

Alkanes

Straight Chain Alkanes

- These are straight open chains of hydrogen and carbon made up of only **single bonds**.
- Each one is made up of a central chain of carbons **saturated** with hydrogens
- The naming system is based on how many carbon atoms in the chain.

IUPAC Names

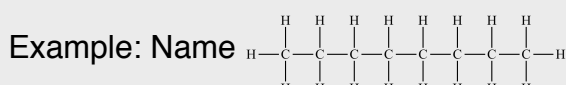
1 C = <u>meth</u> ane	CH ₄	6 C = <u>hex</u> ane	C ₆ H ₁₄
2 C = <u>eth</u> ane	C ₂ H ₆	7 C = <u>hept</u> ane	C ₇ H ₁₆
3 C = <u>prop</u> ane	C ₃ H ₈	8 C = <u>oct</u> ane	C ₈ H ₁₈
4 C = <u>but</u> ane	C ₄ H ₁₀	9 C = <u>non</u> ane	C ₉ H ₂₀
5 C = <u>pent</u> ane	C ₅ H ₁₂	10 C = <u>dec</u> ane	C ₁₀ H ₂₂

- Each molecule all differer by a CH₂ group.

- The general formula for the series is **C_{2n}H_{2n + 2}**

Naming Straight Chain Alkanes

- 1) Identify the number of carbons.
- 2) Use the appropriate IUPAC prefix with the ending 'ane'

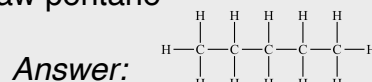


Answer: *Octane*

Drawing Straight Chain Alkanes

- 1) Draw the number of carbon identified by the IUPAC prefix attached by single bonds.
- 2) Saturate with hydrogens.

Example: Draw pentane



Branched Chain Alkanes

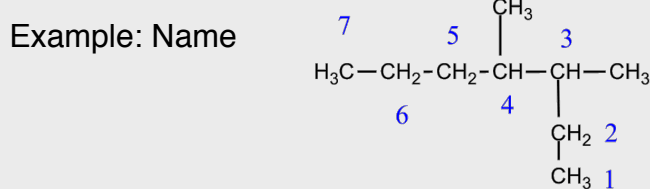
- These are alkanes that contain branches or **side chains**.

IUPAC Names

1 C side chain = <u>meth</u> yl	4 C side chain = <u>but</u> yl
2 C side chain = <u>eth</u> yl	5 C side chain = <u>pent</u> yl
3 C side chain = <u>prop</u> yl	6 C side chain = <u>hex</u> yl

Naming Branched Chain Alkanes

- 1) Identify the longest **continuous** chain to determine the base name.
- 2) Use the suffix 'ane' for all alkanes.
- 3) Number the carbon atoms along the main chain so that the side chains will have the **lowest number possible**. Use this numbering system to indicate the location of each side chain use a number separated by a dash.
- 4) Name side chains according to the number of carbons present in them.
- 5) Side chains must appear in **alphabetical order**.
- 6) Use to prefixes di(2), tri(3), tetra(4) when you have more than one of the same type of side chain. If the side chains are located on different carbons use commas to separate numbers.



Answer 3,4-dimethylheptane

Drawing Branched Chain Alkanes

- 1) Start by drawing the base chain based on the prefix in front of 'ane.'
- 2) Add any side chains based on the location provided by the number and the number of carbons provided by the prefix in front of 'yl.'
- 3) Saturate any remaining bonds using hydrogen.

Example: Draw 3-methylhexane

Answer:

Structural Isomers

- **Compounds with the same molecular formula but a different structural formula.**
- **The greater the number of carbon atoms, the greater the number of structural isomers.**

Example

