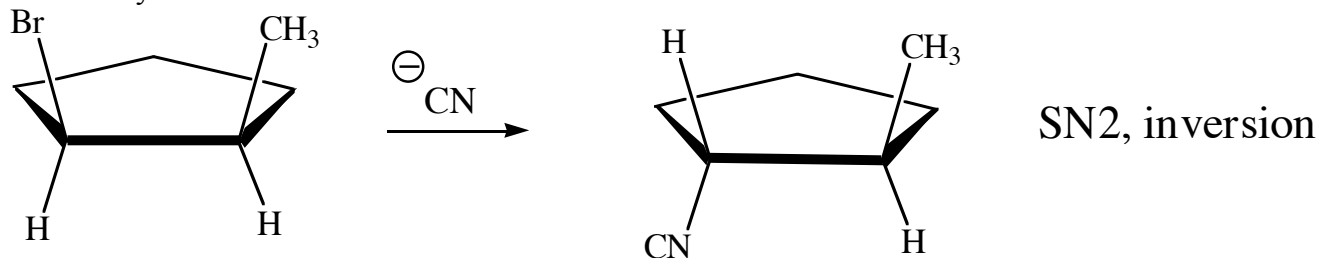


Chem 2600 Assignment 1 Answers 2005

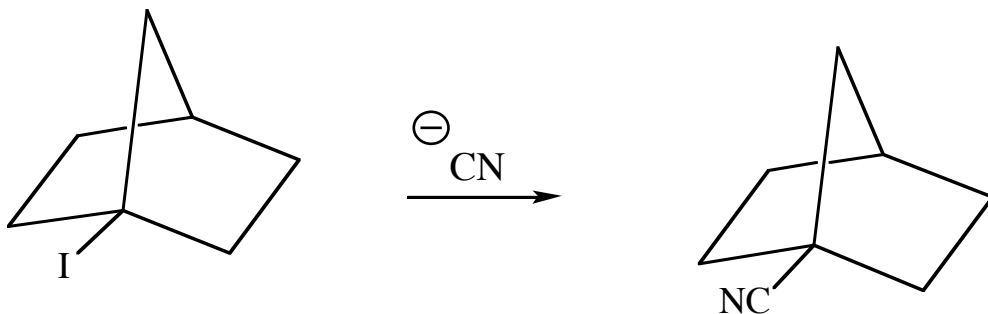
Question One

For each of the following reactions, give the expected product including the correct stereochemistry. If a mixture of products is formed, then show all products. Where possible indicate which are the major product(s). In addition, indicate what mechanisms are operating (S_N1 , S_N2 , E1, E2 etc.). If no reaction occurs, then state a reason why this is the case.

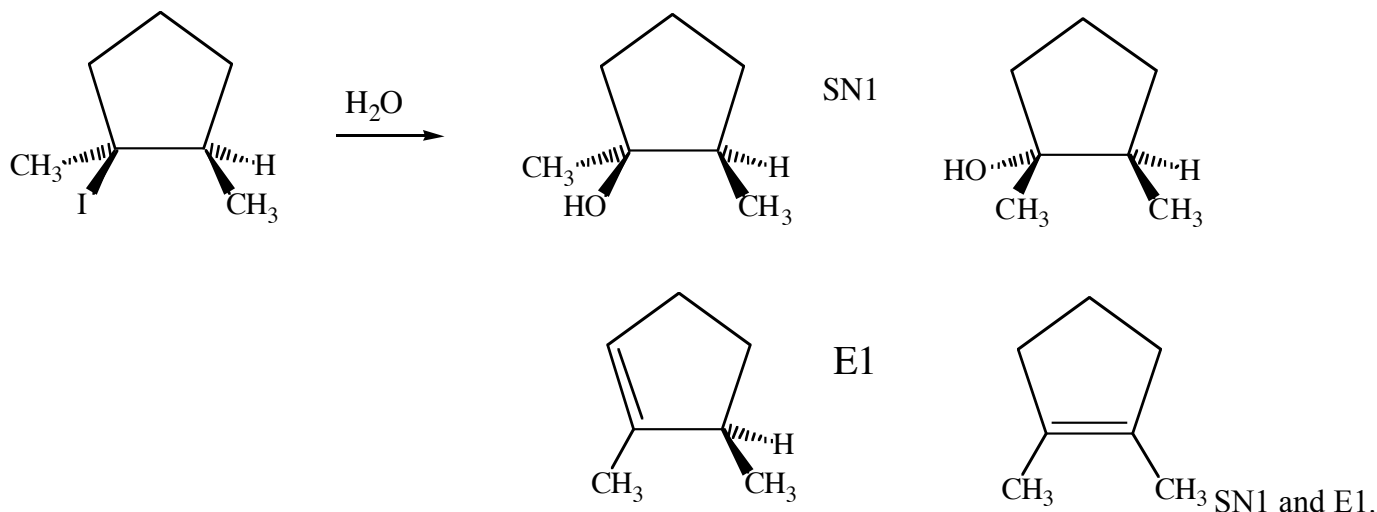


i)

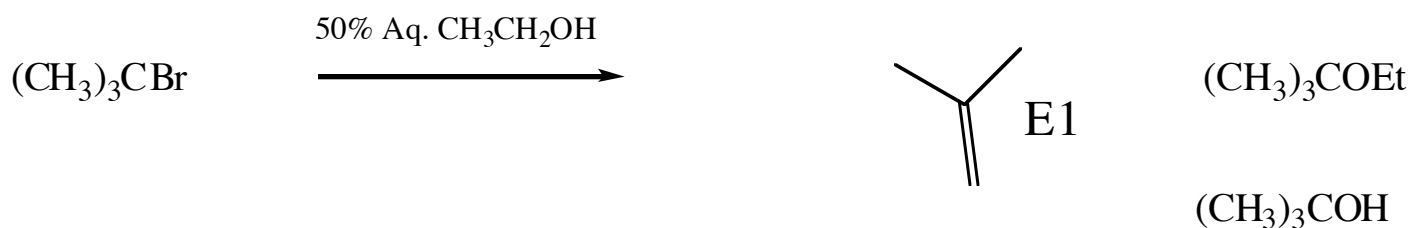
ii) Cyanide is a weak base so E2 is ruled out. The elimination products would be too highly strained, anyway. S_N1 is the only possibility. In truth, the substrate cannot ionize because the carbocation could not become planar (required for sp^2 carbon).



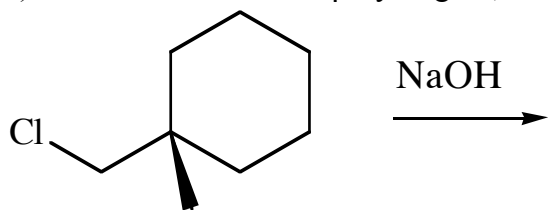
iii) The substitution products are not enantiomers but diastereomers in this case.



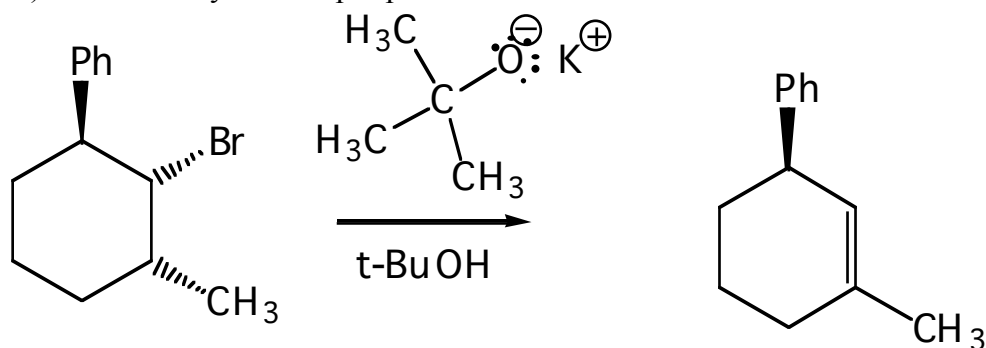
Water is a nucleophile too.



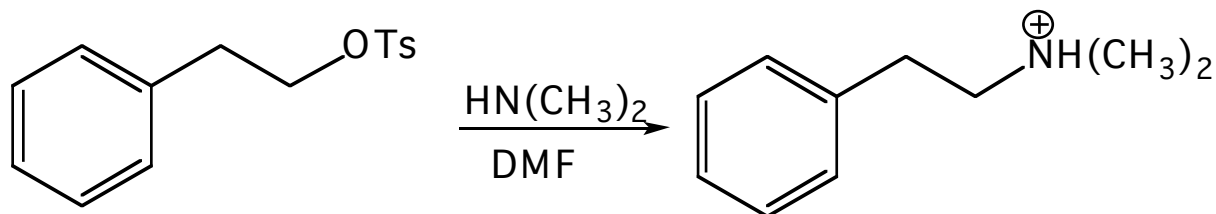
v) No reaction here. No β -hydrogens, so no E2. β -Branching prevents SN2.



iv) E2. Only one antiperiplanar H is available.

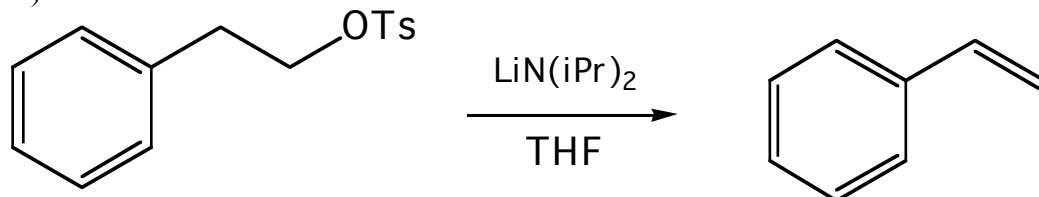


vii) Weak base, SN2.

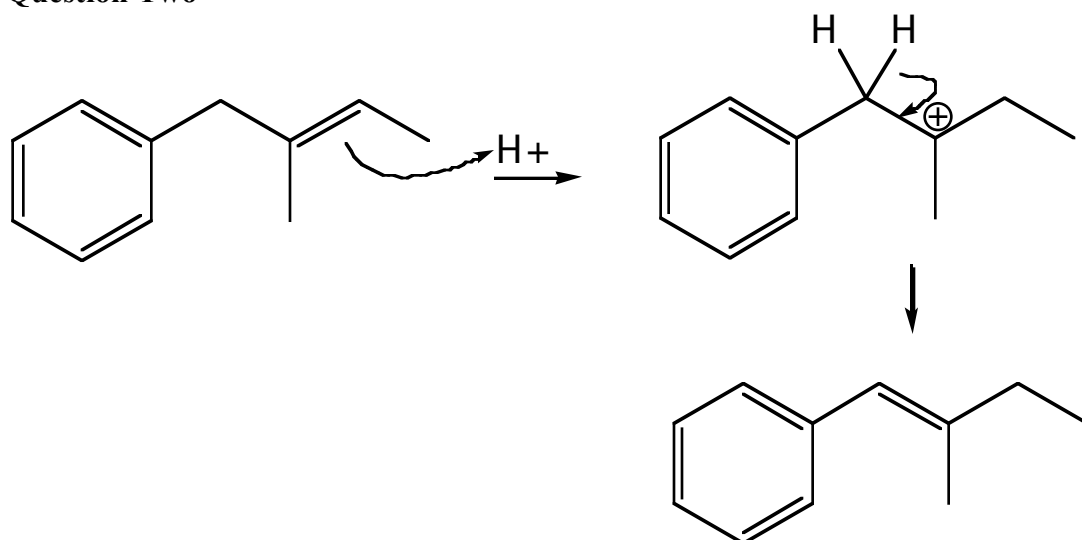


viii) Strong, non-nucleophilic base, E2.

ix)



Question Two



Provide a mechanism for the following reaction and rationalize why it occurs.

First step is simple protonation (electrophilic addition) while second step is the reverse to give the more stable conjugated product.

Question Three

The carbon-deuterium bond is stronger than the regular $C-H$ bond. In the two reactions shown, the alcohol product is formed at the same rate in each, while the alkene product is formed more slowly in the second reaction. Explain.

Any reaction which involves breaking a $C-D$ bond in the rate-determining step will be slower than its $C-H$ counterpart. That tells us that the elimination products formed in this reaction must be $E2$.