

Ch 9 HW Sec Assess 3-9 Rev Con 44,46
Sec 9.1
obj: Distinguish between molecular compounds and ionic compounds.

Molecular Compounds (Covalent Compounds)

- Pure substance that is a chemical combination of nonmetal elements.
 - A molecule is the smallest particle of the compound that has the properties of the compound.
- * Chemically Combined Atoms.
* Atoms combine in simple whole # ratios.

10/9/02 8:14 AM

Carbon Monoxide \Rightarrow Carbon + Oxygen atoms

CO ratio \Rightarrow 1 to 1

Water \Rightarrow Hydrogen + Oxygen atoms

H_2O ratio \Rightarrow 2 to 1

Tri nitrogen Dioxide \Rightarrow Nitrogen + Oxygen Atoms

N_3O_2 ratio \Rightarrow 3 to 2

- = All molecules are electrically neutral.
- All molecules are chemically stable.

Oct 13 - 8:51 AM

Ionic Compounds

- = Ions combine electrically.
- Ions are atoms which have lost or gained 1 or more valence electron
- * Ions are different than the atoms.
- * Ions are Chemically stable.
- * Ions have an electrical charge.

Oct 13 - 8:57 AM

- Types of Ions

1) Cation

- a positively charged ion.
- The atom has lost 1 or more valence electron
- The metal elements are the only elements that lose valence electrons.
- The number of valence electrons that representative elements lose are indicated by their group number.

Groups

1	2	13
IA	IIA	IIIA
Loses	Loses	Loses
$1e^-$	$2e^-$	$3e^-$

Oct 13 - 9:05 AM

- Group 1 - Alkali Metals (IA)
* Lose 1 e⁻

Potassium $\underline{K} \Rightarrow$ Potassium Atom
 $K^{1+} \Rightarrow$ Potassium Ion

- Group 2 - Alkaline Earth Metals (IIA)
* Lose 2 valence electrons

Magnesium $Mg \Rightarrow$ Magnesium Atom
 $Mg^{2+} \Rightarrow$ Magnesium Ion

- Group 13 (IIIA): Boron or
Aluminum Group.

* Atoms Lose 3 Valence electrons.

Aluminum $Al \Rightarrow$ Aluminum Atom
 $Al^{3+} \Rightarrow$ Aluminum Ion.

10/9/02 8:50 AM

2) Anion

- Negatively charged ion

- Atom gains 1 or more valence electron.

- Only nonmetal elements form anions.

(VIIA) - Group 17 - Halogens

* Gain 1 valence electron.

Flourine $F \Rightarrow$ Flourine Atom

$F^{1-} \Rightarrow$ Flouride Ion

Oct 13 - 9:19 AM

- Group 16 - Oxygen Family (VIA)

* The nonmetals gain 2 valence electrons.

Oxygen $O \Rightarrow$ Oxygen Atom

$O^{2-} \Rightarrow$ Oxide Ion.

- Group 15 - Nitrogen Family (VA)

- The nonmetals gain 3 valence electrons.

Phosphorous $P \Rightarrow$ Phosphorous Atom.

$P^{3-} \Rightarrow$ Phosphide Ion.

10/9/02 8:56 AM

- Ionic Compounds have a cation and an anion.

* Ionic Compounds are neutral

- The charge of the cation cancels the charge of the anion.

- The smallest particle of an ionic compound is called a formula unit.

$NaCl \Rightarrow$ Sodium Chloride

Formula Unit

10/9/02 9:01 AM

Properties of both Molecular & Ionic Compounds.

Property	Molecular Compound	Ionic Compound
State of Matter @ Rm Temp	gas, Liquids, Solids	Crystalline Solids
Melting Pts	Low Melting Pts * Less than 300°C	High Melting Pts * Greater Than 300°C
Smallest Particle Formed	Molecule	Formula Unit.
Electrical Charge	Chemically combined atoms Neutral	Electrically Combined ions. Neutral
Chemical Stability	Stable	Stable
Type of elements	Only nonmetals	Metal + Nonmetals

10/9/02 9:15 AM