**CHM 115: Exam 2 Review Sheet**

**Chapter 5**

* John Dalton’s Model
* Thomson’s Model
* Crookes tube
* Rutherford’s Alpha Scattering Experiment
* Nuclear Model
* Subatomic particles
* proton (p+): +1 charge, located inside nucleus
* neutron (n): neutral, located inside nucleus
* electron (e–): –1 charge, located outside nucleus
* Atomic notation:
  + - atomic number = Z
    - mass number = A**E =** element symbol
    - mass number (A): # of protons + # of neutrons
    - atomic number (Z): # of protons=# of electrons
* Be able to give atomic notation for any element given element name & mass number
* Mass number, atomic number, element symbol
  + Given 2, determine the missing info
* Recognize the terms: isotope, atomic weight
* Given all naturally occurring isotopes for an element, use the Periodic Table to determine the most abundant isotope
* Chemical formulas

**CH 6: Nomenclature (Naming Ions and Compounds)**

**ionic compound:** a compound consisting of metal cations and anions held together by ionic bonds

**molecule** (or **molecular compound**)**:** a compound consisting of nonmetal atoms held together by covalent bonds

Identify a compound as an **ionic compound** or **molecule** given its name or chemical formula

**Naming cations**:

- Group IA, IIA, Al, Ag, Zn, Cd:

element name + ion

* All other metals - Stock system: element name (charge in Roman #s) + ion

**Naming anions**: nonmetal stem + "-ide" + ion

* Know the **names and formulas** of **POLYATOMIC IONS**

**Naming ionic compounds**:

* cation name + anion name
* IA, IIA, Al, Ag, Zn, Cd don't need Roman #s
* All other metals need Roman #s

**Nomenclature for Ionic Compounds:**

* Given formula of a compound, determine name.
* Given the name of a compound, give formula.

**Naming binary molecular compounds**:

* Use **Greek prefixes** when more than one atom of an element is present.

**Naming ternary acids:**

H('s) + "-ide" ion → "hydro\_\_\_\_ic acid"

- e.g. Cl- = chloride ion → HCl (aq) = hydrochloric acid

H('s) + "-ate" ion → "\_\_\_\_\_ic acid"

- e.g. SO4 2- = sulfate ion → H2SO4 (aq) = sulfuric acid

H('s) + "-ite" ion →"\_\_\_\_\_ous acid"

- e.g. NO2- = nitrite ion → HNO2 (aq) = nitrous acid

**CH 7: Chemical Quantities**

**Avogadro's number = 6.022x1023**

**Molar Mass** - Be able to get molar masses (in g/mol) for atoms and compounds

**Standard temperature & pressure (STP):**

T=0°C and P=1.00 atm

**Mole calculations using**

* Avogadro's Number (N): 6.022 x 1023
* Molar masses of atoms and compounds (add the molar masses of constituent atoms)

**Examples of Mole calculations:**

- Find # moles given mass

- Find # atoms or molecules given mass

- Find # particles given volume of a gas at STP

**Percentage composition:**

* Find percent composition of all elements in a compound given its **formula** or **name**.
* Use the **formula** or **name** of compound and its percent composition to determine the mass of one or more elements in a sample of the compound.

**Determine Empirical and Molecular Formulas**

* Know empirical formula is simplest ratio of atoms/ions present in compound.
* Use the masses of elements present, the law of conservation of mass, and/or mass percentage to calculate empirical formula.
* Determine the molecular formula using the empirical formula and given molar mass

**CH 8: Chemical Reactions of Inorganic and Organic Compounds**

**Balancing Equations**

Change coefficients, NEVER subscripts to get same # on both sides in the following order:

1. Balance metals.

2. Balance polyatomic ions – Keep as one unit.

3. Balance hydrogen atoms.

4. Balance carbon atoms.

5. Balance oxygen atoms.

6. Balance all other atoms.

**Classify reaction types and balance:**

* Combination
* Decomposition
* Single-replacement/displacement
* Double-replacement/Precipitation
* Acid-Base Neutralization
* Combustion Reactions

**Be able TO PREDICT PRODUCTS given a set of reactants and**

* The Solubility Rules and the Activity Series

**REACTION TYPES**

**Combination/Synthesis reaction:**

* metal + nonmetal → ionic compound (s)

**Decomposition reaction:** AZ → A + Z

**Single-replacement reactions**

* Activity Series, list of Active Metals, and
* Solubility Rules, where reactants are:
* solid metal + metal solution/acid
* solid metal + H2O(l)

**Combustion reaction**

CxHy + O2 → CO2 (g) + H2O (g)

CxHyOz + O2 → CO2 (g) + H2O (g)

**Double-Displacement/Precipitation Reactions precipitate (ppt):** insoluble ionic compound

* Use **Solubility Rules** to determine if a precipitate forms
* Predict products of a reaction given reactants and Solubility Rules

**Acid-Base Neutralization Reactions**

HX + MOH → H2O(l) + salt

HX + MHCO3 → H2O(l) + CO2(g) + salt

HX + MCO3 → H2O(l) + CO2(g) + salt

NH4OH → H2O(l) + NH3(g)