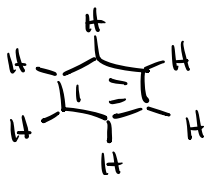


Aromaticity →

Aromatic has nothing to do with smell

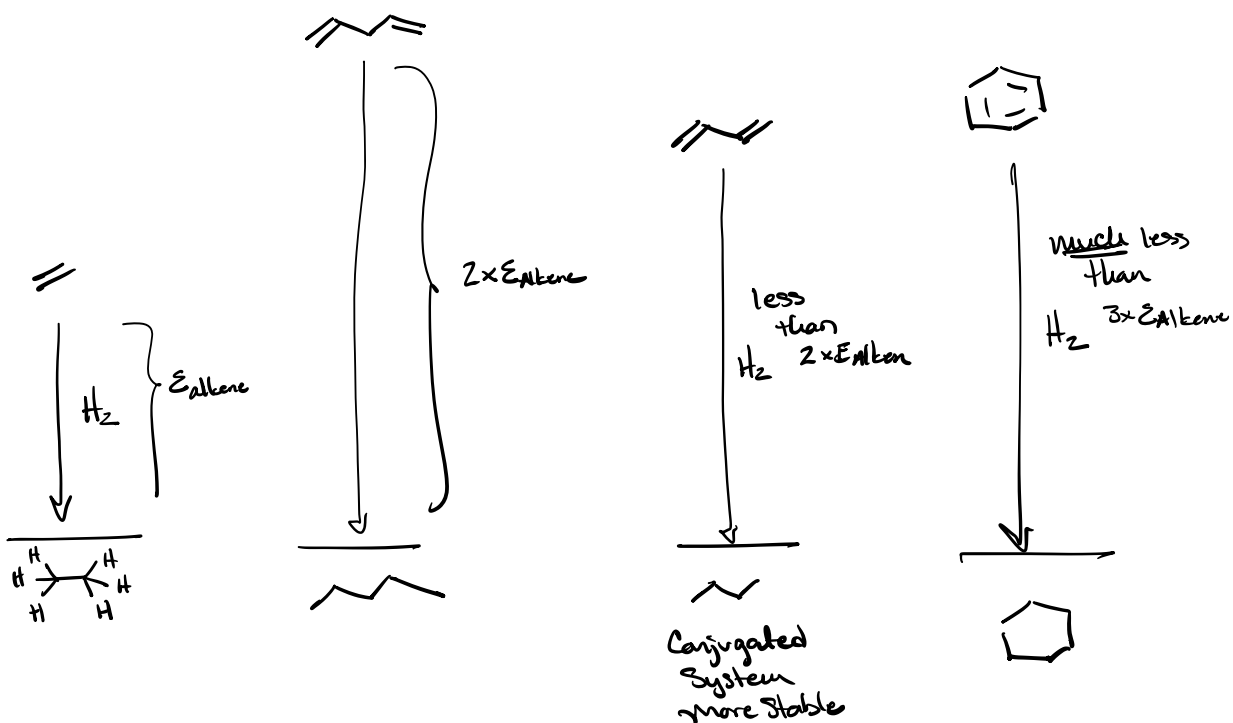
when we think of aromatic we think of benzene



or Benzyl group



Aromatic is a special type of stability



Aromatic molecules

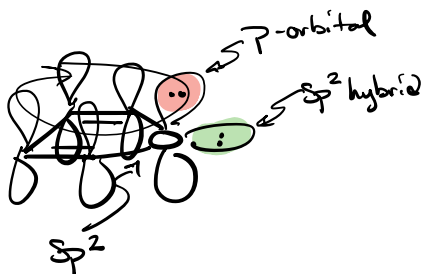
- Ring
 - Flat
 - fully conjugated
 All sp^2 or sp hybridized
 \Rightarrow no sp^3
- } Conjugated
- $4n + 2 \pi e^-$ where n is an integer value $0, 1, 2, \dots$

n	$\frac{\# \pi e^-}{4n+2}$	
0	2	}
1	6	
2	10	
3	14	

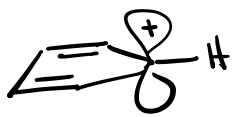
possible #'s of e^-
in a system to
be aromatic



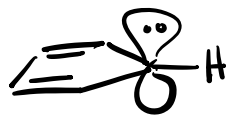
- flat ✓
 - Ring ✓
 - fully conjugated ✓
(all atoms sp^2)
 - $6 \pi e^-$ ✓
- } Aromatic



- flat ✓
- Ring ✓
- fully conjugated ✓
- $6 \pi e^-$ ✓
- Aromatic ✓



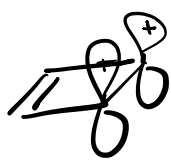
Ring ✓
Flat ✓
fully conjugated ✓
4 πe^- ✗
not aromatic



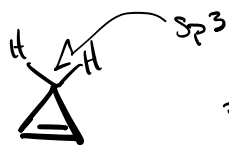
Ring ✓
Flat ✓
fully conjugated ✓
6 πe^- ✓
Aromatic



Ring
Flat
fully conjugated
4 πe^- ✗
not aromatic



Ring ✓
Flat ✓
fully conjugated ✓
2 πe^- ✓
Yes Aromatic



Ring ✓

flat ✓

fully conjugated ✗

not aromatic



Ring ✓

flat ✓

fully conjugated ✓

$4\pi e^-$ ✗

not aromatic



Ring ✓

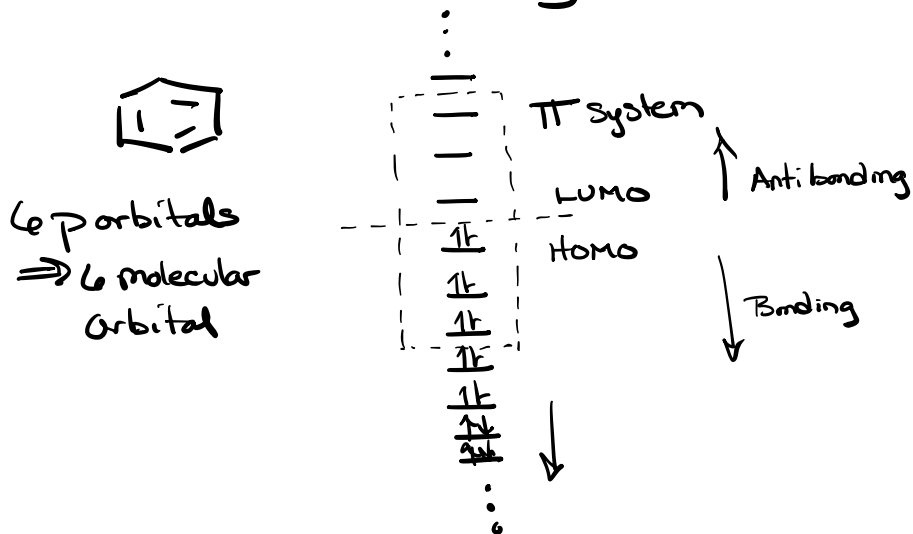
flat ✓

fully conjugated ✓

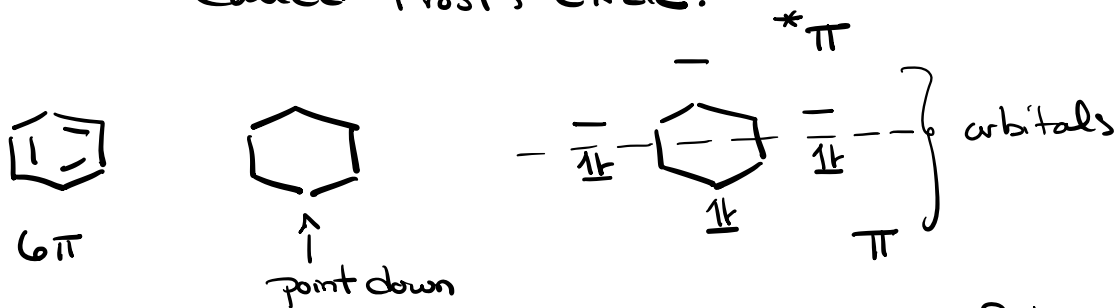
$2\pi e^-$ ✓

yes Aromatic

How does the # e⁻ in π System affect aromaticity?



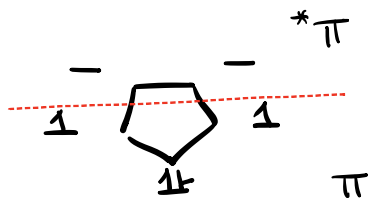
Approximation method for finding the relative energies of the π -System called Frost's Circle.



π -Bonding orbitals full
 $*\pi$ - Antibonding orbitals all empty



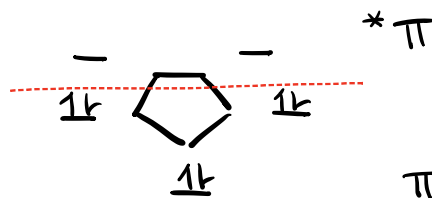
$4\pi e^-$



diradical
extremely
reactive



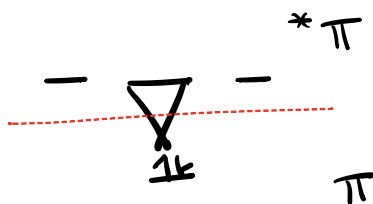
$6\pi e^-$



All bonding orbital full
no e^- in π^*
Aromatic



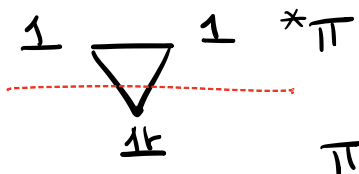
$2\pi e^-$



Aromatic



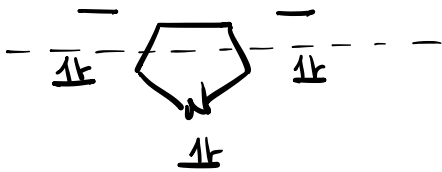
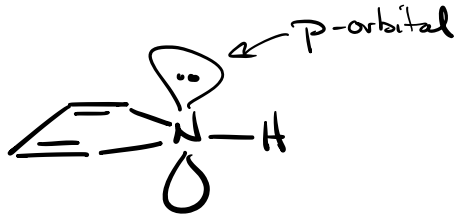
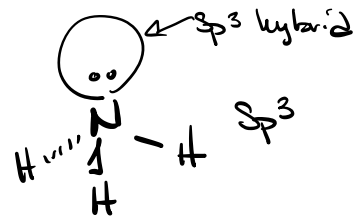
$4\pi e^-$



Diradical
unstable



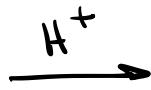
Normal N



Aromatic



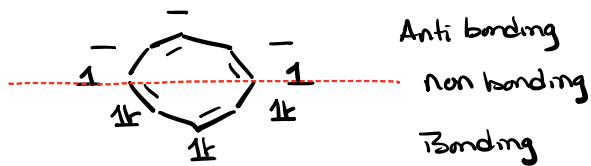
Aromatic



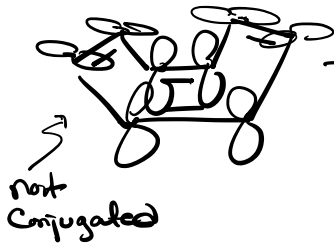
sp^3
Conjugation broken
Loss of aromaticity



$8\pi e^-$

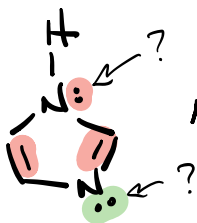


not aromatic

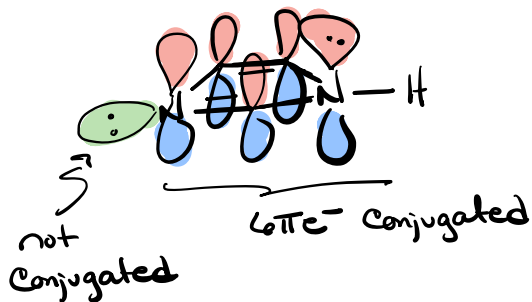


not conjugated

Bends out of plane
 \Rightarrow Breaks conjugation

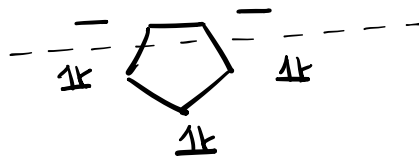


Aromatic? $6\pi e^-$ in conjugated

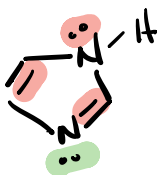


not conjugated

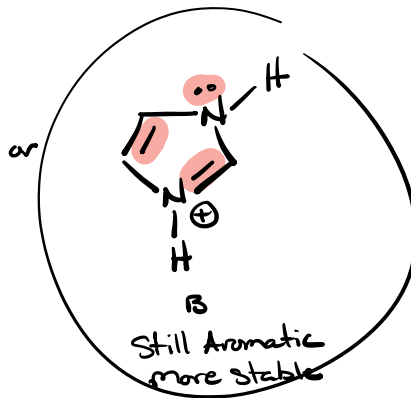
$6\pi e^-$ conjugated



Aromatic ✓



Not aromatic



Still Aromatic
 more stable



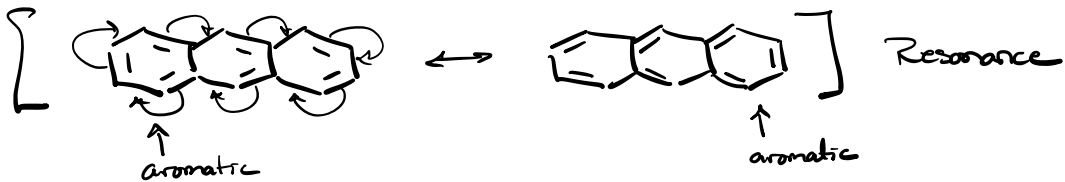
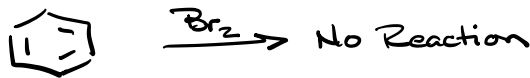
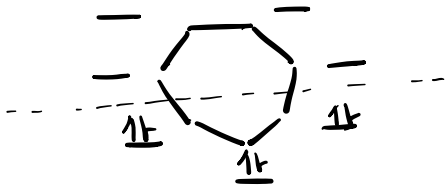
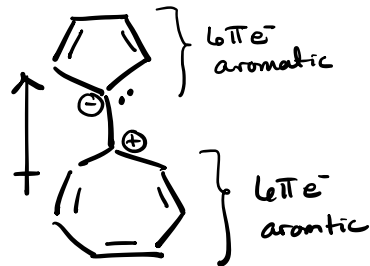
Demonstrates a large dipole moment by experiment. Explain

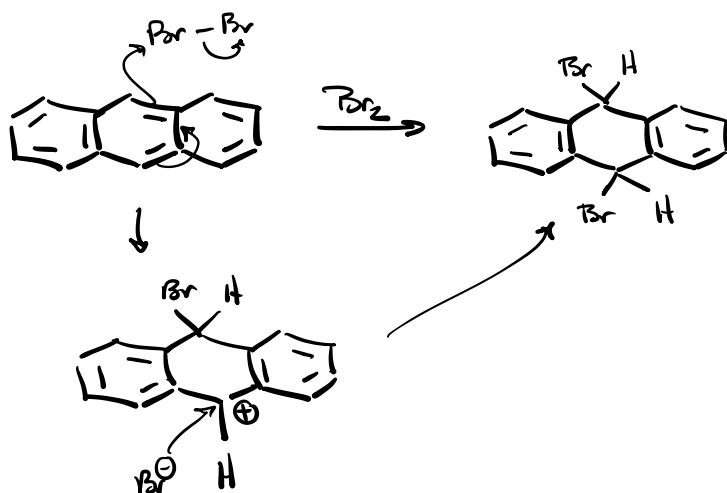


not aromatic



aromatic





Next lecture

- Review of benzylic position
 - Reduction of Aromatic Systems (Birch Reduction)
 - * - Electrophilic Aromatic Substitution
- } synthesis tools
- Functionalization of aromatic systems