“Branches allowed”

1. Locate the longest continuous chain.
   - Number the C’s so side chains are given the lowest possible number.

2. Name side chains:
   - Indicate branch complexity.
   - Every side chain gets its own #.
   - Alphabetically.
   - Use prefixes if duplicate side chains.

\[ \text{CH}_3 \text{CH}_2 \text{CH}_2 \text{CH}_2 \text{CH}_3 \]
   2-methylpentane

\[ \text{CH}_3 \text{CH}_2 \text{CH}_2 \text{CH}_3 \]
   2,2-dimethylpentane

\[ \text{CH}_3 \text{CH}_2 \text{CH}_2 \text{CH}_2 \text{CH}_3 \]
   2,3-dimethylpentane

\[ \text{CH}_3 \text{CH}_2 \text{CH}_2 \text{CH}_2 \text{CH}_3 \]
   3,3-dimethylpentane

\[ \text{CH}_3 \text{CH}_2 \text{CH}_2 \text{CH}_2 \text{CH}_3 \]
   4-ethyl-2,2-dimethylpentane
"branched alkanes"

1. Locate the longest continuous chain
   - number the C's so side chains are given the lower possible number

2. Name side chains
   - "-ane" + yl
   - every side chain gets its own #
   - alphabetically
   - use prefixes if duplicate side chains

\[
\begin{align*}
\text{C}_5 & \text{H}_{12} \\
\text{CH}_3 & \text{CH}_2 \text{CH}_2 \text{CH}_3 \\
\text{CH}_3 & \text{CH}_3 \\
\text{CH}_3 & \text{CH}_2 \text{CH}_2 \text{CH}_3 \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\end{align*}
\]

2-methylpentane

\[
\begin{align*}
\text{C}_5 & \text{H}_{12} \\
\text{CH}_3 & \text{CH}_2 \text{CH}_2 \text{CH}_3 \\
\text{CH}_3 & \text{CH}_3 \\
\text{CH}_3 & \text{CH}_2 \text{CH}_2 \text{CH}_3 \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\end{align*}
\]

2,2-dimethylpentane

\[
\begin{align*}
\text{C}_5 & \text{H}_{12} \\
\text{CH}_3 & \text{CH}_2 \text{CH}_2 \text{CH}_3 \\
\text{CH}_3 & \text{CH}_3 \\
\text{CH}_3 & \text{CH}_2 \text{CH}_2 \text{CH}_3 \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\end{align*}
\]

2,3-dimethylpentane

\[
\begin{align*}
\text{C}_5 & \text{H}_{12} \\
\text{CH}_3 & \text{CH}_2 \text{CH}_2 \text{CH}_3 \\
\text{CH}_3 & \text{CH}_3 \\
\text{CH}_3 & \text{CH}_2 \text{CH}_2 \text{CH}_3 \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\text{CH}_3 & \\
\end{align*}
\]

4-ethyl-2,2-dimethylnonane
4-ethylcyclohexane

Common side chains “alkyl groups”

R - CH₃ methyl
R - C₂H₅ ethyl
R - C₃H₇ propyl
R - C₄H₉ butyl
R - C₅H₁₁ "t-butyl"
R - phenyl

Cycloalkanes CₙH₂ₙ₊₂

\( \text{sp}^3 \)

\( \text{CsH}_{10} \) cyclopentane

1-ethyl-3-methylcyclohexane
Alkenes

\( \text{C} = \text{C} \)

\( \text{sp}^2 \)

no rotation

relatively reactive

Nomenclature

\( \text{"ene"} \); always give the \( \text{C} = \text{C} \) the lowest #

\( \text{CH}_3\text{CH}_2\text{CH} = \text{CH}_2 \quad \text{1-buten} \)

\( \text{CH}_2 = \text{CHCH}_3 \quad \text{2-buten} \)

Geometric Isomers

\( \text{trans} \)

\( \text{cis} \)

Nonpolar

polar