173.

First Exam

Name (PRINT) FARAT, ZADE
Last, First

Chemistry 3331

Signature

September 22, 2006

ID#

Please circle class time.

Dr. Bean's 10:00 AM

Dr. Bean's 1:00 PM

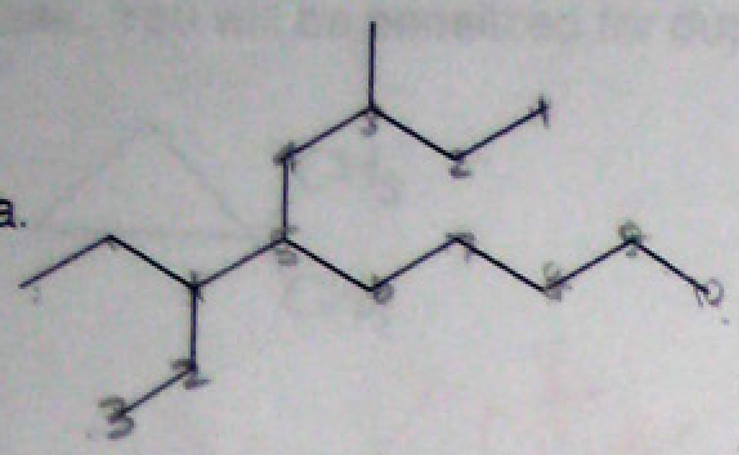
Page #	Score	
1. 16 pts.	1	6
2. 24 pts.	~~2~~	~~3~~ 24
3. 12 pts.	1	2
4. 24 pts.	2	4
5. 24 pts.	2	4

TOTAL ~~99~~ 100

Note: Present your student ID when you return the exam booklet

1. Give an acceptable IUPAC name (a - c) or draw a structure (d) for the following compounds. Be sure to indicate the **stereochemistry** where appropriate. (16 points)

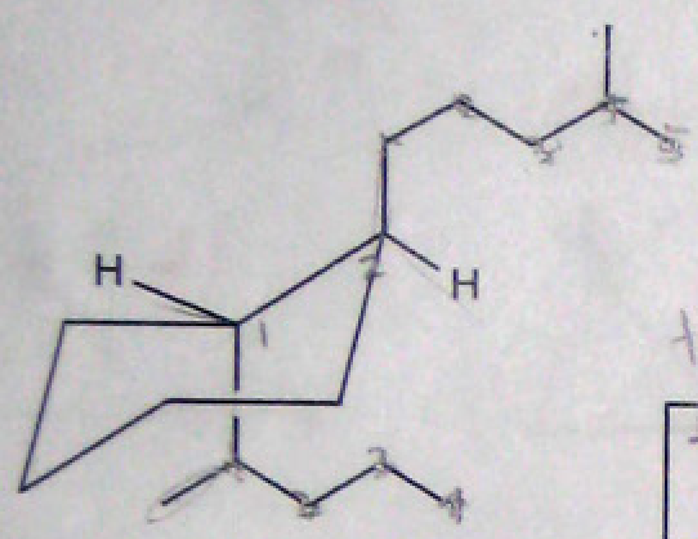
a.



5-(1-ethylpropyl)-3-methyldecane (+4)

decane
3-methyl
5-(1-ethylpropyl)

b.



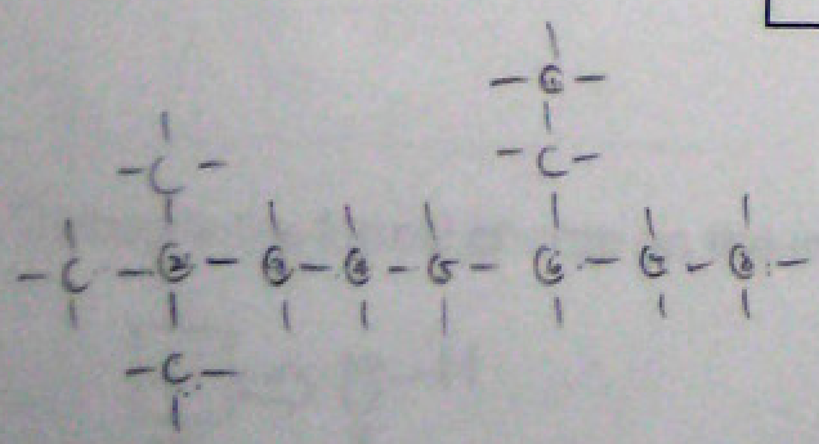
trans-1-(1-methylbutyl)-2-(

trans-1-(1-methylbutyl)-2-(4-methylpentyl)cyclohexane (+4)

cyclohexane
(1-methylbutyl)
(4-methylpentyl)

c. $(CH_3)_3C(CH_2)_3CH(CH_2CH_3)_2$

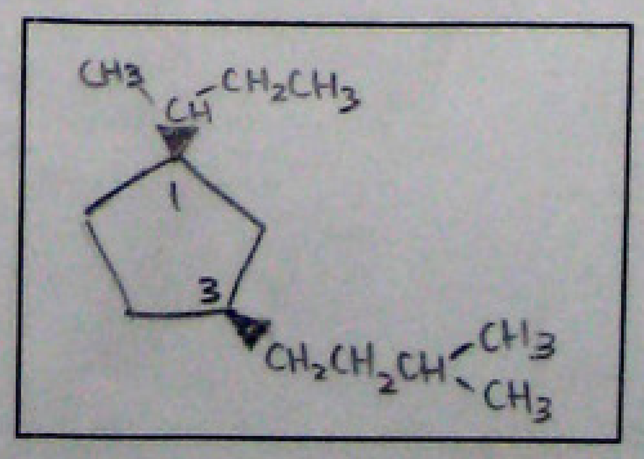
6-ethyl-2,2-dimethyloctane (+4)

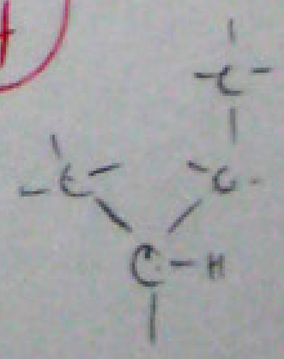


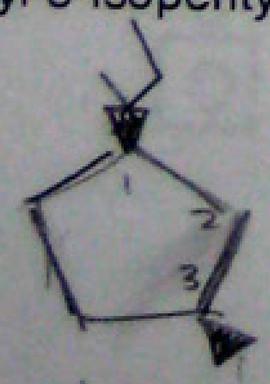
octane
~~2,2 methyl~~ 2,2-dimethyl
6-ethyl

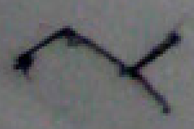
(+4)

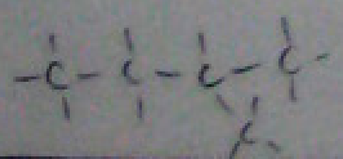
d. *Cis*-1-*sec*-butyl-3-isopentylcyclopentane





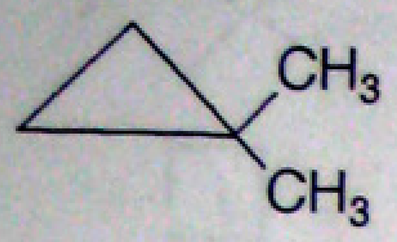


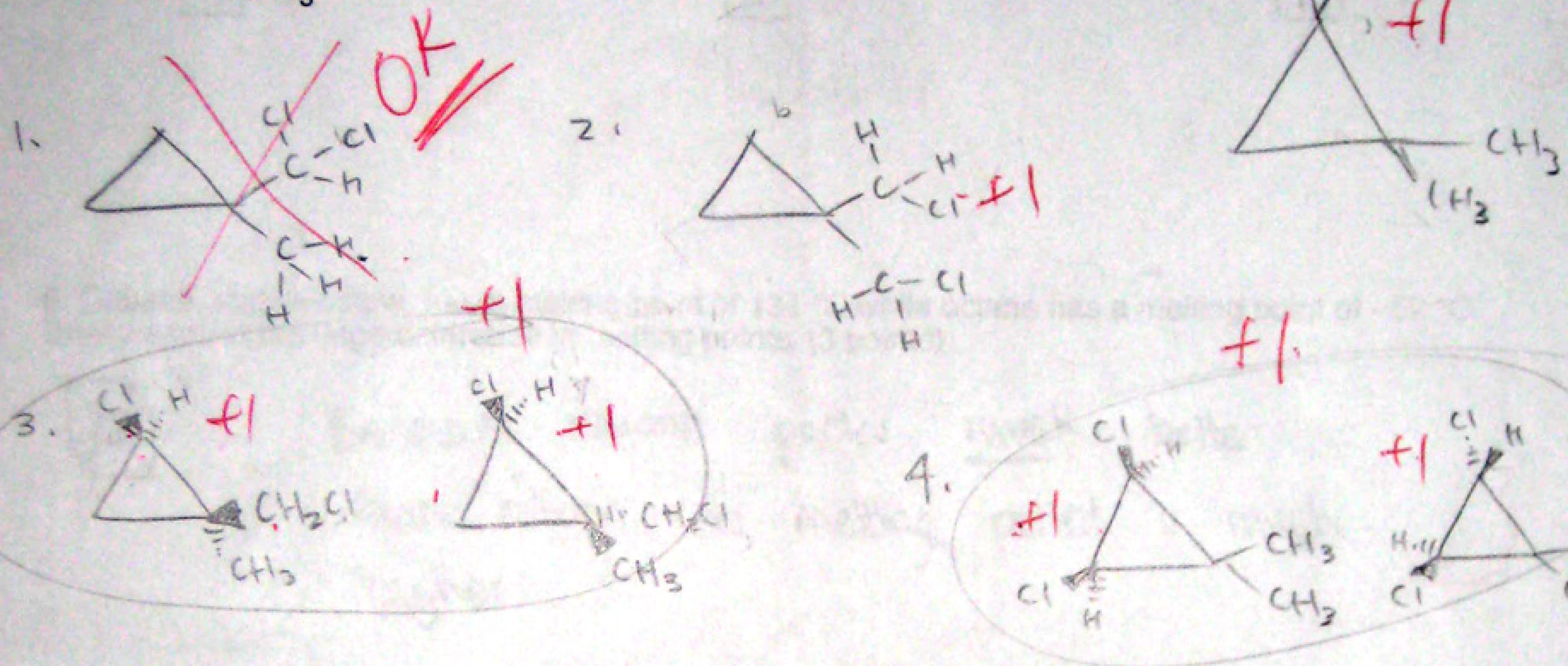




16

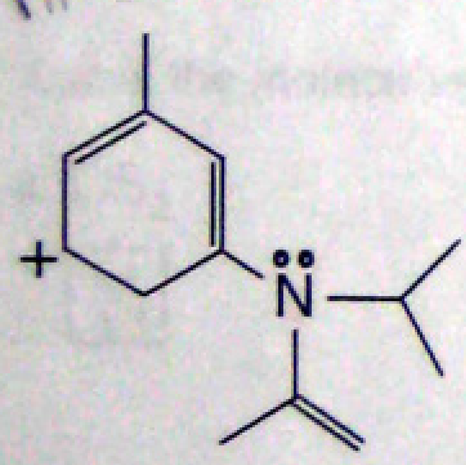
2. Draw all structural and geometric (cis/trans) isomers resulting from the dichlorination of 1,1-dimethylcyclopropane (shown below). Place geometric isomers next to each other and circle each pair. You will be penalized for duplicate structures. (9 points)

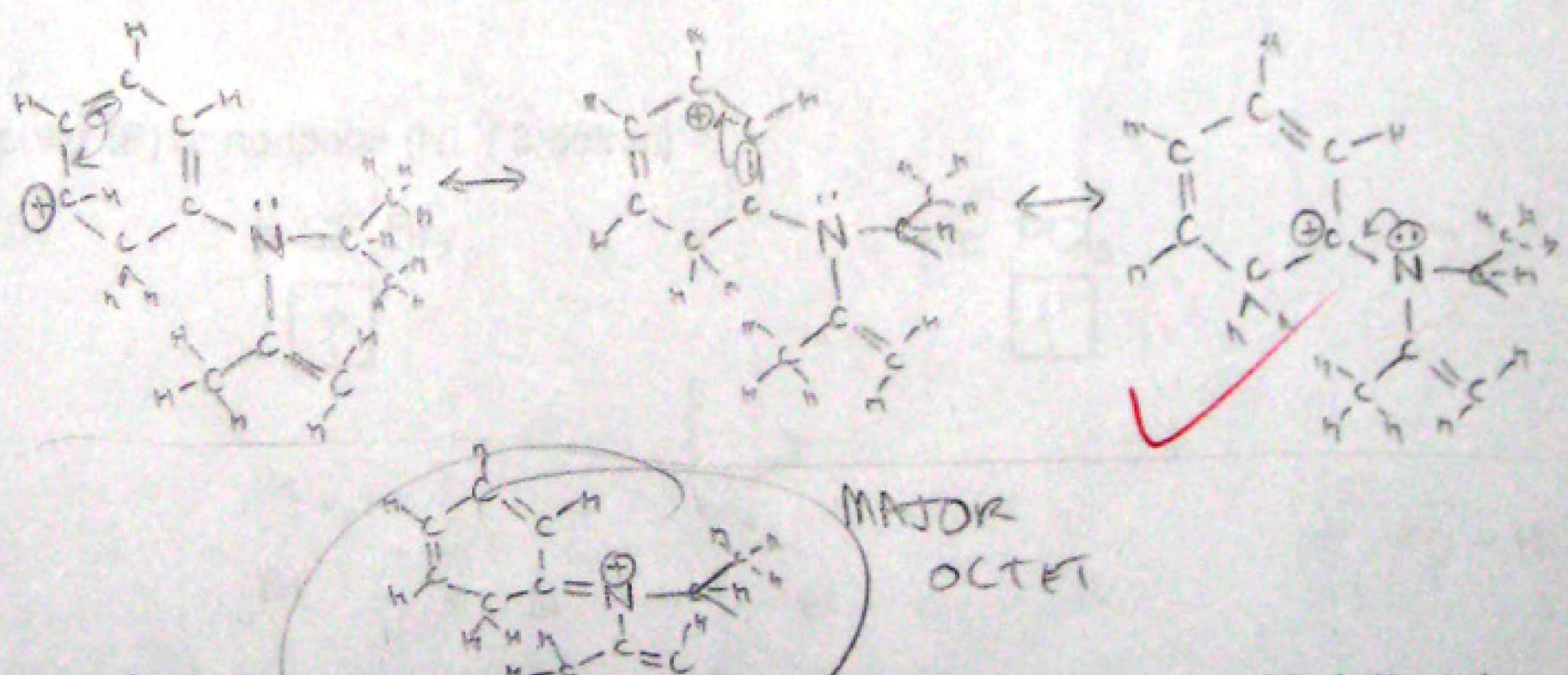




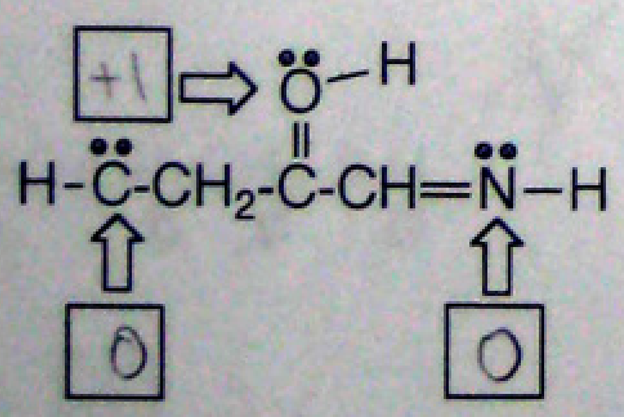
3. For the structure given, draw the important resonance contributors. Circle the major contributor. (12 points)

★ fill in H's



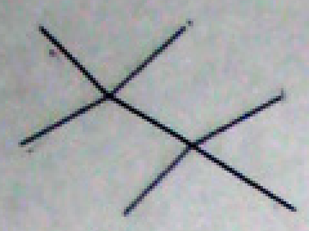


4. Calculate the formal charge on the indicated atoms and place the answers in the boxes provided. (3 pts.)

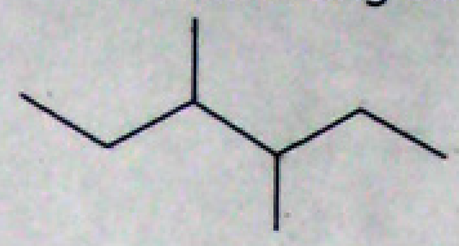


2 9 2. 3. 12 4. 3

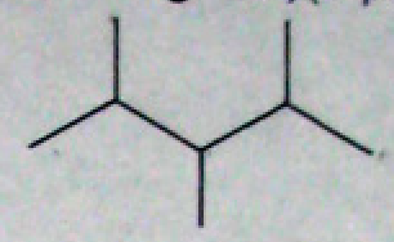
5. Place the following compounds in order of increasing boiling point. (1=lowest, 3=highest)(3 points)



1 ✓



3 ✓



2 ✓

3

6. Cubane, shown below, has a melting point of 131 °C while octane has a melting point of - 57 °C. Briefly explain the large difference in melting points. (3 points)

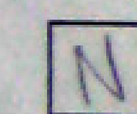
Because cubane packs much better than octane, its melting point is much higher.

3

7. Label the molecules as polar (P) or nonpolar (N). (3 points)

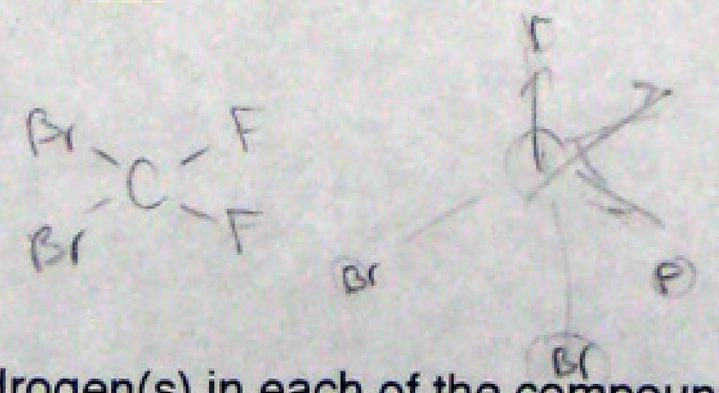
a. CS_2

N ✓



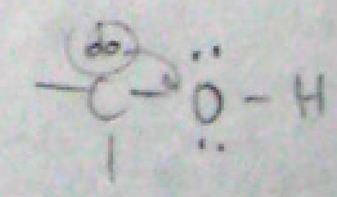
b. CF_2Br_2

P ✓



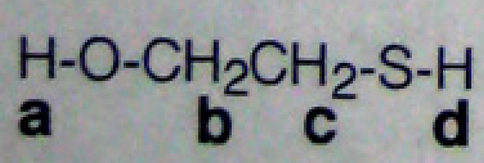
c. PCl_3

P ✓

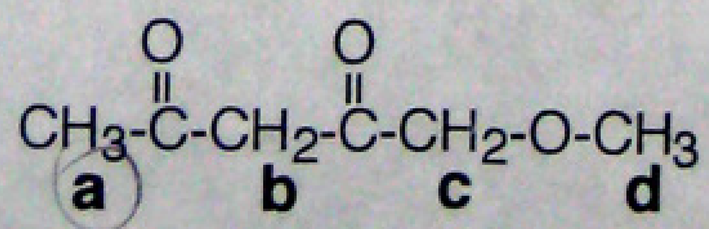


3

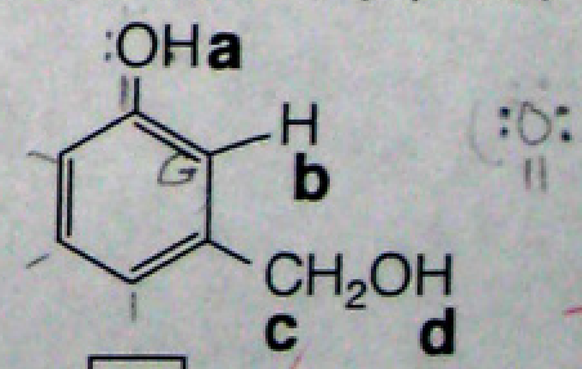
8. Place the letter of the most acidic hydrogen(s) in each of the compounds below in the box. (3 points)



d ✓

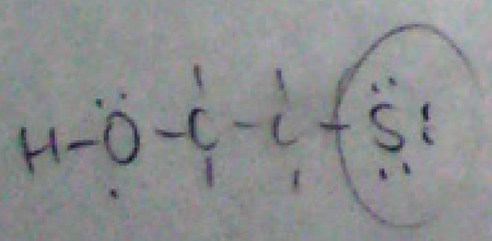


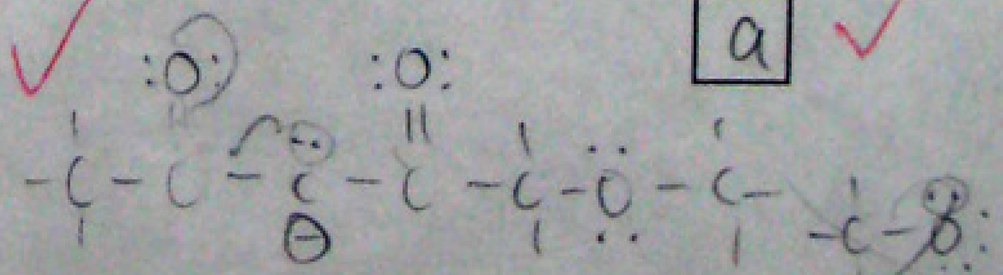
b ✓



a ✓

3

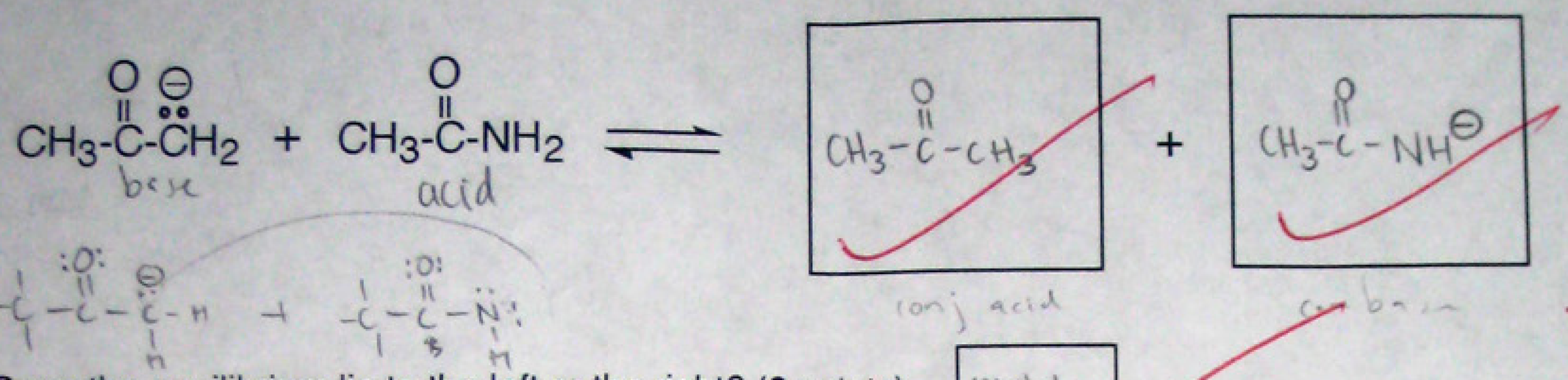




3

12

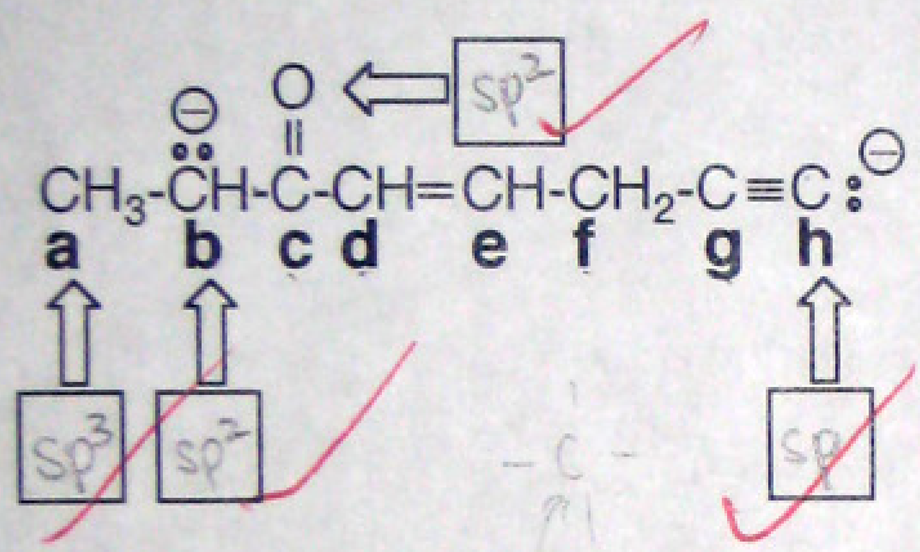
9. Predict the products for the reaction below. (4 points)



Does the equilibrium lie to the left or the right? (2 points) right

+6

10. Consider the structure below and answer the following questions. (14 points)



14

a. Write the hybridization of each atom indicated by an arrow in the box provided.

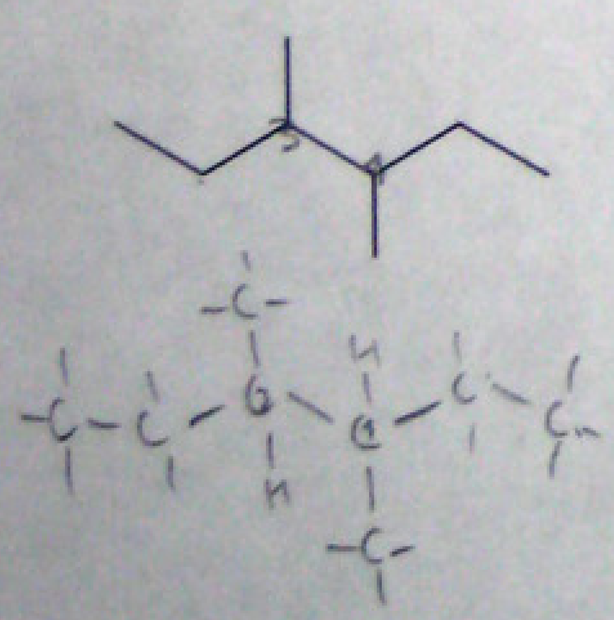
b. What is the C_c-C_d-C_e bond angle? 120°

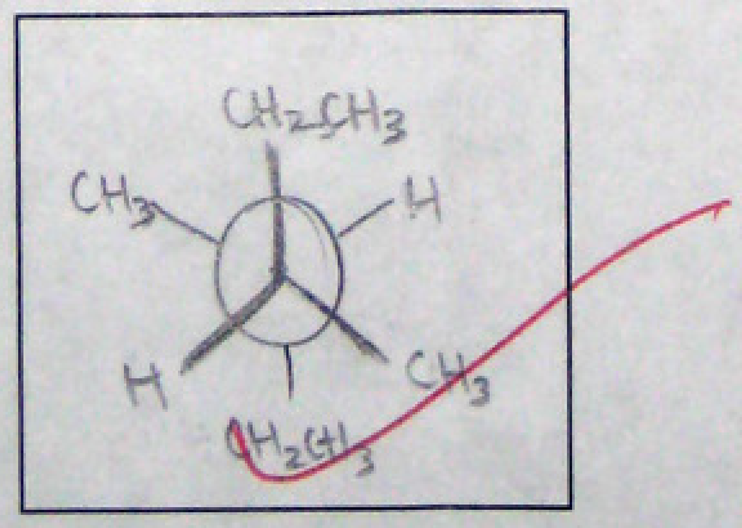
c. What types of orbitals overlap to form the C_f-C_g sigma bond? sp^3 and sp

d. Putting the maximum number of atoms in the same plane, which carbon atoms are coplanar?

all of them a,b,c,d,e,f,g

11. Viewing the molecule along the C3-C4 bond, draw the Newman projection of the most stable conformation of 3,4-dimethylhexane. (4 points)

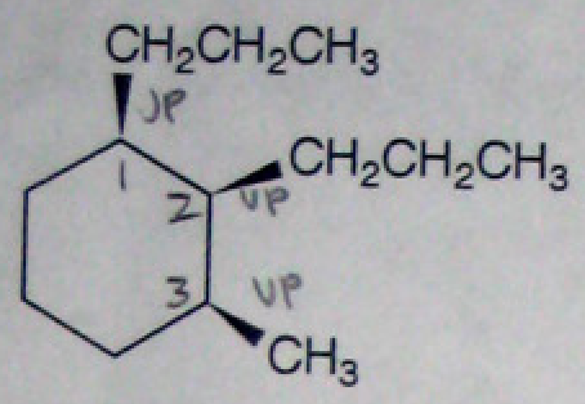


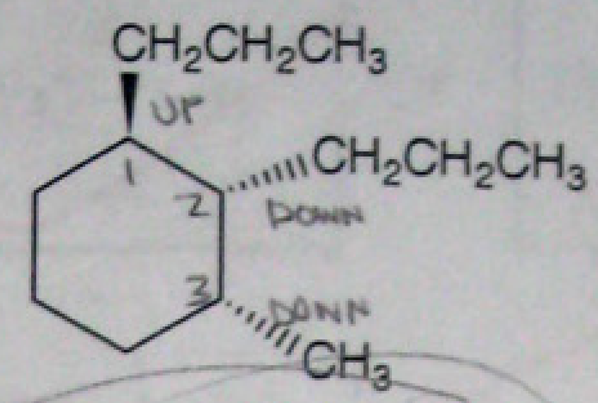


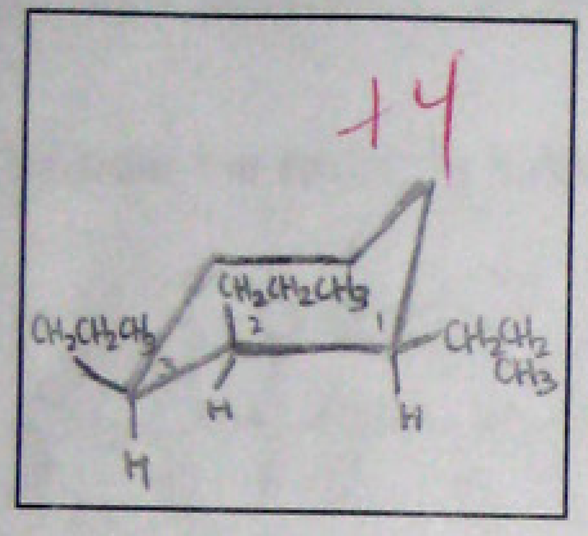
+ 4

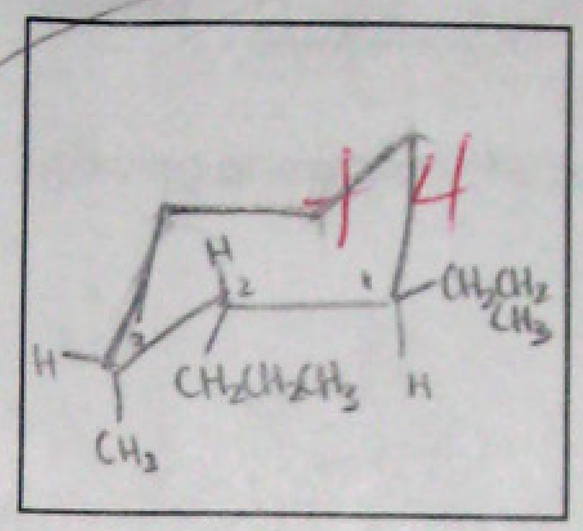
9. 10. 11. 24

12. Draw the more stable chair conformation for each of the methyldipropylcyclohexanes shown below. Circle the more stable isomer. (10 points)







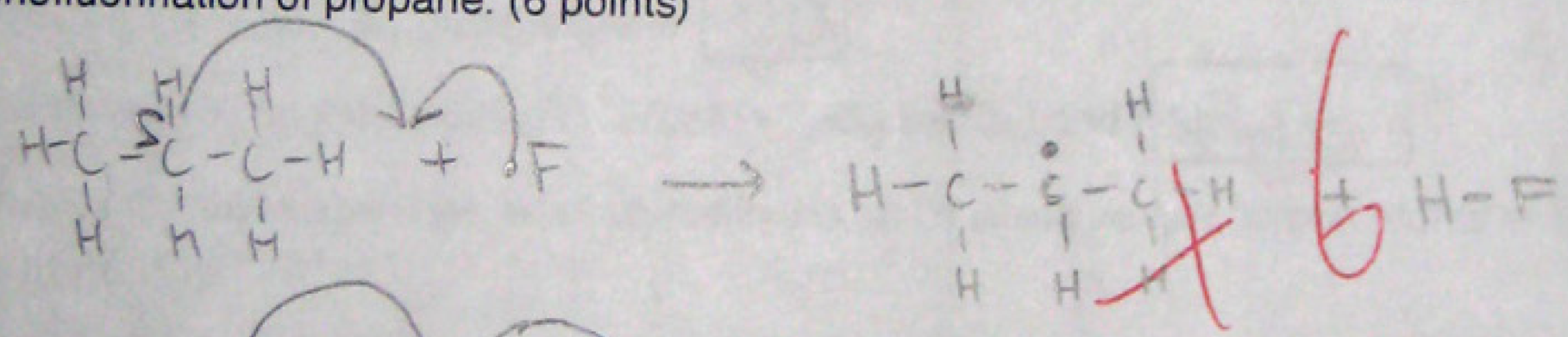


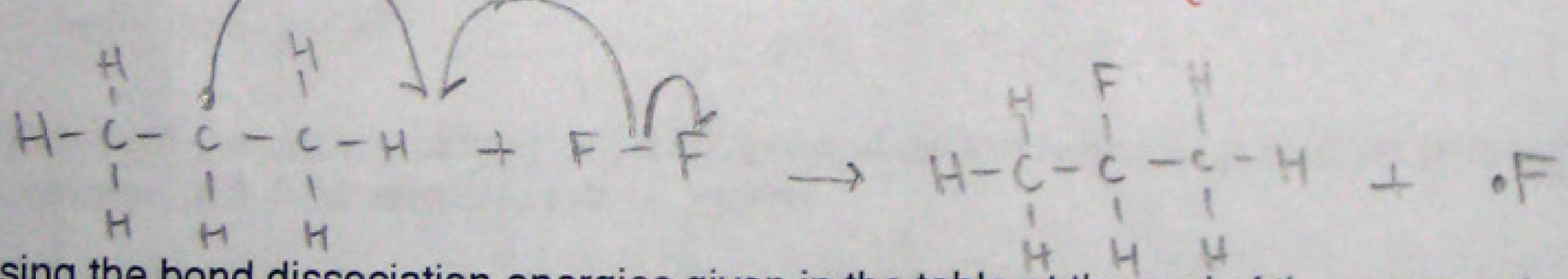
+2

13. Free radical fluorination, shown below, is not a common reaction.

$$CH_3CH_2CH_3 \quad + \quad F_2 \quad \rightleftharpoons \quad CH_3\underset{\underset{F}{|}}{C}HCH_3 \quad + \quad HF$$

a. Using curved arrows to show electron flow, write a mechanism for the propagation steps in the monofluorination of propane. (6 points)





b. Using the bond dissociation energies given in the table at the end of the exam, calculate the overall ΔH° in the box provided. You must show your work. (6 points)

$(95+38)-(106+136)=133-242=-109$ kcal/mol

+6

c. Are the products or reactants favored at equilibrium? (2 points) products +2

$-\overset{|}{\underset{|}{C}}-\overset{F}{\underset{|}{C}}-\overset{|}{\underset{|}{C}}-$

$((CH_3)_2CH-H)$

95
38
133

242
106
136
242

242
-133
109

5

12. 10 13. 14