Additional Problems for practice:

1.) Predict the major alkene product from each of the following eliminations:

- For the first elimination, predict the major alkene product from the given structure.

- For the second elimination, only Ha can eliminate because it is trans-diaxial to Br.

- For the third elimination, predict the major alkene product under E2 conditions.

- For the fourth elimination, predict the major alkene product under E2 conditions in the presence of a bulky base.

The diagrams show the reaction conditions and the expected products for each scenario.
2.) Show the structure and stereochemistry of the alkenes that result from elimination of the following 3-phenyl-2 butanol tosylates:

OTos is a good leaving group, just like "Cl" or "Br"

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2R, 3S
\( \text{CH}_3\text{CH}_3\text{O}^- \) \( \text{Ph} \) \( \text{H} \) \( \text{H} \) \( \text{CH}_3 \) \( \text{H} \) \( \text{OTos} \) \( \text{H} \)
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2R, 3R
\( \text{CH}_3\text{CH}_3\text{O}^- \) \( \text{Ph} \) \( \text{H} \) \( \text{H} \) \( \text{CH}_3 \) \( \text{H} \) \( \text{OTos} \) \( \text{H} \)
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2S, 3R
\( \text{CH}_3\text{CH}_3\text{O}^- \) \( \text{H} \) \( \text{H} \) \( \text{OTos} \) \( \text{H} \) \( \text{Ph} \) \( \text{H} \) \( \text{H} \) \( \text{CH}_3 \)
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2S, 3S
\( \text{CH}_3\text{CH}_3\text{O}^- \) \( \text{H} \) \( \text{H} \) \( \text{OTos} \) \( \text{H} \) \( \text{Ph} \) \( \text{H} \) \( \text{H} \) \( \text{CH}_3 \)
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Note: elimination of enantiomeric tosylates (such as 2R, 3S and 2S, 3R) leads to the same alkene.

3.) Optically active 2-butanol slowly racemizes on standing in dilute sulfuric acid. Propose a mechanism to account for this observation.
4) Account for the different outcomes when menthyl chloride is subjected to the following conditions:

NaOEt
EtOH, 100°C
E2 conditions

EtOH
160°C
E1 conditions

-Ha

-Hb