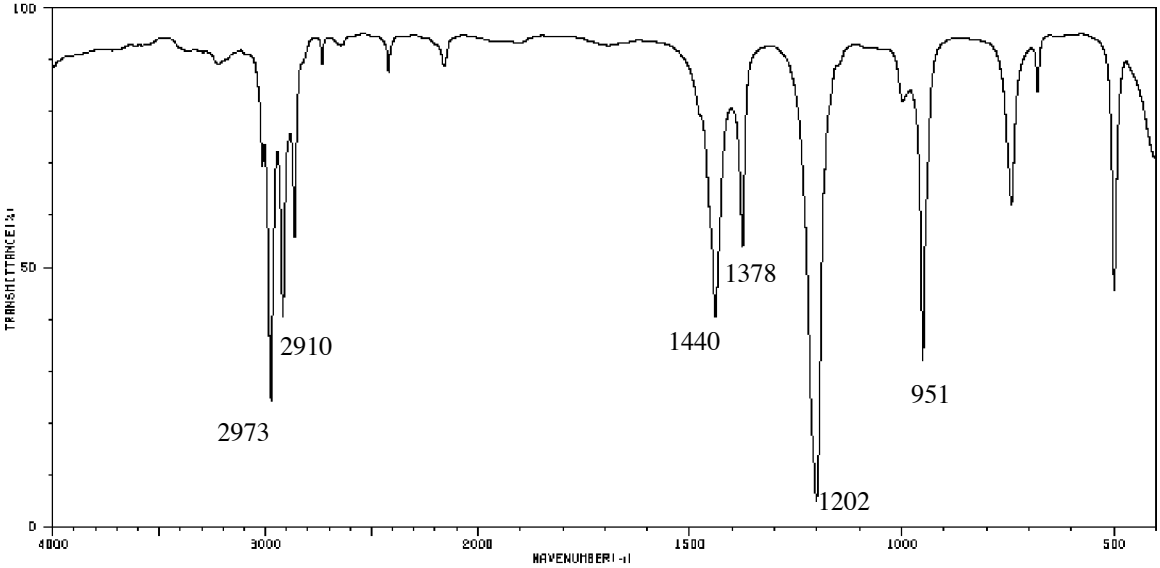
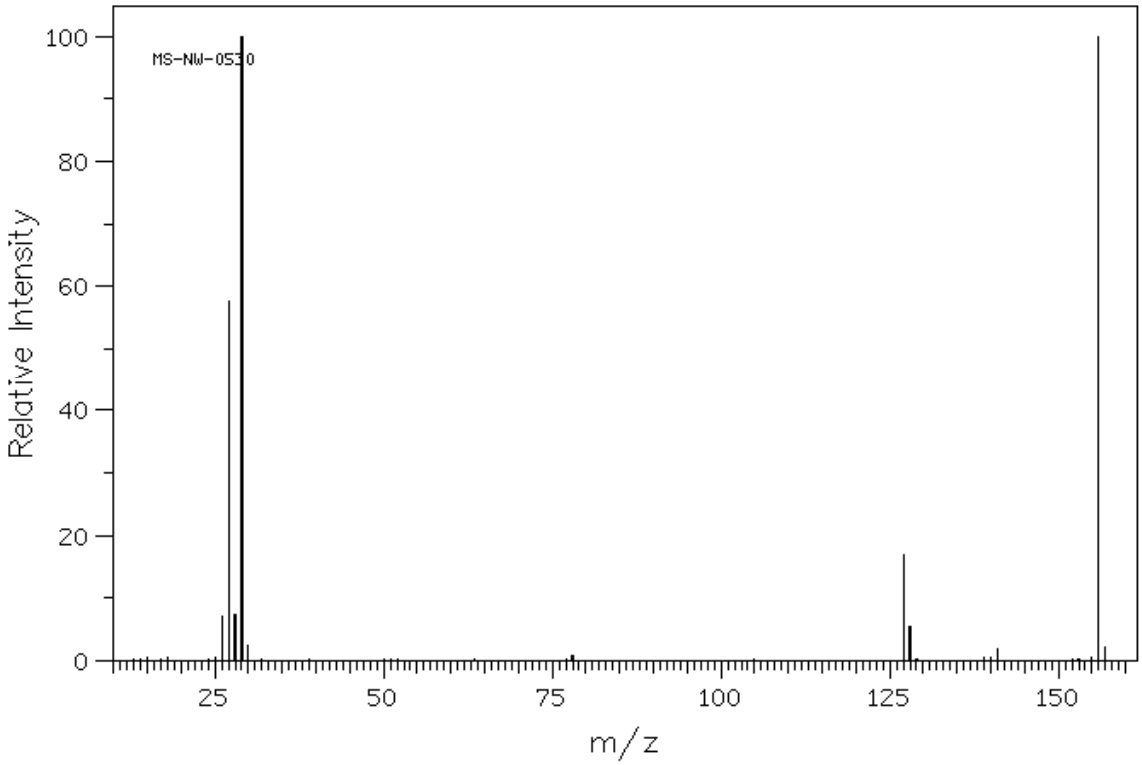
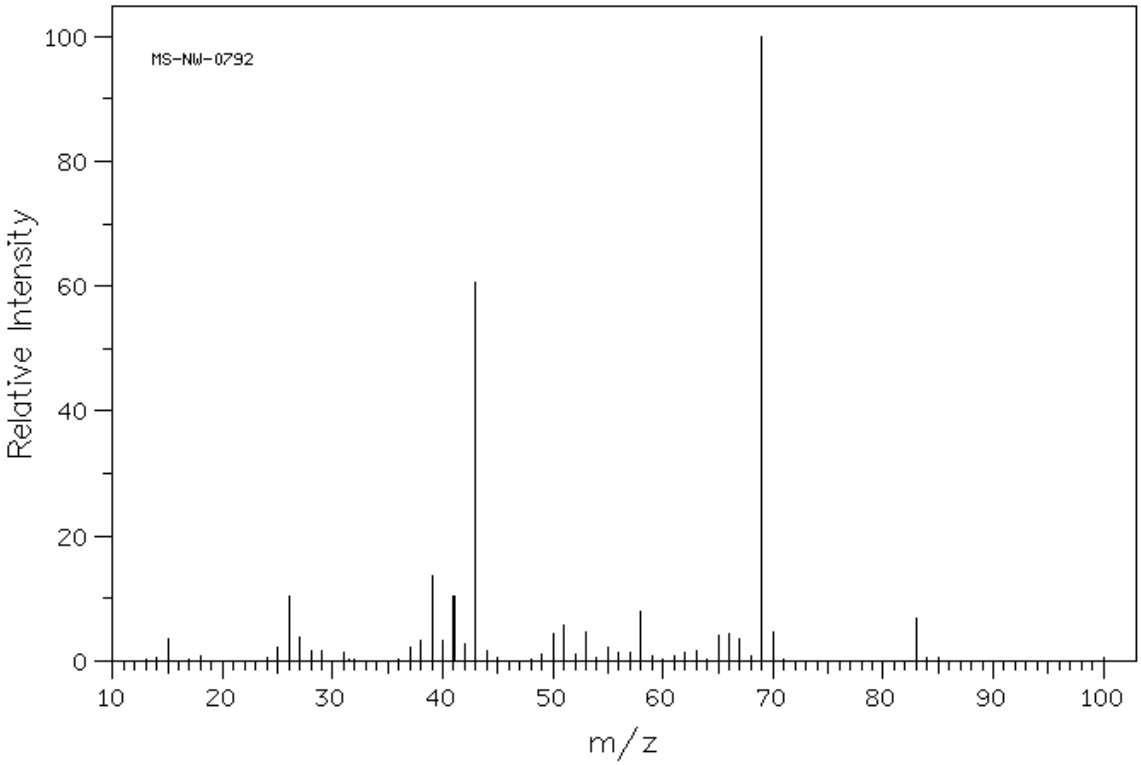
Problem Set 1. 5.13 Due February 14, 2003

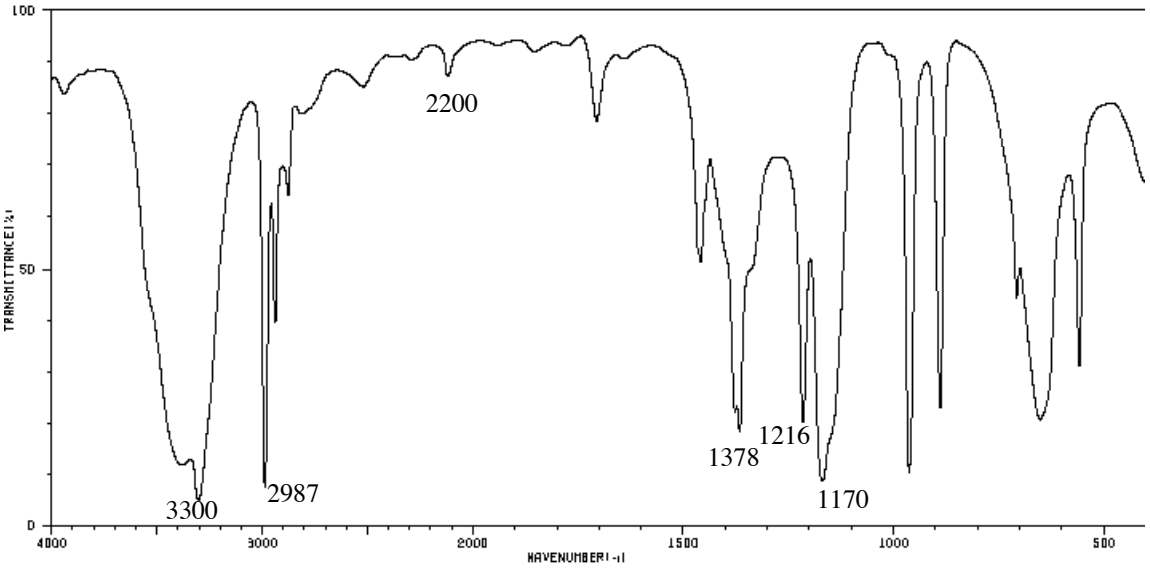
1. Compound X has the following IR and Mass Spectrum. It reacts with magnesium metal and when added to acetone produces an alcohol. C/H analysis shows it to be 15.40%C and 3.23%H. What is compound X.



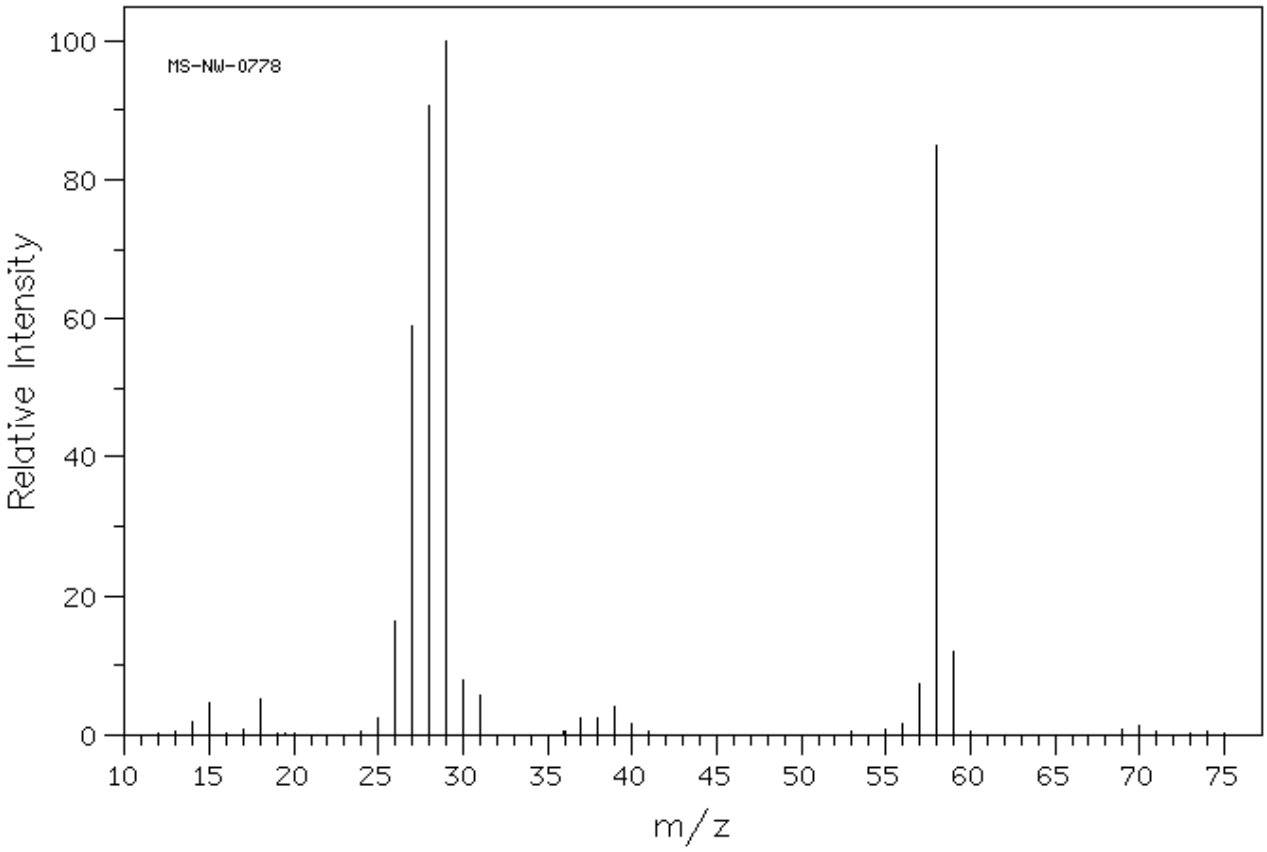


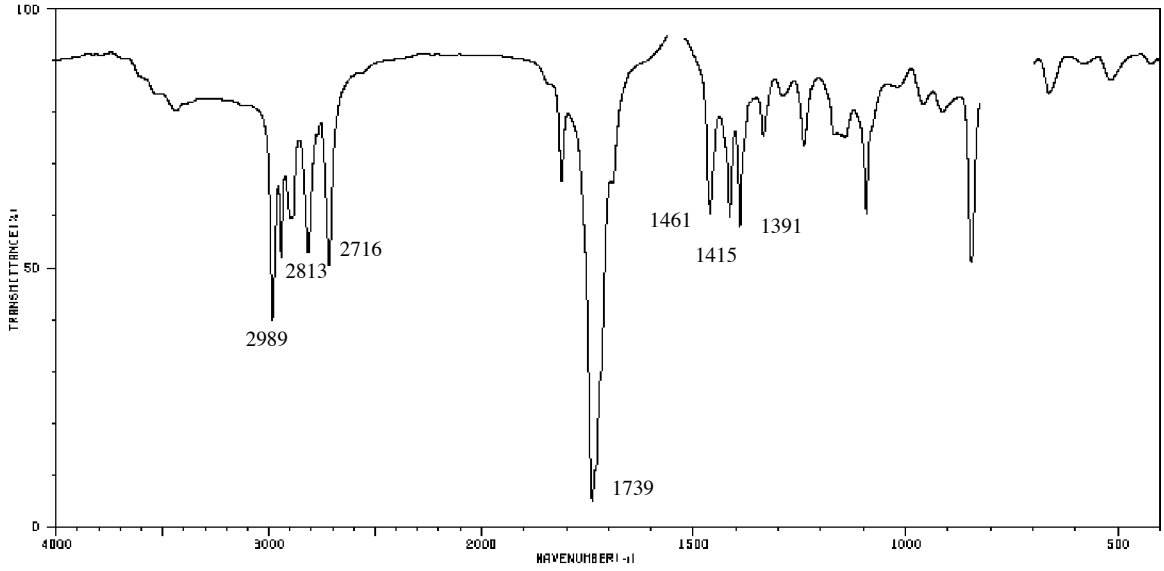
2. Compound X has the following IR and Mass Spectra. Its elemental composition is C 71.4%, H 9.5%, O 19.0%. What is the compound?





3. Compound X has the following IR and Mass Spectra. Its elemental composition is C 62.1%, H 10.3%, O 27.6%. What is the compound?





4. The ketone in cyclobutanone has a higher energy stretching frequency than cyclohexanone. This indicates that the C=O bond is stronger in the smaller ring. Suggest a detailed explanation.

5. Match the following IR spectra to cyclopentane, chloroform, n-hexane, and benzene..