

Alkanes



IDENTITY & CATEGORY

What Are Alkanes?

[Saturated]

Contains the maximum possible number of hydrogen atoms.

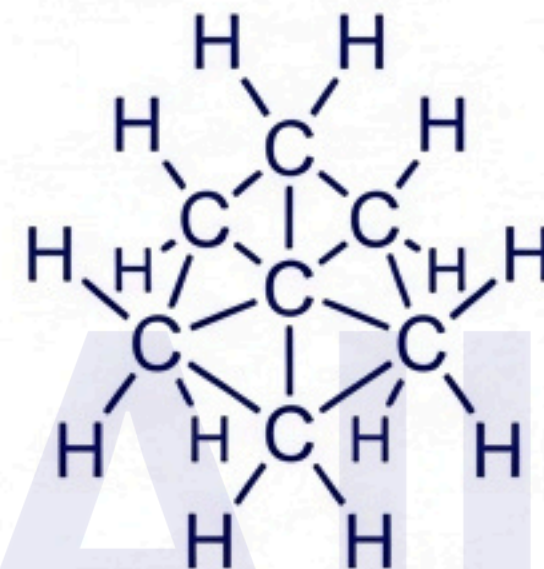
[Open-Chain]

Carbon atoms form a linear or branched sequence, not a closed ring.

[C-C Single Bonds]

Only single covalent bonds exist between carbon atoms.

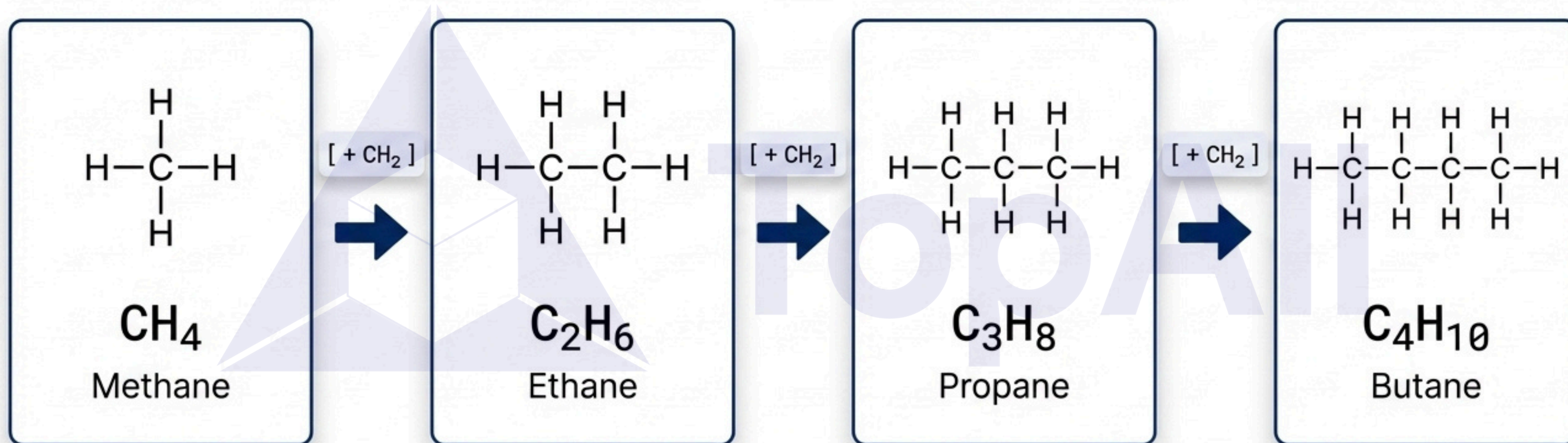
The Paraffins



Alkanes are extremely inert under normal conditions, resisting reactions with acids, bases, and other reagents.

Latin: parum (little) +
affinis (affinity)

The Homologous Series



Each successive member differs only by the addition of one methylene ($-\text{CH}_2-$) group, creating a predictable structural growth pattern.



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

$$E=mc^2$$



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Key Highlights

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- » Get Clear Explanations, Not Just Marks
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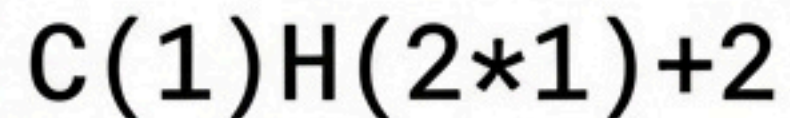


The General Formula

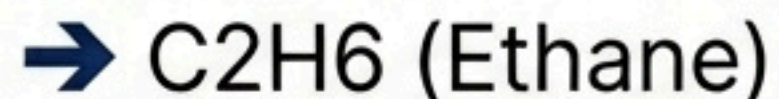
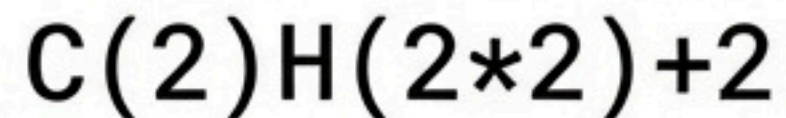


Where n = number of carbon atoms.

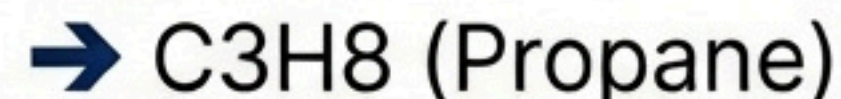
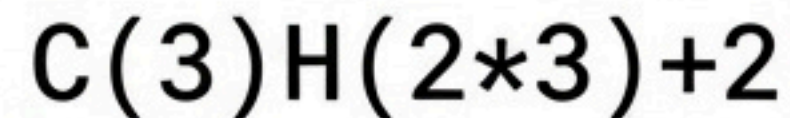
$$n = 1$$



$$n = 2$$



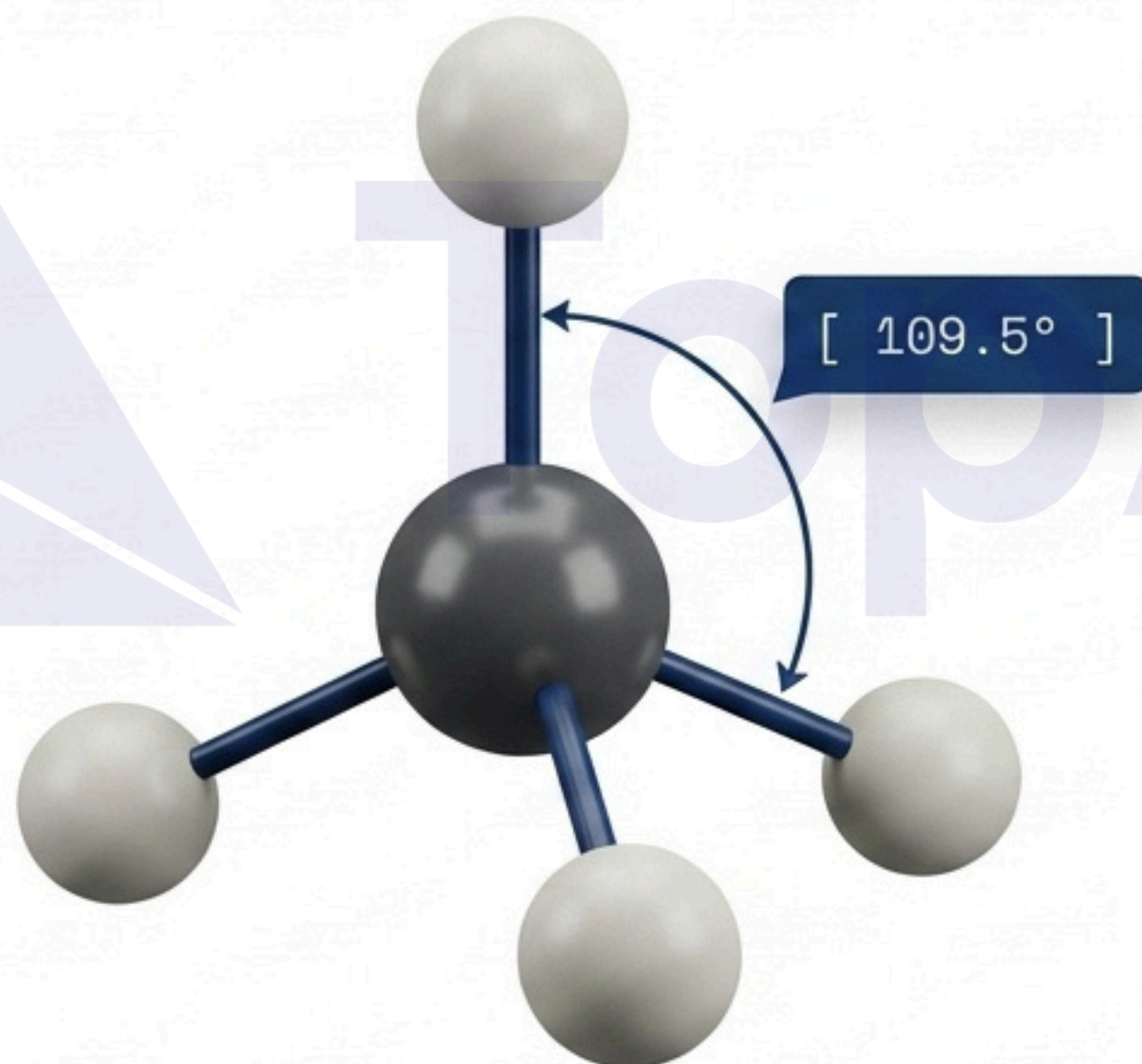
$$n = 3$$



Structure of Methane

Geometry: Tetrahedral

Driven by VSEPR theory to symmetrically minimize electron repulsion.



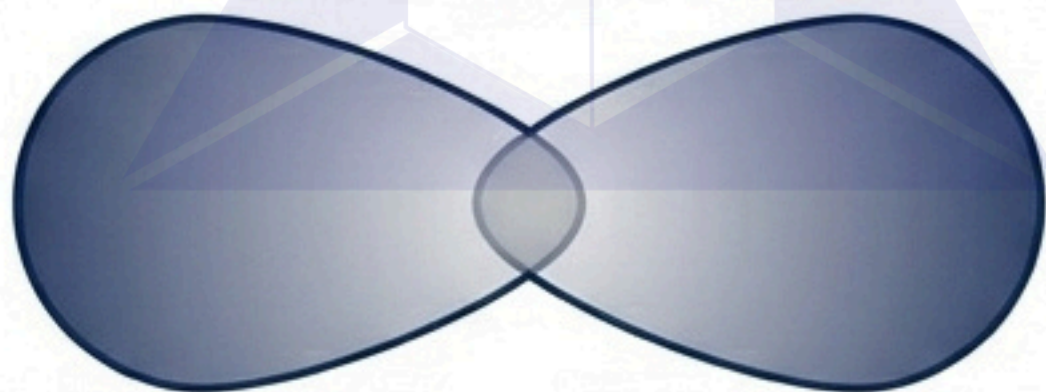
Carbon atom lies at the exact center;
Hydrogen atoms lie at the four corners.

Bonding in Alkanes

All bonds in alkanes are formed by head-on overlapping of atomic orbitals (Sigma / σ bonds).

The C–C Bond

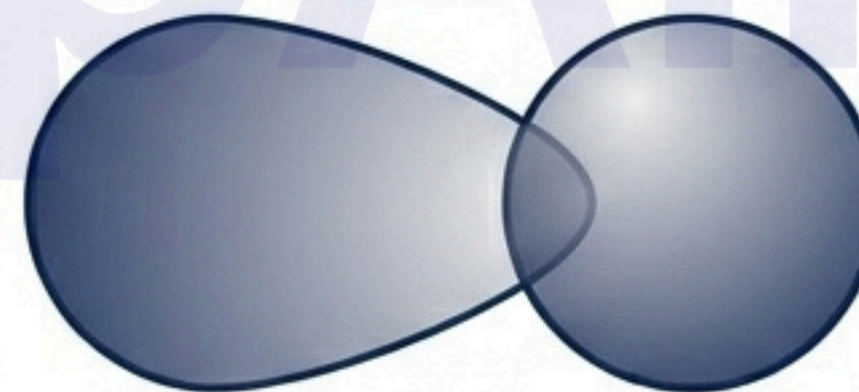
[sp^3 - sp^3 overlap]



Bond Length: 154 pm

The C–H Bond

[sp^3 - 1s overlap]



Bond Length: 112 pm

Key Takeaways

Exam Summary

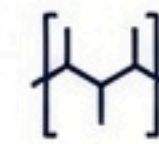
Saturated & Open-Chain



Alkanes contain only single C-C bonds and form open linear or branched chains.

Exam Summary

Homologous Series



Molecules scale predictably by adding monospace(-CH₂-) units.

Exam Summary

General Formula



Follows the universal mathematical rule of monospace(C_nH_{2n+2}).

Exam Summary

Tetrahedral Geometry



Carbon centers form sp³ hybridized, 109.5° tetrahedral structures.



You've Learned the Theory.

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