Formula Writing and Nomenclature:

**(Chemical Names and Formulas)**

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# Chemical Names and Formulas

- Significance of chemical formulas: they represent the _____ of _____ in the formula
  - Always in a _____ proportion for that material
- Ex. NaCl= __ sodium : __ Chlorine
- Ex. $H_2SO_4$= __ Hydrogen : __ Sulfur : __ Oxygen

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# Types of Formulas

1. Molecular- two substances held together by _____ (covalent molecules; polar and non-polar bonding)
   - Example: $H_20$, $CO_2$
2. Ionic- electrically charged particles/_____ held together by opposing charges (ionic compounds)
   - Monatomic ion
     - Ion formed from __ atom
     - Ex. group 1 loses __ electron and becomes _____ charged (Na→ ___ by losing 1 $e^-$)

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# Naming Monoatomic Ions

- Monatomic cations (_____ charged ions) are identified by the element's name
- Example: _____
- Monatomic anions (_____ charged ions) …the element's ending is replaced with "____"
- Example: F (Fluorine)→ _____ ion

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## Binary Ionic Compound

- ____ ions making up a compound
- _____ (__) always is first in name
- _____ (__) always is second in name
  - Example: ____ and ____
    - Sodium chloride
  - The total number of (+) and (-) charges must equal _____.

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## Criss- Cross Method

- When writing/naming the formula use the "criss-cross" method to _____ the charges
- Example:
- Example:

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## Naming a Binary Ionic Compound

- Write name of cation first (+ ion)
- Write name of anion second (- ion)
  - Example: Calcium Bromide
  - When writing the formula use the “criss-cross” method to balance the charges
  - *If _____oxidation states (charges) exists, use “_____” (Roman Numerals of oxidation numbers occurring in the material) for naming the compound.
    - Iron (___) Chloride vs. Iron (___) Chloride
    - Lead (___) Oxide vs. Lead (___) Oxide

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## Stock Nomenclature vs. Older System

- Stock Nomenclature with Roman Numerals
  - Iron (___) Chloride →
  - Iron (___) Chloride →
  - Iron (___) Oxide →
  - Iron (___) Oxide →

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## Stock Nomenclature vs. Older System (continued)

- Older Naming System
  - Uses Latin names→Iron, Fe (from _____)
  - "ic" ending- use _____ oxidation #
    - ex. Ferric chloride (Uses ___)
  - "ous" ending- use _____ oxidation #
    - ex. Ferrous chloride (Uses ___)

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## Polyatomic Ions (Table E)

- Two or more elements in one ion
  - grouped together to form a compound with other monatomic or polyatomic ions
  - Examples:
    - Ca $(NO_3)$ →
    - Na $(CO_3)$ →
    - $(NH_4)$ (OH) →

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# Naming Covalent Molecules

- Composed of Covalently bonded units
  - Usually 2 _____
- When naming, use prefix system for the 1st and 2nd elements

| | |
|---|---|
| Mono | |
| Di | |
| Tri | |
| Tetra | |
| Penta | |
| Hexa | |
| Hepta | |
| Octo | |
| Nona | |
| Deca | |

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# Rules for naming

- When writing the formula, the _____ electronegative element is listed ____ (Table S)
  - Use prefix if there are 2 or more atoms of this element
- The 2nd element is named by combining the prefix indicating the # of atoms
  - followed with base word of 2nd element
  - add "_____" ending
  - if the prefix ends in an "a", drop the "a"
- Example:
  - $P_4O_{10}$=
  - $As_2O_5$=
  - $SO_3$=
  - $ICl_3$=

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# Balancing Chemical Equations

- Chemical equation or _____ tells you the _____ of atoms in the reaction
- Diatomic molecules –(__,__,__,__,__,__,__) atoms that exist in duplicate when not combined with another element
- Law of Conservation of Mass
  - Mass is neither _____ nor _____ during a chemical reaction (must have _____ numbers of atoms of each element on both sides of reaction)

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# Balancing Chemical Equations (continued)

- Use coefficients on both sides of equation to balance
- 1. __Na + __$Cl_2$ → __NaCl
- 2. __Al + __$O_2$ → __$Al_2O_3$
- 3. __Fe + __$O_2$ → __$Fe_3O_4$
- 4. __Ca + __$O_2$ → __CaO
- 5. __NaCl + __$Pb(NO_3)_2$ → __$PbCl_2$ + __$NaNO_3$

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