

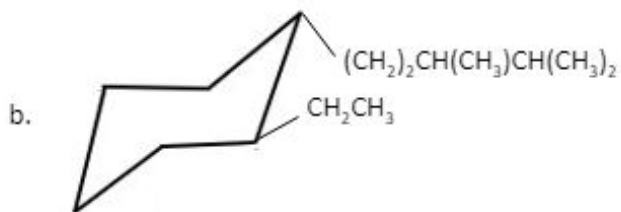
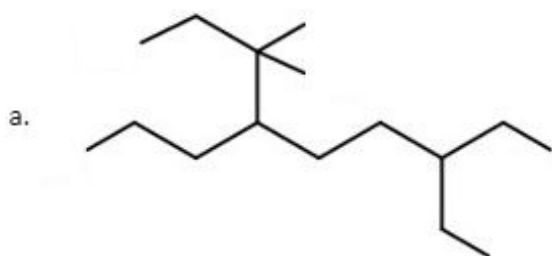
Exam 1, Mock 2

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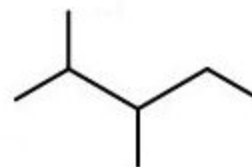
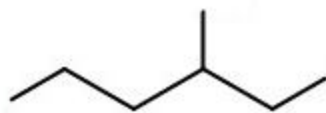
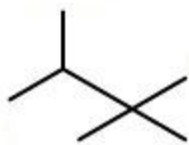
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1. Give an acceptable IUPAC name for each of the compounds in **a-b**. Draw the structure of the compound in **c**. Be sure to indicate the **stereochemistry** where appropriate. (12 points)

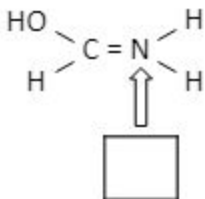
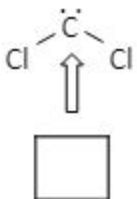


- c. Trans-1-isopentyl-3-(2,2-dimethylbutyl)cyclopentane

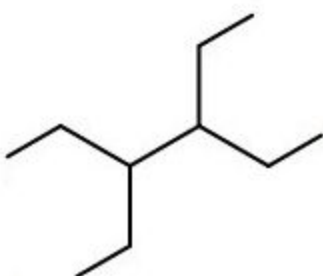
2. Place the compounds below in order of increasing boiling point. (1 = lowest, 3 = highest boiling point) (6 pts.)



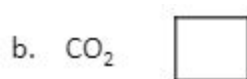
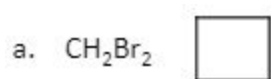
3. Calculate the formal charge of the indicated atoms. (4 pts.)



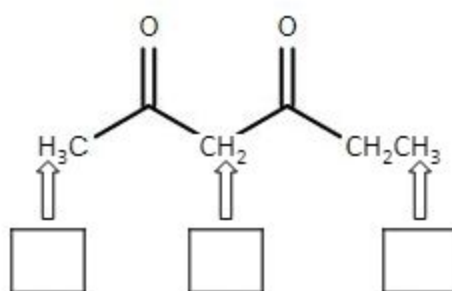
4. Draw all structural isomers resulting from the monobromination of the compound shown below. You will be penalized for duplicate and incorrect structures. (9 points)



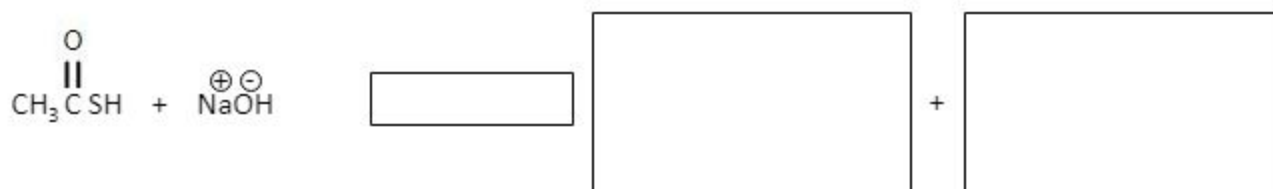
5. Consider the polarity of the compounds below. If the compound is polar, place **P** in the answer box. If the compound is nonpolar, place **N** in the answer box. (4 pts.)



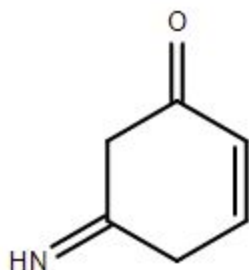
6. Rank the indicated hydrogen atoms in order of increasing acidity. (1 = least acidic, 3 = most acidic) (6 pts.)



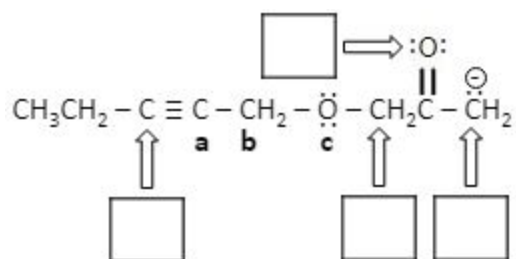
7. Predict the products that would result from an acid/base reaction between the compounds below, and place the answers in the boxes provided. Indicate the direction of the equilibrium by placing an arrow in the box. (6 pts.)



8. For the structure given below, draw the important resonance contributors. Circle the major contributor. (12 pts.)



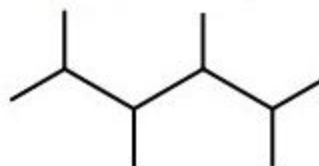
9. Consider the structure below and answer the following questions.



- a. Write the hybridization of each atom indicated by an arrow in the box provided. (8 pts.)
- b. What is the $\text{C}_a - \text{C}_b - \text{O}_c$ bond angle? (2 pts.)

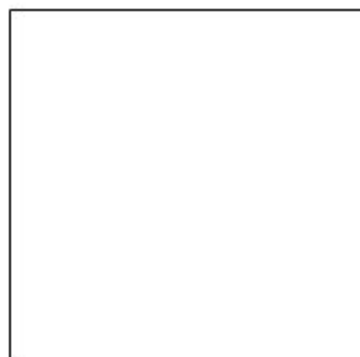
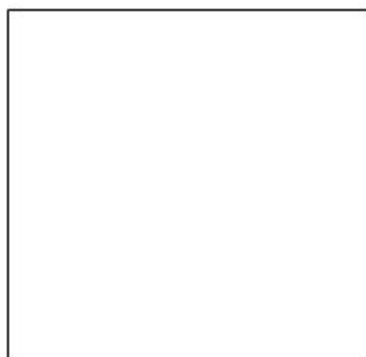
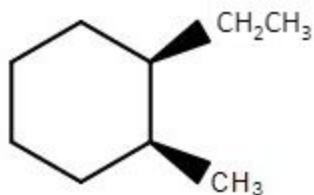
- c. The sigma bond between the atoms labeled a and b is formed by the overlap of what types of orbitals? Be specific (2 pts.)

10. Viewing the molecule along the C3-C4 bond, construct the Newman projection of the least stable conformation of 2,3,4,5-tetramethylhexane. (5 points)



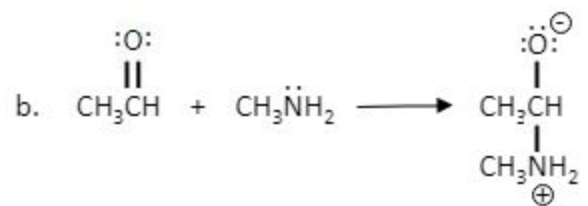
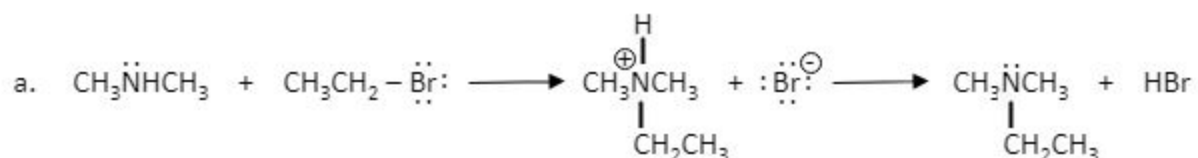
Newman projection:

11. a. In the boxes below, draw the two chair conformations for cis-1-ethyl-2-methylcyclohexane and circle the more stable conformation. (8 points)

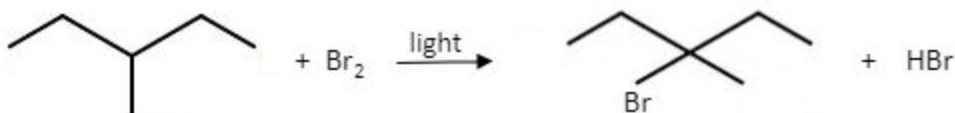


- b. Using a few key words, explain your choice for the most stable conformation (2 points)

12. For the reactions below, provide curved arrows to indicate the electron flow associated with bond breaking and bond forming, i.e., provide the mechanisms. (6 points)



13. An equation representing the halogenation of an alkane is shown below. a) Given the bond dissociation energies (BDE) below, calculate the overall ΔH° for the reaction in the box provided. You must show your work in the box below to receive credit. (6 points)



- d. Are the products or reactants favored at equilibrium? (2 points)

<i>Bond-Dissociation Energy</i>		<i>Bond-Dissociation Energy</i>	
<i>Bond</i>	<i>kcal/mol</i>	<i>Bond</i>	<i>kcal/mol</i>
H—X bonds and X—X bonds		Bonds to secondary carbons	
H—H	104	(CH ₃) ₂ CH—H	95
D—D	106	(CH ₃) ₂ CH—F	106
F—F	38	(CH ₃) ₂ CH—Cl	80
Cl—Cl	58	(CH ₃) ₂ CH—Br	68
Br—Br	46	(CH ₃) ₂ CH—I	53
I—I	36	(CH ₃) ₂ CH—OH	91
H—F	136	Bonds to tertiary carbons	
H—Cl	103	(CH ₃) ₃ C—H	91
H—Br	88	(CH ₃) ₃ C—F	106
H—I	71	(CH ₃) ₃ C—Cl	79
HO—H	119	(CH ₃) ₃ C—Br	65
HO—OH	51	(CH ₃) ₃ C—I	50
Methyl bonds		(CH ₃) ₃ C—OH	91
CH ₃ —H	104	Other C—H bonds	
CH ₃ —F	109	PhCH ₂ —H (benzylic)	85
CH ₃ —Cl	84	CH ₂ =CHCH ₂ —H (allylic)	87
CH ₃ —Br	70	CH ₂ =CH—H (vinyl)	108
CH ₃ —I	56	Ph—H (aromatic)	110
CH ₃ —OH	91	C—C bonds	
Bonds to primary carbons		CH ₃ —CH ₃	88
CH ₃ CH ₂ —H	98	CH ₃ CH ₂ —CH ₃	85
CH ₃ CH ₂ —F	107	CH ₃ CH ₂ —CH ₂ CH ₃	82
CH ₃ CH ₂ —Cl	81	(CH ₃) ₂ CH—CH ₃	84
CH ₃ CH ₂ —Br	68	(CH ₃) ₃ C—CH ₃	81
CH ₃ CH ₂ —I	53		
CH ₃ CH ₂ —OH	91		
CH ₃ CH ₂ CH ₂ —H	98		
CH ₃ CH ₂ CH ₂ —F	107		
CH ₃ CH ₂ CH ₂ —Cl	81		
CH ₃ CH ₂ CH ₂ —Br	68		
CH ₃ CH ₂ CH ₂ —I	53		
CH ₃ CH ₂ CH ₂ —OH	91		