

Nomenclature

How to Name Organic Compounds

This guide has organized the naming of organic compounds in five parts. You should name molecules starting backwards from this list. For example, determine functional group first, then saturation, then the parent chain, then the substituents, and then the stereoisomer characteristics:

Stereoisomer Characteristics	Substituents	Parent Chain	Bond Types	Functional Groups
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1. Stereoisomer Characteristics

a. **Cis (Z) /Trans (E)**

- i. Identifies configuration of double bond
- ii. For Cis/Trans, you need identical groups on either side of the double bond
 1. Cis – identical groups on same side
 2. Trans – identical groups on opposite sides
- iii. For (Z)/(E), you need priority numbers
 1. (Z) – The higher priority groups are on the same side
 2. (E) – The higher priority groups are on opposite sides
- iv. (3E) – Give number to indicate location of double bond. For this case, the double bond is between carbon #3 and #4

b. **(R)/(S)**

- i. identifies configuration of stereocenters
- ii. all attached groups to stereocenter (carbon) must be different
- iii. To determine whether R or S, find the direction of the priority groups numbered 1-3. Lowest priority group (#4) must be in back when doing this.
 1. (R)- priority #1-3 are clockwise
 2. (S)- priority #1-3 are counterclockwise
- iv. (3R, 4S)- put number to indicate position of stereocenter

c. **(+)(-)**

- i. Identifies rotation under plane-polarized light
- ii. To determine whether molecule is (+) or (-), need to do laboratory tests where the molecule is put in plane-polarized light
 1. (+) – rotates clockwise
 2. (-) – rotates counterclockwise

2. Substituents

- After determining the functional group and parent chain, everything else that is left are considered substituents.
- Carbon chain-** Name using following names based on number of carbons. Numbers correlate with amount of carbons in chain:

Number of carbons in substituent chain	Name
1	Methyl
2	Ethyl
3	Propyl
4	Butyl
5	Pentyl
6	Hexyl
7	Heptyl
8	Octyl
9	Nonyl
10	Decyl

- Branched carbon** substituents (not connected in straight line like usual):
isopropyl:



tert-butyl:



- Halide functional groups-** take the halogen name (ex. Chlorine) and remove the “-ine” and add an “-o” in place for the resulting name (ex. Chloro)
- Include any other **functional groups** that were not part of the parent chain. (Ex. -oxy- for ethers)
- Rings-** If parent chain is in a ring, add cyclo- to the beginning of parent name.
- Give number to indicate location of substituent on parent chain.(ex. 3-methylpentane indicates a methyl group on the 3rd carbon of the parent chain of pentane)

3. Parent Chain

- a. Name chain with following names in accordance to number of carbons in parent chain.

Number of carbons in substituent chain	Name
1	Meth-
2	Eth-
3	Prop-
4	But-
5	Pent-
6	Hex-
7	Hept-
8	Oct-
9	Non-
10	Dec-

- b. **To determine parent chain:**

- Try to look for longest chain of carbon in molecule. This is the parent chain.
- If there is a functional group, double bond and/or triple bond, include the functional group in the parent chain. Then try to include the double bond, then the triple bond. This may require choosing a shorter parent chain.

4. Bond Types

- an-**; alkanes; single bonds only in structure
- en-**; alkenes; double bonds exist in structure
- yn-**; alkynes; triple bonds exist in structure
- If more than one double or triple bond use prefixes:
 - Di-**
 - Tri-**
 - Tetra-**
 - Penta-**
 - Hexa-**
- If both double and triple bonds exist, list double bond then triple bond. (ex. 2,3,5-trien-4,5-diyne)

5. Functional Groups

- Written as a suffix at the end of compounds name
- 3-ol – Give number to indicate the carbon that the functional group is attached to
- If there is more than one functional group, put the one higher on the hierarchy in the suffix and the others in the substituents
- e; If no functional group attached, end the name with an “e”. (ex) pentane)
- Some functional groups listed in order of hierarchy:



2. **–oate**; ester



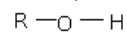
3. **–al**; aldehyde



4. **–one**; ketone



5. **–ol**; alcohol



6. **–amine**; amine

