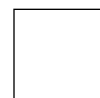
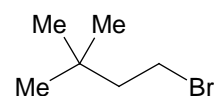
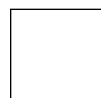
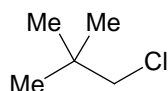
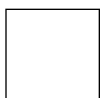
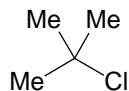
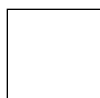
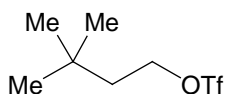


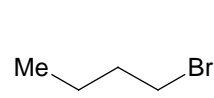
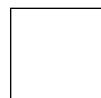
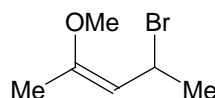
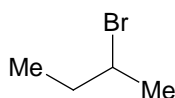
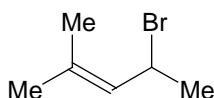
**Problem Set #6, 5.12 Spring 2003**

**Due Monday, March 31, 4pm**

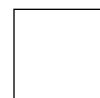
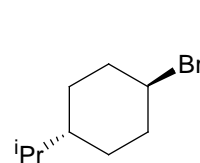
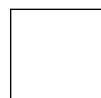
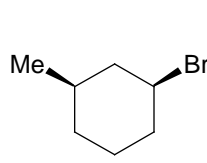
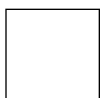
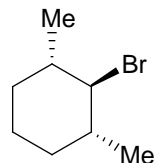
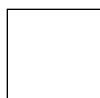
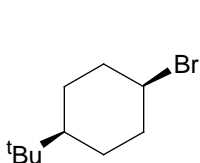
1. a) Rank the following series of molecules based on reactivity in an  $S_N2$  reaction (NaI/acetone).  
(1= fastest  $S_N2$ , 4= slowest  $S_N2$ )



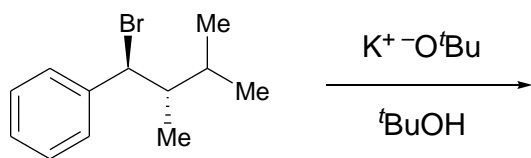
- b) Rank the following series of molecules based on reactivity in an  $S_N1$  reaction (EtOH/heat).  
(1= fastest  $S_N1$ , 4= slowest  $S_N1$ )



- c) Rank the following series of molecules based on reactivity in an  $E2$  reaction (NaO<sup>i</sup>Pr/ <sup>i</sup>PrOH).  
(1= fastest  $E2$ , 4= slowest  $E2$ )



2. a) Predict the product of the following reaction, and provide the mechanism for its formation.



b) Draw a picture of the transition state for the above reaction. Pay attention to stereochemistry!

c) If the same molecule were heated in diisopropylamine ( $^i\text{Pr}_2\text{NH}$ ), would you expect the same product that you drew in part a? Why or why not?

3. Predict the products of the following **substitution** reactions, and specify whether each proceeds by **S<sub>N</sub>1** or **S<sub>N</sub>2**. Pay attention to stereochemistry.

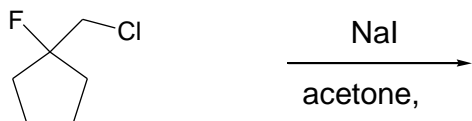
a)



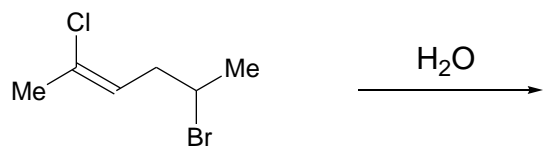
b)



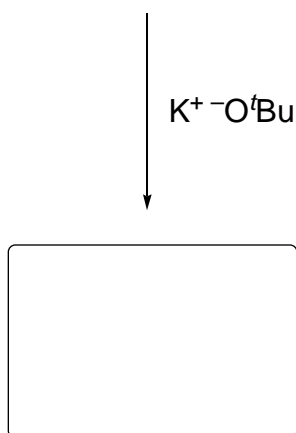
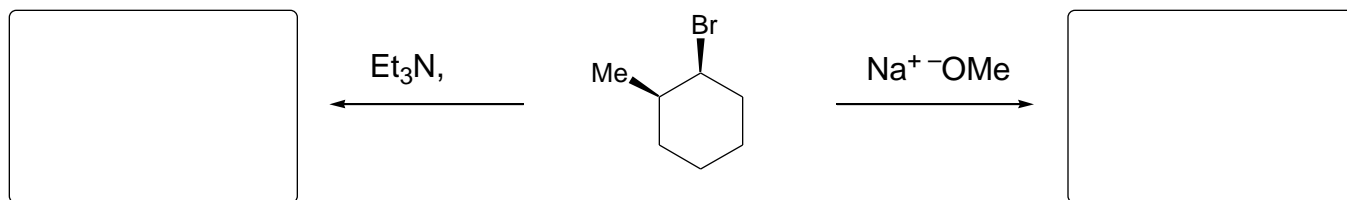
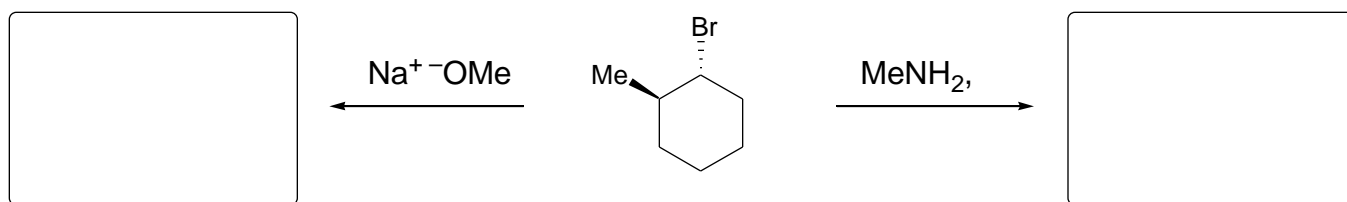
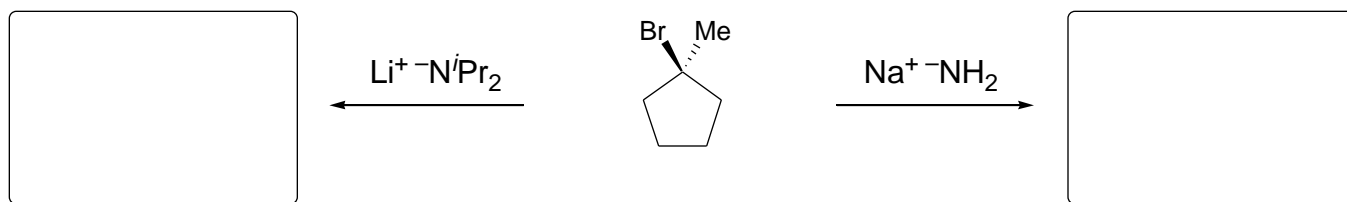
c)



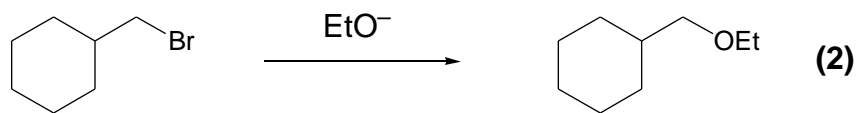
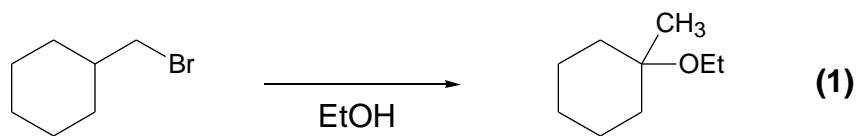
d)



4. The reaction conditions are very important in determining what products are obtained in elimination reactions. Predict the **major** products of the following **elimination** reactions.



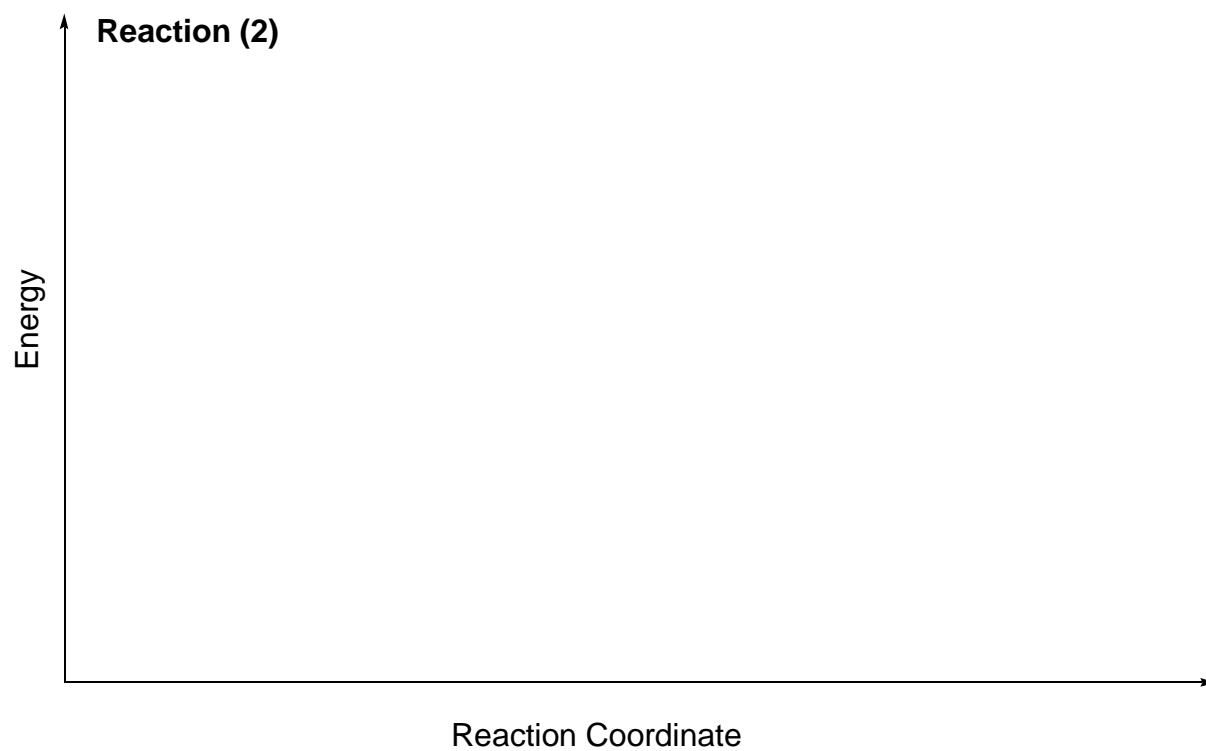
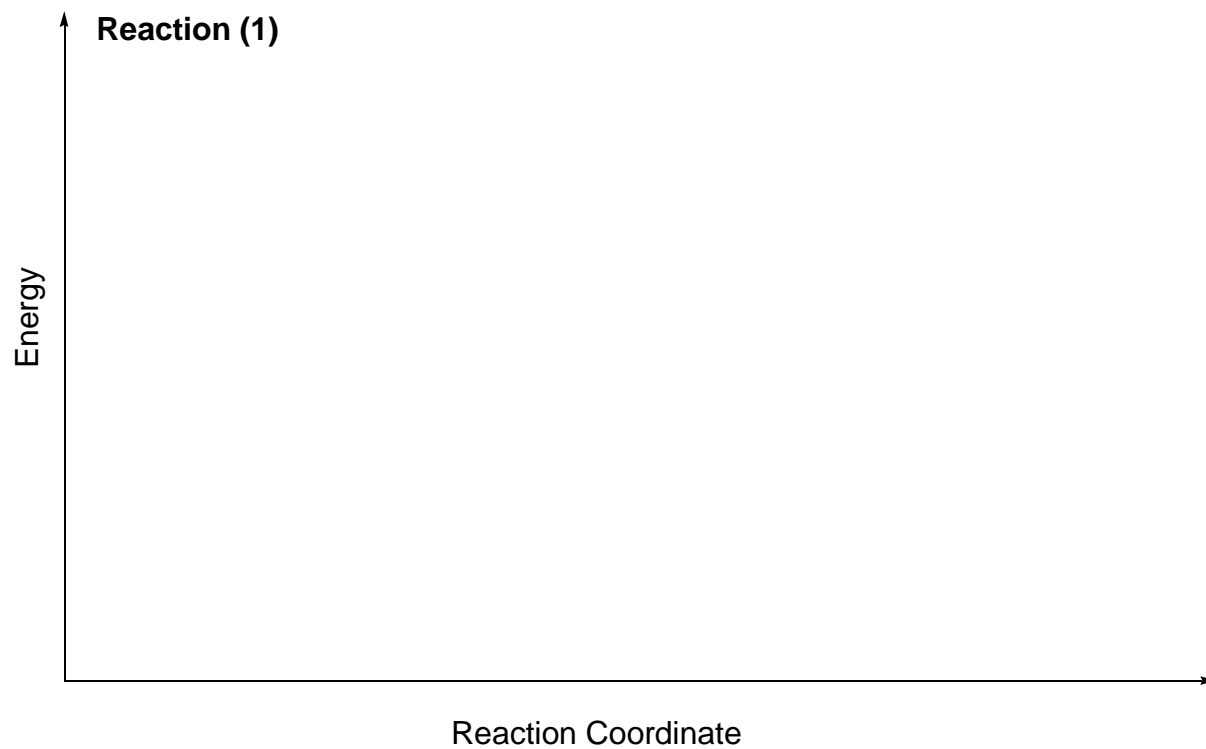
5. (Bromomethyl)cyclohexane undergoes the following two reactions:



a) Provide a **detailed** mechanism for reaction (1).

b) Provide a **detailed** mechanism for reaction (2).

- c) Draw reaction-energy diagrams for the reactions on the previous page. Clearly label starting materials, intermediates, products, and the rate-determining step for each reaction.



6. The mechanism of the following reaction involves mechanistic steps that you are already familiar with. Provide a detailed mechanism.

