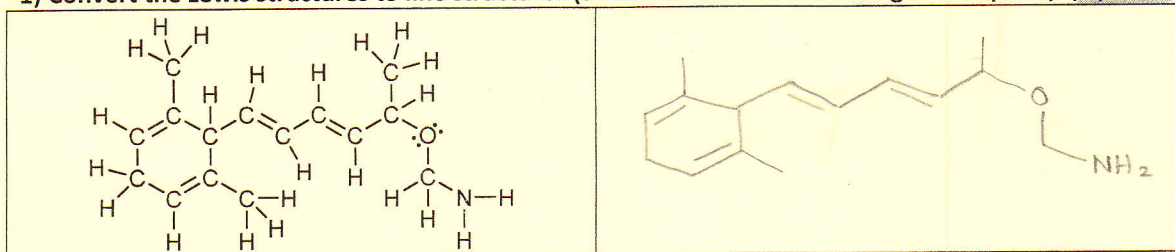
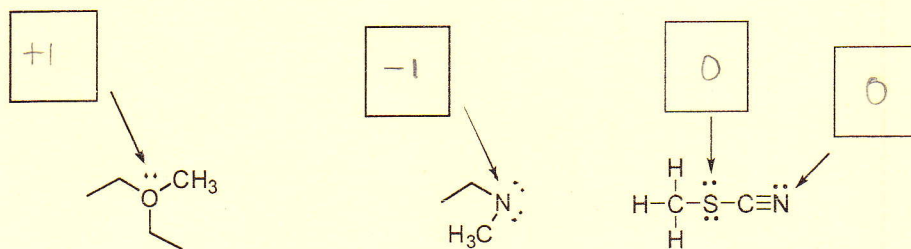


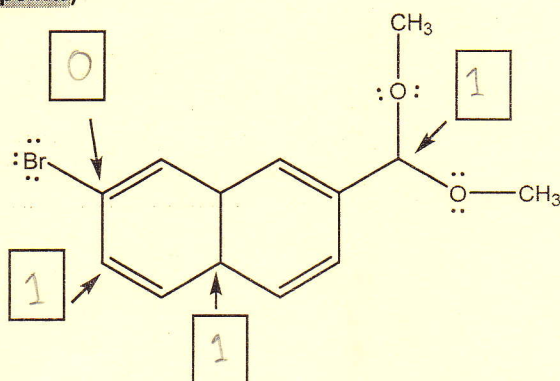
1) Convert the Lewis structures to line structures (Similar to Vitamin A drawing in WileyPlus). (4 points)



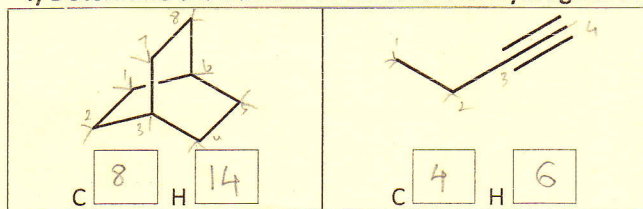
2) What is the formal charge on the indicated atom in the following? Ans in box. (4 points)



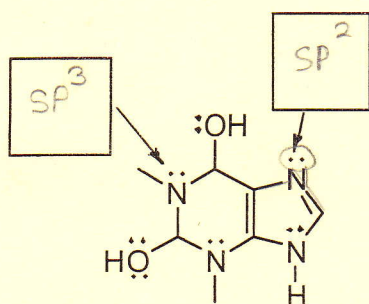
3) How many hydrogens (hidden in the skeletal drawing) are bonded to the atom indicated? If none, write 0 in the box. (4 points)



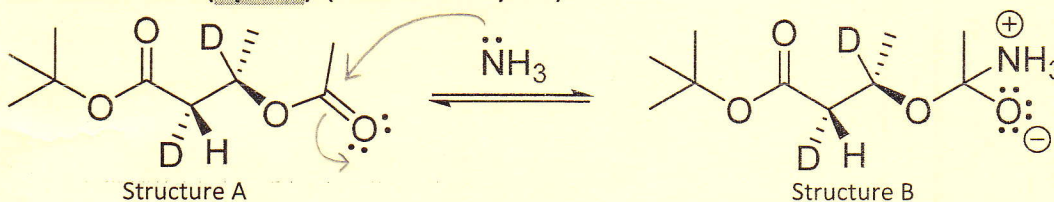
4) Determine the number of Carbons and Hydrogens in each Bond-line (skeletal) structure below (4 points)



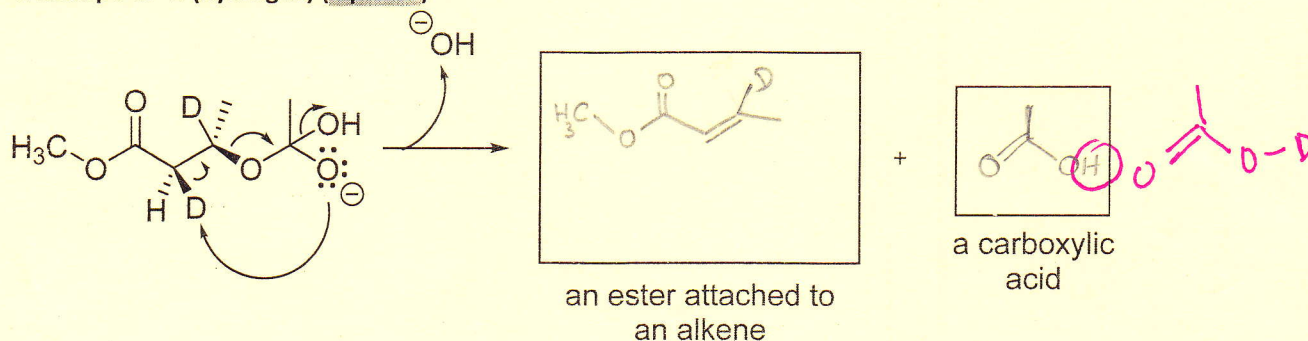
5) Identify the hybridization state (sp^x) of the identified atom in caffeine (2 points)



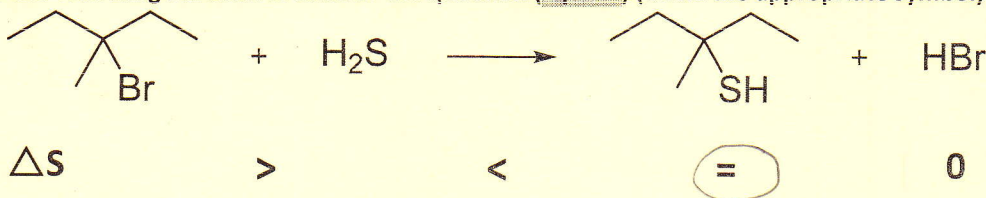
6) Draw 2 curved arrows to show the change in bonding between Structure A when it reacts with ammonia (NH_3) to make Structure B (2 points). (Based on WileyPlus)



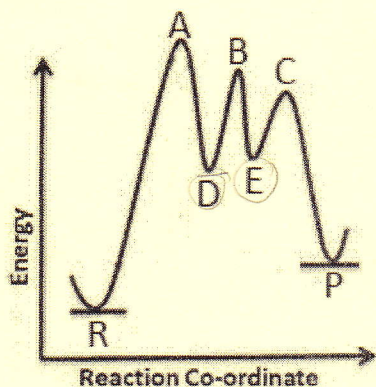
7) Draw the two products created, using the arrows shown in the structure below as a guide. NOTE: D (deuterium is ^2H isotope of ^1H (hydrogen)) (4 points)



8) Use the following reaction to answer the question (1 point) (Circle the appropriate symbol)



9) Use the following energy diagram to answer the questions (6 points).



For the reaction from R → B... (Circle the appropriate symbol)

$\Delta G \dots$ $>$ $<$ $=$ 0

For the reaction from B → P... (Circle the appropriate symbol)

K_{eq} is... $>$ $<$ $=$ 1

How many steps is this reaction from R → P?

The reaction from R → P is...?

CIRCLE

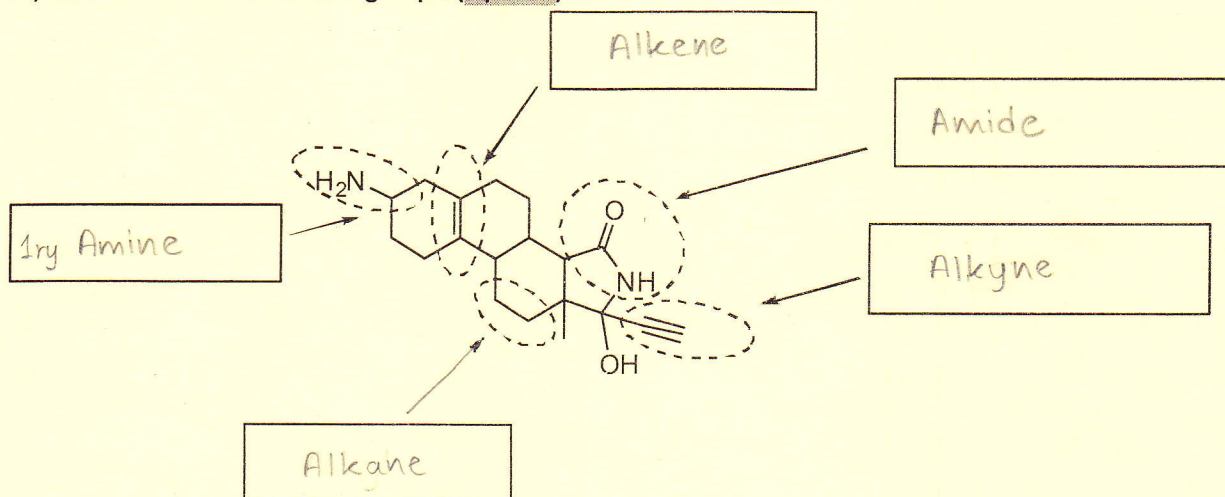
endergonic

exergonic

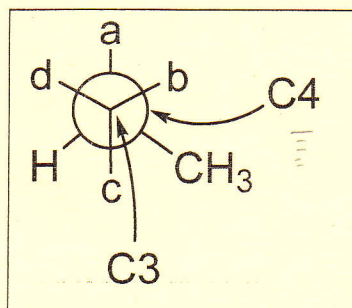
List the Transition States by letter:

List the Intermediates by letter:

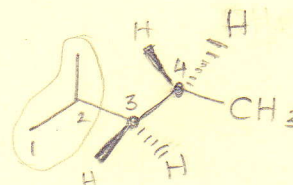
10) Name the circled functional groups. (5 points)



11) Complete the Newman projection below to draw the most stable conformation of 2-methylpentane, looking down the bond from C3 to C4 (labeled). (Based on WileyPlus question) (4 points)



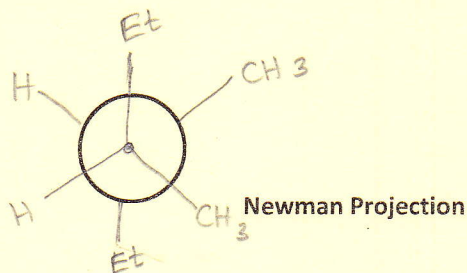
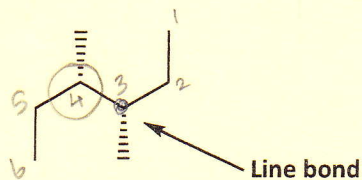
a =	<input type="text" value="CH3"/>
b =	<input type="text" value="H"/>
c =	<input type="text" value="H"/>
d =	<input type="text" value="isopropyl"/>



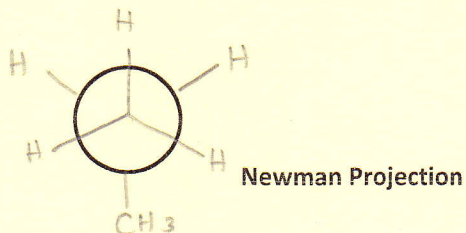
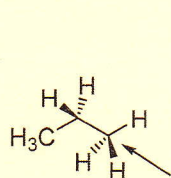
NAME _____

PID _____

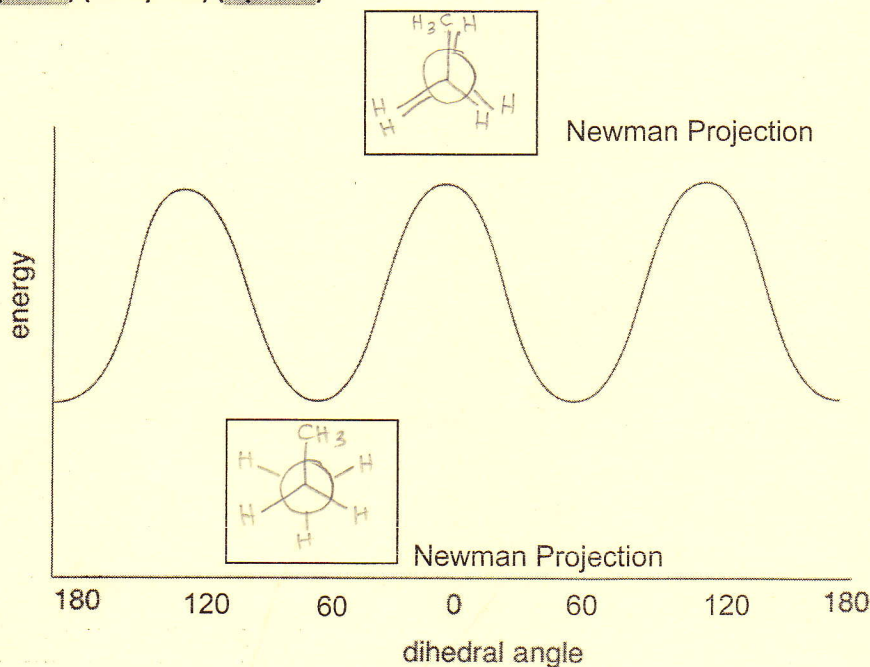
12) Use the circle template below to draw the NEWMAN projection of the compound at the left viewed down the indicated bond in the conformation. (4 points)



13) Concept Problem: Use the circle template below to draw the NEWMAN projection of the compound at the left viewed down the indicated bond in the conformation. (WileyPlus) (4 points)



14) Concept Problem continued: Draw the Newman Projection conformation (use Newman projection of propane above) in the boxes below that correspond to the peak and valley on the energy/dihedral angle diagram below. (4 points)



6

15) Calculate the degrees of unsaturation (dous) for the following molecular formula $C_5H_5N_5O$ (3 points)

$$\frac{1}{2} [(2 \times 5) - 5 + 5 + 2]$$

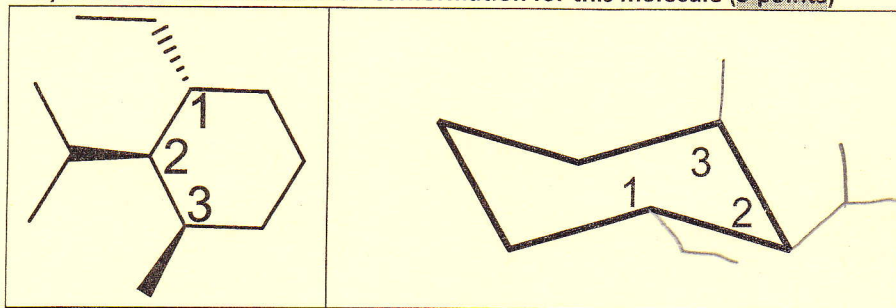
\uparrow #C \uparrow #H \uparrow #N
 = $\frac{1}{2} [10 + 2] = 6$

$$DOU = \frac{2C + 2 + N - X - H}{2}$$

OR

C ₅ H ₅ N ₅ O	C ₅ H ₁₂
↳ C ₅ H ₅ N ₅	- C ₅ H ₀
↳ C ₅ H ₀	-----
	H ₁₂ / 2 = 6
	H ₂

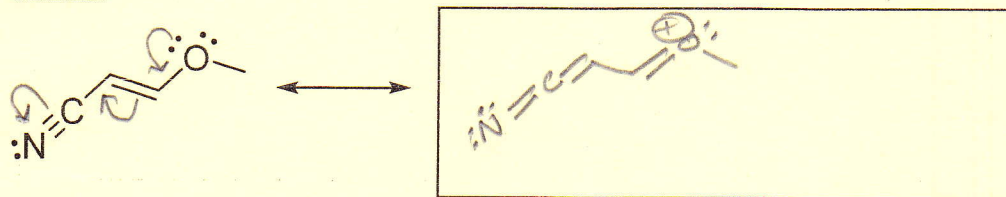
16) Draw the most stable chair conformation for this molecule (3 points)



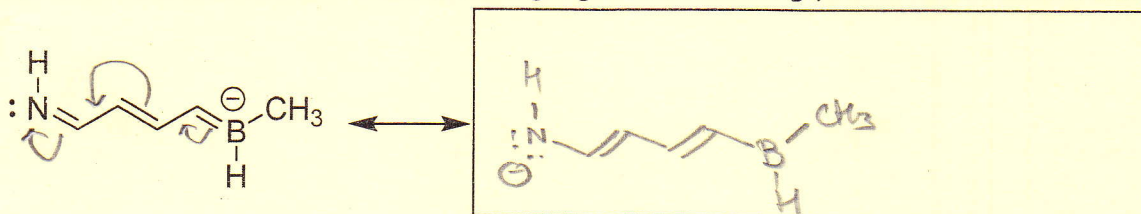
17) For credit, must use arrows to show movement of electrons in structure at the left.

a) Draw a resonance structure where the O-atom gains a formal charge and the N-atom gains a formal charge. (5 points)

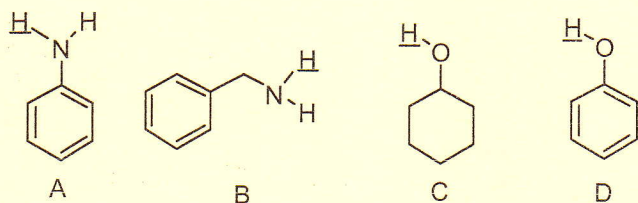
(5 points)



b) Draw a resonance structure where the Nitrogen gains a formal charge, and the Boron loses its charge. (4 points)



18) Identify the least and most ACIDIC compounds.



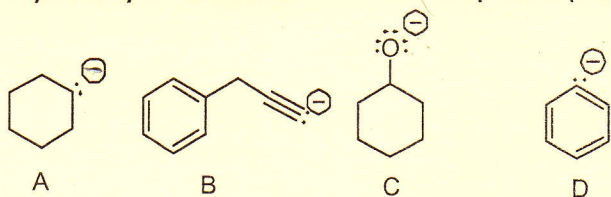
B
Least

D
Most

NAME _____

PID _____

19) Identify the least and most BASIC compounds (That is, the least and most stable ions). (2 points)

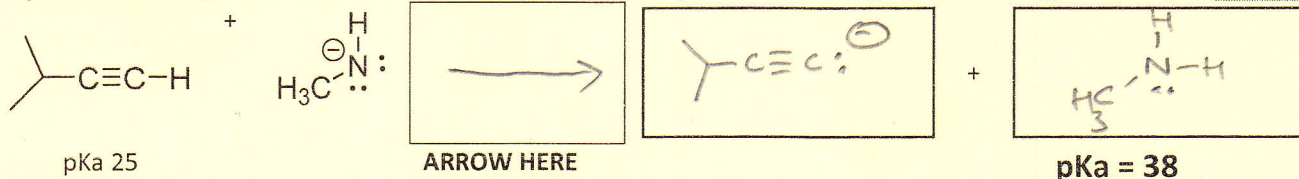

 C

Least

 A

Most

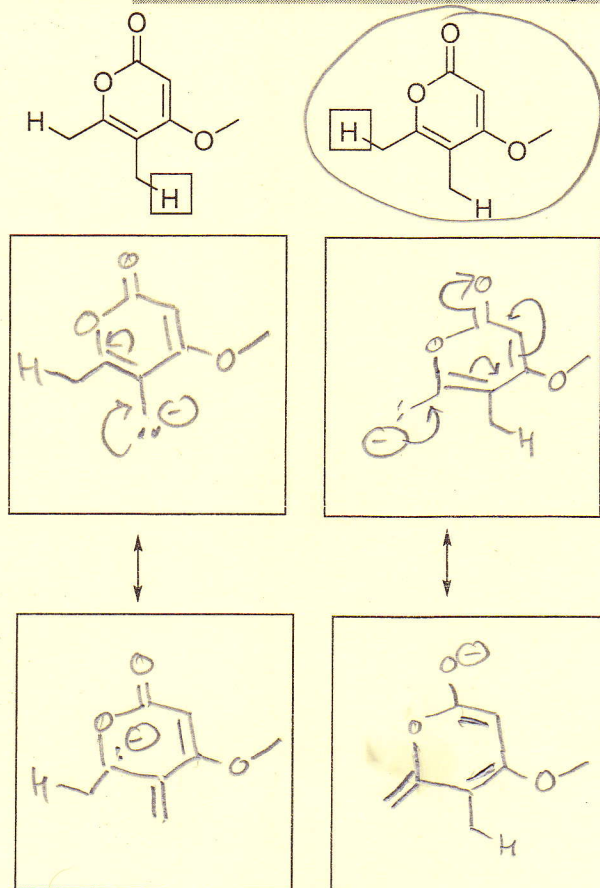
20) READ CAREFULLY! Draw ONE arrow in the box to indicate the favored direction of the acid/base reaction at equilibrium. Complete the reaction by drawing compounds (with formal charges, if necessary) on the right (5 points)



21) Circle the compound that has the most acidic proton (boxed). (6 points)

Draw the conjugate base of each acid in the box below it.

If the conjugate base can form a resonance structure (without violating the octet rule), draw ONE resonance structure in the box below it. If no resonance structure of the conjugate base can be drawn, draw an X in the box.



22) CIRCLE Which effect is most significant toward determining the acidity (3 points)

ATOM

 RESONANCE

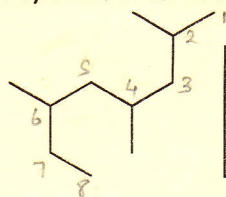
INDUCTION

ORBITALS

NAME _____

PID _____

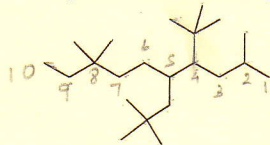
23) Use the IUPAC system to name the following compound. (4 points)



2,6,4-trimethyloctane

USE COMMON NAME SUBSTITUENTS IF NEEDED

24) Use the IUPAC system to name the following compound. (4 points)



4-tert-butyl-2,8,8-trimethyl-5-neopentyl

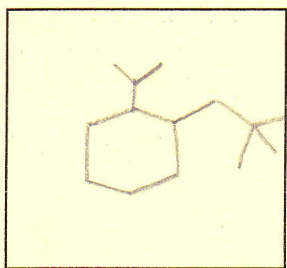
decane

2,8,8-trimethyl

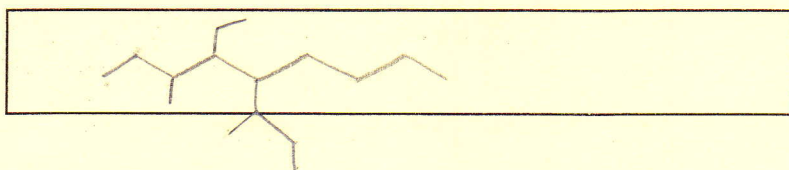
4-tertbutyl

* - 5-neopentyl

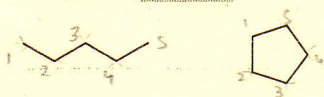
Draw 1-isopropyl-2-neopentylcyclohexane. (4 points)



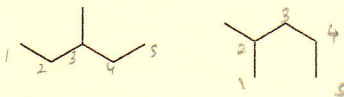
Draw 5-sec-butyl-4-ethyl-3-methylnonane. (4 points)



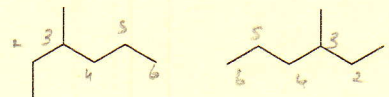
25) Determine if the pairs are (I)dentical, (C)onstitutional isomers, or (N)ot isomers. Write a letter in the box below the pairs. (3 points)



N



C



I