Elimination Fundamentals

UCI Chem 51A
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Goals

☐ After this lesson you should be able to
  ☐ Identify and classify alkenes
  ☐ Rank relative stability of alkenes
  ☐ Describe the general method by which alkenes can be made from alkyl halides
Alkyl Halide Reactions

**Substitution**

\[ R-X + \text{Nu}^- \rightarrow R-\text{Nu} + X^- \]

**Elimination**

\[
\begin{align*}
\text{C} & \quad \text{C} \\
\text{H} & \quad \text{X} \\
\end{align*}
\]

\[ + \text{B} \rightarrow \begin{align*}
\text{=C} & \\
\end{align*} + \text{HB} + X^- \]
Alkenes 101

- Alkenes = C-C double bond
- No rotation!

Alkene Isomers
Alkene Stability

1. More substituted = more stable.

2. Sterics!
Why Are More Substituted Alkenes More Stable?

Electronegativity: $sp^2$ vs $sp^3$

- $sp^2$ more electronegative than $sp^3$
- $sp^3$ donate to $sp^2$

Hyperconjugation
Elimination Components & Factors

- Alkyl Halide (or other molecule with LG)
- Leaving Group (same as substitution)
- Base
- Solvent (same as substitution)
Making Alkenes: β-Hydrogens

\[ \beta-H \text{ ABSOLUTELY REQUIRED!} \]

\[ \text{note: } \alpha \text{ C can sometimes be } sp^2 \]
The Base

☐ Base is required for eliminations!
Making Alkenes: 2 Possible Pathways

All at Once

\[
\text{H} \quad \text{X} \quad \xrightarrow{B} \quad + \text{HB} + \text{X}^- 
\]

One Step at A Time

\[
\text{H} \quad \text{X} \quad \xrightarrow{B} \quad \text{H} + \text{X}^- \xrightarrow{B} \quad + \text{HB} 
\]
Wrapping Up

- Practice identifying types of alkenes
- Practice ranking relative alkene stabilities
- Practice identifying β-hydrogens