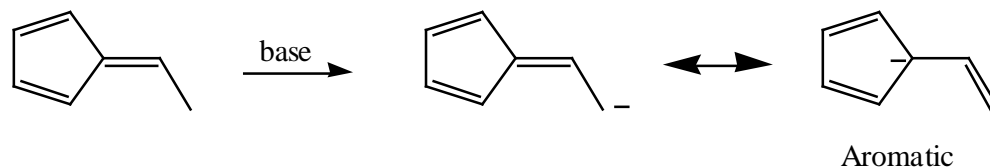
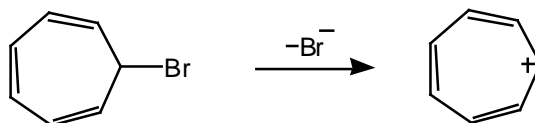


Answers to Problem Set #2  
CH242-2002S

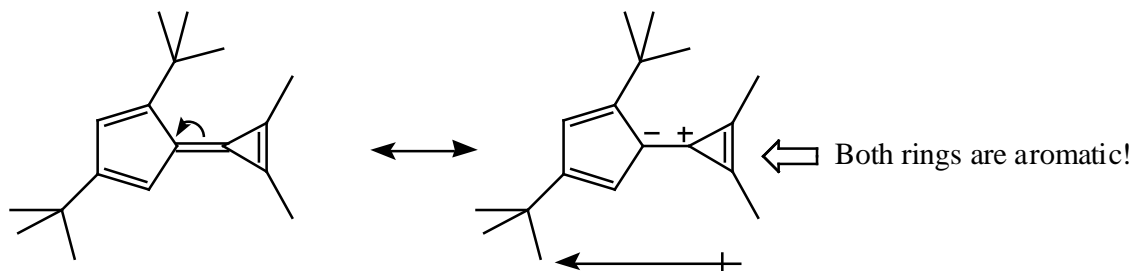
- [1] Of the three choices, the following compound is most acidic as it leads to a particularly stable aromatic anion (conjugate base.)



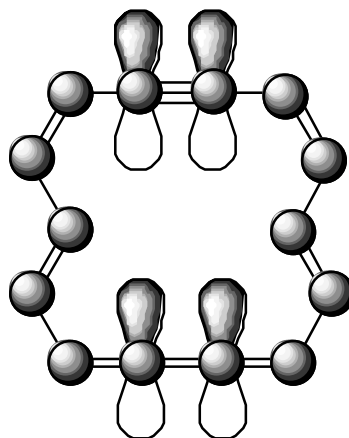
- [2] Of the four choices, the compound shown below ionizes most easily as it leads to a stable aromatic cation.



- [3] The bond connecting the two rings has some single bond character because the molecule has an important resonance structure in which both rings are aromatic ions. So rotation about this bond ought to be easier than ordinary double bonds. The ionic resonance contributor also accounts for the unusually large dipole moment.



- [4] The molecule is aromatic as there are 14 electrons in the planar and cyclic conjugated system. Note that there are four p orbitals which are not part of the loop formed by the other fourteen p orbitals. In the  $^1\text{H}$  NMR spectrum, the two internal hydrogens will show a signal that is far upfield because they are in the shielding zone of the magnetic field induced by the ring current. The external hydrogens, however, are in the deshielding zone and will show characteristic downfield signals.



- [5] (a) Azulene is a polar molecule because it has significant contributions from resonance structures in which either ring may be represented as an aromatic ion. For example, the seven-membered ring is an aromatic cation in **A**, and the five-membered ring is an aromatic anion in **B**.



- (b) The electrophile will go after the five-membered ring which is relatively "electron rich" as evident from the resonance structures above. The attack will occur at the 1 or 3 position (these positions are equivalent) because a stable intermediate can be generated.

