Chemistry
STUDY GUIDE #3

Updated 1/8 /2011

Periodicity and the Periodic Table

A student who completes this unit should be able to do all of the following:

1) Explain the development of the Periodic Table
   a) Mendeleev (using atomic weights)
   b) Moseley (using atomic numbers)
   c) Periodic Law: the chemical and physical properties of elements are <u>periodic functions</u> (recurrent functions) of their atomic numbers
2) Read and explain the Periodic Table:
   a) Names and Locations of:
      i) Groups (vertical)
      ii) Periods (horizontal)
      iii) Metals and their general properties:
         malleable, ductile, shiny, good conductors, lose electrons to form positive ions
      iv) Nonmetals and their general properties:
         Brittle, no metallic luster, poor conductors, gain electrons to form negative ions
      v) Metalloids: elements sharing some metallic and some nonmetallic properties
      vi) "Stairway to 7": boundary line between metals and nonmetals
      vii) Main group elements: groups 1-2 and 13-18 (modern usage)
      viii) Transition metals: groups 3-12; scandium (Sc) through zinc (Zn) and all below them
      ix) Lanthanides: elements 58-71, following lanthanum (La)
      x) Actinides: elements 90-103, following actinium (Ac)
      xi) Alkali metals (group 1): Li, Na, K, Rb, Cs, Fr. Hydrogen (H) is chemically similar.
      xii) Alkaline earth metals (group 2): Be, Mg, Ca, Sr, Ba, Ra
      xiii) Halogens (group 17): F, Cl, B, I, At
      xiv) Noble or inert gases (group 18): He, Ne, Ar, Kr, Xe, Rn, with complete octets
   b) s,p,d,f blocks
   c) valence electrons
      i) definition: outermost shell of electrons that determine chemical properties of an element
      ii) be able to determine # of valence electrons for any main group element
      iii) Lewis dot diagrams
      iv) Importance of valence electrons to physical and chemical properties
      v) The octet rule: atoms are most stable with 8 valence electrons (2 in the first period)
   d) Ionization
      i) Reason why atoms form ions
      ii) Predict what ions will form for an atom based on atom's position on periodic table
3) Understand Periodic Trends and use these trends to predict properties of atoms
   a) Recognize that elements within the same group share similar physical and chemical properties
   b) Understand the reason why this occurs
   c) General Period Trends
      i) Atomic radius
         (1) Definition
         (2) Know trend (both group and period)
         (3) Reason for trend (both group and period)
      ii) Ionization energy
         (1) Definition

(2) Basic chemical equation
(3) Know trend (both group and period)
(4) Reason for trend (both group and period)
(5) Coulombic force equation (Coulomb's law): $F = k Q_1 Q_2 / d^2$
(6) First ionization energy vs. second ionization energy vs. third ionization energy, etc.

iii) Electronegativity
(1) Definition
(2) Know trend (both group and period)
(3) Reason for trend (both group and period)

TEXT CHAPTER: Ch. 5
MASSACHUSETTS CURRICULUM FRAMEWORKS, content standard #3

STUDY EVERY NIGHT. COME TO CLASS PREPARED.
ASK FOR HELP IF YOU NEED HELP.
DO CAN DO WELL IF YOU WANT TO.