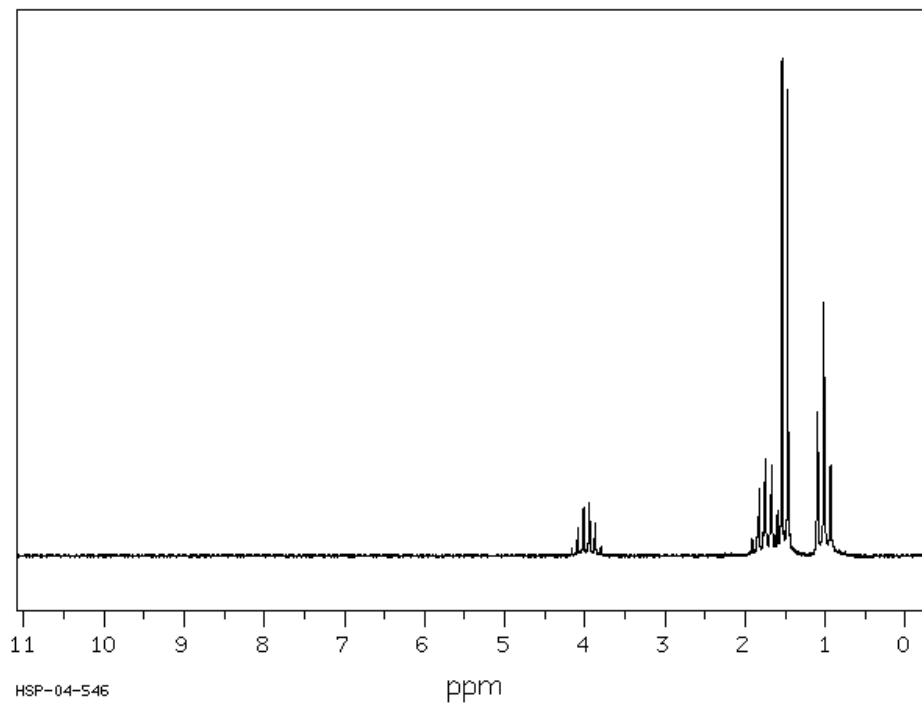


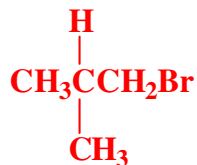
## CHM 202 NMR Problems

1. Identify compound **A** ( $C_4H_9Cl$ ) that gives rise to the following  $^1H$  NMR spectrum. The integration of the four signals upfield to downfield is 3:3:2:1.

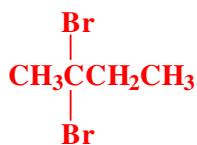


2. Draw a compound that is consistent with the following NMR data:

a)  $C_4H_9Br$ , has 3 signals in the  $^1H$  NMR spectrum, 2 doublets and a 9-line multiplet.



b)  $C_4H_8Br_2$ , has 3 signals in  $^1H$  NMR spectrum, a singlet, a triplet and a quartet.



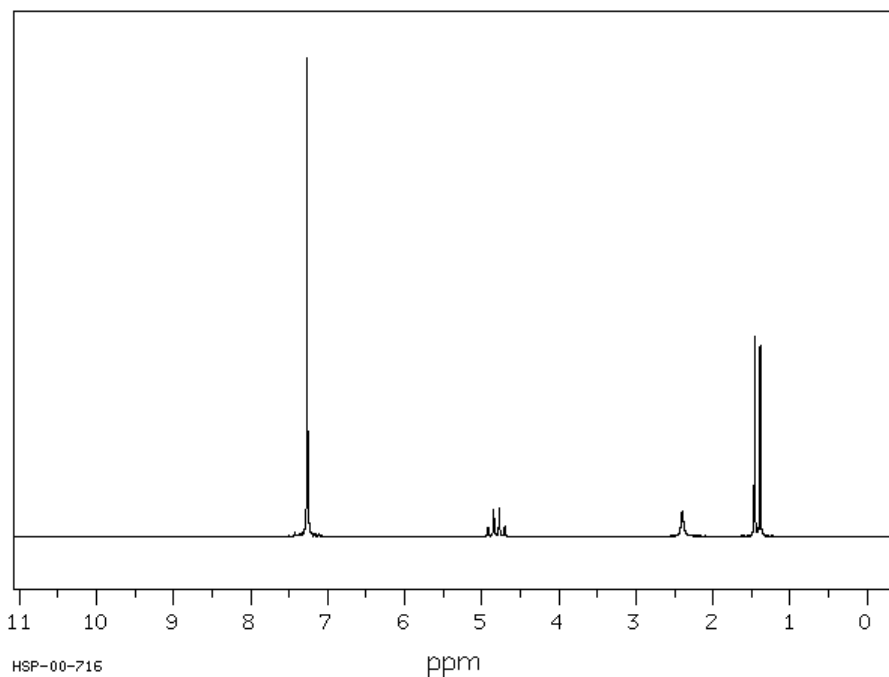
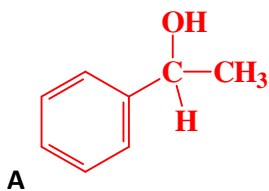
3. Give the structure of a compound with a formula of  $C_4H_{10}O_2$  that gives only two singlets in the  $^1H$  NMR spectrum in an integral ratio of 3:2.

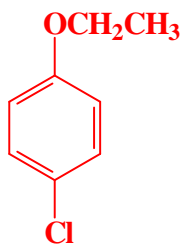


4. For the link that follows, click on "Problems" and choose a problem from the matrix. You can click on the C-13,  $^1H$  NMR, IR and mass spectra. The formula is given. In the proton spectra, click on the peaks to expand them. Suggested problems 1,3,27,46,50,62,64. **Answers posted on our web page.**

<http://www.nd.edu/%7Esmithgrp/structure/workbook.html>

5. Identify the compounds **A** ( $C_8H_{10}O$ ) and **B** ( $C_8H_9ClO$ ) that give rise to the two  $^1H$  NMR spectra below. Integration for **A**, upfield to downfield: 3:1:1:5; Integration for **B**, upfield to downfield: 3:2:2:2





**B**

