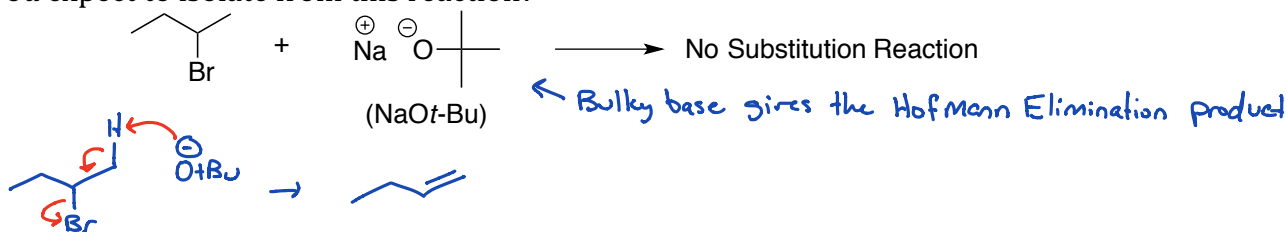


**Answer Key**  
**Chemistry 233**  
**Chapter 11 Problem Set – Pt. 2 (Elimination Reactions)**

1. The example below was given on the Ch. 9 Problem Set. Given what you now know, what product(s) would you expect to isolate from this reaction?



2. Specify how each of the following would affect the rate of an **E2** reaction.  $E2 \text{ Rate} = k[RX][\text{Base}]$

a. Increase changing the base from  $\text{NaOCH}_3$  to  $\text{NaNH}_2$ .

$\uparrow$  rate  $\text{NH}_2^-$  is a stronger base than  $\text{OCH}_3^-$

b. Increasing the concentration of base.

$\uparrow$  rate

c. Decreasing the concentration of alkyl halide.

$\downarrow$  rate

d. Changing the alkyl halide from 2-bromo-2-ethylpentane to 2-bromopentane.

$\downarrow$  rate E2 rate  $\uparrow$  with substitution 3° Br 2° Br

e. Changing the alkyl halide from 2-bromopentane to 2-iodopentane.

$\uparrow$  rate better LG

3. Specify how each of the following would affect the rate of an **E1** reaction.  $E1 \text{ Rate} = k[RX]$

a. Changing the base from  $\text{NaOH}$  to  $\text{H}_2\text{O}$ .

No Change

b. Decreasing the concentration of base.

No Change

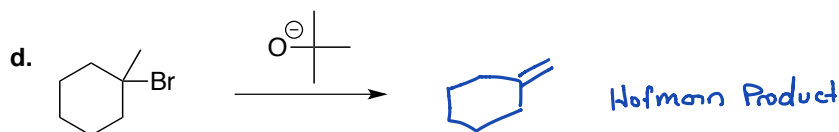
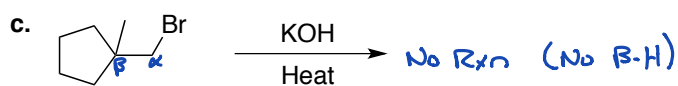
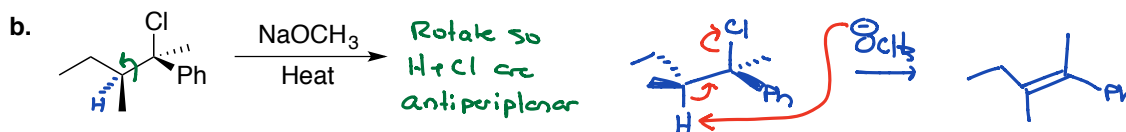
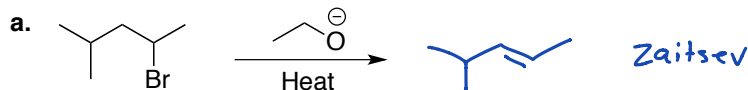
c. Changing the solvent from acetone to methanol.

$\uparrow$  rate  $\uparrow$  polar aprotic  $\rightarrow$  polar protic

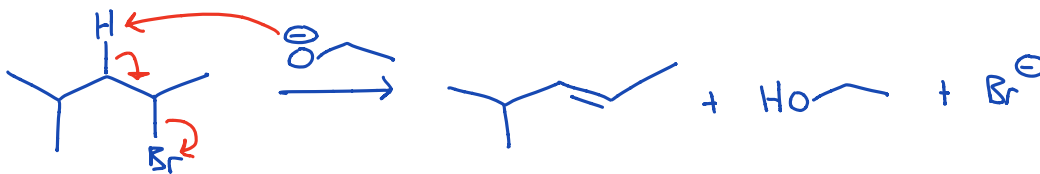
d. Changing the alkyl halide from 2-bromo-2-ethylpentane to 2-bromopentane.

$\downarrow$  rate E1 rate  $\downarrow$  with substitution

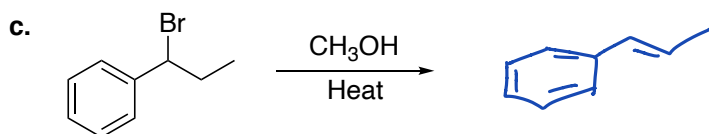
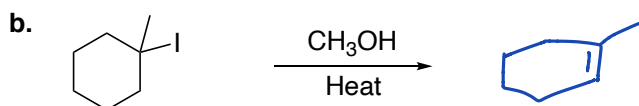
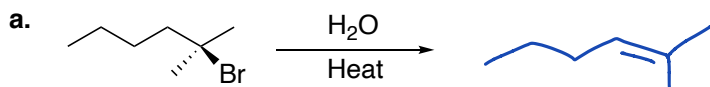
4. Predict the product(s) for each of the E2 elimination reactions below. Identify the major product for each.



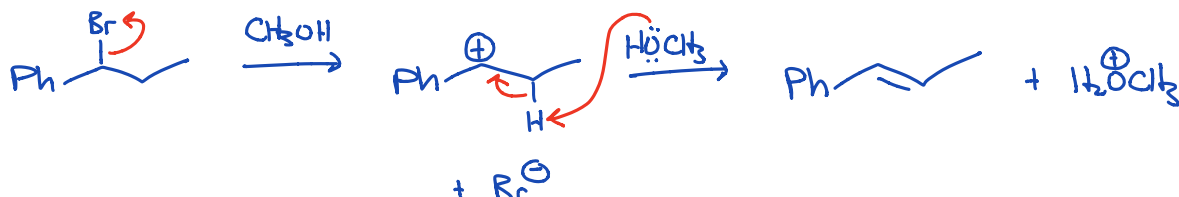
5. Show the complete electron pushing mechanism for the reaction in **question 4 part a**.



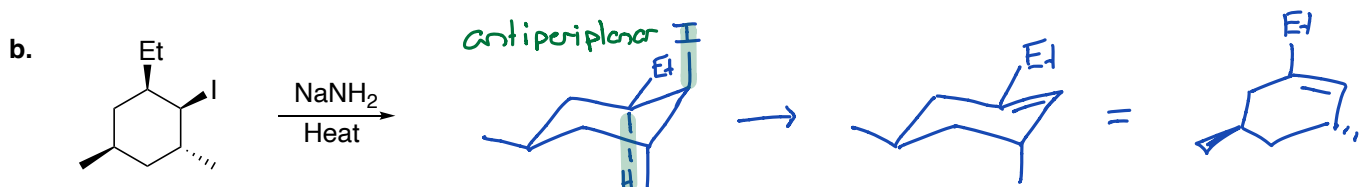
6. Predict the product(s) for each of the E1 elimination reactions below. Identify the major product for each.



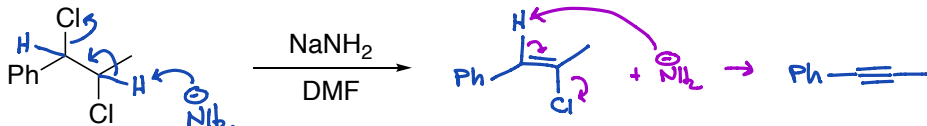
7. Show the complete electron pushing mechanism for the reaction in **question 6 part c**.



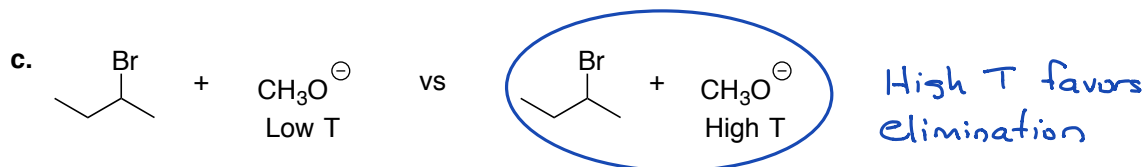
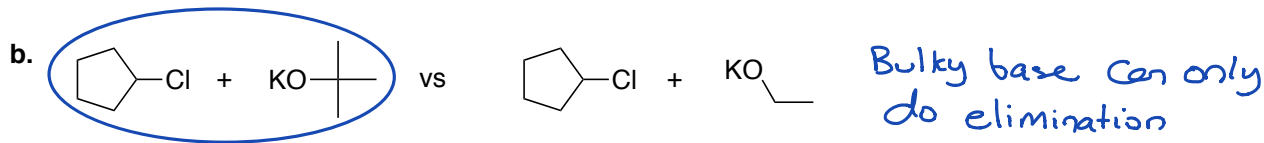
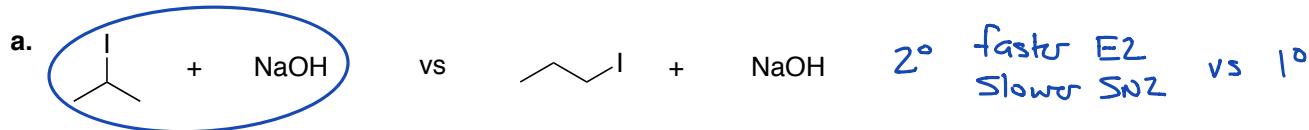
8. For each reaction below, predict the E2 elimination product with correct alkene stereochemistry where appropriate. Also, draw the reactive (anti-periplanar) conformation.



9. The compound below can undergo two successive elimination reactions upon heating. Draw the product of the reaction.



10. Circle the one in each of the following pairs that would be expected to give a higher yield of elimination over substitution.

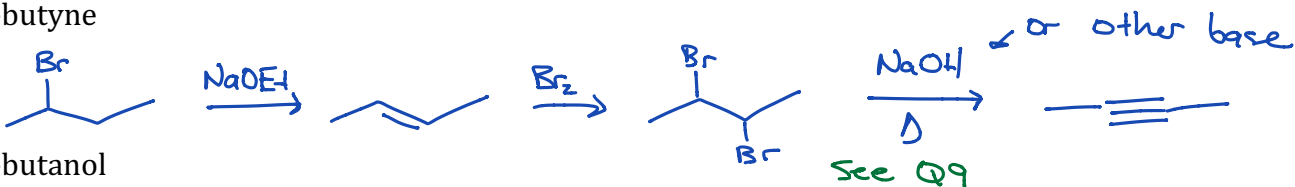


11. **Synthesis:** Propose a synthesis for each of the following starting with 2-bromobutane.

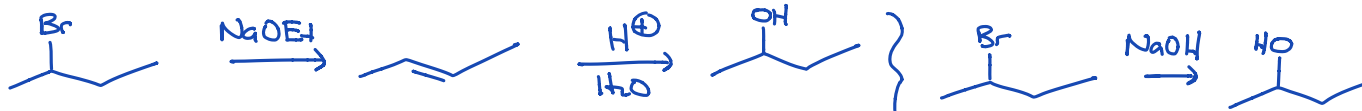
a. 2-butene



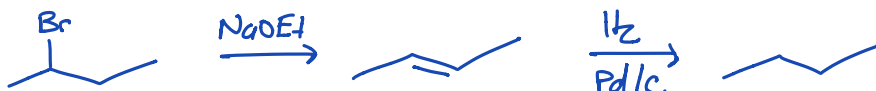
b. 2-butyne



c. 2-butanol



d. butane



12. Rank the following from fastest (1) to slowest (4) E2 elimination.

