Unit 4 Topics Covered

1. Metallic vs. covalent vs. ionic compounds (be able to tell which type it is from a formula or name)

Classification of compounds,

Properties of each type of compound (how they are different from one another)

* + - what are electrons doing
    - Conductivity (When solid? Liquid? Aqueous (dissolved in water)?)
    - state at room temperature
    - malleability/ductility/luster
    - name of individual components (formula units, molecules)

1. naming ionic compounds
   * when/how to use Roman numerals
   * **NO** prefixes (mono, di, tri,…)
   * balance ionic charges
   * polyatomic ions (where found?)
2. naming covalent compounds
   * **NO** Roman numerals
   * how to use prefixes (no “mono” on first element)

\*octet rule as it relates to both ionic and covalent compounds

1. simple Lewis Dot/structural formula
   * count valence electrons, divide by 2, equals number of pairs (number of lines)
   * hook the atoms together in a simple fashion with lines
   * distribute the lines so that everyone has an octet (exceptions: H and B with 2 and 6)
2. Percent Composition

* Calculate the total mass of a compound based on its formula (g/mole)
* Calculate mass of each element in formula and divide by the total mass x 100 = % element composition.

1. Empirical/Molecular Formulas (EF/MF)

* If sample size isn’t given, assume 100.0 g (%s add up to 100%)
* Change mass to moles
* Divide by the smallest # of moles (smallest ÷ smallest = 1)
* If very close to a whole number, round (e.g. 1.98 = 2). If clearly a fraction (1.5 or 2.33), multiply to get a whole # (e.g. 2.5 x 2 = 5; 1.33 x 3 = 4)
* For MF, figure out EF (see above) if not given. Calculate the EF mass (mass of each element present in EF).
* Divide the MFmass (given) by the EFmass to get the “multiplier” (should be a whole number).
* Multiply the EF by the multiplier (e.g. Multiplier = 2, EF = CH2 🡪 2 x CH2 = C2H4)

VSEPR theory – Use the Chart of Shapes

1. VSEPR shapes of covalent molecules

Domains around the center atom and lone pairs (unshared pairs)

2 domains—linear (0 lone pairs)

3 domains—trigonal

trigonal planar (0 lone pairs)

bent (1 lone pair)

4 domains—tetrahedral

tetrahedral (0 lone pairs)

trigonal pyramidal (1 lone pair)

bent (2 lone pairs)

1. polar vs. nonpolar *bonds*

use arrow with plus sign to show direction of dipole: +🡪

using Table K for electronegativity diffs

1. polarity of *molecules*

depends on polarity of bonds and symmetry (asymmetry) of molecules (does it have a direction?)

1. intermolecular forces, which type of compound experiences each? How does that relate to solubility?
   * London dispersion forces
   * Dipole-dipole interactions
   * Hydrogen bonding
   * Ion-molecule interactions

Directly related to Polarity of molecules as well as shape of molecule.