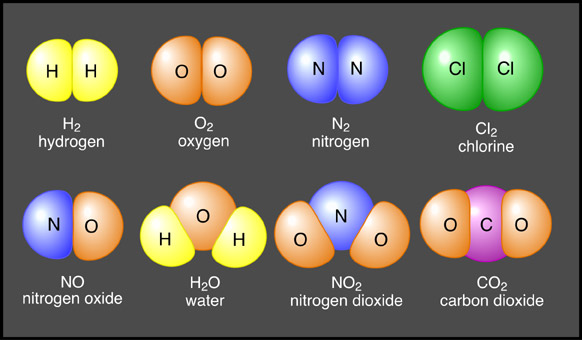
Section 5.8 and 5.9

Ionic Compounds



There are over one hundred elements and thousands of different compounds are formed when these elements combine.

Formulas are written to represent them

Need to know:

1. Must know the valence (electrons in outer ring) or combining capacity of each element.
2. The sum of charges between two elements need to equal zero
3. Metals and nonmetals combine to form ionic compounds
4. Pure substances that involve metals and polyatomic ions (groups of atoms that tend to stay together and carry an overall charge) are called polyatomic compounds.

Steps for Writing Formulas for Ionic Compounds

1. Write the symbols; **METALS FIRST**

Ca I

calcium iodine

1. Write the ionic charge above each symbol to indicate the stable ion that each element forms. **USE THE CHEAT SHEET**

2+ 1-

Ca I

Hand out the cheat sheet and have students highlight 1+, 2+, 3+, 1-, 2-, and 3- columns. This sheet is to be used on a regular basis.

1. Determine how many ions of each type you need so that the **total ionic charge is ZERO.**

(2+) + 2(1-) = 0

ONE CA2+ ION WILL BALANCE THE CHARGE OF TWO I 1- IONS

1. Write the formula using subscripts to indicate the number of ions of each type.

**CA1I2 or CaI2**

Add the Bohr diagram to help visualize what is occurring.

Try the following:

Al S

Aluminum Sulfur

Provide the answer on the board and add the Bohr diagrams to help

Home work:

Write formulas for each of the following, provide the steps involved:

1. **Lithium and fluorine**
2. **Calcium and bromine**
3. **Sodium and nitrogen**
4. **Aluminum and nitrogen**
5. **Sodium and iodine**

**Answers**

1. **Li1+ F1-**

**Balanced by one of each - LiF**

1. **Ca2+ Br1-**

**Balanced by having two Br – CaBr2**

1. **Na1+ N3-**

**Balanced by having 3Na – Na3N**

1. **Al3+ N3-**

**Balanced by having one of each - AlN**

1. **Na1+ I1-**

**Balanced by having one of each - NaI**

Steps for writing formulas for Polyatomic Compounds – Provide the list of common polyatomic ions and their charges.

1. Write the symbols of the metals and of the polyatomic group

Na SO4

Sodium Sufate

1. Write the ionic chagres

1+ 2-

Na SO4

1. Choose the number of ions to balance the charge

2(1+) + (2-) = 0

TWO Na+ IONS WILL BALANCE THE CHARGE OF ONE SO4 2- ION

1. Write the formula using subscripts

**Na2SO4**

Try calcium carbonate - place the answer on the board

**Ca 2+ CO3 2-**

**Balance by having one of each - CaCO3**

**Try the following:**

1. **Sodium phosphate**
2. **Calcium sulfate**
3. **Potassium chlorate**
4. **Aluminum hydroxide**
5. **Beryllium nitrate**

**Answers:**

1. **Na1+ (PO4)3-**

**Balanced by having 3Na – Na3PO4**

1. **Ca2+ (SO4)2-**

**Balanced by having one of each – CaSO4**

1. **K1+ (CLO3)1-**

**Balanced by having one of each – KCLO3**

1. **Al3+ OH1-**

**Balanced by having 3OH – Al(OH)3**

1. **Be2+ (NO3)1-**

**Balanced by having 2NO3 – Be(NO3)2**

**Naming Ionic and Polyatomic Compounds**

**Instructions for Naming Compounds - Ionic & Molecular**

Ionic Compounds

* Metal is named first & keeps its name
* Non-metal is named last & has the suffix -ide”

Writing Formulas – Ionic Compounds

* Metal symbol is written first
* Non-metal symbol is written second
* Numerical subscripts are used to indicate the number of atoms needed to ensure the complete exchange of electrons (full/empty outer shell)

Molecular Compound

* First non-metal name remains the same
* Last non-metal name add “-ide”
* Use prefixes to indicate number of atoms of each type

**Prefixes**:

Mono – one (not used for 1st element in compound) Di for two

Tri for three Tetra for four

Penta for five Hexa for six

Hepta for seven Octa for eight

Nona for nine Deca for ten

Example: CO2 is carbon dioxide. N2O5 is dinitrogen pentoxide.

Polyatomic Ions

* Special ions
* Treat like anion or cation
* Name does not get “-ide” on the end

Multivalent Metals

* Name the same as normal cation
* Add roman numerals in brackets to indicate charge (name only)
* Ex. Copper (II) Oxide - CuO

Multivalent Metals - see transition area of periodic table

* Chromium: Cr2+, Cr3+, Cr6+
* Cobalt: Co2+, Co3+,
* Copper: Cu+, Cu2+
* Iron: Fe2+, Fe3+
* Lead: Pb2+, Pb4+
* Manganese: Mn2+, Mn3+, Mn4+, Mn7+
* Mercury: Hg2(2+), Hg2+
* Nickel: Ni2+, Ni3+
* Tin: Sn2+, Sn4+

Special Elements

* Carbon C (can work with 1+, 2+, 3+, 4+)
* Nitrogen (can work with 3+, 5+, 3-)
* Phosphorus (can work 5+, 3+,3- )
* Sulphur (can work 4+, 6+,2−)

Class work and home assignments

1. Hand out the work sheet.
2. Show home assignments that are to be completed.