Name _____Chem. 111F13-QUIZ 3/Odago

Attempt all the questions, and fill in the bubbles correctly on the scantrons provided. Make sure you enter your A# correctly for credit. Incorrectly filled scantrons will NOT be graded, and will consequently result in a zero.

1. _____In the ICl_4^- ion, the **electron pairs** are arranged around the central iodine atom in the shape of
   a. a tetrahedron
   b. a trigonal bipyramid
   c. a square plane
   d. an octahedron
   e. a trigonal pyramid

2. _____In the XeF_4 molecule, how many valence electrons are around the Xe atom?
   a. 4
   b. 6
   c. 8
   d. 10
   e. 12

3. _____ Which of the following molecules has polar bonds and is nonpolar?
   a. HF
   b. ICl_3
   c. NF_3
   d. SF_4
   e. BF_3

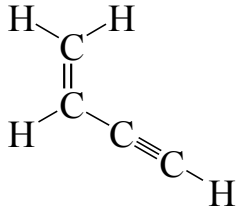
4. _____ A π (pi) bond is the result of the
   a. overlap of two s orbitals.
   b. overlap of an s orbital and a p orbital.
   c. overlap of two p orbitals along their axes.
   d. sidewise overlap of two parallel p orbitals.
   e. sidewise overlap of two s orbitals.

5. _____What is the molecular geometry of NH_3?
   a. trigonal-pyramidal
   b. trigonal-planar
   c. bent
   d. T-shaped
   e. Linear

6. _____Draw the Lewis structure for BrF5. What is the hybridization on the Br atom?
   a. sp^3d^2
   b. sp^3d
   c. sp^3
   d. sp^2
   e. sp

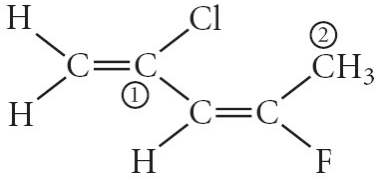
7. _____Which of the following species represents an exception to the octet rule?
   a. CH_3OH
   b. CCl_4
   c. PH_3
   d. BF_3
   e. BF_4^-

8. _____How many sigma (σ) bonds and pi (π) bonds are in the following molecule?



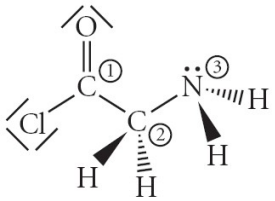
   a. seven σ and three π
   b. seven σ and two π
   c. five σ and five π
   d. five σ and three π
   e. five σ and two π

9. _____Consider the molecule below. Determine the hybridization at each of the 2 labeled carbons.



   a. $C_1 = sp^3$, $C_2 = sp^3d$
   b. $C_1 = sp$, $C_2 = sp^2$
   c. $C_1 = sp^2$, $C_2 = sp^3d$
   d. $C_1 = sp^3d$, $C_2 = sp^3d^2$
   e. $C_1 = sp^2$, $C_2 = sp^3$

10. _____Consider the molecule below. Determine the hybridization at each of the 3 labeled atoms.



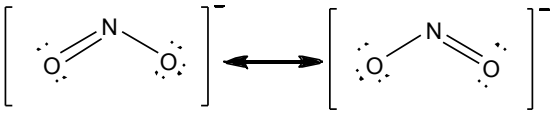
   a. $1=sp^2$, $2=sp^3$, $3=sp^2$
   b. $1=sp^2$, $2=sp^3$, $3=sp^3$
   c. $1=sp^3$, $2=sp^3$, $3=sp^3$
   d. $1=sp^3$, $2=sp^3$, $3=sp^2$
   e. $1=sp$, $2=sp^2$, $3=sp^2$

11. _____All the following species would be expected to have a tetrahedral geometry **EXCEPT**
    a. BF_4^-
    b. CF_4
    c. NF_4^+
    d. SiF_4
    e. ClF_4^-

12. _____The total number of valence electrons in the phosphate ion (PO_4^{-3}) is
    a. 24
    b. 26
    c. 28
    d. 30
    e. 32

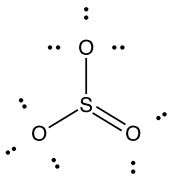
13. _____What is the total number of valence electrons in the ammonium ion, NH_4^+?
    a. 8
    b. 9
    c. 10
    d. 11
    e. 12

14. _____For the resonance hybrid of the nitrite ion, what is the average number of bonds between the nitrogen atom and an oxygen atom?



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

15. _____In the Lewis formula that minimizes formal charge, what is the formal charge on the sulfur atom in sulfur trioxide, SO_3?



    a. –2
    b. 0
    c. +2
    d. +4
    e. +6