Chemistry 14A
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Ch 1: Quantum World Worksheet

1. If the wavelength of orange yellow light is $6.2\ x\ 10^{2}\ nm,$ what is its frequency?

2. CHEM, an FM radio station, broadcasts at 99.5 MHz. What is the wavelength of the corresponding radio waves?

3. If a certain frequency of radiation is not ejecting electrons from the surface of a metal, is it possible to eject electrons by increasing the intensity of the incident radiation?

4. No electrons are emitted from the surface of metallic Cs until the frequency of the radiation reaches $4.50\ x\ 10^{16}$ Hz. Find the energy required to remove the electron from the metal surface.

5. An electron was ejected from a surface of an unknown metal. The ejected electron had $2.35\ x\ 10^{-18}$ J of kinetic energy. The photon used to eject the electron had $4.19\ x\ 10^{-18}$ J.
    a. What is the work function (threshold energy) of the unknown metal?

Note: This worksheet may contain problems adapted from Dr. Lavelle's past exams.

b. What is the velocity of the ejected electron in part a?

6. The work function for lithium is $4.6\,x\,10^{-19}$ J.
   a. What is the lowest frequency of light that will cause photoelectric emission?

   b. What is the maximum energy of the electrons emitted when light of $7.3\,x\,10^{14}$ Hz is used?

7. An excited hydrogen atom emits light with a frequency of $1.14\,x\,10^{14}$ Hz to reach the energy level for which n=4. In what principle quantum level did the electron begin?

8. Determine the frequency of the emitted photon when an electron in a hydrogen atom drops from the quantum state n=3 to n=1.