Bonding - Ch. 7

Types of Bonding

I. holds everything together!
II. All bonding occurs because of
III. Ionic Bonding
  A. Bond that exists between
  B. Involves the from the
  C. Ionic solids have a structure.
IV. Covalent Bonding (bonding)
  A. Bond that exists between
  B. Involves
  C. Includes:
    1. Polar covalent -

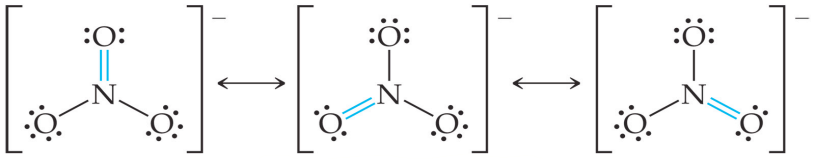
      a. hydrogen bonding:
      b. dipole-dipole:
    2. Nonpolar Covalent -
( ).
V. Metallic Bonding
  A. Bonding that exists between
  B. Electrons are
  C. Electrons act like

Lewis Structures - Covalent Bonding

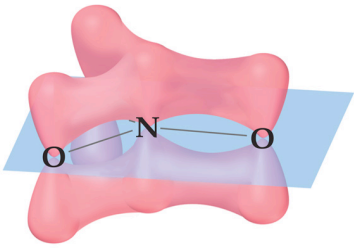
I. All smaller atoms want ( )
  A. Except for ( )
  B. Some atoms with can have (
).
II. Lewis Structures show how molecules
  A. A line represents a

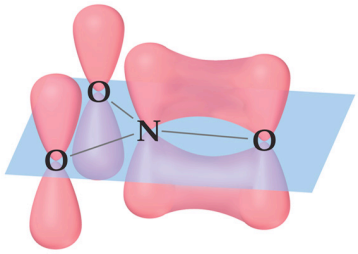
  B. Unshared/lone pair -
III. How to draw them:
  A. Count the total number of valence electrons
  B. Arrange the atoms (C is usu. middle. Also, element that is least abundant is in the middle).
  C. Draw single bonds between all atoms and subtract the number used from total (one line=2 electrons!)
  D. Place the rest of the electrons around outer elements until all of them have eight.
    1. Extra electrons? Put them on the central atom.
    2. Need electrons? Move electrons from outer atoms to create double and triple bonds.
  E. Check work!
    1. Does the number of electrons in structure equal the total number of valence electrons?
    2. Does every element follow the octet rule?

Bonding - Ch. 7



IV. Resonance structures:
A. Shown through a double sided arrow: ↔
B. Actual structure is an (like an average) of all the resonance structures.
C. Therefore, the bonds present.

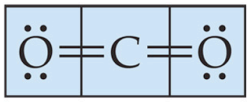


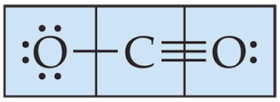


V. Ions: Don't forget to place around ions and to

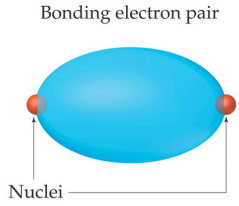
VI. Exceptions to Octet Rule
A. Some are :
B. Some can be : P, S, Cl, As, Se, Br, Kr, Sb, Tr, I, Xe (p. 171)
1. Because
2. Place any extra electrons on the central atom of these even if it already has eight!
VII. Acidic and basic Lewis structures:
VIII. A more thorough method of checking your structure:
A. Molecules will be arranged in the structure in which

B. Formal charge =
C. Calculate formal charge for each atom in structure!
D. This explains the octet rule exceptions (Ex. BeF_2).



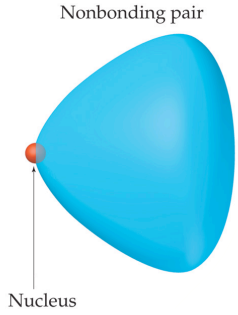


VSEPR



I. VSEPR states that
A. Electrons will orient themselves
B. Lone pairs, since they are , will

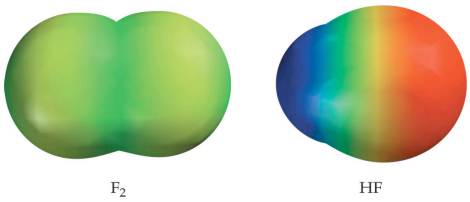
C. This is used to predict (Think in 3-D!!!)
II. Refer to the table summarizing the shapes.
A. Angular means bent.



Polarity

I. Electronegativity (Table 6.5 on p. 154):
A. Used to determine
B. If difference is...
1. =
2. =

Bonding - Ch. 7

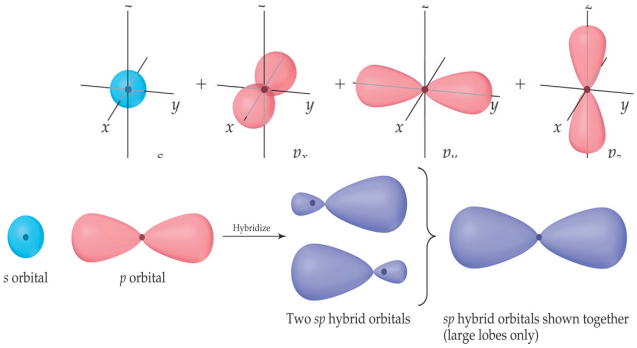


3. =
4. For , the bond is . The bond is

C. The trend in type of bond is the same as the trend regarding

II. Dipole: Molecule that has ( ) on one end and a ( ) on the other.
III. Dipole moment shows ( )
IV. How to determine polarity:
A. If all dipole moments (polar bonds) If they do not cancel out, the molecule is ( ).
B. Generally, ; . DO NOT explain using only the symmetry argument!

Orbital Hybridization

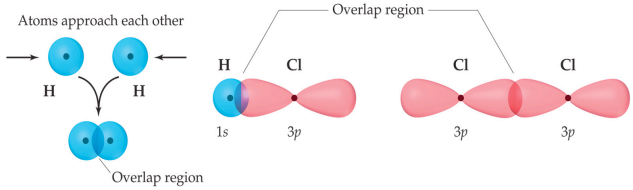


I. The shapes we know don't match shapes from Ch. 6!!!
A. As elements form a bond, their orbitals become a

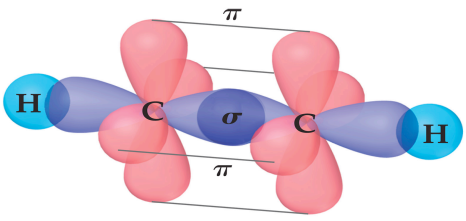
B. You can find
1. Look at table again...hybridization =

2. Ex: NH_3 = 1 lone pair & 3 atoms=4 orbitals. Thus, it is sp^3 hybridized.

II. Multiple Bonds (memorize)
A. A single bond is known as a ( ) bond.

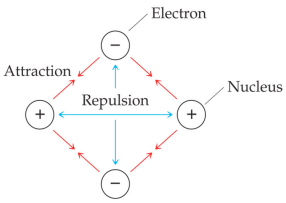


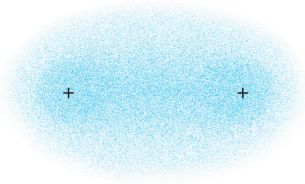
B. A double bond contains ( ) bond and ( ) bond ( ).
C. A triple bond contains ( ) bond and ( ) bonds.
D. π bond is σ bond.
E. Examples...

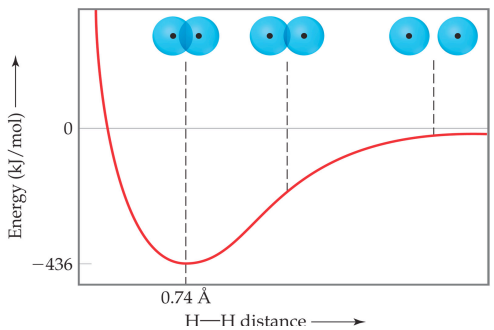


Nature of Bonding

I. Covalent bond nature
A. Two nuclei have multiple electrostatic forces acting within it.
1.
2.
B. Attractive forces at an .
C. hold bond together.







II. Ionic bond nature

A. Metals have and would more likely to a nonmetal (which have).

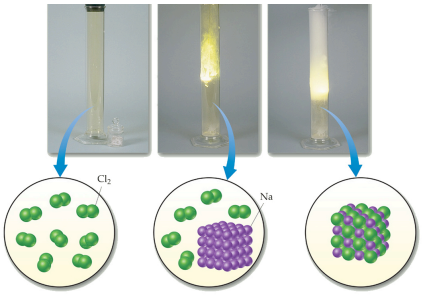
B. Ionic structures are held together by ( )..

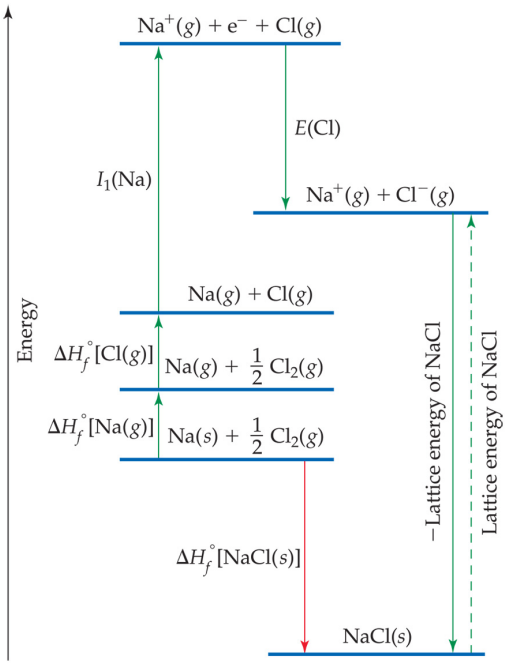
C. Ionic compound is more stable because all ions involved

TABLE 7.2 Successive

Element	I_1
Na	495
Mg	738

O −141	F −328	Ne > 0
S −200	Cl −349	Ar > 0
Se −195	Br −325	Kr > 0
Te	I	Xe





III. Properties:

A. Ionic compounds are orderly ( ) so they are

B. Molecules don't usually form ordered structures so

IV. Bottom line: All elements want to bond because they form

V. More on this in later chapters...

VI. One more thing...

A. Ionic bond strength

1.

2. The , the

3. Predicted by Coulomb's Law:

a.

i. F=

ii. k_e=

iii. q_1 &q_2 =

iv. r=

4. Electrostatic attraction is...

a.

b. between charges.

5. The

Compound	Lattice Energy (kJ/mol)	Compound	Lattice Energy (kJ/mol)
LiF	1030	$MgCl_2$	2326
LiCl	834	$SrCl_2$	2127
LiI	730		
NaF	910	MgO	3795
NaCl	788	CaO	3414
NaBr	732	SrO	3217
NaI	682		
KF	808	ScN	7547
KCl	701		
KBr	671		
CsCl	657		
CsI	600		