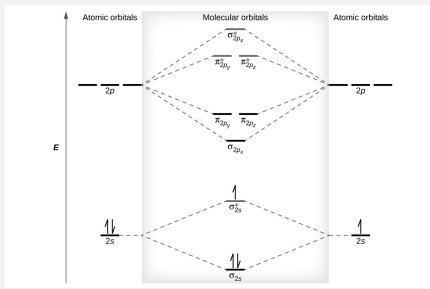


Hybridization	
Formal Charge	$FC = (\text{group \#}) - (\text{loan pairs} + \text{bonds})$
Bond Enthalpy	$\Delta H_{\text{rxn}} = (\text{sum of bonds broken}) - (\text{sum of bonds formed})$
	Weaker bonds broken provide more exothermic reactions. Weaker product bonds make for a less exothermic reaction.
Bond Order and Length	Shorter bond length = greater bond order
	Single bonds are the longest and the weakest Triple bonds are the shortest and the strongest
	Non-integer bond order indicates resonance
Non-polar covalent bonds	ex: Cl-Cl small energy difference in electronegativity
Polar Covalent Bonds	ex: H-Cl medium energy difference
Ionic Bonds	ex: Li-Cl large energy difference (over 1.7)
Average Bond Order	$ABO = (\text{\# of bonds in the molecule}) \div (\text{\# of resonance structures})$

MO Theory	
	
MO diagram for F ₂ , O ₂ , Ne ₂ , and all other molecules	

MO Theory	
Bond Order	$(\text{bonds} - \text{antibonds}) \div 2$
Bonds	σ, π
Anti-Bonds	σ^*, π^*
Sigma Bond	hybridized \
Pi Bond	unhybridized p orbital \
Loan Pair	Spin Paired \ $\rightarrow X$

VSEPR			
Number of Electrons	Electron Geometry	Atoms + Loan Pairs	Molecular Geometry
2	linear	2+0	linear
3	trigonal planar	3+0	trigonal planar
		2+1	bent
4	tetrahedral	4+0	tetrahedral
		3+1	trigonal pyramidal
		2+2	bent
5	trigonal bipyramidal	5+0	trigonal bipyramidal
		4+1	see-saw
		3+2	T-shaped
		2+3	linear
6	octahedral	6+0	octahedral

VSEPR (cont)	
5+1	square pyramidal
4+2	square planar

Polarity	
Requirements for a Polar Molecule	Bonds must be polar The molecule cannot have symmetry A bond is polar if one side is more electronegative than the other

MO Theory	
	
Diagram for B ₂ , C ₂ , and N ₂	

The Born-Haber Cycle			
Sublimation	Na (s) + 1/2 Cl ₂ (g) $\rightarrow$ Na (g) + Cl (g)	+107.32 kJ	
Cl-Cl bond energy	Na (g) + Cl (g) $\rightarrow$ Na (g) + 1/2 Cl ₂ (g)	+121.68 kJ	
ionization energy of sodium	Na (g) + 1/2 Cl ₂ (g) $\rightarrow$ Na ⁺ (g) + Cl (g) + e ⁻	+496 kJ	
Electron Affinity of Cl	Na ⁺ (g) + Cl (g) + e ⁻ $\rightarrow$ Na ⁺ (g) + Cl ⁻ (g)	-349 kJ	
Lattice Energy of NaCl	Na ⁺ (g) + Cl ⁻ (g) $\rightarrow$ NaCl (s)	-786 kJ	



Sigma and Pi Bonds

Valence Bond Theory When two atoms are in close proximity to one another, they arrange themselves at the lowest possible energy

Sigma bonds Formed by end-on overlap of orbitals along the internuclear axis

the electron density is highest right between the two atoms

Pi bonds Formed by side on overlap of orbitals

there is no electron density between the atoms

Weaker than sigma bonds

Valence electron pairs	Electron Geometry	Hybridization
------------------------	-------------------	---------------

2	linear	sp
---	--------	----

3	trigonal planar	sp ²
---	-----------------	-----------------

4	tetrahedral	sp ³
---	-------------	-----------------

5	trigonal bipyramidal	sp ³
---	----------------------	-----------------

6	octahedral	sp ³
---	------------	-----------------

Single Bonds	one sigma bond
--------------	----------------

Double Bonds	one sigma, one pi bond
--------------	------------------------

Triple Bonds	one sigma, two pi bonds
--------------	-------------------------



By **mjb**
cheatography.com/mjb/

Published 9th November, 2020.
 Last updated 9th November, 2020.
 Page 2 of 2.

Sponsored by **CrosswordCheats.com**
 Learn to solve cryptic crosswords!
<http://crosswordcheats.com>