**Study Guide: Electron Arrangement & Periodic Law**

**Chapter 4 - Be sure to know:**

* All vocabulary words on p. 124

The Electromagnetic Spectrum and the Nature of Light

* Know and understand the electromagnetic spectrum
  + Be familiar with the major classes of EM radiation (i.e., gamma rays, radio waves, etc.)
  + Know the relationships between wavelength (λ), frequency (ν), and energy (E)
* Be able to use Planck’s constant (h) and the constant speed of light (c) in equations to describe the above relationships (E= hv and c = vλ)
* Know and understand the dual wave-particle nature of EM radiation
  + Understand the concepts of a quantum and a photon
  + Be able to describe the photoelectric effect
  + Understand how Thomas Young’s double-slit experiment illustrates the wave nature of light
  + Be able to draw a transverse wave and identify its parts (crest, troughs, amplitude, and wavelength)
* Know and understand how Bohr’s atomic model explains the line emission spectrum of hydrogen
  + Compare and contrast a continuous spectrum with a line-emission spectrum
  + Understand how the arrangement of electrons in an atom affects how much energy the electrons can absorb/emit

Quantum Model of the Atom

* Know and understand how electrons exhibit a dual wave-particle nature
  + Know and understand the Heisenberg Uncertainty Principle
* Why the quantum theory of the atom was developed, and the basic principles of the quantum theory
* Know and understand how quantum theory describes the wave properties of electrons mathematically
  + Understand the concepts of an orbital and probability regions
    - Know the s, p, d, and f orbitals
  + Know how many total electrons each energy level and subshell can hold

Electron Configurations

* Know and understand the three major rules governing electron configurations
  + Aufbau principle
  + Pauli exclusion principle
  + Hund’s rule
* Be able to describe the location of all the electrons in a given atom using electron configurations using either orbital notation, electron-configuration notation (long form), and noble gas notation (short form)

**Chapter 5-Be sure to know:**

* All vocabulary words on p. 164

History of the Periodic Table

* Describe how the first modern periodic table was created
* Know the contributions of Dmitri Mendeleev and Henry Moseley in creating the periodic table we know table
* Know and understand the periodic law

Periodic Trends

* Know and understand how the periodic table is arranged such that elements with similar properties are found in the same vertical column (group/family)
  + Be able to explain the following concepts and describe their associated periodic trends:
    - Atomic Mass/Atomic Number
    - Atomic radius
    - Ionic radius (cation and anion)
    - Ionization Energy
    - Electronegativity
    - Reactivity (Metals and Nonmetals)
* # of Valence Electrons (How to find the valence electrons (how many and what orbitals they are in) for an atom, and why the valence electrons are important and Determine which ion will form – cation or anion – metals lose and nonmetals gain)
* Know and understand how elements within the following groups have similar chemical properties. Be able to give examples of elements within each group, describe the chemical properties of each group, and list industrial uses of elements within each group.
  + Alkali metals, Alkaline earth metals, Halogens, Noble gasses, Transition elements (including Lanthanides and actinides)
* Compare and contrast differences in periodic trends between main group elements and transition elements

Review textbook pages 97-122 in Chapter 4 and pp. 131-162 in Chapter 5. Look over Chapter summaries for both Chapters on pp. 124 and 164.

Remember this is just a guide! We have modeled and practiced, read, discussed, and covered all concepts on test in a variety of ways in and out of class.