Unit 1 – Chapter 7 **Name _____**

Assignment #2 **Period _____**

1) An electron is excited from the n = 1 ground state to the n = 3 state in a hydrogen atom. Which of the following statements are true? **Correct the false statements to make them true.**
   a. It takes more energy to ionize (completely remove) the electron from n = 3 than from the ground state.
   b. The electron is farther from the nucleus on average in the n = 3 state than in the n = 1 state.
   c. The wavelength of light emitted if the electron drops from n = 3 to n = 2 will be shorter than the wavelength of light emitted if the electron falls from n = 3 to n = 1.
   d. The wavelength of light emitted when the electron returns to the ground state from n = 3 will be the same as the wavelength of light absorbed to go from n = 1 to n = 3.
   e. For n = 3, the electron is in the first excited state.

2) What are the possible values for n, ℓ, and m_ℓ?

3) Which of the following orbital designations are incorrect: 1s, 1p, 7d, 9s, 3f, 4f, 2d?

4) Which of the following sets of quantum numbers are not allowed? For each incorrect set, state why it is incorrect.
   a. n = 3, ℓ = 3, m_ℓ= 0, m_s = -1/2
   b. n = 4, ℓ = 3, m_ℓ= 2, m_s = -1/2
   c. n = 4, ℓ = 1, m_ℓ= 1, m_s = +1/2
   d. n = 2, ℓ = 1, m_ℓ= -1, m_s = -1
   e. n = 5, ℓ = -4, m_ℓ= 2, m_s = +1/2
   f. n = 3, ℓ = 1, m_ℓ= 2, m_s = -1/2

5) How many electrons in an atom can have the designation 5p, 3d_{z2}, 4d, n = 5, n = 4?

6) Give the maximum number of electrons in an atom that can have these quantum numbers:

   a. n = 0, ℓ = 0, m_ℓ= 0
   b. n = 2, ℓ = 1, m_ℓ= -1, m_s = -1/2
   c. n = 3, m_s = +1/2
   d. n = 2, ℓ = 2
   e. n = 1, ℓ = 0, m_ℓ= 0

7) For elements 1-36, there are two exceptions to the filling order as predicted from the periodic table. Draw the atomic orbital diagrams for the two exceptions and indicate how many unpaired electrons are present.

8) Write the expected electron configurations for each of the following atoms: Cl, Sb, Sr, W, Pb, Cf.

9) In the ground state of element 115, Uup,
    a. How many electrons have n = 5 as one of their quantum numbers?
    b. How many electrons have ℓ = 3 as one of their quantum numbers?
    c. How many electrons have m_ℓ= 1 as one of their quantum numbers?
    d. How many electrons have m_s = -1/2 as one of their quantum numbers?

10) Give a possible set of values of the four quantum numbers for the 4*s* and 3*d* electrons in titanium.