

Molecular Orbital Theory has several advantages and differences over VSEPR & VB theory:

- MO does a good job of predicting electronic spectra and *paramagnetism*, when *VSEPR* and the *VB* theories don't.
- The *MO* theory like *VB* theory, predicts the bond order of molecules, however it does not need resonance structures to describe molecules
- MO theory treats molecular bonds as a sharing of electrons between nuclei. Unlike the *VB* theory, which treats the electrons as *localized hybrid orbitals* of electron density.
- MO theory says that the electrons are *delocalized*. That means that they are spread out over the entire molecule.

The main drawback to our discussion of *MO* theory is that we are limited to talking about *diatomic molecules* (molecules that have only two atoms bonded together), or the theory gets very complex.

MO Terminology:

- σ -bonding orbital:* stabilizing MO that exists between nuclei.
- σ^* -anti-bonding orbital:* destabilizing MO that exists between nuclei.
- π -bonding orbital:* stabilizing MO that exists above and below the internuclear axis.
- π^* -anti-bonding orbital:* destabilizing MO that exists above and below the internuclear axis.
- node:* region of zero probability
- ground state:* lowest energy configuration of electrons in a molecule
- excited state:* electron(s) moved to higher energy MO's