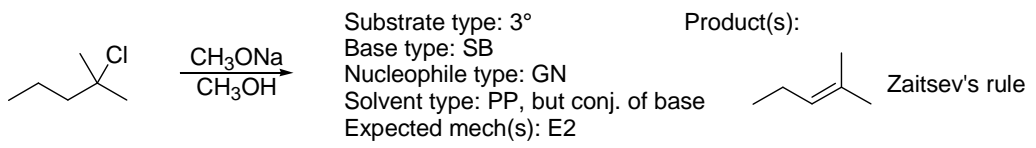
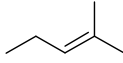
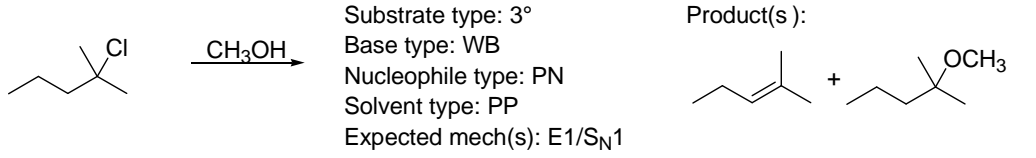
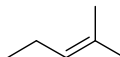
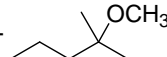
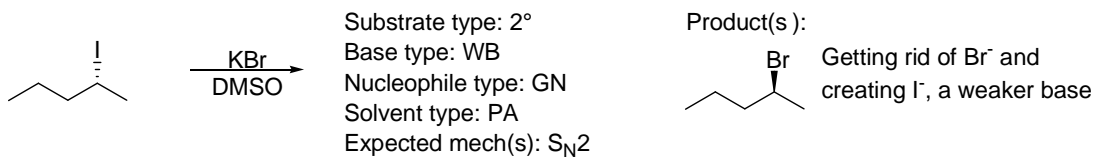
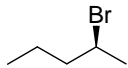
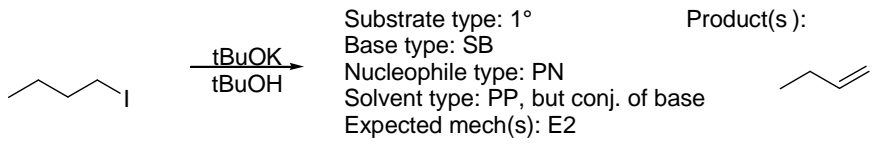

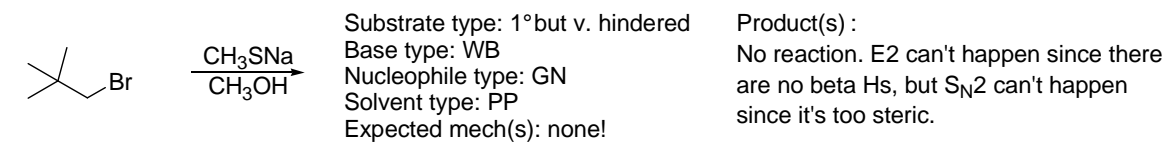
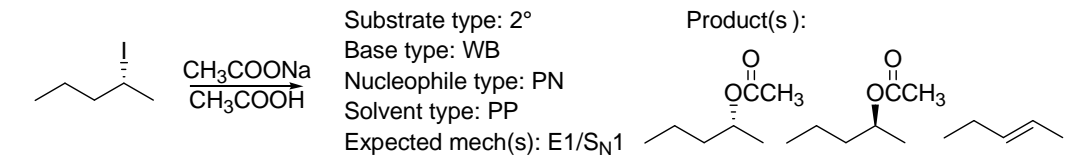
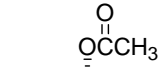
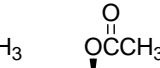
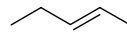
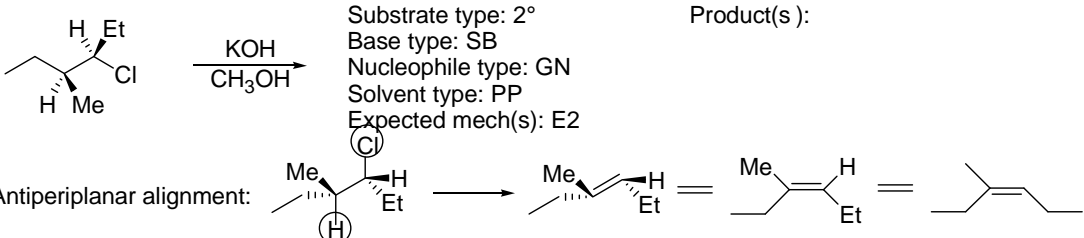
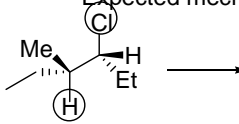
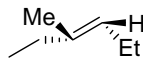
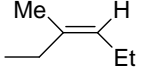
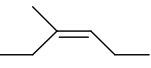
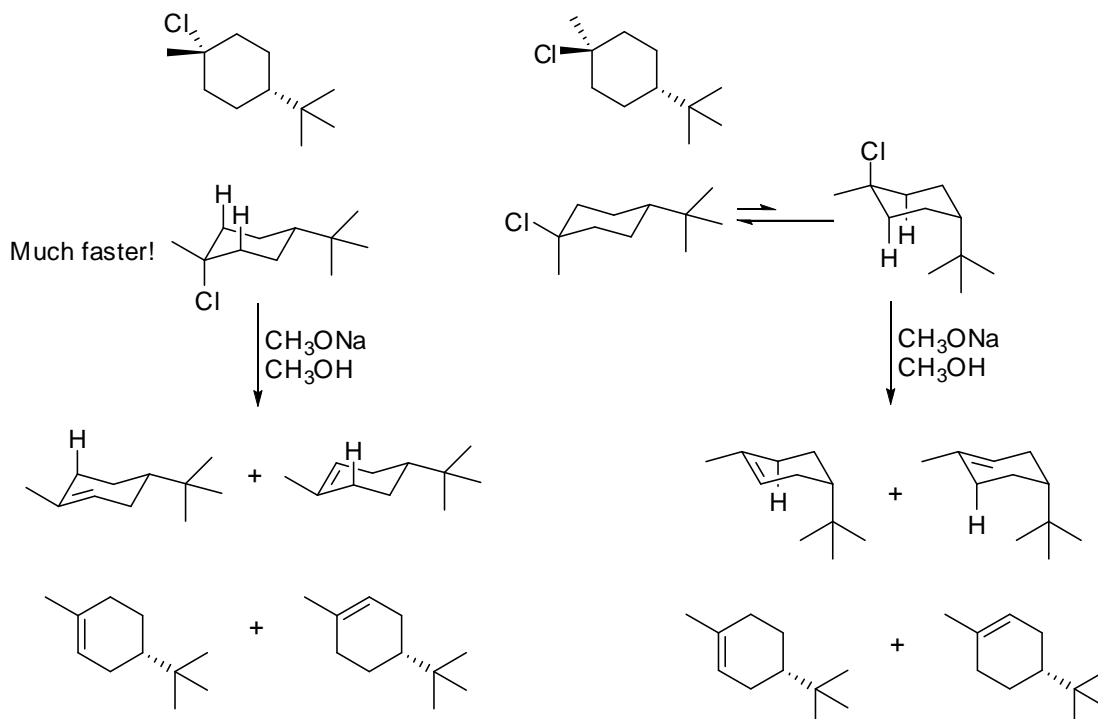


1) Predict the product of the reaction conditions below by filling in details about the substrate, reagent, and solvent. Remember to show all stereochemical possibilities if any product is chiral.

- a. 
 Substrate type: 3°
 Base type: SB
 Nucleophile type: GN
 Solvent type: PP, but conj. of base
 Expected mech(s): E2
 Product(s):  Zaitsev's rule
- b. 
 Substrate type: 3°
 Base type: WB
 Nucleophile type: PN
 Solvent type: PP
 Expected mech(s): E1/S_N1
 Product(s):  + 
- c. 
 Substrate type: 2°
 Base type: WB
 Nucleophile type: GN
 Solvent type: PA
 Expected mech(s): S_N2
 Product(s):  Getting rid of Br⁻ and creating I⁻, a weaker base
- d. 
 Substrate type: 1°
 Base type: SB
 Nucleophile type: PN
 Solvent type: PP, but conj. of base
 Expected mech(s): E2
 Product(s): 
- e. 
 Substrate type: 1° but v. hindered
 Base type: WB
 Nucleophile type: GN
 Solvent type: PP
 Expected mech(s): none!
 Product(s): No reaction. E2 can't happen since there are no beta Hs, but S_N2 can't happen since it's too steric.
- f. 
 Substrate type: 2°
 Base type: WB
 Nucleophile type: PN
 Solvent type: PP
 Expected mech(s): E1/S_N1
 Product(s):   
- g. 
 Substrate type: 2°
 Base type: SB
 Nucleophile type: GN
 Solvent type: PP
 Expected mech(s): E2
 Antiperiplanar alignment:  →  =  = 

- 2) Below are two molecules. What reaction would you expect them to do in $\text{CH}_3\text{ONa}/\text{CH}_3\text{OH}$? Which one will be faster at it? Hint: Draw them both in chair format. Which one meets the geometric requirements of the reaction better?



With a tertiary substrate and strong base/good nucleophile, E2 is the only possibility. But for E2 to occur, the molecule must be in antiperiplanar alignment, with the Cl and a neighboring H pointing in opposite directions (both axial, in other words). For the first molecule, it exists in this state most of the time so the elimination happens quickly and easily, on either anti H. The second molecule must ring-flip to achieve this, but putting the tBu group axial is so unfavorable that it's a very slow process. Eventually it will make the same two products as the first molecule. There's also the possibility that both of these molecules could make the anti-Zaitsev product by creating a double bond to the methyl group. This is more likely for the second molecule, since the cost is so high for following Zaitsev's rule.

- 3) Fill in the intermediate products of this multi-step synthesis. Hint: In the last step, elimination is not very likely because you'd be forming a double bond to something that's forced to hold 60° bond angles by the three-membered ring it's in.

