10/5/11  IUPAC names
Common names of substituents
Primary, secondary, and tertiary carbons
cyclic compounds

Construction of IUPAC Names

- parent chain
  - substituents
  - stereo descriptors / locants / substituents / parent
    - cis, trans, E/Z
    - 1, 2, 3 methyl
    - position
    - numbers
  - functional group

Rule #1 - The parent chain is the longest continuous carbon chain.

- has nine carbons
- has eight carbons

Alkanes - hydrocarbon with only single bonds

CH₄  CH₃CH₃  ~ ~ ~ ~ ~ ~
methane  ethane  propane  butane  pentane  hexane
  heptane  octane  nonane  decane
  (7)     (8)     (9)     (10)

- one indicates only alkanes are present as the most important functional group
Alkyl is a substituent name ending in -yl.

CH₃ - methyl
CH₃CH₂ - ethyl
CH₃CH₂CH₂ - propyl
CH₃CH₂CH₂CH₂ - butyl

2-methylhexane

Rule #2 - compounds are numbered so that the first substituent receives the lowest possible number.

Common names of substituents

- isopropyl
- sec-butyl
- isobutyl
- tert-butyl
- neopentyl

Primary carbon (1°) - a carbon attached to only one other carbon
Secondary (2°) - a carbon attached to 2 carbons
Tertiary (3°) - attached to 3 carbons
Quaternary (4°) - attached to 4 carbons

cyclohexane in a ring
formal charge vs. oxidation state

Formal charge and oxidation are both counting systems for electrons, in which the number of electrons on an atom in a molecule is compared to how many it would have as an unreacted element.

- Formal charge assumes covalent bonding → one electron is given to each atom for each bond.
- Oxidation state assumes ionic bonding → both electrons are given to the most electronegative atom in the bond. If a bond is made of two of the same atom, then the bond is treated covalently, meaning the electrons are evenly split.
Formal charge = \( \text{FC} \) = \# of valence e\(^-\) - \# bonds - \# lone e\(^-\) (\(\frac{1}{2}\) bonding e\(^-\))