CHM 151
Recitation #8, 22 October 2005

1. Calculate the **frequency** (in Hz) of the emitted photon when an electron drops from the $n = 4$ to the $n = 2$ level in a hydrogen atom.

2. Thermal neutrons are neutrons that move at speeds comparable to those of air molecules at room temperature. These neutrons are most effective in initiating a nuclear chain reaction among ^{235}U isotopes. Calculate the **wavelength** (in nm) associated with a beam of neutrons moving at 7.00×10^2 m/s. (Mass of a neutron = 1.675×10^{-24} g)

3. The 22nd electron in a titanium atom is in a 3*d* orbital. Give a *possible* set of 4 quantum numbers for this electron (n, l, m_l, and m_s)

4. Three sets of quantum numbers are listed below. Pick the best answer.

I. $n = 3, l = 3, m_l = 2$ II. $n = 4, l = 2, m_l = 0$ III. $n = 1, l = 0, m_l = 0$

a) I and II are allowed sets, III is not
b) only III is an allowed set
c) II and III are allowed sets, I is not *
d) all three sets are allowed
e) only II is an allowed set

5. What is the maximum number of electrons that can occupy the energy level with principal quantum number, $n = 5$?

6. In what group of the periodic table would an element with the following electron configuration belong?

$$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^1$$

a) Group 1 b) Group 13 c) Group 15 d) Group 17 e) none of these

7. Write the **electron configurations** and **orbital diagrams** for the following atoms. You may write these in shorthand notation. Also, identify whether the element is paramagnetic or diamagnetic.

a) Cl

b) Tc

Potentially Useful Information

$c = \lambda\nu$ $E = h\nu$ $E = \dfrac{hc}{\lambda}$ $c = 3.00 \times 10^8$ m/s

$h = 6.626 \times 10^{-34}$ J·s $E_n = -R_H\left(\dfrac{1}{n^2}\right)$ $\Delta E = -R_H\left(\dfrac{1}{n_f^2} - \dfrac{1}{n_i^2}\right)$ $R_H = 2.18 \times 10^{-18}$ J

$\Delta E = E_f - E_i$ $\lambda = \dfrac{h}{mu}$