CHEM 3231
F'01

PROBLEM SET #4 SOLUTIONS

1. (a)

1

2

] cyclopentadienyl cation ANTIAROM.

] cyclopropenyl anion ANTIAROM.

Two antiaromatic halves of this res. structure make it a poor contributor.

1

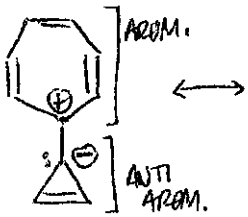
3

] cyclopentadienyl anion AROM.!

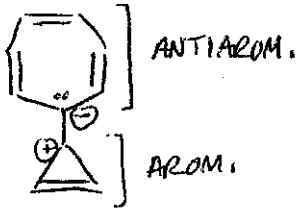
] cyclopropenyl cation AROM.!

Two aromatic halves make this res. structure a good picture of the electronic distribution of **1**.

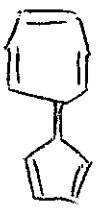
(b)



4



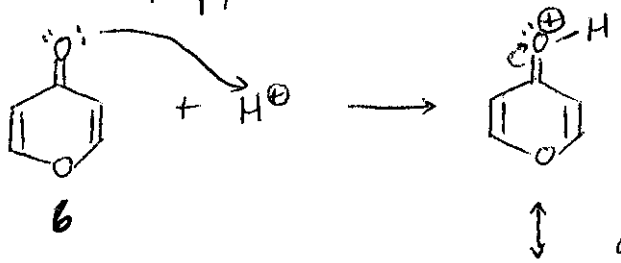
Both resonance structures have one aromatic component and one antiaromatic component. So **4** is less resonance-stabilized.



5

Both components are aromatic — so **5** is better stabilized by resonance.

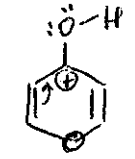
2. Protonation of pyrone (**6**):

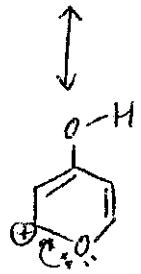


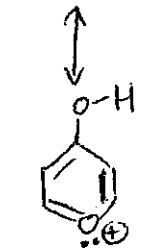
6

very stable cation

draw resonance forms

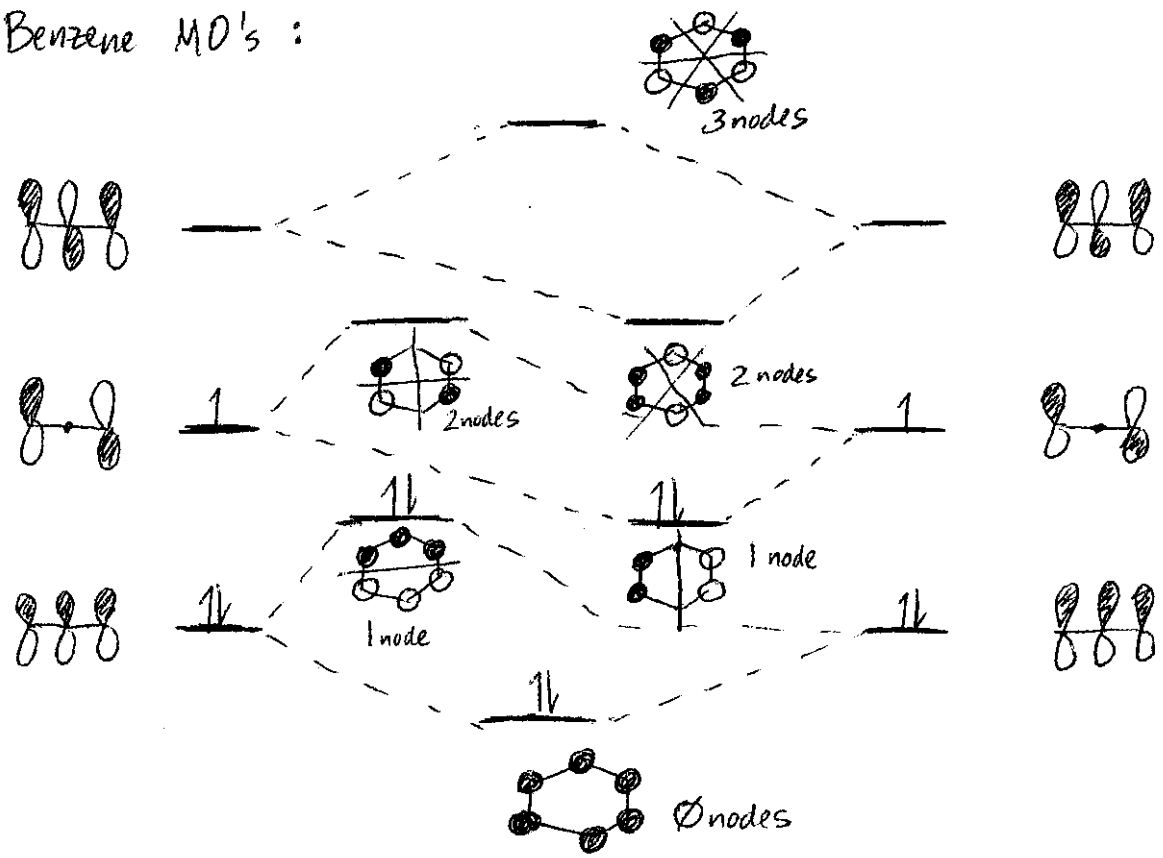




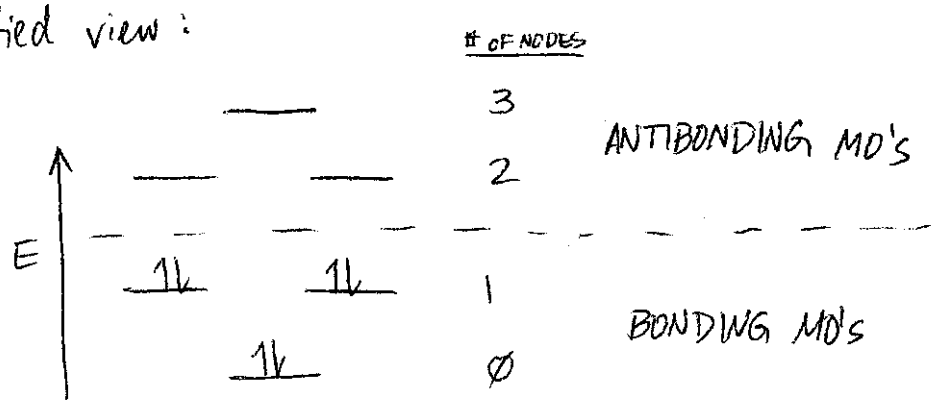


This res. structure is aromatic — largest contributor to electronic picture AND provides additional stability.

3. Benzene MO's :



A simplified view :



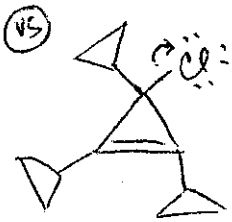
4.

7

lose $Cl^{\oplus}$ →

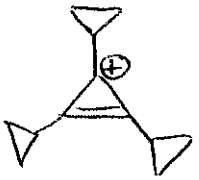
$4\pi e^-$ ANTIAROM.

(VS)



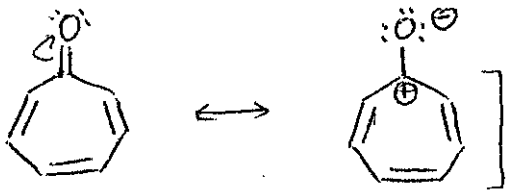
7

lose $Cl^{\ominus}$ →



$2\pi e^-$ AROM. ✓

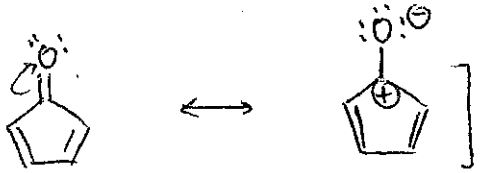
5. In comparing compounds **8** and **9**, remember that the C=O bond is polarized:



8

cycloheptatrienyl cation $6\pi e^-$
AROM.
∴ quite stable

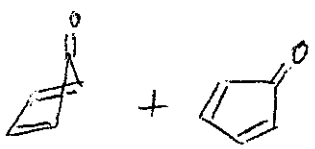
(VS)



9

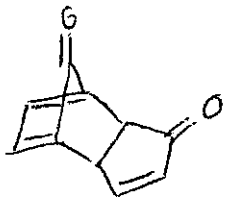
cyclopentadienyl cation $4\pi e^-$
ANTIAROM
∴ unstable

Also,



9 9

Diels-Alder →



9 readily dimerizes by the Diels-Alder rxn, so v. reactive!