Organic nomenclature

Alkanes
CH₄ methane (1), CH₃-CH₃ ethane (2), CH₃-CH₂-CH₃ propane (3), butane (4), pentane (5), etc.
General formula CₙH₂n+₂

Complex alkanes, priority orders
1-Longest carbon chain, 2-Most branched chain, 3-Number the chains with the nearest substituent group.
Simple substituents ordered alphabetically by name (isopropyl) and using di, tri, tetra but these prefixes do not count alphabetically. Complex substituents (branched) ordered by the first letter, (1,2,2-trimethylpropyl ordered by “t” and not by “m”).
tert- and sec- prefixes do not count alphabetically (tert-butyl, sec-butyl, ordered by b in both cases).

We use dash to separate numbers-letters; comma to separate number,number; and nothing for letter-letter.
Some examples:

-CH₃ methyl, -CH₂CH₃ ethyl, -CH₂-CH₂-CH₃ propyl, etc

-CH₂CH₂CH₂CH₂CH₃ 1-propylpentyl -CH₂-CH₂-CH₃ isopropyl -CH₂-CH₂-CH₃ tert-butyl

-C₃H₇ isopropyl

CH₃

CH₃

Cycloalkanes
Cyclopropane (3), cyclobutane (4), cyclopentane (5), cyclohexane (6), etc.
Substituents ended in -yl:

Alkenes, alkynes, cycloalkenes
CH₂=CH₂ ethene, CH=CH ethyne (acetylene), CH₃-CH=CH₂ 2-butene, cyclopentene, etc.
Most important double than triple bond: CH₂=CH-CH₂-C=CH 1-pentene-4-yne.
CH₃CH₂CH₂-C=CH₂ 2-ethyl-1-pentene.

Benzene derivatives
Benzene, naphthalene (2 cycles), anthracene (3 cycles).
ortho (o), meta (m), para (p):

1-ethyl-3-methylbenzene = m-ethylmethylbenzene
As substituent benzene is named phenyl.
**Halogen derivatives**
F, Cl, Br, I alphabetically ordered ended in -oro, -odo, also used di, tri, tetra, etc.
Double bond (also in benzene) most important than halogen.
CH<sub>3</sub>-CH<sub>2</sub>-CHCl  1-cloropropane
CH<sub>2</sub>=CH-CHI-CHI-CH<sub>3</sub>  3,4-diiodo-1-pentene

**Functional groups**
Most important than the double bond, when more than one they have to be ordered by importance and numbered accordingly.

**Alcohols**
R-OH, CH<sub>3</sub>-CH<sub>2</sub>OH Ethanol, propanol, phenol, etc
CH<sub>2</sub>=CH-CH<sub>2</sub>-CHOH-CH<sub>3</sub>  4-penten-2-ol
CH<sub>3</sub>-CHOH-CH<sub>3</sub>  2-propanol

**Ethers**
R-O-R'
CH<sub>3</sub>-O-CH<sub>3</sub> Dimethylether
Complex ethers, least important -oxy and we put the number of the substitution position:
2-methoxypropane, ethylphenylether = ethoxybenzene C<sub>6</sub>H<sub>5</sub>-O-CH<sub>3</sub>

**Aldehydes**
R-CHO, HCHO Methanal, CH<sub>3</sub>-CHO Ethanal, CHO-CH<sub>2</sub>-CHO Propandial (two groups).
CH<sub>3</sub>-CH-CH<sub>2</sub>-CH<sub>2</sub>-CHO  5-hexenal

**Ketones**
R-CO-R' alkyl alkyl ketone or using suffix -one.
CH<sub>3</sub>-CO-CH<sub>3</sub> Dimethylketone
CH<sub>2</sub>=CH-CH<sub>2</sub>-CO-CH<sub>3</sub>  5-hexen-3-one
CH<sub>3</sub>-CH<sub>2</sub>-CO-CH<sub>2</sub>-CH<sub>3</sub>  3-hexanone (or ethylpropylketone)
CH<sub>2</sub>=C-CHO-CH<sub>2</sub>-CO-CH<sub>3</sub> 6-bromo-6-hepten-2,5-dione

**Carboxylic acids**
R-COOH, CH<sub>3</sub>-COOH Ethanoic acid, HCOOH Methanoic acid, Benzoic acid.
CH<sub>3</sub>-CH=CH-COOH  2-butenoic acid.

**Acid anhydrides**
R-CO-O-CO-R'
CH<sub>3</sub>-CO-O-CO-CH<sub>3</sub> Ethanoic anhydride, CH<sub>3</sub>-CO-O-CO-CH<sub>2</sub>-CH<sub>3</sub> Ethanoicpropanoic anhydride.

**Esters**
R-COO-R' -yl -oate
CH<sub>3</sub>-CH<sub>2</sub>-COONa Sodium propanoate, CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>2</sub>-COOCH<sub>3</sub> Methylpentanoate.

**Amines**
R-NH<sub>2</sub> primary: CH<sub>3</sub>-NH<sub>2</sub> Methylamine, NH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-NH<sub>2</sub> 1,2-Ethandiamine
CH<sub>3</sub>-NH<sub>2</sub> Phenylamine
R-NH-R' secondary: CH<sub>3</sub>-NH-CH<sub>3</sub> N-dimethylamine
R-NR'R'' tertiary: CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>2</sub>-N(CH<sub>3</sub>)<sub>2</sub>-CH<sub>3</sub> N-ethyl-N-methylpropylamine
CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-N(CH<sub>3</sub>)<sub>2</sub> N,N-dimethylbutylamine
Amides
R-CONH₂
CH₃-CH₂-CONH-CH₃ N-methylpropanamide
CH₃-C(CH₃)₂-CH₂-CONH₂ 3,3-dimethylbutanamide
When amino has double substitution we name “N,N-dimethyl o N-ethyl-N-methyl...”

Nitriles
R-C≡N, CH₃-CH₂-CH₂-CN Butanenitrile

Nitro compounds
-NO nitroso, -NO₂ nitro; Less important than alkyl substituents.
Nitrobenzene, CH₃-CH₂-NO₂ nitroethane

Priority order
1-Carboxylic acids, 2-Acid anhydrides, 3-Esters, 4-Amides, 5-Nitriles, 6-Aldehydes, 7-Ketones, 8-Alcohols, 9-Amines, 10-Ethers, 11-Double bond, 12-Triple bond, 13-Longest chain, 14-Most ramified chain.

Names as substituents

Examples:
HOOC-C(CN)(NH₂)-CO-CH₂-COOH
2-amino-2-cyano-3-oxo-1,5-pentanedioic acid.

HOOC-CH(COOH)-CH₂-COOH
2-carboxy-1,4-butanedioic acid.

CH₃-C≡C-CO-CH₂-CH₂-CBr₂-COOH
2,2-dibromo-5-oxo-6-octyne acid.

Optical isomerism, enantiomers
When having chiral carbons.
Nomenclature R,S
Substituent priority:
1-Highest atomic number.
2-When having the same atomic number, we continue with next chain atom.
3-Double bond counts double, triple bond counts triple.
We draw the molecule with the fourth substituent back, and we follow the R₁, R₂, R₃ groups. If these groups go clockwise the compound is R, if counterclockwise the compound is S.

Diasteromers
Cis (Z) and trans (E): To find the most important group we count the atomic number, when it is the same we follow the chain next atom.
When having the most important groups at the same side, compound is Z, on the contrary compound is E: