CHEMISTRY CONTENT FACTS

The following is a list of facts related to the course of Chemistry. A deep foundation of factual knowledge is important; however, students need to understand facts and ideas in the context of the conceptual framework. This list is not intended to provide a comprehensive review for State and National Assessments. Its purpose is to provide a highlight of the factual material covered in Chemistry. This list is not all inclusive, be sure to check Nevada State Standards and your district syllabi.

Stoichiometry and Mathematics

- **Mole** of any gas occupies 22.4 dm^3 at STP and contains 6.02 X 10^{23} molecules

- $\# \, of \, moles = \dfrac{given \, mass \, (grams)}{molar \, mass \, (add \, up \, masses \, from \, periodic \, table)}$

- **Avogadro's Law -** equal volumes of gases at same temperature and pressure contain equal # of molecules

- **Molarity** $= \dfrac{\# \, of \, moles \, of \, solute}{Liter \, of \, solution}$

- **Molality** $= \dfrac{\# \, of \, moles \, of \, solute}{Kg \, solvent}$

- **Solubility:** like dissolves like (polarities)

- **Unsaturated solution -** holds less solute than the maximum for given temperature and pressure

- **Saturated -** holds the exact amount of solute the solvent can hold for given temperature and pressure

- **Super saturated -** holds more than the maximum amount of solute for that temperature and pressure

- **Concentrated solution -** holds a large amount of solute for volume solvent

- **Dilute solution** - holds a small amount of solute for volume solvent

- **Solubility of a *solid* -** (ability to dissolve) generally increases as temperature increases

- **Solubility of a *gas*** – generally increase as temperature decreases and pressure increases. Think of when soda goes flat (CO_2 escapes)

- **Boiling point elevation -** for every mole of particles dissolved in solution the boiling point increase by a constant amount. i.e. for H_2O, $k_b = 0.52$ °C/molal

- **Freezing point depression -** for every mole of particles dissolved in solution the freezing point decreases by a constant amount. i.e. for H_2O, $k_f = 1.86$ °C/molal

- When figuring out boiling point elevation and freezing point depression keep in mind that electrolytes (molecules that split into ions) create more moles in solution than the moles solute dissolved

- How do you know when a substance is an electrolyte? If it is *ionically* bonded it is an electrolyte. i.e. NaCl (salt) or NaOH (base) or it is polar covalently bonded and ionizes in H_2O (ex. HCl, HBr)

- **Molecular formula** - the actual # of atoms in the covalently bonded molecule. i.e. $C_6H_{12}O$

- **Empirical formula** - shows the simplest ratio of atoms in a substance i.e. $C_6H_{12}O_6 \rightarrow CH_2O$
- Finding the empirical formula from percentages
  - Divide the percentages by the atomic masses (see periodic tables)
  - Divide the resulting numbers by the smallest result and this gives you your ratio for the empirical formula
  - Put this into a whole number ratio if fraction results
- Finding the molecular formula from percentages. You **MUST** be given the molar mass to do this
  - Divide the percentages by the atomic masses (see periodic tables)
  - Divide the resulting numbers by the smallest result and this gives you your ratio for the empirical formula
  - Figure out what the empirical formulas mass is and see how many times it goes in to your total mass
  - Then multiply subscripts by this number
- **Percentage comp.** $= \dfrac{Total\ mass\ of\ element\ in\ compound}{Total\ mass\ of\ compound} x100$

- **Percent error** $= \dfrac{|experimental\ value - true\ value|}{true\ value} x100$