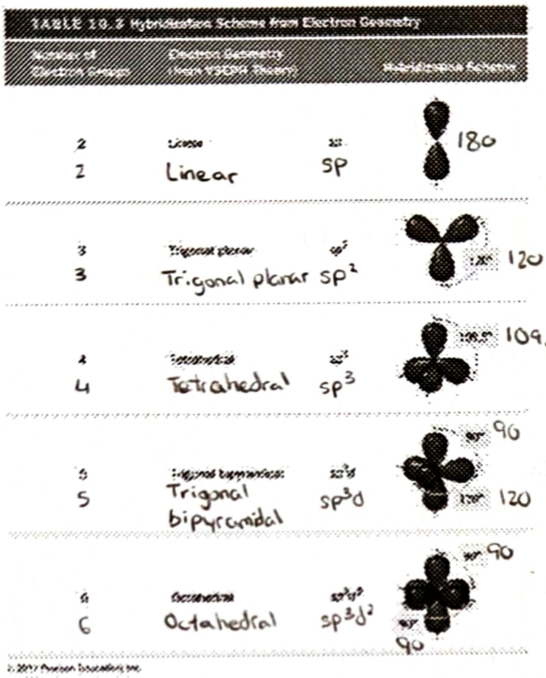


TABLE 10.3 Hybridization Scheme from Electron Geometry

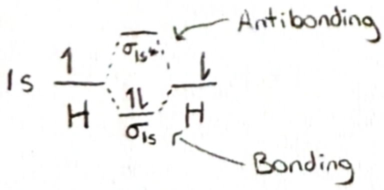
| Number of Electron Groups | Electron Geometry (from VSEPR Theory) | Hybridization Scheme | |
|---|---|---|---|
| 2 | Linear | sp | 180 |
| 3 | Trigonal planar | $sp^2$ | 120 |
| 4 | Tetrahedral | $sp^3$ | 109.5 |
| 5 | Trigonal bipyramidal | $sp^3d$ | 90, 120 |
| 6 | Octahedral | $sp^3d^2$ | 90, 90 |



# Molecular Orbital (MO) Theory

Molecules do not behave as a conglomeration of individual atoms. Atomic orbitals from bonding atoms form molecular orbitals specific to the molecule.

Example: $H_2$

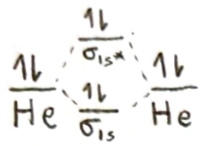



Bond order: $\dfrac{\#\text{ of electrons in bonding orbitals} - \text{antibonding orbitals}}{2}$

Most likely stable when >0

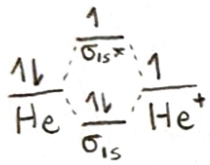
# Molecular Orbital (MO) Theory

Example: $He_2$



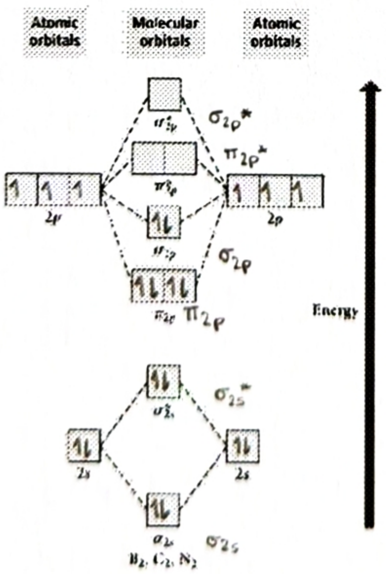

Bond order = 0

Example: $He_2^+$



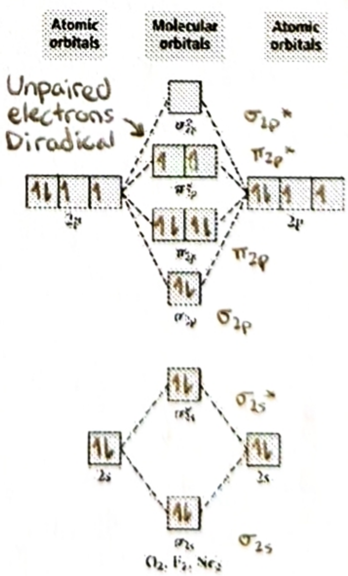

Bond order = $\frac{1}{2}$

# Period 2 Homonuclear Diatomics




$N_2$

Bond order = 3




$O_2$

Bond order = 2

# Paramagnetism vs. Diamagnetism

**Paramagnetism** $O_2$

Results from the presence of unpaired electrons

**Diamagnetism** $N_2$

Property observed when all electrons are paired