Chapter 6, Electronic Structure

Objectives

Terms:

- light
- wavelength
- frequency
- electromagnetic spectrum
- spectrum
- continuous spectrum
- emission line spectrum
- absorption line spectrum
- ground state
- excited state
- ionization
- photon
- Heisenberg's uncertainty principle
- quantum (wave) mechanics
- Schrodinger's wave equation
- wave functions
- orbital
- hertz
- effective nuclear charge
- screening (shielding)
- Pauli exclusion principle
- valence electrons
- Hund's rule
- electronegativity
- ionization energy
- diamagnetic
- paramagnetic

You should be able to:

1. describe the wave and particle nature of light,
2. describe the relationship between $f$, $\lambda$, and energy per photon,
3. list in order of increasing energy the different regions of the electromagnetic spectrum including the different colors of visible light,
4. work problems involving $f$, $\lambda$, c, and the energy per photon,
5. explain why electromagnetic radiation from different regions of the spectrum have different effects on matter,
6. explain the formation of emission and absorption line spectra,
7. describe the conditions needed to produce emission line, absorption line, and continuous spectra.
8. describe Bohr's postulates for the H-atom,
9. calculate the $\lambda$, $f$, or energy of light emitted or absorbed during the transition of an electron from one energy level to another in a H-atom,
10. explain why the wave properties of electrons are used to describe electrons in atoms rather than the particle nature of the electrons,
11. explain why an electron can't be accurately observed (i.e. explain the Heisenberg uncertainty principle),
12. describe what is obtained when Schrodinger's wave equation is solved,
13. describe the significance of wave functions,
14. explain what distinguishes an orbital of one type from an orbital of another,
15. indicate the number of subshells in each shell, and the maximum number of electrons that can fit into a given shell or subshell,
16. indicate the number of orbitals in each subshell and shell,
17. draw the shapes and orientations of the s, p, and d orbitals,
18. write the electron configuration for a given element (know the exceptions Cr,Cu)
19. indicate the number of unpaired electrons in an atom,
20. explain why elements in a group have similar chemical properties,
21. given a group of atoms, list them in order of increasing ionization energy or electronegativity
22. given a group of atoms and ions list them in order of increasing size.