**NOMENCLATURE**

<table>
<thead>
<tr>
<th>What and where are substituents</th>
<th>How many carbon?</th>
<th>Parent functional group</th>
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<tbody>
<tr>
<td>Prefix</td>
<td>Parent</td>
<td>Suffix</td>
</tr>
</tbody>
</table>

Examples:
- 2-methyl-
- 2,3,4-trimethyl-
- 4-ethyl-2-methyl-
- 4-chloro-2-ethyl-1-methylcyclo-

**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.

- You may use a number more than once. 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.*

*When alphabetizing, the prefixes *iso-, neo- and cyclo-* 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.*
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

**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-cyclobutylpentane

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 is an incorrect name)

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

**Halogenalkanes**

Halogens are treated exactly as alkyl substituents with respect to numbering, alphabetizing etc.

**Alcohols**

1) Find the longest chain in the molecule containing the hydroxyl group and name it (remove the final "-e" from the alkane and replace it with "-ol").

2) Number the chain such that the -OH group is attached to the lowest possible number, and that number becomes a prefix. e.g., 2-butanol, 4-methyl-1-pentanol

3) Number the substituents according to their position in the chain and list them in alphabetical order when writing the name. e.g., 2-methyl-2-pentanol

- The number for the hydroxyl group is placed immediately before the -ol suffix when the molecule also contains a double or triple bond: 3-cyclohexen-1-ol
Alkenes

1) Find the longest chain in the molecule containing the double bond and name it: \(-\text{ane} \rightarrow \text{-ene}\).

2) Number the chain to include both atoms of the double bond with the lowest possible number. Use the first atom of the double bond as the number of the double bond location.
(\*hydroxy groups take numbering precedence over double bonds
\text{e.g.} 4\text{-methyl-3-penten-2-ol}
\*cycloalkenes should be numbered with the double bond between the 1- and 2-carbons and the other substituent numbers as low as possible

Alkynes

1) Find the longest chain in the molecule containing the double bond and name it: \(-\text{ane} \rightarrow \text{-yne}\).

2) Number the chain to include both atoms of the triple bond with the lowest possible number. Use the first atom of the triple bond as the number of the triple bond location.
(\*numbering priority rules: hydroxy > double bond > triple bond
\text{e.g.,} 1\text{-pentin-4-yn}, 2\text{-methyl-2-octyn-2-ol}