

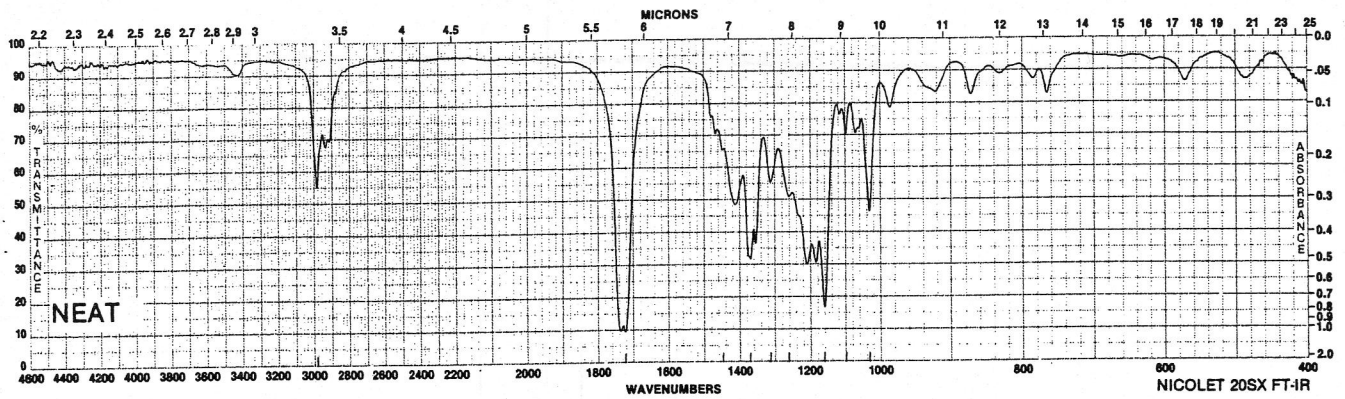
**At the end of these lectures you should:**

- Understand, in simple terms, the basic principles underlying IR and UV spectroscopy
- Know the parameters and constraints on UV, IR sample preparation
- Be aware of typical spectral layout for UV, IR, MS and reporting conventions
- Interpret changes in IR using a Hooke model as a guide
- Know key regions of IR spectra as they relate to specific vibrations
- Relate changes in IR resonance position to bond order/strength especially for key bond types (e.g. C=O) including familiarity with specific values (in  $\text{cm}^{-1}$ )
- Relate changes in UV spectra to electronic transitions
- Know the Beer-Lambert law and its limits
- Understand the basic origin of effect of solvent, auxochromes and conjugation upon spectral transitions associated with chromophores
- Be aware of Woodward-Fieser rules and their application
- Understand basic principles behind methods of ion mass/charge analysis and ion generation
- Be able to mechanistically rationalize fragmentations in EI mode MS and be aware of how this relates to processes in other modes
- Relate fragmentation patterns to molecular structure
- Recall applications of MS
- Have an overview of the characterization process as a key empirical process in Organic Chemistry

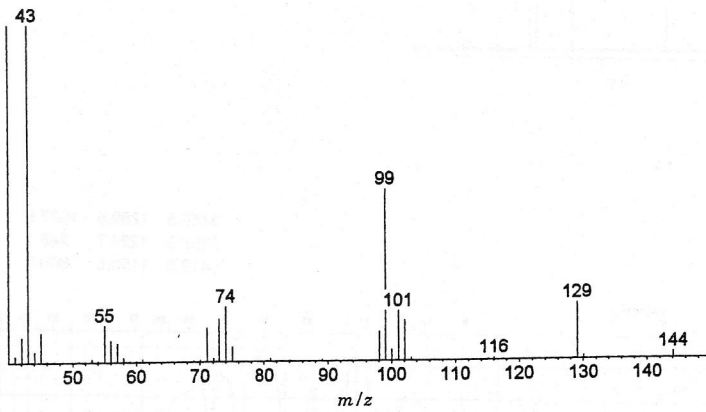
Problem 1

INFRARED

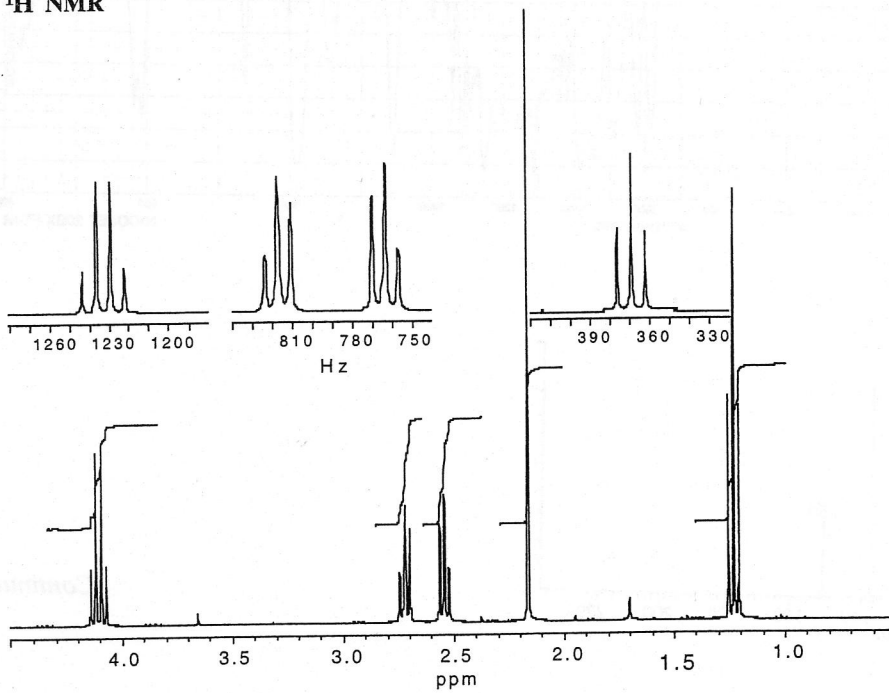
2983.5 1367.6 1159.5  
1721.4 1310.6 1097.0  
1445.9 1259.6 1031.1



MASS

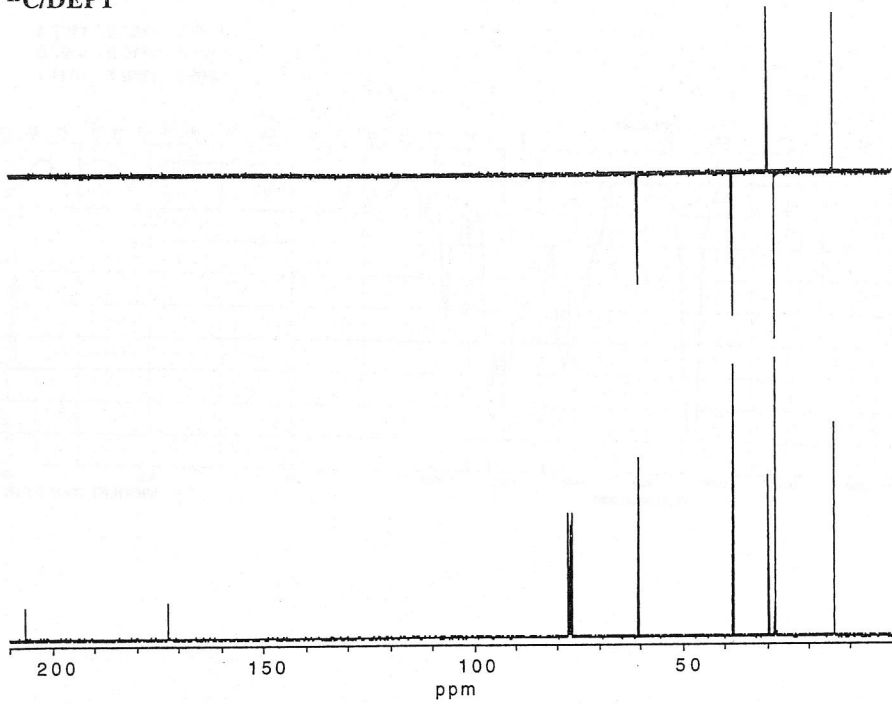


<sup>1</sup>H NMR



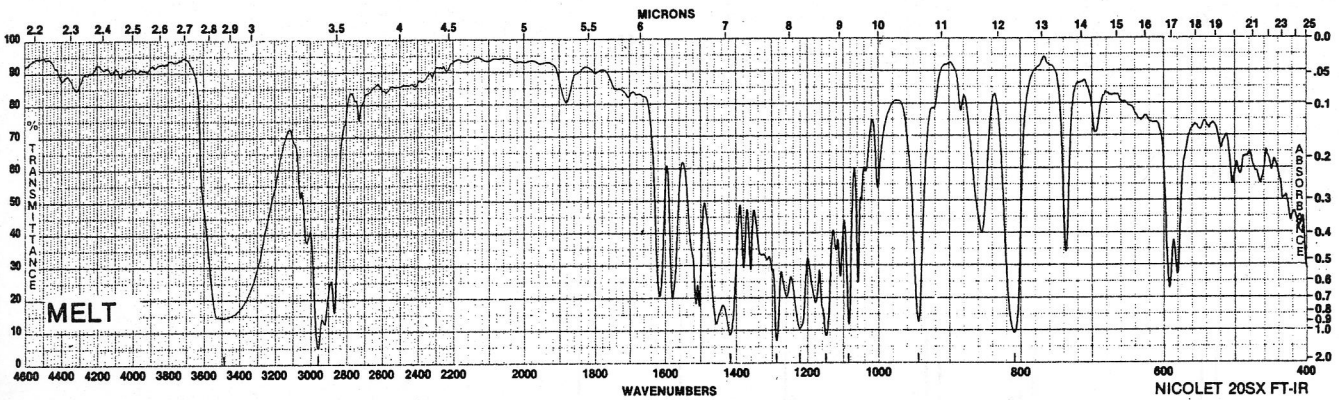
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<sup>13</sup>C/DEPT

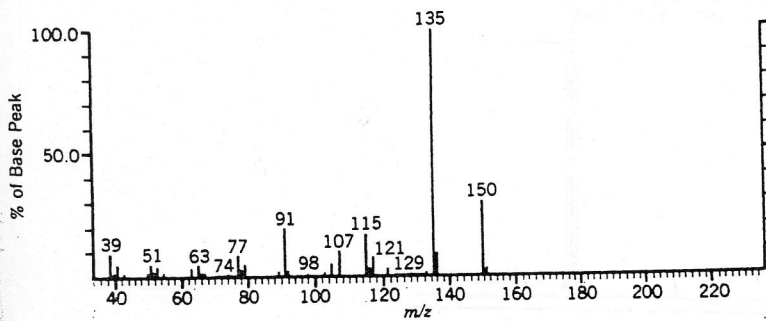


**Problem 2**  
**INFRARED**

3489.6 1289.6 1087.6  
2962.3 1224.7 945.1  
1419.0 1152.6 809.3

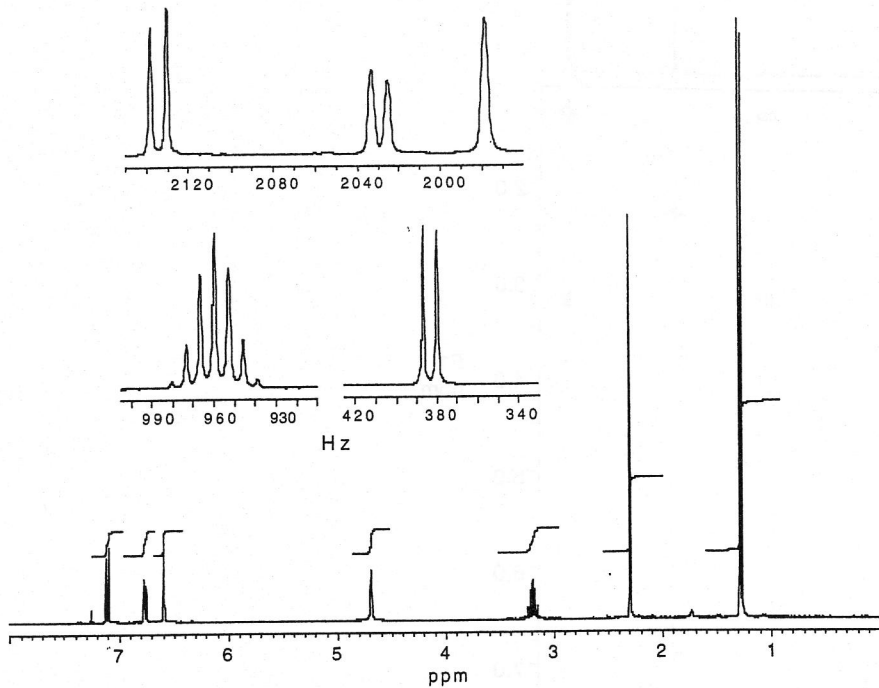


**MASS**

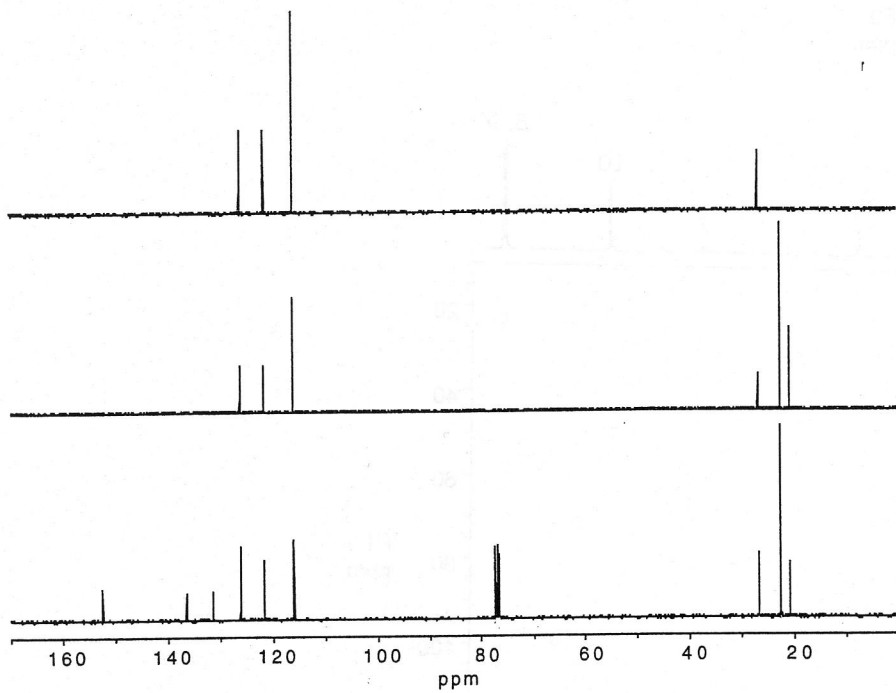


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<sup>1</sup>H NMR



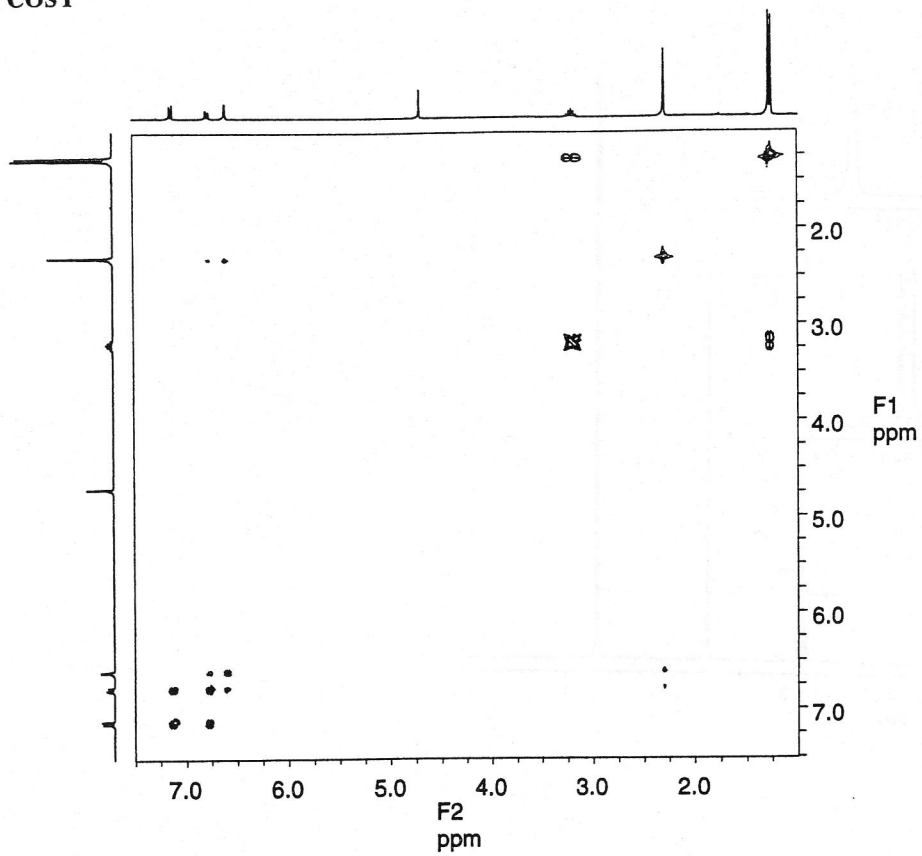
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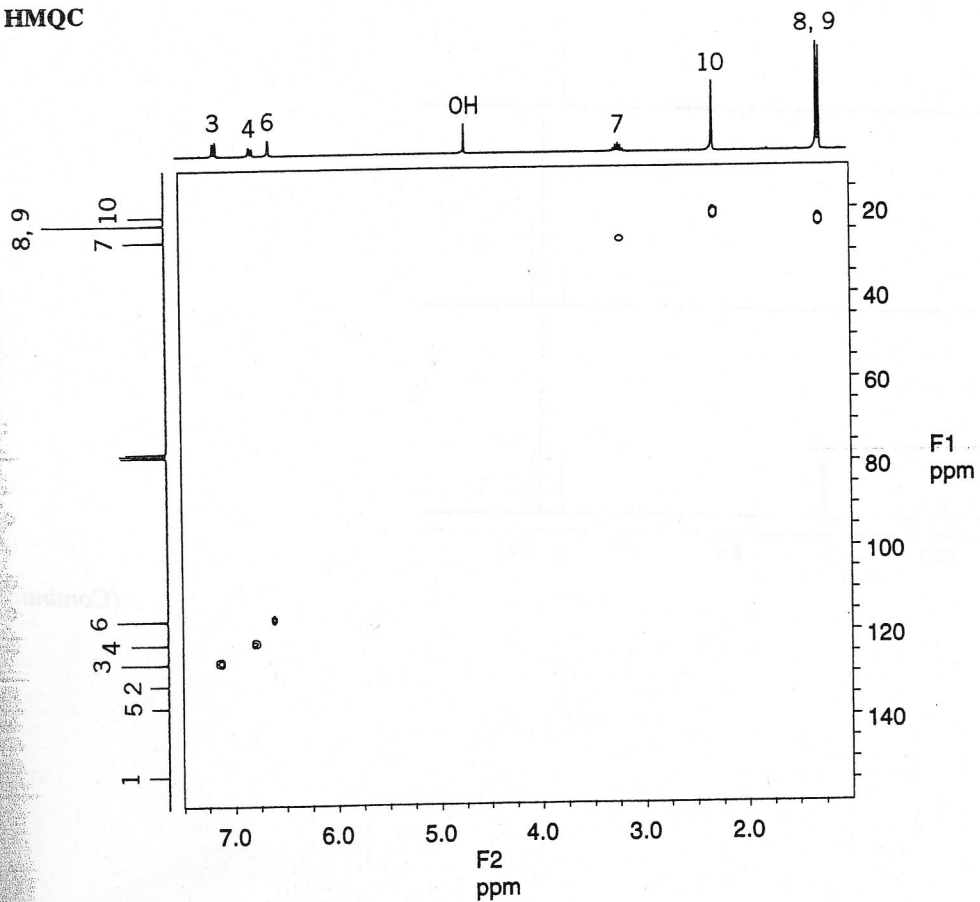
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COSY



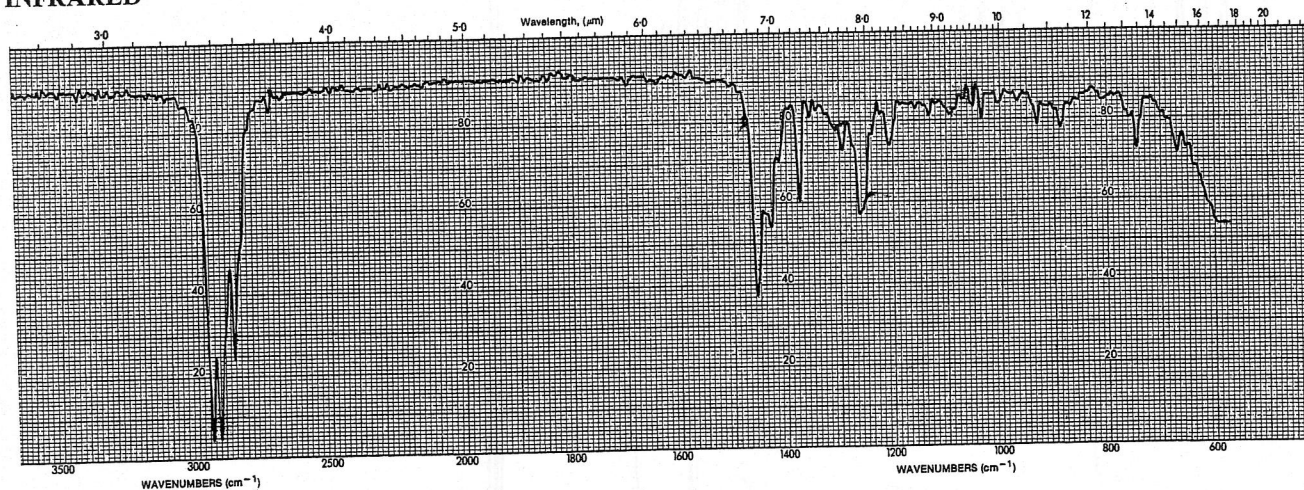
HMQC



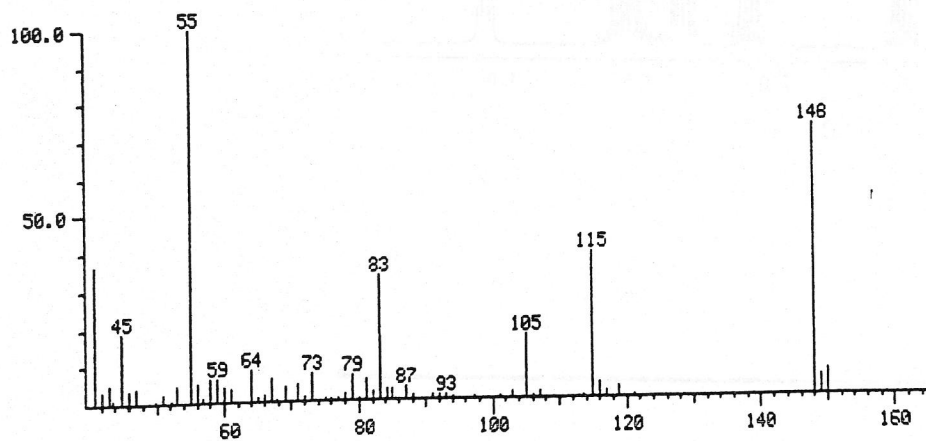
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Problem 3

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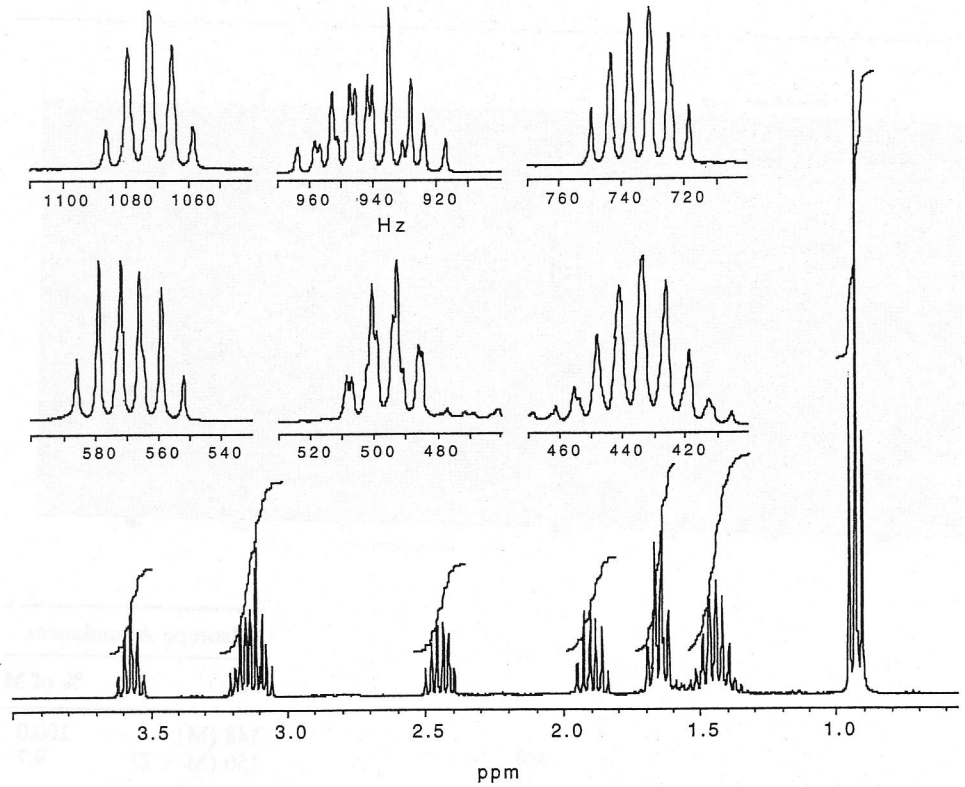


MASS

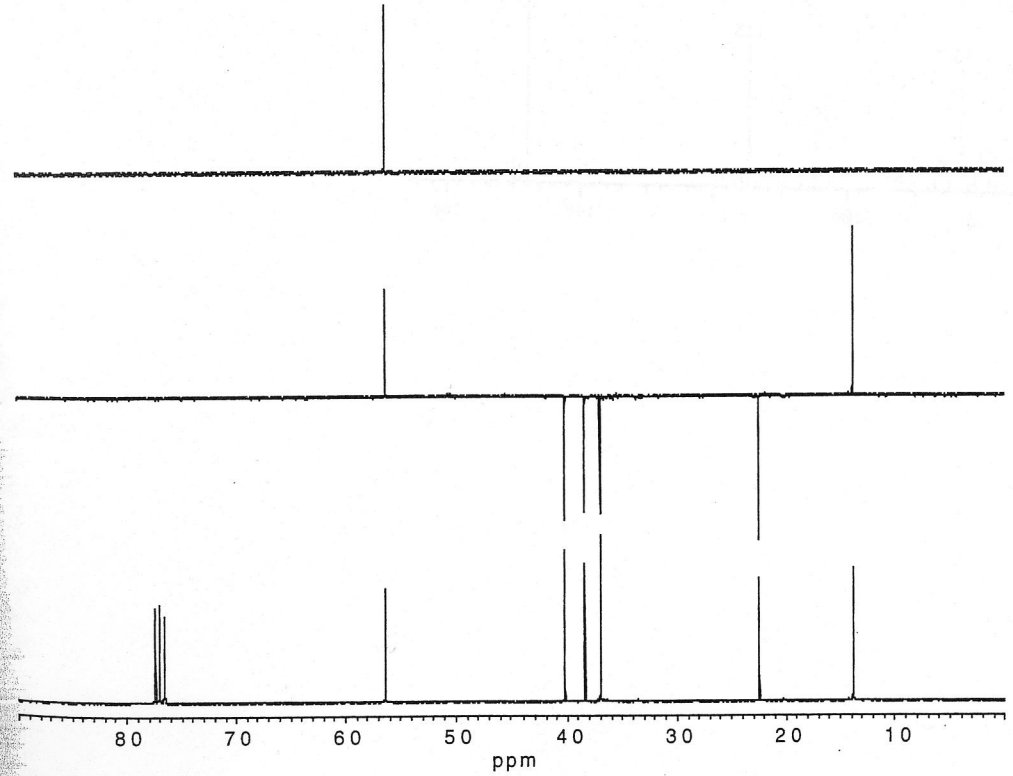


Isotope Abundances	
<i>m/z</i>	% of M
148 (M)	100.0
150 (M + 2)	9.7

<sup>1</sup>H NMR

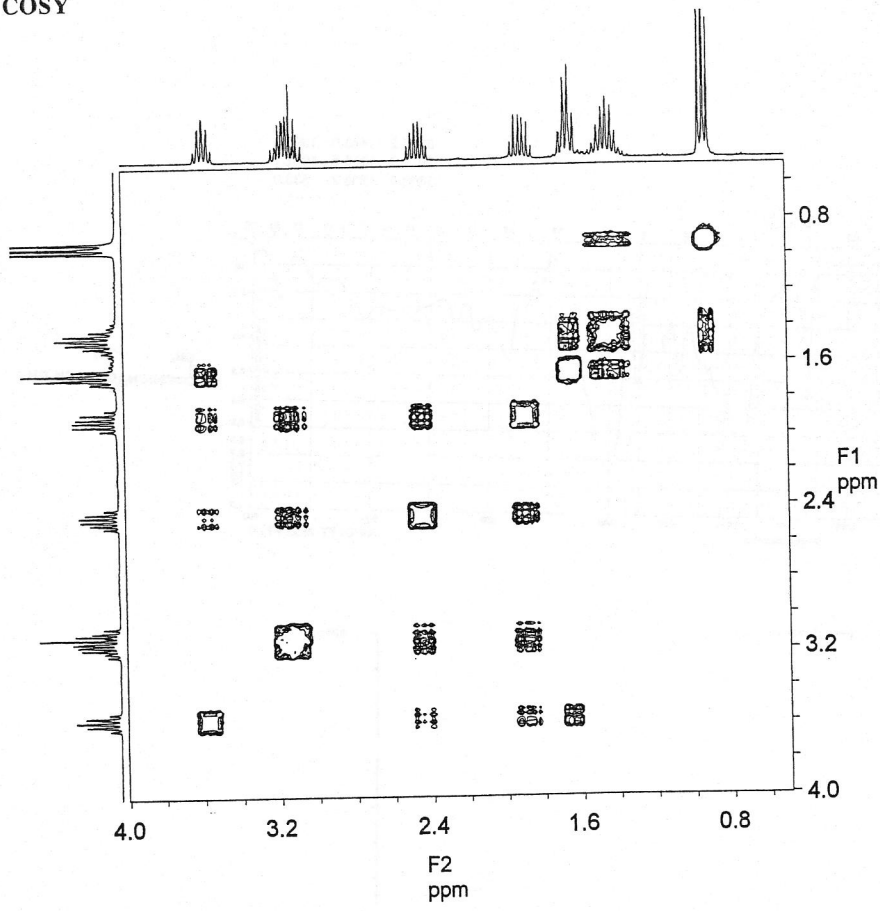


<sup>13</sup>C/DEPT



COSY

7.



HETCOR

