

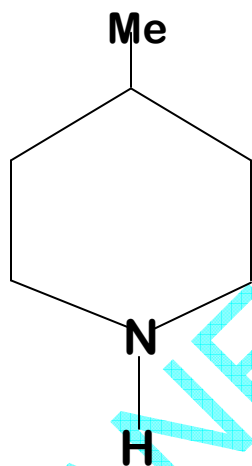
Solution to Crack Problem 48

This question may have various acceptable solutions that are provided below:

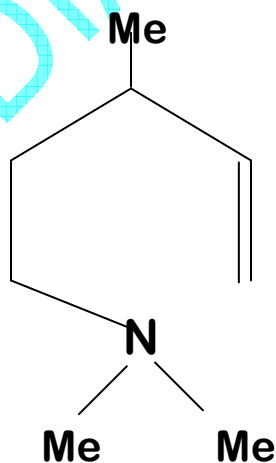
Solution-1

Reasoning: A quaternary ammonium salt when heated in presence of Ag_2O undergoes Hoffman Elimination leading to the formation of one or more alkenes (the yield is determined by symmetry and thermodynamic stability considerations.)

The structure of A is:



The structure of B is:

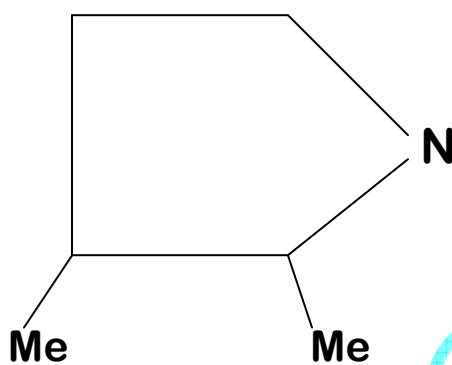


The structure of C is the given conjugate diene:

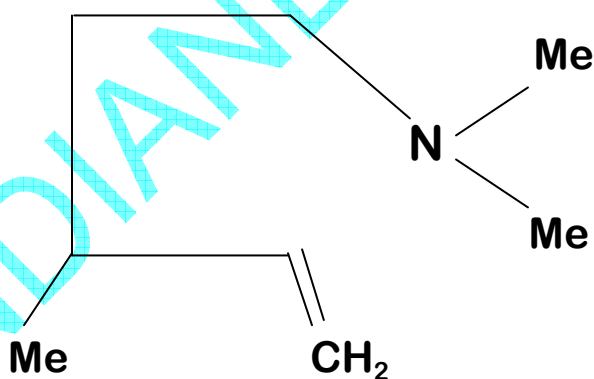


Solution-2

The structure of A is:



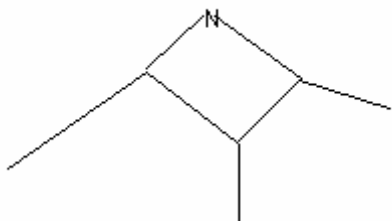
The structure of B is:



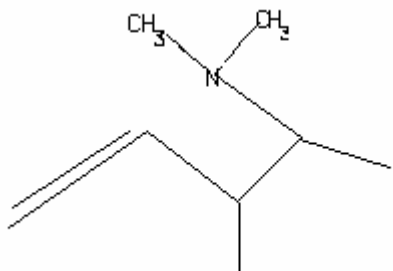
Solution-3

The compounds are as follows

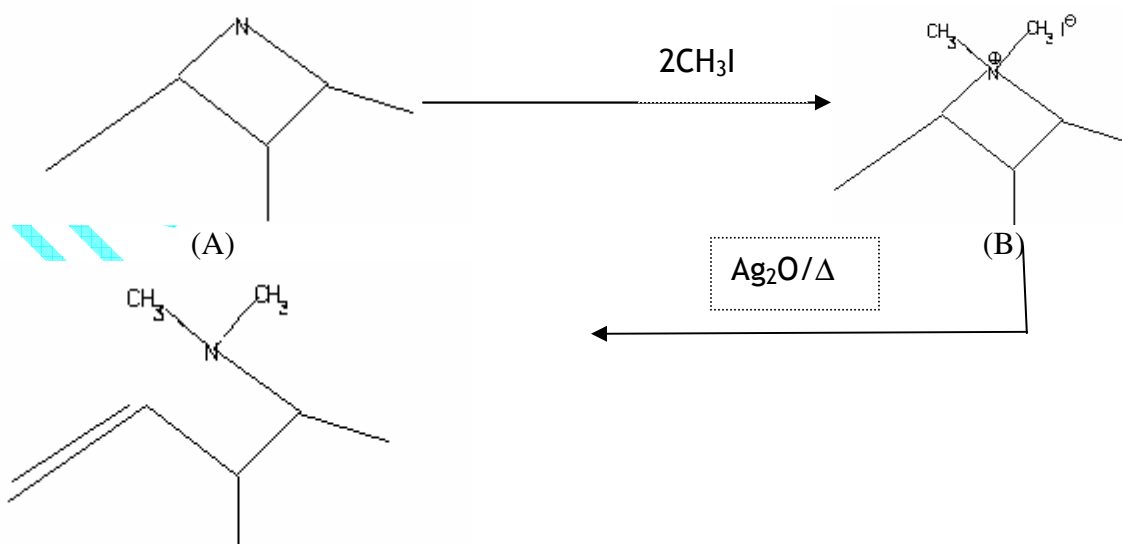
A is



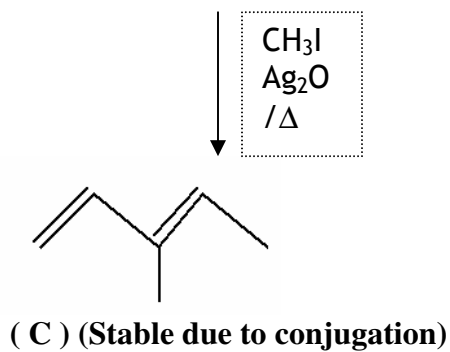
B is



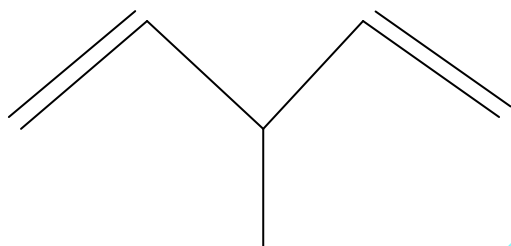
Hence the reactions are



(B) (Hoffman Product)



Remarks: Note that the rule for alkene formation here is, “Rich becomes poor” that is just opposite to Zetsev’s rule that is, “Poor becomes poorer”. Also, in the final stage, one would expect the following di-ene to be formed:



However, it is rearranged to conjugated di-ene in the presence of OH^- .