Lab Chem ***Practice Test 6*** Name: _____ Date: _____

____ 1. Draw the Lewis structures for the following compounds to assist you in answering this question.

CBr_2H_2 BH_3 $XeCl_4$ CF_4 HCl

How many of the compounds are nonpolar?
A) 1 B) 2 C) 3 D) 4 E) 5

Use the following to answer questions 2-5.

Draw the Lewis Structure for each of the following molecules. Use the following choices to describe the molecular structure of each of the following molecules or ions.
a. linear
b. trigonal planar
c. tetrahedral
d. pyramidal
e. V-shaped

2. CH_4

3. SO_2

4. PF_3

5. OCl_2

____ 6. Draw the Lews Structure for each of the following compounds:

NH_3 CO_2 CH_4 H_2

How many of the compounds above are nonpolar?
A) 1 B) 2 C) 3 D) 4 E) 5

T F 7. True or false? The frequency of the wave indicates how many wave peaks pass a certain point per given time period.

____ 8. Which color of visible light has the most energy per photon?
A) violet B) blue C) green D) yellow E) red

____ 9. Which color of visible light has the least amount of energy per photon?
A) violet B) blue C) green D) yellow E) red

____ 10. Which of the following is a reasonable criticism of the Bohr model of the atom?
A) It makes no attempt to explain why the negative electron does not eventually fall into the positive nucleus.
B) It does not adequately predict the line spectrum of hydrogen.
C) It does not adequately predict the ionization energy of the valence electron(s) for elements other than hydrogen.
D) It does not adequately predict the ionization energy of the first-energy-level electrons for one-electron species for elements other than hydrogen.
E) It shows the electrons to exist outside the nucleus.

____ 11. As the principal energy level increases in an atom's orbitals, the average distance of an electron energy level from the nucleus _____.
A) increases
B) decreases
C) stays the same
D) varies
E) none of these

____ 12. Consider the following representation of a 2*p* orbital:

Which of the following statements best describes the movement of electrons in a *p* orbital?
A) The electrons move along the outer surface of the *p* orbital, similar to a "figure 8" type of movement.
B) The electrons move within the two lobes of the *p* orbital, but never beyond the outside surface of the orbital.
C) The electrons are concentrated at the center (node) of the two lobes.
D) The electrons are moving in only one lobe at any given time.
E) The electron movement cannot be exactly determined.

____ 13. A given set of *f* orbitals consists of _____ orbital(s).
A) 1 B) 3 C) 5 D) 7 E) 9

____ 14. The maximum number of electrons allowed in the *p* sublevel of the third principal level is
A) 1 B) 2 C) 3 D) 6 E) 8

____ 15. The number of unpaired electrons in a nitrogen atom is
A) 1 B) 2 C) 3 D) 4 E) 5

____ 16. Choose the correct electron configuration for oxygen in an excited state.
A) $1s^2 2s^2 2p^4$
B) $1s^2 2s^2 2p^3 2d^1$
C) $1s^2 2s^2 2p^4 4s^1$
D) $1s^2 2s^2 2p^3 4s^1$
E) $1s^2 2s^2 2p^3 4s^1 4p^1$

____ 17. The number of electrons in the third sublevel of an iron atom is
A) 3 B) 6 C) 8 D) 26 E) 56

____ 18. All these atoms have seven electrons in their outermost energy levels **except**
A) H B) F C) Cl D) Br E) I

____ 19. The maximum number of electrons in the second principal energy level of an atom is
A) 2 B) 6 C) 8 D) 18 E) 32

____ 20. When moving down a group (family) in the periodic table, the number of valence electrons
A) remains constant
B) increases by 2 then 8 then 18 then 32
C) doubles with each move
D) decreases regularly
E) changes in an unpredictable manner

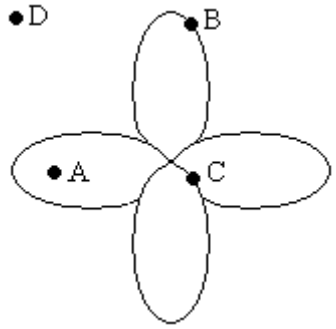
____ 21. The Group III elements through the Group VIII elements form an area of the periodic table where the electron sublevels being filled are
A) *p* orbitals
B) *s* and *p* orbitals
C) *d* orbitals
D) *p* and *d* orbitals
E) *f* orbitals

____ 22. How many unpaired electrons does the element cobalt (Co) have in its lowest energy state?
A) 0 B) 1 C) 2 D) 3 E) 7

____ 23. How many of the following electron configurations for the species in their ground state are correct?
I. Ca: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
II. Mg: $1s^2 2s^2 2p^6 3s^1$
III. V: [Ar] $3s^2 3d^3$
IV. As: [Ar] $4s^2 3d^{10} 4p^3$
V. P: $1s^2 2s^2 2p^6 3p^5$
A) 1 B) 2 C) 3 D) 4 E) 5

T F 24. True or false? The 47th electron of silver, Ag, will be in a *d* orbital.

____ 25. Consider the following representation of the **one** orbital below. The points represent various electron locations.



Where could an electron be located in the representation above?

A) Point A
B) Point B
C) Point C
D) Point D
E) An electron could be located at any of these points.

____ 26. What element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$?

A) Cl B) Se C) I D) Kr E) Br

____ 27. What element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^3$?

A) N B) P C) S D) Al E) Cl

____ 28. What element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2$?

A) Ba
B) Sn
C) Pb
D) Po
E) none of these

29. Write the electron configuration for Co.

30. Write the electron configuration for Ca.

31. Write the electron configuration for Cd.

____ 32. Which of the following statements is true?

A) The krypton 1*s* orbital is smaller than the helium 1*s* orbital because krypton's *p* and *d* orbitals crowd the *s* orbitals.
B) The krypton 1*s* orbital is larger than the helium 1*s* orbital because krypton contains more electrons.
C) The krypton 1*s* orbital is smaller than the helium 1*s* orbital because krypton's nuclear charge draws the electrons closer.
D) The krypton 1*s* orbital and helium 1*s* orbital are the same size because both *s* orbitals can only have two electrons.
E) The krypton 1*s* orbital is larger than the helium 1*s* orbital because krypton's ionization energy is lower so it's easier to remove electrons.

____ 33. Which of the following atoms has the smallest atomic radius?
A) As B) Sb C) Bi D) P E) N

T F 34. True or false? Covalent bonding occurs when a metal reacts with a nonmetal.

Use the following to answer questions 35-38.

Use the following choices to classify the bonds in each of the following molecules.
a. ionic
b. polar covalent
c. non polar covalent

35. OCl_2 _____

36. K_2O _____

37. $CoCl_2$ _____

38. CF_4 _____

____ 39. Which of the following compounds contains an ionic bond?
A) HCl*(g)* B) NaCl C) CCl_4 D) SO_2 E) O_2

____ 40. Which of the following compounds contains one or more covalent bonds?
A) NaCl B) CaO C) CO_2 D) Cs_2O E) $BaBr_2$

____ 41. The least electronegative element of those listed is
A) O B) Pb C) Ba D) Cu E) Se

____ 42. Arrange the following elements in order of increasing electronegativity (from the smallest to the largest): N, Be, F, C.
A) N < C < Be < F
B) C < F < Be < N
C) F < N < C < Be
D) Be < C < N < F
E) C < N < F < Be

____ 43. One of the most important characteristics of the water molecule is its _____, which allows it to surround and attract both positive and negative ions.
A) polarity B) strength C) magnetism D) fluidity E) stability

____ 44. Which of the following has the smallest radius?
A) S^{2-} B) Cl^- C) Ar D) K^+ E) Ca^{2+}

____ 45. Which of the following ions has the same electron configuration as an argon atom?
A) Br^- B) S^{3-} C) P^{3+} D) K^+ E) Ca^+

____ 46. The electron configuration for Ca^{2+} is identical to that of
A) Ne B) Kr C) Ca D) Ar

____ 47. Which of the following is the product of the reaction $Al + O_2$?
A) AlO B) AlO_2 C) AlO_3 D) Al_3O_2 E) Al_2O_3

____ 48. Which element listed below has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^4$?
A) Se
B) O
C) P
D) S
E) none of these

49. Write the electron configuration for Sr^{2+}.

T F 50. True or false? A packet of energy of electromagnetic radiation is called a neutron.

____ 51. A photon is produced when an electron
A) moves to a higher energy level
B) moves to a lower energy level
C) absorbs energy
D) is in an orbital

____ 52. Which of the following species are polar? (Check all that apply.)
A) HBr B) NO_3^- C) H_2O D) SF_4 E) $KrCl_4$ F) I_3^-

____ 53. Which of the following atoms has the highest ionization energy?
A) Al B) Si C) P D) As E) Sb

____ 54. Which of the following statements is correct **and** provides the best explanation for what happens when the first two electrons are removed from calcium?
A) Energy is released when either electron comes off since calcium is a metal and not very electronegative.
B) It takes less energy to remove the second electron from calcium as compared to the first because calcium wants to have eight electrons in its outer shell (and thus have a noble gas configuration).
C) It takes less energy to remove the first electron as compared to the second because it is in a higher energy level than the second electron.
D) It takes more energy to remove the second electron as compared to the first because the nucleus binds the electrons more tightly as each electron is removed.
E) Electrons cannot be removed from calcium since it is a metal and only wants to gain electrons to become more stable.

____ 55. 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

Answer Key - Practice Test 13May10

1. B
2. c
3. e
4. d
5. e
6. B
7. True
8. A
9. E
10. C
11. A
12. E
13. D
14. D
15. C
16. D
17. B
18. A
19. C
20. A
21. A
22. D
23. B
24. True
25. E
26. E
27. B
28. A
29. [Ar] $4s^2 3d^7$
30. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$ or [Ar] $4s^2$
31. [Kr] $5s^2 4d^{10}$
32. C
33. E
34. False
35. b
36. a
37. a
38. b
39. B
40. C
41. C
42. D
43. A
44. E
45. D

46. D
47. E
48. D
49. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6$
50. False
51. B
52. A, C, D
53. C
54. D
55. A