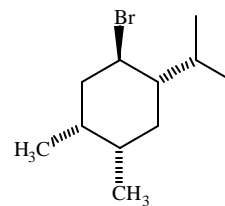


2. Consider the molecule to the right: Compound A (35 points):

2a. What is the name of Compound A?

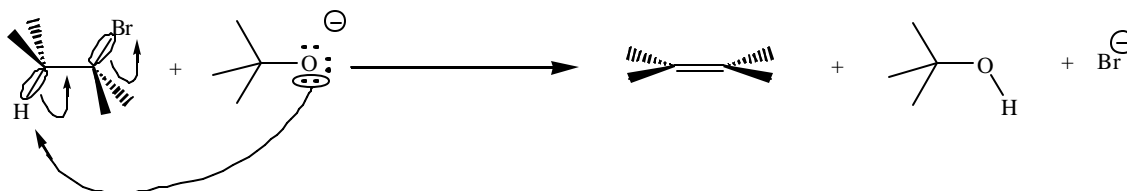


Compound A

2b. Draw the 2 chair conformational isomers of Compound A.

2c. Circle the most stable conformer and briefly explain your rationale.

2d. Fact: There is a reaction called an elimination reaction that involves the removal of a halogen and an adjacent hydrogen from an alkyl halide to form an alkene (see reaction below).



In order for the reaction to occur, the hydrogen and the halide must be in the anti conformation.

Question: Which chair conformer(s) of compound A allow(s) this conformation to exist? Draw the chair conformer(s) in a way that allows you to clearly see the anti conformation (3-dimensional perspective or Newmann projection).

2e. Will the reaction of compound A be more favorable or less favorable than the acyclic reaction given above (reaction of 2-bromo-2,3-dimethylbutane)? Explain briefly.

3. Consider the compounds with molecular formula $C_{10}H_{18}$ (40 points):
- 3a. How many elements of unsaturation do these molecules have? Explain briefly.
- 3b. What general types or classes of constitutional isomers can these compounds exist as? That is, how does an element of unsaturation affect the possible structures you could draw for a compound?
- 3c. Upon reaction of a subset of these compounds with HCl, of which there are 5 isomers, only one major product is formed, 2-chloro-1-cyclopentyl-2-methylbutane. What are two possible structures for this subset of 5 isomers of $C_{10}H_{18}$?
- 3d. Name these 2 compounds.
- 3e. Draw the arrow pushing mechanism for the reaction of one of the $C_{10}H_{18}$ compounds with HCl to yield 2-chloro-1-cyclopentyl-2-methylbutane.

- 3f. Draw an energy diagram that supports your mechanism. Ensure that you label all appropriate energies involved that help you understand the reaction. What determines how fast the reaction goes? What determines whether the reaction will be favorable?

4. EXTRA CREDIT (10 points) Why do alkenes react with HCl and not NaCl?