**Matter**

**Diatomics**- a group of elements that exist in pairs (theirs 7 of them!)

H2 = Hydrogen  
O2= Oxygen  
F2= Fluorine  
Br2= Bromine  
I2= Iodine  
N2= Nitrogen  
Cl2= Chorine

Heterogeneous (different throughout)  
- Garbage  
-Soil

Homogeneous (same throughout)  
- Solutions  
 - Something dissolved into H2O is Aqueous  
Ex- NaCl(aq)= salt water

Compound  
-two of more elements Combined Chemically in a definite ratio  
- Two or more capital letters   
Ex- NaCl

Element  
-Can not be broken down by any means

-Only ONE capital Letter  
Ex -Na

Mixtures  
combined and broken down physically

Substance   
(Homogeneous= same throughout, uniformly composed)

**Particle Diagrams**

**-Monatomic elements**

**-Diatomic Elements**

**-Compound**

**-Mixture of elements**

**-Mixture of compounds**

**-Mixture of elements AND compounds**

**Formula Writing**

**Ionic Compounds- A transfer of electrons from a metal to a non-metal  
  
Caton= positively charged ion (Metal of NH3)  
Anion= negatively charged particle (-Non-metal or polyatomic ion Table E)**

**Covalent (Molecular)- a sharing of electrons between non-metals  
  
Both qualitative and quantitative information is given in a chemical formula  
Qualitative= what elements are Present  
Quantitative= how many atoms of each element are present  
Ex- H2O-   
Qualitative = Hydrogen, Oxygen  
Quantitative = 2=Hydrogen  
 1= Oxygen**

**Counting Atoms   
Coefficients represent Moles   
  
2H2O= two moles of water  
Hydrogen = 4 atoms  
Oxygen = 2 atoms   
If theirs Multiple polyatomic ions in a compound use parentheses  
  
Empirical Formula  
- Represents the simplest whole number ratio of atoms in a compound  
-Ionic compounds are always written in empirical form  
- Covalent compounds can have both a molecular form and an empirical form  
- Molecular formula = represents the actual number of atoms in a molecule**

**Empirical  
ex- C6H12O6 CH6O**

**Naming Covalent Compounds  
Binary compound = a compound composed of two elements**

**All binary compounds end in the “ide” suffix**

1 atom = NO prefix

**1st element =**

2 or more = prefix

**2nd element always gets a prefix and ends in “ide”**

**Prefix**

**Mono = 1**

**Di = 2**

**Tri = 3**

**Tetra = 4**

**Penta = 5**

**Hexa = 6**

**Hepta = 7**

**Oct = 8**

**Non = 9**

**Deca = 10**

**CO2 N2O5 P4O10  
Carbon Dioxide Dinitrogen Pentoxide Tetraphosphorus decoxide**

**Naming Binary Ionic Compounds   
(with 1 oxidation state)   
  
1. CHECK for a metal**

1 oxidation name the metal as is and add “ide” suffix to the Non-metal

**2. CHECK the number of oxidation states**

More than one oxidation state use the stock system

**NaCl AlBr3  
Sodium Chloride Aluminum Bromide**

**Formula Writing with Binary Ionic Compounds**

1. **Crisscross the oxidation state to become subscripts**

**2. Reduce the ratio of atoms**

**Ex- Sodium Bromide Sodium Oxide**

**Na +1 Br -1 Na+1O-2**

**NaBr Na2O**

**Formula Writing- Ionic Compound containing polyatomic ions (TABLE E)**

**Sodium Carbonate Aluminum Carbonate  
Na+1(CO3)-2 Al+3(CO3)3**

**Na2CO3 Al2(CO3)3**

**The StockSystem**

**The stock system is used when naming and writing formulas from a compound in which one of the elements take on multiple oxidation states.**

**I = +1**

**II = +2**

**III = +3**

**IV = +4**

**V = +5**

**VI = +6**

**VII = +7**

**Iron (II) Oxide Tin (II) Sulfide**

**Fe+2O-2 Sn+2S-2**

**FeO SnS**

**Naming Ionic Compounds Using the Stock System**

**Fe2O3**

**Iron (III) Oxide**

**+6 -6 =0**

**+3 -2**

**Fe2 O3**

**1. Arrhenius acid yields an H+ ion as the only positive ion in the solution therefore formulas that contain hydrogen as the first elements are acids**

**Binary Table E**

**HF – Hydrofluoric “Ate” 🡪 “ic”**

**HCl – Hydrochloric “Ite” 🡪 “ous”**

**HBr – Hydrobromic**

**HI – Hydriodic acid**

**Types of Chemical Reactions**

1. **Synthesis = the formation of one product (right) from two or more reactants (left)  
   2H2+O2 🡪 2H2O**
2. **Decomposition = the breaking down of one reactant (left) to form 2 or more products (right)  
   2H2O🡪 2H2+O2**

**3. Single Replacement = element1 + compound1 🡪 element2 + Compound2In order for a single replacement reaction to occur the element must be more active (higher on table E) then the metal in the compound  
Li+NaCl🡪 Na + LiCl**

**4. Double Replacement = compound1 + compound2 🡪 compound3 + compound4**

**NaCl + KBr 🡪 KCL + NaBr**

**Balancing Equations**

**In Chemistry there is a conservation of 3 things**

1. **MASS**
2. **CHARGE**
3. **ENERGY  
     
   Use coefficients (big number in front) to balance equations.  
   Coefficients represent the number of moles  
   2H2+1 O2 🡪 2H2O  
   When balancing equations you must use the simplest whole number coefficients in your final answer.  
     
   2NH3🡪 1N2+3H2  
   2:1:3  
   Sum of coefficients is 6**