Quiz #7

Section 309

Name ______________________

Don't open this cover sheet until told to do so.
You have 40 minutes to answer the 10 questions.
You may have one page of notes (both sides).
1. What is the wavelength of the line in the Balmer series of hydrogen that is composed of transitions from the n=5 to the n=2 level? (R = 1.097 x 10^7 m^-1 and 1 nm = 10^-9 m)
   a) 339 nm
   b) 563 nm
   c) 434 nm
   d) 467 nm

2. The Lyman series of hydrogen is made up of those transitions made from higher levels to n=1. If the first line in this series has a wavelength of 122 nm, what is the wavelength of the second line?
   a) 49 nm
   b) 486 nm
   c) 103 nm
   d) 364 nm
3. The Paschen series of hydrogen corresponds to electron transitions from higher levels to n=3. From what level do electrons com that produce a wavelength of 1282 nm?
   a) 4
   b) 7
   c) 5
   d) 6

4. The ionization energy of the hydrogen atom in its ground state is 13.6 eV. What is the energy of the n=4 state?
   a) 3.40 eV
   b) -0.850 eV
   c) -3.40 eV
   d) 0.850 eV
5. In the hydrogen atom, the potential energy is negative and the total energy of the electron:
   a) is equal to the kinetic energy of the electron.
   b) is equal to $n^2$ times the kinetic energy of the electron.
   c) is twice the kinetic energy of the electron.
   d) is half the potential energy of the electron.

6. A muon behaves like an electron except that it has 207 times the mass of the electron. If a muon were bound to a proton, how would the energy levels in the Bohr model compare to those for a bound electron?
   a) They would be the same.
   b) They would be $(1/207)$ times as much as those for the electron.
   c) They would be $(207)^2$ times as much as those for the electron.
   d) They would be 207 times as much as those for the electron.
7. A hydrogen atom in the ground state absorbs a 12.09 eV photon. To what level is the electron promoted? (The ionization energy of hydrogen in the ground state is 13.6 eV)
   a) n = 2
   b) n = 5
   c) n = 3
   d) n = 4

8. Lithium has an atomic number of 3. What is the energy needed to change a Li$^{++}$ ion in its ground state to a Li$^{+++}$ ion? (The ionization energy of hydrogen in its ground state is 13.6 eV).
   a) 13.6 eV
   b) 122.4 eV
   c) 40.8 eV
   d) 81.6 eV
9. If the principal quantum number for hydrogen is 5, which one of the following is not a permitted orbital quantum number for that atom?
   
   a) 2
   b) 5
   c) 3
   d) 4

10. What is the highest value of the orbital quantum number (l) for an electron in krypton's (atomic number 36) outer shell when in its ground state? (Hint: a filled shell has \(2n^2\) unique quantum states).
   
   a) 3
   b) 0
   c) 2
   d) 1