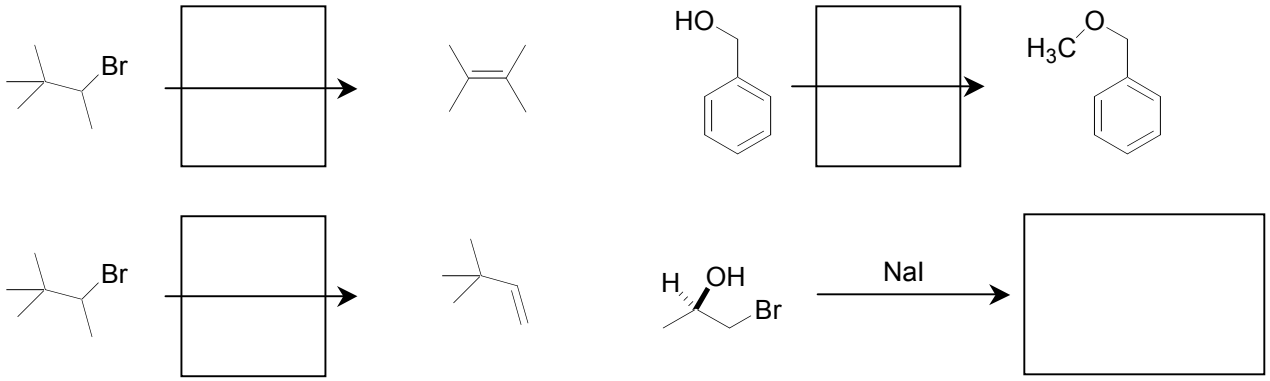
Chemistry 30A Discussion – Week 6/7: Substitutions & Eliminations – DCF

I: Predict Product/Reagents

1. Fill in the empty box with the correct product(s) or reagents. Watch out for stereochemistry. If you expect no reaction, label NR.

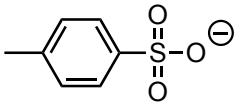


II: Some Questions

2. Rank the following leaving groups from best to worst (1 = best).

Cl^- I^- Br^- TsO^- H_2O HO^- $CH_3CO_2^-$

TsO^- =

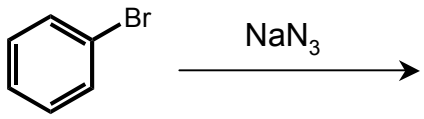


3. Circle the appropriate word for each choice.

Lewis **Acids / Bases** attack Lewis **Acids / Bases**, which means that arrows have to **start / end** at electrons.

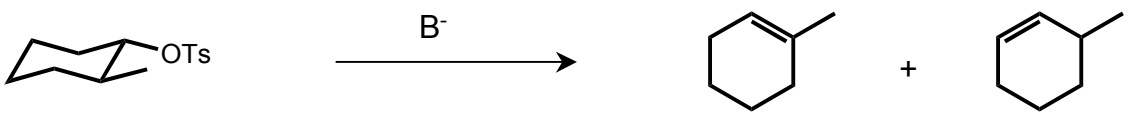
4. E2 eliminations require an anti-periplanar orientation between the β-H and the leaving group. Explain why this is in a few words and a picture.

5. When considering S_N1 and S_N2 reactions, the hybridization of the α-carbon is important. State whether the following reaction will occur. If yes, give the product of the reaction.

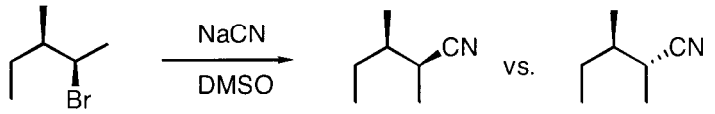


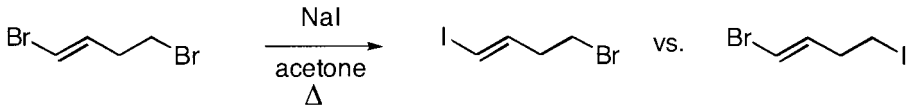
III: Major Product?

6. Circle the major product of the reaction.

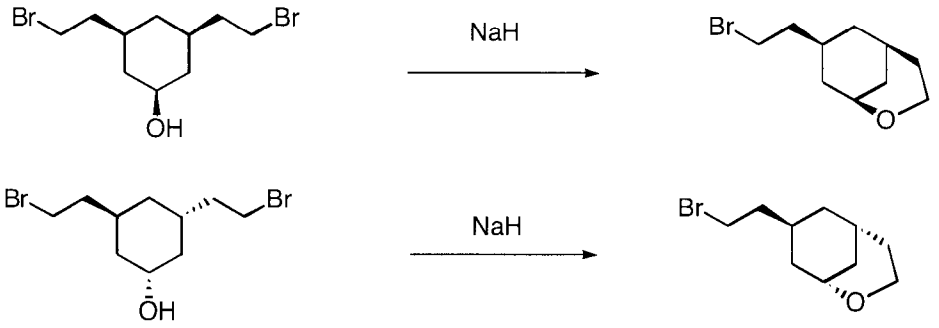


7. For each reaction, indicate which would be the major product, **and** explain ***why***.

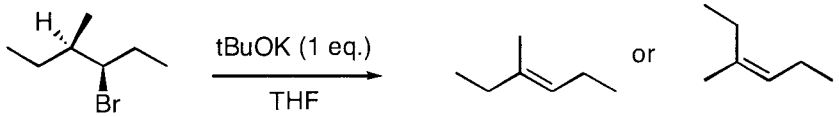


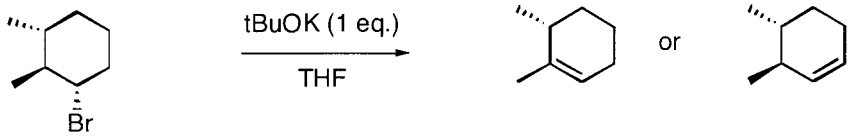


8. Which would cyclize faster? ***Why***?

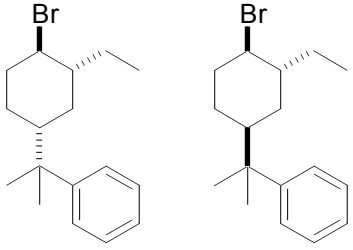


9. For each reaction, which product would be formed and why? Write your explanation, and also draw a structural diagram to help explain it.



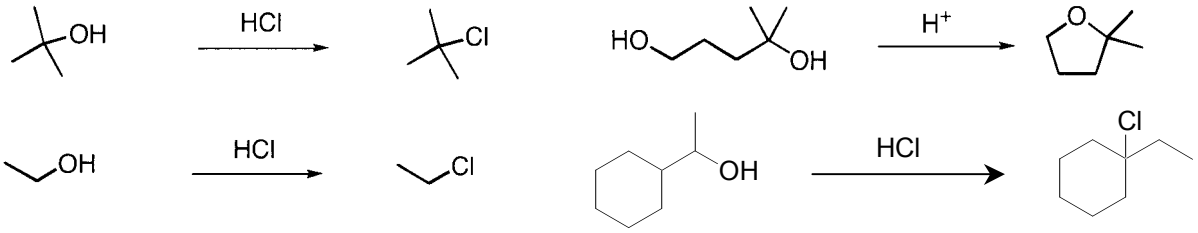


10. One of the following compounds reacts rapidly when treated with Na^{t}OBu. The other compound does not react. Circle the one that reacts rapidly, draw the product, and explain why one stereoisomer is unreactive.

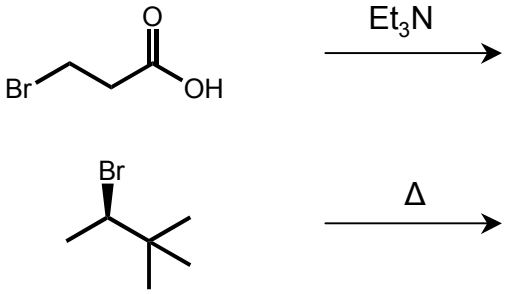


IV: Mechanisms

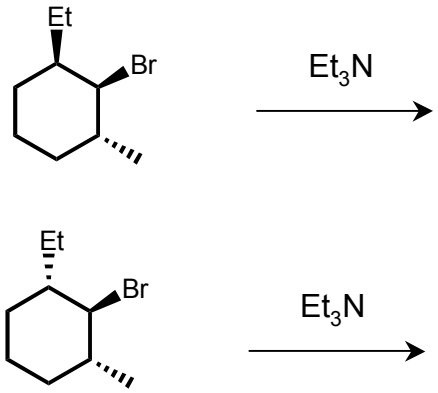
11. Provide curved-arrow mechanisms for the following transformations:



12. Predict the product for the reaction. Draw an arrow-pushing mechanism for the reaction. What reaction type is this?



13. Predict the products of the reactions. Draw the appropriate chair conformations and the arrow-pushing mechanism. What reaction type is this?



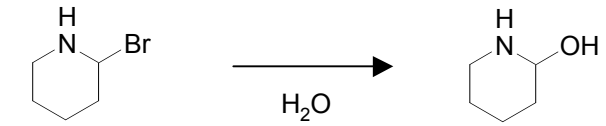
V: Kinetics

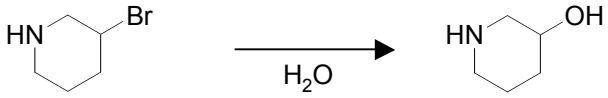
14. Rank the following sets of compounds with respect the rate they react with a strong nucleophile. (1 = fastest. For compounds that will not react, write NR.)

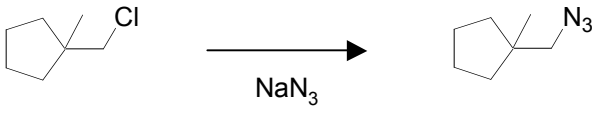
A – 

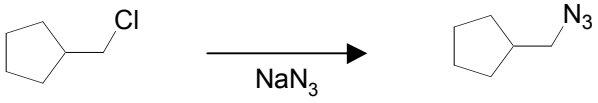
B – 

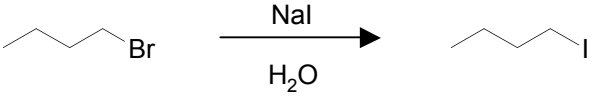
15. For each pair of reactions, mark the box to the left of the reaction that will proceed at a **faster** rate. In the box below each pair, give a **short** explanation for your choice.

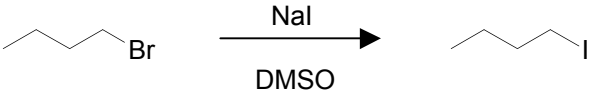
☐ 

☐ 

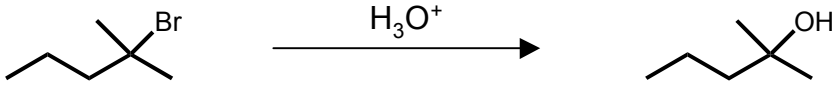
☐ 

☐ 

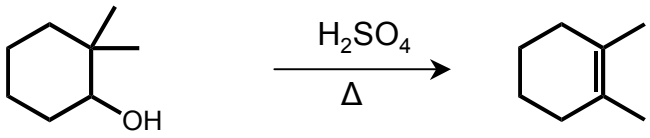
☐ 

☐ 

16. Draw an arrow-pushing mechanism for the following reaction. Draw the corresponding reaction coordinate diagram. Label all intermediates with structures, as well as labeling the starting materials and products, as well as identify the rate determining step on the graph.



17. For the reaction below, draw an arrow-pushing mechanism and a reaction coordinate diagram. Be sure to label any intermediates in the mechanism on the diagram.



VI: Challenge Problems

18. Predict the product(s) of the reaction. Draw the arrow-pushing mechanism(s). What reaction type is this?

19. Draw an arrow-pushing mechanism for the following transformation.