

Chapter 22: Organic and Biological Molecules**22.1: Alkanes: Saturated Hydrocarbons**

Hydrocarbons: - compounds that contains hydrogen and carbon atoms.
 - it may contain oxygen, nitrogen and other halogen atoms. In complex organic compound, it may even contain transition metals.

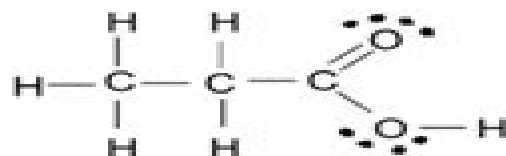
Examples: CH_4 (Methane), C_3H_8 (Propane), $\text{C}_6\text{H}_{12}\text{O}_6$ (Glucose), CH_3OH (Methanol) are hydrocarbons.
 CO_2 (Carbon dioxide) and CO (Carbon monoxide) are not hydrocarbons (no hydrogen atoms).

Saturated Bonds: - bonds in hydrocarbons that are single bonds only (mainly $2sp^3$ orbitals for carbon and oxygen and $1s$ orbital for hydrogen).

Unsaturated Bonds: - bonds in hydrocarbons that are double or triple bonds ($2sp^2$ orbitals for $\text{C}=\text{C}$ and $\text{C}=\text{O}$ bonds; $2sp$ orbitals for $\text{C}\equiv\text{C}$ and $\text{C}\equiv\text{N}$ bonds).

Lewis Structure of Hydrocarbons: - each carbon has 4 valence electrons; therefore it has a maximum of 4 bonding sites.
 - all lone pairs must be drawn in.

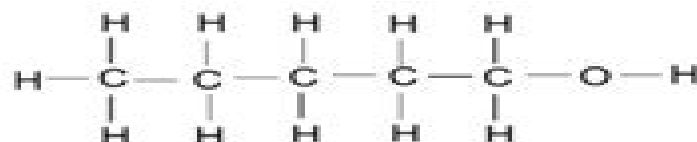
Example: $\text{C}_2\text{H}_5\text{COOH}$ (Propanoic Acid)



Note that there are 4 bonds around each carbon atom.

Structural Formulas: - a Lewis structure without any lone pairs notations.
 - there are many forms to write the structural formulas

Example: $\text{C}_5\text{H}_{11}\text{OH}$ (1-Pentanol)



Complete Extended Structural Formula



Skeletal Forms

(Each endpoint of the zigzag represents a carbon atom)

(Notice the two lone pairs around the oxygen atom are not drawn)

Chapter 22 Hydrocarbons Study Guide Answers

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