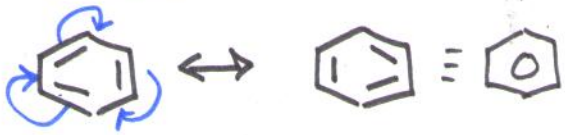
NAME KEY due date _____

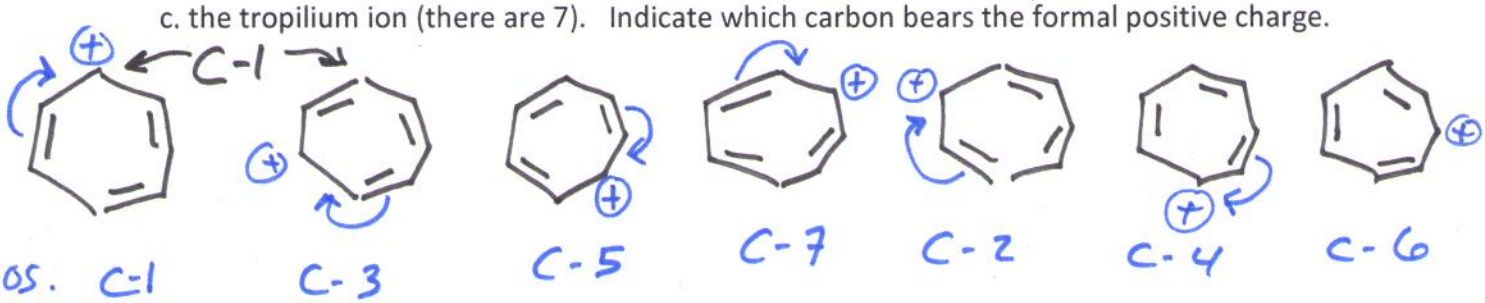
1. Draw the resonance structures for:

a. benzene



b. cyclobutadiene

c. the tropilium ion (there are 7). Indicate which carbon bears the formal positive charge.

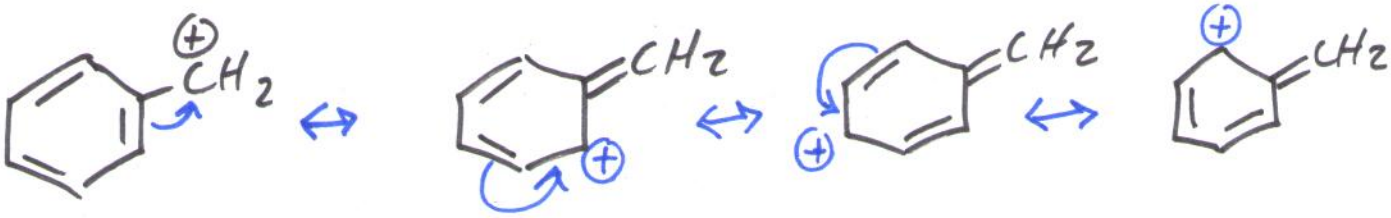


pos. charge at C-1 C-3 C-5 C-7 C-2 C-4 C-6

all carbons bear partial positive charge

2. Draw the *p* orbitals on the sp^2 carbon atoms of benzene and the *p* orbitals on the cyclopentadienyl anion showing how there is continuous overlap above and below the plane of each ring system.

3. Consider the benzyl cation [$C_7H_7^+$]; draw resonance structures to show how the positive charge is delocalized over four carbon atoms.



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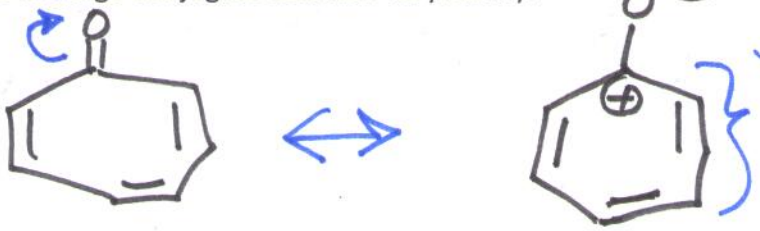
4. a. Draw cycloheptatriene. Is this molecule expected to undergo conjugate addition, yes or no?

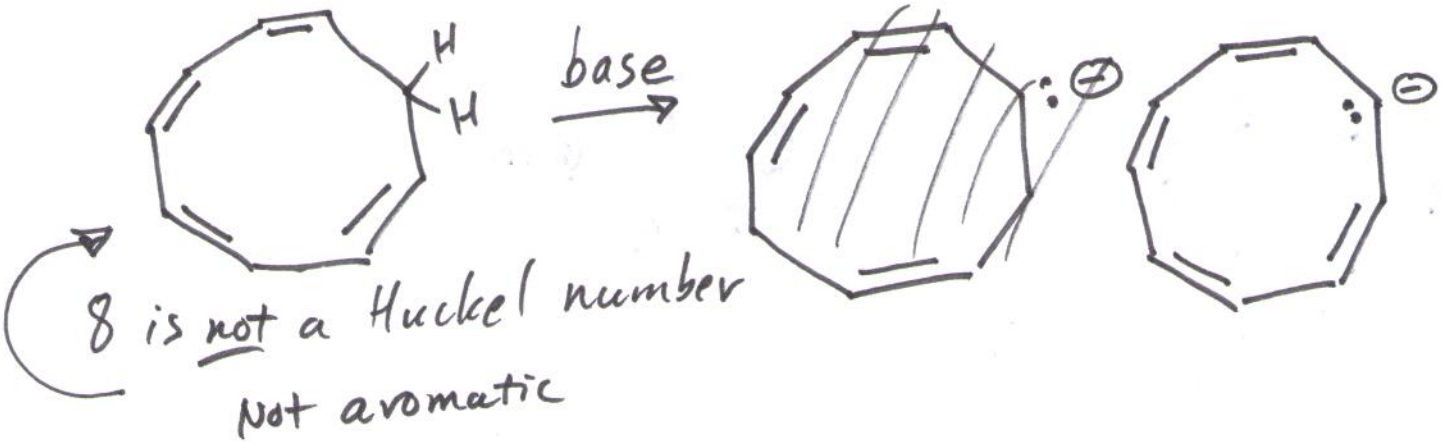
should undergo addition reactions

b. Draw cycloheptatrienone (a cyclic ketone with 3 olefins). This molecule does not undergo conjugate addition very readily. (Remember that aromatic compounds do not undergo addition reactions.) Draw a resonance structure for cycloheptatrienone to explain why this molecule is very stable, i.e., why does this molecule undergo conjugate addition very slowly.



this resonance structure contains an aromatic ring i.e. resembles cycloheptatrienyl cation

5. a. Draw 1,3,5,7-cyclononatetraene (the neutral molecule). Does it have a Huckel number of pi electrons?



8 is not a Huckel number

Not aromatic

b. Show how 1,3,5,7-cyclononatetraene might be converted to an aromatic species. (Consider the corresponding ions formed by removal of a hydrogen atom or hydride.)

treatment with base produces conjugate base which has a Huckel number of e's and is expected to be aromatic. CH_2 group changes from sp^3 to sp^2 and supplies the p-orbital available for overlap and supplies 2 e's to attain a Huckel number.

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