Chemistry 141 Name

Dr. Cary Willard

Double Quiz A – Quantum (42 points) April 12, 2010

1. (6 points) FM radio stations broadcast at different frequencies. Calculate the wavelength and energy corresponding to the broadcast of KKNB in Lincoln, Nebraska with a frequency of 104.1 MHz
2. (6 points) The power of a red laser (λ=630 nm) is 1.00 watt (abbreviated W, where 1 W = 1 J/sec). How many photons per second does the laser emit?
3. (6 points) the first ionization energy of a gas-phase atom of a particular element is 834 kJ/mol. What is the minimum wavelength of light required to ionize an atom of this element.
4. (4 points) What set of orbitals corresponds to each of the following sets of quantum numbers?
   1. n=4,l=2
   2. n=1,l=0
5. (4 points) Which of the following combinations of quantum numbers are allowed?
   1. n=1,l=0,ml=2,ms=-1/2
   2. n=2,l=1,ml=2,ms=+1/2
6. (4 points) How can an electron get from the (+) lobe of a p orbital to the (-) lobe without going through the node between the lobes?
7. (3 points) What is a photon?
8. (4 points) Describe the similarities and differences between the emission and the absorption spectra of hydrogen.
9. (3 points) How many quantum numbers are required to identify an orbital? (Be careful on this one!!)

Chemistry 141 Name

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Double Quiz B – Quantum (42 points) April 12, 2010

1. (6 points) FM radio stations broadcast at different frequencies. Calculate the wavelength and energy corresponding to the broadcast of WFNX in Boston, Massachusetts with a frequency of 101.7 MHz
2. (6 points) The power of a green laser (λ=510 nm) is 1.00 watt (abbreviated W, where 1 W = 1 J/sec). How many photons per second does the laser emit?
3. (6 points) the first ionization energy of a gas-phase atom of a particular element is 558 kJ/mol. What is the minimum wavelength of light required to ionize an atom of this element.
4. (4 points) What set of orbitals corresponds to each of the following sets of quantum numbers?
   1. n=2, l=1
   2. n=5 ,l=3
5. (4 points) Which of the following combinations of quantum numbers are allowed?
   1. n=1,l=1,ml=0,m=+1/2
   2. n=3,l=0,ml=0,ms=-1/2
6. (4 points) How can an electron get from the (+) lobe of a p orbital to the (-) lobe without going through the node between the lobes?
7. (3 points) What is a photon?
8. (4 points) Describe the similarities and differences between the emission and the absorption spectra of hydrogen.
9. (3 points) How many quantum numbers are required to identify an orbital? (Be careful on this one!!)