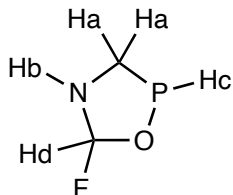


Organic Chemistry I for the Life Sciences
CHM 223
Test 3
Chapters 3, 6-8

Name _____

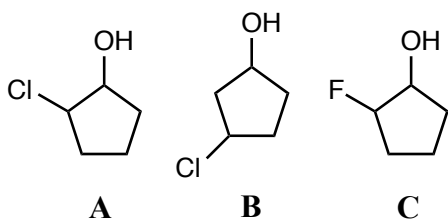
1. Which of the indicated hydrogen atoms (Ha, Hb, Hc or Hd) in the compound below is MOST acidic and LEAST acidic?



most acidic:

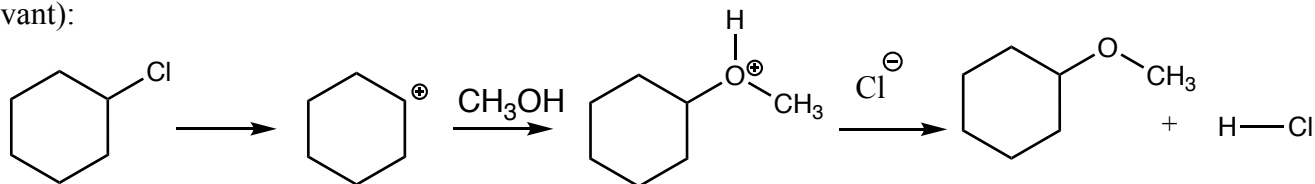
least acidic:

2. The structures of three alcohols are provided below. Which of the following ranks their acidities correctly from most acidic >> least acidic)?

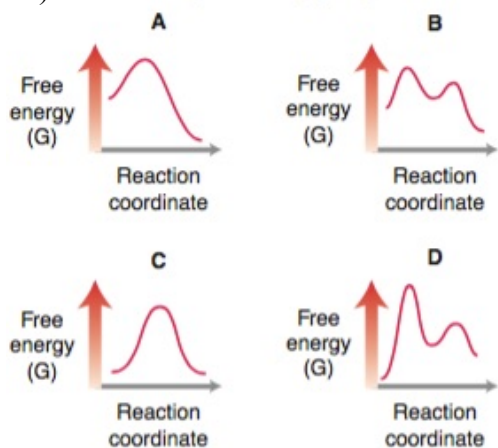


- A. A > B > C
 B. A > C > B
 C. B > A > C
 D. B > C > A
 E. C > B > A
 F. C > A > B

3. Draw the curved arrows that accomplish each of the transformations below (include lone pairs where relevant):



4. Answer the following questions based on the reaction coordinates below (may be more than one answer for each)



i. Which reaction coordinate(s) describe a concerted reaction?

A B C D

ii. For reaction coordinate B, which step is the rate-determining step (circle one):

step 1 step 2 step 3

iii. Which describe overall endothermic reactions?

A B C D

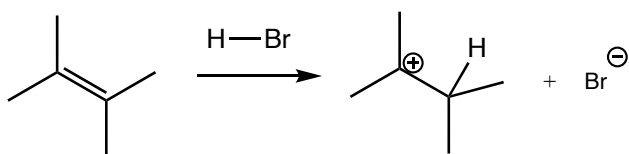
5. In addition to requiring a collision between reactants with proper orientation, what is the third condition that must be met for a reaction step to be successful?

- A. it must be an endothermic reaction step
 B. there must be an acidic hydrogen available for removal
 C. it must be an exothermic reaction step
 D. there must be sufficient energy to reach the transition state
 E. there must be formation of transition states with complete Lewis dot structures

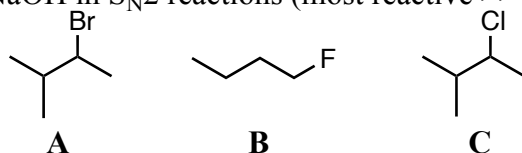
6. Raising the temperature of a reaction increases the rate of a reaction because (may be more than one answer):

- A. raising the temperature converts endothermic reactions into exothermic reactions
- B. raising the temperature increases the proportion of molecules with sufficient energy to surmount the activation barrier of the rate determining step
- C. raising the temperature increases the likelihood of collisions between molecules
- D. raising the temperature lowers the activation energy for the reaction

7. Predict the transition state for the following reaction step using proper conventions:

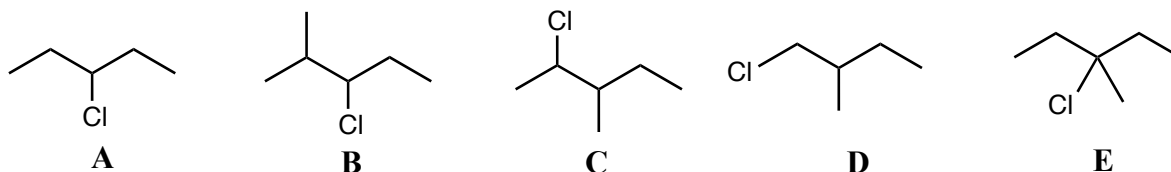
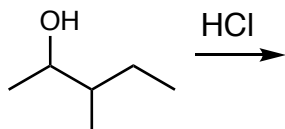


8. Which of the following correctly ranks the alkyl halides below according to their expected rate of reaction with NaOH in S_N2 reactions (most reactive >> least):

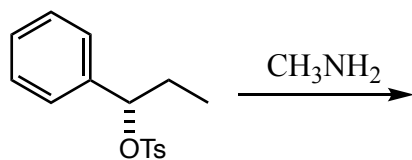


- A. A > B > C
- B. A > C > B
- C. B > A > C
- D. B > C > A
- E. C > B > A
- F. C > A > B

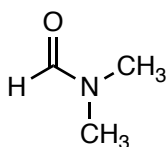
9. Which of the compounds below is the major product of the reaction below:



10. Predict the final product (including stereochemistry) of the following S_N2 reaction:



11. How would the following solvent, named dimethylformamide or DMF, be best characterized?

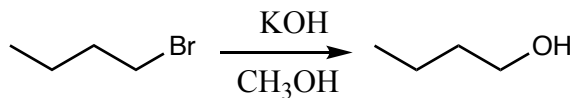


- A. nonpolar
- B. nonpolar aprotic
- C. polar protic
- D. polar aprotic

12. Jimmy proposes running the following reaction as an S_N2 reaction. As written, however, the reaction is not expected to proceed readily. Identify the major reason why this reaction would NOT proceed via an S_N2 reaction as written, and propose a change that could be made so that it does proceed via the S_N2 mechanism.



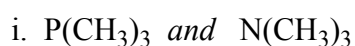
Jimmy



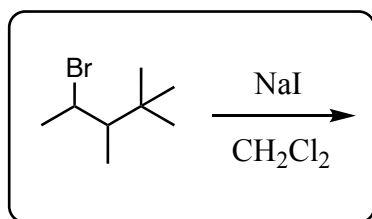
major reason for failing to proceed via S_N2 :

change that could be made so it DOES proceed via S_N2 :

13. From each pair of nucleophiles below, circle the one expected to be most nucleophilic and provide a sufficient rationale for your selection:



14. Answer the true/false questions below concerning the reaction provided (circle T or F):



i. the alkyl bromide substrate can only react via an S_N2 reaction. **T F**

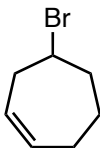
ii. the leaving group favors S_N1 reaction over the S_N2 reaction. **T F**

iii. the nucleophile in the reaction would be considered to be weak. **T F**

iv. CH_2Cl_2 as solvent for the reaction favors the S_N1 process over S_N2 . **T F**

v. overall, this reaction favors the S_N2 process over S_N1 . **T F**

15. Provide the complete IUPAC name for the following compound:



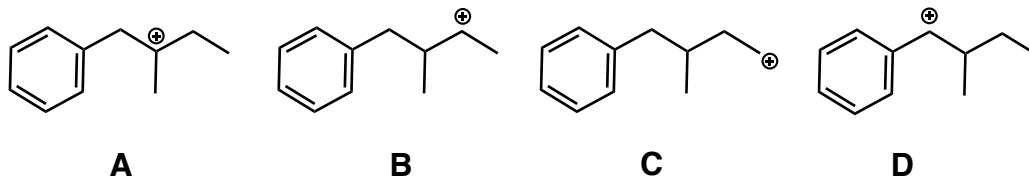
16. Which one of the following isomeric alkenes is MOST and LEAST stable?

- A. trans-2-heptene B. 2-methyl-2-hexene C. cis-2-heptene D. 2-methyl-1-hexene

MOST stable:

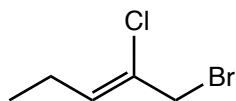
LEAST stable:

17. Arrange the following carbocations according to their expected stabilities (most stable >>> least):

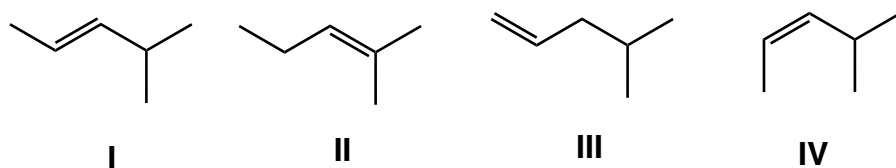


most stable _____ > _____ > _____ > _____ **least stable**

18. What is the stereochemistry (E/Z) of the following alkene (indicate how you arrived at your answer by showing which substituents are rank highest):



19. The alkenes below are formed from an elimination reaction that abides by Zaitsev's rule. Which of the following orders them according to their expected yields from most >>> least:



- A. I > IV > III > II
- B. II > IV > I > III
- C. III > I > IV > II
- D. I > III > II > IV
- E. II > I > IV > III

20. What are the expected products from the following E2 reaction.

