Due: Monday, 24-October-2005 at the beginning of class. Please remember this is to be your own work.

1) It is found that light having a wavelength of 264 nm has the minimum energy needed to eject electrons from a sample of silver metal. Another light which has the wavelength of 235 nm is then shined on the metal. What is the velocity of the ejected electron?

2) Elements with atomic numbers beyond 118 have been tentatively identified in nuclear reactions. Given that these would be in Period 8 (n = 8), list all possible subshells for n = 8 (include how many of each i.e. 1 s subshell, 3 p subshells, etc.)

3) Carbon-carbon bonds form the ‘backbone’ of nearly every organic and biological molecule. The average bond energy of the C-C bond is 347 kJ/mol. Calculate the frequency and wavelength of the least energetic photon that can break this bond. In which region of the electromagnetic spectrum is this radiation?

4) A ground state Hydrogen atom absorbs a photon of wavelength 94.91 nm and attains an excited state. The atom then emits two photons: one of wavelength 1281 nm to reach an intermediate level, and second one which returns the atom to its ground state.
   a) What was the energy level of the excited state?
   b) What was the intermediate level the atom reached?
   c) What was the wavelength of the second photon.

5) An atom emits yellow light when an electron makes the transition from the n = 5 to the n = 1 level. In separate experiments, suppose you bombarded the n = 1 level of this atom with red light, yellow light (obtained from the previous emission), and blue light. In which experiment or experiments would the electron be promoted to the n = 5 level?