Name _____ AP Chemistry

Chapter 7 HW 3: Due 1/14/16 Complete the following multiple choice questions. All will be graded. Write your answer clearly on the line in front of the question.

1. E In which groups do all the elements have the same number of valence electrons?
a. P, S, Cl b. Ag, Cd, Ar c. Na, Ca, Ba d. P, As, Se e. none

2. B An atom of fluorine contains 9 electrons. How many of these electrons are in s orbitals?
a. 2 b. 4 c. 6 d. 8 e. none

3. C How many unpaired electrons are there in an atom of sulfur in its ground state?
a. 0 b. 1 c. 2 d. 3 e. 4

4. E How many electrons can be contained in all of the orbitals with $n = 4$?
a. 2 b. 8 c. 10 d. 18 e. 32

5. A Of the following elements, which has occupied d orbitals in its ground-state neutral atoms?
a. Ba b. Ca c. Si d. P e. Cl

6. D Of the following elements, which needs three electrons to complete its valence shell?
a. Ba b. Ca c. Si d. P e. Cl

7. E Which of the following electron configurations is correct?
a. Ga: $[Kr]3d^{10}4s^24p^1$ b. Mo: $[Kr]5s^24d^5$ c. Ca: $[Ar]4s^13d^{10}$
d. Br: $[Kr]3d^{10}4s^24p^7$ e. Bi: $[Xe]6s^24f^{14}5d^{10}6p^3$

8. C The electron configuration of Ti^{2+} is
a. $[Ar]4s^2$ b. $[Ar]4s^13d^1$ c. $[Ar]3d^2$ d. $[Ar]4s^23d^2$ e. none of these

9. B $1s^22s^22p^63s^23p^64s^23d^2$ is the correct electron configuration for which of the following atoms?
a. Ca b. Ti c. Ge d. Zr e. none of these

10. D Which of the following atoms has three electrons in p orbitals in its valence shell?
a. Ba b. Ga c. V d. Bi e. none of these

11. B How many of the following electron configurations for the species in their ground state are correct?
I. Ca: $1s^22s^22p^63s^23p^64s^2$ II. Mg: $1s^22s^22p^63s^1$ III. V: $[Ar]\ 3s^23d^3$
IV. As: $[Ar]\ 4s^23d^{10}4p^3$ V. P: $1s^22s^22p^63p^5$

a. 1 b. 2 c. 3 d. 4 e. 5

12. B The number of unpaired electrons in the outer subshell of a Cl atom is
a. 0. b. 1. c. 2. d. 3. e. none of these

13. A For which of the following elements does the electron configuration for the lowest energy state show a partially filled d orbital?
a. Ti b. Rb c. Cu d. Ga e. Kr

14. C A strong line in the spectrum of atomic mercury has a wavelength of 254 nm. When mercury emits a photon of light at this wavelength, the frequency of this light is
a. $8.46 \times 10^{-16}\ s^{-1}$ b. $7.61 \times 10^{5}\ s^{-1}$ c. $1.18 \times 10^{15}\ s^{-1}$
d. $1.31 \times 10^{-6}\ s^{-1}$ e. none of these

15. C Which statements about hydrogen are true?

I. H has a lower ionization energy than He. II. H^- is smaller than H.
III. H bonds with the halogens to form polar covalent compounds. IV. H is always a metal.
V. H does not have a second ionization energy.

a. I, V b. II, IV c. I, III, V d. II, IV, V e. I, III, IV, V

16. E Which of the following electron configurations are different from those expected?
a. Ca b. Sc c. Ti d. V e. Cr

17. E Which of the following have 10 electrons in the d orbitals?
a. Mn b. Fe c. Cu d. Zn e. two of these

18. A Order the elements S, Cl, and F in terms of increasing ionization energy.
a. S, Cl, F b. Cl, F, S c. F, S, Cl d. F, Cl, S e. S, F, Cl

19. D Order the elements S, Cl, and F in terms of increasing atomic radii.
a. S, Cl, F b. Cl, F, S c. F, S, Cl d. F, Cl, S e. S, F, Cl

20. D When ignited, a uranium compound burns with a green flame. The wavelength of the light given off by this flame is greater than that of
a. red light. b. infrared light. c. radio waves. d. ultraviolet light. e. none of these

21. A Which one of the following types of radiation has the shortest wavelength, the greatest energy, and the highest frequency?
a. ultraviolet radiation b. infrared radiation c. visible red light d. visible blue light
e. none because short wavelength is associated with low energy and low frequency, not high energy and high frequency

22. C Which form of electromagnetic radiation has the longest wavelengths?
a. gamma rays b. microwaves c. radio waves d. infrared radiation e. x-rays

23. B Which of the following frequencies corresponds to light with the longest wavelength?
a. $3.00 \times 10^{13}\ s^{-1}$ b. $4.12 \times 10^{5}\ s^{-1}$ c. $8.50 \times 10^{20}\ s^{-1}$
d. $9.12 \times 10^{12}\ s^{-1}$ e. $3.20 \times 10^{9}\ s^{-1}$

24. C Green light has a wavelength of 5.50×10^{2} nm. The energy of a photon of green light is
a. 3.64×10^{-38} J b. 2.17×10^{5} J c. 3.61×10^{-19} J
d. 1.09×10^{-27} J e. 5.45×10^{12} J

25. B What is the wavelength of light that is emitted when an excited electron in the H atom falls from n = 5 to n = 2?
a. 5.12×10^{-7} m b. 4.34×10^{-7} m c. 6.50×10^{-7} m
d. 5.82×10^{-7} m e. none of these

26. E Which of the following is incorrectly paired?
a. wavelength – λ b. frequency – ν c. speed of light – *c*
d. hertz – s^{-1} e. x-rays – shortest wavelength

27. B In Bohr's atomic theory, when an electron moves from one energy level to another energy level more distant from the nucleus:
a. energy is emitted. b. energy is absorbed. c. no change in energy occurs.
d. light is emitted. e. none of these

28. A What is the wavelength of a photon of red light (in nm) whose frequency is 4.60×10^{14} Hz?
a. 652 nm b. 153×10^{6} nm c. 153 nm
d. 460. nm e. none of these