*CHEM 242 – Lecture 15 11/02/2015*

Overheads: - Outline

Recap Chem 241: Benzene & Resonance

1860’s: cyclic structure first proposed by Kekulé



Resonance = Stability:



Benzene is Aromatic: ⇨ special kind of cyclic compound with unusual stability

⇨ named because of “aroma” of benzene

In order to be Aromatic, 2 criteria must BOTH apply:

1. Must have an uninterrupted ring of atoms with a p orbital on each atom in the ring

⇨ gives a cloud of electrons above and below ring



- like a donut with chocolate on both sides!

- In order for this to occur, the molecule must be:

a) cyclic

b) planar (flat) so that all orbitals overlap

c) have a p orbital on each atom

1. There must be an odd number of pairs of  electrons in the ring



3 pairs ✓ 4 pairs 🗶

Another way to think about it:

Huckel’s Rule: to be aromatic, a compound must have 4n+2  electrons (where n = any integer: 0, 1, 2, etc.)



n = 0 4n+2 = 2 = 1 pair

n = 1 4n+2 = 6 = 3 pairs odd pairs = 4n+2 ☺

n = 2 4n+2 = 10 = 5 pairs

Antiaromatic: a compound that fits rule #1, but NOT rule #2

⮱ cyclic, flat ⮱ NOT 4n+2

p orbital on each atom

\*\* antiaromatic compounds are VERY unstable

⇨ worse than if no resonance at all!



But… since not flat, can’t do resonance either, so like unconjugated diene

\*\* If molecule can bend to avoid being antiaromatic it will

Examples of Aromatics:





⇨ heteroatom can go sp2 and put lone pair in p if doing so will make it aromatic

⇨ if heteroatom is already part of a double bond, p is already “used” so lone pair goes in sp2 (doesn’t count)



