Chemistry Fall Final Review

*Soon you will be embarking on your first semester chemistry final. This is your study GUIDE. It is a guide and not all inclusive, but if you answer* **AND** *UNDERSTAND the following outline points you will be in good shape.*

**On the day of the final be sure to bring:**

* Calculator (I will not be giving out extras if you forget yours!)
* Pencil
* Naming Card
* Note Card – **THIS IS REQUIRED**… ONE **HAND-WRITTEN** (both sides) 3x5 note card. You **MUST** turn in this note card with your final, if you do not then YOU WILL LOSE **10%** off your final exam grade.
* Homework Passes – you must walk through the door with them if you want to get the extra credit

***You will be provided with a periodic table***

1. **Introduction to Chemistry, Matter, and Change: Chapter 1 and 2**

* **Learning Target 1.1: Know what chemistry is and the different branches of chemistry**

1. What is Chemistry? What do chemists study?
2. What is matter? What are some examples of things that are and are not matter?

* **Learning Target 1.2: Identify classroom and safety procedures as well as common lab equipment**

1. What are three things you need to be sure to do/wear to be safe for every lab?

* **Learning Target 1.3: Apply the steps of the scientific method and know a science theory compared to a law**

1. What is a hypothesis and how should it be written?
2. Describe the different between a dependent variable and independent variable.
3. What is a trial? Be able to determine how many take place in an experiment.
4. Define qualitative and quantitative observations.

* **Learning Target 1.4: Classify matter as an element, compound, or mixture (homogenous or heterogeneous) and how they can be separated**

1. What are elements and compounds?
2. How are mixtures classified?

* **Learning Target 1.5: Compare and contrast physical and chemical properties/changes**

1. What is a physical property? Give at least three examples.
2. What is a physical change? Give at least three examples.
3. What are the five signs that a chemical change has occurred?

**Learning Target 2.4: Know the components for the metric system and how to do conversions**

1. What are the metric units for length, volume, mass, and temperature?
2. **The Atom and its Particles: Chapters 4 and 5**

* **Learning Target 3.1: Describe an atom and the subatomic particles**

1. What is an atom made up of? Where are each of these subatomic particles located?
2. How do you utilize the Periodic Table to determine number of protons, neutrons, and electrons?
3. How do you determine the number neutrons in an atom?

* **Learning Target 3.2: Recognize contributions various scientists have made to chemistry**

Don’t need to know these ☺

* **Learning Target 3.3: Know what an isotope is and how to calculate the average atomic mass**

1. Define what an isotope is.
2. What is the weighted atomic mass of an unknown element with the composition of 50% 45X, 36% 46X, and 14% 47X?

* **Learning Target 3.4: Know what an isotope is and how to calculate the average atomic mass**

1. How many electrons can each individual energy level hold?
2. Draw the Bohr model for Ta (73).
3. **Locating Electrons**

* **Learning Target 3.5: Describe and calculate wavelength and frequency for the electromagnetic spectrum**

1. What is the electromagnetic spectrum? What types of things have the longest wavelength? Shortest?
2. What is the wavelength of radiation with a frequency of 4.6×1015 Hz?

* **Learning Target 3.6: Know the theory and principles that involve the Quantum Mechanic model of the atom**

1. Describe what the quantum mechanics model of an atom looks like.

* **Learning Target 3.7: Know how to complete an Aufbau diagram and electron configurations correctly**

1. List the correct order of atomic orbitals in an aufbau diagram/electron configuration.
2. Draw the Aufbau diagram for Uranium (U).

Also, know how to determine the number of valence electrons and what type/family an element is from an Aufbau diagram.

1. Why are noble gases used in writing short hand configurations?
2. Write the full electron configuration and short hand electron configuration for Francium (Fr).
3. **The Periodic Table: Chapter 6**

* **Learning Target 4.1: Explain how elements are organized in a periodic table**

1. What are the three types of elements? Where are they located on the periodic table?
2. What are periods? What are groups? Families?

* **Learning Target 4.2: Compare early and modern periodic tables**

1. Who was the first to organize the periodic table? How was it organized?
2. How is the periodic table organized now?

* **Learning Target 4.3: Identify the different group/families in the periodic table and their characteristics**

1. Describe the characteristics and where the following families are located:
   1. Alkali metals
   2. Alkaline earth metals
   3. Halogens
   4. Nobel gases
   5. Transition metals

* **Learning Target 4.4: Explain what an ion is and how it forms**

1. What is an ion?
2. How are valence electrons determined?
3. What type of ions do metals tend to form? Nonmetals?

* **Learning Target 4.5: Describe the different periodic trends**

1. What is atomic size? Know how it increases/decreases across and down the periodic table.
2. What is ionization energy? Know how it increases/decreases across and down the periodic table.
3. What is electronegativity? Know how it increases/decreases across and down the periodic table.
4. **Chemical Compounds: Chapters 7, 8, and 9**

* **Learning Target 5.1: Show how ions form by writing ionization equations**

1. What is the ionization equation for nitrogen?

* **Learning Target 5.2: To be able to count the number of atoms in a compound**

1. How many atoms are in the compound Al(H2PO4)3?

* **Learning Target 5.3: Know what an ionic compound is, how to write the chemical formula, and name them**

1. What type of elements make up an ionic compound?
2. What is a polyatomic ion?
3. What are Lewis structures and what are they used to represent?
4. What is the chemical formula for the following:
   1. Sodium Sulfite \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Copper (II) Phosphate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Ferric Carbonate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Name the following compounds. If the compound involves a metal that can have different charges, then give **BOTH** the **STOCK** and **CLASSICAL** name for that compound:
   1. Al(H2PO4)3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Cu2SO3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. (NH4)3PO4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Learning Target 5.4: Know what a molecular (covalent) compound is, how to write the chemical formula, and name them**

1. What type of elements make up a molecular compound?
2. What is the structural formula for CCl4? SO3?
3. Name the following molecular compounds:
   1. CO \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. N2O2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. PCl3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Learning Target 5.5: Know what a metallic compound is.**

1. What type of elements make up a metallic compound?

* **Learning Target 5.6: Know what acid and bases are and how to name them.**

1. What is an acid? What is a base?
2. What are the rules for naming acids?
3. Name the following:
   1. HF \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. H3PO4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. NH4OH \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**VI. Balance Basic Chemical Equations**

* **Learning Target 6.2: Classify the Basic Type of Reaction**

1. Indicate the **type** of reactions seen below.
   1. FeCO3 🡪 FeO + CO2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. C3H8  + 5O2 🡪3CO2 + 4H2O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. 2Cu + S 🡪Cu2S \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Li3PO4 + Al2(SO4)3 🡪\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   5. HCl + NaOH 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   6. Na + Zn(NO3)2 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Learning Target 6.3: Balance Chemical Equations**

1. Balance the following chemical reactions (4 points)
   1. \_\_\_\_\_ TiO2 + \_\_\_\_\_ Al → \_\_\_\_\_ Al2O3 + \_\_\_\_\_Ti
   2. \_\_\_\_\_ MoO3 + \_\_\_\_\_ H2 → \_\_\_\_\_ MoO2 + \_\_\_\_\_ H2O
   3. \_\_\_\_\_ ZnF2 + \_\_\_\_\_ PBr3 → \_\_\_\_\_ PF3 + \_\_\_\_\_ ZnBr2
   4. \_\_\_\_\_ NaHCO3 → \_\_\_\_\_ Na2CO3 + \_\_\_\_\_ H2O + \_\_\_\_\_ CO2