



Present

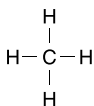
The Deep-Fried World of Organic Chemistry (Part 1)

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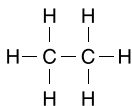
- I. What Is Organic Chemistry, Anyway?**
- II. Review of Basic Chemistry**
 - A. Lewis Structures
 - B. VSEPR's and Coulomb's Law
 - C. Covalent Bonds
 - D. Ionic Bonds
 - E. Intermolecular Forces
 - F. Acids and Bases
- III. Organic Chemistry: Hybridization Sates of Carbon**
 - A. ground-state electron configurations
 - B. hybrid atomic orbitals
 - C. sp^3 hybrid orbitals
 - D. sp^2 hybrid orbitals
 - E. sp hybrid orbitals
- IV. Alkanes**
 - A. Naming Alkanes
 - 1. straight-chained alkanes
 - 2. alkyl groups
 - 3. isomers
 - 4. 1° , 2° , 3° , and 4° carbons
 - 5. branched-chain alkanes
 - 6. cycloalkanes
 - 7. alkyl-substituted cycloalkanes
 - 8. cycloalkyl-substituted alkanes
 - B. Alkane Structures
 - 1. Newman Projections
 - 2. conformations of alkanes
 - 3. eclipsed conformation
 - 4. staggered conformation
 - 5. torsional strain
 - 6. van der Waal's repulsions
 - 7. gauche conformation
 - C. Cycloalkane Structures
 - 1. bond angles
 - 2. the boat conformation
 - 3. the chair conformation
 - 4. ring axis
 - 5. ring equator
 - 6. axial hydrogens
 - 7. equatorial hydrogens
 - 8. diaxial interaction
 - 9. ring flip
 - 10. angle strain

PART 1

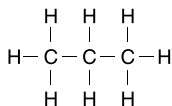
alkane: the simplest class of organic molecules; made of only carbon, hydrogen, and single bonds; C_nH_{2n+2}



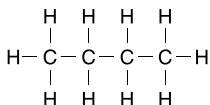
Methane, CH_4



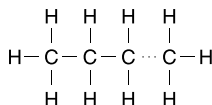
Ethane, C_2H_6



Propane, C_3H_8

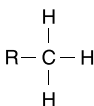


Butane, C_4H_{10}

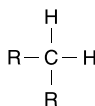


C_nH_{2n+2}

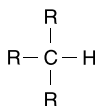
| | |
|--------------------|------------------------|
| <i>pent</i> -five | Pentane, C_5H_{12} |
| <i>hex</i> -six | Hexane, C_6H_{14} |
| <i>hept</i> -seven | Heptane, C_7H_{16} |
| <i>oct</i> -eight | Octane, C_8H_{18} |
| <i>non</i> -nine | Nonane, C_9H_{20} |
| <i>dec</i> -ten | Decane, $C_{10}H_{22}$ |



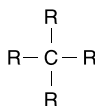
Primary Carbon, (1°)



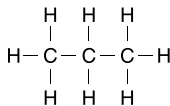
Secondary Carbon, (2°)



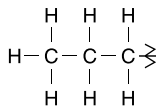
Tertiary Carbon, (3°)



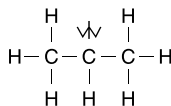
Quaternary Carbon, (4°)



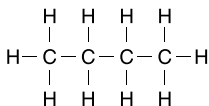
$CH_3CH_2CH_3$
Propane



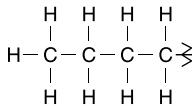
$CH_3CH_2CH_2 \curvearrowright$
Propyl-



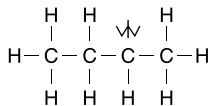
$CH_3\overset{\swarrow}{C}HCH_3$
Isopropyl



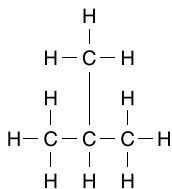
$CH_3CH_2CH_2CH_3$
Butane



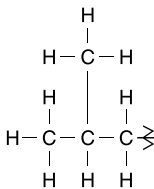
$CH_3CH_2CH_2CH_2 \curvearrowright$
Butyl-



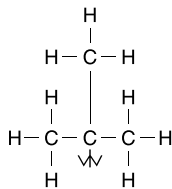
$CH_3CH_2\overset{\swarrow}{C}HCH_3$
sec-butyl



2-methylpropane
(Isobutane)



Isobutyl-



tert-butyl

Naming Alkanes

- Find the longest continuous chain of carbon atoms in the molecule
- Start numbering the chain at the carbon nearer the the first branching point (the substituents should have the lowest numbers possible)
- Name and number the substituents
 - If there are two substituents attached to the same carbon, assign both of them the same number
- Write out the name of the molecule
 - list the substituent names in alphabetical order
 - if there are two identical substituents on the molecule, use the prefix *di-*; if there are three identical substituents on the molecule, use the prefix *tri-*; if there are four identical substituents on the molecule, use the prefix *tetra-* (alphabetize the substituents by the main name of the substituent, not by any prefixes the substituents may have)
 - separate the substituent names with hyphens
 - tag the name of the parent chain onto the end of the substituent names

A few extra rules to follow:

- Use commas to separate numbers
- Use hyphens to separate numbers from the substituent names
- Never name alkanes after drinking
- Don't allow children to name alkanes unattended

Cycloalkane: ring of CH₂ units



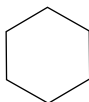
Cyclopropane



Cyclobutane



Cyclopentane



Cyclohexane

Naming cycloalkanes:

- Determine whether the molecule is a cycloalkyl-substituted alkane or an alkyl-substituted cycloalkane. If you choose cycloalkyl-substituted alkane, go to the sun; If you choose alkyl-substituted cycloalkane, go to the moon.

cycloalkyl-substituted alkane: an alkane with a cycloalkyl substituent; the main component of the molecule is an alkane; name a cycloalkyl-substituted alkane exactly the same as you would name an alkane

alkyl-substituted cycloalkane: a cycloalkane with alkyl substituents; the main component of the molecule is a cycloalkane

Naming alkyl-substituted cycloalkanes:

2. Number the carbons of the cycloalkane
 - a. Start at the first carbon which has a substituent attached to it
 - b. If there are two substituents, number the ring so that each of the substituents has the lowest number possible
 - c. If two or more different substituents are present, start numbering the carbons at that substituent which is first alphabetically, then number around the ring so that each substituent has the lowest number possible
3. Name and number the substituents
 - If there are two substituents attached to the same carbon, assign both of them the same number
4. Write out the name of the molecule
 - List the substituent names in alphabetical order
 - If there are two identical substituents on the molecule, use the prefix *di-*; if there are three identical substituents on the molecule, use the prefix *tri-*; if there are four identical substituents on the molecule, use the prefix *tetra-* (alphabetize the substituents by the main name of the substituent, not by any prefixes the substituents may have)
 - Separate the substituent names with hyphens
 - Tag the name of the parent chain onto the end of the substituent names

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