Naming Ionic Compounds

Review

- An ionic compound is a bond between a metal and a non-metal.
- Metals form a positively charged ions by giving away an electron.
- Non-metals form a negatively charged ions by gaining an electron.
- Anions are always written first in the formula or name.
- Anions have “ide” at the end of the root of the element’s name.
- Cations have “ion” as a second word after the name of the element.
- Changing the number of atoms of each element can assist the compound to have a neutral charge.

Pull Out Blank Periodic Tables

- Make sure the following elements are on the periodic table in the correct locations.
- Group 3
  - Sc^{3+}
- Group 4
  - Ti^{2+}, Ti^{3+}
- Group 6
  - Cr^{2+}, Cr^{3+}
- Group 7
  - Mn^{2+}, Mn^{3+}
- Group 8
  - Fe^{2+}, Fe^{3+}
- Group 9
  - Co^{2+}, Co^{3+}
- Group 11
  - Cu^{2+}, Cu^{3+}
  - Ag^{+}
  - Au^{+}, Au^{3+}
- Group 13
  - Ga^{2+}, Ga^{3+}
- Group 14
  - Sn^{2+}, Sn^{4+}
  - Pb^{2+}, Pb^{4+}

Transition Metals

- For elements that have more than one charge (oxidation value), roman numerals are used within parentheses.
- The number within the parentheses is equal to the charge of the element.
- Transition metals are a sub category of metals; therefore their charge is always positive.

Identifying the Charge of Transition Metals

- Within Ionic Compounds, Transition Metals must be bonded with a non-metal.
- Non-metal elements have a set oxidation value.
- The charge of a transition metal can be identified by working backwards.
- Examples
  - CuO
  - CoCl3
  - Fe2O3

Chemical Formula

- Shows the kind and number of atoms in the smallest piece of a substance.

Polyatomic Ions

- Atoms that are grouped with a charge.
- Must have at least three different atoms.

Polyatomic Cations

- Ammonium: NH_4^+

The only polyatomic cation you need to know.

Polyatomic Anions: suffix "ate"

(Greatest Number of Oxygens)

- Nitrate: NO_3^-
- Carbonate: CO_3^{2-}
- Sulfate: SO_4^{2-}
- Phosphate: PO_4^{3-}
- Chromate: CrO_4^{2-}
- Dicromate: $Cr_2O_7^{2-}$
- Chlorate: ClO_3^-
- Acetate: $C_2H_3O_2^-$ or $CH_3CO_2^-$

Polyatomic Anions: suffix "ite"

(One less Oxygen than "ate")

- Nitrite: NO_2^-
- Sulfite: SO_3^{2-}
- Phosphite: PO_3^{3-}

Polyatomic Anions: Hydrogen prefix

- Bicarbonate: HCO_3^-
- Hydrogen Sulfate: HSO_4^-
- Hydrogen Sulfite: HSO_3^-
- Dihydrogen Phosphate: $H_2PO_4^-$
- Hydrogen Phosphate: HPO_4^{2-}

Other Polyatomic Anions

- Cyanide: CN^-
- Hydroxide: OH^-

Caution:

- If ions are written as a group, use parentheses to represent multiple compounds.
  - Ex: Mg(SO4)2, Al(NO3)3

- The net charge of the compound must be neutral (0).
  - For a compound containing calcium ion, Ca^{2+}, and nitrate, $NO3^{-}$,
  - The ratio must be **1:2** (one calcium ion for every two nitrates).
  - So, the formula would be **Ca(NO3)2.**