

## Unit 1 – Atomic Structure Review

1. Draw a wave that has a high energy level. Identify the wavelength and frequency in this wave.
2. In a sentence or two describe a low energy wave using the terms wavelength and frequency.
3. Put the following colours of light in order of increasing energy: yellow, violet, green, orange, red, and blue.
4. Explain Bohr's model of the atom. What was he unable to explain?
5. Explain how the Quantum Model of the atom was developed.
6. Compare and contrast Bohr model of the atom and the Quantum Mechanical model of the atom.
7. What is the difference between an orbital and a sublevel?
8. What is the difference between a sublevel and an energy level?
9. Name the four Quantum numbers and describe what each tells us about the structure of the atom or placement of the electrons.
10. Describe how the second shell is filled with electrons using the orbitals in your answer.
11. Write the full electron configuration for the following elements:
  - a. Calcium
  - b. Oxygen
  - c. Lithium
  - d. Cobalt
  - e. Germanium
  - f. Krypton
12. Write the short hand electron configuration for the following element. Include the spin diagrams for the final portion of the configuration.
  - a. Silicon
  - b. Fluorine
  - b. Manganese
13. How many valence electrons will the following elements have according to the electron configurations?
  - a.  $[\text{He}] 2s^2 2p^3$
  - b.  $[\text{Ar}] 4s^2 3d^{10} 4p^5$
  - c.  $[\text{Ne}] 3s^2 3p^1$
  - d.  $[\text{Ne}] 3s^1$
14. Which of the following elements has the larger atomic radius?
  - a. Copper, silver
  - b. Selenium, oxygen
  - c. Gallium, Chlorine
15. Which of the following elements has the smallest ionization energy?
  - a. Aluminum, Sodium
  - b. Manganese, Rhenium
  - c. Sulfur, Gold

16. Compare the radius of an  $\text{Mg}^{+2}$  cation to the radius of the Mg atom. Explain why the radius changes in size.

17. Compare the radius of an  $\text{Cl}^{-1}$  anion to the radius of the Cl atom. Explain why the radius changes in size.

18. Predict the type of bond that will occur in the following compounds. Explain your reasoning.

a.  $\text{MgO}$

b.  $\text{NaCl}$

c.  $\text{NO}_2$

d.  $\text{CH}_4$

e.  $\text{ZnO}$

f.  $\text{H}_2$