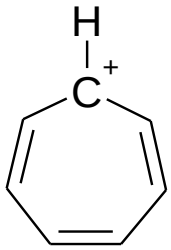
CHM 2211 – Ch 15 Homework

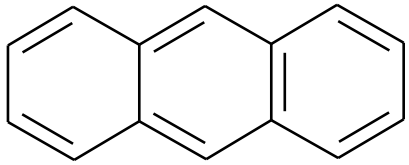
1. Describe the characteristics of aromaticity in detail.
   Then, draw cycloheptatriene, and explain whether or not it is aromatic. (1.5 pts)

2. For the cycloheptatrienyl cation below, determine the hybridization and orbital set for the positive C. Note that it has one empty orbital, and refer to the Hybrid Orbitals diagram if necessary. Then, determine the total number of Π electrons and $sp^2$ atoms for the molecule, and explain if the molecular cation is aromatic. Show at least one more resonance form, and use a curved arrow to show how it formed. (1.5 pt)



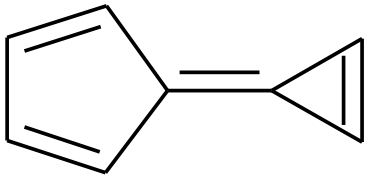

cycloheptatrienyl cation

3. For the anthracene molecule below, determine the total number of both Π electrons and $sp^2$ atoms. Then, explain if it is aromatic by applying the Hückel rule to the molecule as a whole. (1 pt)



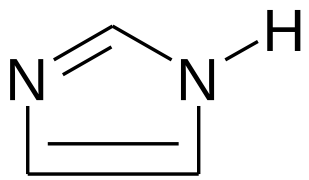
anthracene

4. Calicene, below, has an aromatic resonance form where the two rings become oppositely charged. Draw its structure, and use a curved arrow to show how it is formed. Describe how both rings follow the Hückel rule. Draw resonance forms that show electron movement in both of the aromatic rings. (2 pts)

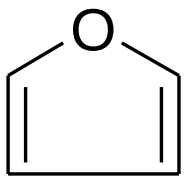


calicene

5. Draw all of the lone pairs on the molecules below, and then determine the hybridization of *all four* valence orbitals for *each* of the nitrogen and oxygen atoms. Finally, for each molecule, determine the total number of Π electrons, and explain whether or not it is aromatic. (4 pts)




imidazole




furan

orbital type # of valence e⁻'s function (σ bond, Π bond, or nonbonding)

N's hybridization: _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

N's hybridization: _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

O's hybridization: _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____