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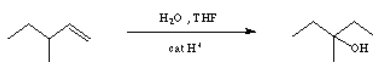
Organic Chemistry 2444-01

September 24, 2008

EXAM ONE

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1. (8 pts) Give the complete mechanism for the following reaction.



[ANSWER](#)

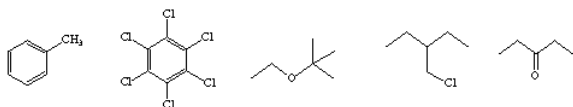
2. (12 pts) In each case circle the correct answer(s).
-1/2 for each extra answer.

(a) Circle all structures that are consistent with a mass spectrum having a P-35 peak.



[ANSWER](#)

(b) Circle all molecules expected to show at least one a singlet proton NMR.



[ANSWER](#)

(c) Circle the molecule used as the zero point in the proton NMR.

CH3CH2OH KBr (CH3)4Si THF CH3CH2OCH2CH3

[ANSWER](#)

(d) Circle the most stable carbocation.



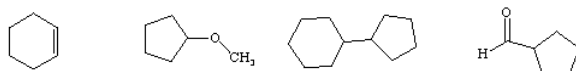
[ANSWER](#)

(e) Circle all reagents that convert 2-pentanol to 2-bromopentane..

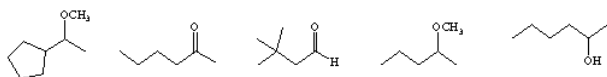
SOCl2 PBr5 POCl3 HBr KBr

[ANSWER](#)

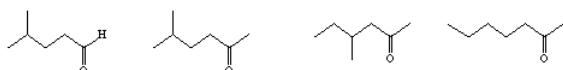
(f) Circle all molecules that exhibit magnetic anisotropy in the proton NMR.

ANSWER

- (g) A molecule with a formula $C_6H_{12}O$ shows a strong peak at 1725 cm^{-1} and no peak at $3300\text{--}3600\text{ cm}^{-1}$.
Circle all possible structures that are consistent with this data.

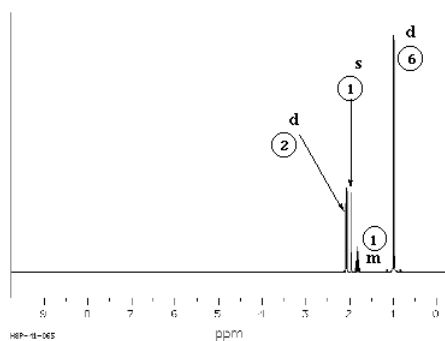
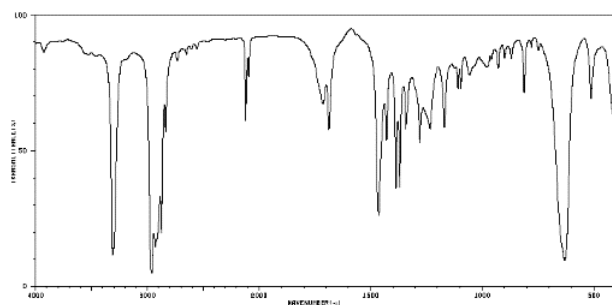
ANSWER

- (h) Circle all molecules that react with i. NaBH_4 ii. aq NH_4Cl to give 4-methyl-2-hexanol.

ANSWER

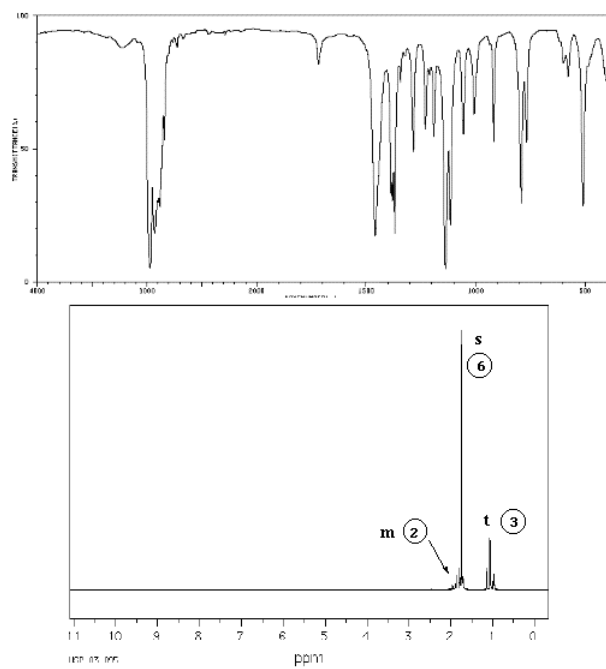
3. (15 pts) Given the following spectral data, what is the structure of this molecule? SHOW YOUR WORK.

P (82) (100) P+1 (83) (6.66) P+2 (84) (0.22)

ANSWER

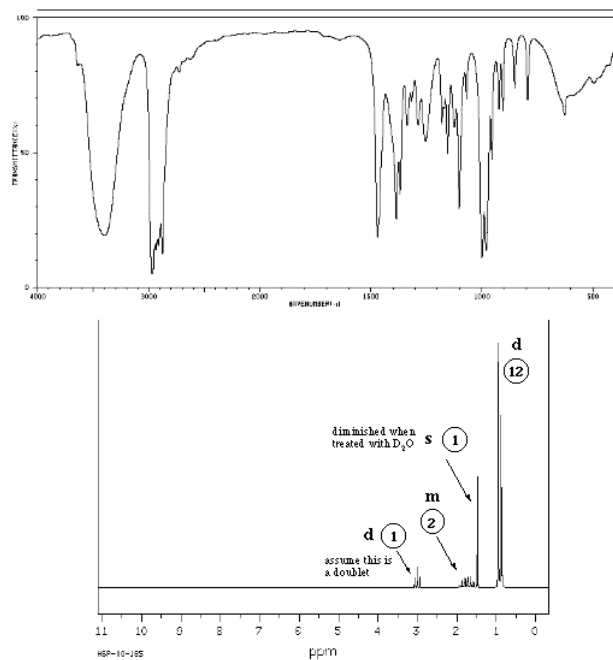
4. (15 pts) Given the following spectral data, what is the structure of this molecule? SHOW YOUR WORK.

P (150) (100) P+1 (151) (5.55) P+2 (152) (98)

**ANSWER**

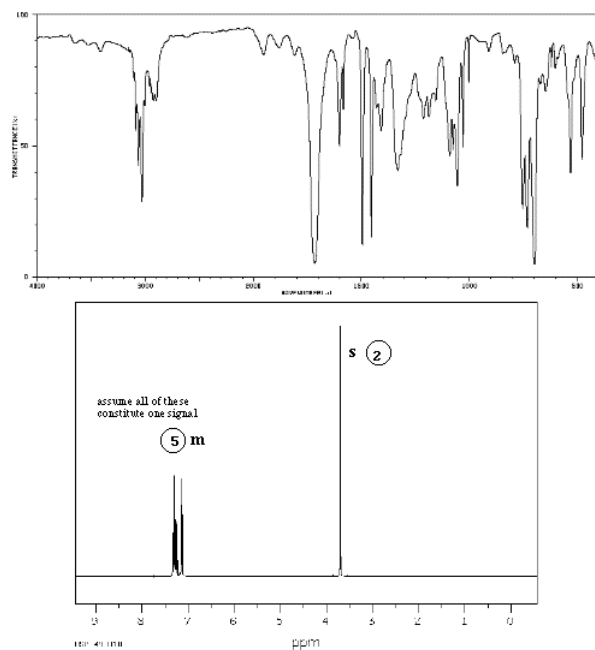
5. (15 pts) Given the following spectral data, what is the structure of this molecule? SHOW YOUR WORK.

P (116) (100) P+1 (117) (7.77) P+2 (118) (0.50)

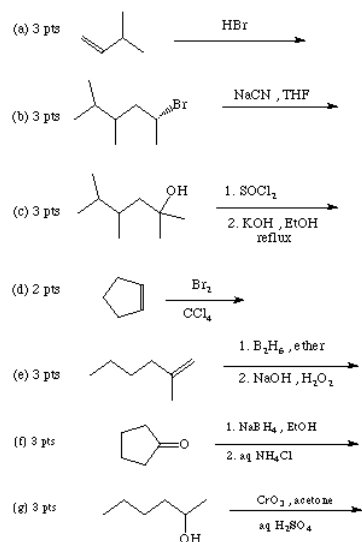
**ANSWER**

6. (15 pts) Given the following spectral data, what is the structure of this molecule? SHOW YOUR WORK.

P (210) (100) P+1 (211) (16.65) P+2 (212) (1.59)

**ANSWER**

7. (20 pts). In each reaction give the major product. If there is no reaction, indicate that with N.R. Remember stereochemistry where it is appropriate.

**ANSWER**

P+1 = (1.11) (#C) + 0.38 (#N)	P+2 = [1.11 x #C]/200 + 0.20 (#O)	rings or pi-bonds(no N) = 2#C+2-#H-#X/2	rings or pi bonds (
InfraRed			
Functional Group	v (μ)	Functional Group	v (μ)
C-H	alkanes		
	2850-2960 (3.38-3.51)		
1350-1470	(6.80-7.41) C-H	alkenes	
	3020-3080 (3.25-3.31)		
675-1000	(10.00-14.81)		
C-H	aromatic rings		
	3000-3100 (3.23-3.33)		
675-870	(11.49-14.81) C≡C-H	alkynes	
	3300 (3.03)		

C=C	alkenes	1640-1680 (5.95-6.10)	CaC	alkynes	2100-2260 (4.42-4.76)
C-C	aromatic rings	1600 & 1500 (6.25 & 6.75)	C-O	alcohols, ethers,	acids, esters, etc. 1080-1300 (7.69-9.26)
C=O	aldehydes, ketones,	acids, esters	acid chloride	conjugated carbonyls	1690-1760 (5.68-5.92)
1802	(5.55)				
1695	(5.90)	O-H	monomeric		
	H-Bonded				
	RCOOH	3610-3640 (2.75-2.77)			
3200-3600	(2.78-3.13)				
2500-3000	(3.33-4.00)				
N-H	amines				
1; = doublet; 2; = singlet		3300-3500 (2.86-3.03)	C-N	amines	1180-1360 (7.35-8.48)
CaN	nitriles	2210-2260 (4.43-4.52)	O=C-H	aldehyde C-H	2817 (3.55)
NMR CHEMICAL SHIFTS in ppm from TMS					
cyclopropane		0.2	primary	R-CH3	0.9
secondary	R2-CH2	1.2	tertiary	R3-CH	1.5
vinyllic	C=C-H	4.6-5.9	alkynyl	CaC-H	2.0-3.0
aromatic	Ar-H	6.0-8.5	benzylic	Ar-C-H	2.2-3.0
allylic	C=C-C-H	1.7	fluorides	F-C-H	4.0-4.5
chlorides	Cl-C-H	3.0-4.0	bromides	Br-C-H	2.5-4.0
iodides	I-C-H	2.0-4.0	alcohols	HO-C-H	3.4-4.0
ethers	C-O-C-H	3.3-4.0	esters	RCOO-C-H	3.7-4.1
acids	HOOC-C-H	2.0-2.2	esters	ROOC-C-H	2.0-2.6
carbonyls	O=C-C-H	2.0-2.7	aldehydes	O=C-H	9.0-10.3
hydroxyl	C-O-H	1.0-5.5	phenols	Ar-O-H	4.0-12.0
enols	C=C-O-H	15.0-17.0	carboxyl	RCO-O-H	10.5-15.0
amino	R-N-H	1.0-5.0	amines	N-C-H	2.5

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Thank you very much.