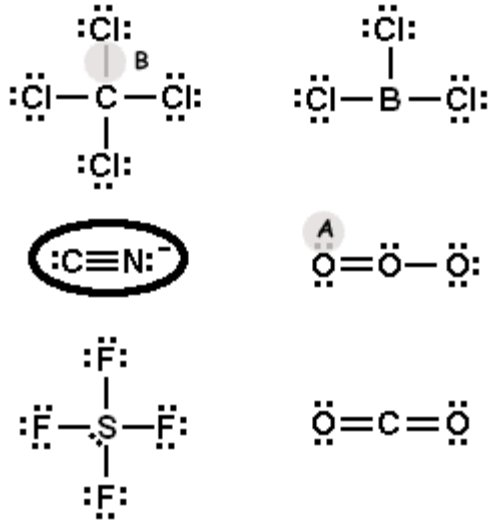
Chem 110 **Fall 2006** **Exam II Key** **Whelan**

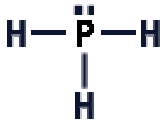
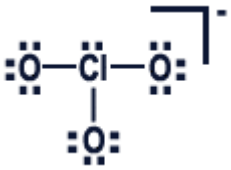
Question 1
10 Points



1. The **letter** that corresponds to a pair of valence electrons **shared** by **two atoms**. **B**
2. The **letter** that corresponds to a pair of valence electrons **held** by a **single atom**. **A**
3. How many of these molecules **obey** the **octet rule**? **4**
4. **Circle** the structure(s) that contain a **triple bond**.
5. How **many** of these molecules have **resonance** structures? **1 or 2**

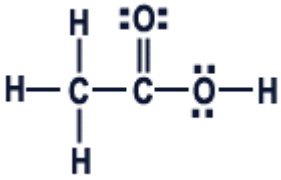
Question 2
12 Points

Draw the best **Lewis Dot Structure** for the following molecules

PH_3 	**SF_2** 
HCN 	**ClO_3^-** 

Question 3
10 Points

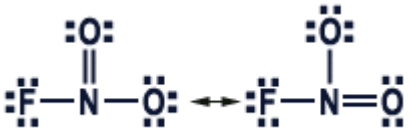
Draw the Lewis Dot Structure for **CH_3COOH** in the space provided on the left. Then answer the questions of the right.



1. The **number** of **C-H** bonds: **3**
2. The **number** of **O-H** bonds: **1**
3. The **number** of **C-C** bonds: **1**
4. The **number** of **C-O** bonds: **2 or 3**
5. **Total** number of **unshared pairs**: **4**

Question 4
6 Points

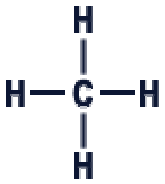
Draw **all resonance** structures for NO_2F?



Question 5
10 Points

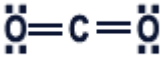
1. **Name** the compound with the formula BCl_3? **Boron trichloride**
2. **Name** the compound with the formula SF_6? **Sulfur hexafluoride**
3. **Name** the compound with the formula SO_2? **Sulfur dioxide**
4. The **formula** for **dioxygen difluoride**? O_2F_2
5. The **formula** for **phosphorus pentachloride**? PCl_5

Question 6
22 Points

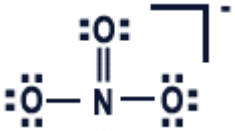


A

B

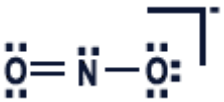


C



D

E



F

1. The **molecular geometry** for **B** is: **Trigonal pyramid**
2. The **molecular geometry** for **F** is: **Angular/Bent**
3. The **molecule(s)** with a bond angle of ~ 109^0 **A, B, E**
4. The **molecule(s)** with a bond angle of ~ 180^0 **C**
5. The **molecule(s)** with **trigonal planar** molecular geometry: **D**
6. The **molecule(s)** with an **angular/bent** molecular geometry: **E, F**
7. The molecule in **6**. that has the **largest** bond **angle**: **F**

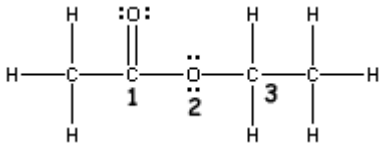
Question 7
6 Points

Classify **each** of the **molecules** in **Question 6** as wither **Polar** (**P**) or **Non Polar** (**NP**)?

A. NP B. P C. NP

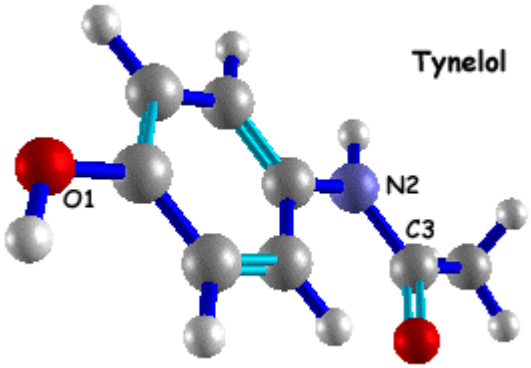
D. NP E. P F. P

Question 8
6 Points



1. The **predicted** bond angle about **1** is: **120**
2. The **predicted** bond angle about **2** is: **109**
3. The **predicted** bond angle about **3** is: **109**

Question 9
6 Points



What is the **predicted** bond **angle** about the atoms indicated on Tylenol:

1. **Oxygen 1**: **109**
2. **Nitrogen 2**: **109**
3. **Carbon** 3: **120**

Question 10
6 Points

Write the **equilibrium expressions** for the following reactions:

1. $2\ NO(g) + Cl_2(g) \Leftrightarrow 2\ NOCl(g)$ K = $[NOCl]^2/[NO]^2[Cl_2]$
2. $2\ H_2S(s) \Leftrightarrow 2\ H_2(g) + S_2(g)$ K = $[H_2]^2[S_2]$
3. $F^- + H_2O(l) \Leftrightarrow HF(aq) + OH^-$ K = $[HF][OH^-]/[F^-]$

Question 11
6 Points

For the following equilibria, indicate using the appropriate letter whether:

A. Appreciable quantities of all species are present at equilibrium.
B. The forward reaction is favored at equilibrium.
C. The reverse reaction is favored at equilibrium.

1. $HF(aq) + H_2O(l) \Leftrightarrow H_3O^+ + F^-$ K = 7.55×10^{-4} @ 25^0C **C**
2. $N_2(g) + 3\ H_2(g) \Leftrightarrow 2\ NH_3(g)$ K = 3.5×10^8 @ 25^0C **B**
3. $Hb + O_2(g) \Leftrightarrow HbO_2$ K ~ 75 @ 25^0C **A**

Exam II Score