CHEM 261

## **Conjugated Systems**

Definition: Systems that are separated by exactly one single bond from a double bond

## **Compounds containing conjugated systems:**

**Polyenes:** 

Example: **1,3-Butadiene** 

Double bonds are separated by one single bond

## **Aromatic Compounds:**

- 1) Cyclic
- 2) Conjugated throughout
- 3) Planar
- 4) 4n + 2 electrons, where n is an integer (n=1,2,3,4...)

Br

Br

n cannot be 0.5

Example: 1,2-Dibromobenzene





4 π electrons

Therefore it cannot satisfy 4n + 2 rule

**Aromatic Compounds Are Not Like Alkenes** 

much less reactive

## **Benzene:**

- 36 kcal/mole more stable than is expected





1,3-Pentadiene is planar often so that p-orbitals can overlap as seen below. The partial interaction of orbitals in the middle bond shortens the bond length due to partial double bond character. There is still rapid rotation about the single bond between the two double bonds, but the preferred conformation all pi bonds aligned. (Transoid preferred over cisoid)



1,3-Pentadiene prefers to be planar so that p-orbitals can overlap