SIMPLIFIED RULES FOR NAMING

Rules for naming compounds: Structure → Name
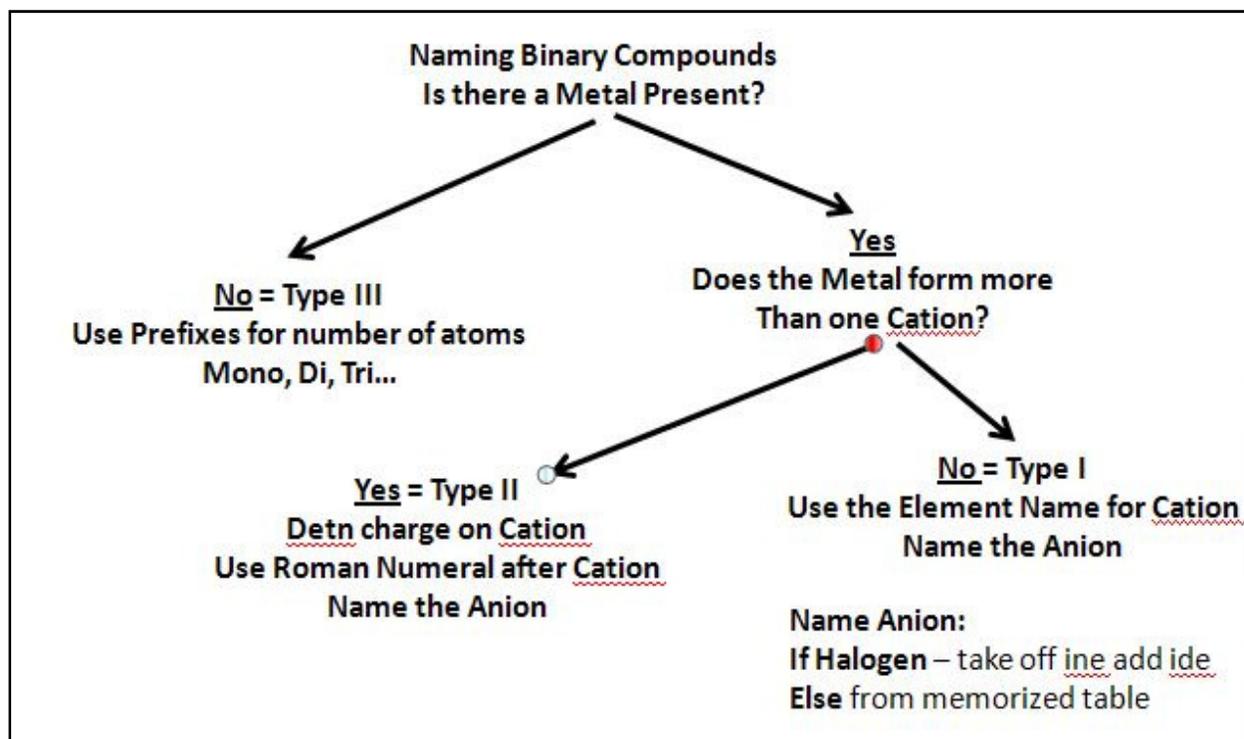
1. If it begins with an H, it's an acid, except for water. You need to memorize the common acids:

    H₂SO₄   Sulfuric Acid   **H₂O**   Di-Hydrogen Oxide

    HNO₃   Nitric Acid   **H-OH** Hydrogen Hyrdoxide [always write like this]

    HCl   Hydrochloric Acid

2. What is the Cation [+], what is the name of the Cation element?

    MgCl₂   Mg is the Cation and is Magnesium

3. Follow the rules below for naming.

Rules for naming compounds: Name → Structure

1. Convert the Cation Name, the first name of the compound to a Chemical Symbol

      Sodium → **Na**   **Sodium** Chloride   NaCl

                              Sodium Carbonate Na_2CO_3

                              Iron (III) Carbonate $Fe_2(CO_3)_3$

2. Convert the Anion Name to a Chemical Symbol   Chloride → **Cl**

3. If the Anion is a Polyatomic, put down the correct formulae for it   Carbonate → **CO_3**

4. Put the charges for the Cation and Anion above the element   **Na^{+1}**   **Cl^{-1}**

                                                          Na^{+1}   **CO_3^{-2}**

                                                          Fe^{+3}   **CO_3^{-2}**

These charges come from various locations. Locate the Cation on the Periodic Table

A. If the Cation is in Group I, the Alkaline Metals, its charge is +1

B. If the Cation is in Group II, the Alkaline Earth Metals, it's charge is +2

C. If the Cation is in the middle of the table, you must memorize the charge.

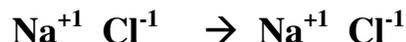D. If the Cation Name has a Roman Numeral after it, that is the charge   Iron (III) → Fe^{+3}

Locate the Anion on the Periodic Table.

1. If the Anion is in Group VII, the Halides, it has a -1 charge

2. Else you must memorize the charge and structure of the Poly Atomic

Now put in the correct number for the subscripts, or multipliers for the charge, so the compound has

a net zero charge: **Na^{+1} Cl^{-1}** → **Na^{+1} Cl^{-1}**

                                      Na^{+1} CO_3^{-2} → **$Na^{+1}{}_2\, CO_3^{-2}$**

                                      Fe^{+3} CO_3^{-2} → **$Fe^{+3}{}_2\, (CO_3^{-2})_3$**

**Note as a shortcut [but don't tell anyone!]**

    The +3 charge for the iron now becomes the 3 subscript for the carbonate

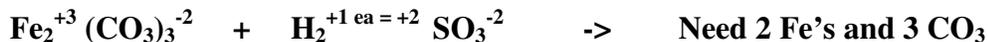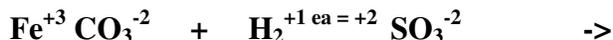   The -2 charge for the carbonate now becomes the 2 subscript for the iron.

Rules for Writing and Balancing and Equation:

5.01 grams of Iron (III) Carbonate is reacted with xcs [Excess] Sulfurous Acid. What are the products and how much of each is formed?

1. Translate the English to Chemical REACTANTS using the above rules. Don't balance charges yet.

$Fe\ CO_3$ + H_2SO_3 ->
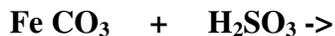
2. Balance the ions in each Reactant Compound so the net charge is zero

$Fe^{+3}\ CO_3^{-2}$ + $H_2^{+1\ ea\ =\ +2}\ SO_3^{-2}$ ->

$Fe_2^{+3}\ (CO_3)_3^{-2}$ + $H_2^{+1\ ea\ =\ +2}\ SO_3^{-2}$ ->   **Need 2 Fe's and 3 CO$_3$**

$Fe_2\ (CO_3)_3$ + H_2SO_3 ->   **Correct Reactants Formulae**

3. Determine the Products and write down the basic compounds.   **AB + CD -> AD + CB**

Use the simple ionic exchange

$Fe_2\ (CO_3)_3$ + H_2SO_3 -> $Fe\ SO_3$ + $H\ (CO_3)$

4. Balance the ions in each Product Compound so the net charge is zero

$Fe_2\ (CO_3)_3$ + H_2SO_3 -> $Fe^{+3}\ SO_3^{-2}$ + $H^{+1}\ (CO_3)^{-2}$

$Fe_2\ (CO_3)_3$ + H_2SO_3 -> $Fe_2^{+3}\ (SO_3^{-2})_3$ + $H^{+1}_2\ (CO_3)^{-2}$

$Fe_2\ (CO_3)_3$ + H_2SO_3 -> $Fe_2\ (SO_3)_3$ + $H_2\ CO_3$

5. Balance the equation [See Below]so there are equal number of each element on each side of the reaction arrow

$Fe_2\ (CO_3)_3$ + $3\ H_2SO_3$ -> $Fe_2\ (SO_3)_3$ + $3\ H_2\ CO_3$

6. With the known amount of starting compound / reactant, determine the molecular weight of that compound

7. Determine the molecular weight of each of the Product Compounds.

8. Set up the simple ratio of known amount of starting material to molecular weight equals x over the mw of each product and calculate the amount of each product. Don't forget to put in all the units!!

9. Write out the answers – the amount of each product in grams [or milligrams] corrected to the proper number of significant digits with the units.

Rules for Balancing an Equation

$$\underline{Fe_2}\,(CO_3)_3 \quad + \quad H_2SO_3 \qquad \rightarrow \qquad Fe_2\,(SO_3)_3 \qquad + \quad H_2\,CO_3$$

1. Take one Cation, the element on the left side, from one compound on the Left [Reactant] side of the equation. I'll take the Fe – see underscore above. I usually take the most unusual or heaviest element.

2. There are 2 Fe's on the left side. How many are on the right Side.

3. There are 2 Fe's on the right side. Attached to the Fe on the right is SO_3.

4. There are 3 SO_3 on the right side. How many are on the left side?

5. There is 1 SO_3 on the left side. So, make it 3 like on the right side:

$$Fe_2\,(CO_3)_3 \quad + \quad \underline{3}\,H_2SO_3 \qquad \rightarrow \qquad Fe_2\,(SO_3)_3 \qquad + \quad H_2\,CO_3$$

6. Attached to the SO_3 on the left side is 3 * 2 H's. How many are on the right side.

7. There is 1 H_2 on the right side, so make it 3 * 2 H's

$$Fe_2\,(CO_3)_3 \quad + \quad \underline{3}\,H_2SO_3 \qquad \rightarrow \qquad Fe_2\,(SO_3)_3 \qquad + \quad \underline{3}\,H_2\,CO_3$$

The equation is now balanced!

Rules for Conversions from one Unit to Another:

1. WRITE DOWN THE MAIN FORMULA: e.g. Density g/cm^3 = Mass (g) / Volume (cm^3)

2. Write down any derived formula for what is to be calculated;   Volume (cm^3) = Mass (g) / Density g/cm^3

3. Put in your values with units: Volume (cm^3) = 123.34 g / 1.00 cm^3

4. Cancel out the units – be sure your answer is in the correct units

5. Do The Math   Add / Subtract   Multiply / Divide   Do it to many digits

6. Calculate the number of Significant Digits that need to be in the answer, use proper rounding.

7. Put the answer in the correct Scientific Notation [Power of 10], if needed

8. **<u>SHOW ALL MATH</u>** ALL FORMULAE ALL UNITS AND ALL UNITS CANCELING.