REVIEW QUESTIONS
Chapter 9

1. Determine the wavelength in the diagram shown below:

![Diagram showing wave with labels 0, 3.0, 9.0, and 15.0 cm on x-axis and y-axis labeled y with a wave line v]

2. Arrange the following electromagnetic radiation in increasing order of wavelength:

   X-rays  Radiowaves  Visible light  Microwaves

   ______________ < ____________ < ____________ < _____________

   shortest      longest

3. Arrange the following orbitals in increasing order of energy:

   3p  4f  5s  3d  4p

   __________ < ________ < ________ < ________ < ________

   lowest      highest

4. Identify each of the following elements from their electron configurations:

   a) 1s² 2s² 2p⁴  ___________

   b) [Ar] 4s² 3d⁷  ___________

   c) [Ne] 3s² 3p³  ___________
5. Shown below are excited states for some elements. Identify each element and write its ground state configuration:
   a) \[1s^2 \ 2s^2 \ 2p^6 \ 3s^1 \ 3p^1\] __________ ______________
   b) \[[\text{Ar}] \ 4s^2 \ 3d^4 \ 4p^1\] __________ ______________
   c) \[1s^2 \ 2s^2 \ 2p^6 \ 3s^2 \ 3p^4 \ 4s^1\] __________ ______________

6. Using only a periodic table, write the notations requested for each element below:
   Sulfur (S): ________________________________ (complete configuration)
   Selenium (Se): ____________________________ (abbreviated configuration)
   Nickel (Ni): (orbital notation for valence electrons)

7. Give symbol and name the element in the fourth period of the periodic table with:
   a) 5 valence electrons _______________________
   b) a total of four 4p electrons ___________________
   c) a total of three 3d electrons ___________________
   d) a complete outer shell _______________________
8. Write complete electron configuration for each of the following ions:

a) F\(^-\) ________________

b) P\(^{3-}\) ________________

c) Al\(^{3+}\) ________________

What do all the electron configurations above have in common?

9. Using electron configurations, explain why oxygen tends to form a 2\(^-\) ion while calcium forms a 2\(^+\) ion.

10. According to the quantum mechanical model for the hydrogen atom, which transition produces light with longer wavelength: 3p to 2s or 4p to 2s? Give clear explanation and reasoning.
11. Complete each statement below with a suitable word or phrase:

A) Based on Bohr’s model of atom, the electrons exist in ________________ around the nucleus.

B) The arrangement of the electrons around the nucleus is called ____________________.

C) A particle of light is referred to as a(n) ________________.

D) The group number of representative elements represents the ________________.

E) The number of waves per unit of time is called ____________________.

F) Electrons that exist in the same orbital must possess ____________________.

G) When electrons descend from higher energy levels to lower ones they ________________.