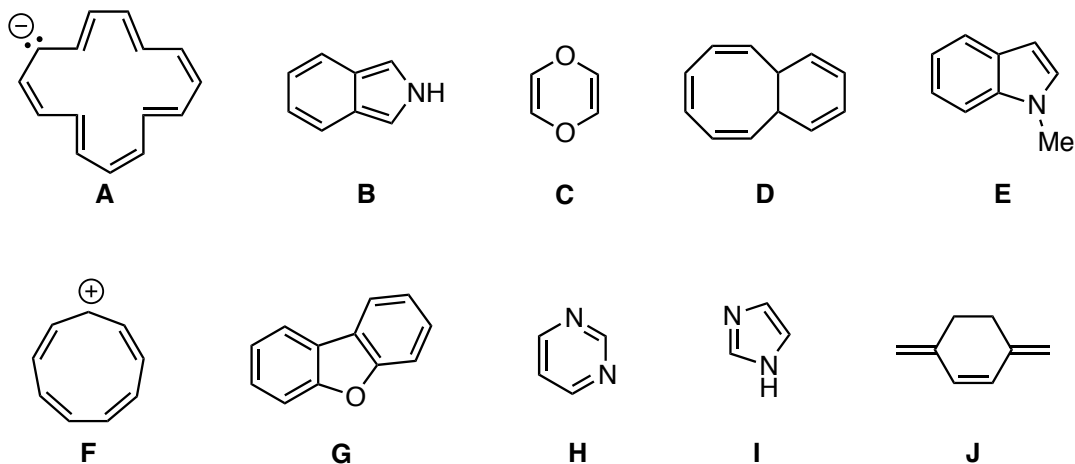


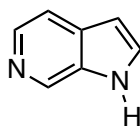
Discussion Section 1: Aromaticity

1. Predict whether each of the following molecules is aromatic, antiaromatic, or nonaromatic. Assume that each system is planar, and justify your choice. Predict specific chemical or physical properties that would reveal the aromatic, antiaromatic, or nonaromatic character of the compound.

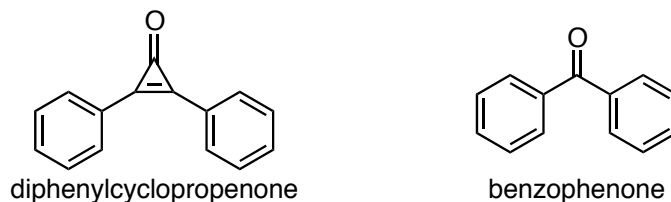


2. Provide reasonable explanations for the following observations:

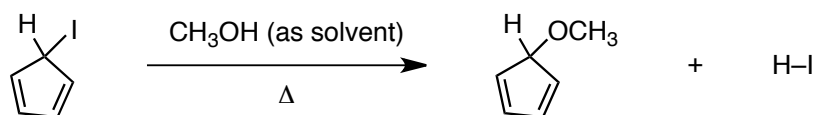
a) The compound shown reacts with HCl to give a weak acid ($pK_a \sim 5-6$). What is the structure of that weak acid?



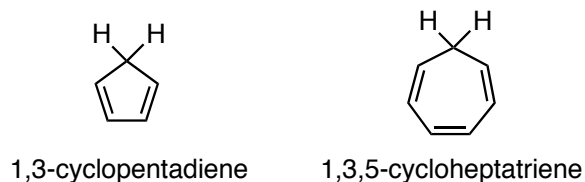
b) Diphenylcyclopropenone has a dipole moment of 5.08 D, but benzophenone has a dipole moment of 2.97 D.



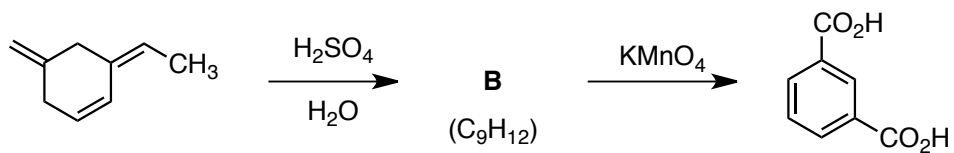
c) The following synthetic procedure was a total failure; the starting material was recovered unreacted.



d) 1,3-Cyclopentadiene is extremely acidic for a hydrocarbon ($pK_a \sim 15$), whereas 1,3,5-cycloheptatriene is extremely nonacidic (pK_a too high to measure).



3. Compound **A**, when treated with aqueous sulfuric acid, was converted to isomeric compound **B**. When **B** was heated for an extended time with KMnO_4 , dicarboxylic acid **C** was obtained. Give the structure of **B** and a mechanism that accounts for its formation from **A**.



4. Explain why cyclopropenium cation is very stable, whereas cyclopropenium anion is not. Use molecular orbital diagrams in your answer.

