PRACTICE EXAM #4

General Chemistry I

SPRING 2012

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) No two electrons can have the same four quantum numbers is known as the 1) _____
A) Aufbau principle
B) Hund's rule
C) Pauli exclusion principle
D) Heisenberg uncertainty principle

2) Give the set of four quantum numbers that could represent the last electron added (using the Aufbau principle) to the Cl atom. 2) _____
A) $n = 3, l = 0, m_l = 1, m_s = -\frac{1}{2}$
B) $n = 3, l = 1, m_l = 1, m_s = +\frac{1}{2}$
C) $n = 2, l = 1, m_l = 1, m_s = -\frac{1}{2}$
D) $n = 3, l = 2, m_l = 1, m_s = +\frac{1}{2}$
E) $n = 3, l = 2, m_l = 1, m_s = -\frac{1}{2}$

3) Give the ground state electron configuration for Se. 3) _____
A) $[Ar]4s^2 4d^{10} 4p^4$
B) $[Ar]4s^2 3d^{10} 4p^6$
C) $[Ar]4s^2 3d^{10}$
D) $[Ar]3d^{10} 4p^4$
E) $[Ar]4s^2 3d^{10} 4p^4$

4) Give the number of core electrons for Cd. 4) _____
A) 44 B) 47 C) 48 D) 45 E) 46

5) How many unpaired electrons are present in the ground state Ge atom? 5) _____
A) 1 B) 2 C) 4 D) 3 E) 0

6) Identify the number of valence electrons for Mn. 6) _____
A) 7 B) 2 C) 5 D) 8

7) Give the complete electronic configuration for Mn. 7) _____
A) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^6$
B) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$
C) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4d^5$
D) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4p^5$

8) Place the following elements in order of decreasing atomic radius. 8) _____

Xe Rb Ar

A) Rb > Xe > Ar
B) Ar > Xe > Rb
C) Xe > Rb > Ar
D) Ar > Rb > Xe
E) Rb > Ar > Xe

9) Place the following in order of increasing radius. 9) _____

Br^- Na^+ Rb^+

A) $Na^+ < Rb^+ < Br^-$
B) $Br^- < Rb^+ < Na^+$
C) $Br^- < Na^+ < Rb^+$
D) $Rb^+ < Br^- < Na^+$
E) $Rb^+ < Na^+ < Br^-$

10) Which of the following represent the Lewis structure for N? 10) _____

A) B)  C) D) E) 

11) Which of the following represent the Lewis structure for Br^-? 11) _____

A)  B) C)  D)  E)

12) Use Lewis theory to determine the chemical formula for the compound formed between Al and O. 12) _____

A) Al_2O B) Al_3O_2 C) AlO D) Al_2O_3 E) AlO_2

13) Identify the compound with the highest magnitude of lattice energy. 13) _____

A) KCl B) CsCl C) LiCl D) NaCl

14) Place the following elements in order of <u>increasing</u> electronegativity. 14) _____

K Cs P

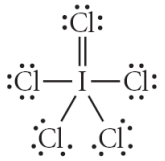
A) K < P < Cs
B) Cs < P < K
C) P < K < Cs
D) Cs < K < P
E) P < Cs < K

15) Choose the bond below that is <u>most</u> polar. 15) _____

A) C-C B) C-N C) C-F D) C-O E) F-F

16) Choose the best Lewis structure for ICl_5. 16) _____

A)



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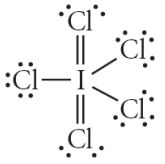
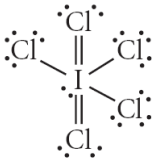
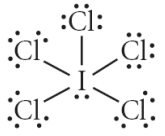


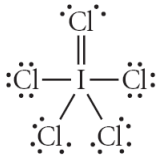
C)



D)



E)



17) How many of the following elements can form compounds with an expanded octet? 17) _____

I O Cl Xe

A) 4 B) 3 C) 1 D) 0 E) 2

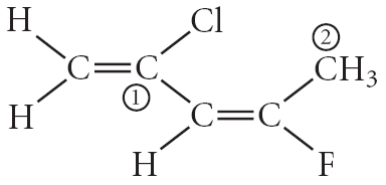
18) Determine the electron geometry (eg) and molecular geometry (mg) of CO_2. 18) _____

A) eg=trigonal planar, mg=bent
B) eg=trigonal planar, mg=trigonal planar
C) eg=linear, mg=trigonal planar
D) eg=tetrahedral, mg=tetrahedral
E) eg=linear, mg=linear

19) Draw the Lewis structure for BrF_5. What is the hybridization on the Br atom? 19) _____

A) sp^3d^2 B) sp^2 C) sp^3 D) sp E) sp^3d

20) Consider the molecule below. Determine the hybridization at each of the 2 labeled carbons. 20) _____



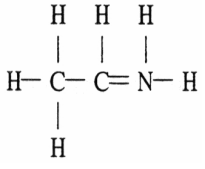
A) C1 = sp, C2 = sp^2
B) C1 = sp^2, C2 = sp^3d
C) C1 = sp^2, C2 = sp^3
D) C1 = sp^3d, C2 = sp^3d^2
E) C1 = sp^3, C2 = sp^3d

21) Use the molecular orbital diagram to determine which of the following are paramagnetic. 21) _____

A) B_2 B) B_2^{2-} C) B_2^{2+} D) N_2^{2+} E) C_2^{2-}

22) Which molecule listed below is a polar molecule? 22) _____
A) H_2O
B) HCN
C) NH_3
D) all of the compounds
E) none of the compounds

23) The number of sigma bonds and pi bonds in the following compound are _____, respectively. 23) _____



A) 7 and 2 B) 8 and 1 C) 7 and 1 D) 8 and 2 E) 6 and 2

ESSAY. Pick ONLY one of the following two questions. Write your answer in the space provided or on a separate sheet of paper.

24) Draw a correct Lewis structure for HCOOH.

25) Draw the Lewis structure for OCN^-. If several resonance structures are available, calculate the formal charges and determine the best structure. 25) _____