Chapter 8 & 9 worksheet- CHM 2045

Disclaimer: These problems were not written nor reviewed by Dr. Calvo or Jurca and should only be used as a study aid. Not all of the information or topics is guaranteed to be on your exam/quizzes, and there may questions from topics not listed on here. Please refer back to your powerpoints, lectures, and textbook. Please bring any questions regarding material to sessions and Good Luck on your Exam!

1. A laser pulse with wavelength 532 nm contains 3.85 mJ of energy. How many photons are in the laser pulse?

2. Which electron is, on average, closer to the nucleus: an electron in a 2*s* orbital or an electron in a 3*s* orbital?

3. According to the quantum-mechanical model for the hydrogen atom, which electron transition produces light with the longer wavelength: 2*p* **to** 1*s* or 3*p* **to** 1*s*?

4. An electron in the $n = 7$ level of the hydrogen atom relaxes to a lower energy level, emitting light of 397 nm. What is the value of n for the level to which the electron relaxed?

5. Write the full electron configuration for each element.

   a. Si b. O c. K d. Ne

6. Use the periodic table to write an electron configuration for each element. Represent core electrons with the symbol of the previous noble gas in brackets.

   a.P b.Ge c.Zr d.I

7. Which outer electron configuration would you expect to belong to a reactive metal? To a reactive nonmetal?

   a. $ns2$ b. $ns2np6$ c. $ns2np5$ d. $ns2np2$

8. Which experience a greater effective nuclear charge: the valence electrons in beryllium or the valence electrons in nitrogen? Why?

9. Choose the larger atom from each pair.
   a. Al or In b. Si or N c. P or Pb d. C or F

10. Arrange these elements in order of increasing atomic radius: Ca, Rb, S, Si, Ge, F.

11. Write orbital diagrams for each ion and indicate whether the ion is diamagnetic or paramagnetic.

    a. V^{5+} b. Cr^{3+} c. Ni^{2+} d. Fe^{3+}

12. Arrange this isoelectronic series in order of decreasing radius: F^-, O^{2-}, Mg^{2+}, Na^+

13. Which is the larger species in each pair?

    a. Li or Li^+ b. Cr or Cr^{3+} c. I^- or Cs^+ d. O or O^{2-}

14. Choose the element with the higher first ionization energy from each pair.

    a. Br or Bi b. Na or Rb c. As or At d. P or Sn

15. Arrange these elements in order of increasing first ionization energy: Si, F, In, N.

16. Choose the element with the more negative (more exothermic) electron affinity from each pair.

    a. Na or Rb b. B or S c. C or N d. Li or F

17. Choose the more metallic element from each pair.

a. Sr or Sb b. As or Bi c. Cl or O d. S or As

18. Arrange these elements in order of increasing metallic character: Fr, Sb, In, S, Ba, Se.

19. Consider the elements: B, C, N, O, F.

Which element has the highest first ionization energy?

Which element has the largest atomic radius?

Which element is most metallic?

Which element has three unpaired electrons?