

The Universal Blueprint of an IUPAC Name

Every organic compound's name is constructed using a strict, **five-part additive** formula.



Secondary Prefix + Primary Prefix + Word Root + Primary Suffix + Secondary Suffix = IUPAC Name

Card 1
Substituents / Branches
(e.g., Chloro)

Card 2
Cyclic nature
(e.g., Cyclo-)

Card 3
Number of carbons
in the parent chain
(e.g., pent-)

Card 4
Carbon-carbon bond
type (e.g., -an)

Card 5
Principal functional
group (e.g., -ol)

4-Chloro + pent + an + 2-ol = 4-Chloropentan-2-ol

Prefixes: Modifying the Parent Chain

Alkyl Groups (Carbon Branches)

Groups derived by removing one hydrogen from an alkane (suffix '-yl').

	Methyl (Me): -CH₃		Ethyl (Et): -CH₂CH₃
	Isopropyl (i-Pr): -CH(CH₃)₂		tert-Butyl (t-Bu): -C(CH₃)₃
	Neopentyl: -CH₂C(CH₃)₃		

Non-Carbon Substituents

Fluoro (**-F**)

Chloro (**-Cl**)

Bromo (**-Br**)

Iodo (**-I**)

Nitro (**-NO₂**)

Alkoxy (**-OR**)

The Alphabetical Rule

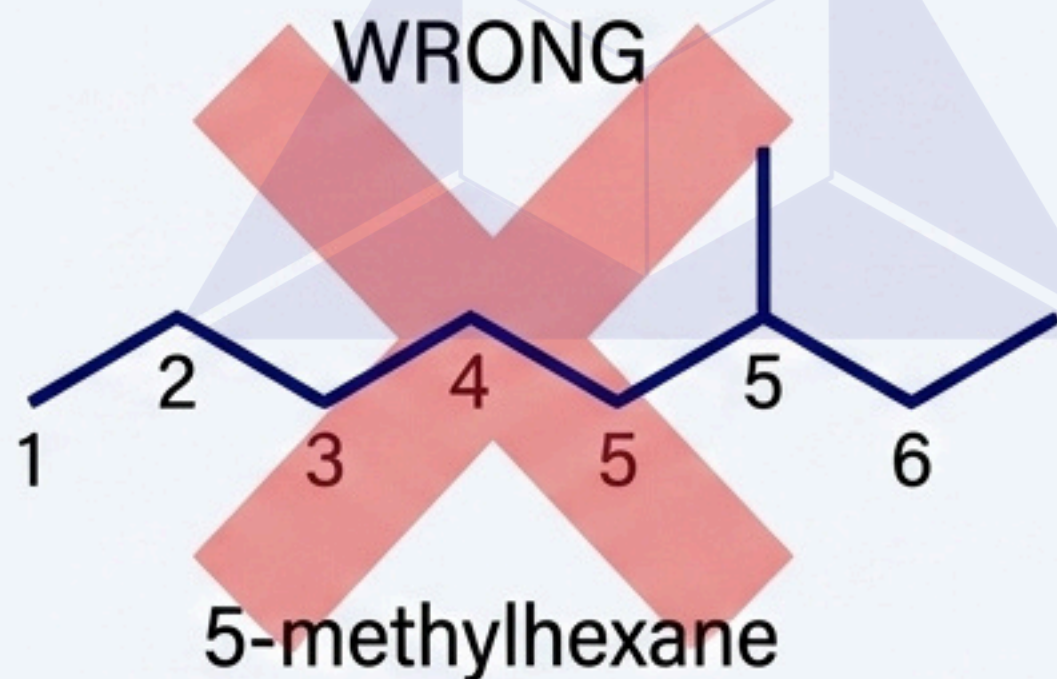
Substituents are cited in strict alphabetical order.

Crucial Exception: Ignore multiplying prefixes (**di**, **tri**, **tetra**) and structural prefixes (**sec**, **tert**) when alphabetizing. Do include '**iso**' and '**neo**'.

The Word Root: Defining the Parent Chain

- **Rule 1: The Longest Chain.** Identify the longest continuous carbon chain that contains the principal functional group or multiple bonds.
- **Rule 2: Lowest Locant Rule.** Numbering must start from the end that gives the lowest possible numbers (locants) to the functional groups and branches.

Right vs. Wrong



Word Roots Table

C1: Meth-

C2: Eth-

C3: Prop-

C4: But-

C5: Pent-

C6: Hex-

C7: Hept-

C8: Oct-

C9: Non-

C10: Dec-



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Suffixes: Saturation and Chemical Identity

Word Root

Primary Suffix (Saturation)

Indicates carbon-carbon bond type.

- **-ane** (Single C-C)
- **-ene** (Double C=C)
- **-yne** (Triple C≡C)

Secondary Suffix (Principal Functional Group)

Indicates the dominant reactive site.

Alcohols: **-ol**
(e.g., -OH)

Aldehydes: **-al**
(e.g., -CHO)

Ketones: **-one**
(e.g., >C=O)

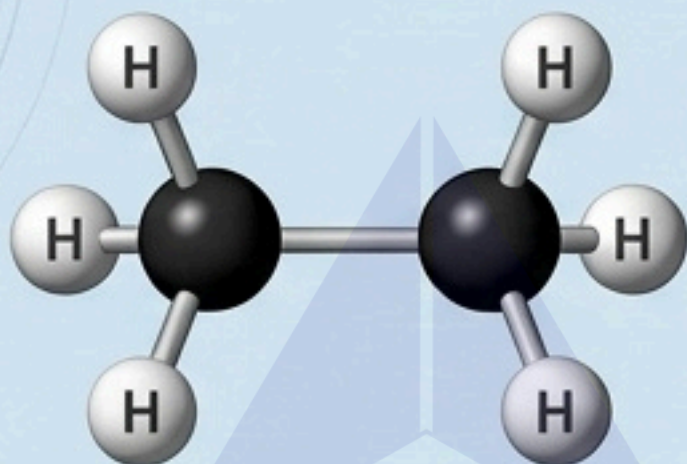
Carboxylic Acids:
-oic acid (e.g., -COOH)

The Vowel Deletion Rule

If the secondary suffix begins with a vowel (a, i, o, u) or 'y', the terminal 'e' of the primary suffix is dropped.

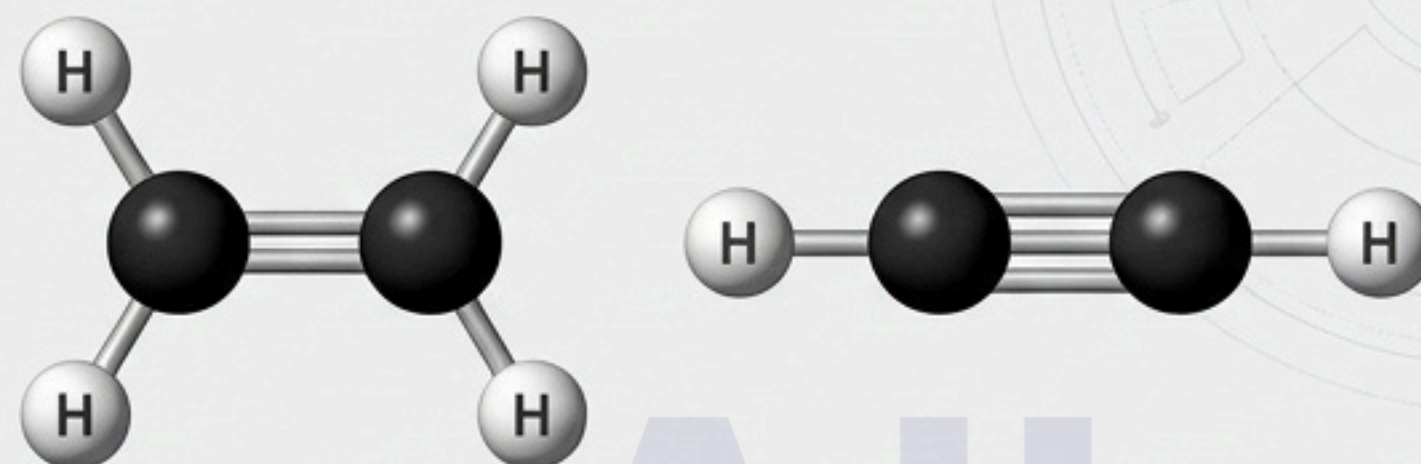
Propan + ~~e~~ + ol = Propanol

Hydrocarbon Classification: Saturated vs. Unsaturated



Saturated Hydrocarbons

- **Bonding:** Only Carbon-Carbon single bonds.
- **Terminology:** Alkanes (formerly Paraffins).
- **General Formula:** C_nH_{2n+2}
- **Hybridization:** sp^3 hybridized carbons.
- **Primary Suffix:** -ane



Unsaturated Hydrocarbons

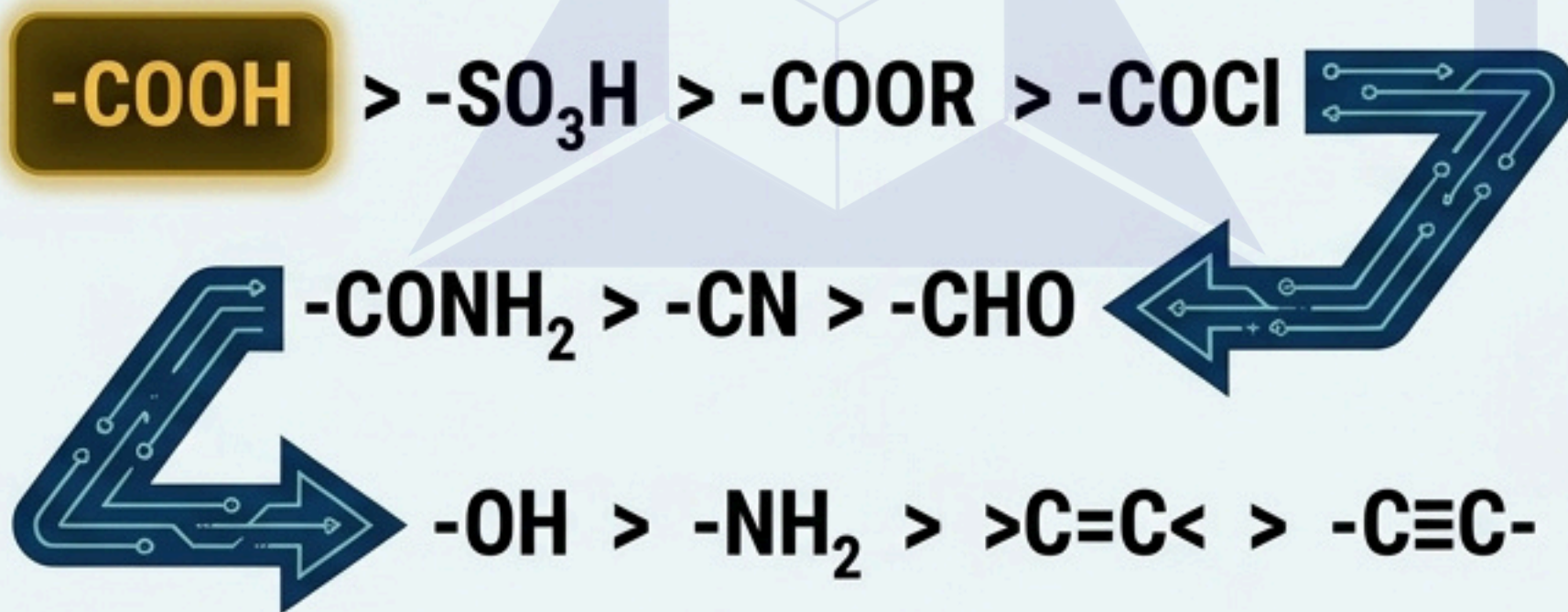
- **Bonding:** Contains at least one C=C double or C≡C triple bond.
- **Terminology:** Alkenes and Alkynes.
- **Hybridization:** sp^2 (double) or sp (triple) hybridized carbons.
- **Primary Suffix:** -ene or -yne

The Nomenclature Revision Frame

Universal Master Equation

Secondary Prefix + **Primary Prefix** + **Word Root** + **Primary Suffix** + **Secondary Suffix** = **IUPAC Name**

Priority Order of Functional Groups (Descending)



Root Words

Meth (1)	Hex (6)
Eth (2)	Hept (7)
Prop (3)	Oct (8)
But (4)	Non (9)
Pent (5)	Dec (10)

Prefix Quick-Ref

Me:	Methyl
Et:	Ethyl
Pr:	Propyl
i-Pr:	Isopropyl
t-Bu:	tert-Butyl

- Alphabetize substituents (ignore di/tri/tetra, include iso/neo).
- Lowest locant rule applies first.
- Drop "e" before vowels in suffix.



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