ChemActivity 45
Stereochemistry of E2 reactions

Part A: Alkene Potential Energy

1. "Syn" addition, concerted addition
2. R,R and S,S will form (syn addition)
3. Exothermic
4. To an alkene with one, two, three or four substituents (not hydrogens)
5. \[ H - C = C - H \] not other carbon-containing group is attacked to either carbon atom of the double bond
6. More substitution, less PE, more stability
7. 2) 44%
   Disubstituted on one carbon
   28% trisubstituted
   Disubstituted on one carbon, monosubstituted on the second carbon
   58% disubstituted on both carbons

8a) Yes, major products are more stable (less PE)

Model 2: Zaitsev's Rule

2. Yes
   Type 1
2) No
   Type 2
b) 
\[ H_3C - C - C - H \]
   Br
   \[ H \]
   \[ H \]
   \[ H \]
   \[ H \]
c) Is less steric hindrance

d) Easier for the "bigger" or "bulkier" base to access the sites of primary H

e) In an E2 reaction with a large base the less substituted alkene product will dominate the product mixture

9. The need to show that priority substituents are on the same or opposite sides of the double bond

Model 3: Rules for assigning E vs. Z

Model 4: Leaving group

axial anti
Part B: Stereochemistry of E2 Reactions

Model 5: Newnan projections

13. Trans cis E2 or favorable impossible

14. II anti

15. a) the 3rd
    b) the 2nd with the CH₃ in opposite sides

16. a) yes
    b) yes
    c) yes
    d) the 2nd, the trans
    e) trans-2-butene
    f) do not answer

17. 

\[
\begin{align*}
&\text{H}_2\text{CHC} \quad \text{H} \\
&\text{H}_2\text{CHC} \\
&\text{Br} \\
&\text{H}_2\text{CHC} \\
&\text{H} \\
&\text{Br} \\
&\text{H}_2\text{CHC} \\
&\text{H} \\
&\text{C} \quad \text{H} \\
&\text{H}_2\text{CHC} \\
&\text{H} \\
&\text{Br} \\
&\text{H}_2\text{CHC} \\
&\text{H} \\
&\text{Br} \\
\end{align*}
\]

\[\rightarrow \quad \text{cis} \quad \text{cis} \quad \text{deuterated}\]

\[\rightarrow \quad \text{trans} \quad \text{non-deuterated}\]
Model E: Orbital explanation for anti-only E2 reaction

A

B

C

D