**Unit 6/7 Review Packet**

Electron Configuration, Quantum Mechanical Model, Periodic Trends

1. Explain how the Quantum Mechanical Model utilizes the theories proposed by Rutherford and Bohr.
2. How is Schrödinger’s equation used to express electron behavior? What is the disadvantage to specifying the location of an electron? (Hint: Uncertainty)
3. An apple appears red to the eye, if a median wavelength for red light is about 655nm, what energy of photon is being absorbed by the photoreceptors in your retina?
4. Which neutral element is represented by the following electron configuration?
5. 1s22s22p63s23p64s23d9
6. Write out the proper configuration for part a, explaining the reasoning behind any changes you made.
7. Follow the AUFBAU Principle, Hund’s Rule, and the Pauli Exclusion Principle to complete the following orbital electron configurations. Make sure your diagram reflects the most stable configuration.
8. Cadmium 2+ b. Germanium1-



1. How many orbitals are full in 5b?
2. For 5b: Identify the four quantum numbers for the 2nd electron in the 3rd orbital of 3d and explain the significance of each.
3. For the electron diagram in 5a:
4. Circle the {n = 2, l = 1, ml = -1, ms = 1/2} electron
5. Put a box around the {n = 3, l = 2, ml = 1, ms = -1/2} electron
6. What allows electrons to pair-up in orbitals despite having repulsive electrostatic charges? Explain.
7. Which of the following are isoelectric with krypton?

Se3- Zr4+ Cd7+ Sr2+ Br2-

1. A sample of silver is exposed to electromagnetic energy with a frequency of 9.97x1014 s-1 a. How much energy (in eV) are the electrons of the silver atoms being exposed to?
2. If the binding energy for a silver 5s electron is 0.23eV, describe what you would see if the silver sample was being analyzed via photoelectron spectroscopy. The work function for silver is 4.26 eV.
3. What would be the minimum wavelength (nm) required to emit a 5s electron?
4. If a 5s electron emitted from a sample of silver was found to have a KE = 3.77x10-18J, what wavelength (nm) of electromagnetic energy was the sample likely hit with?
5. How would the KE of a 5s and a 3p electron (EB=58.3eV) compare if both were emitted from when exposed to x-rays with a frequency of 1.69x1016 s-1?
6. Label the peaks and identify the element given the following photoelectron spectroscopy data.
7. 



 b.

1. Referencing the photoelectron spec data in problem 12b, answer the following:
2. Describe what would happen to the data if a -3 ion of the same element was analyzed.
3. Describe how the spec data for the element silicon would compare to 12b.
4. If the light source used for the analysis of 12b could now create a maximum wavelength of 62 nm. (Work function of 12b is 1.2eV).
5. Describe the two atomic characteristics that influence radius and explain their effect using Coulomb’s Law.
6. Explain why the trends for ionization energy and electronegativity are related to radius.
7. Explain how Coulomb’s Law provides information on the 1st ionization energy for an atom.
8. Explain why 2nd ionization energy is always larger than 1st ionization energy. Reference radius and Coulomb’s Law.
9. Which trend is a good predictor of metal reactivity? Explain your reasoning.
10. Which trend is a good predictor of non-metal reactivity? Explain your reasoning.
11. Predict the products of the following reactions. If a reaction would not occur, write “No Rxn”.
12. KCl (aq) + Li (s)
13. Rb (s) + Na2SO4 (aq)
14. Br2 (l) + MgF2 (aq)

 21) If the first ionization energy for calcium is 1200 kJ/mol, predict the relative energies associated with the following.

 a. Ca 2nd ionization energy

 b. Ca 3rd ionization energy

 c. K 1st ionization energy

 d. Se 1st ionization energy