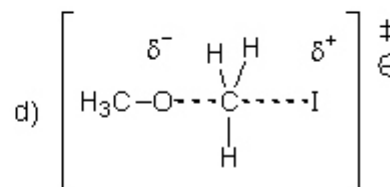
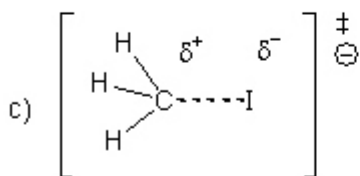
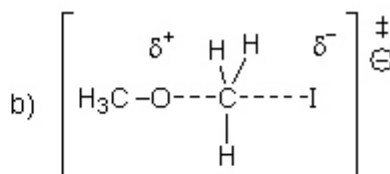
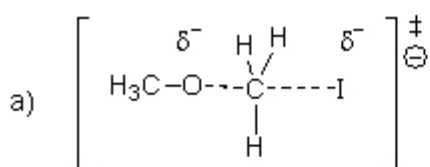


Dr. Davies  
 Chem 2310 Organic I Chemistry  
 Substitution / Elimination Review

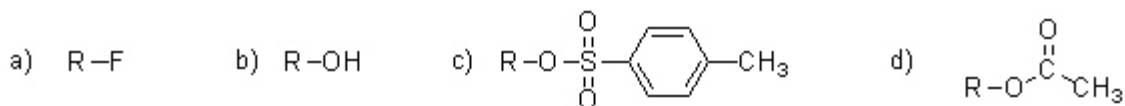
1. Which solvent would best facilitate the reaction between sodium methoxide and methyl iodide? (2 points)

- a) hexane      b) methylene chloride      c) ethanol      d) diethyl ether

2. Which is a correct depiction of the transition state in the reaction between sodium methoxide and methyl iodide? (3 points)



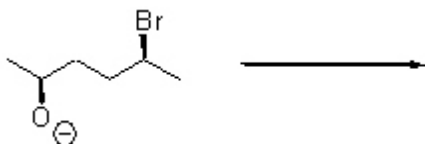
3. Which substrate has the best leaving group? (3 points)



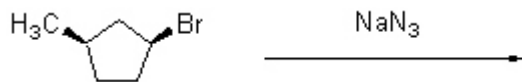
4. Which factor(s) below is/are favorable for nucleophilicity but not for basicity? (3 points)

- a) Negative charge  
 b) Highly polarizable  
 c) Low electronegativity  
 d) High steric hindrance

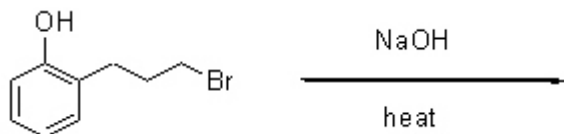
5. Show the product of the following reaction. (5 points)



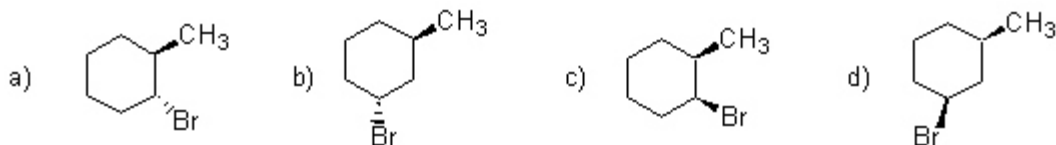
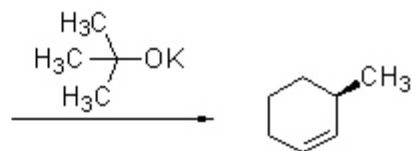
6. Predict the product of the following reaction. Include any relevant stereochemistry. (3 points)



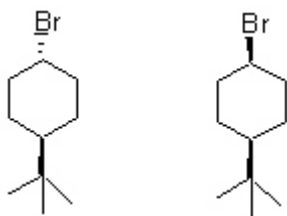
7. Given that proton exchanges in an acid/base reaction are much more rapid than addition/elimination reactions, predict the product of the following reaction. (3 points)



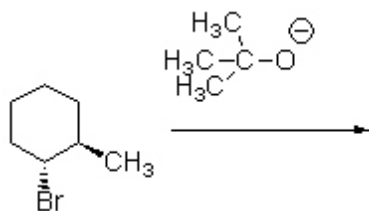
8. Which alkyl halide produces the best yield of 3-methylcyclohexene when treated with potassium *tert*-butoxide? (3 points)



9. Which of the following substrates will undergo E2 elimination most rapidly when treated with potassium *t*-butoxide? Thoroughly justify your answer using chair structures. (5 points)



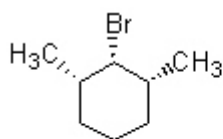
10. Show all products of the reaction below. (4 points)



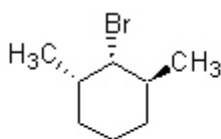
11. Show the two products expected from the following reaction. (8 points)



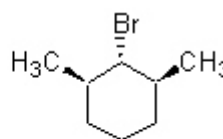
12. Rank the following alkyl halides in order of increasing rate of E2 elimination when treated with sodium ethoxide. (3 points)



1



2



3

a) 1-2-3

b) 2-3-1

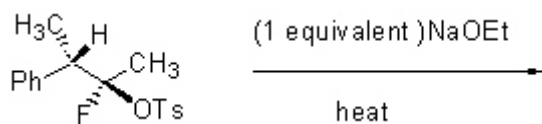
c) 3-1-2

d) 3-2-1

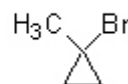
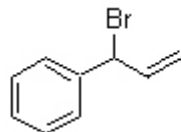
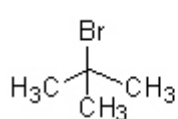
e) 2-1-3

f) 1-3-2

13. Draw the elimination products resulting from the following reaction and circle the major product. (8 points)



14. Which sequence correctly ranks the following substrates in order of increasing reactivity in an  $\text{S}_{\text{N}}1$  reaction? (Least reactive listed first, 3 points)

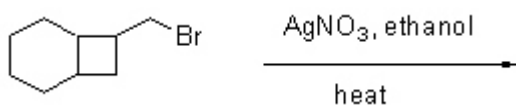


- a) 1-2-3      b) 2-3-1      c) 3-1-2      d) 3-2-1      e) 2-1-3      f) 1-3-2

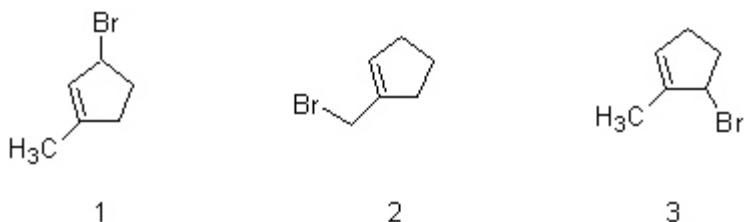
15. Predict the major product of the following reaction. (4 points)



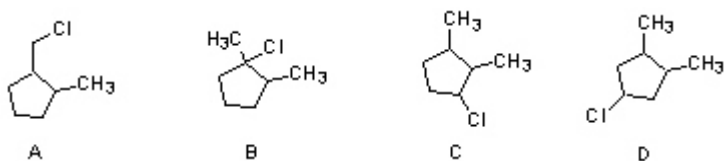
16. Show the major substitution product and the major elimination product resulting from the reaction below. (8 points)



17. Rank the following alkyl halides in order of increasing rate of solvolysis. (3 points)



- a) 1-2-3      b) 2-3-1      c) 3-1-2      d) 3-2-1      e) 2-1-3      f) 1-3-2



18. Which of the alkyl halides above would give the following structure as the major elimination product when treated with  $\text{AgNO}_3$  / ethanol. (3 points)

