain isomer). Start by deducting 1 carbon from the main carbon chain, and putting this carbon as a branch along the main chain. The branch cannot be at the ends of the main chain (otherwise it is just part of the main chain)
4. Think about shifting the functional groups, major or minor (positional isomer). Keep doing this until you start producing structures that are the same.
5. Repeat step 3, then step 4, all the way until you start producing structure that are the same.
6. Restart at step 1, now think about a whole new major functional group with a straight-chain version of the longest possible carbon chain.
7. Repeats steps 2-5.

E.g. Draw the Isomers of the organic compound with
molecular formula C_4H_8