

**GENERAL CHEMISTRY II**

**QUIZ 1**

January 26, 2007

**INSTRUCTIONS:**

**PRINT YOUR NAME** \_\_\_\_\_ **>** **NAME** \_\_\_\_\_

**WORK 3 OF #1 THROUGH #4 (3@ 25)**

**SHOW YOUR WORK FOR PARTIAL CREDIT**

**USE THE CORRECT NUMBER OF SIGNIFICANT FIGURES**

**THE LAST TWO PAGES ARE A PERIODIC TABLE AND A VSEPR CHART**

**R = 0.08206 lit-atm/mol-K**

**1** \_\_\_\_\_

**R = 8.3145 J/mol-K**

**2** \_\_\_\_\_

**h = 6.626 X 10<sup>-34</sup> J-s**

**3** \_\_\_\_\_

**c = 2.9979 X 10<sup>8</sup> m/s**

**4** \_\_\_\_\_

**TOTAL(75)** \_\_\_\_\_

**1. For each of the following molecules or ions**

I) Draw a valid Lewis structure .

II) Describe the shape around the central atom for each of these molecules or ions predicted by the VSEPR theory,

III) Identify the hybridization of the central atom.

IV) Assign the formal charges to each atom in (c) and (e). You do not have to assign formal charges for the others

(a) HCN  
(C atom is central)

(b)  $\text{ClO}_3^-$

(c)  $\text{HCO}_2^-$   
(C atom is central)

(d)  $\text{O}_2\text{XeCl}_2$   
(Xe atom is central)

(e)  $\text{ClBr}_4^-$

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Electronegativities of selected elements

H = 2.1, Na = 0.9	C = 2.5	N = 3.0	O = 3.5	F = 4.0
Ti = 1.5	Si = 1.8	P = 2.1	S = 2.5	Cl = 3.0
				Kr = 2.0 (estimate)

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2. Consider the following molecules. For each draw a valid Lewis structure. Using the Table above consider any bond with an electronegativity difference of greater than 0.4 to be polar. Determine whether each molecule is polar.

(a)  $\text{OCl}_2$

(b)  $\text{KrCl}_2$

(c)  $\text{SiCl}_4$

(d)  $\text{HOCN}$   
Connectivity is as written

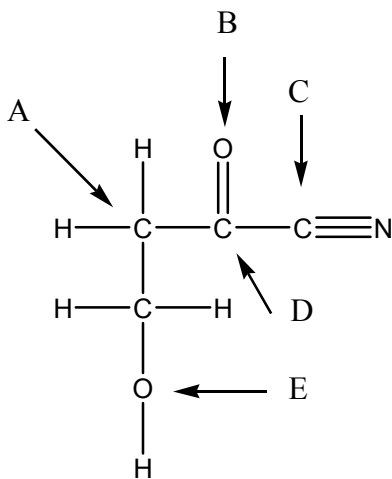
3. Consider the perchlorate ion  $\text{ClO}_4^-$ . (Oxygen is more electronegative than chlorine.)  
(a) Draw a valid Lewis structure in which each atom obeys the octet rule. Assign the formal charges for each atom in the structure.

(b) What is wrong with the structure that you drew in part (a) ?

(c) Draw a resonance structure for the perchlorate ion that improves the problem you found in part (b). Assign formal charges to each atom in the structure.

(d) What are the hybridizations for the two structures that you drew in part (a) and part (c)

4. Consider the molecule shown below. The angles in the drawing are not necessarily the actual angles in the molecule.



(a) Complete the Lewis structure with the appropriate number of lone pairs.

(b) Identify the hybridization of the following atoms:

Carbon(A)\_\_\_\_\_ Oxygen(B)\_\_\_\_\_ Carbon(C)\_\_\_\_\_ Carbon(D)\_\_\_\_\_

Oxygen(E)\_\_\_\_\_ Nitrogen\_\_\_\_\_

(c) What are the approximate angles for around the following atoms?

Carbon(A)\_\_\_\_\_ Carbon(C)\_\_\_\_\_ Carbon(D)\_\_\_\_\_ Oxygen(E)\_\_\_\_\_

(d) Describe the bonding of Carbon(D) and Oxygen(B) in terms of hybrid orbitals. I am looking for what which orbitals are used to form each bond. Include a description of the two parts of the double bond, the two single bonds to carbon, and the location of any lone pairs.