Alkane and Cycloalkane Nomenclature

- *Branched Alkanes*
  1) Find the longest chain in the molecule and name it.

  - if two chains have identical length, the chain with the largest number of substituents (the most branch points) is the parent chain.

  2) Number the atoms in the main chain beginning from the carbon nearest the first branch point.

    - if each end is identical distance to the first branch point, start with the end nearest the second branch point.
    - if there are only two substituents, both equidistant from the ends, the substituent that comes first in alphabetical order is attached to the lower numbered carbon.

  3) Identify and number the substituents based upon their position along the main chain.

    - if there are two substituents on the same carbon, assign both the same number.
    e.g., 3-ethyl-3-methylhexane or 2,2-dimethylpentane

  4) Create the name

    i) Hyphens separate number and prefix
    ii) Commas separate numbers adjacent to each other
    iii) List prefixes (substituents) in alphabetical order
    iv) If have multiple identical substituents, use numerical prefixes *di-* , *tri-* , *tetra-* , etc. but don't use numerical prefix when alphabetizing.

  5) Occasionally, substituents themselves are branched. To name the branch, follow the above steps, but numbering always begins at the carbon attached to the main chain.

    - the branched substituent name is set off in parentheses in the complete molecule name
    e.g., 2,3-dimethyl-6-(2-methylpropyl)decane

Note:

a) When alphabetizing, the prefixes *iso-* , *neo-* and *cylco-* are considered part of the alkyl name, whereas numerical prefixes *di-* , *tri-* , and *tetra-* and hyphenated prefixes *sec-* and *tert-* are not considered part of the alkyl name.

b) Halogens are treated identically to alkyl substituents.
**Cycloalkanes**

Naming of cycloalkanes follows rules similar to that for straight chain alkanes.

1) Use the ring to define the parent chain unless a substituent has more carbons. e.g., butylcyclopentane and 2-cyclobutylpentaene

2) To number substituents, start with a point of attachment and number to achieve the lowest possible sum. e.g., 1,3-dimethylcyclohexane *not* 1,5-dimethylcyclohexane (the same molecule, but the latter in an incorrect name)

• When two or more different alkyl groups are present, number according to alphabetical priority.