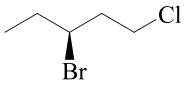
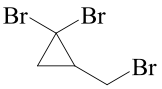
(12) 1. Name or draw the structure of the compound in each case.

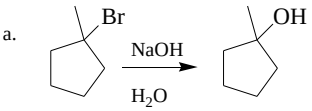
a) (*R*)-2-methyl-3-bromopentane

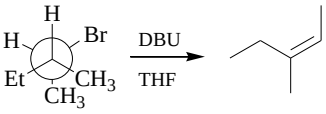
c) 

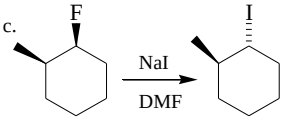
b) 

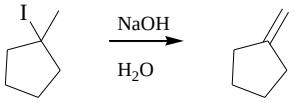
d) *trans*-3-fluoro-1-isopropylcycloheptane

(12) 2. In each case, identify the mechanism as S_N1, S_N2, E1, or E2, and indicate whether the reaction would be successful in giving the indicated major product or not.

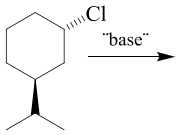
a. 

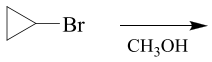
b. 

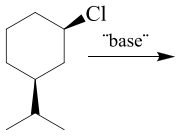
c. 

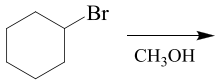
d. 

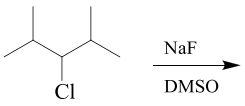
(16) 3. In each case, indicate which reaction will go faster. For the faster reaction, indicate the major product.

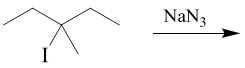
a. 

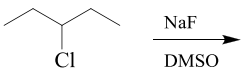
b. 

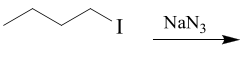




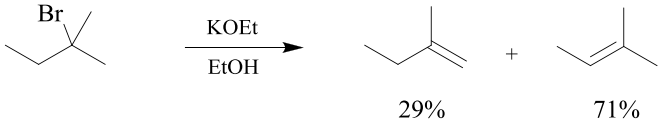
c. 

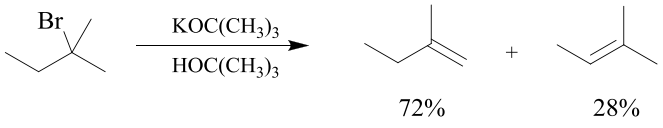
d. 

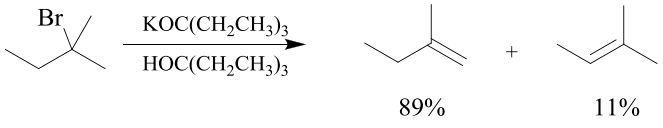




(9) 4. Explain the changes in product ratios in the data shown on the right, indicating what type of mechanism is involved, and why the trend is as it is there.

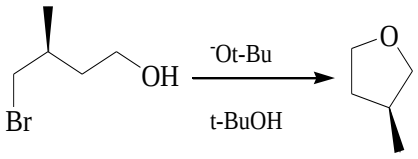






(5) 5. Explain why S_N1 reactions are rarely utilized in the synthesis of drugs.

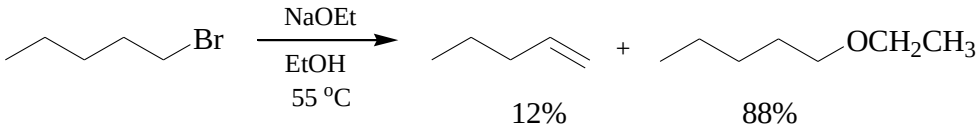
(20) 6. Write the mechanism of the following reaction, and draw an energy diagram to accompany it.



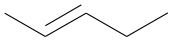
Be sure to think about whether reaction steps should be significantly exothermic, significantly endothermic, or neither. Consider, if there are two steps, which you think would be rate-determining.

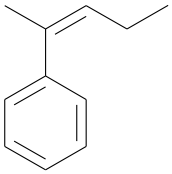
(6) 7. Give three examples of *polar aprotic solvents*. Show structures, not acronyms.

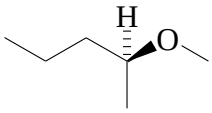
(4) 8. Consider the data below. What simple thing could be done to "optimize" the reaction to reduce the yield of 1-hexene and increase the yield of ethyl pentyl ether?



(16) 9. In each case, show the alkyl halide reactant, the base or nucleophile, and the solvent that you would use to make the compound in an efficient manner (that is, as the major product).

a. 

b. 

c. 

d.