

Test questions Chapter 8

Note: Pick and choose, depending on how far we get this semester

1. (15 points) Violet light has a wavelength of about 400 nm.
A. What is the frequency of this light in units of Hertz (sec^{-1})

B. What is the energy of a single photon of this light?

C. What is the energy of one mole of these photons?

2. (15 points) Using the Bohr model, the energy available to an electron in the hydrogen atom can be found using the equation:

$$E = -2.178 \times 10^{-18} \text{ J} \left(\frac{Z^2}{n^2} \right)$$

A. Find the energy associated with a transition from $n=2$ to $n=1$.

B. In the lab I mentioned that this transition does exist but isn't visible. Using your answer to 1B above explain this.

3. (15 points) For each of the four quantum numbers: (1) give the name of the quantum number, (2) give the abbreviation of the quantum number, (3) give a short explanation of the physical attributes of the quantum number (energy, shape, etc.), and (4) tell the range in values for this quantum number. (Assume a principle quantum number of n .)

4.(15 points) What is the maximum number of electrons that can have the following designations:
(NOTE: If the designation is not allowed write NA for your answer)

_____ A. $n=3$

_____ B. $3f$

_____ C. $n=1, l=1, m_l = -1$

_____ D. $n=2, l=1, m_l = -1, m_s = +1/2$

_____ E. $2p$

5.(15 points) Write the expected electron configuration for the following elements or ions

Ca

Fe^{3+}

O

O^{2-}

6. (10 points) The electronic configurations of N is $1s^2 2s^2 2p^3$.

How many valence shell p orbitals are there? _____

Would these orbitals be filled with paired or unpaired electrons? _____

7. (15 points) What is the difference between an electron affinity, an ionization energy, and a reduction potential?

8.(15 points) Rank the following

Largest atom to smallest atom

Si, Rb, Sn

Most negative electron affinity to least negative electron affinity

As, Br, F

Smallest first ionization energy to largest ionization energy

K, Ga, Cs

Largest ion to smallest ion

O^{2-} , F^- , Li^+

Most electronegative to least electronegative

S, Sn, Te

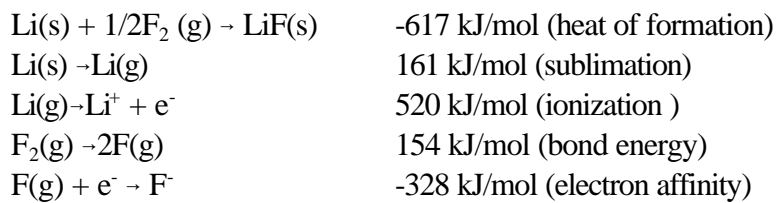
9. (15 points) Give the name and formula of each of the binary compounds formed with the elements:

Li and N

Al and F

Na and O

10. (20 points) Calculate the lattice energy for the formation of LiF(s) from Li⁺(g) and F⁻(g). Some energies that might be useful are:



1. (18 points) Draw Lewis structures for the following compounds



2. (18 points) Draw at least 2 non-equivalent resonance forms for each of the following molecules and evaluate the formal charge of each atom in each structure. Which is the "best" structure.



3. (12 points) Write the Lewis structures and determine the molecular structure, bond angles, and polarity of the following compounds



4. (12 points) Determine the Lewis structure, the hybridization of the central atom, and the bond angles in the following molecules

