HOMEWORK ASSIGNMENT #1: ORGANIC CHEMISTRY I

**Lewis Modeling, Bondline structures, HONC, dipoles and hybridization**

Due Wed 6 September 2017

**Your name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_answers\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_/30**

1. **Lewis Model Practice (10 pts)**

1.1. Consider the 4 compounds below: (4 pts)

A B C D

.... .. .. .. ..

H-C=N=O: H-C≡N-O: H-C≡N-O: H-C=N-O:

**.. ..**

1. which contain positively charged C \_\_\_\_D\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. which contains positively charged O \_\_\_\_\_A,B\_\_\_\_\_\_\_\_\_\_\_\_\_
3. which contains negatively charged N \_\_\_\_\_\_None\_\_\_\_\_\_\_\_\_\_
4. which contains negatively charged O \_\_\_\_\_C,D\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Draw all the possible structures that obey the Lewis rules (see p. 7 of text) for a neutral

compound that has the empiric formula C2H4O. Make sure to indicate where lone pairs and

formal charges are present in order for the octet rule to apply. (3 pts)



Ethenol ethylene oxide acetaldehyde

1.3. Draw all the possible structures for O3 that obey the Lewis rules. Indicate (if present) formal charges, lone pairs and if resonance is present, circle the resonant structures. (3 pts)





↔

Equivalent resonance pair non-equivalent isomer

1. **Abbreviated Bond Line Structures and the HONC rule (9 pts)**

2.1 Draw an abbreviated bond line structure consistent with the HONC rules for the molecular

formulas below: **(6 pts)**

1. C2H7N b) C3H8O c) C3H7ClO







2.2. Based on the HONC rules, can the molecular formulas listed below exist as organic chemicals ?

If yes, draw a likely structure**. 3 pts**

1. C­­­2H4N b) C2H2O c) C2HO2

**Yes** **No** **Yes** No Yes **No**

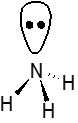


1. **Dipoles (3 pts)**

For the molecular shapes below, predict the most likely direction of dipole **( + - )**







H coming vertically out of page and vertically behind page.

Lone pairs on plane of page.

1. **Valence Bond Theory (5 pts)**

Determine the hybridization on the **bolded** atoms below. Note that the lone pairs have been omitted so you must figure that count out on your own.

H2 C=**O** H2**C=**O H2C=**C**=O **C**FBr3 C**F**Br3

\_\_\_\_sp2\_\_ \_\_\_\_sp2\_\_\_\_ \_\_\_sp\_\_\_\_\_\_ \_\_\_sp3\_\_\_\_\_ \_\_\_\_sp3\_\_\_\_\_

1. **Problem 1.81a of your text (page 47) (3 pts)**

**Left hand N-C-N angle is ~109.5 (cengtral C is sp3 hybridized to form a pyramid)**

**Right hand N-C-N bond is 120o since central C is doubly bonded to O and singly bonded to the two N, making the hybridization sp2.**