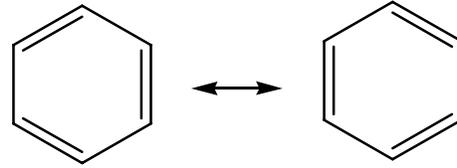
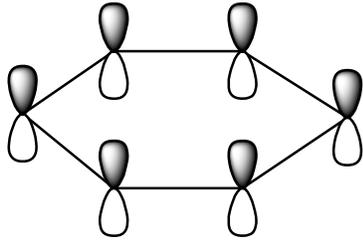


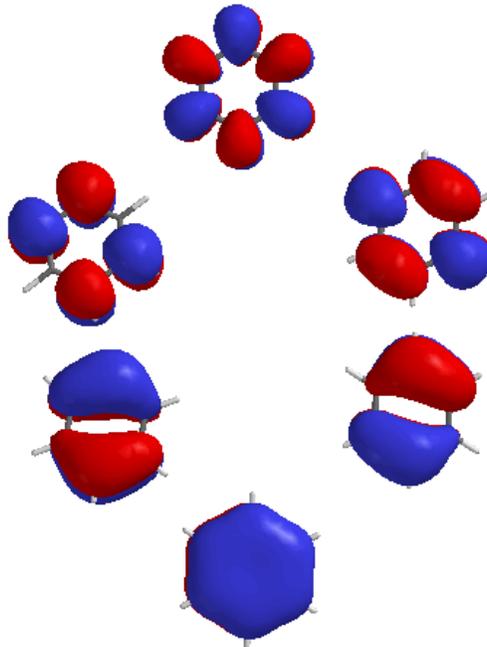
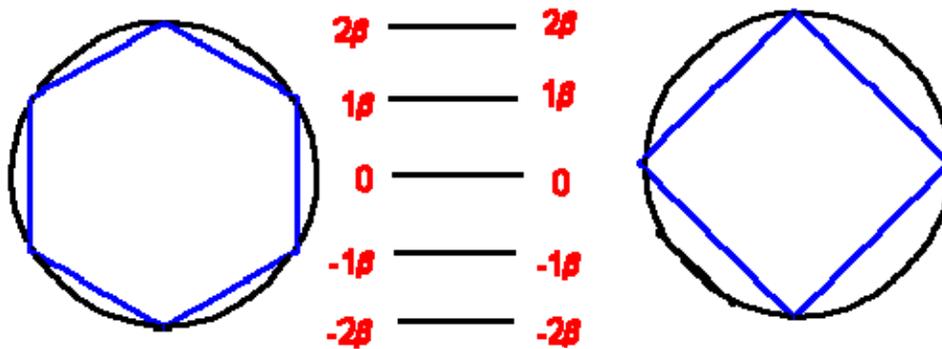
## Benzene Structure Resonance

Hybridization



Molecular Orbital & Frost Circle

The Frost Circle: A method for describing the relative energies of molecular orbitals conjugated cyclic systems



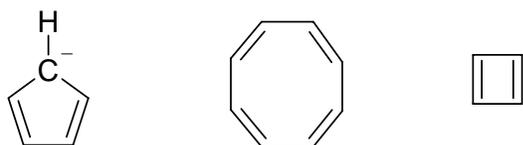
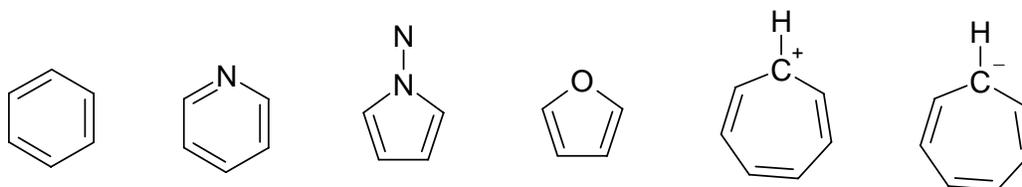
## Huckel's Rule

- Must be cyclic
- Must be planar (if not, non-aromatic)
- Must have  $4n+2$  electrons (If  $4n$ , anti-aromatic)

## Why anti?

Benzene all below the line.

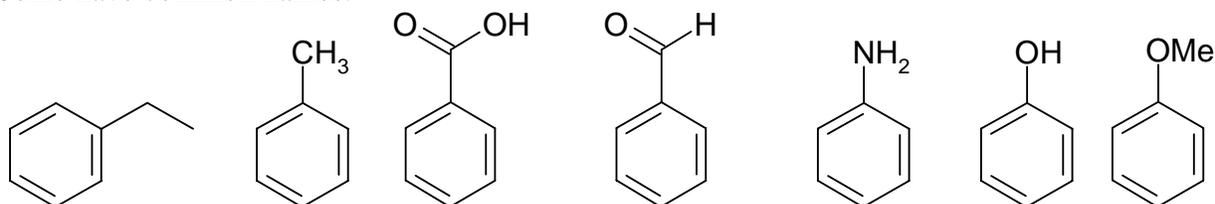
Cyclobutadiene: 2 below, 2 at the line but unpaired. (Unpaired is less good.)



## Nomenclature:

Mono-substituted: The name of the substituent is listed first, followed by the word, "benzene"

Some have common names.



Ethyl Benzene

Toluene

Benzoic Acid

Benzaldehyde

Aniline

Phenol

Anisole

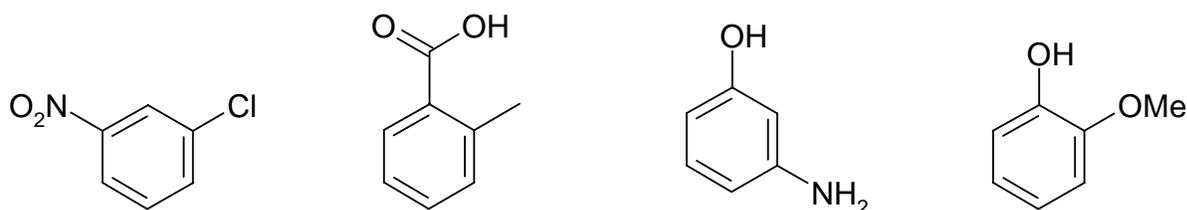
Di substituted : Use the common names when you can.

Example: 1,4-dichloro benzene or *p*-diclorobenzene

*ortho*-, or *o*- for the 1,2 isomer;

*meta*-, or *m*- for the 1,3 isomer;

*para*-, or *p*- for the 1,4 isomer;



1-chloro-3-nitrobenzene

2-methylbenzoic acid

3-aminophenol

2-methoxyphenol