

ORGANIC CHEMISTRY / SECTION 8.5.2

IUPAC Nomenclature of Alkanes

The structural blueprint for naming saturated hydrocarbons.

[Prefix]

+

[Root]

+

[Suffix]

The Foundation: Straight-Chain Alkanes

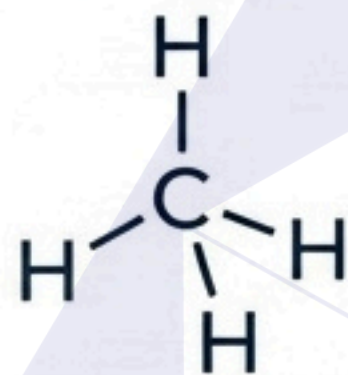
The parent chain determines the root name of the compound. Saturated hydrocarbons end with the suffix -ane.

Carbon Count	IUPAC Name
C1	Meth -ane
C2	Eth -ane
C3	Prop -ane
C4	But -ane 
C5	Pent -ane
C6	Hex -ane
C7	Hept -ane
C8	Oct -ane
C9	Non -ane
C10	Dec -ane

The Modifiers: Alkyl Groups

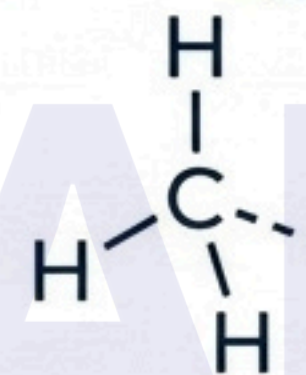
An alkyl group is derived by removing one hydrogen atom from a saturated hydrocarbon. The suffix shifts from **-ane** to **-yl**.

Methane (CH₄)



- 1 Hydrogen (-H)

Methyl -yl



[Me] = Methyl (-CH₃)

[Et] = Ethyl (-CH₂CH₃)

[Pr] = Propyl (-CH₂CH₂CH₃)

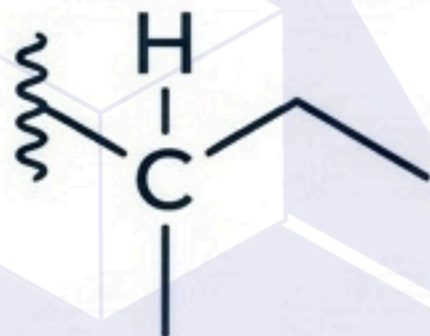
[Bu] = Butyl (-CH₂CH₂CH₂CH₃)

Trivial Names for Complex Branches

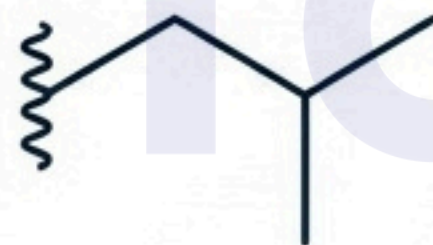
Common branched groups have specific trivial names accepted by IUPAC. Note the structural differences in the propyl and butyl families.



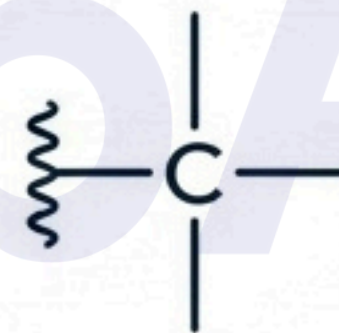
isopropyl-



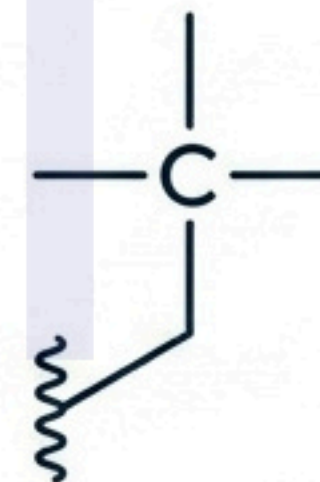
sec-butyl-



isobutyl-



tert-butyl-

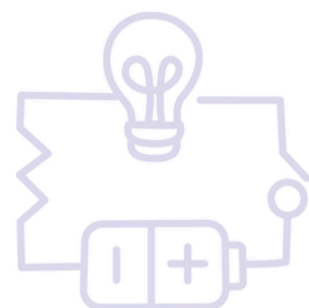
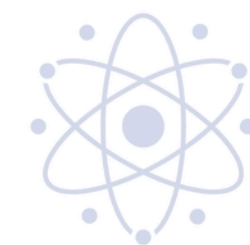


neopentyl-



**You've Learned the Theory.
Let's Test Them Now.**

$$E=mc^2$$



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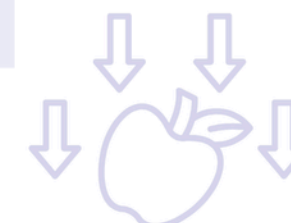
Practice Now



At prep.topall.app

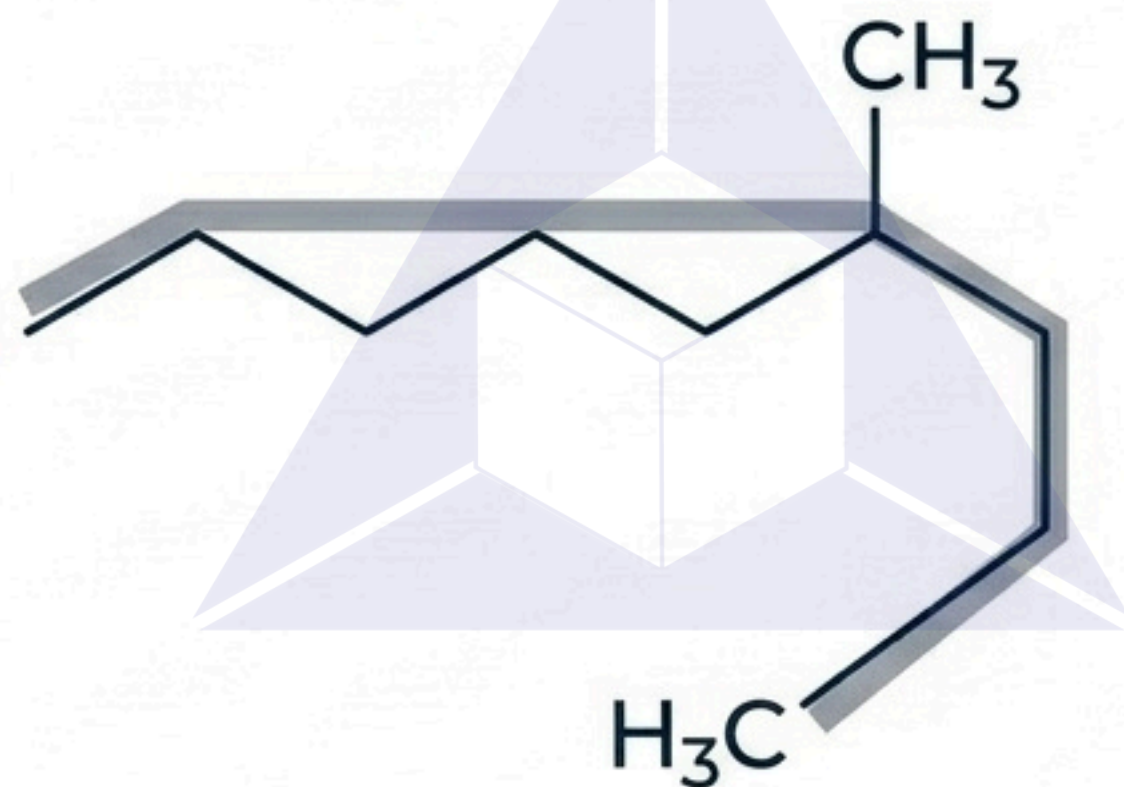
Key Highlights

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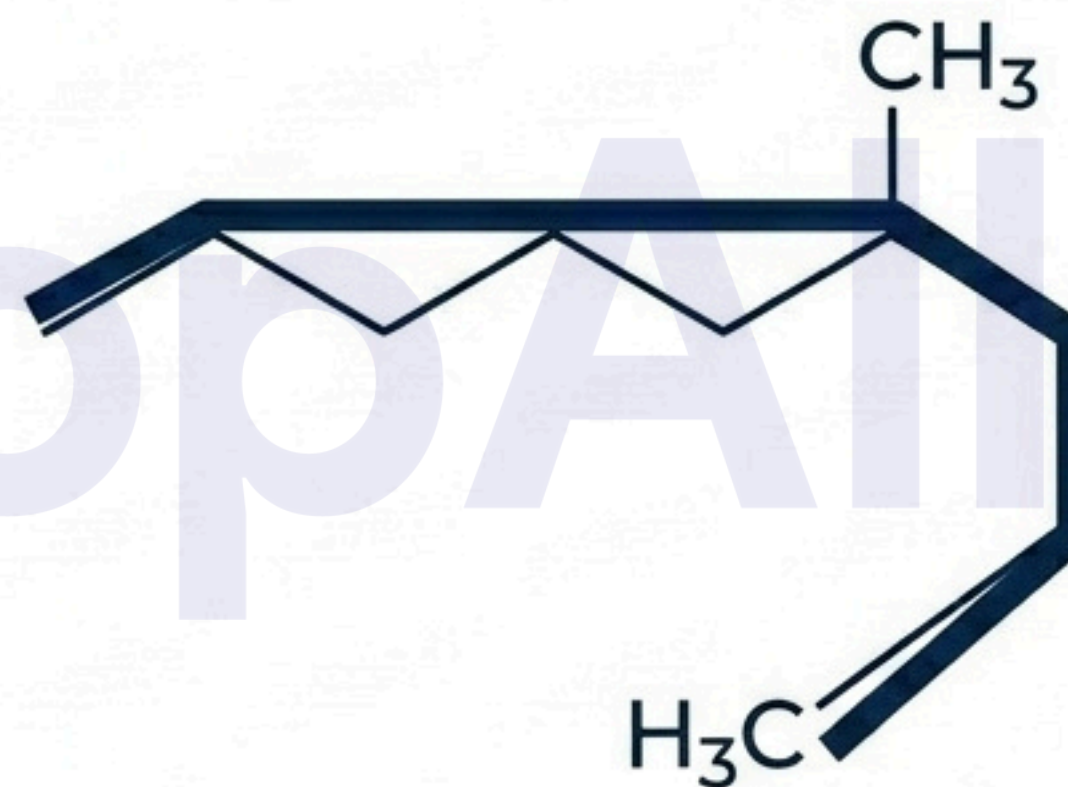


Rule 1: Identify the Longest Chain

The longest continuous carbon chain determines the parent name. It does not have to be drawn linearly.



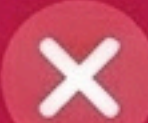
Incorrect: Ignores the longer descending branch. (Stops at Hexane)

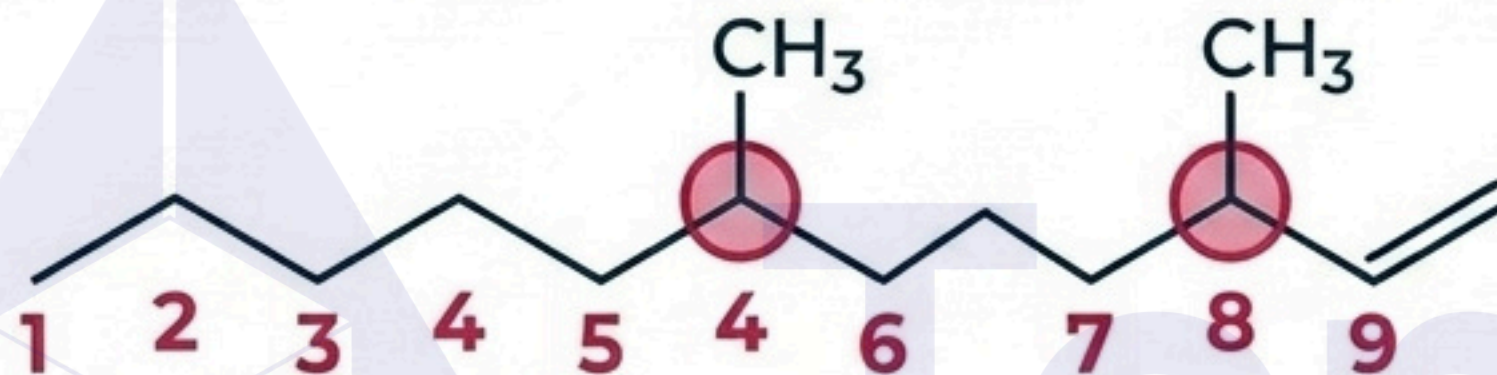


Correct: The longest continuous path is 9 carbons. (Reaches Nonane)

Rule 2: Lowest Locants

Number the parent chain from the end that gives the branched carbon atoms the lowest possible numbers.

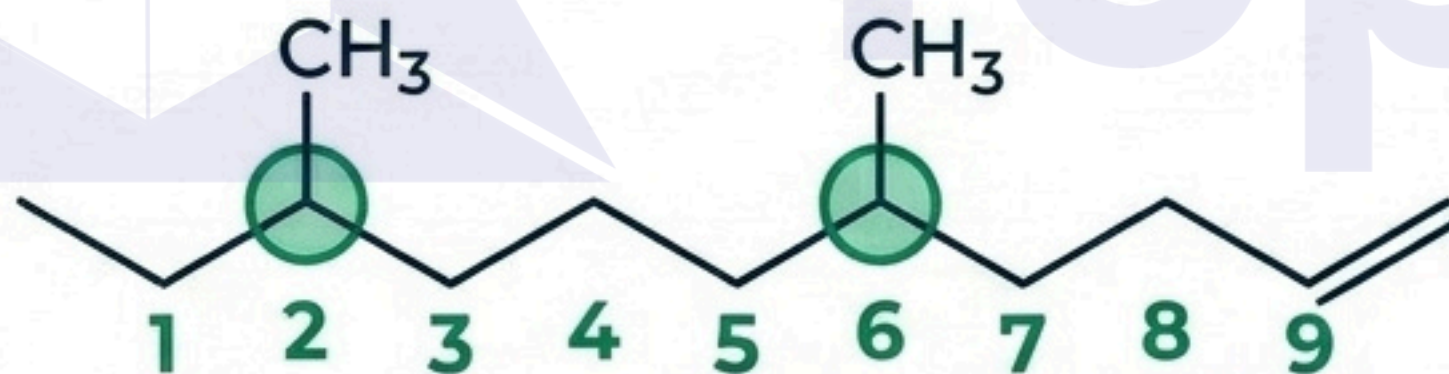

Incorrect



[Locants: 4, 8]




Correct



[Locants: 2, 6]



Conclusion: The set {2, 6} is lower than {4, 8}, making left-to-right the correct numbering scheme.

Rule 3: Alphabetical Order & Multipliers

When multiple branches are present, list them alphabetically. Use multipliers for identical groups, but follow strict rules on what counts towards the alphabet.

Multipliers (Ignored)

[di-]

[tri-]

[tetra-]



Do **NOT** use these to alphabetize.

(e.g., Ethyl comes before dimethyl)

Structural Prefixes

~~[sec-]~~

~~[tert-]~~



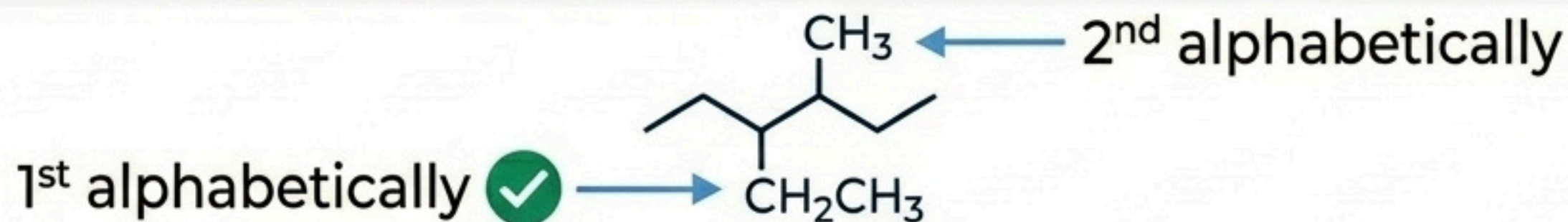
Ignored for alphabetizing.

[iso-]

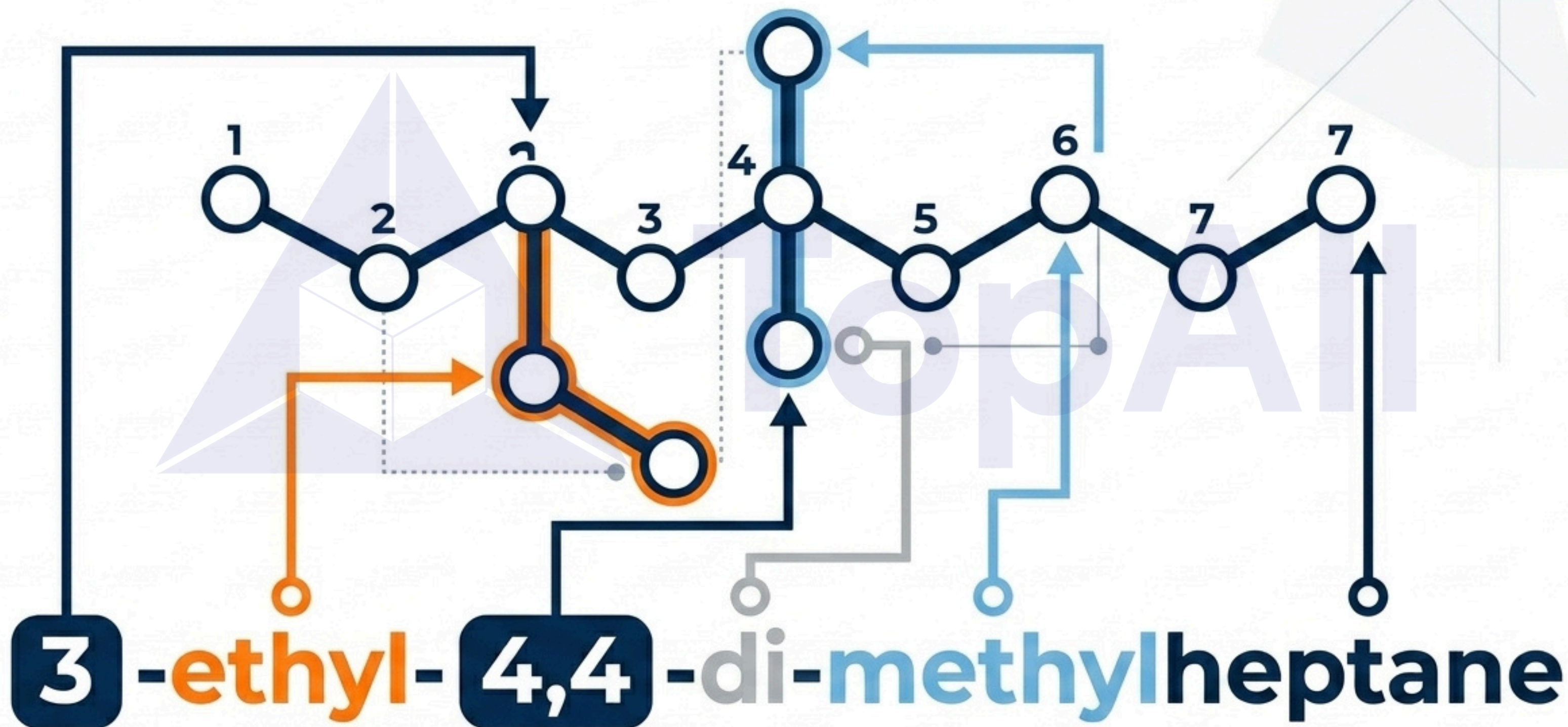
[neo-]



Included in alphabetizing.



Synthesis: Anatomy of a Name



Key Takeaways: IUPAC Alkanes

1

Find the Root

Identify the longest continuous carbon chain. This dictates the “-ane” base name.

2

Number for Lowest Locants

Number the chain from the end closest to a branch to give substituents the lowest possible numbers.

3

Assemble Alphabetically

Name the branches (changing -ane to -yl), add locants, and list them alphabetically (ignoring di/tri/tetra, sec/tert, but including iso/neo).

Microcopy: Always place commas between numbers, and hyphens between numbers and letters.



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