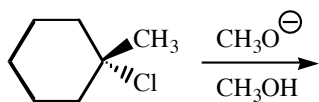


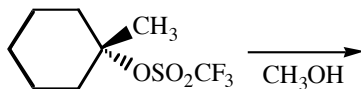
Questions 6 - 8 refer to this E2 reaction:



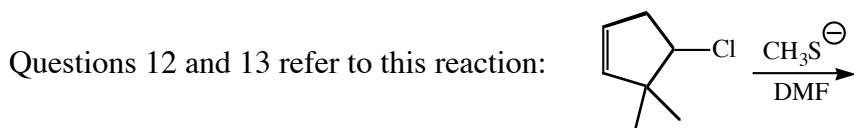
6. (6 points) In the box write two E2 products that might be formed in this reaction. Label the major product as "major."
7. (4 points) Write the E2 mechanism for the major product only. Include the transition states.

8. (2 points) Complete this rate expression for the reaction: Rate = k

Questions 9 - 11 refer to this E1 reaction:



9. (6 points) In the box write two E1 products that might be formed in this reaction. Label the major product as "major."
10. (7 points) Write the E1 mechanism to show how both of your predicted products are formed. Do not include any transition states.
11. (2 points) By changing only the base, rewrite this E1 reaction so is *obviously slower*. Include the product but not the mechanism.

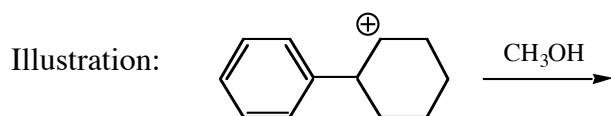


12. (2 points) Circle the most probable mechanism for this reaction: S_N2 S_N1 E2 E1

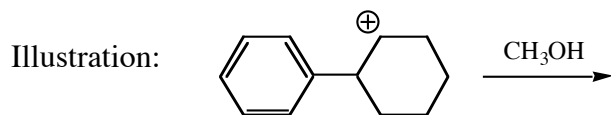
13. (9 points) Briefly explain your choice of reaction mechanism.

14. (9 points) In lecture it was mentioned that regardless of the origin of a carbocation, it only reacts in a three ways, which we call the three carbocation fates. Using the carbocation shown below and CH_3OH as the *only reactants in each case*, name and illustrate the three carbocation fates. Use curved arrows and show the products of each carbocation fate. If the fate can proceed by more than one pathway, write only the most favorable pathway.

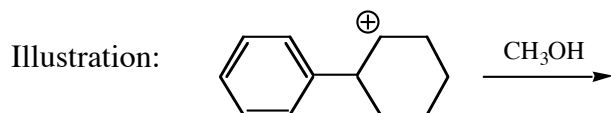
Fate #1: _____



Fate #2: _____



Fate #3: _____



15. (6 points) Circle the appropriate answer in each case.

- (a) Best leaving group: CH_3SO_3^- CF_3SO_3^- $\text{CF}_3\text{CH}_2\text{O}^-$ $\text{CF}_3\text{CH}_2\text{S}^-$
 (b) Most polar protic solvent: Methanol Ethanol DMF Acetone
 (c) Most stable carbocation: $^+\text{CH}_3$ $^+\text{CH}_2\text{OCH}_3$ $^+\text{CH}_2\text{N}(\text{CH}_3)_2$ $^+\text{CH}_2\text{N}(\text{CF}_3)_2$

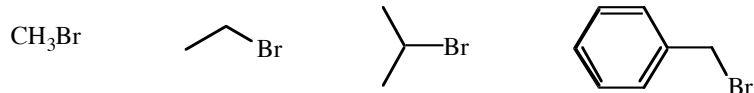
16. (4 points) In CH_3OH , fluoride is a (circle one): Good nucleophile Poor nucleophile

The reason for this is (finish the sentence in five words or less)...

17. (2 points) Consider this reaction: $(\text{CH}_3)_3\text{CX} + \text{ROH} \rightarrow (\text{CH}_3)_3\text{COR}$. ROH is the reaction solvent. This reaction is fastest when (circle one):

- (a) $\text{R} = \text{CH}_3$ and $\text{X} = \text{F}$ (d) $\text{R} = \text{H}$ and $\text{X} = \text{Br}$
 (b) $\text{R} = \text{CH}_3$ and $\text{X} = \text{Br}$ (e) Rates about equal for all of these cases
 (c) $\text{R} = \text{H}$ and $\text{X} = \text{F}$

18. (2 points) Consider this reaction: $\text{RBr} + \text{CH}_3\text{OH} \rightarrow \text{ROCH}_3$. CH_3OH is the reaction solvent. This reaction is fastest when RBr is (circle one):



19. (2 points) Consider this reaction: $(\text{CH}_3)_3\text{C-I} + \text{nuc}^- \rightarrow (\text{CH}_3)_3\text{C-X}$. This reaction is fastest in DMF when nuc^- is (circle one):

- F^- Cl^- Br^- I^- Rates about equal

20. (6 points) Consider this reaction, in which the alcohol is present in large excess (i.e., it is the solvent).



List three distinctly different, one-sentence reasons why this is *not* a reasonable S_N1 reaction.

Reason #1:

Reason #2:

Reason #3:

21. (4 points) Draw a molecule having exactly five carbons and a good leaving group, but *cannot* undergo an E2 reaction. In one sentence or less briefly explain your answer. *Hint: Favoring another reaction mechanism does not prevent E2.*

Molecule:

Explanation: