O R G A N I C C H E M I S T R Y I

Exam # 1 1 Oct 5:00 P.M.–6:20 P.M.

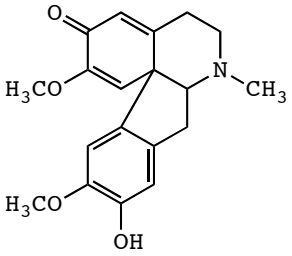
Name_____

P L E A S E P R I N T

Page 1_____/025	
Page 2_____/024	
Page 3_____/030	
Page 4_____/021	
TOTAL____/100	

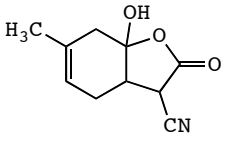
Instructions Write all answers on these pages. Regrade requests are due one week after the exam is returned.
Good luck!

(1) [4 points] In the space provided write the formula of the molecule at right.

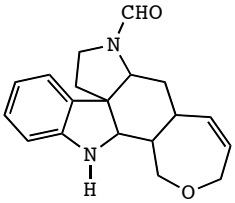


Answer **$C_{19}H_{21}NO_4$**

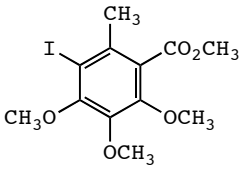
(2) [8 points] Rank these compounds in order of degrees of unsaturation (1 = most degrees of unsaturation). Write the rank in the space provided.



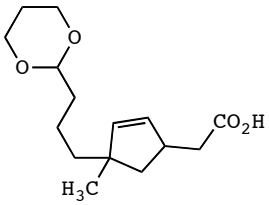
2 [6]



1 [10]



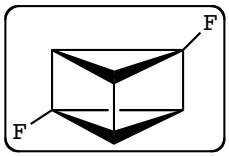
3 [5]

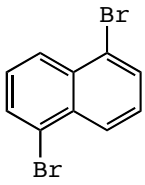


4 [4]

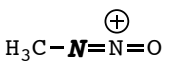
(3) [5 points] Circle the molecules that have a non-zero molecular dipole moment.

1,1-dibromomethane $CH_2(CCF)_2$ CCl_2CCl_2

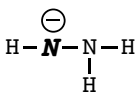




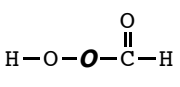
(4) [8 points] In the space provided, write the hybridization state of the atoms ***in bold type***.



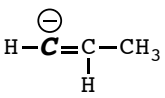
sp^2



sp^3

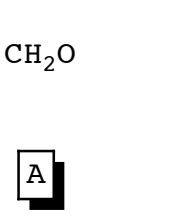


sp^2



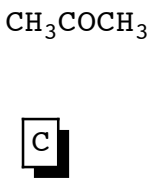
sp^2

(5) [12 points] Match each compound **A**–**L** to the appropriate functional group. Assign each letter only once.

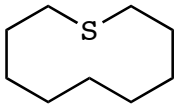


A

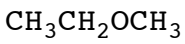
B



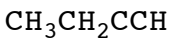
C



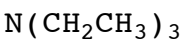
D



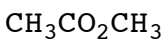
E



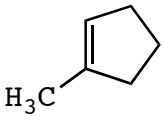
F



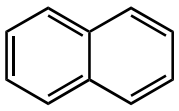
G



H

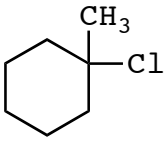


I



J

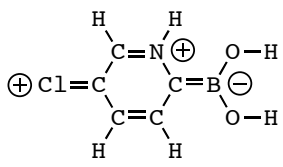
K

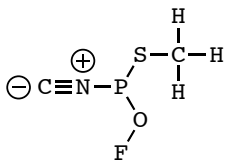


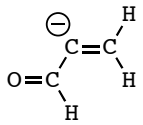
L

_____ 1º alcohol
_____ 2º alcohol
_____ 3º alcohol
A aldehyde
_____ monosubstituted alkene
_____ disubstituted alkene
I trisubstituted alkene
_____ tetrasubstituted alkene
_____ internal alkyne
F terminal alkyne
K 1º amide
_____ 2º amide
_____ 3º amide
_____ 1º amine
_____ 2º amine
G 3º amine
J arene
_____ carboxylic acid
H ester
E ether
_____ 1º halide
_____ 2º halide
L 3º halide
C ketone
B nitrile
D sulfide (thioether)
_____ thiol

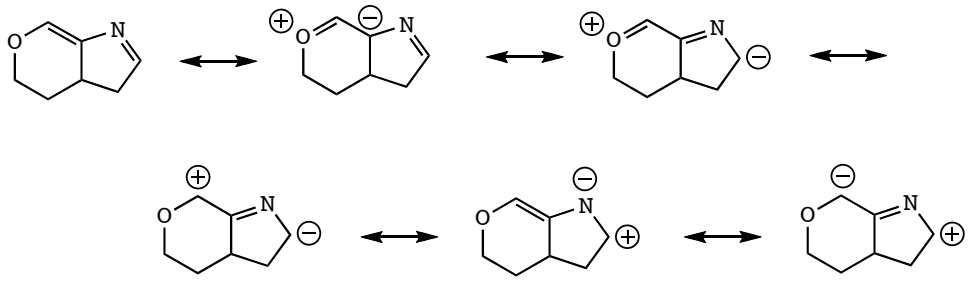
(6) [12 points] All atoms in these molecules have an octet of valence electrons, except the hydrogens, which all have a duet of valence electrons; unshared electron pairs are not shown. Write non-zero formal charges on the atoms that require them.







(7) [15 points] Draw three additional reasonable resonance structures of the molecule shown below.



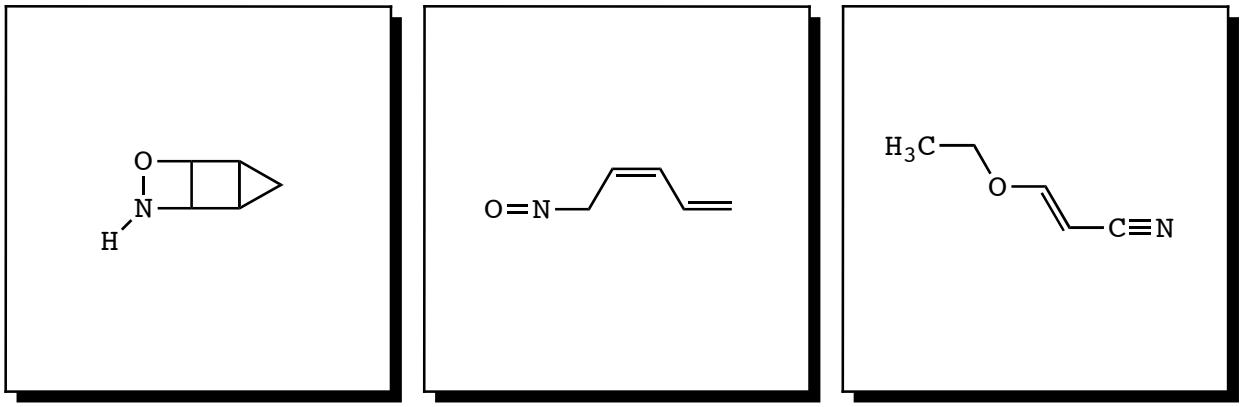
(8) [9 points] In the boxes provided, draw a structure of C_5H_7NO that has no formal charges and

(a) no double bonds and no triple bonds

(b) no rings and no triple bonds

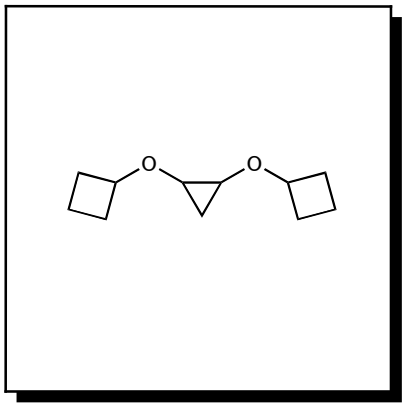
(c) no rings and no double bonds

Many correct answers: all must have three DOUs. Examples:

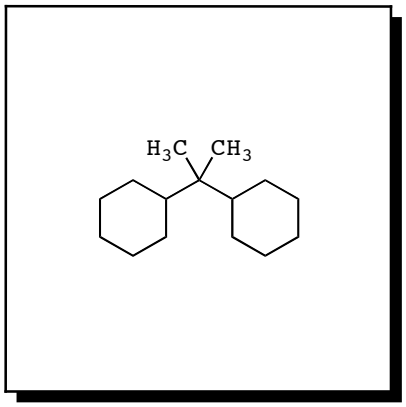


(9) [6 points] In the boxes provided draw the structure of

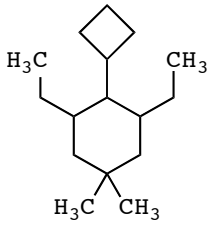
(a) 1-(2-cyclobutoxycyclopropoxy)cyclobutane



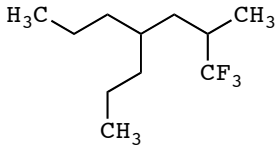
(b) 1-(1-cyclohexyl-1-methylethyl)cyclohexane



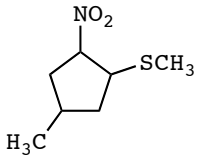
(10) [12 points] Write the systematic name of these compounds. Do not write names employing nicknames or common names.

(a) 

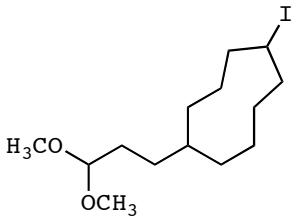
4-cyclobutyl-3,5-diethyl-1,1-dimethylcyclohexane

(b) 

1,1,1-trifluoro-2-methyl-4-propylheptane

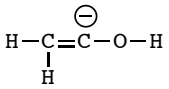
(c) 

4-methyl-1-methylthio-2-nitrocyclopentane

(d) 

1-(3,3-dimethoxypropyl)-5-iodocyclononane

(11) Draw a three-dimensionally accurate picture of the bonding orbitals of the ion at right. The following features must be apparent from your drawing and not from labeling:



(a) [3 points] The correct hybridization state of all atoms.

(b) [3 points] Orbitals in which unshared electron pairs reside.

(c) [3 points] Pairs of dots representing unshared electron pairs placed in the appropriate orbitals.