- Organic compound – any molecule that contains carbon
    - Exceptions are carbides and carbonates (Ca_2C , CO_3^{2-})
- Representations of compounds
    - Molecular formula
    - Lewis structure
    - Molecular shape
    - Space-filling model
    - Line-Angle Notation
- Hydrocarbons

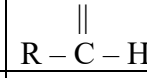
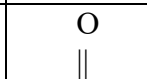
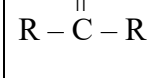
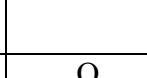
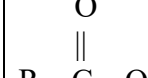
Methane	CH_4
Ethane	C_2H_6
Propane	C_3H_8
Butane	C_4H_{10}
Pentane	C_5H_{12}
Hexane	C_6H_{14}
Heptane	C_7H_{16}
Octane	C_8H_{18}
Nonane	C_9H_{20}
Decane	$C_{10}H_{22}$

    - Follow structure C_nH_{2n+2}
    - Hydrocarbons are simplest organic compounds (only H and C)
        - Saturated (carbon forms 4 single-bonds) vs unsaturated (there is a double or triple bond)
        - Most hydrocarbons come from large chains of carbons that are broken down using distillation
    - Alkanes – hydrocarbons that have only single bonds between carbon atoms
        - Drawn using line-angle notation due to repeatability
            - End of line segment represents carbon atom, hydrogen atoms not depicted
        - Branched-chain alkanes
        - Order and arrangement of atoms determine identity and properties of each molecule
            - Butane vs isobutane
            - Substituent groups – branches that attach to the longest continuous chain of carbons (parent chain), take the place of one of the hydrogens
                - Branch names replace the suffix -ane with -yl
- IUPAC Nomenclature
    1. Number each carbon in the longest continuous chain starting at the end carbon closest to a substituent group (give all substituent groups the lowest position numbers possible). Use the name of the straight-chain alkane with that number of carbons as the name of the parent chain of that structure
    2. Name each alkyl group substituent. Place the name of the group before the name of the parent chain (in alphabetical order when there is more than one attached to the parent chain)

3. If the same alkyl group occurs more than once as a branch on the parent structure, use prefixes). DO NOT consider the prefixes when determining alphabetical order
4. Place the position number of the carbon to which each alkyl group is attached to indicate its position (use the smallest numbers possible)
5. Write the entire name, using hyphens to separate numbers from words and commas to separate numbers. Do not include spaces between substituent and parent chain
    - Ex. 2,5,5,6 – tetramethyloctane; 4 – ethyl – 3,5 – dimethyloctane

- Cycloalkanes – organic compound that contains a hydrocarbon ring with only single bonds
- Alkenes – compounds that contain one or more double bonds between carbon atoms in a chain
    - Change -ane to -ene
    - Number the parent chains tarting at the end closest to the double bond. Number the position of the double bond, using the number of the first carbon in the double bond
        - Ex. but-1-ene vs but-2-ene
- Alkynes – compounds that contain one or more triple bonds between carbon atoms in a chain
    - Much more reactive
    - Change ending to -yne
- Benzyne – cylcoalkene with formula C_6H_6
    - Delocalized bonds
- Hydrocarbon Isomers – same molecular formular but different molecular structure
    - Structural isomers – same chemical formula but different arrangement of bonds/atoms
        - Ex. pentane, 2 - methylbutane, 2,2 - dimethylpropane
    - Stereoisomers – same order, arranged differently in space
        - Cis – same side
        - Trans – across from
        - Ex. cis-2-butene, trans-2-butene
- Chirality
    - Compounds that are mirror images of one another that do not function as the same molecule
    - Dextro- (left) and levo- (right)
    - Chiral atoms are attached to 4 or more other groups that are all different
- Functional Groups

Halocarbon	R – X X = F, Cl, Br, I	For the alkyl halides, a prefix indicates which halogen is present. The prefixes are formed by changing the -ine at the end of each halogen name to -o. If more than one type of substituent group is present in the same molecule, the groups are listed alphabetically in the name.
Alcohol	R – OH	An alcohol group has a OH group bonded to the end of the chain and the ending of the name changes from -e to -ol. A carbon chain can have more than one hydroxyl group. Prefixes are used before the -ol to indicate the

		number of hydroxyl groups present. The full alkane name, including -ane is used before the prefix.
Ether	R – O – R	First name the alkyl group, then add the word ether. If the two alkyl groups are different, the groups are listed in order, followed by the word "ether".
Amine	R – NH_2	The amino group is indicated by the suffix -amine. When necessary, the position of the amino group is designated by a number. If more than one amino group is present, prefixes are used to indicate the number of groups.
Aldehyde		Named by changing the final -e of the name of the alkane with the same number of carbons to the suffix -al.
Ketone		Formally named by changing the -e at the end of the alkane name to -one and including the number before the name to indicate the position of the ketone group. The carbonyl group can be located only in the center, but the prefix 2- is usually added to the name for clarity.
Carboxylic Acid		Organic compound that has a carboxyl group (COOH). Consists of a carbonyl group bonded to a hydroxyl group. Change -ane of parent alkane to -anoic acid.
Ester		Any organic compound with a carboxyl group where the hydrogen of the hydroxyl group has been replaced with an alkyl group. Named by writing name of alkyl group followed by the name of the acid with the -ic ending replaced by -ate.
Amide		Organic compound where the hydroxyl group of a carboxylic acid is replaced by a nitrogen atom bonded to other atoms. Named by writing name of the alkane with same number of carbon atoms and replacing final -e with -amide.

- Polymers – chains of repeating units (monomers)
  - Structure
    - Linear
    - Branched
    - Crosslinked
    - Network
  - Biological Molecules

Proteins	Amino acid
Nucleic acid	Nucleotides
polysaccharides	carbohydrates