**Basic Guidelines for Writing Chemical Equations:**

**Please save this for college…it will be useful.**

**Writing the equation:**

1. Cation with Anion and Cation is written FIRST.

CaCl2 calcium is the metal cation so it must be first Cl2Ca is incorrect.

1. Be sure to watch for “ide”, “ite”, and “ate”.

Sulfide S-2 Sulfite SO3-2 Sulfate SO4-2

1. Make each formula NEUTRAL, new subscripts for new formulas.

Na +1 with Cl-1 is only NaCl

Swap and drop if the charges to not neutral Ca+2 Cl-1 is CaCl2

1. Check all elements for Diatoms (N2, O2, F2, Cl2, Br2, I2, H2 – “7” 6 + H)

Oxygen is O2 but oxide is an anion so it must neutral with the cation.

Calcium and Oxygen yield Calcium oxide (Ca + O2 🡪 CaO)

**Now time to Balance –**

1. ONLY write Coefficient not subscripts! Number MUST be in front of formula.

\_\_\_\_ H2  + \_\_\_\_O2 🡪 \_\_\_\_\_H2O you do not do this….\_\_\_\_ H2  + \_\_\_\_O2 🡪 \_\_\_\_\_H2O2

1. Keep Polyatomic ions together, if possible.

If there is a sulfate on both sides, count it as sulfate, SO4, not 1 S and 4 O

1. Count water as H-OH for hydrogen with hydroxides, “commit and stick”

Hydrogen and Hydroxide, OH-1, like to form water, H2O (H – OH)

1. If you are in an endless loop….you wrote a formula wrong. Double check.
2. If you get stuck with any numbers as ½ then double everything but that number.

**Types of reactions:**

1. Single Replacement - ALWAYS check activity series for all

We will learn about this later in the unit

1. Double Replacement – Cation with Anion and Cation is 1st – new formula may have new subscripts! They must neutral so Calcium and Sodium never have the same amount of chlorine when they bond. CaCl2 and NaCl
2. Combustion – ALWAYS makes CO2 and H2O – follow steps to balance.
3. Balance C
4. Balance H
5. Add up oxygen on product side
6. Subtract any O from CxHyOz if there is O on the carbon compound.
7. Divide final # by 2 and add to O….if not a whole # multiply every coefficient by 2.

**Additional Hints for Balancing Chemical Equations:**

**What to look for and what you should do:**

1. Keep polyatomic ions together and usually when you start with the larges valued ion you will never have to change a coefficient.

For example, I start with Al+3 or PO4-3, before Li+1

1. Leave single elements for last – you can give them any coefficient needed last.

\_\_\_Al + \_\_\_HCl 🡪 \_\_\_AlCl3  + \_\_\_H2 Save aluminum for last….H is diatomic NOT single

1. If you see a 2:3 combination try to start by making both 6

\_\_\_Fe + \_\_\_O2  🡪 \_\_\_Fe2O3  Oxygens on both side should total 6

 Iron is a singlet so leave it for last

1. If you have even numbers with an odd number DOUBLE THE ODD NUMBER. This comes into play often with O2. You will never get an odd number of oxygen balanced with a

diatomic, O2.

\_\_\_Li + \_\_\_O2 🡪 2 Li2O

\_\_\_SnCl2 + \_\_2\_ FeCl3 🡪 \_\_\_SnCl4 + \_\_\_ FeCl2 Start by doubling FeCl3

1. Recognize if you have an element written in more than one place!

\_\_\_CaCO3 🡪 \_\_\_CaO + \_\_\_ CO2 This is already balanced - Oxygen is used twice.

1. If you have H and OH on one side and H2O on the other – look at water is H-OH. COMMIT – 2H2O = 2H’s & 2 OH’s not 4 hydrogen and 2 oxygen

\_\_\_ H2SO4 + \_\_\_ Al(OH)3 🡪 \_\_ Al2(SO4)3 + \_\_\_ H2O If you start with H2 is looks good but its not.

 Start with your highest value ion Al+3 first and count water as H- OH, and then bounce

 From cation on one side to anion on the other and so forth.

 Here are step by step of what Mrs. H would do…..

\_\_\_ H2SO4 + 2 Al(OH)3 🡪 \_\_ Al2(SO4)3 + \_\_\_ **H-OH** 2 Al on product so make 2

 That made 2 x 3 = 6 OH then make 6 OH on product side

\_\_\_ H2SO4 + 2 Al(OH)3 🡪 \_\_ Al2(SO4)3 + 6 H2O That now makes 6 OH’s…. 6 H-OH

 Which now makes 6 H’s

 3 H2SO4 + 2 Al(OH)3 🡪 \_\_ Al2(SO4)3 + 6 H2O That makes 3 SO4 and you should be done!

 3 H2SO4 + 2 Al(OH)3 🡪 \_\_ Al2(SO4)3 + 6 H2O See done!

1. If you are unable to balance and find yourself needing to double touch numbers again, then CHECK YOUR FORMULAS since one usually will be written wrong.