

Hey, Baby. You and I Have a Bond...Ch. 8

C. Structures for polyatomic ions:

1. When drawing a Lewis structure of an ion, follow all the steps above and then:
 - a. A charge means that you must add or subtract that number of electrons.
 - b. A charge means that you must add or subtract that number of electrons.

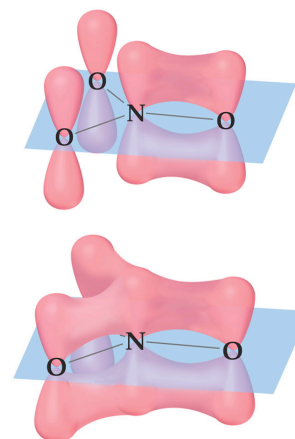
- c. Place the central atom in the middle.
- d. Place the surrounding atoms around the central atom.

2. Ex: NH_4^+



D. Lewis Structures:

1. For some molecules, there are multiple Lewis structures.
2. These molecules show resonance.
3. The average of all the resonance structures is the real structure.
4. Draw a Lewis structure for each of the following.
5. Example: NO_3^-



E. Octet Exceptions:

- 1.
- 2.
- 3.

V. Molecular Shapes (see handout)

A. Lewis structures can be used to predict shapes.

B. The shape of molecules is described using

C.

1.

D. We Will Study Five Shapes

1.

- a. Bond angle = 180°
- b. Examples: O_2 , HCl , CO_2

2.

- a. Bond angle = 120°
- b. Example: BCl_3 , CO_3^{2-}

3.

- a. Bond angle = 109.5°
- b. Examples: CH_4 , CF_4

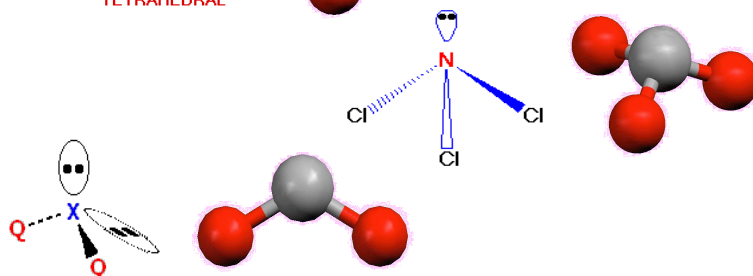
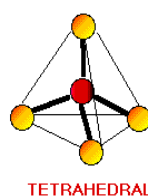
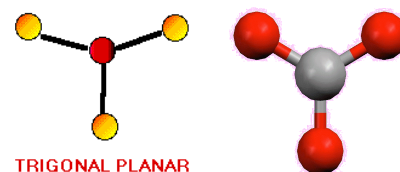
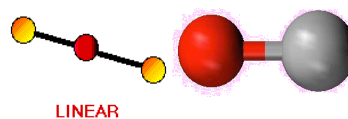
4.

- a. Bond angle = 109.5°
- b. Examples: NH_3 , PCl_3

5.

- a. Bond angle = 180°
- b. Example: H_2O

models



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E. Examples:

What is the shape of PI_3 ?

What is the shape of HCN?

VI. Polarity

A. A molecule is

B. Determining Polarity:

1. The

determine whether the molecule is

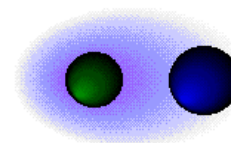
2.

3.

4.

5. NOTE: ALL

, no matter the



C. Examples:

Water

Formic Acid (HCOOH)

CH_4

CH_3Cl

SO_3

VII. Types of Covalent Bonds

A. Electronegativity (EN) and Covalent Bonding

1. Elements have different EN's.

2.

Ex: Cl_2 , O_2 .

3.

a. Dipoles are bonds with

b. The

Designated with " δ ".

().

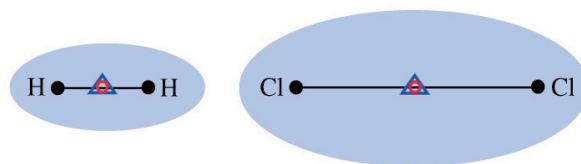
B. Predicting Bond Types –

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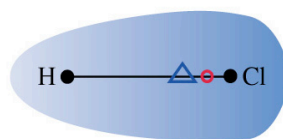
1.

2.

3.



(a) Nonpolar covalent bonds



(b) Polar covalent bond

● = Atomic nucleus

△ = Center of positive charge

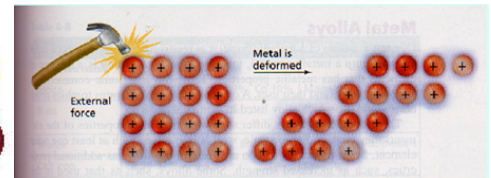
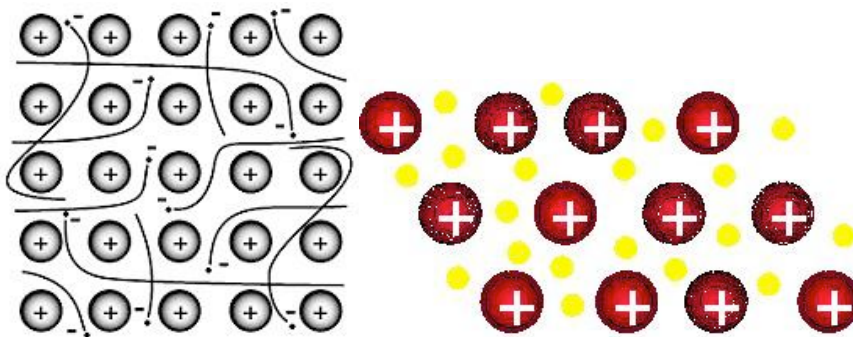
○ = Center of negative charge

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VIII. Properties of Covalent Compounds

- A. Between molecules, the forces are
 - 1. Because of this, they are
 - 2. They also have
- B. Electrons are
 - 1. Thus, they

IX. Metallic Bonding

- A. Metals have
- B. When metals are bonded, they don't want their electrons.
- C. Their electrons thus flow like a
- D. This gives rise to the fact that metals are



X. Bond Energetics

- A. Energy changes in bonds
 - 1. When a bond is , energy is
 - 2. When a bond is , energy is