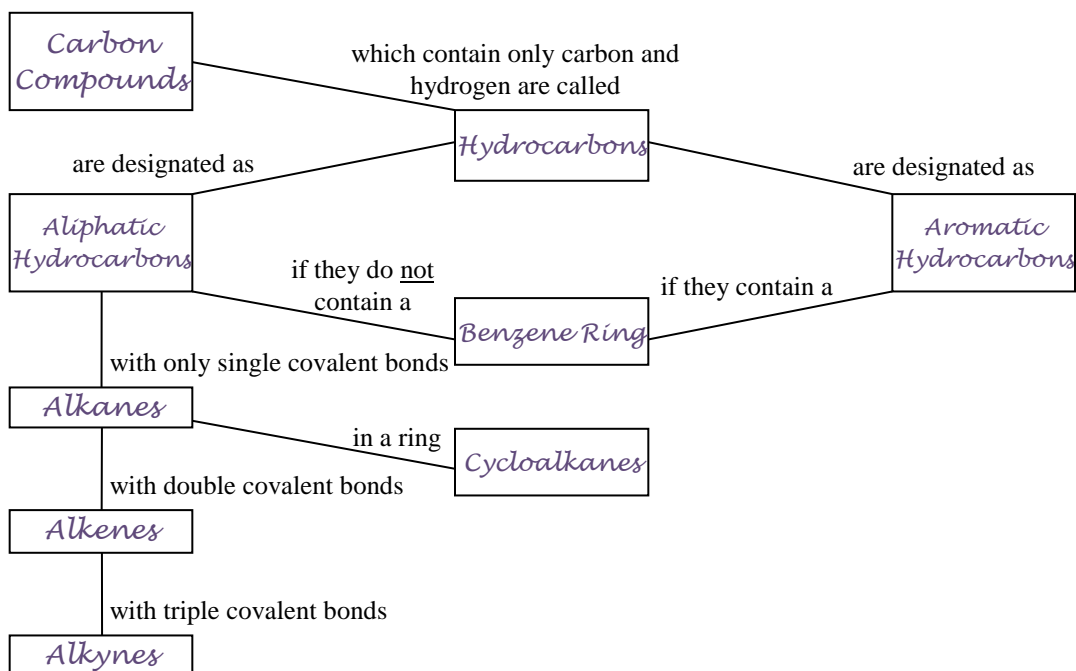
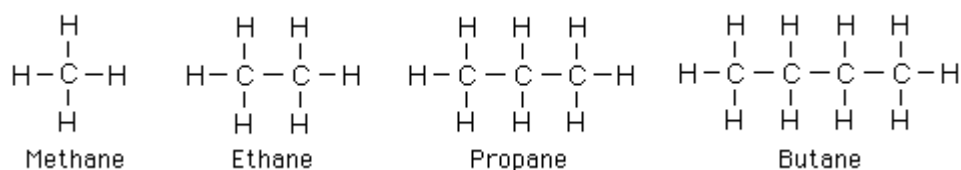


Organic chemistry is the study of the vast number of compounds that contain *carbon*. Carbon forms more compounds than any other element except *hydrogen*.



Straight-Chain Alkanes

- Alkanes are *saturated* hydrocarbons, having only single covalent bonds.
 - Saturated* means there is a *hydrogen* in every possible bonding location.
- Count the carbons, use appropriate prefix, and add the suffix *-ane*.
- Me Eat Peanut Butter* corresponds to the first four alkanes (methane, ethane, propane, butane).



- Then use the Greek prefixes associated with naming covalent compounds.

# Carbons	1	2	3	4	5	6	7	8	9	10
Prefix	<i>Meth-</i>	<i>Eth-</i>	<i>Prop-</i>	<i>But-</i>	<i>Pent-</i>	<i>Hex-</i>	<i>Hept-</i>	<i>Oct-</i>	<i>Non-</i>	<i>Dec-</i>

- Straight-chain alkanes have the general formula $C_n H_{2n+2}$, where n equals the number of *carbon* atoms in the chain.

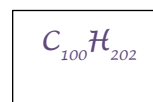
Practice: Draw the structural formulas for each of the alkanes below.

Pentane	Hexane	Heptane
Octane	Nonane	Decane

Complete the molecular formulas for the following alkanes.

IUPAC Name	Number of Carbons	Molecular Formula
Methane	1	
Ethane	2	
Propane	3	
Butane	4	
Pentane	5	
Hexane	6	
Heptane	7	
Octane	8	
Nonane	9	
Decane	10	

Hectane is the IUPAC name for the straight-chain alkane that contains 100 carbon atoms. What is the molecular formula for hectane?



Properties of Alkanes

- Bonds in alkanes are between a *carbon* and *hydrogen* atom or between two *carbon* atoms.
 - Carbon's electronegativity value is 2.55, and hydrogen's is 2.20. The electronegativity difference for a C—H bond is 0.35, indicating a *nonpolar* covalent bond.
 - Since the EN difference for a C—C bond is 0.0, it is also a *nonpolar* covalent bond.
 - Therefore, alkanes are *nonpolar* covalent molecules.
- Nonpolar covalent molecules are *immiscible* (insoluble) in water.
 - The attractive forces between *alkane molecules* are stronger than the attraction between *alkane molecules and water molecules*.
 - The solubility rule "*like dissolves like*" explains that nonpolar covalent molecules, such as alkanes, will not dissolve in a *polar* substance like water.
- The first *four* alkanes exist as *gases* at room temperature. *Solids* appear around C₁₇H₃₆.
- Alkanes have *low* boiling points due to *weak intermolecular forces*.
- Alkanes are usually stable at room temperature and have *low* reactivity due to their relatively *strong* C—C and C—H bonds.
- Alkanes are used as *fuels* because they undergo *combustion* reactions. This chemical reaction occurs when a substance reacts with *oxygen*, releasing energy as *heat* and *light*.