3.2: OVERVIEW OF THE IUPAC NAMING STRATEGY

learning objectives

- name alkanes, cycloalkanes, alkenes, alkynes, alkyl halides, ethers, alcohols, amines, benzene and its derivatives, aldehydes, ketones, amines, carboxylic acids, and carboxylic acid derivatives using IUPAC (systematic) and selected common name nomenclature
- draw the structure of alkanes, cycloalkanes, alkenes, alkynes, alkyl halides, ethers, alcohols, amines, benzene and its derivatives, aldehydes, ketones, amines, carboxylic acids, and carboxylic acid derivatives from the IUPAC (systematic) and selected common names

Overview of the IUPAC System for Naming Organic Compounds

The International Union of Pure and Applied Chemistry (IUPAC) has established the rules of nomenclature of all chemical compounds. IUPAC nomenclature can also be called "systematic" nomenclature because there is an overall system and structure to the names. This section provides an overview of the general naming strategy and structure for organic compounds.

Naming organic compounds according to the IU{AC system requires up to four pieces of information

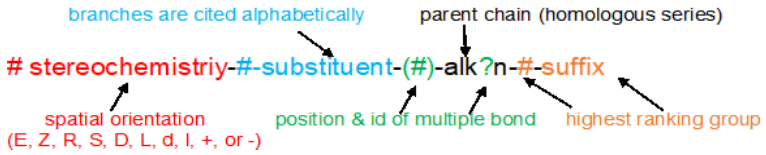
1. recognize & prioritize the functional group(s) present

2. identify & number the longest continuous carbon chain to give the highest ranking group the lowest possible number

3. cite the substituents (branches) alphabetically using the numbering determined above

4. recognize & classify any stereochemistry (E/Z, R/S, cis/trans, etc)

With these four pieces of information, the IUPAC name is written using the format below. This same format applies to **ALL** the organic compounds.



Recognize & Prioritize the Functional Group(s) Present

The IUPAC Rules of Organic Nomenclature assume that the following table is understood and memorized.

Structure	Classification	Suffix Name	Substituent Name
higher priority 	Carboxylic acid	-oic acid	carboxy-
	Ester	-oate	alkoxycarbonyl-
	Amide	-amide	amido-
	Nitrile	-nitrile	cyano-
	Aldehyde	-al	formyl-
	Ketone	-one	oxo-
	Alcohol	-ol	hydroxy-
	Amine	-amine	amino-
	Alkene	-ene	alken-
	Alkyne	-yne	alkyn-
	Alkane*	-ane	alkyl-
	Ether*	---	alkoxy-
lower priority	Alkyl halide*	---	halo-

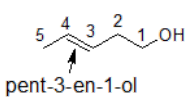
*Same overall priority, prioritize by structure as described in the appendix

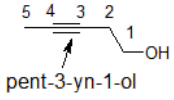
Identify & Number the Longest Continuous Carbon Chain with the Highest Priority Group

The longest continuous carbon chain (parent) is named using the Homologous Series, as well as any carbon branches. The suffixes and location within the name distinguish between the parent and the branches.

When Alkenes and Alkynes have Lower Priority

The hydrocarbon suffixes differ in the letter preceeding the "n". When alkenes and alkynes occur in compounds with higher priority functional groups, then the distinction between hydrocarbons is communicated with a single letter: "e", or "y" for alkenes and alkynes, respectively, An example is shown below to illustrate the application of this rule.





substituents (branches) alphabetically

The major substituents are listed above and need to be memorized. There are a few additional substituents that will introduced later in the text.

Stereochemistry

Distinguishing spatial orientations of atoms (stereochemistry) are communicated at the beginning of the name using the appropriate symbols, such as E/Z, R/S, cis/trans, etc. This nomenclature will be discussed when it is possible for a functional group.
