

Chapter 4-1: The Importance of Carbon

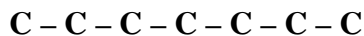
Carbon, Carbon EVERYWHERE! (Next to water that is ☺☺☺☺)

**Organic chemistry is the
study of carbon compounds**

- Organic chemistry -The study of carbon compounds - focuses on any compound with carbon (organic compounds).
- The overall percentages of the major elements of life (C, H, O, N, S, and P) differ little from one organism to another.
- But because of carbon's versatility, they can be combined to build an infinite variety of organic molecules.

**Variation in carbon skeletons contributes
to the diversity of organic molecules**

- Carbon chains form the skeletons of most organic molecules.



- The skeletons may vary in length and may be straight, branched, or arranged in closed rings.
- The carbon skeletons may also include double bonds.
- **Hydrocarbons** are organic molecules that consist of only carbon and hydrogen atoms.
- Fats are biological molecules that have long hydrocarbon tails attached to a non-hydrocarbon component.
- **Isomers:** compounds that have the *same molecular formula* but *different structures* and therefore *different chemical properties*.
- **Enantiomers** are molecules that are mirror images of each other
 - Possible if there are four different atoms or groups of atoms bonded to a carbon.
 - It is possible to arrange the four groups in space in *two different ways that are mirror images*.
 - Like left-handed and right-handed versions.
 - Cannot be superimposed on each other.
 - Usually one is biologically active, the other inactive.
 - Often have pharmacological significance.

**Interesting facts about Enantiomers
(no you do NOT need to copy this!!)**

- Even the *subtle structural differences* in two enantiomers have important functional significance because of emergent properties from the specific arrangements of atoms.
 - One enantiomer of the drug thalidomide reduced morning sickness, its desired effect, but the other isomer caused severe birth defects.
 - The L-Dopa isomer is an effective treatment of Parkinson's disease, but the D-Dopa isomer is inactive.