

Clearly print your name in the space provided.
Maintain appropriate security over your exam.
Do not open exam until instructed to do so.
Do not write on the front or back of this exam besides your name.

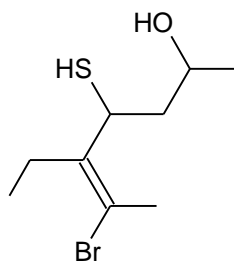
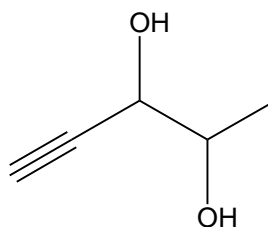
PERIODIC TABLE OF THE ELEMENTS

1A																	8A
1 H 1.01	2A										3A	4A	5A	6A	7A	2 He 4.00	
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31	3B	4B	5B	6B	7B	8B	8B	8B	1B	2B	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.3
55 Cs 132.91	56 Ba 137.33	57 La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.85	75 Re 186.21	76 Os 190.2	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.19	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.03	89 Ac (227)	104	105	106	107	108	109									

1. Draw all the following compounds.
a) butoxy cyclopentane

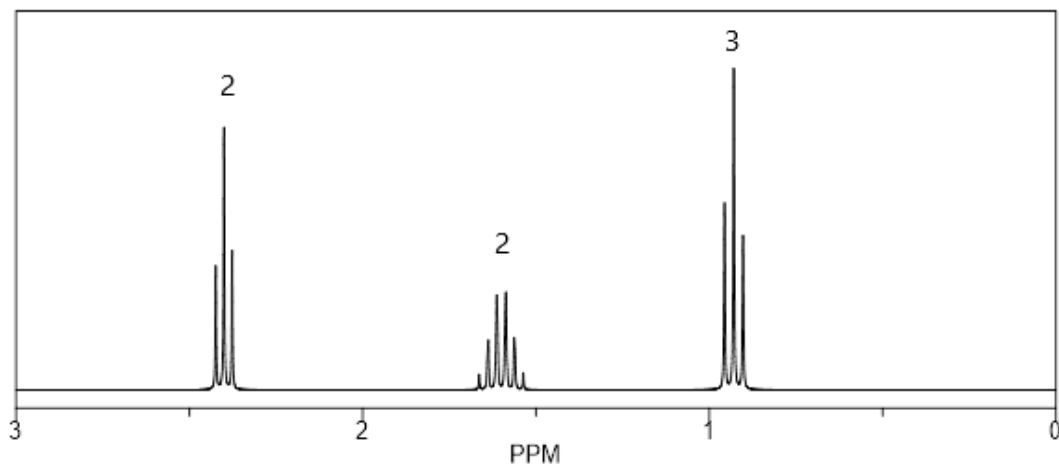
b) potassium isopropoxide

2. Name the following compounds.

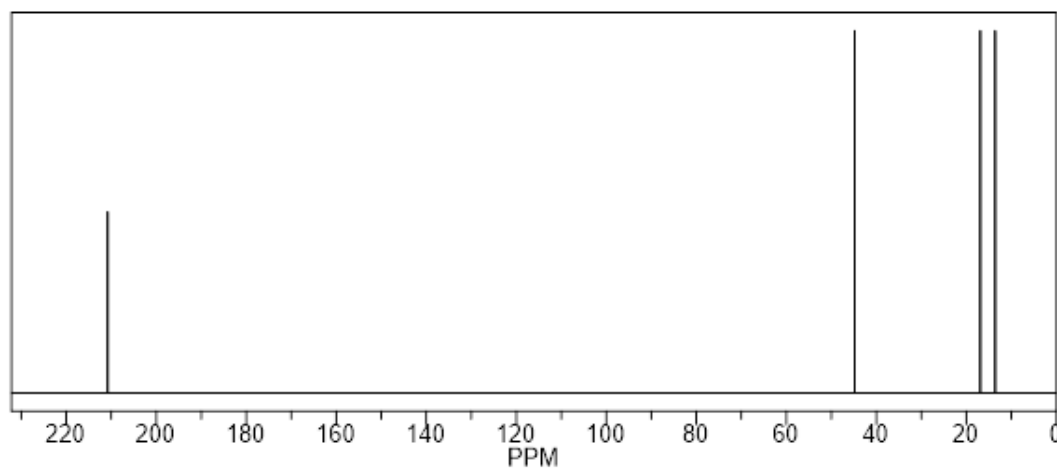


3. Draw a molecule that would could have the following ^1H NMR and ^{13}C NMR.

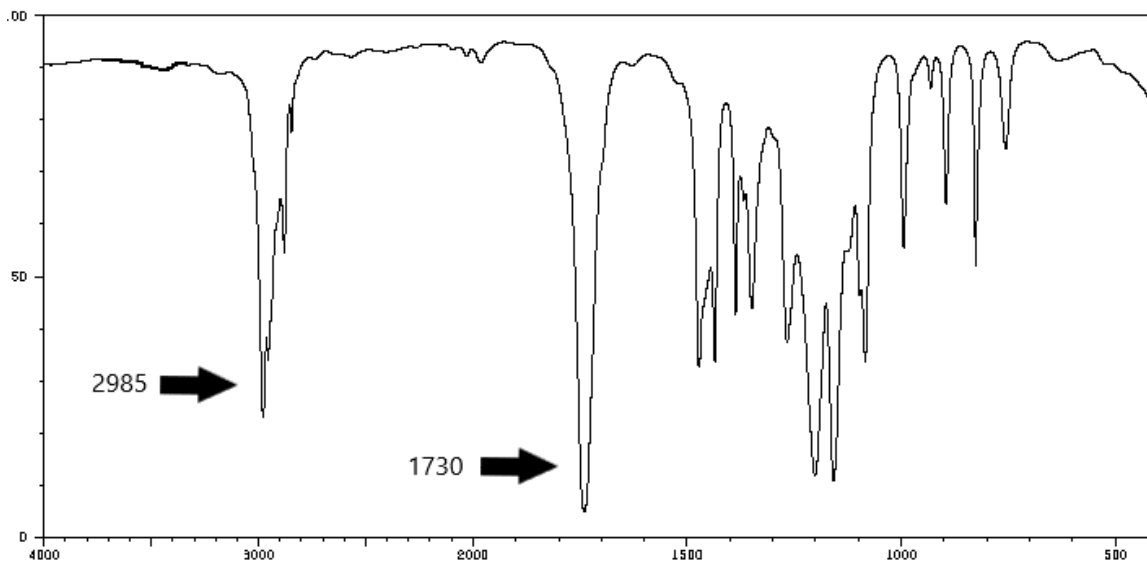
Hydrogen NMR



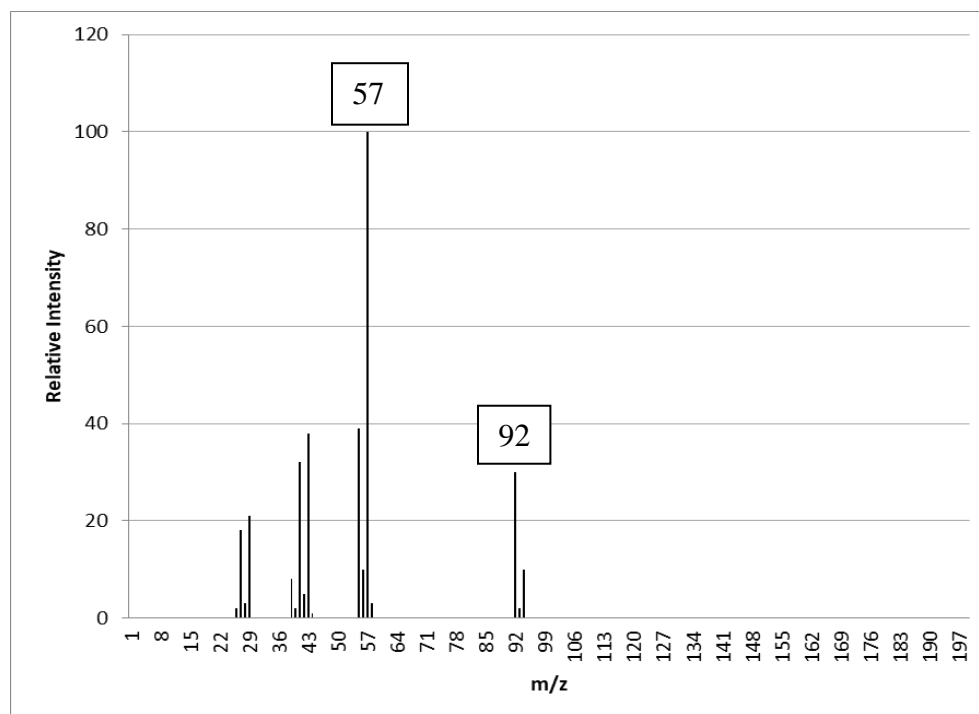
Carbon NMR



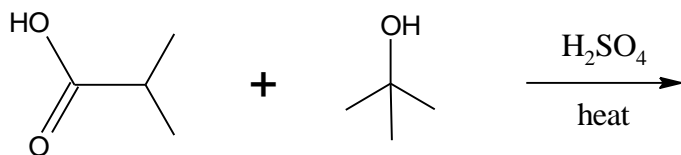
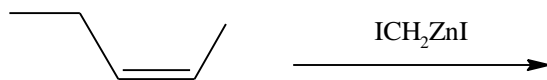
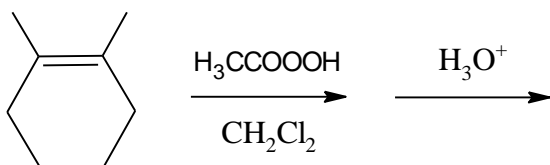
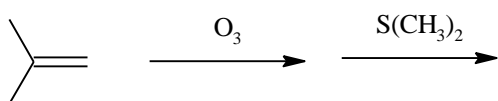
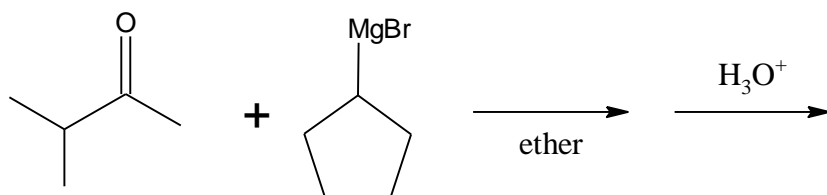
4. Draw a molecule with a molecular formula of $C_5H_{10}O_2$ that would be consistent with the following IR spectrum.



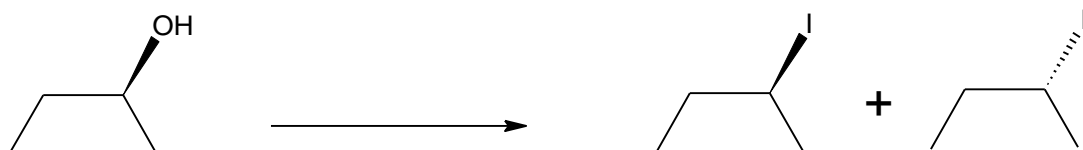
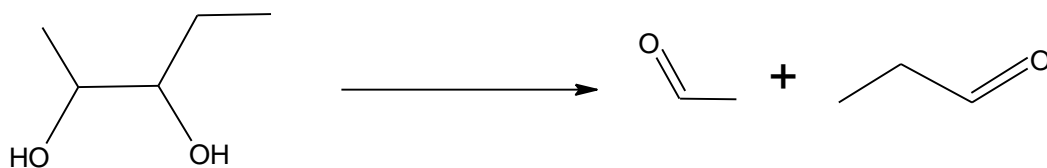
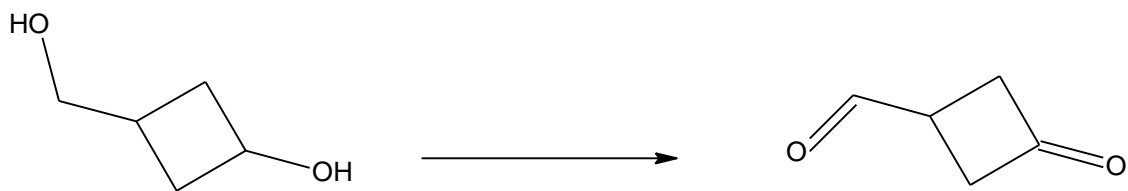
5. Draw a molecule that would be consistent with the following mass spectrum.



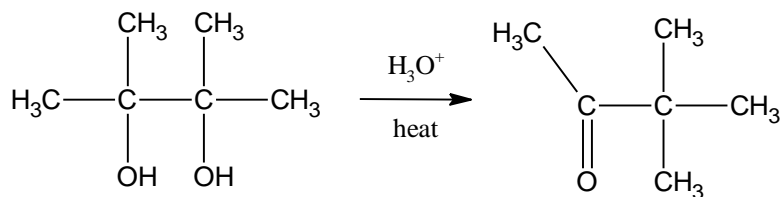
6. Determine the product(s) for the following reactions.



7. Show what reagents, as discussed in class, you would use to make the following synthetic transformations.



8. The pinacol rearrangement is shown below. Write out the proposed mechanism for this acid initiated rearrangement starting with the diol and ending in the ketone. **Be sure to show all lone pair of electrons and use curved arrow formalism.**



9. Starting with **only 2-bromopropane** and using any reagents which were discussed in class form 3-hexanol. *Hint: All the carbons in the product must originate from a 2-bromopropane molecule.*

10. Draw the structures of molecules A, B, C and D shown in the reaction below.

