

Simulated Exam I (F09O1B)

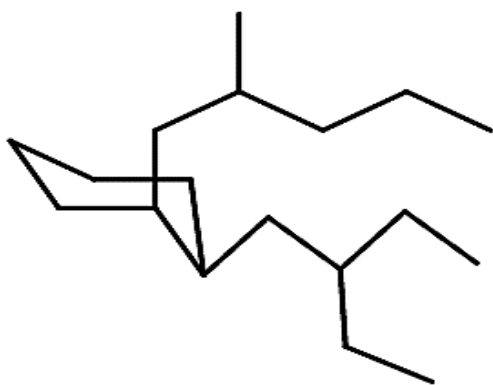
Disclaimer: UHScienceResource provides resources and services but is not responsible for, and expressly disclaims all liability for, damages of any kind arising out of use, reference to, or reliance on any information provided. While the information contained within the site is periodically updated, no guarantee is given that the information provided is correct, complete, and up-to-date. Moreover, UHScienceResource is not responsible for the accuracy or content of information contained in external sites provided by links.

Notice to User: Great effort has been used to make this document accurate and comprehensive but may still contain typos or other errors. If any errors are found, please email them to:

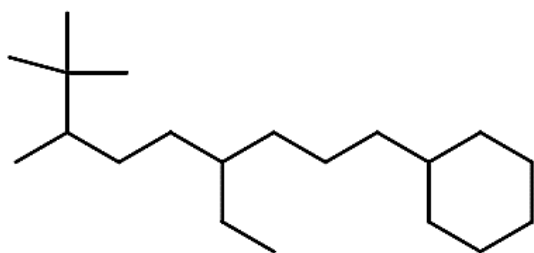
UHScienceResource@gmail.com

1. Name each of the compounds in the box provided using IUPAC naming including stereochemistry if applicable (16).

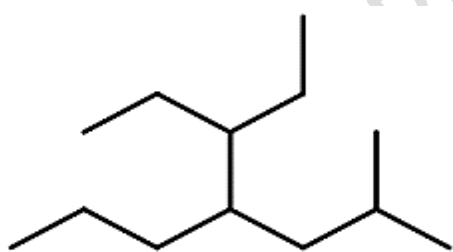
a.



b.

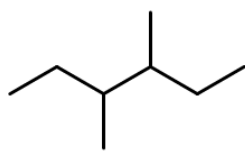


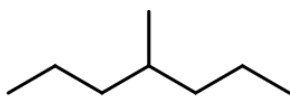
c.

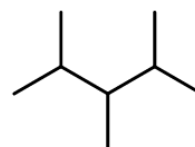


d. $(\text{CH}_3)_3\text{C}(\text{CH}_2)_3\text{CH}(\text{CH}_2\text{CH}_3)_2$

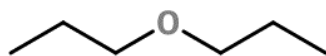
2. Rank the compounds in order of increasing melting point, with 1 = lowest mp, 3 = highest mp (6).

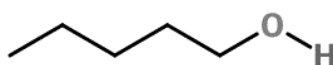


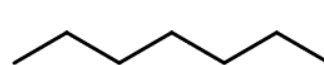




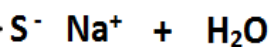
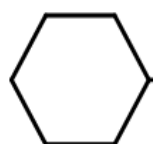
3. Rank the compounds in order of increasing solubility in water, with 1 = lowest solubility, 3 = highest solubility (6).







4. In the acid/base reaction below, provide the products that would result **AND** place an arrow to show the direction of equilibrium (8).



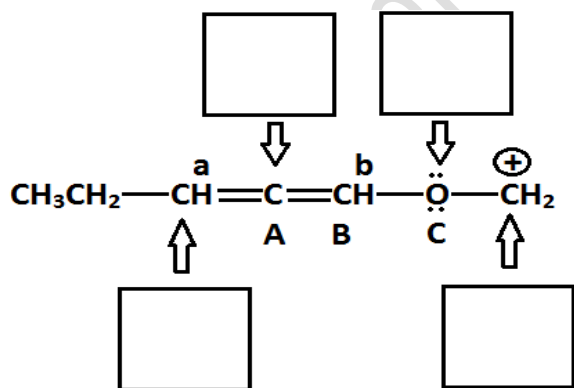
Arrow

Product

+

Product

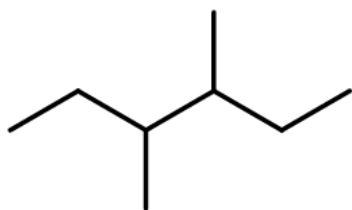
5. Provide the hybridization in the boxes provided (12).



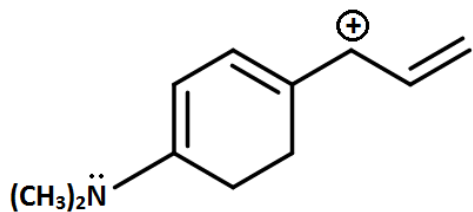
Bond angle of $C_A C_B O_C$? _____

Are hydrogens "a" and "b" in the same plane (YES/NO) _____

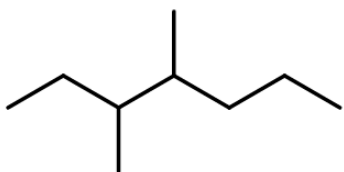
6. From the monochlorination of 3,4-dimethylhexane below, draw all structural isomers (8).



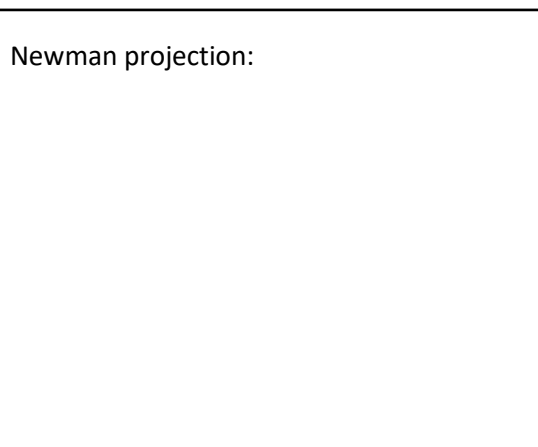
7. Draw important resonance contributors for the structure below. Circle the major contributor (10).



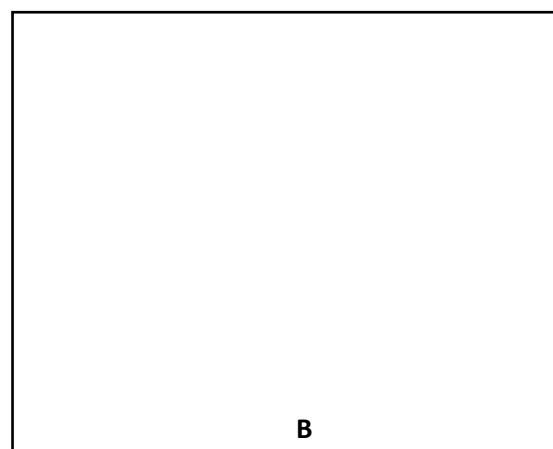
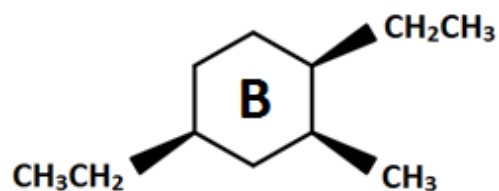
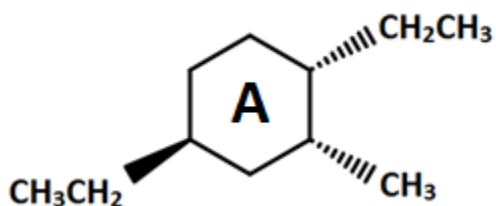
8. Draw the Newman projection of the most stable conformation of 3,4-dimethylheptane along the C3-C4 bond (6).



Newman projection:



9a. Draw the most stable chair conformation for each compound in the box below (10).

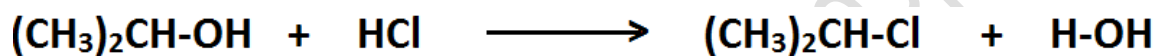


b. Which is more stable (A or B)? _____

10. In the monobromination of butane below, show the propagation steps of the mechanism that explains the formation of the products (10).



11. The following reaction:



a. With the bond dissociation energies below, calculate the overall ΔH° showing all work (4)

b. At equilibrium, are products or reactants favored? (2) _____

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