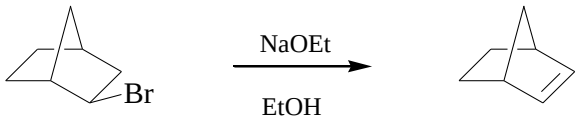
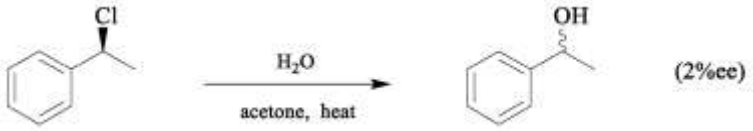
Chemistry 247A Hanson **PRE-EXAM 4** **for discussion**

1. What is the likely mechanism of the following reaction?



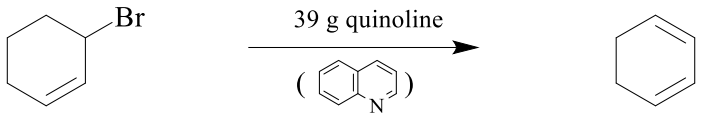
(a) S_N1 (b) S_N2 (c) E1 (d) E2

2. The following reaction most likely involves what mechanism?



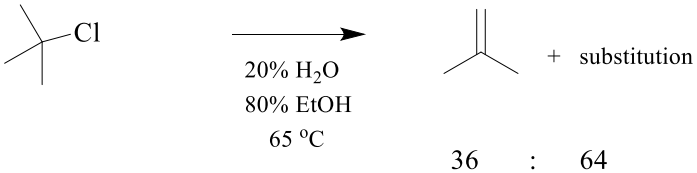
(a) S_N1 (b) S_N2 (c) E1 (d) E2

3. In the following reaction, this particular solvent was used because…



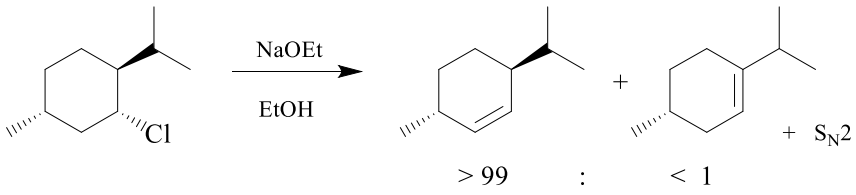
(a) It is a strong base.
(b) It is a weak, nonnucleophilic base.
(c) It is protic.
(d) The reaction was expected to go through an E1 mechanism.

4. regarding the reaction shown on the right, the reason there is more substitution than elimination is:



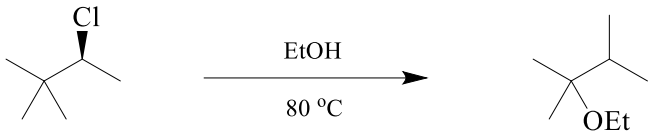
(a) Chloride is an especially good leaving group in ethanol.
(b) Water is a good nucleophile.
(c) Ethanol is a good nucleophile.
(d) Both water and ethanol are very weak bases.

5. In the following reaction, the selectivity is so high because:



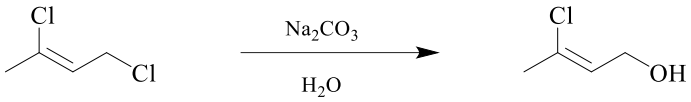
(a) The result is an example of Zaitsev's rule.
(b) Only one anti periplanar elimination is possible.
(c) The leaving group is equatorial in the more stable conformation.
(d) The less substituted alkene is more stable in this particular case.

6. The mechanism in this case:



(a) is a concerted, single-step process
(b) involves the formation of a racemic mixture
(c) involves EtO^- as the nucleophile
(d) involves a carbocation

7. What is the most likely mechanism of the reaction shown on the right?

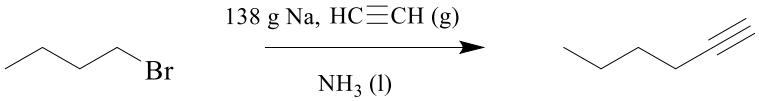


(a) S_N1 (b) S_N2 (c) E1 (d) E2

8. In the reaction shown above in Problem 7:

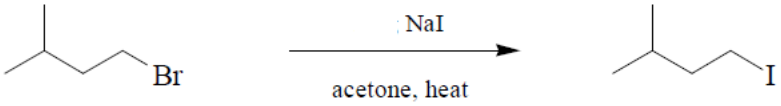
(a) CO_3^{2-} acts as a base.
(b) The nucleophile is H_2O.
(c) The nucleophile is CO_3^{2-}.
(d) The leaving group is OH^-.

9. In the following reaction, why was ammonia used as a solvent instead of water?



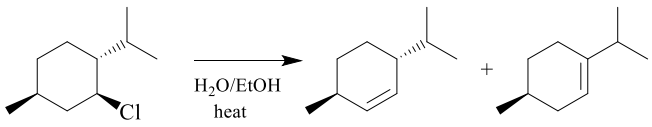
(a) Because ammonia is more nucleophile than water.
(b) Because ammonia is aprotic.
(c) Because ammonia is less acidic than water.
(d) Because ammonia is basic enough to remove a proton from the alkyne, creating the nucleophile.

10. In the following reaction, why was acetone used as solvent?



(a) Because sodium bromide is insoluble in acetone.
(b) Because sodium iodide is insoluble in acetone.
(c) Because the product is insoluble in acetone.
(d) Because it is a nonpolar aprotic solvent.

11. The mechanism of the reaction shown on the right is:

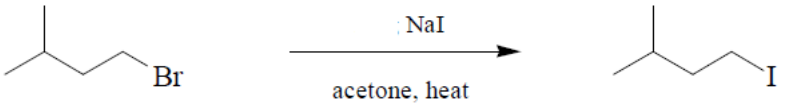


(a) S_N1 (b) S_N2 (c) E1 (d) E2

12. Regarding the reaction shown above in Problem 11:

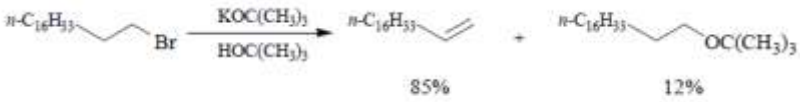
(a) The product is a racemic mixture.
(b) The alkene that is less substituted is favored.
(c) The product is a mixture of diastereomers.
(d) The product is probably accompanied by a substantial amount of substitution.

13. The following reaction most likely involves what mechanism?



(a) S_N1 (b) S_N2 (c) E1 (d) E2

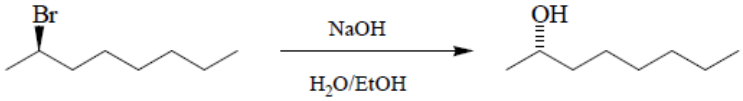
14. Given the following result, briefly describe two possible modifications that could be tried to get more alkene.



1.

2.

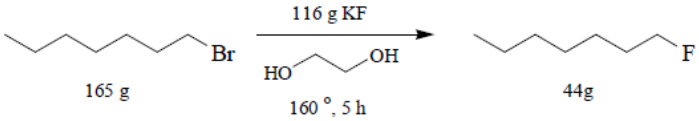
15. In the following reaction, why was ethanol used instead of just doing the reaction in water?



(a) Because it was the nucleophile.
(b) Because protic solvents are superior to other solvents for the S_N1 reaction.
(c) It was probably needed to dissolve the reactant.
(d) It was probably needed to dissolve the product.

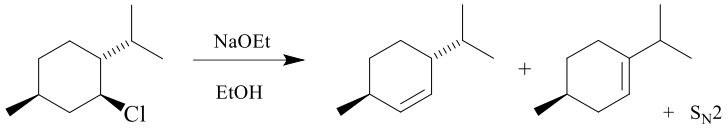
16. In the reaction given above for Problem 15, what are four additional compounds we would expect to find in the product mixture?

17. In the following reaction, why do you think this particular solvent was chosen rather than ethanol?



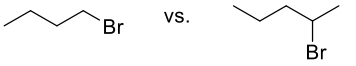
(a) Because the reaction required a higher temperature than could be achieved using ethanol.
(b) Because protic solvents are superior to other solvents for the S_N1 reaction.
(c) Because it is aprotic.
(d) In order to increase the nucleophilicity of KF.

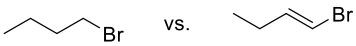
18. Based on drawings *of the transition state* for the rate-determining step, involving one or more cyclohexane chair conformations, explain the very high stereoselectivity of the following reaction:

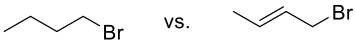


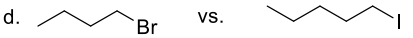
> 99 : < 1

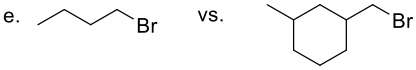
19. In each case, circle the compound you think will react faster in an S_N2 reaction and briefly explain why.

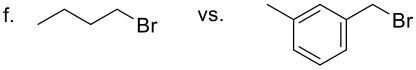
a. 

b. 

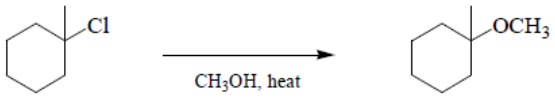
c. 

d. 

e. 

f. 

20. Write the mechanism for the following reaction. Describe each step using one or two words.



21. Draw a proper reaction coordinate diagram for the mechanism you wrote in Problem 20. Show structures of all intermediates, but do not show structures for transition states. For full credit, make sure that each step is balanced, with all atoms accounted for from beginning to end.