Name	
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## CHEM 121a Quiz 4

Please print your name and the "Test Color" on your Scantron sheet. Carefully mark the appropriate answer to each question on the Scantron sheet, and show any work in the space provided. Each question is worth 1 point (20 pts total). Please hand in <u>both</u> the Quiz and the Scantron sheet.

- 1. Which of the following statements is incorrect?
  - a. Ionic bonding results from the transfer of electrons from one atom to another.
  - b. Dipole moments result from the unequal distribution of electrons in a molecule.
  - c. The electrons in a polar bond are found nearer to the more electronegative element.
  - d. A molecule with very polar bonds can be nonpolar.
  - e. Linear molecules cannot have a net dipole moment.
- 2. Atoms having greatly differing electronegativities are expected to form:
  - a. no bonds
  - b. polar covalent bonds
  - c. nonpolar covalent bonds
  - d. ionic bonds
  - e. covalent bonds
- 3. For the elements Rb, F, and O, the order of increasing electronegativity is:
  - a. Rb < F < O
  - b. Rb < O < F
  - c. O < F < Rb
  - d. F < Rb < O
  - e. Rb = F = O
- 4. Which of the following molecules does not have a dipole moment?
  - a. HCl
  - b. CO
  - $c. NCl_3$
  - d. BCl<sub>3</sub>
  - e. H<sub>2</sub>O
- 5. Which of the following has the smallest radius?
  - a. Cl-
  - b. K+
  - c. Cr
  - d. Al<sup>3+</sup>
  - e. Ar

6. Calculate the lattice energy for LiF(s) given the following:

 $\begin{array}{lll} \text{sublimation energy for Li(s)} & +166 \text{ kJ/mol} \\ H_f \text{ for F(g)} & +77 \text{ kJ/mol} \\ \text{first ionization energy of Li(g)} & +520 \text{. kJ/mol} \\ \text{electron affinity of F(g)} & -328 \text{ kJ/mol} \\ \text{enthalpy of formation of LiF(s)} & -617 \text{ kJ/mol} \end{array}$ 

- a. 285 kJ/mol
- b. -650. kJ/mol
- c. 800. kJ/mol
- d. -1052 kJ/mol
- e. 356 kJ/mol
- 7. As the number of bonds between two carbon atoms increases, which one of the following decreases?
  - a. number of electrons between the carbon atoms
  - b. bond energy
  - c. bond length
  - d. all of these
  - e. none of these
- 8. Using the following bond energies

Bond Bond Energy (kJ/mol)
C C 839
C-H 413
O=O 495
C=O 799
O-H 467

estimate the heat of combustion for one mole of acetylene:

$$C_2H_2(g) + 5/2 O_2(g)$$
 2  $CO_2(g) + H_2O(g)$ 

- a. 1228 kJ
- b. -1228 kJ
- c. -447 kJ
- d. +447 kJ
- e. +365 kJ
- 9. Which of the following is a valid Lewis structure for  $O_3$ ?
  - a. :0=0=0:
  - b. :O-O-O:
  - c. :O=O-O:
  - d. :O-O O:
  - e. :O-O=O:

10.	. Which of the following compounds contains only one unshared pair of valence electrons?					
	a. $NH_3$ b. $H_2O$ c. $CH_4$ d. $NaCl$ e. $BeF_3$					
11.	In the Lewis structure for $SF_6$ , the central sulfur atom shares electrons.					
	a. 4 b. 8 c. 10 d. 12 e. 0, because $SF_6$ is an ionic compound					
12.	The geometry of AsCl <sub>5</sub> is					
	<ul><li>a. trigonal bipyramidal.</li><li>b. square pyramidal.</li><li>c. distorted tetrahedral.</li><li>d. octahedral.</li><li>e. see-saw</li></ul>					
13.	The correct molecular structure for $IF_4^-$ is:					
	<ul> <li>a. square pyramidal</li> <li>b. tetrahedral</li> <li>c. square planar</li> <li>d. octahedral</li> <li>e. trigonal bipyramidal</li> </ul>					
14.	In the molecule $C_2H_4$ the valence orbitals of the carbon atoms are assumed to be					
	<ul> <li>a. not hybridized.</li> <li>b. sp hybridized.</li> <li>c. sp<sup>2</sup> hybridized.</li> <li>d. sp<sup>3</sup> hybridized.</li> <li>e. dsp hybridized.</li> </ul>					
15.	The hybridization of sulfur in the sulfate anion, $SO_4^{2-}$ , is:					
	a. $sp^3$ b. $sp^2$ c. $sp$ d. $s^2p^3$ e. not hybridized					

16.	Which of the following contains a bond? a. $H_2CO$ b. $PF_2$ c. $C_2H_6$ d. $HClO$ e. $CCl_4$
17.	What is the bond order of $Ne_2$ ?  a. 0 b. $1/2$ c. 1 d. 1 $1/2$ e. 2
18.	In which of the compounds below is there more than one kind of hybridization (sp, sp $^2$ sp $^3$ ) for carbon?  I. $CH_3CH_2CH_2CH_3$ II. $CH_3CH=CHCH_3$ III. $CH_2=CH-CH=CH_2$ IV. $H-C$ $C-H$ a. II and III b. II only c. III and IV d. I and IV e. III
19.	If four orbitals on one atom overlap four orbitals on a second atom, how many molecular orbitals will form?  a. 1 b. 4 c. 8 d. 16 e. 32
20.	The configuration ( $2s)^2(\ 2s^*)^2(\ 2p_y)^1(\ 2p_x)^1$ is the molecular orbital description for the ground state of a. Li $_2^+$ b. Be $_2$ c. B $_2$ d. B $_2^{2-}$ e. C $_2$

## ANSWER KEY for Quiz 4

2.       d       2.       a       (10)       2.       e       (16)       2.       c       (         3.       b       3.       d       (5)       3.       d       (8)       3.       d       (         4.       d       4.       d       (11)       4.       c       (19)       4.       e       (         5.       d       4.       d       (11)       4.       c       (19)       4.       e       (         5.       d       (4)       5.       e       (15)       5.       e       (         6.       d       6.       c       (14)       6.       e       (       (       6.       e       (14)       6.       e       (       6.       e       (       14.       e       (       6.       c       (14)       6.       e       (       6.       c       (14)       6.       e       (       6.       c       (14)       6.       e       (       7.       c       (       6.       c       (14)       7.       c       (       9.       e       (       9.       2.       c       (9) <t< th=""><th>Vers</th><th>sion 1</th><th colspan="2">Version 2</th><th>2</th><th colspan="3">Version 3</th><th colspan="3">Version 4</th></t<>	Vers	sion 1	Version 2		2	Version 3			Version 4		
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