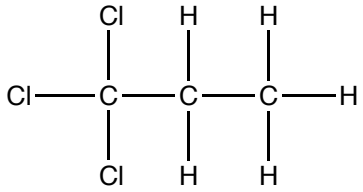
Name _____ Test 1 (10/5)
CHEM 0201 (Organic) Fall 2018

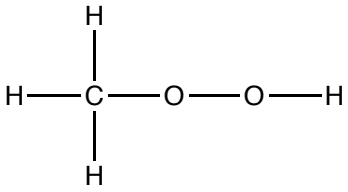
1. (16 pts.) Draw Lewis structures for the following condensed structures.

CH_2ClCHO $HCCCH_3$

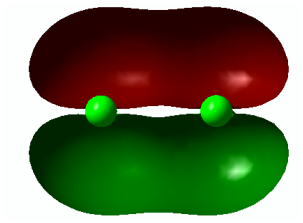
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

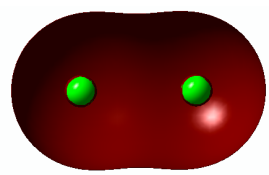
2. (10 pts.) Using wedge (◄) and dashed (┈┈) bonds where appropriate, draw three-dimensional representations of the following Kekulé structures.

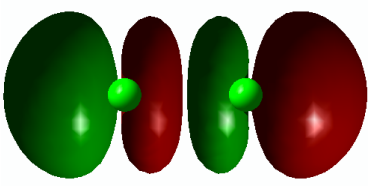




3. (12 pts.) Label (σ, π, bonding, and/or antibonding) the following molecular orbitals. Cutaway views of the MO's are provided. The two green dots represent the nuclei of the Cl atoms.

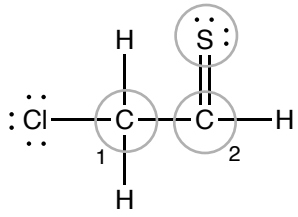






4. (10 pts) Determine the hybridization of the circled atoms in the structures drawn below. Lewis, Kekulé, and condensed structures have been provided.

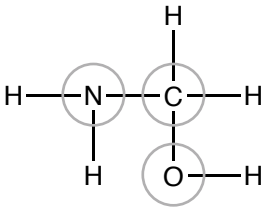
a.



C(1)_____ C(2)_____

S _____

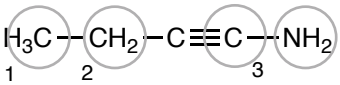
b.



N _____ C _____

O _____

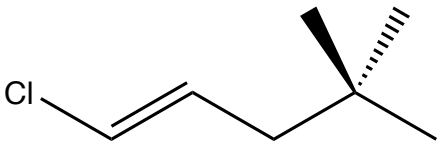
c.

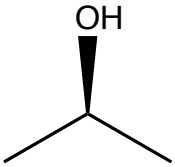


C(1)_____ C(2)_____

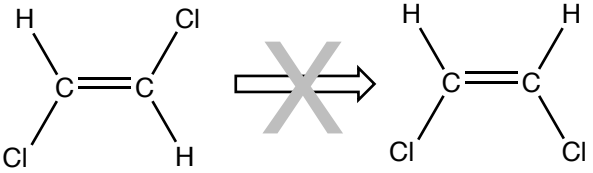
C(3)_____ N _____

5. (12 pts.) Convert the following skeletal structures to condensed structures; that is, add C's, CH's, CH_2's, and CH_3's where appropriate.



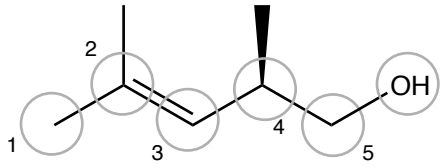


6. (12 pts.) At room temperature, rotation around the double bond in 1,2-dichloroethene does not happen.



Using valence bond theory (hybridization) explain why rotation does not occur around the double bond. In the explanation make certain to name the atomic or hybrid orbitals that are being described.

7. (10 pts.) Determine the hybridization of the circled atoms in the following skeletal structure.



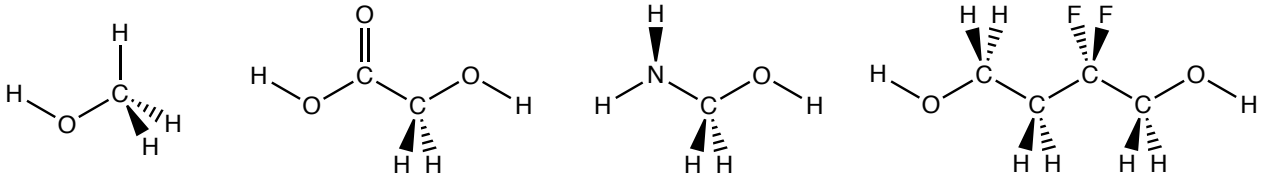
C(1)_____ C(2)_____ C(3)_____

C(4)_____ C(5)_____ O _____

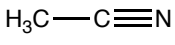
8. (10 pts.) Based on the provided pK_a values rank the following molecules in order of decreasing acidity; that is, place the strongest acid on the left, followed by the next strongest and ending with the weakest acid on the right.

$CH_3CH_2CH_2ClCO_2H$	HNO_3	CH_3CH_2OH	C_6H_5OH	$CH_3CH_2CH_2CO_2H$
(pK_a = 2.86)	(pK_a = -1.6)	(pK_a = 15.9)	(pK_a = 10.0)	(pK_a = 4.5)

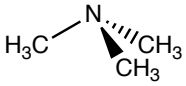
9. (12 pts.) For each of the following structures, circle the H that would most easily be removed by a base.



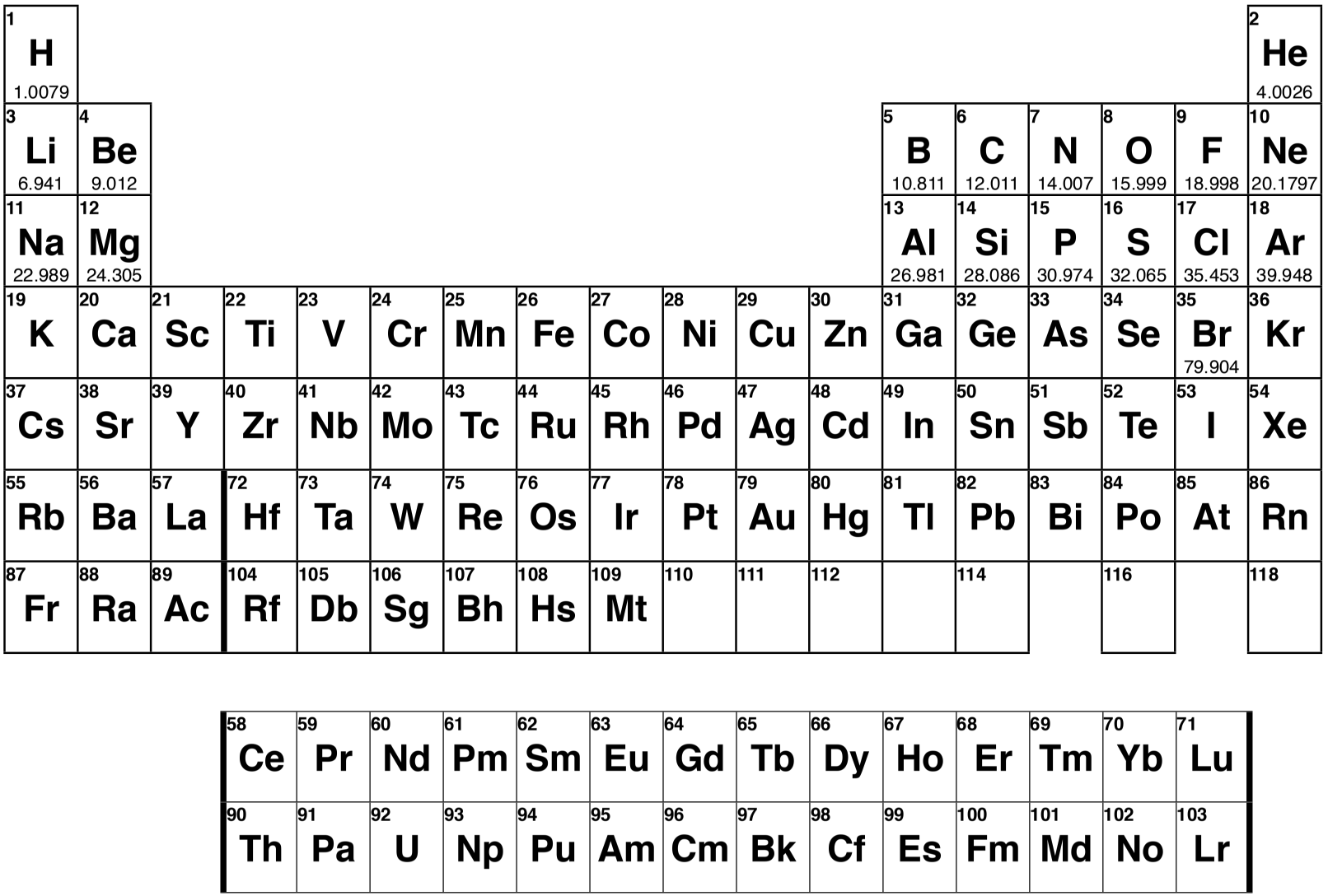
10. (12 pts) Trimethylamine is a stronger Brønsted base than acetonitrile. Determine the hybridization of the N atoms in the two molecules and explain why trimethylamine is a stronger base.



acetonitrile



trimethylamine


1 H 1.0079
2 He 4.0026
3 Li 6.941
4 Be 9.012
5 B 10.811
6 C 12.011
7 N 14.007
8 O 15.999
9 F 18.998
10 Ne 20.1797
11 Na 22.989
12 Mg 24.305
13 Al 26.981
14 Si 28.086
15 P 30.974
16 S 32.065
17 Cl 35.453
18 Ar 39.948
19 K
20 Ca
21 Sc
22 Ti
23 V
24 Cr
25 Mn
26 Fe
27 Co
28 Ni
29 Cu
30 Zn
31 Ga
32 Ge
33 As
34 Se
35 Br 79.904
36 Kr
37 Cs
38 Sr
39 Y
40 Zr
41 Nb
42 Mo
43 Tc
44 Ru
45 Rh
46 Pd
47 Ag
48 Cd
49 In
50 Sn
51 Sb
52 Te
53 I
54 Xe
55 Rb
56 Ba
57 La
72 Hf
73 Ta
74 W
75 Re
76 Os
77 Ir
78 Pt
79 Au
80 Hg
81 Tl
82 Pb
83 Bi
84 Po
85 At
86 Rn
87 Fr
88 Ra
89 Ac
104 Rf
105 Db
106 Sg
107 Bh
108 Hs
109 Mt
110
111
112
114
116
118
58 Ce
59 Pr
60 Nd
61 Pm
62 Sm
63 Eu
64 Gd
65 Tb
66 Dy
67 Ho
68 Er
69 Tm
70 Yb
71 Lu
90 Th
91 Pa
92 U
93 Np
94 Pu
95 Am
96 Cm
97 Bk
98 Cf
99 Es
100 Fm
101 Md
102 No
103 Lr