**Study Guide: Chapters 3 and 21**

Review textbook pages in Chapter 3 pp. 69- 90 and Chapter 21 pp. 649-669. Look over Chapter summaries on pages 91 & 671. Review labs, notes, activities, review, and practice problems. Remember this is just a guide! We have practiced, read, discussed, and covered all concepts on test in a variety of ways in and out of class.

**Be able to:**

Explain and give examples of:

*-* Law of Conservation of Mass

- Law of Definite Proportions

- Law of Multiple Proportions

* Describe the five main ideas of Dalton's Atomic Theory - Which of Dalton's ideas are still valid today and which are not
* Thomson's use of the cathode ray tube to discover electrons
* Rutherford's experiment to discover the atomic nucleus - be able to describe the experiment and what happened. How did the results lead Rutherford to propose the existence of the nucleus?
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* What are isotopes? Atomic number and mass number? How can we determine these values?
* Location and properties of subatomic particles (p.76)
* Given the identity of a nuclide, find its number of protons, neutrons, and electrons
* How the masses in the periodic table are determined - how are these masses related to the masses of the isotopes of each element?
* Definition of molar mass, mole, Avogadro's number

How to calculate:

* Given mass, find the number of moles
* Given moles, find the mass
* Given moles, find the number of particles (atoms of an element or molecules of a compound)
* Given the number of particles, find moles
* Given the mass, find the number of particles
* Given the number of particles, find the mass
  + Be able to explain what a nuclide is and describe the various ways a nuclide can be represented.
  + Define and relate the terms "mass defect” and "nuclear binding energy".
  + Explain the relationship between the number of nucleons and stability of nuclei.
  + Explain why nuclear reactions occur and know how to balance nuclear equation.
  + Be able to write equations for alpha, beta, gamma, and positron emission, and electron capture, and describe their effects on the nucleus.
  + Be able to compare the penetrating ability of alpha, beta, and gamma radiation.
  + Know what half-life is, explain how it relates to the stability of the nucleus, and be able to calculate half-life problems
  + Know how artificial radioactive nuclides are produced and explain their significance.
  + Be able to define and relate the terms "parent nuclide", "daughter nuclide", and "decay series".
  + Know several common uses of radioactive isotopes.
  + Know some of the basics of using radioactive isotopes to find out the age of objects.
  + Compare & contrast nuclear fusion & fission and describe a nuclear chain reaction.
  + Know the major components of a nuclear reactor and their function:
    - Fuel rods- U-235 that undergoes fission
    - Control rods - control the amount of fission that takes place by absorbing neutrons
    - Moderator- slows the neutrons enough for fission to occur (usually water)
    - Coolant- water keeps the core from getting too hot
    - Shielding -lead, concrete
  + Know what the trans uranium elements are and be able to explain what is meant by ionizing radiation