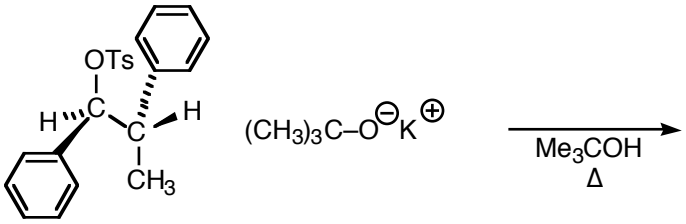
WORKSHOP

Alkyl Halides and Tosylates: Mechanism II

1. a. Even though the following reaction can potentially give two stereoisomeric elimination products, only one is formed. Give the structure for this alkene.



b. The diastereomer of the tosylate shown above also reacts with potassium *t*-butoxide to give an alkene that is diastereomeric to that obtained above. Give the structure for this alkene. Clearly account for the stereochemical course of these two reactions. Why is there no crossover? Explain clearly.

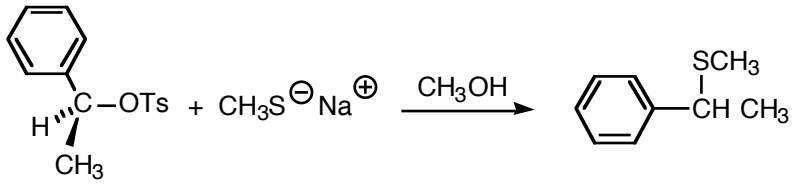
c. Give the products for the following two reactions.

trans–2–methylcyclohexyltosylate $\xrightarrow{Me_3CO^{\ominus}/\ Me_3COH}$

cis–2–methylcyclohexyltosylate $\xrightarrow{Me_3CO^{\ominus}/\ Me_3COH}$

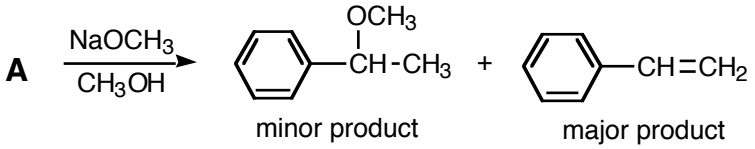
d. Discuss how the experiments in parts 1(a), (b) and (c) are related to our general understanding of the mechanism of bimolecular elimination reactions.

2. a. When the following optically active tosylate (**A**) was reacted with CH_3SNa in CH_3OH, the reaction was observed to be second order, and the substitution product shown was formed almost exclusively. Show the mechanism for this reaction, and predict the stereochemistry of the product.



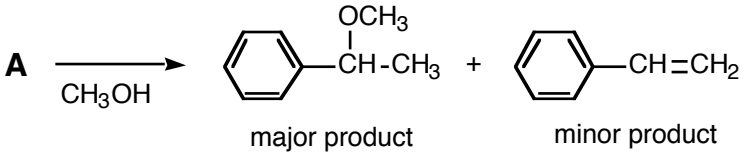
A

b. When **A** was reacted with $NaOCH_3$ in CH_3OH, the reaction was still kinetically second order. However, the major product was the following alkene. Account for the shift from predominant substitution for the reaction in part (a) to predominant elimination for the reaction with CH_3ONa/CH_3OH. Also, show the stereochemistry of the methyl ether substitution product.



d. How would you change reagents or reaction conditions so that **A** would give almost exclusively the alkene ($C_6H_5CH=CH_2$)?

e. When **A** is refluxed in methanol (no added CH_3ONa), both substitution and elimination products are formed, as in part (c). However, substitution predominates, and the stereochemical results are different from those observed for part (c). Explain how and why these results are different from the reaction of **A** with methoxide ion in methanol.



3. Provide reagents and draw the correct stereochemical structures for the following reactions: