

Unit 1 – Chapter 7

Name \_\_\_\_\_

Assignment #1

Period \_\_\_\_\_

- 1) A photon of ultraviolet (UV) light possesses enough energy to mutate a strand of human DNA. What is the energy of a single UV photon and a mole of UV photons having a wavelength of 25 nm?
  
- 2) One type of electromagnetic radiation has a frequency of 107.1 MHz, another type has a wavelength of  $2.12 \times 10^{-10}$  m, and another type of electromagnetic radiation has photons with energy equal to  $3.97 \times 10^{-19}$  J/photon. Identify each type of electromagnetic radiation and place them in order of increasing photon energy and increasing frequency.
  
- 3) It takes 208.4 kJ of energy to remove 1 mole of electrons from an atom on the surface of rubidium metal. How much energy does it take to remove a single electron from an atom on the surface of solid rubidium? What is the maximum wavelength of light capable of doing this?
  
- 4) Neutron diffraction is used in determining the structures of molecules.
  - a. Calculate the de Broglie wavelength of a neutron moving at 1.00% of the speed of light.
  - b. Calculate the velocity of a neutron with a wavelength of 75 pm ( $1\text{pm} = 10^{-12}$  m).
  
- 5) Calculate the wavelength of light emitted when each of the following transitions occur in the hydrogen atom. What type of electromagnetic radiation is emitted in each transition?
  - a.  $n = 4 \rightarrow n = 3$
  - b.  $n = 5 \rightarrow n = 4$
  - c.  $n = 5 \rightarrow n = 3$
  
- 6) An excited hydrogen atom emits light with a wavelength of 397.2 nm to reach the energy level for which  $n = 2$ . In which principal quantum level did the electron begin?