

Chem 141  
Fall 2006  
Exam 1  
9/13/06

NAME: \_\_\_\_\_

LAB SECTION  
(Time, Day and TA): \_\_\_\_\_

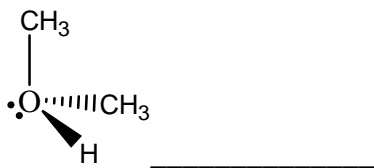
Problems	Pages	Points	Grader
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

TOTAL \_\_\_\_\_points

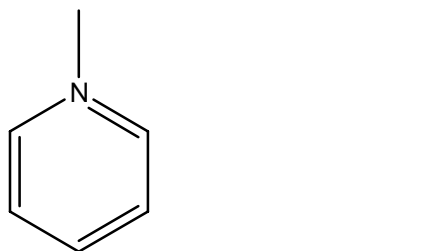
% \_\_\_\_\_

1) What are the charges on the following molecules (+, - or neutral)?(1 point each)

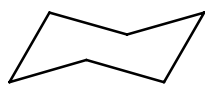
a)



b)

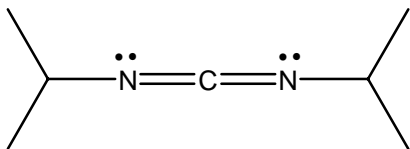


c)



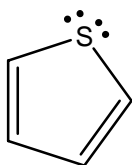
\_\_\_\_\_

d)



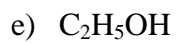
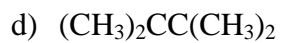
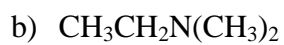
\_\_\_\_\_

e)



\_\_\_\_\_

2. Draw the following condensed formulae as bond-line structures (include lone pairs where appropriated and illustrate the overall shape). (3 points each)



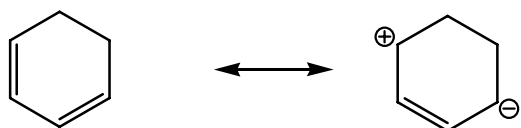
3) What is a constitutional isomer? Explain a few concise sentences and illustrations. (5 points)

4)a) Using sodium and chloride, show the formation of an ionic bond by writing an equation including the Lewis dot structures of the sodium and chloride and the resultant atoms. (4 points)

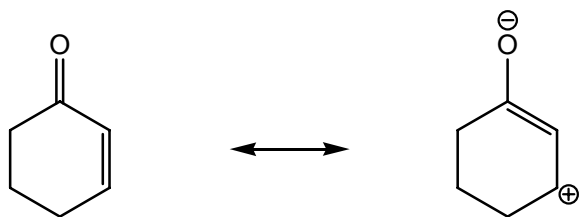
b) Using carbon and hydrogen, draw Lewis dot structures to show the formation of methane. (4 points)

5) Using arrows illustrate how the following resonance structures are related. Add arrows to show the flow of electrons. (7 points)

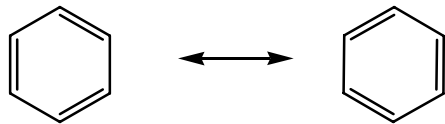
a)



b)

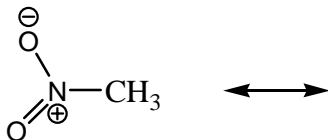


c)

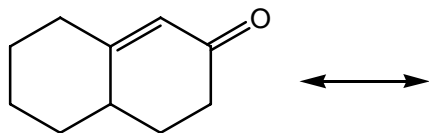


6) Draw a resonance contributing structure for the following structures. Illustrate the electron flow required by drawing an arrow to push the electrons. (5 points each)

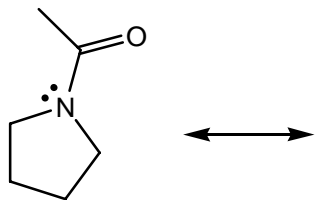
a)



b)



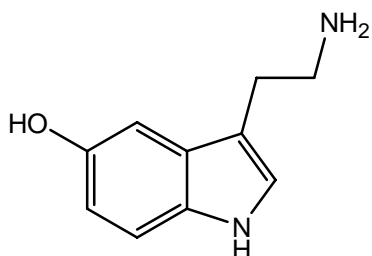
c)



7) In a few concise sentences define which is stronger a covalent bond or a dipole-dipole (such as Hydrogen bonding). (4 points)

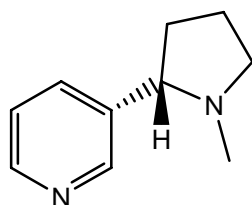
8) Draw arrows to each of the carbon, nitrogen and oxygen atoms in the following structures and define the hybridization of the valence electrons. (25 points)

a)



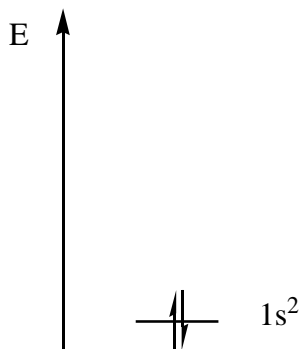
serotonin  
(neurotransmitter)

b)



nicotine  
(alkaloid)

9)a) Cyanide ( $\text{C}\equiv\text{N}^-$ ) is toxic due to its ability to bind covalently to enzymes within the mitochondria. Fill in the rest of this electron energy level diagram to represent the **nitrogen** atom of cyanide. (4 points)



9)b) Draw an illustration of cyanide and include p-orbitals as lobes where appropriate. (4 points)

10) Name the following structures. (3 points each)

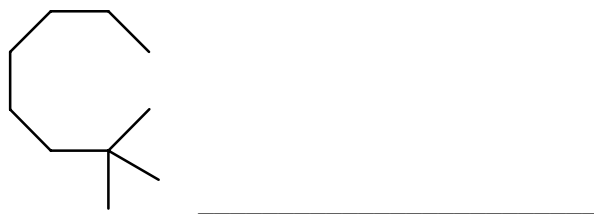
a)



b)



c)



11) Draw the following structures as bond-line structures. (3 points each)

a) 3,4,5 trimethyl-heptane

b) 4-chloro-2-fluoro-hexane

12) Define the term Organic Chemistry. (4 points)