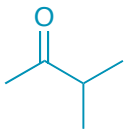
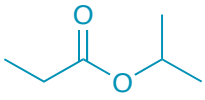
Answers to Sample Spectroscopy Problems
Spring 2004

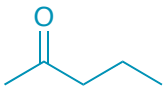
Below is the IR and ^{1}H NMR spectra for an unknown compound with a molecular formula $C_5H_{10}O$. In the ^{13}C NMR, four resonances appear at 210, 45, 22, and 16 ppm. Determine the structure of this molecule.



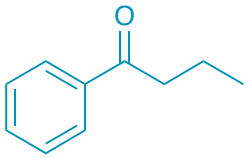
A molecule with the formula $C_6H_{12}O_2$ shows a characteristic Infrared absorption at 1735 cm^{-1} and the following NMR spectra. The proton spectra shows the peaks, the number of hydrogens that each resonance integrates for, and the coupling constant (J in Hz). Determine the structure.



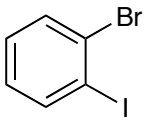
A molecule with the formula $C_5H_{10}O$ shows a characteristic Infrared absorption at 1715 cm^{-1} and the following MS and NMR spectra. Determine the structure.



Determine the structure for an unknown molecule with a molecular formula of $C_{10}H_{12}O$. The IR spectra shows a strong absorbance at 1680 cm^{-1}. The ^{1}H NMR and ^{13}C NMR spectra for this unknown are shown below.

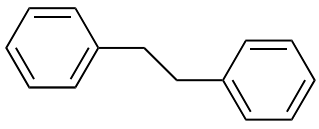


The three compounds shown below have very different ^{13}C NMR spectra. Match the structures with the correct spectra.



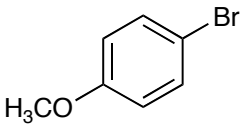
A

Spectrum 1



B

Spectrum 3



C

Spectrum 2