

# Syntheses of Difluorinated Carbasugar Phosphates from Trifluoroethanol

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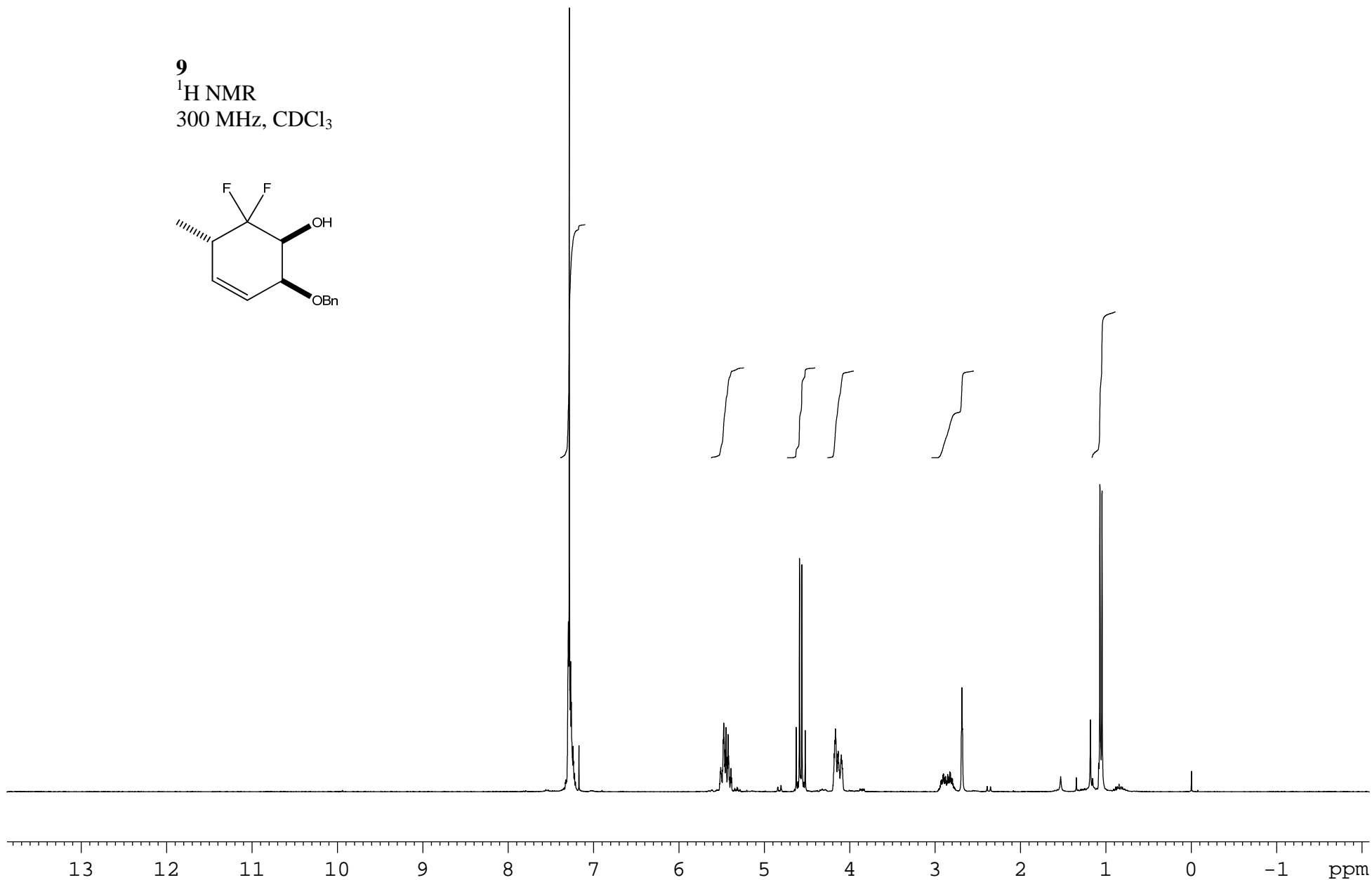
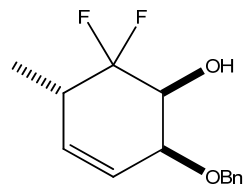
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<sup>b</sup>WestCHEM, Department of Pure and Applied Chemistry, Thomas Graham Building, 295 Cathedral Street, Glasgow G1 1XL, UK, Fax: +44 141 4822; Tel: +44 141 548 4398; E-mail: jonathan.percy@strath.ac.uk

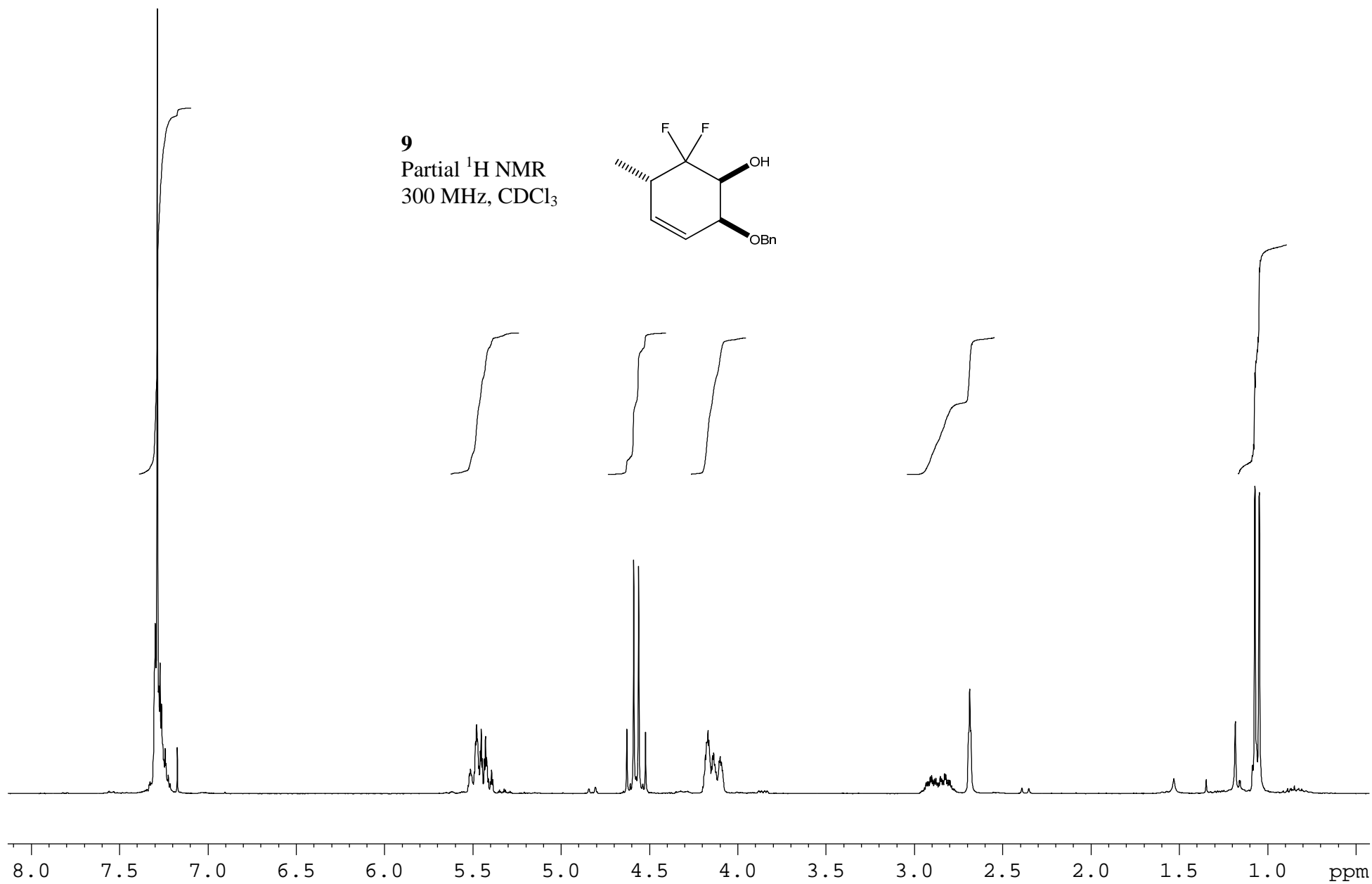
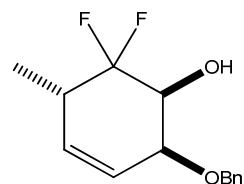
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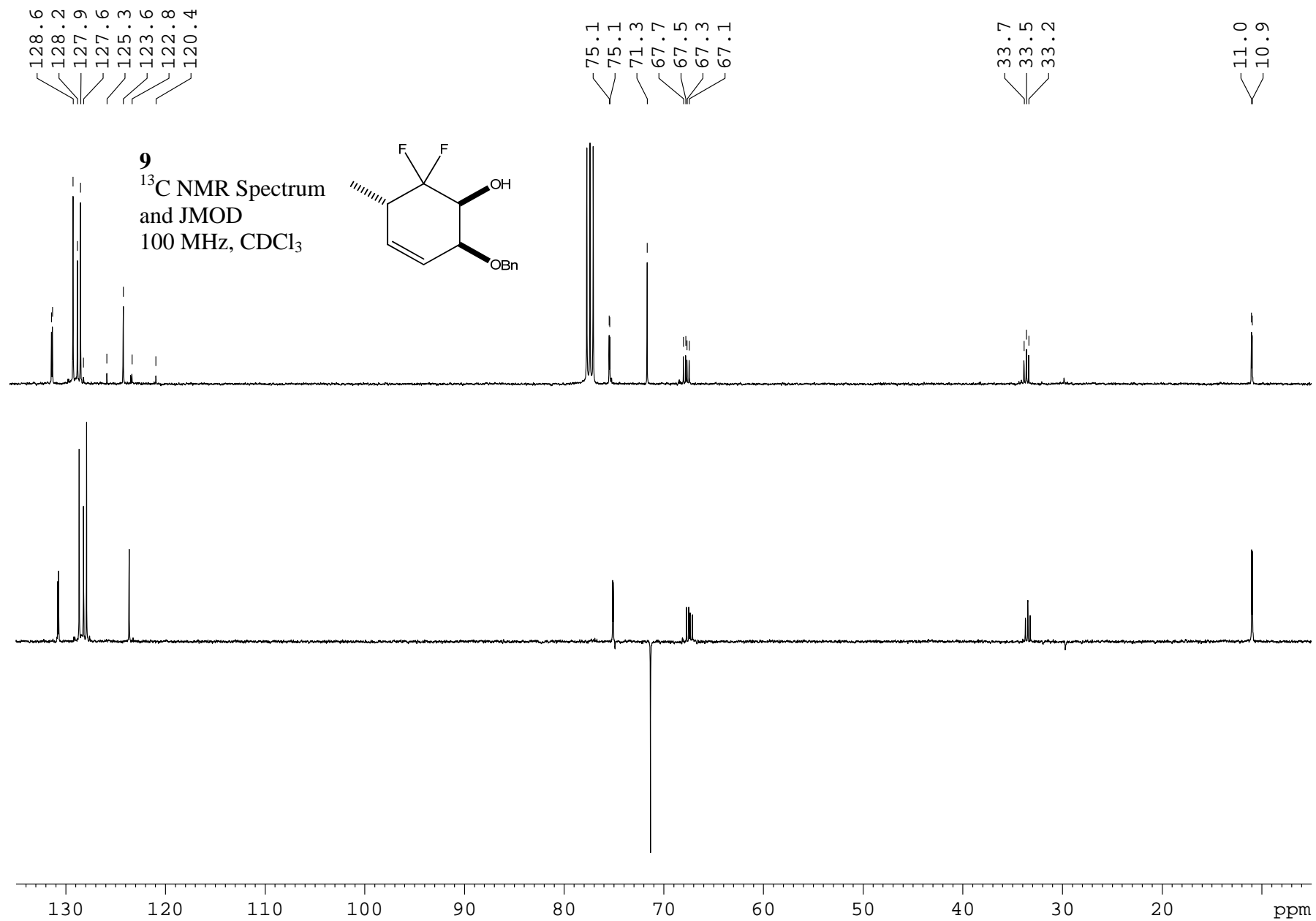
Characterisation spectra for <b>9, 11, 12, 19, 20, 21, 24, 25.</b>	S2-S68
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**9**  
<sup>1</sup>H NMR  
300 MHz, CDCl<sub>3</sub>

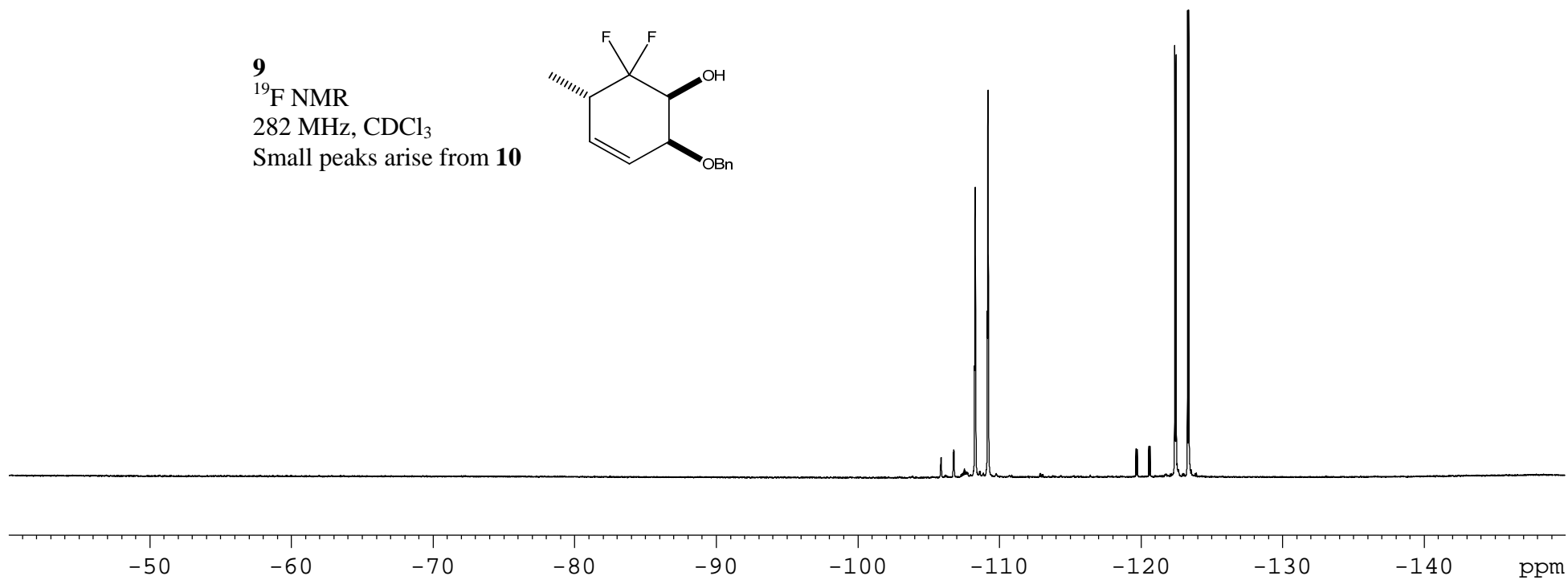
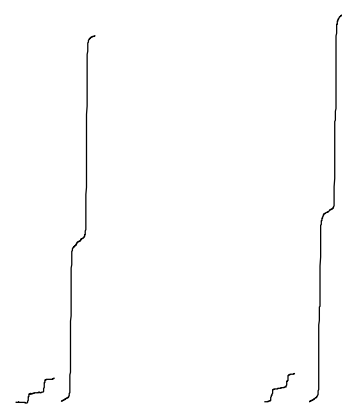
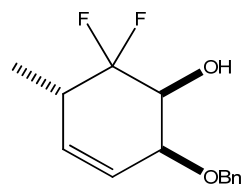


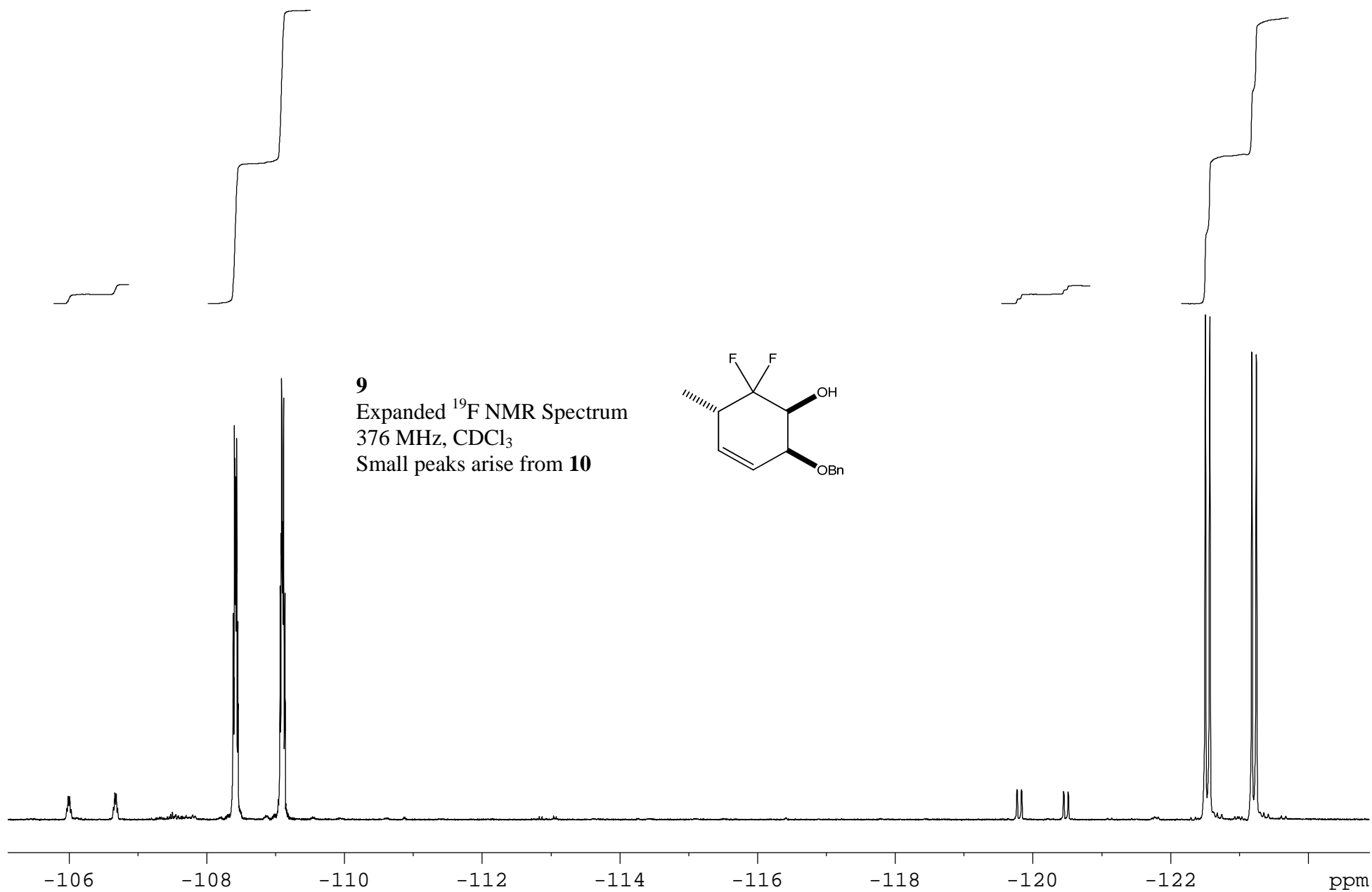
**9**  
Partial  $^1\text{H}$  NMR  
300 MHz,  $\text{CDCl}_3$



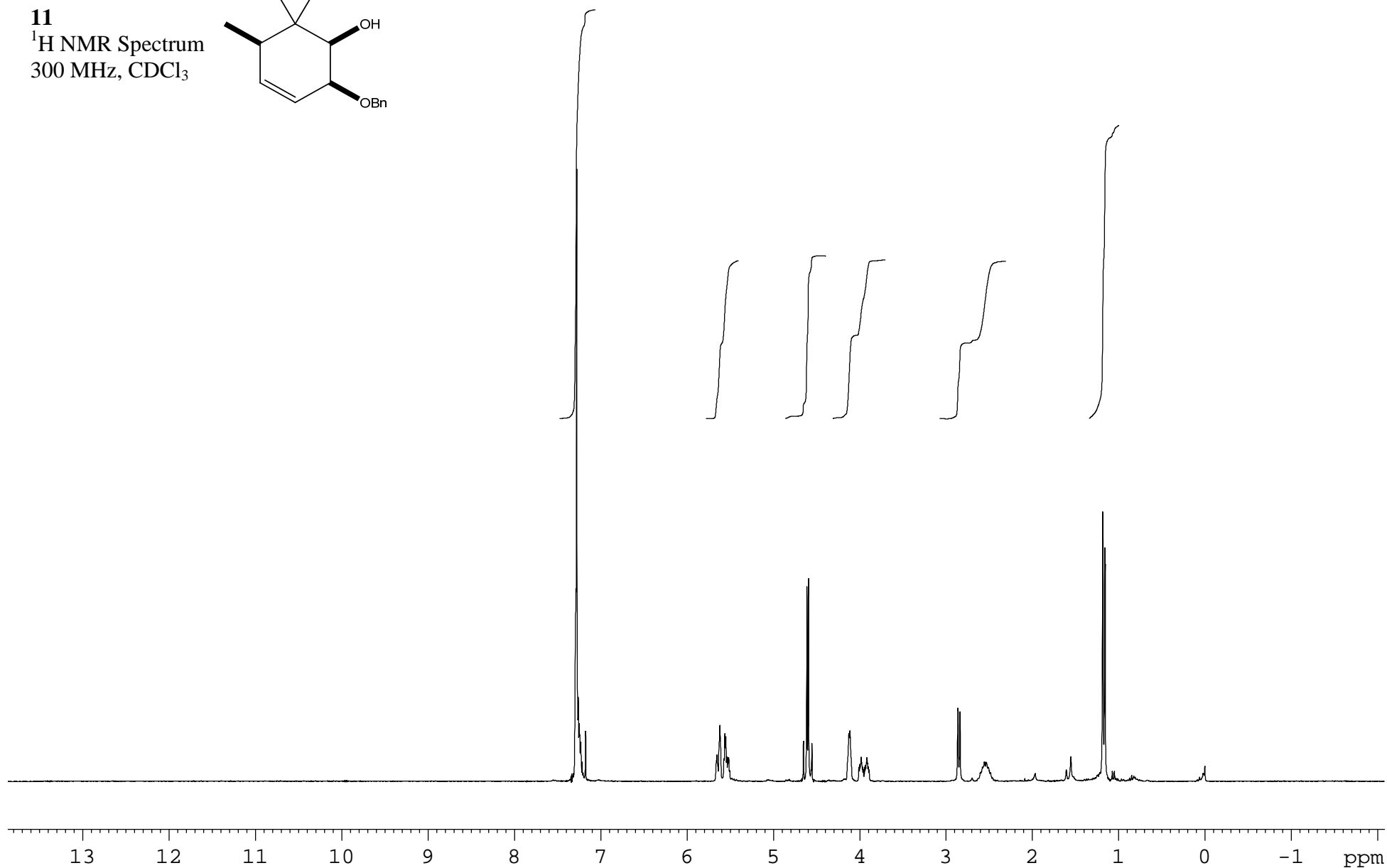
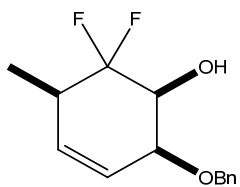


**9**  
<sup>19</sup>F NMR  
282 MHz, CDCl<sub>3</sub>  
Small peaks arise from **10**

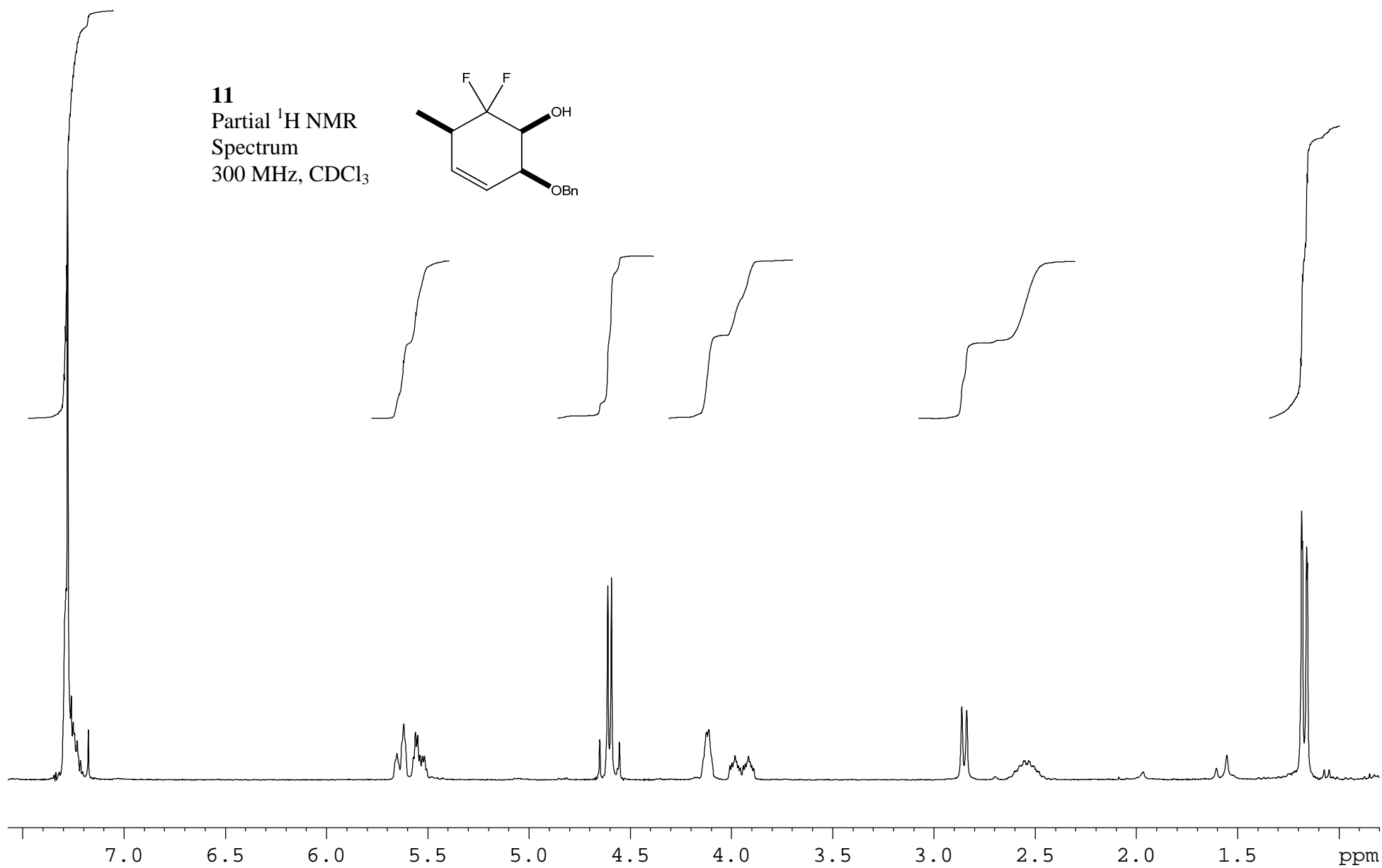
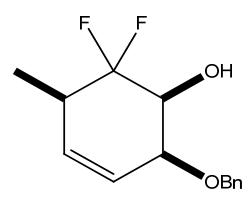




**11**  
<sup>1</sup>H NMR Spectrum  
300 MHz, CDCl<sub>3</sub>



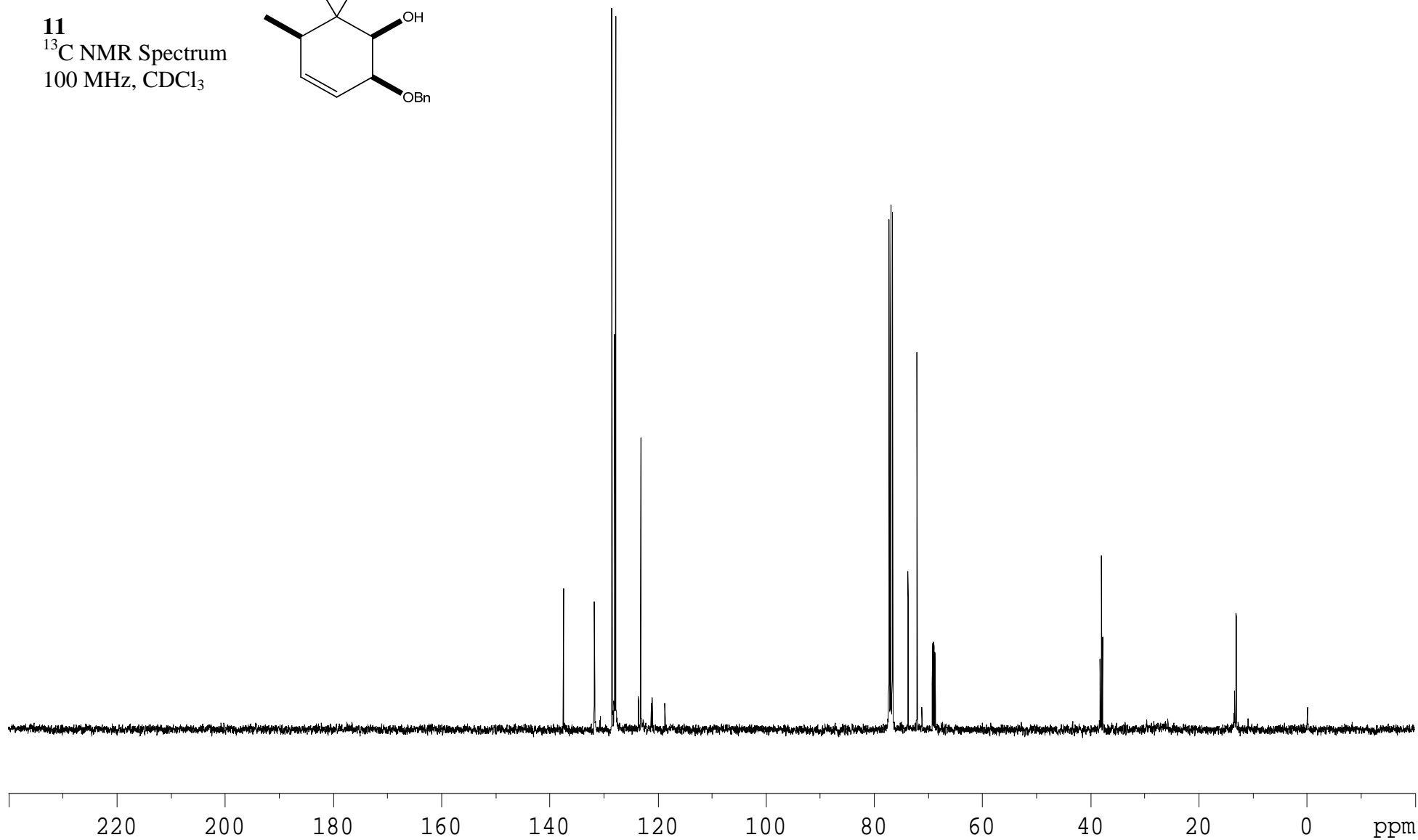
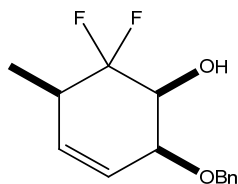
**11**  
Partial  $^1\text{H}$  NMR  
Spectrum  
300 MHz,  $\text{CDCl}_3$



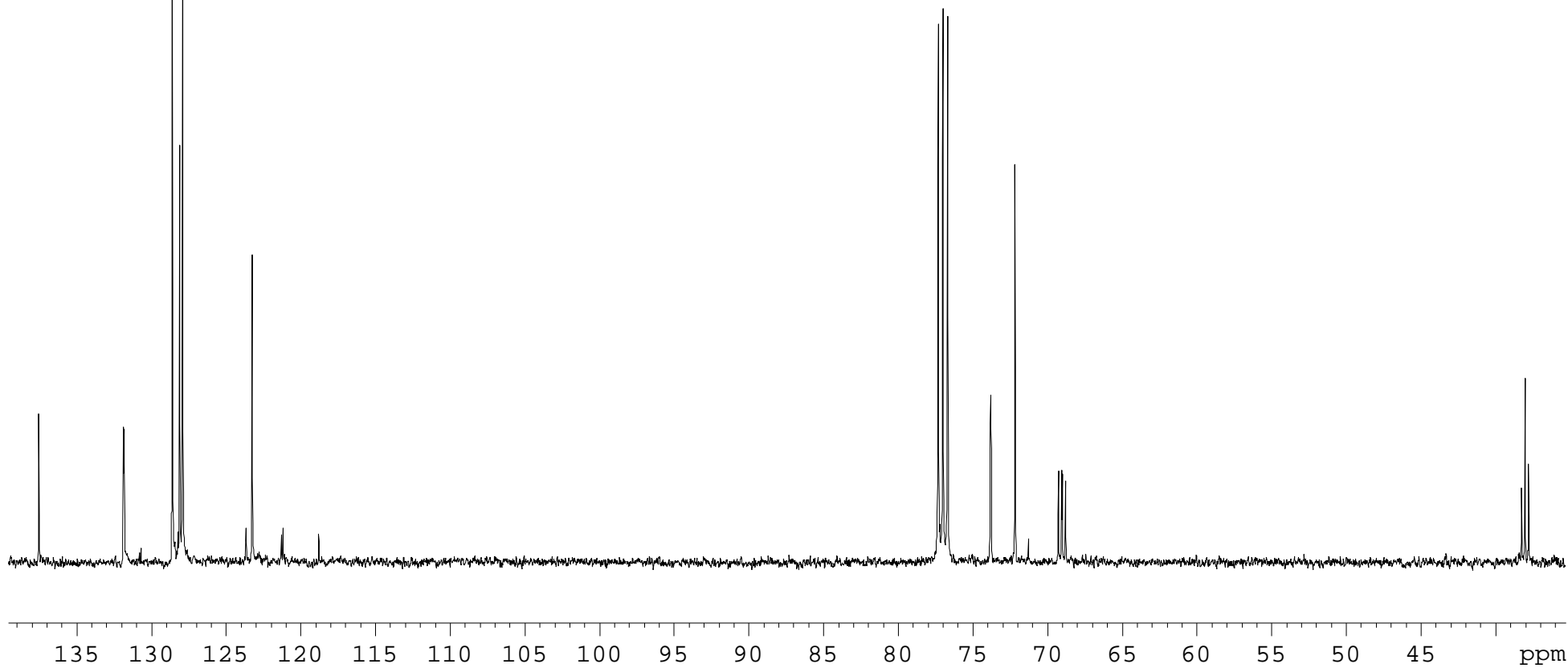
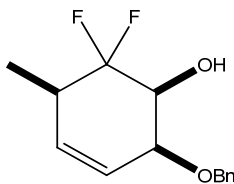




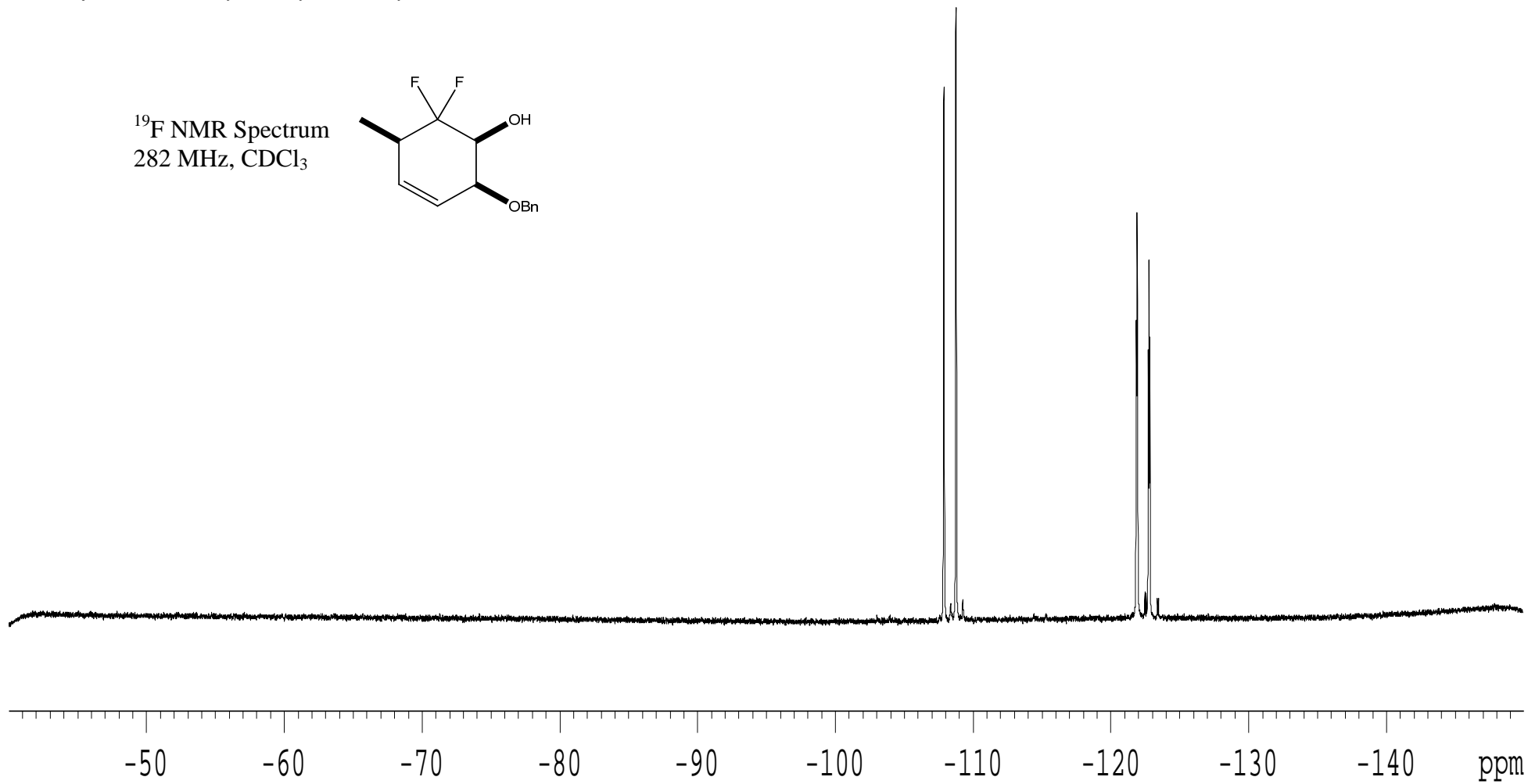
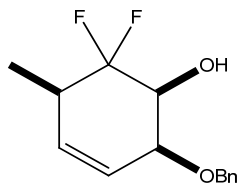
**11**  
<sup>13</sup>C NMR Spectrum  
100 MHz, CDCl<sub>3</sub>

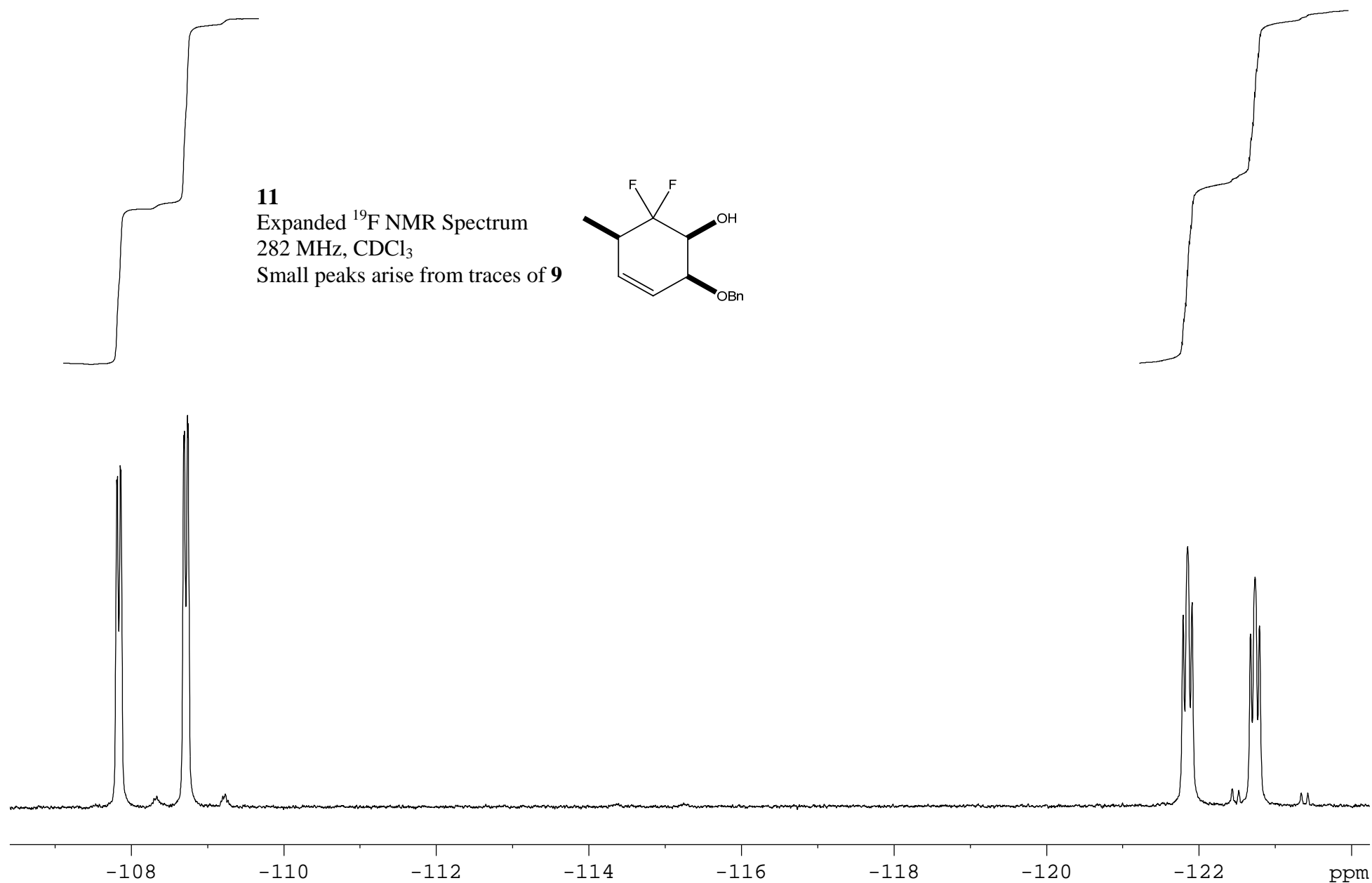


**11**  
Expanded  $^{13}\text{C}$  NMR Spectrum  
100 MHz,  $\text{CDCl}_3$



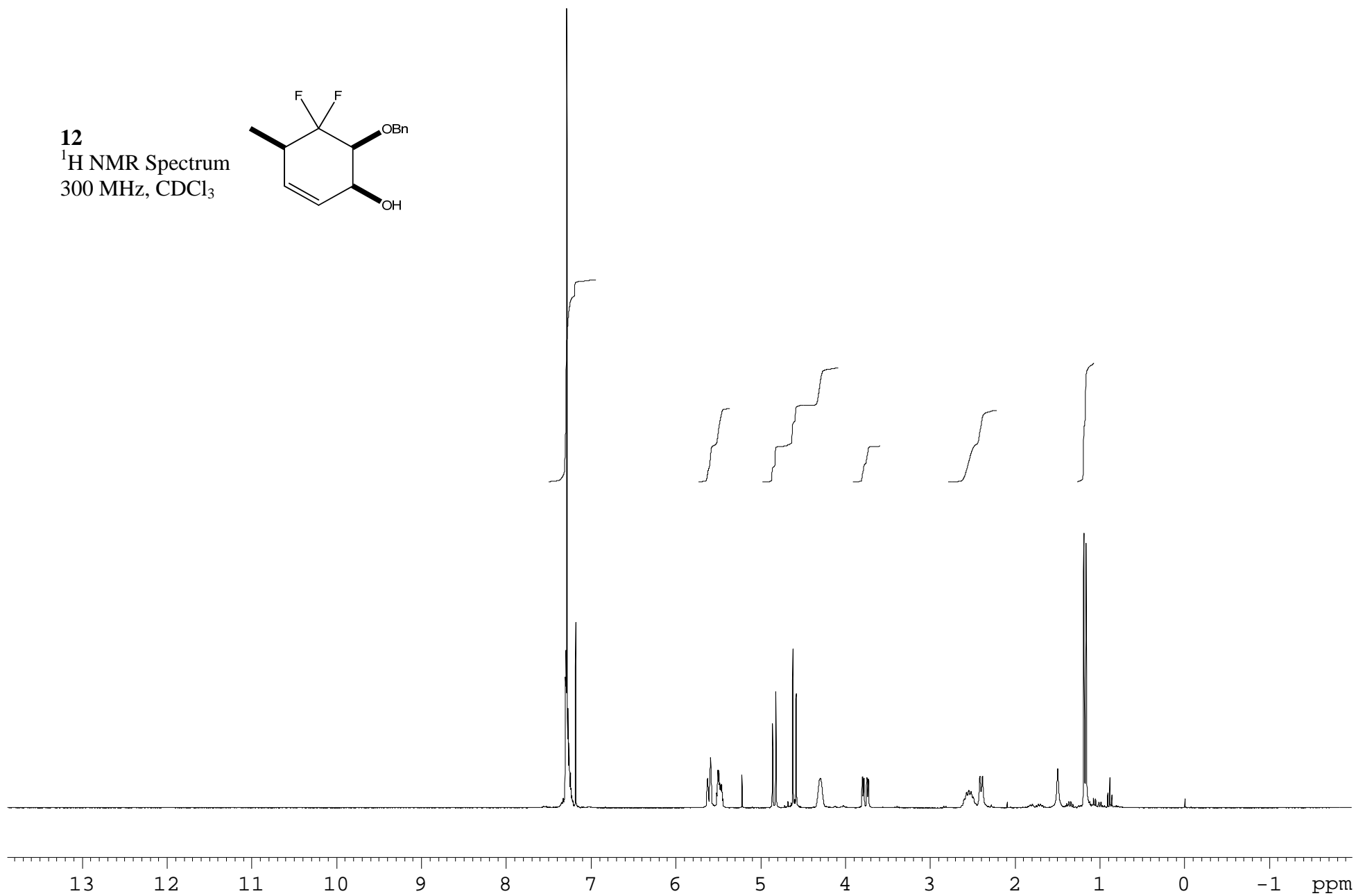
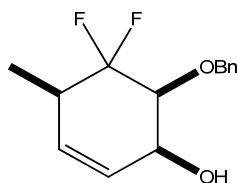
$^{19}\text{F}$  NMR Spectrum  
282 MHz,  $\text{CDCl}_3$







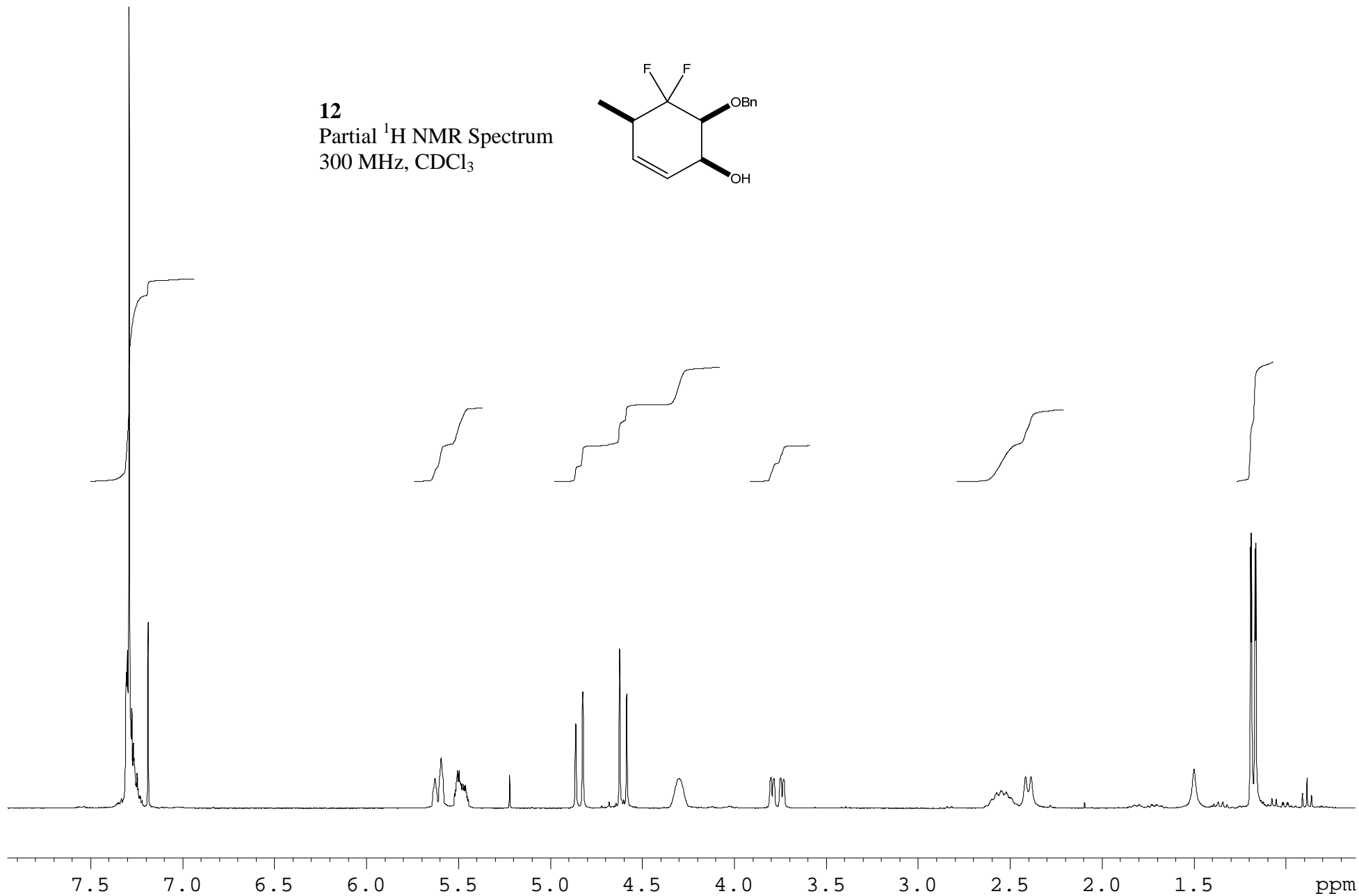
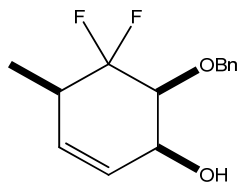
**12**  
<sup>1</sup>H NMR Spectrum  
300 MHz, CDCl<sub>3</sub>



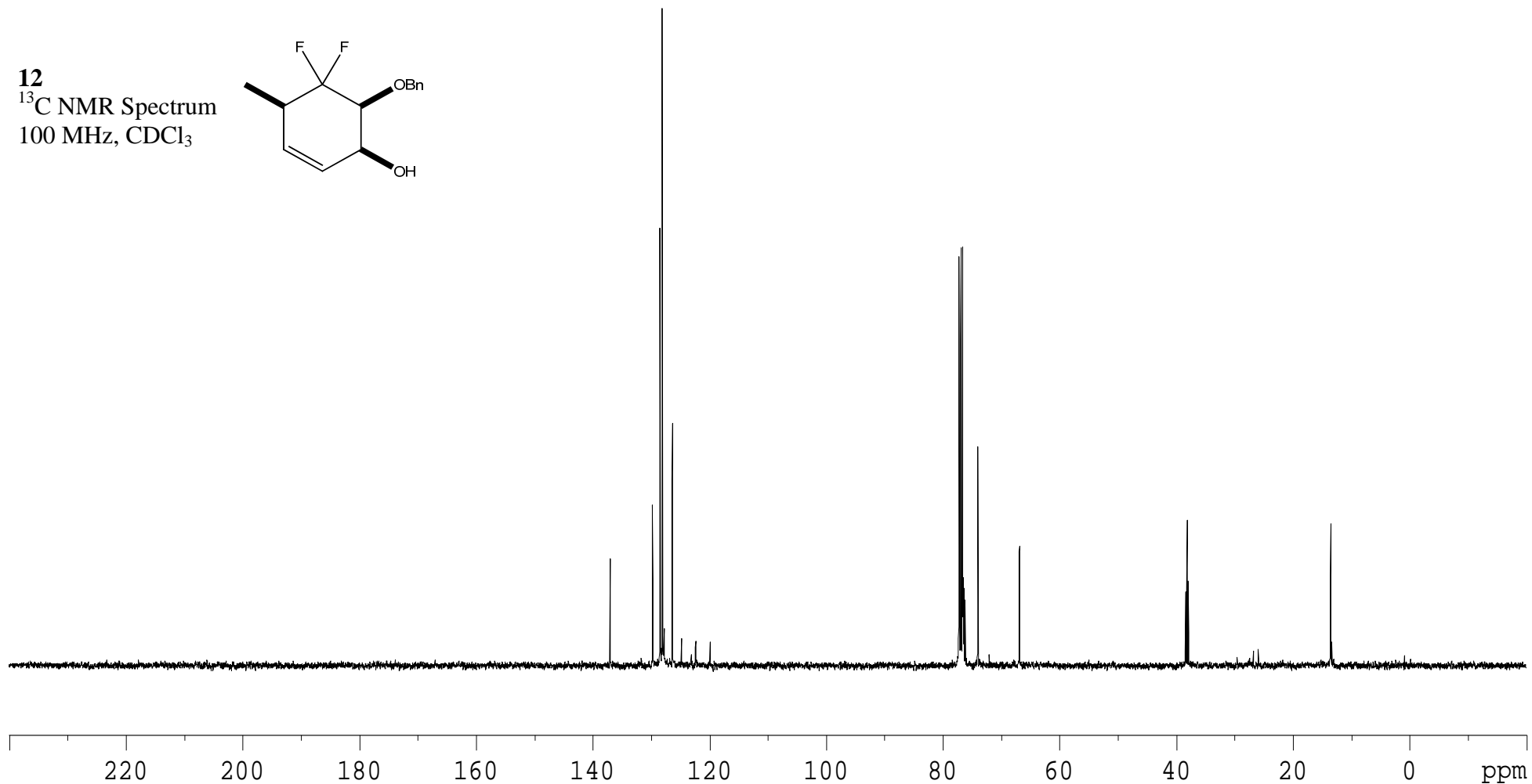
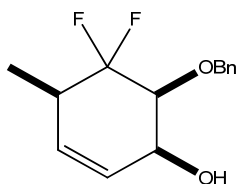




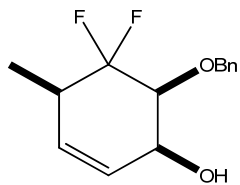
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Partial  $^1\text{H}$  NMR Spectrum  
300 MHz,  $\text{CDCl}_3$

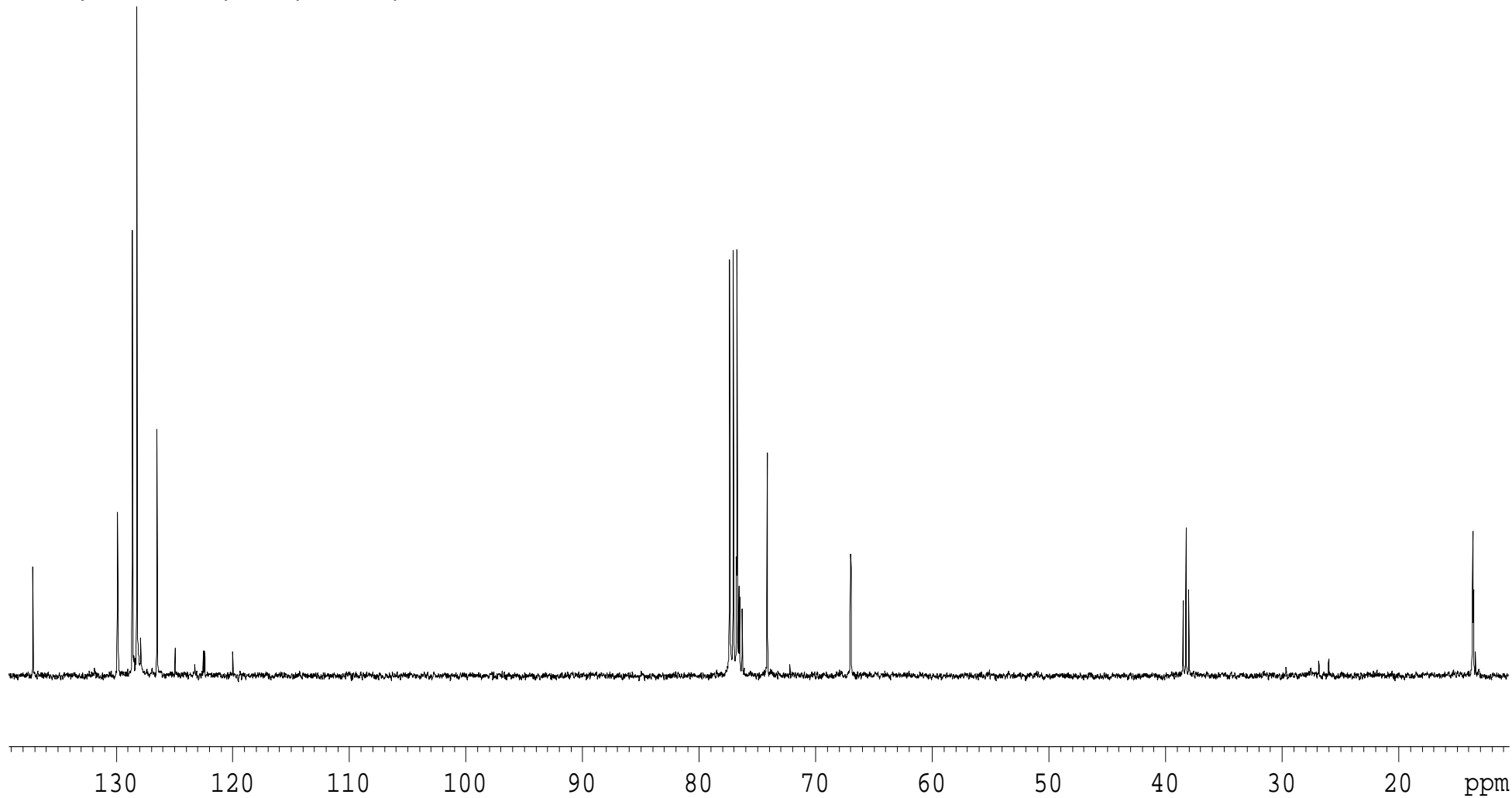


**12**  
<sup>13</sup>C NMR Spectrum  
100 MHz, CDCl<sub>3</sub>

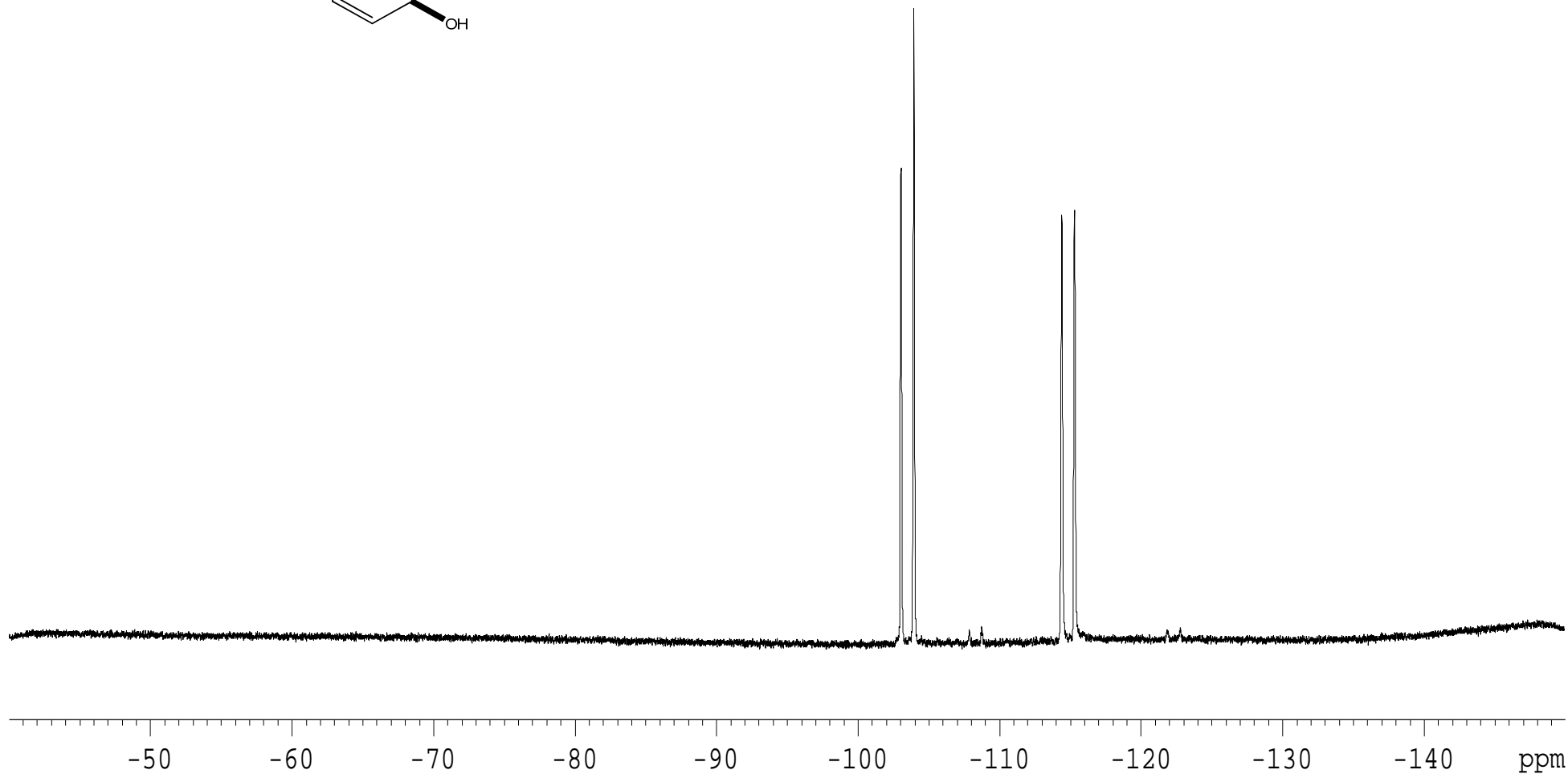
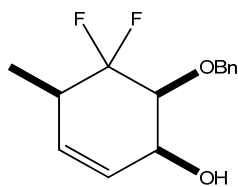


**12**  
Partial  $^{13}\text{C}$  NMR Spectrum  
100 MHz,  $\text{CDCl}_3$

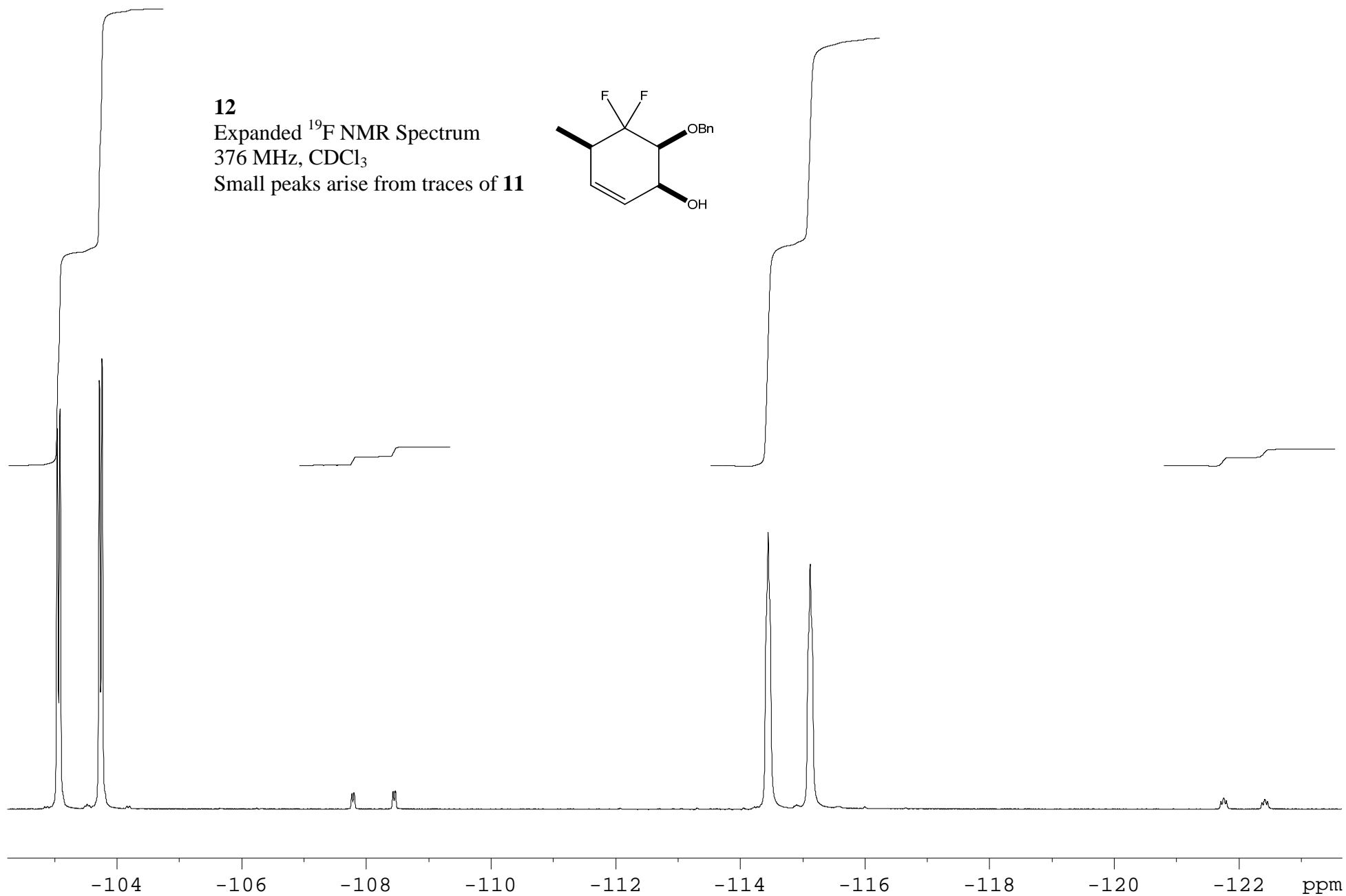
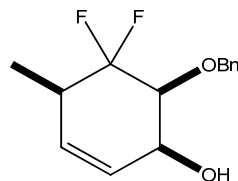




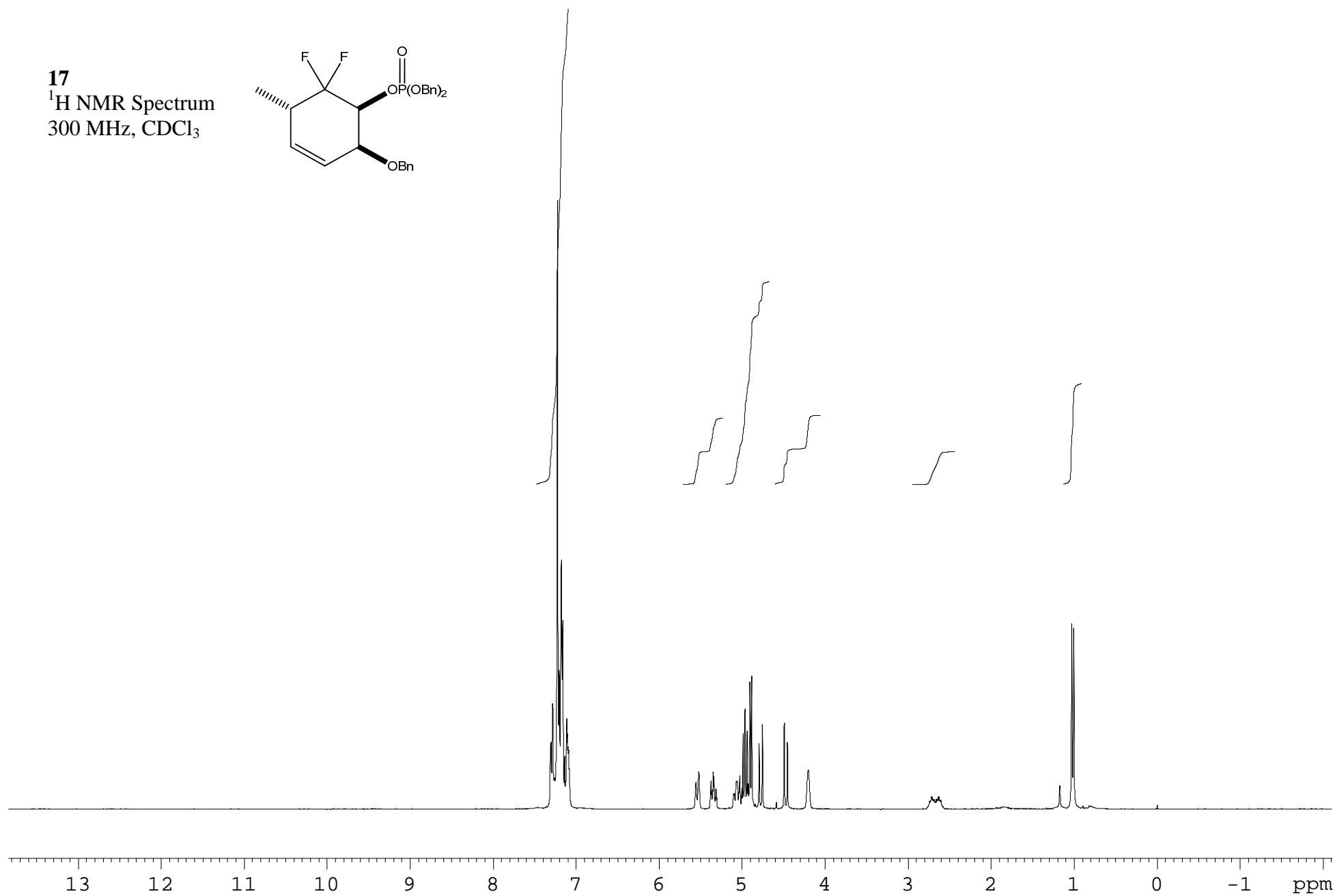
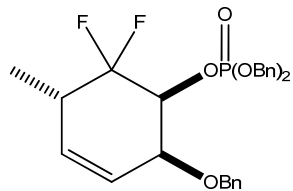
**12**  
<sup>19</sup>F NMR Spectrum  
282 MHz, CDCl<sub>3</sub>



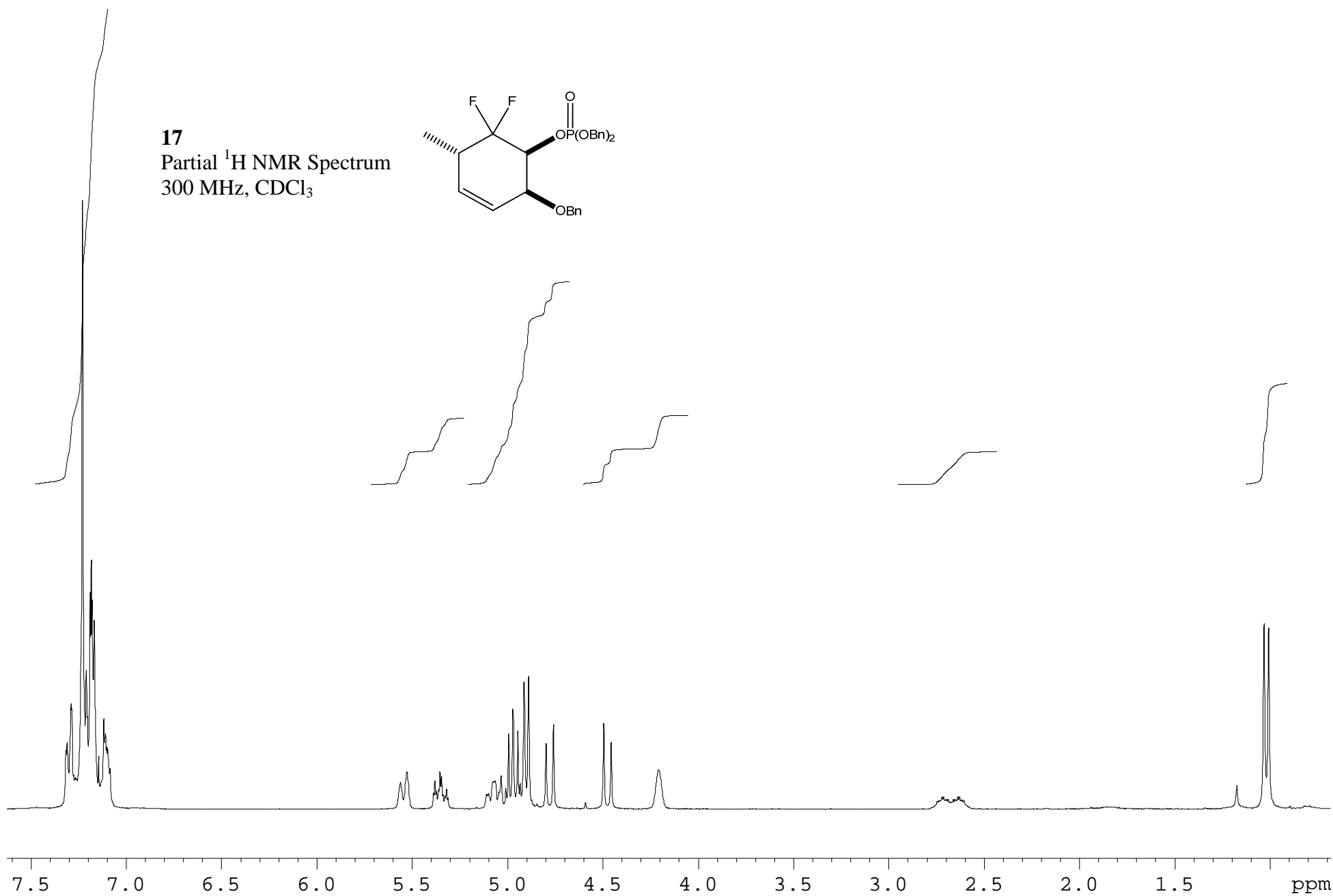
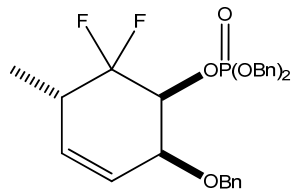
**12**  
Expanded  $^{19}\text{F}$  NMR Spectrum  
376 MHz,  $\text{CDCl}_3$   
Small peaks arise from traces of **11**



**17**  
<sup>1</sup>H NMR Spectrum  
300 MHz, CDCl<sub>3</sub>



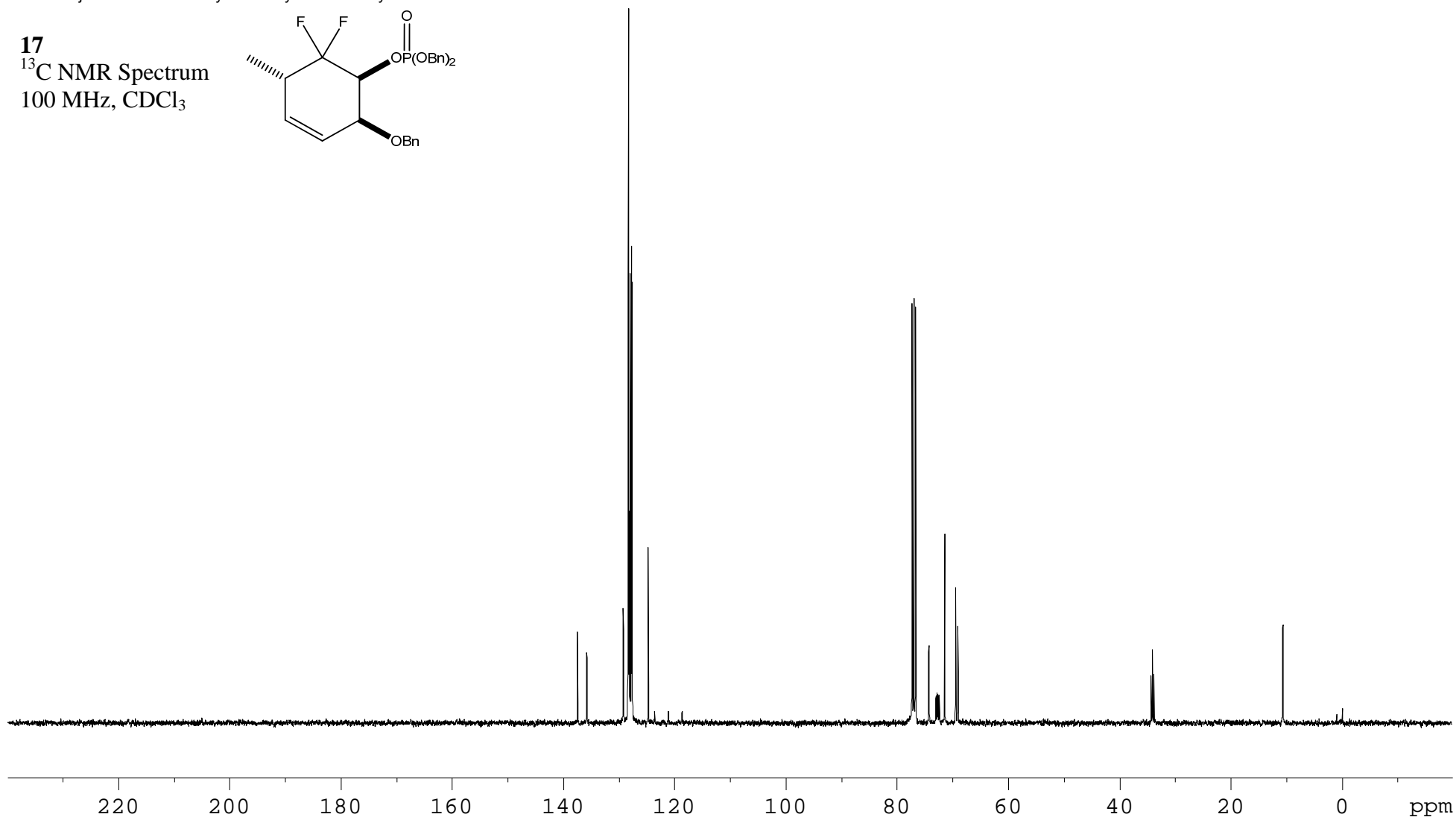
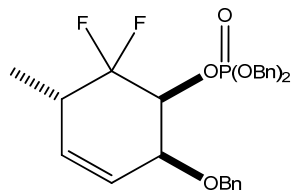
**17**  
Partial  $^1\text{H}$  NMR Spectrum  
300 MHz,  $\text{CDCl}_3$



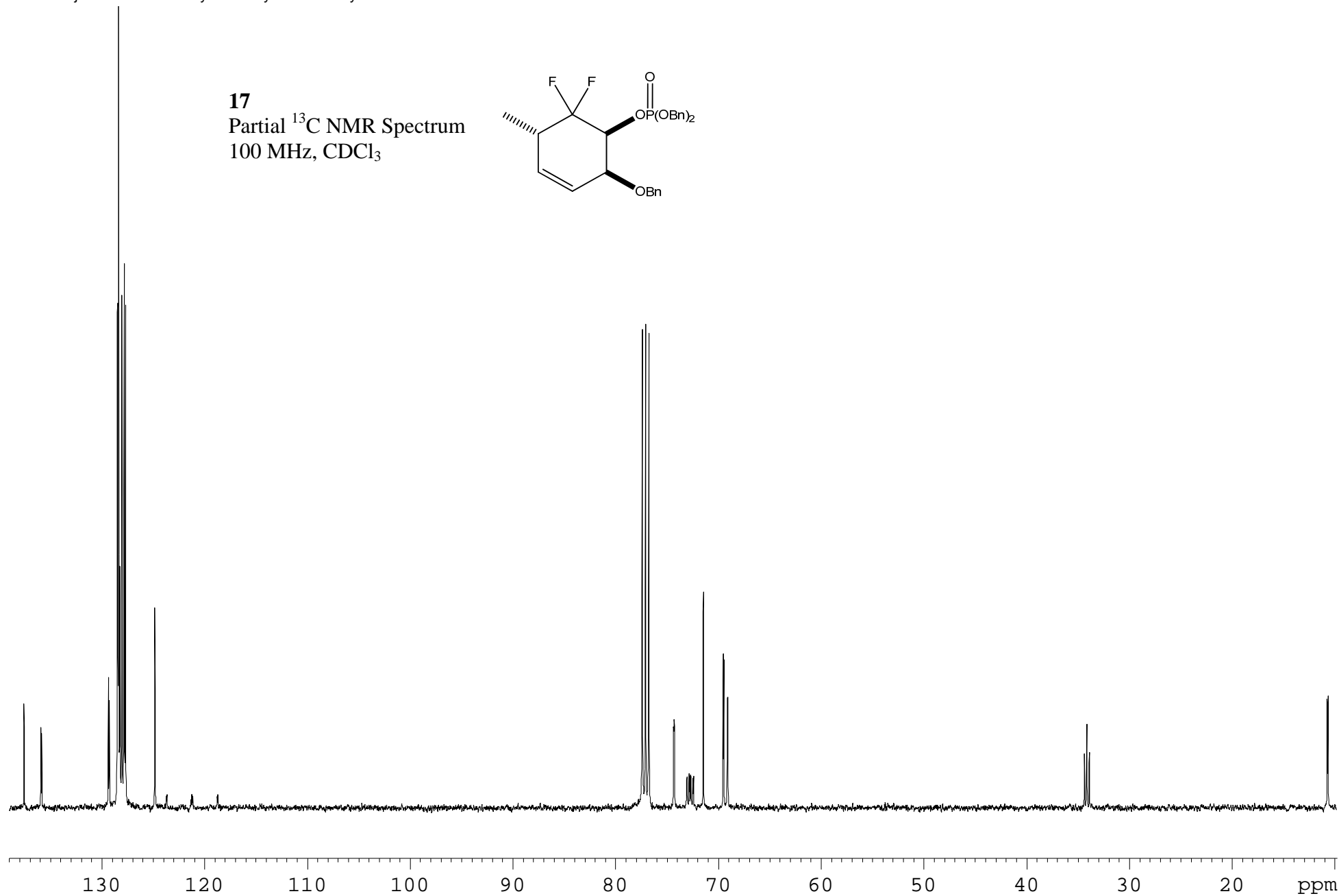
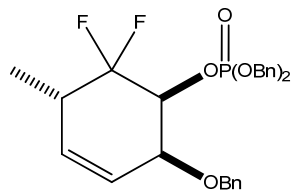




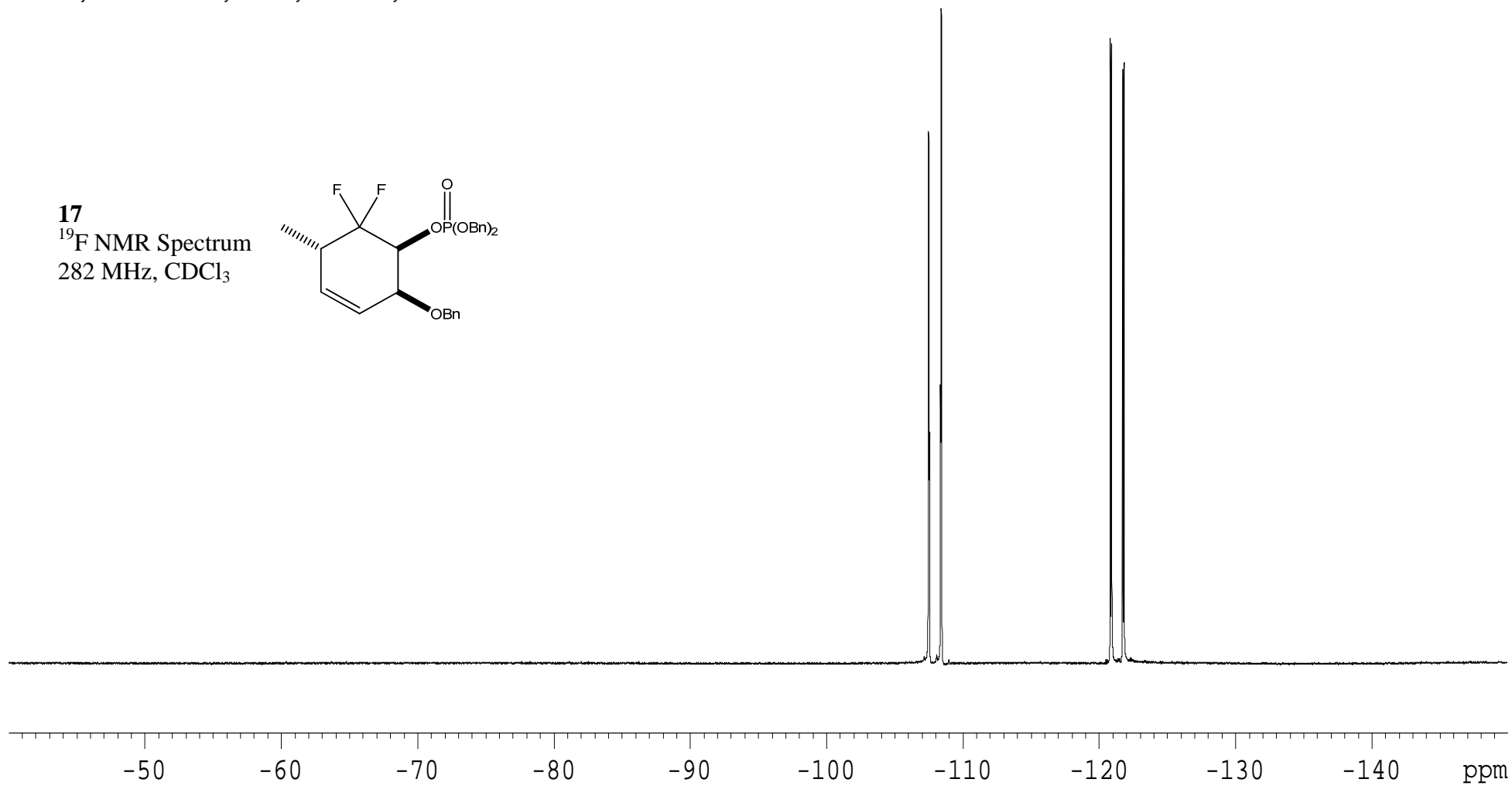
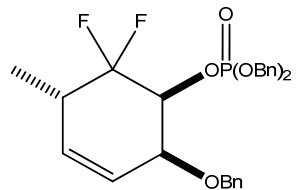
**17**  
<sup>13</sup>C NMR Spectrum  
100 MHz, CDCl<sub>3</sub>



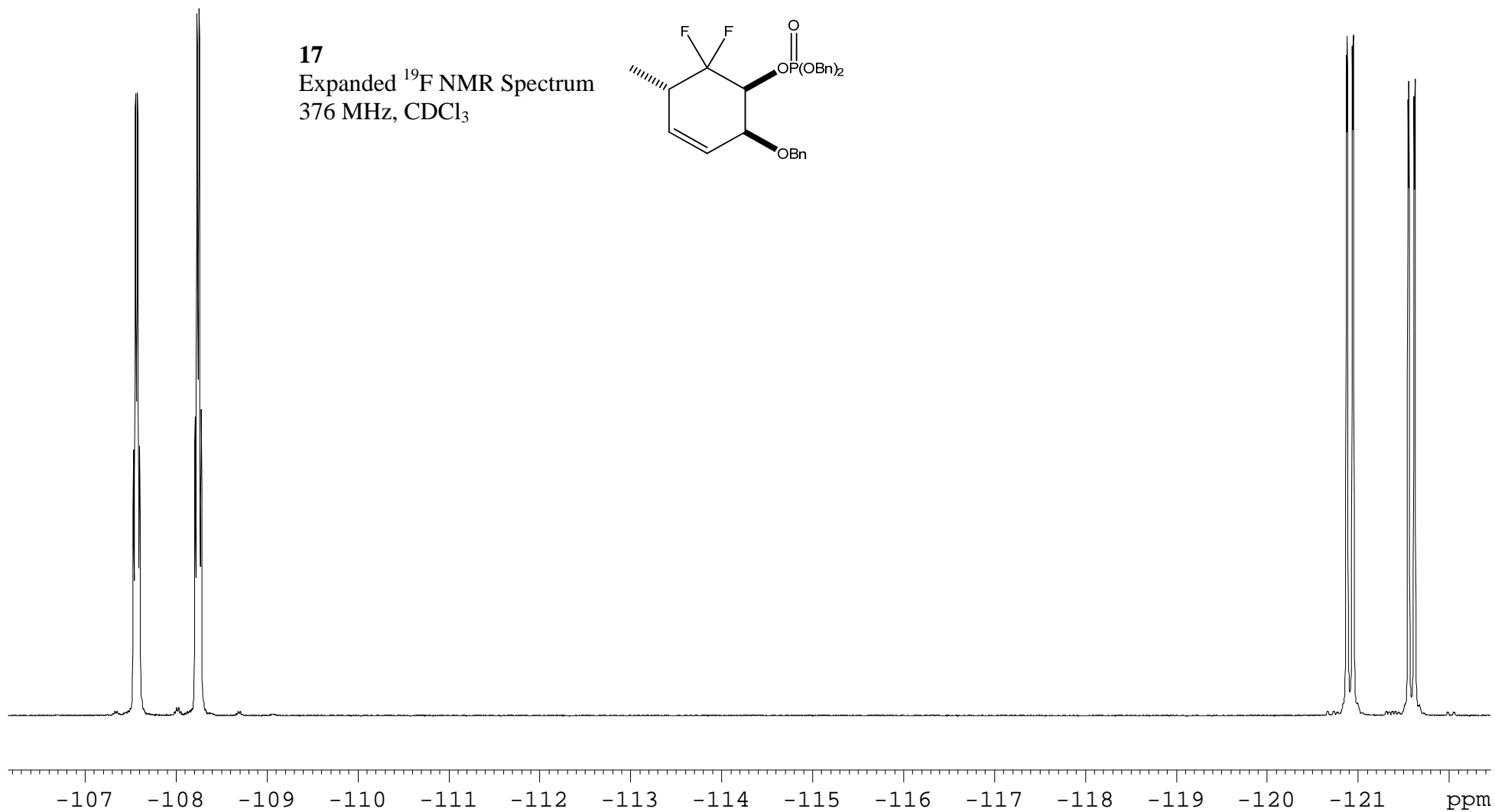
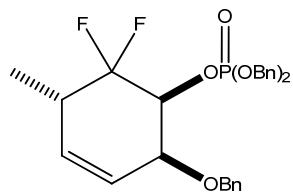
**17**  
Partial  $^{13}\text{C}$  NMR Spectrum  
100 MHz,  $\text{CDCl}_3$



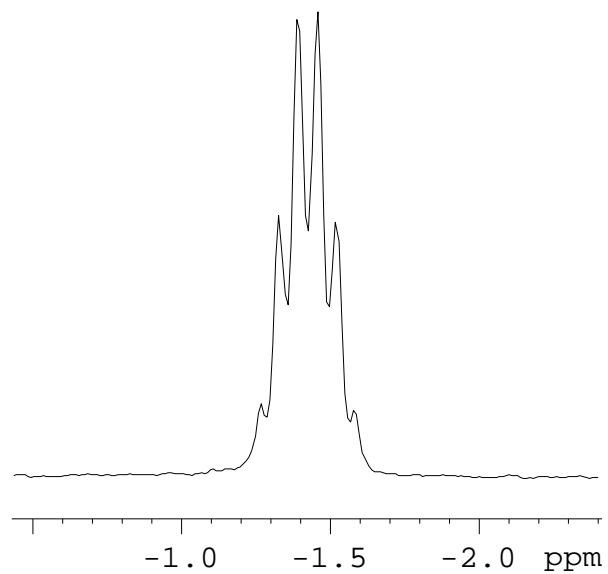
**17**  
 $^{19}\text{F}$  NMR Spectrum  
282 MHz,  $\text{CDCl}_3$



**17**  
Expanded  $^{19}\text{F}$  NMR Spectrum  
376 MHz,  $\text{CDCl}_3$



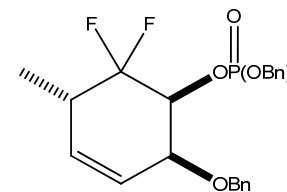
$^{31}\text{P}$  NMR Spectrum



$\{^1\text{H}\}^{31}\text{P}$  NMR Spectrum

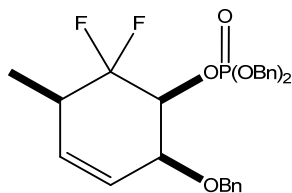


**17**  
 $^{31}\text{P}$  NMR Spectra  
121 MHz,  $\text{CDCl}_3$

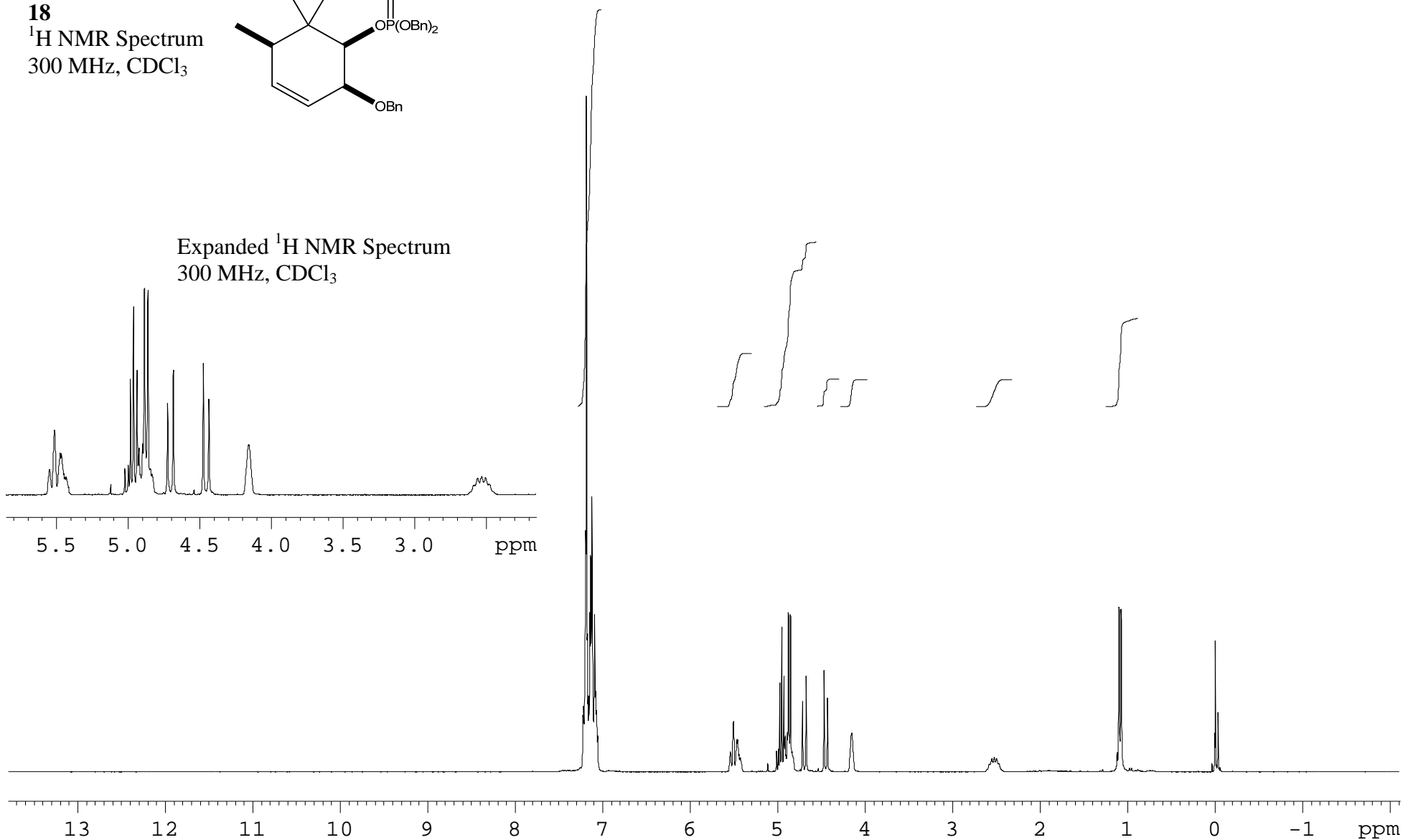




**18**  
<sup>1</sup>H NMR Spectrum  
300 MHz, CDCl<sub>3</sub>

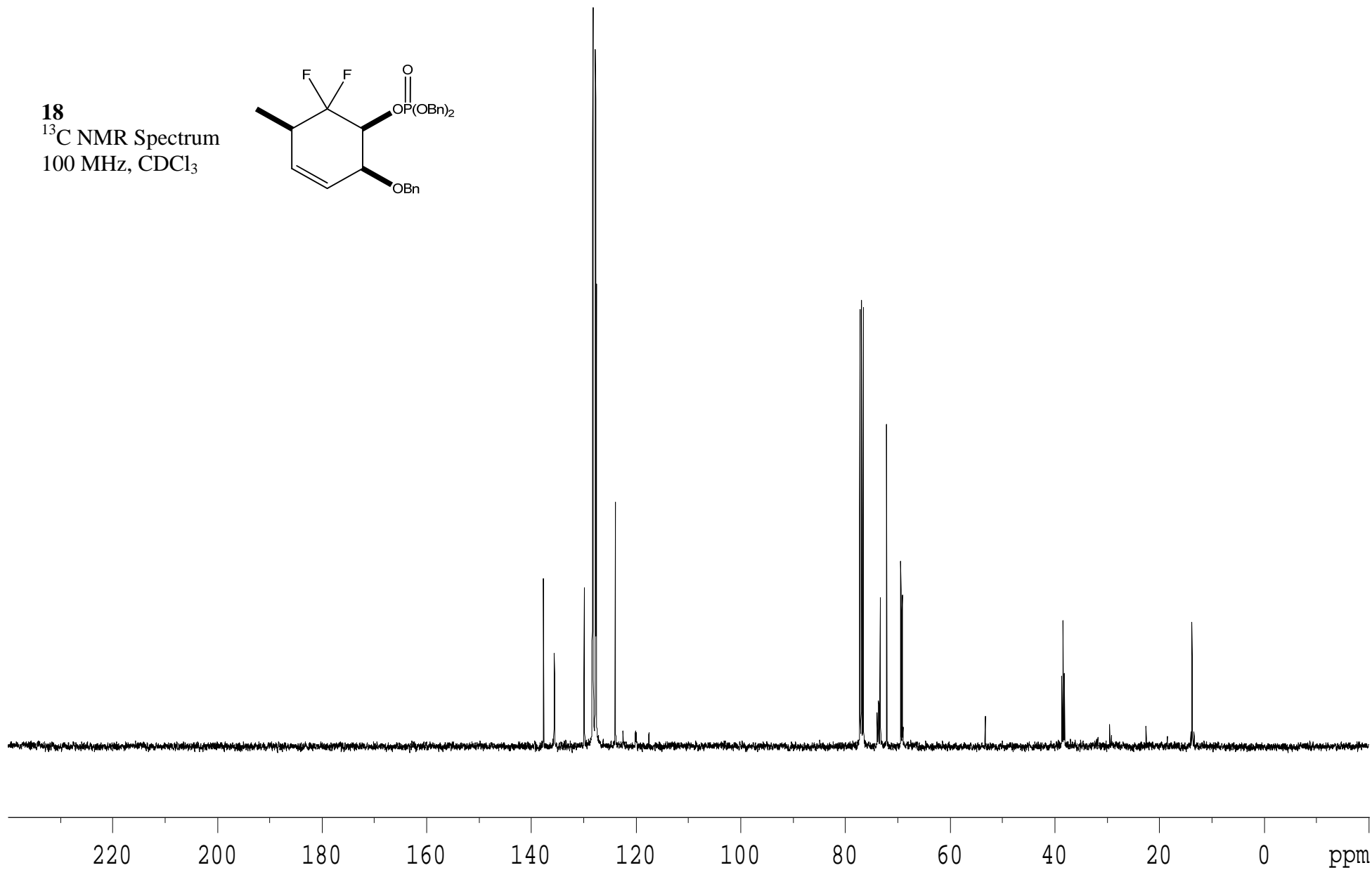
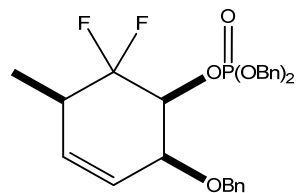


Expanded <sup>1</sup>H NMR Spectrum  
300 MHz, CDCl<sub>3</sub>

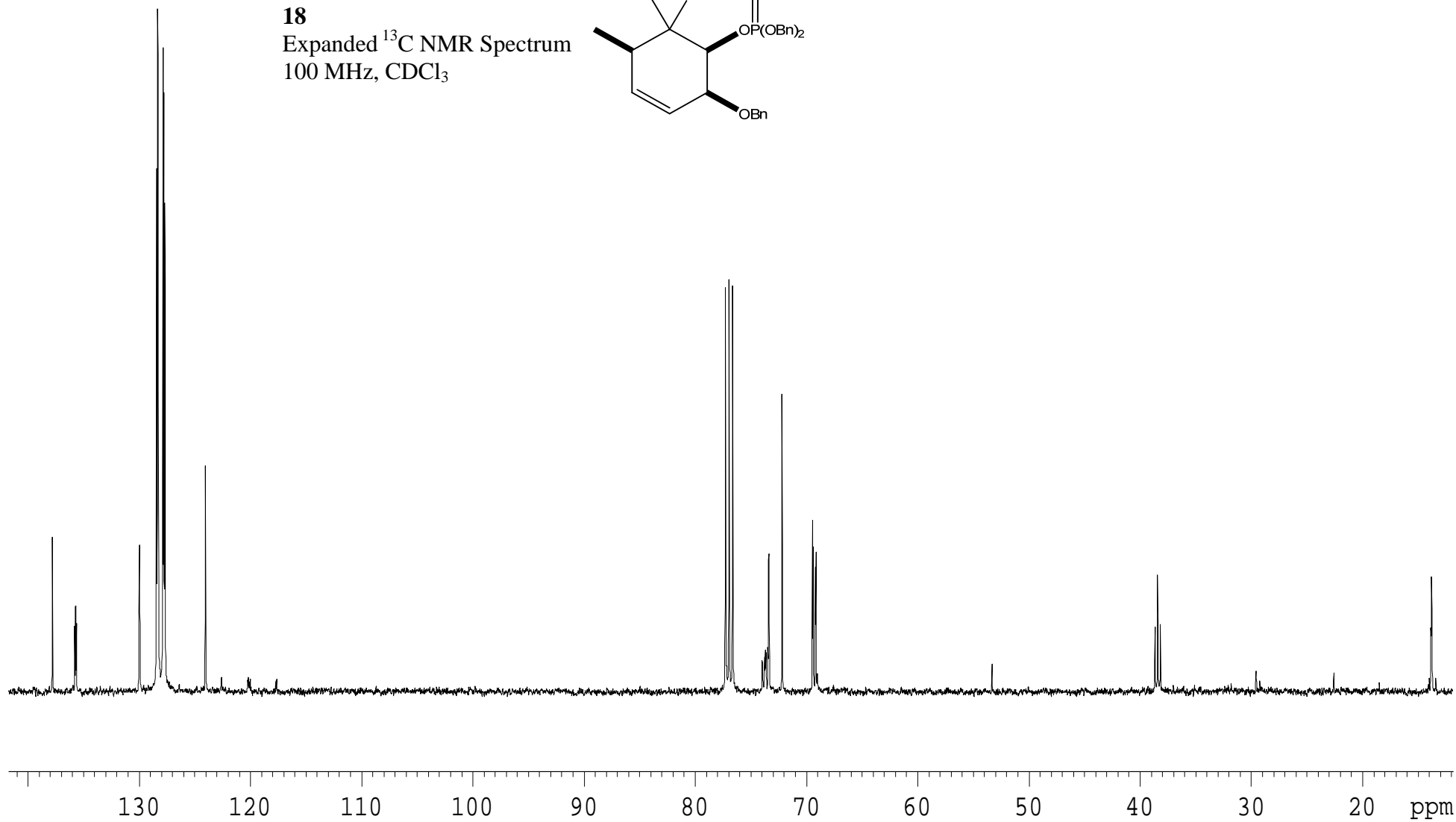
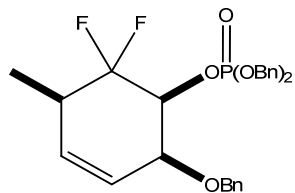




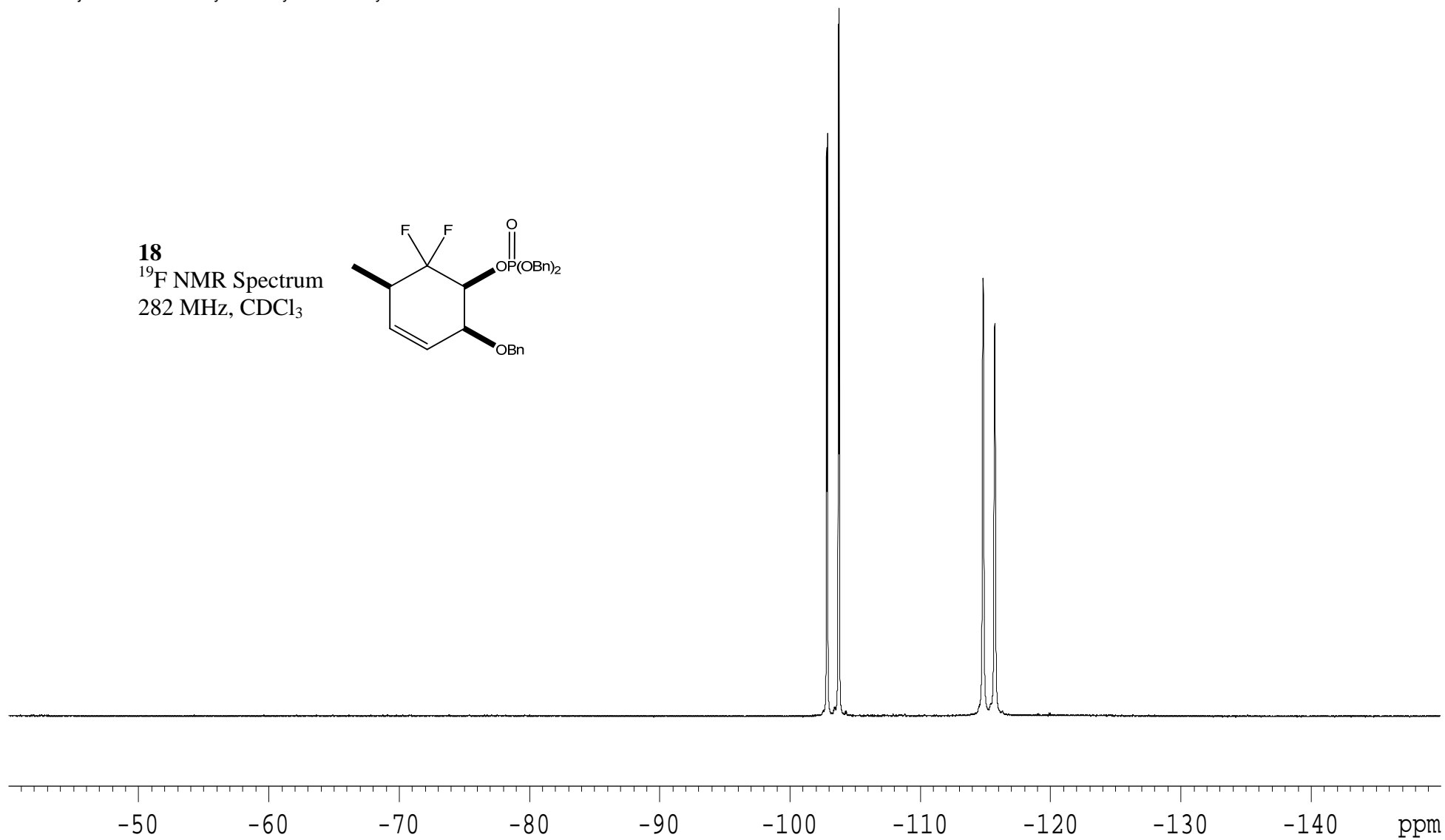
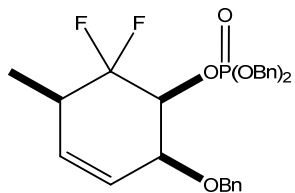
**18**  
 $^{13}\text{C}$  NMR Spectrum  
100 MHz,  $\text{CDCl}_3$



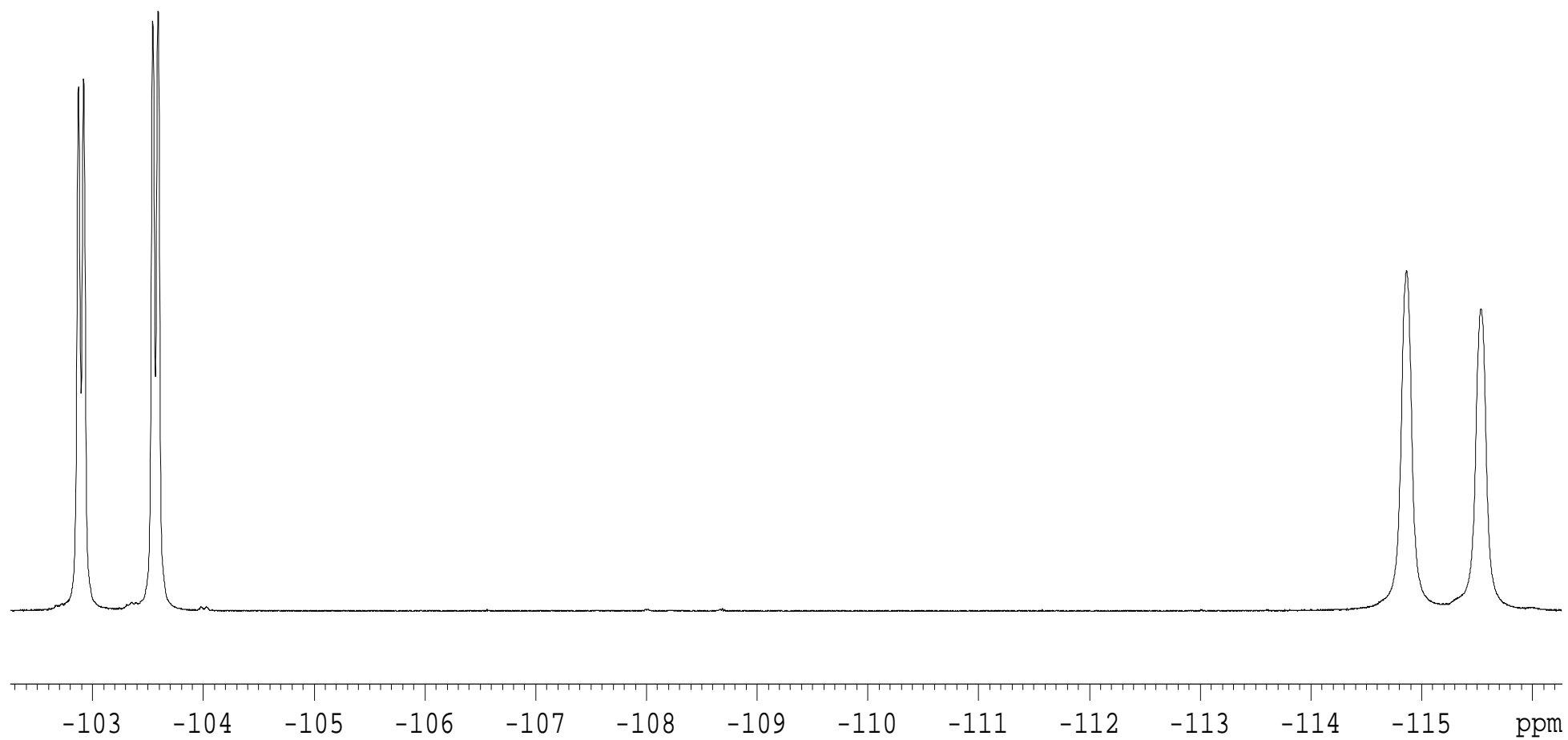
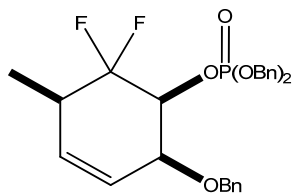
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Expanded  $^{13}\text{C}$  NMR Spectrum  
100 MHz,  $\text{CDCl}_3$



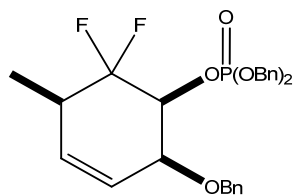
**18**  
 $^{19}\text{F}$  NMR Spectrum  
282 MHz,  $\text{CDCl}_3$



**18**  
Expanded  $^{19}\text{F}$  NMR Spectrum  
376 MHz,  $\text{CDCl}_3$

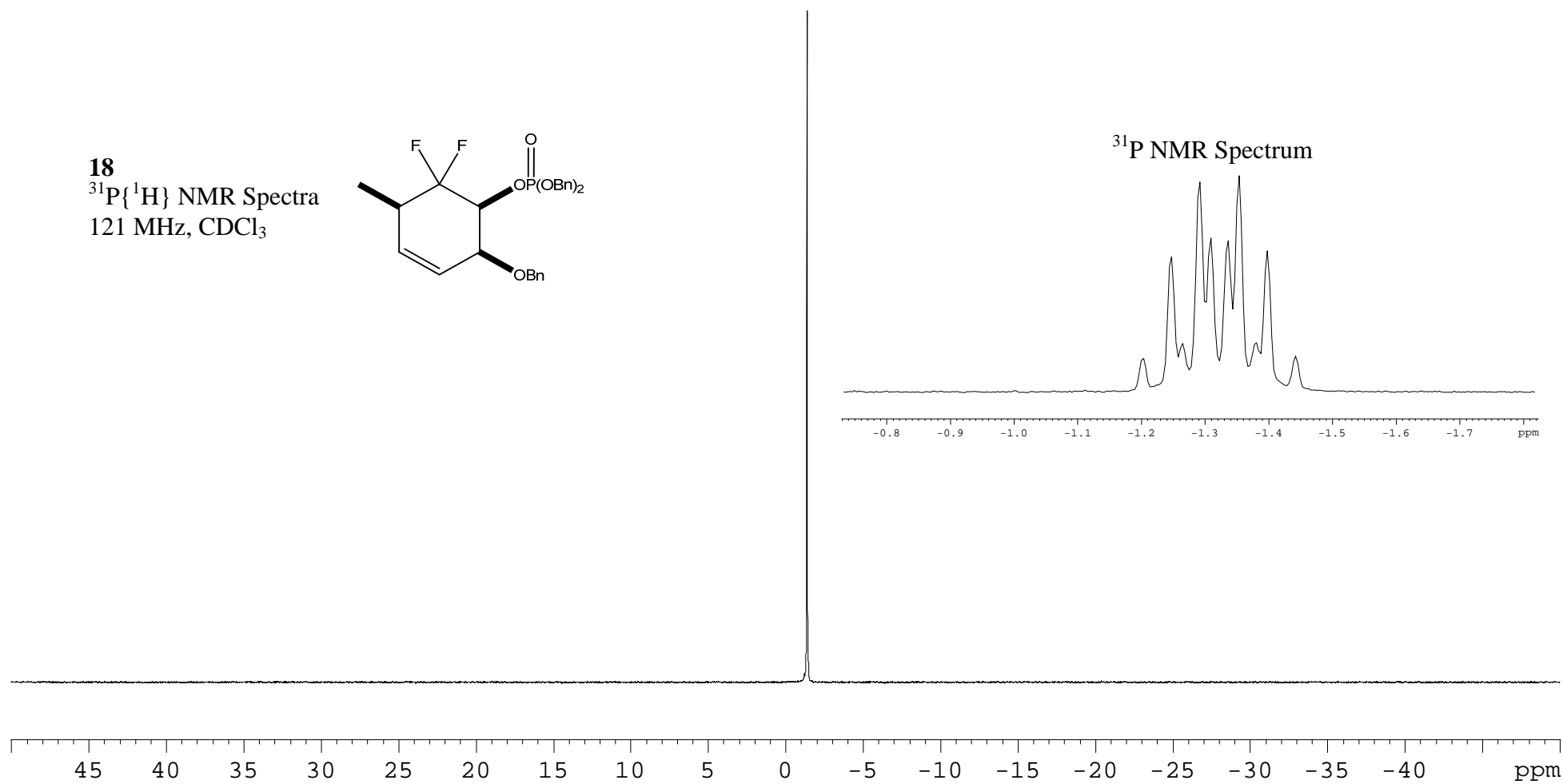


**18**  
 $^{31}\text{P}\{^1\text{H}\}$  NMR Spectra  
121 MHz,  $\text{CDCl}_3$



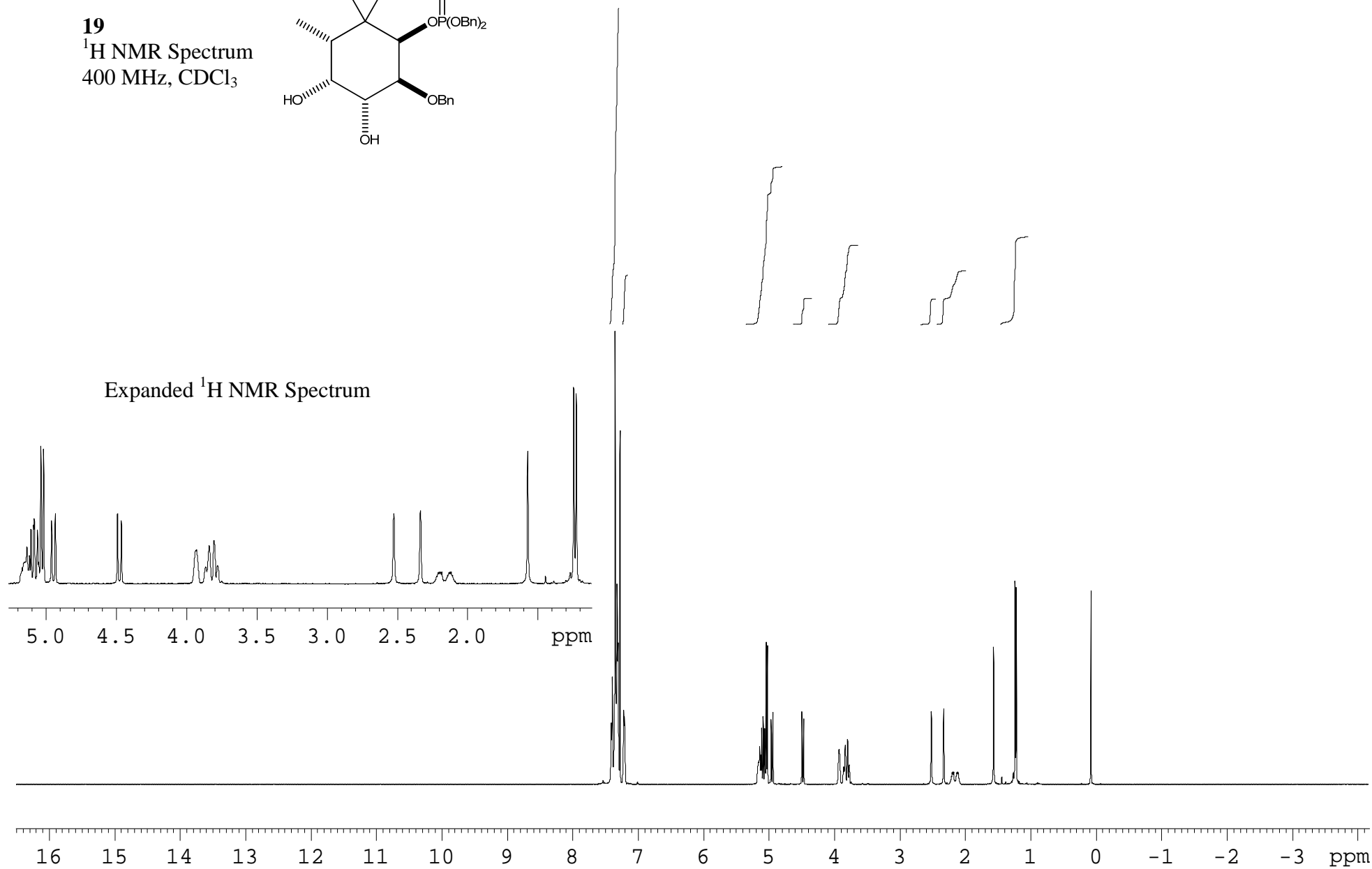
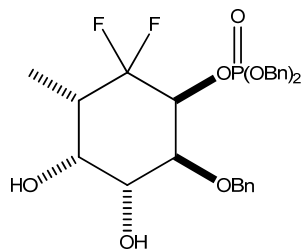
$^{31}\text{P}\{^1\text{H}\}$  NMR Spectrum

$^{31}\text{P}$  NMR Spectrum





**19**  
<sup>1</sup>H NMR Spectrum  
400 MHz, CDCl<sub>3</sub>













**19**

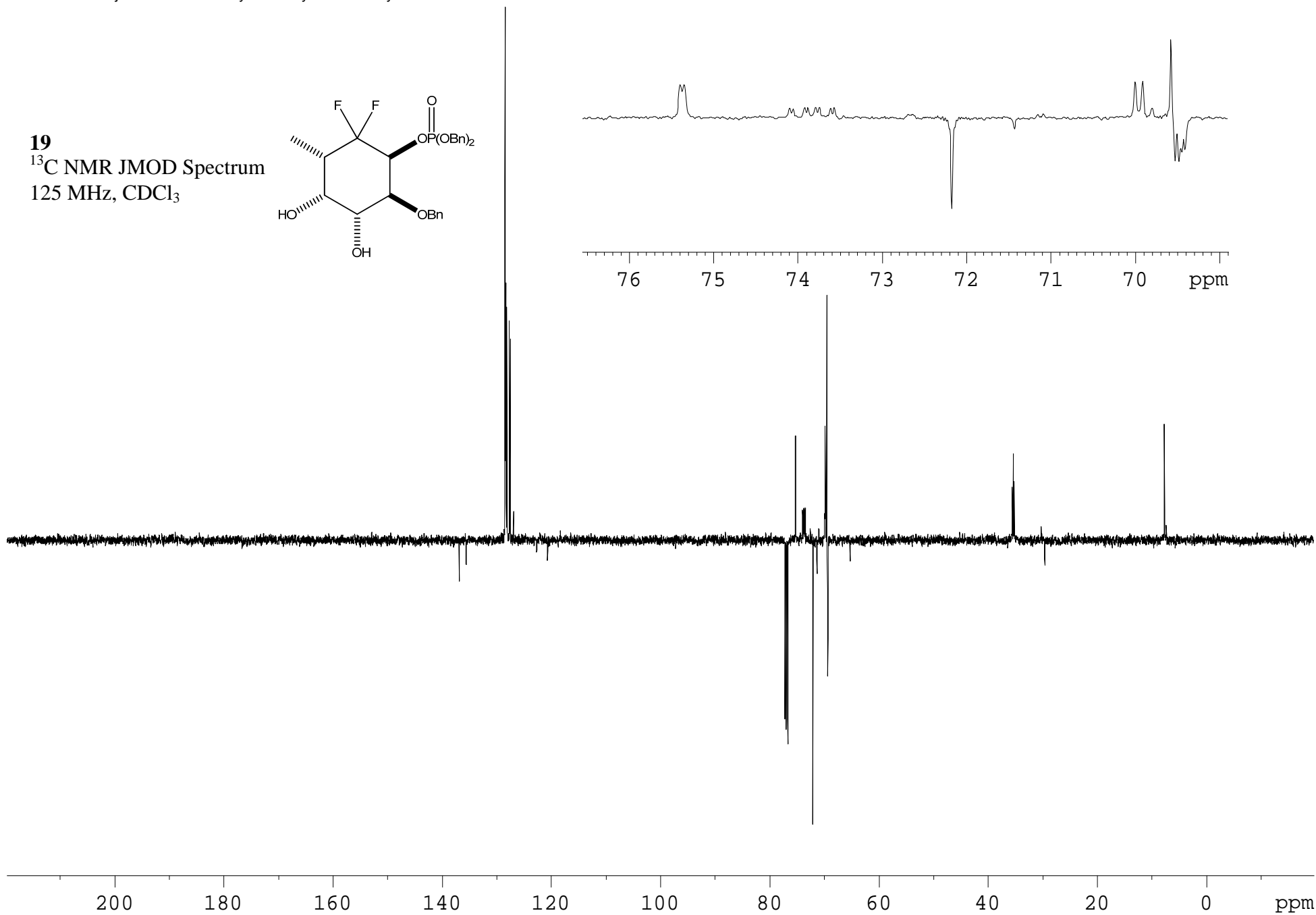
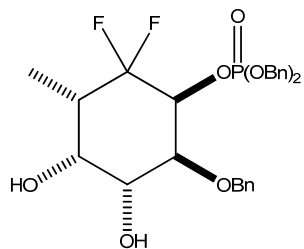
Partial  $^1\text{H}$  NMR Spectrum  
400 MHz,  $\text{CDCl}_3$

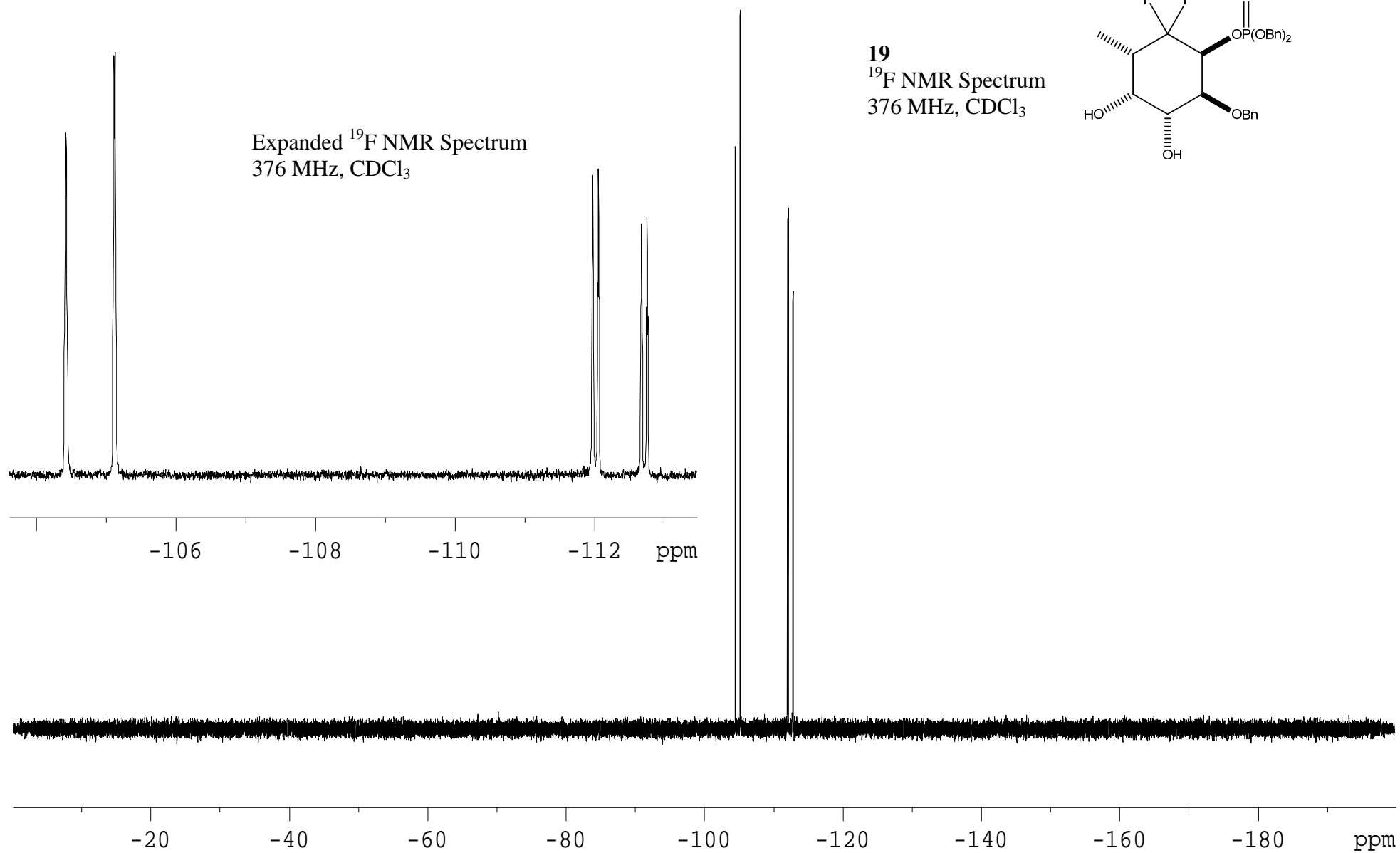
**19**

Partial  $\{^{19}\text{F}\}^1\text{H}$  NMR Spectrum  
400 MHz,  $\text{CDCl}_3$

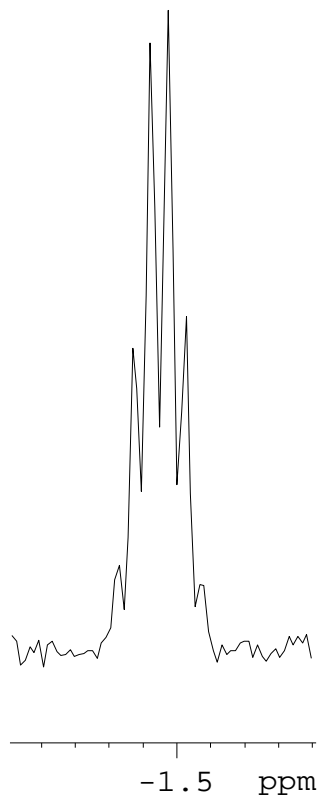


**19**  
<sup>13</sup>C NMR JMOD Spectrum  
125 MHz, CDCl<sub>3</sub>





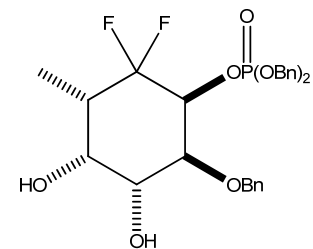
$^{31}\text{P}$  NMR Spectrum



$\{^1\text{H}\}^{31}\text{P}$  NMR Spectrum



**19**  
 $^{31}\text{P}$  NMR Spectra  
162 MHz,  $\text{CDCl}_3$



200

150

100

50

0

-50

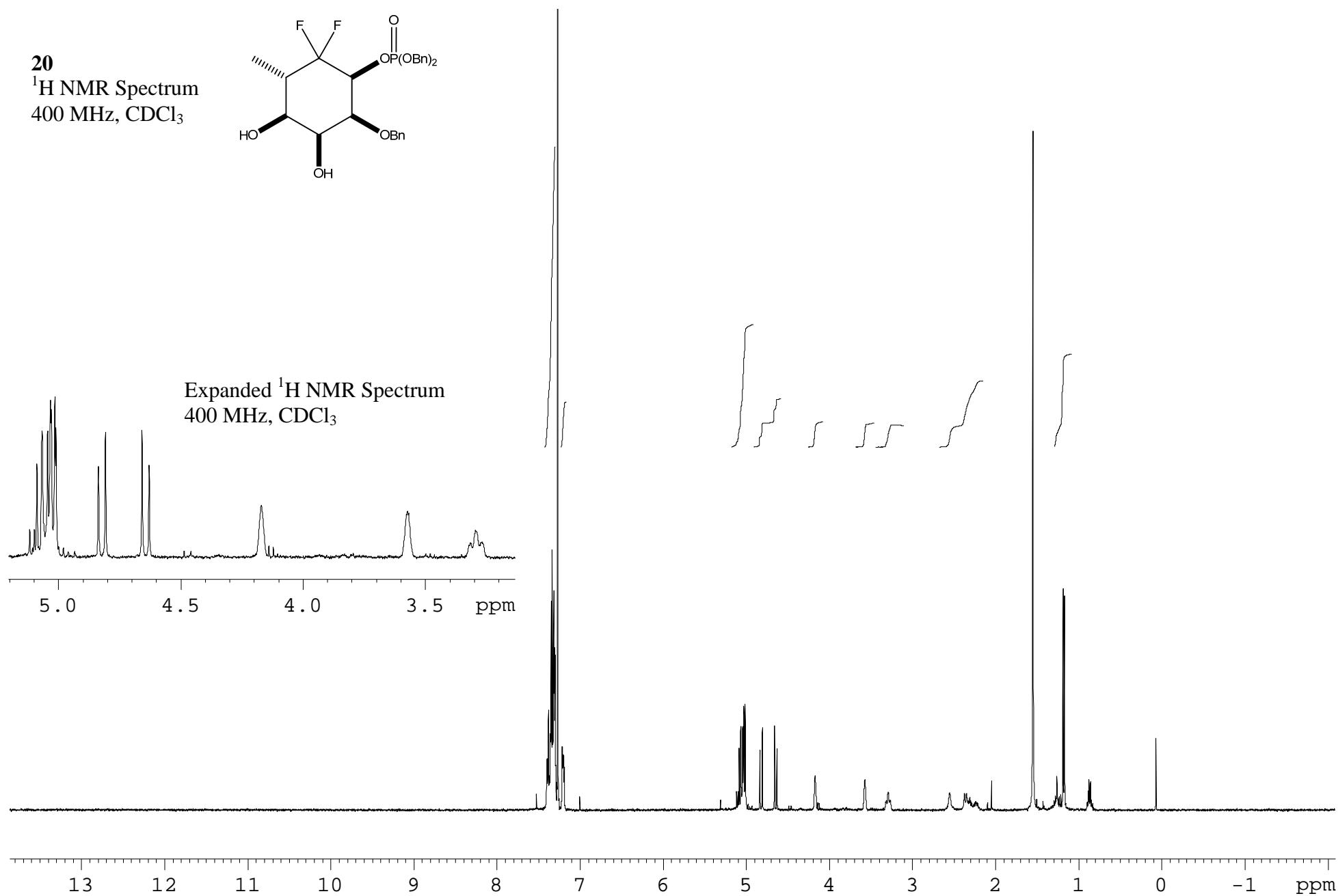
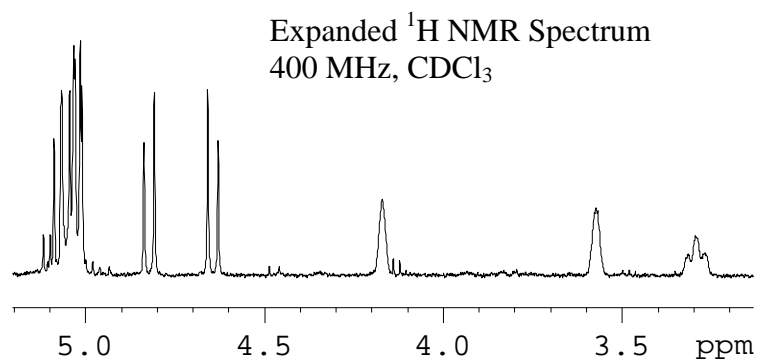
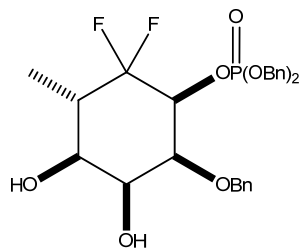
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-150

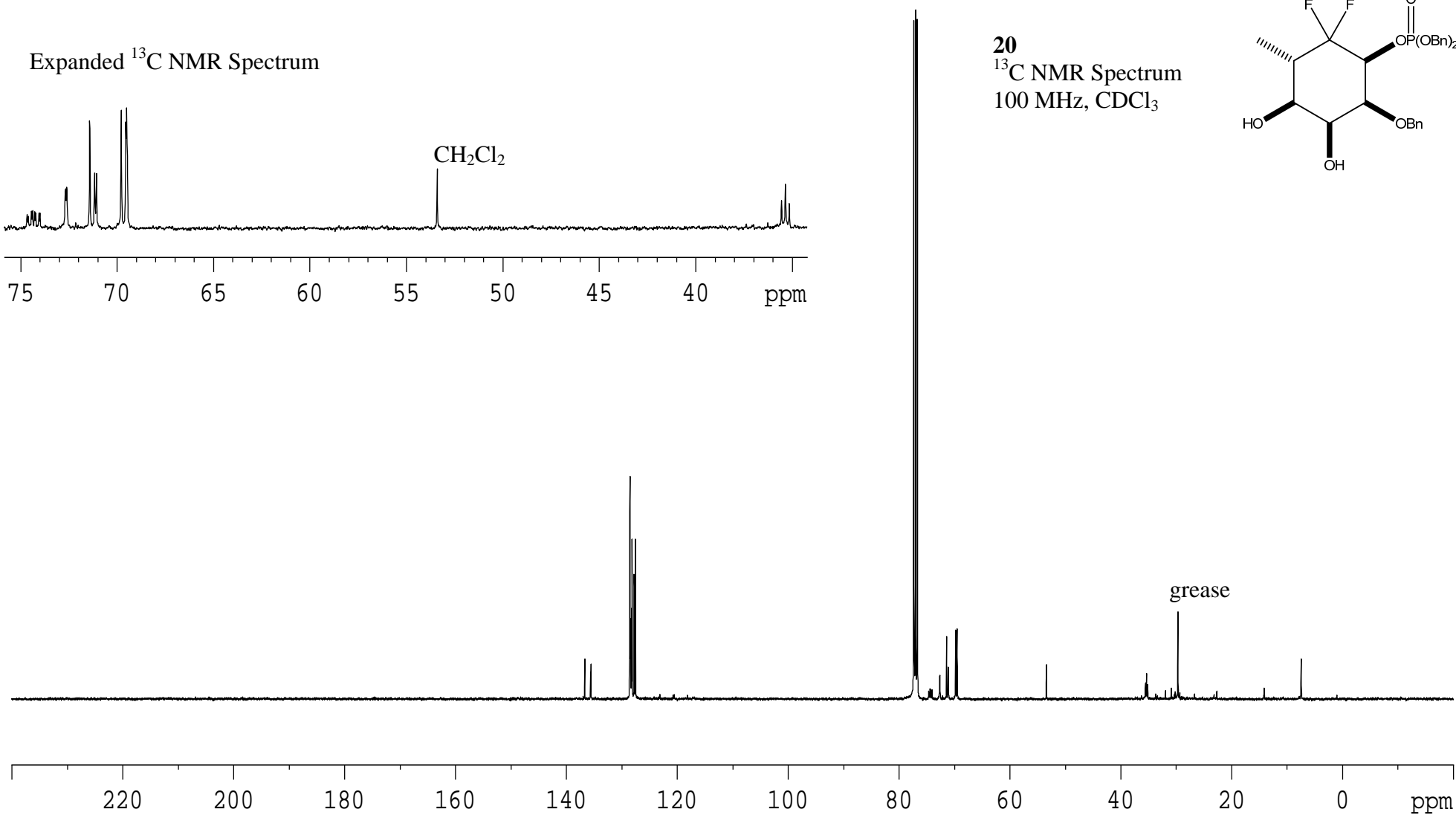
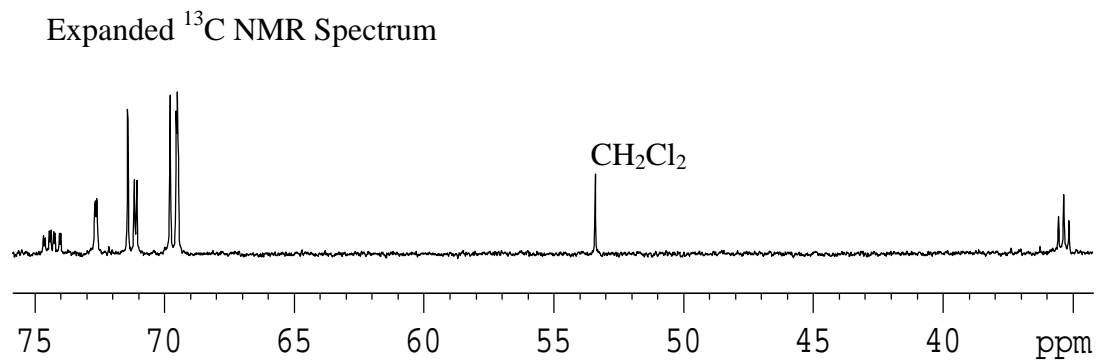
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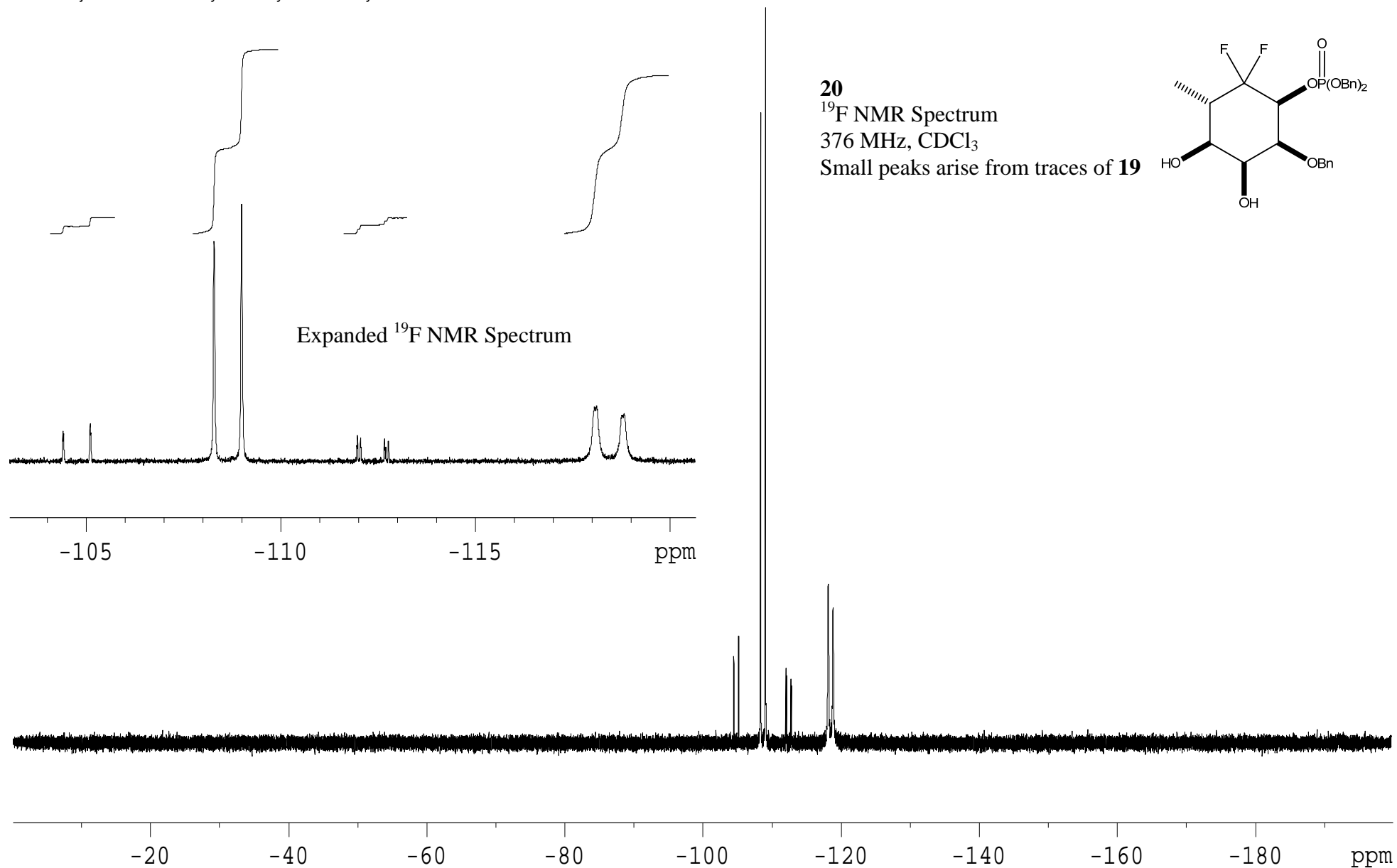


**20**  
<sup>1</sup>H NMR Spectrum  
400 MHz, CDCl<sub>3</sub>

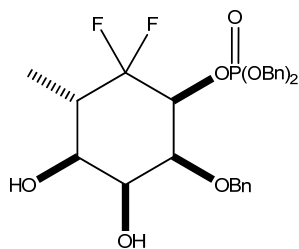




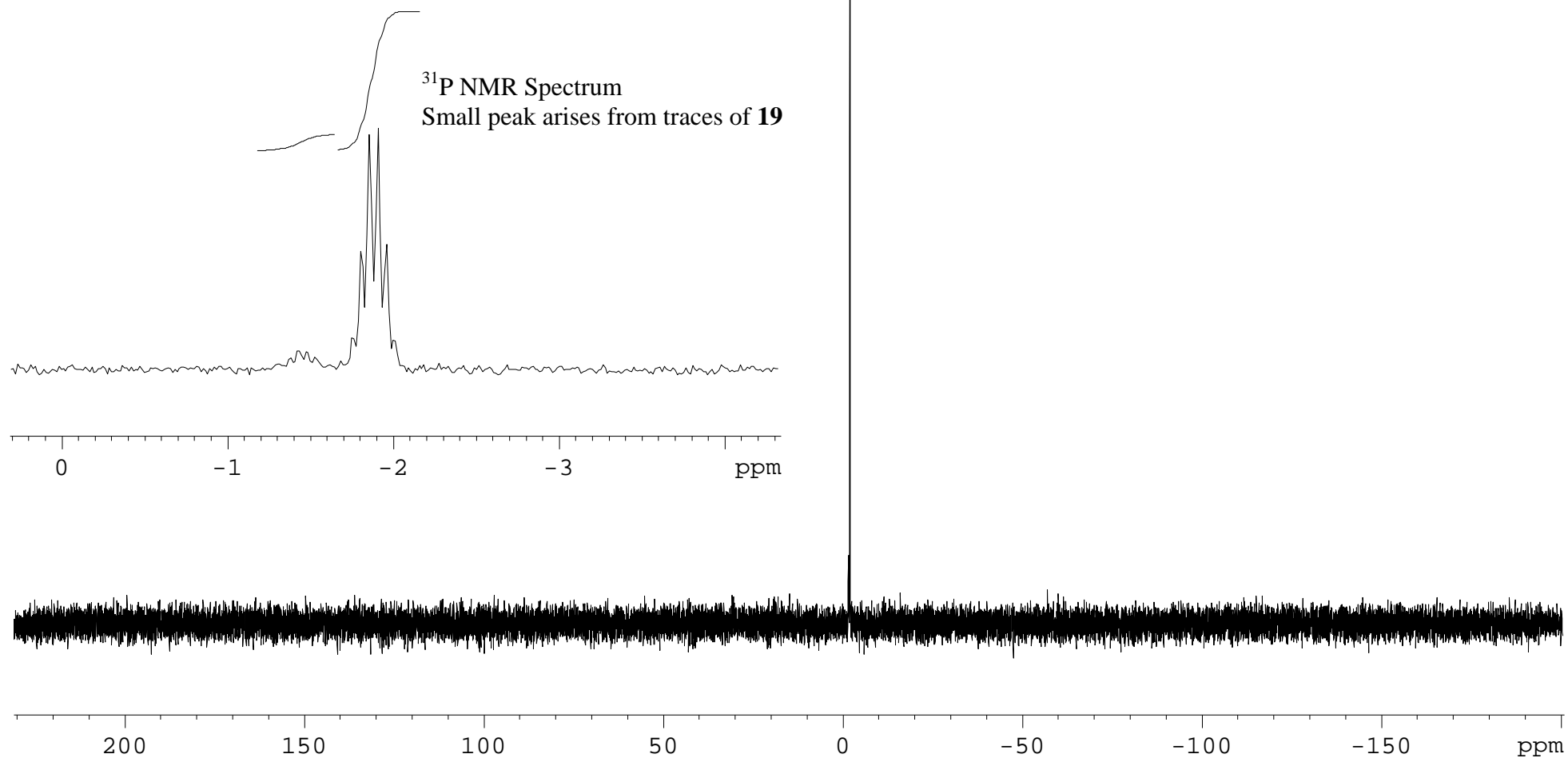




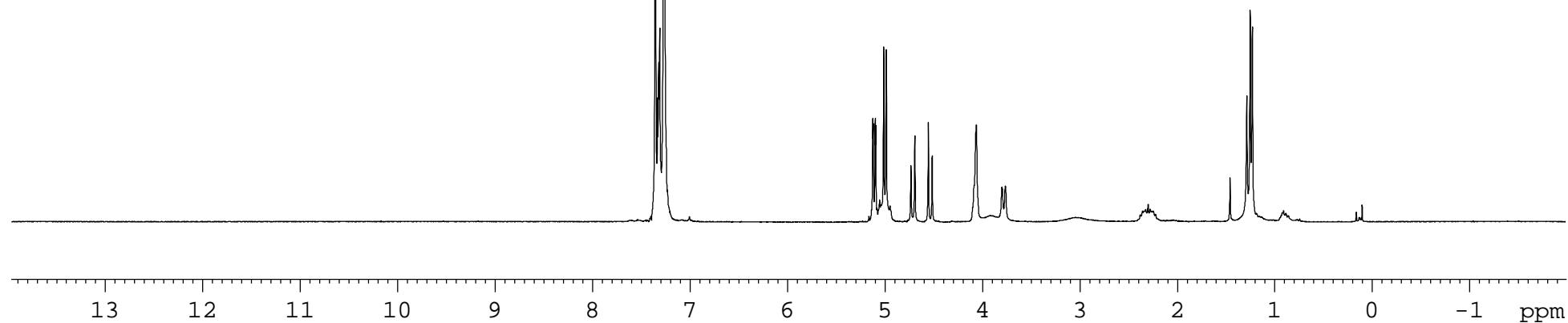
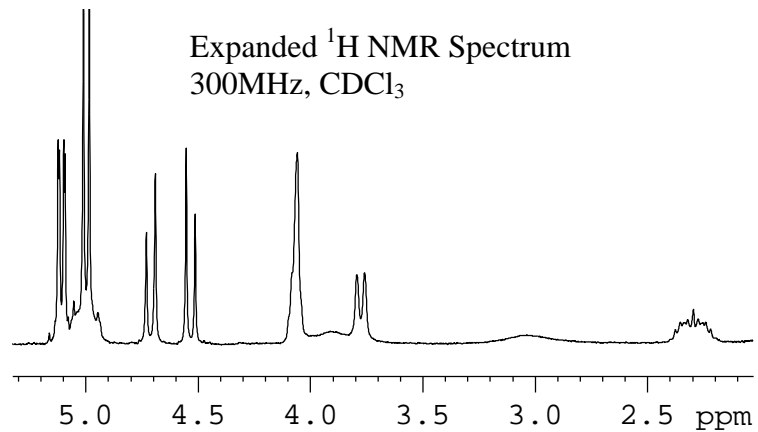
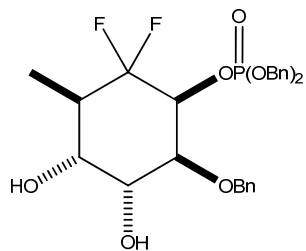
**20**  
 $^{31}\text{P}$  NMR Spectra  
161 MHz,  $\text{CDCl}_3$



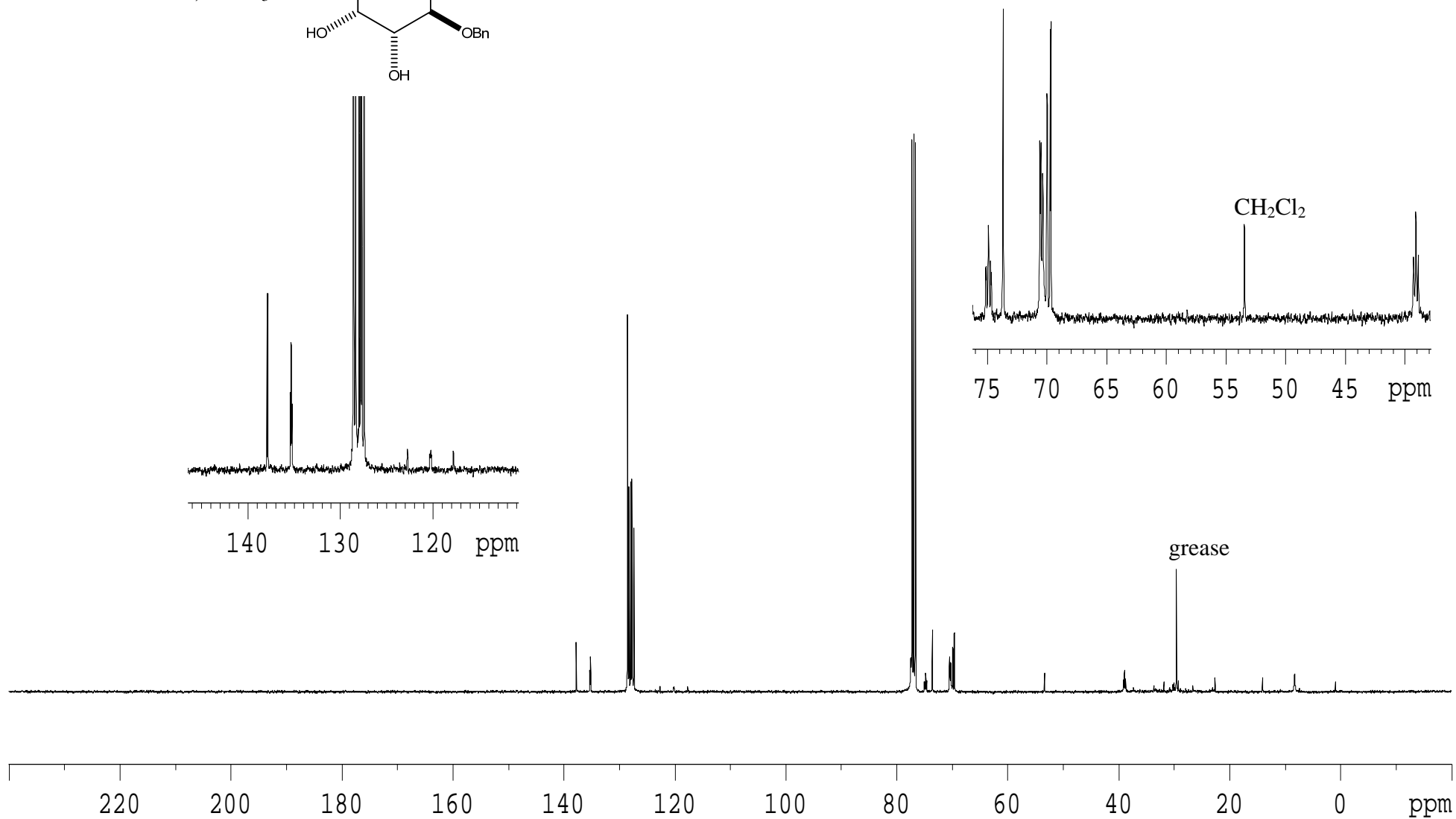
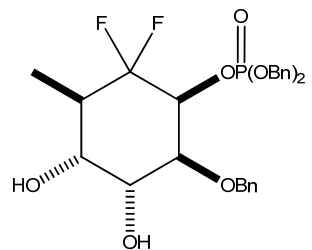
$\{^1\text{H}\}^{31}\text{P}$  NMR Spectrum



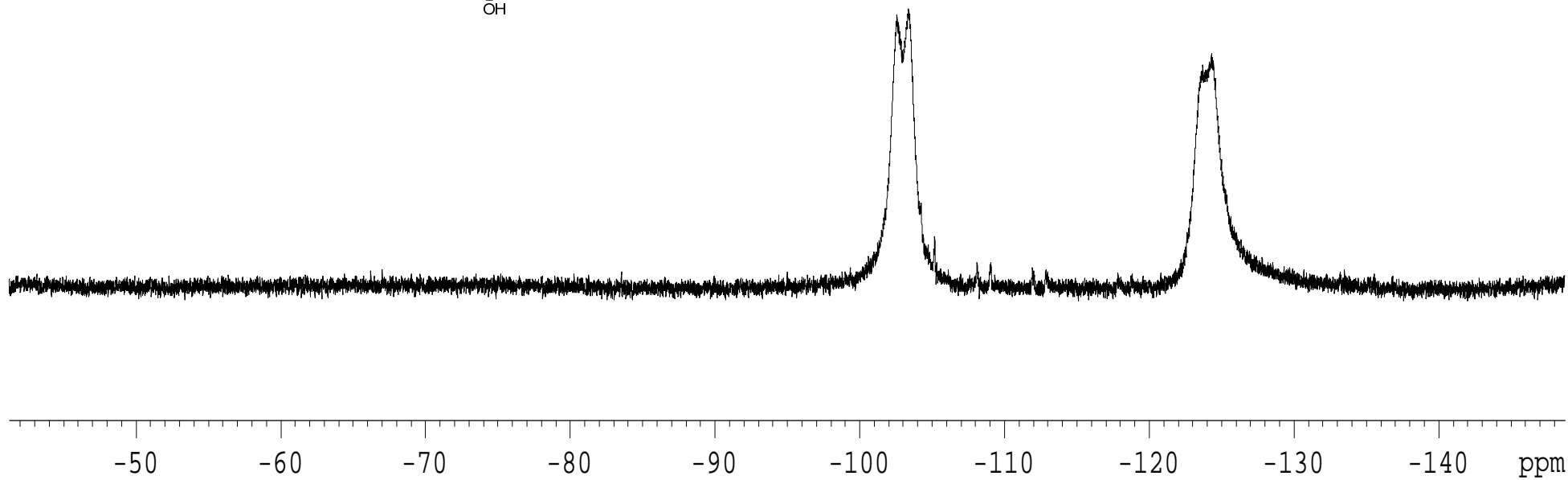
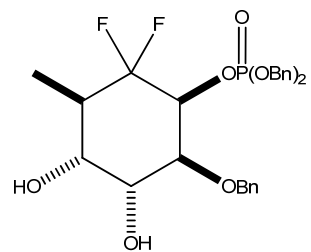
**21**  
<sup>1</sup>H NMR Spectrum  
300MHz, CDCl<sub>3</sub>



**21**  
<sup>13</sup>C NMR Spectrum  
100 MHz, CDCl<sub>3</sub>

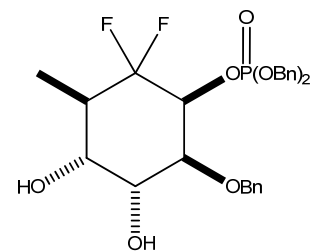


**21**  
 $^{19}\text{F}$  NMR Spectrum  
282 MHz,  $\text{CDCl}_3$

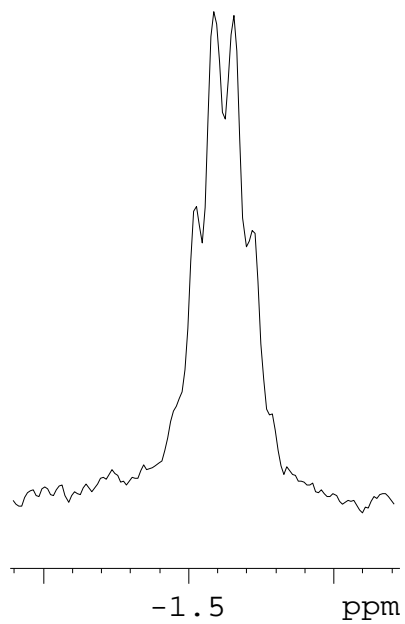




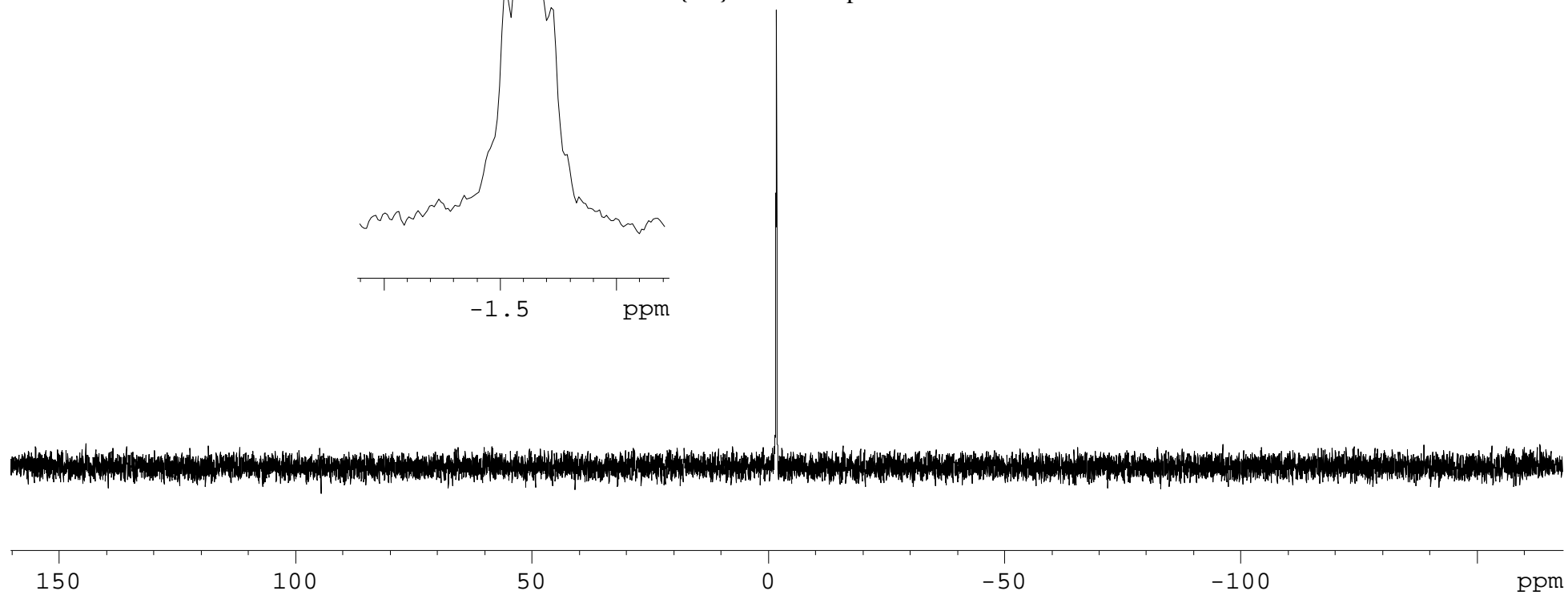
**21**  
 $^{31}\text{P}$  NMR Spectra  
121 MHz,  $\text{CDCl}_3$



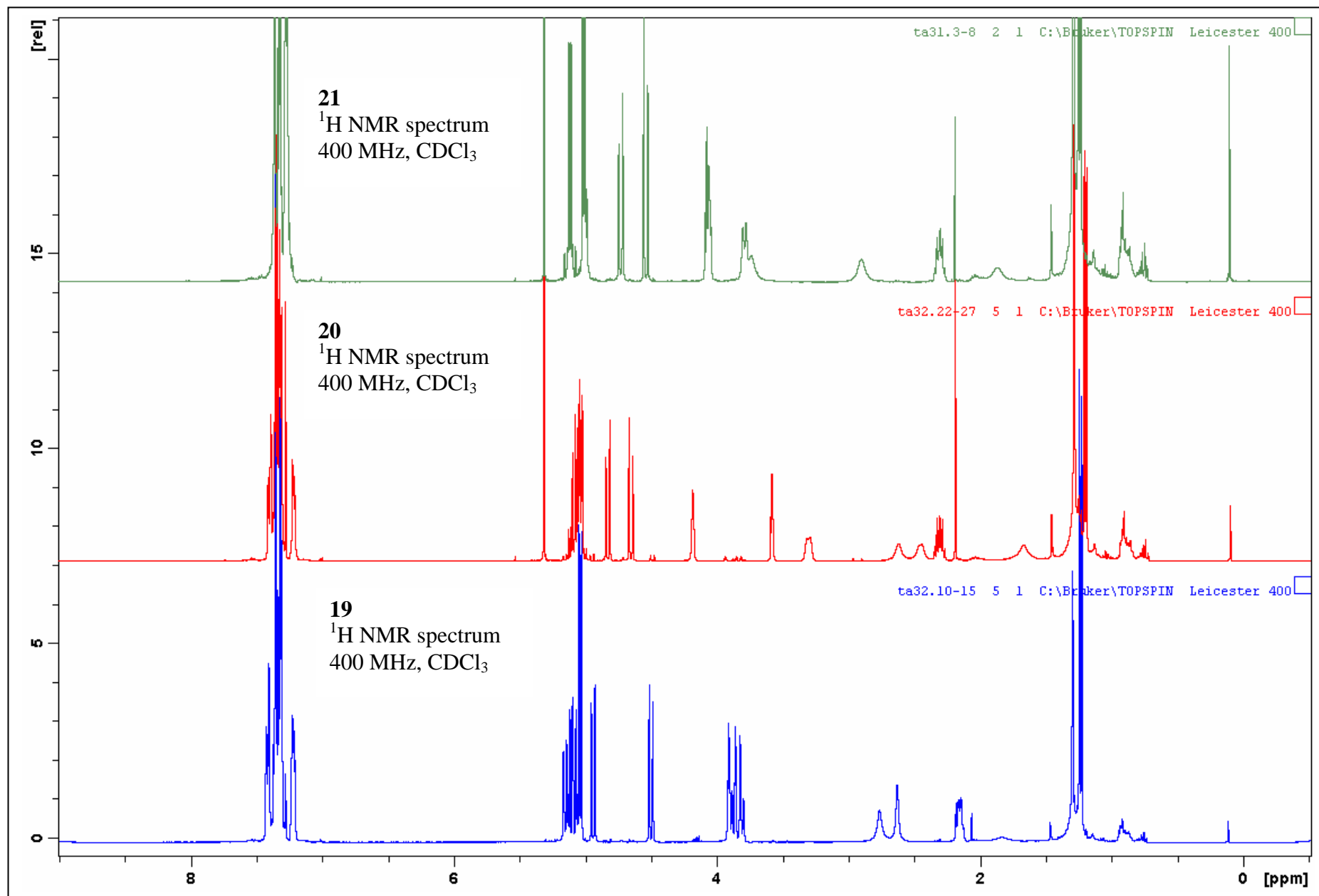
$^{31}\text{P}$  NMR Spectrum



$\{^1\text{H}\}^{31}\text{P}$  NMR Spectrum

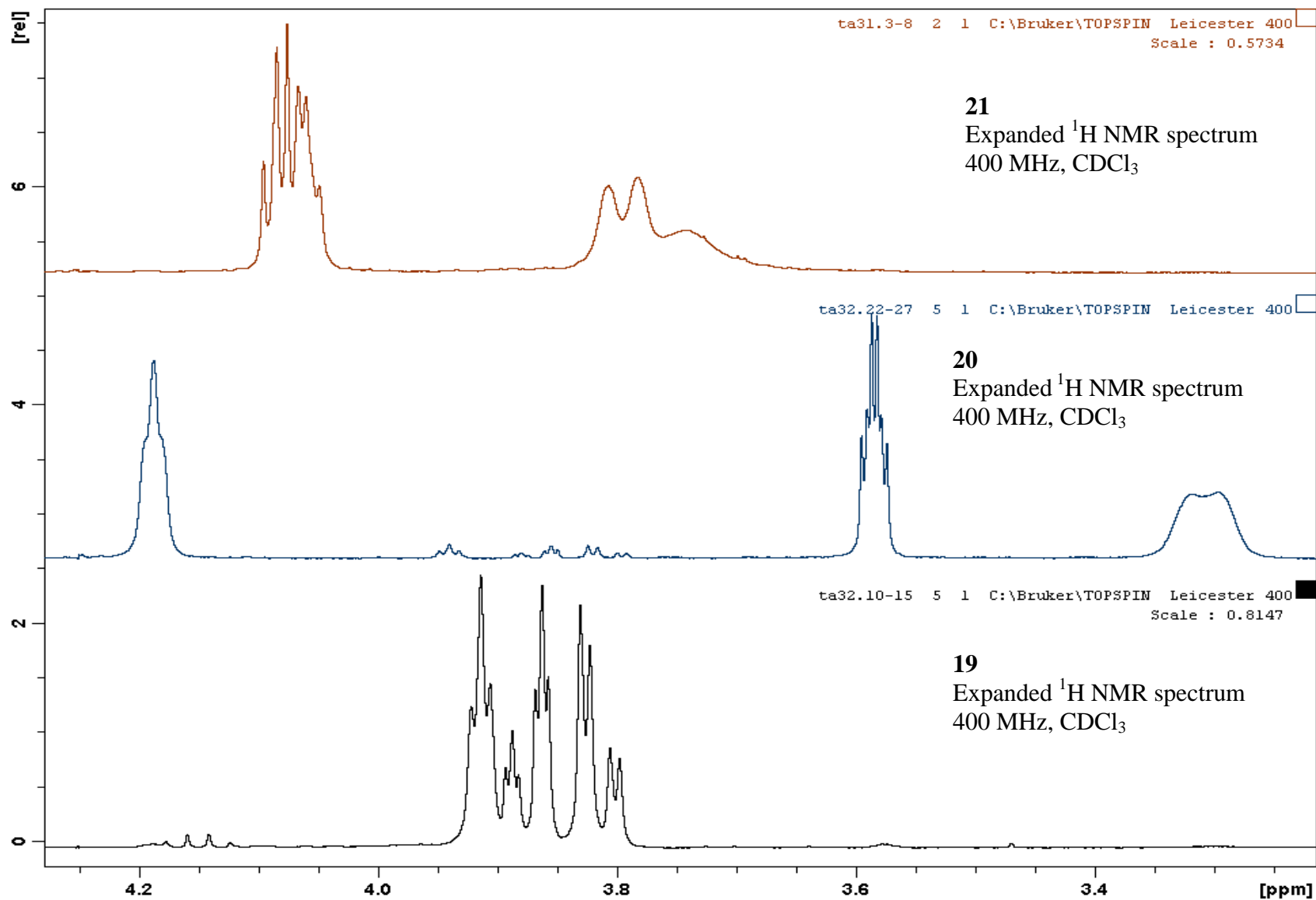


**19, 20 and 21**  
Overlay of  $^1\text{H}$  NMR spectra  
400 MHz,  $\text{CDCl}_3$

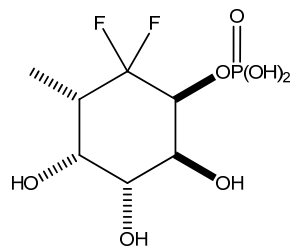


**19, 20 and 21**

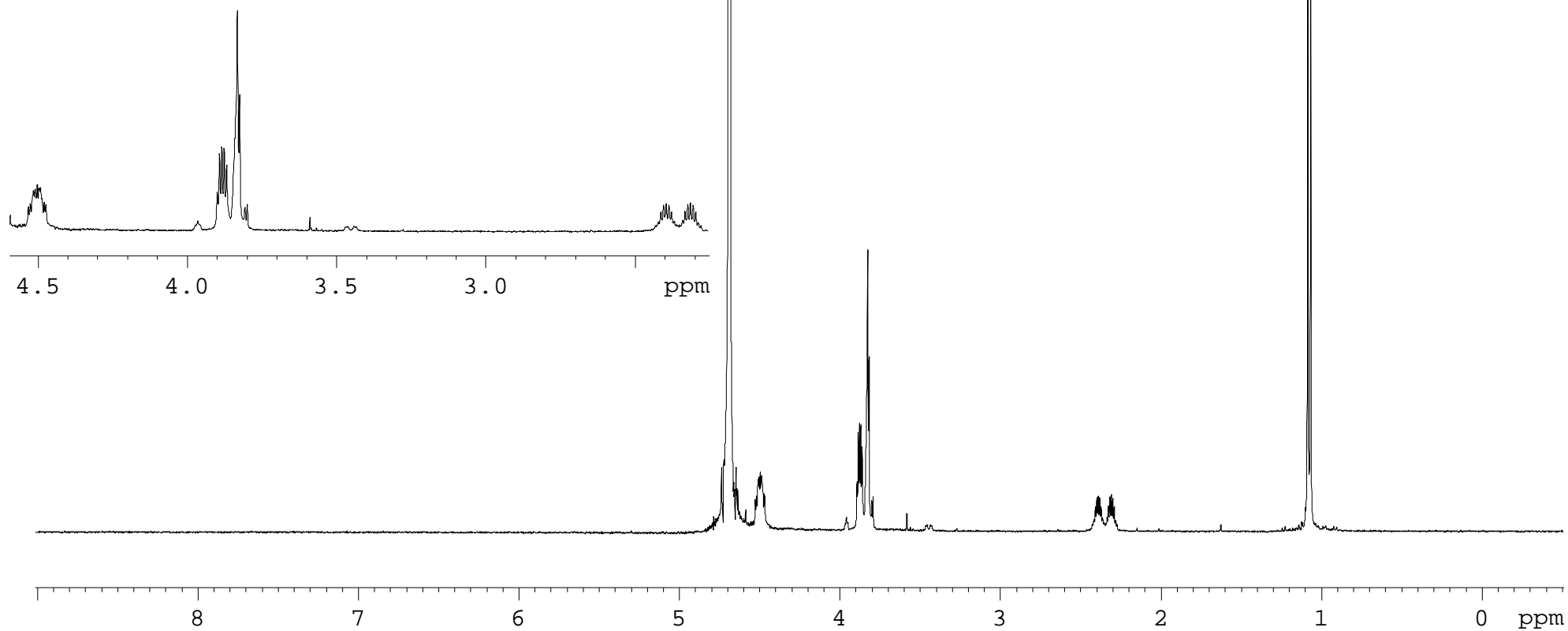
Overlay of expanded  $^1\text{H}$  NMR spectra  
400 MHz,  $\text{CDCl}_3$



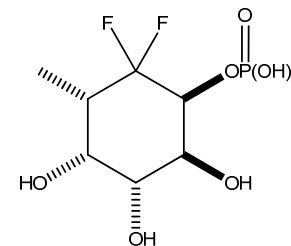
**24**  
<sup>1</sup>H NMR Spectrum  
400 MHz, D<sub>2</sub>O



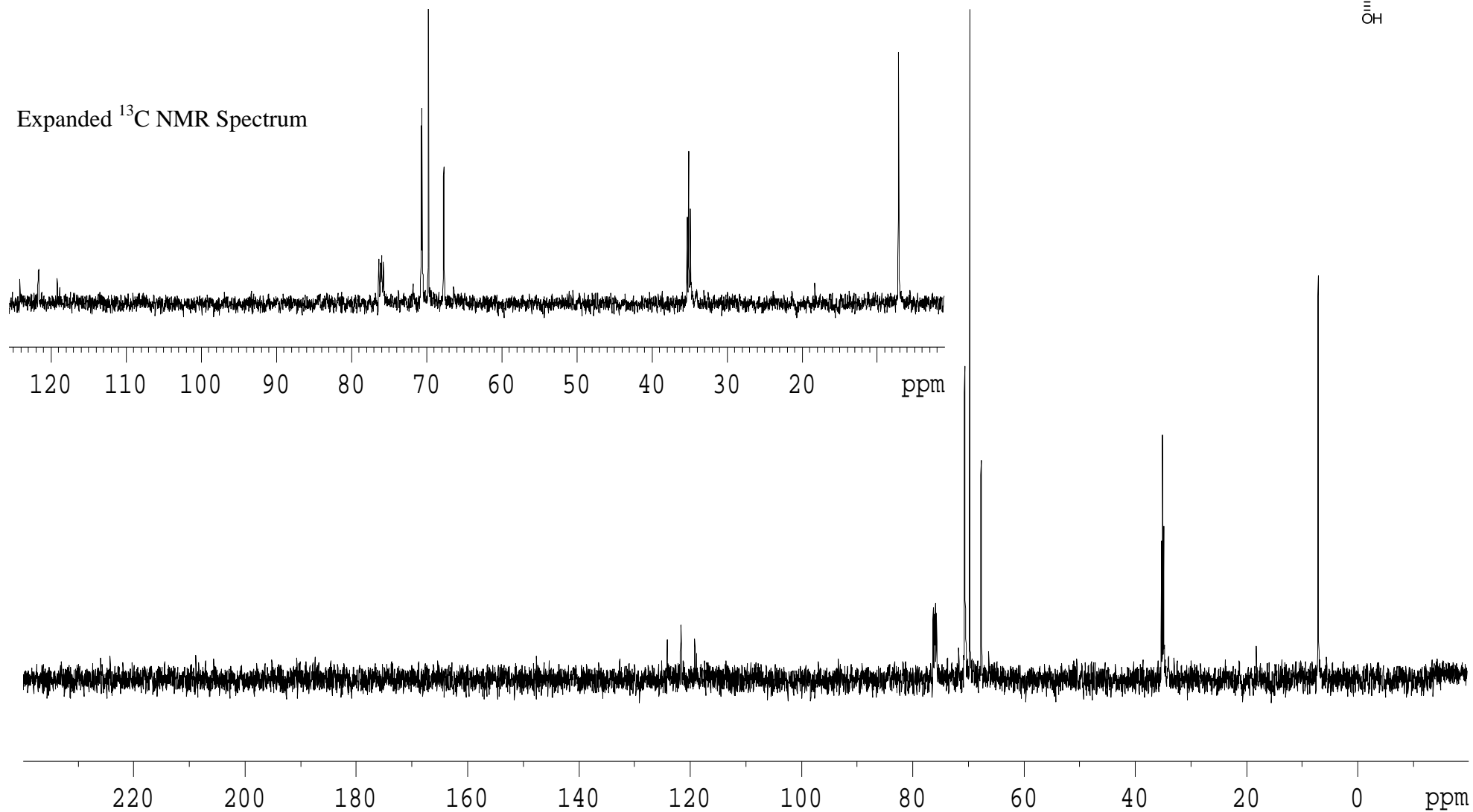
Expanded <sup>1</sup>H NMR Spectrum



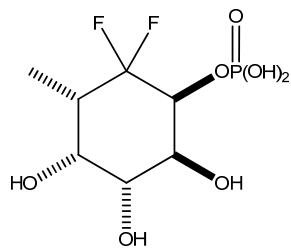
**24**  
<sup>13</sup>C NMR Spectrum  
100 MHz, D<sub>2</sub>O



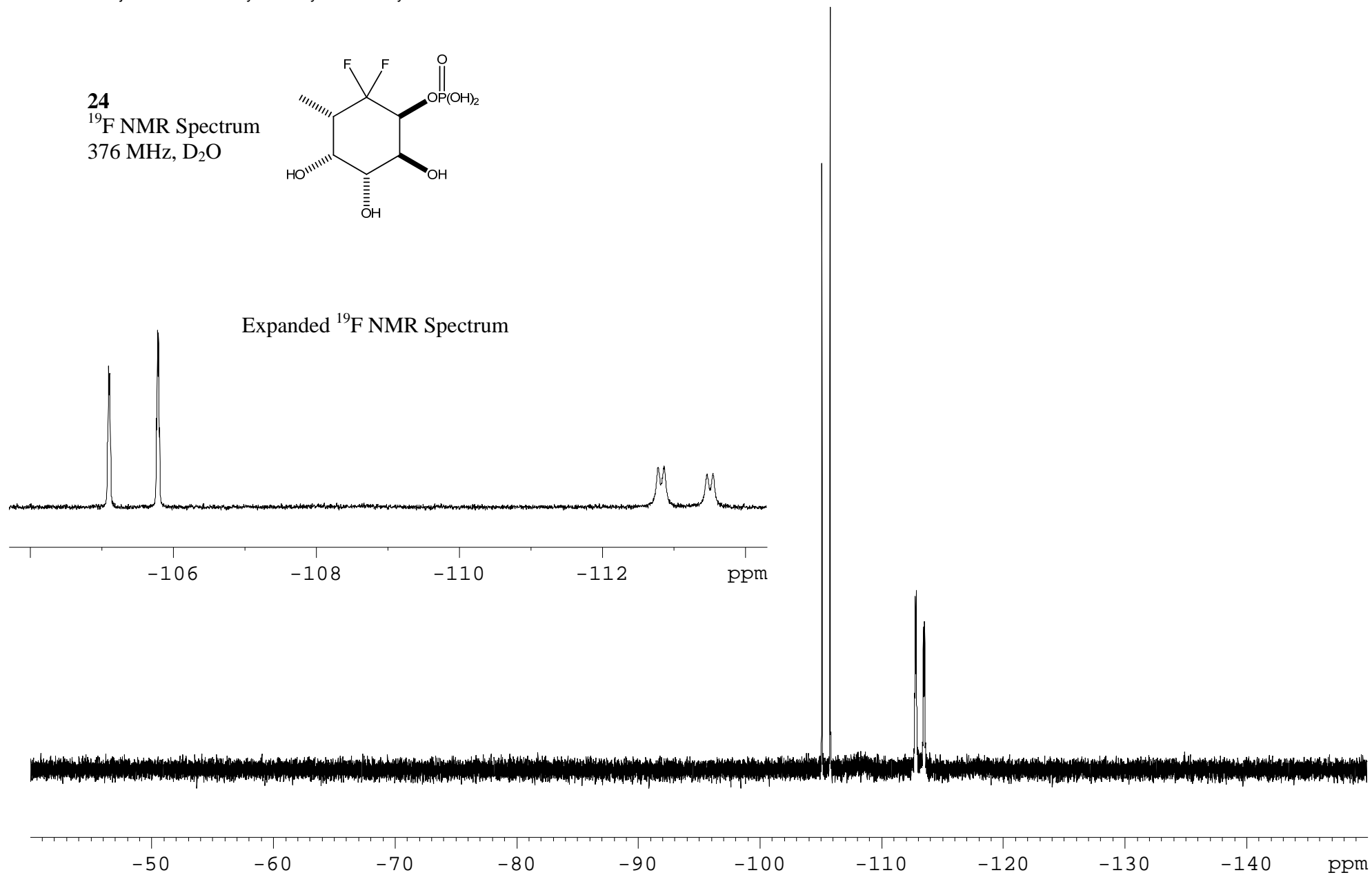
Expanded <sup>13</sup>C NMR Spectrum



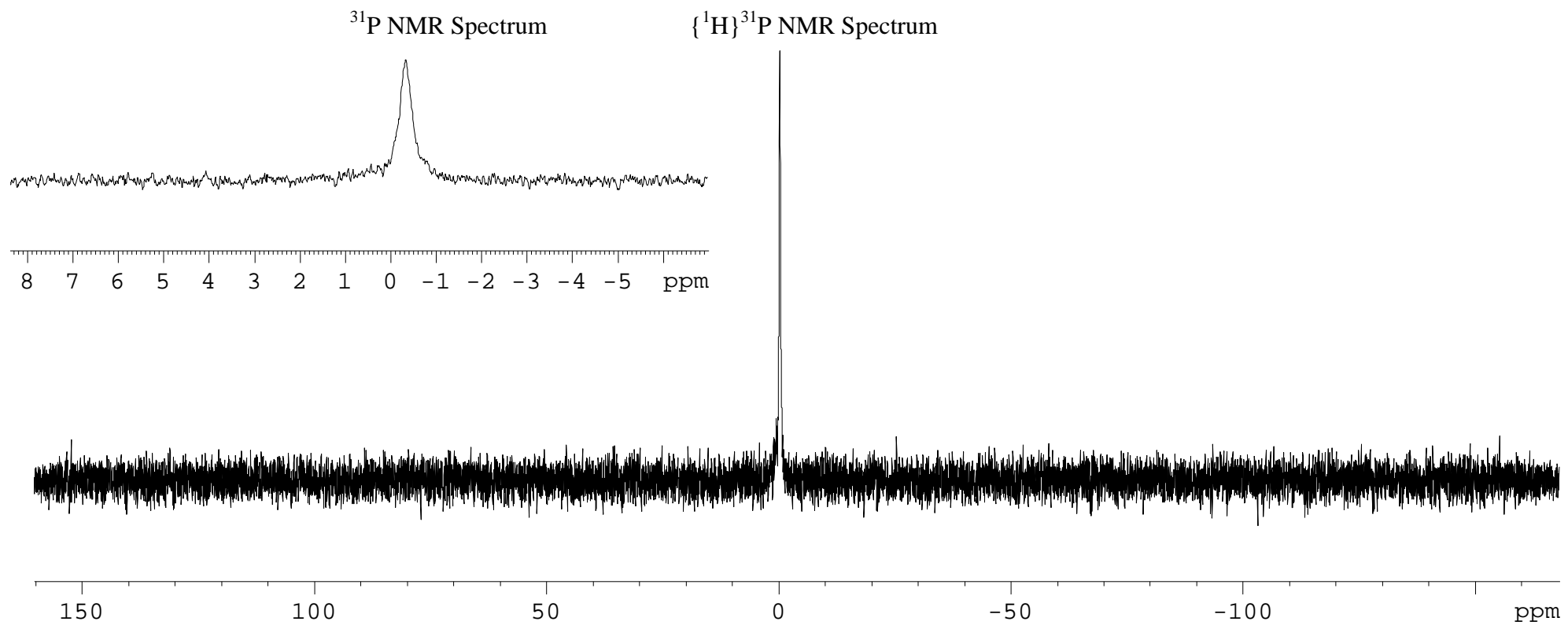
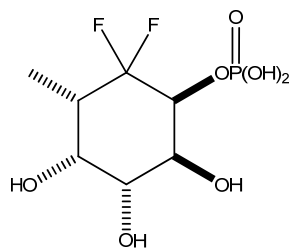
24  
<sup>19</sup>F NMR Spectrum  
376 MHz, D<sub>2</sub>O



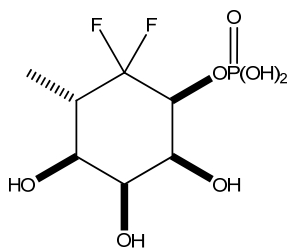
Expanded <sup>19</sup>F NMR Spectrum



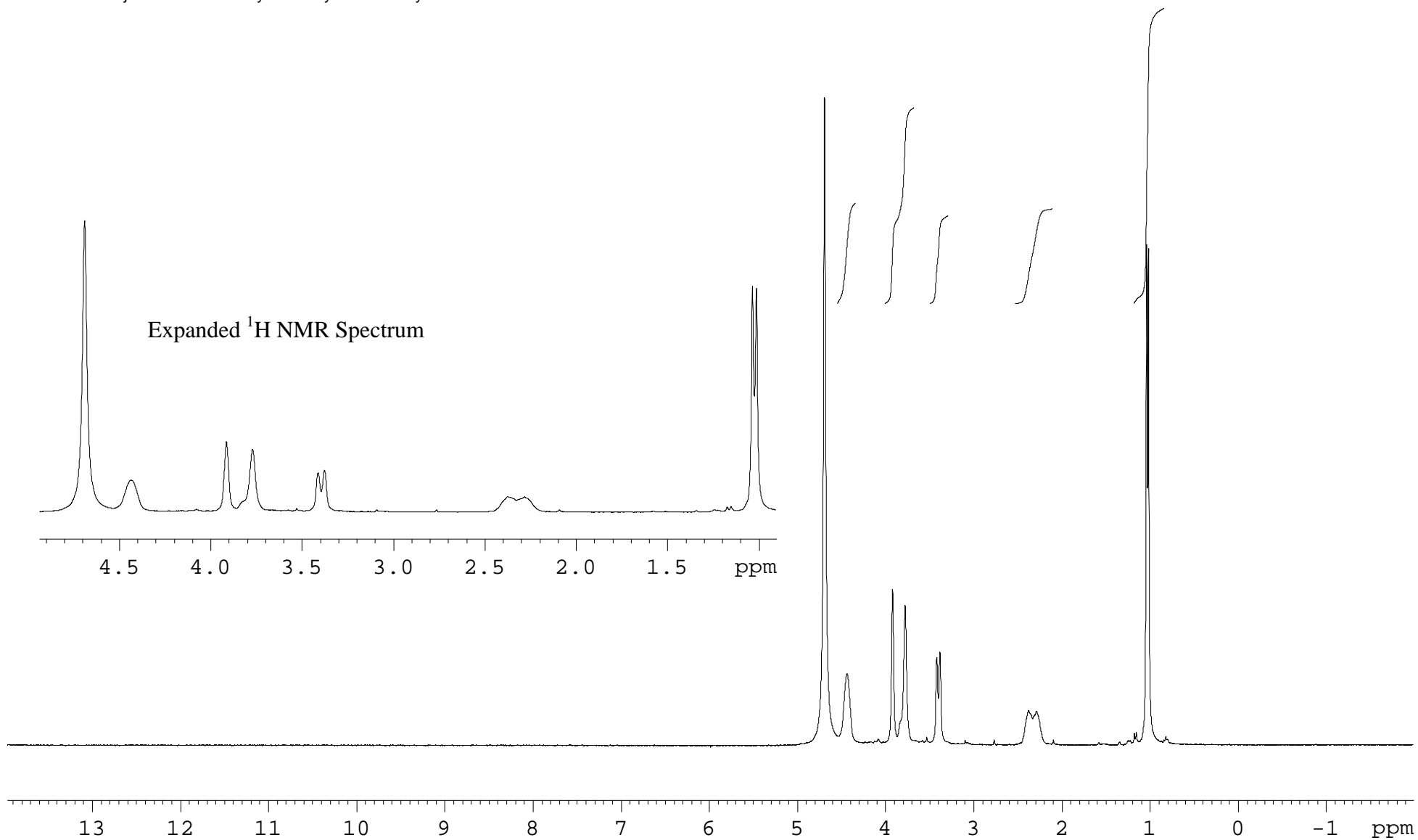
**24**  
<sup>31</sup>P NMR Spectra  
121 MHz, D<sub>2</sub>O



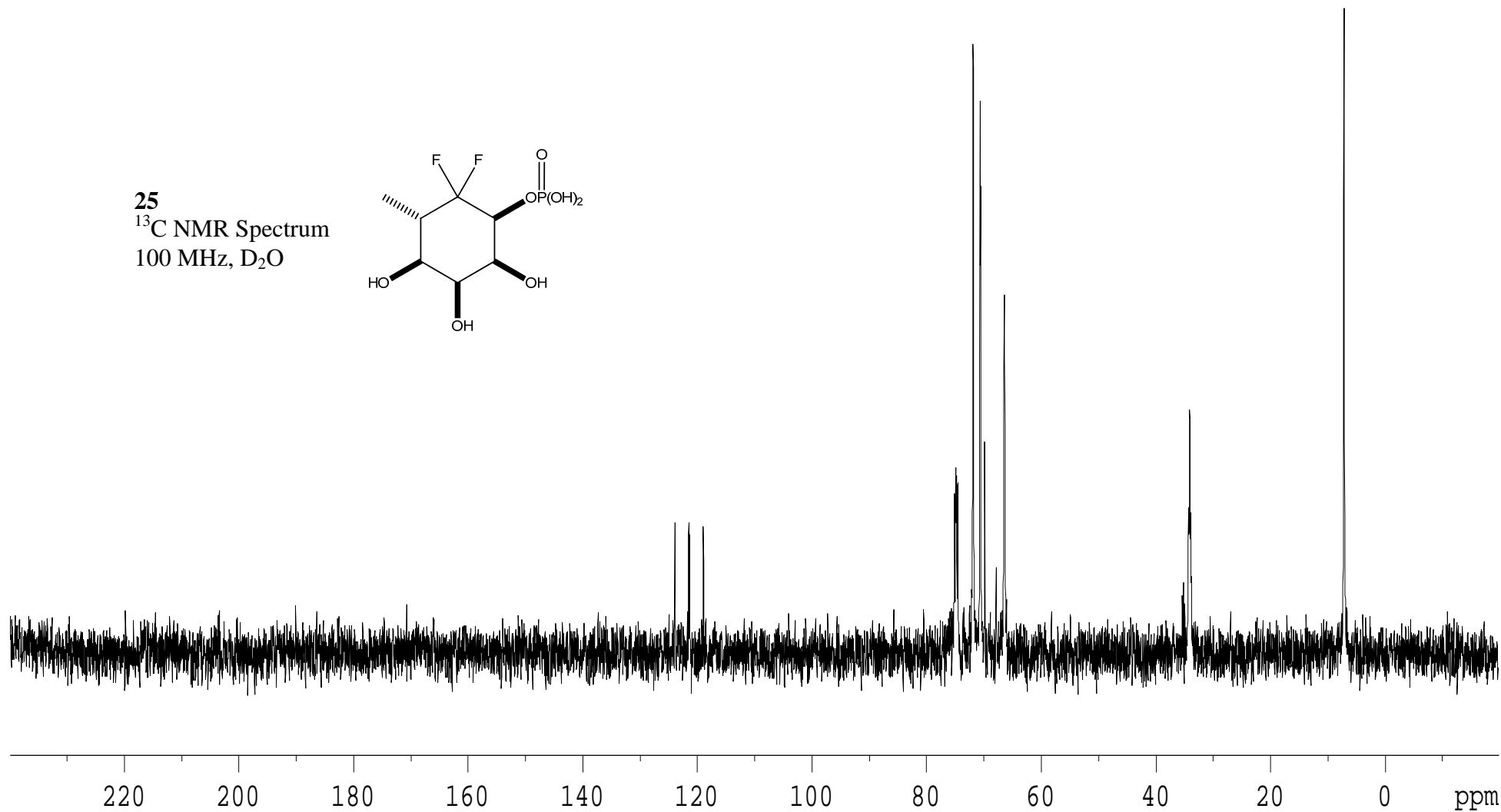
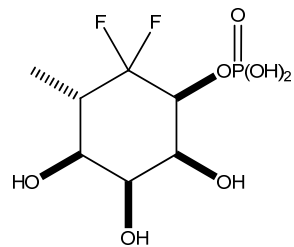
**25**  
<sup>1</sup>H NMR Spectrum  
400 MHz, D<sub>2</sub>O



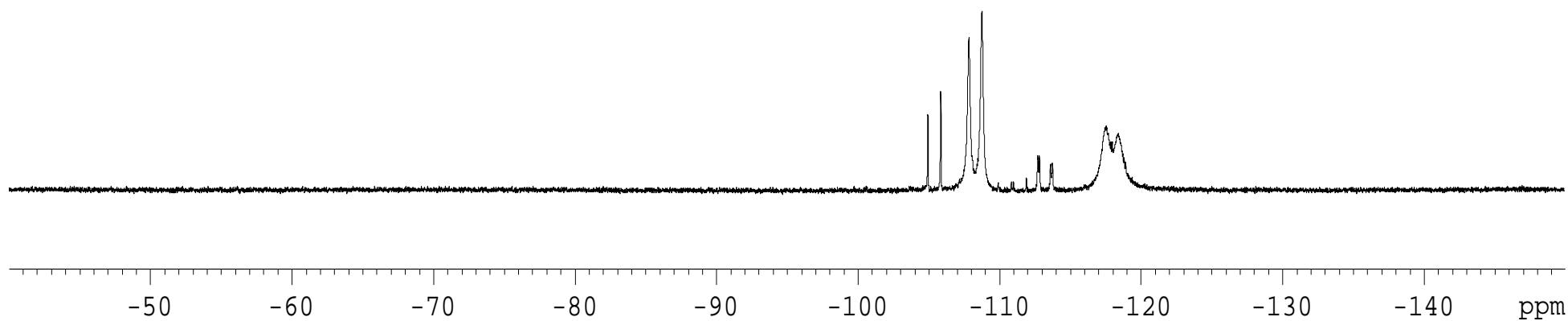
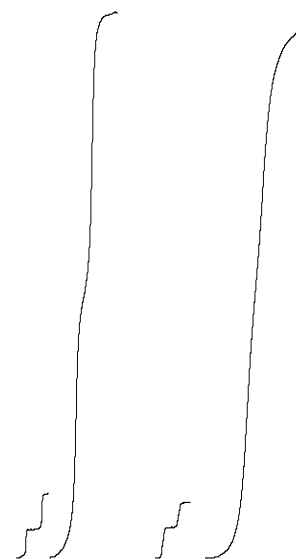




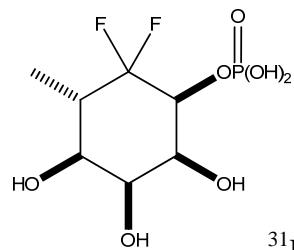
**25**  
<sup>13</sup>C NMR Spectrum  
100 MHz, D<sub>2</sub>O



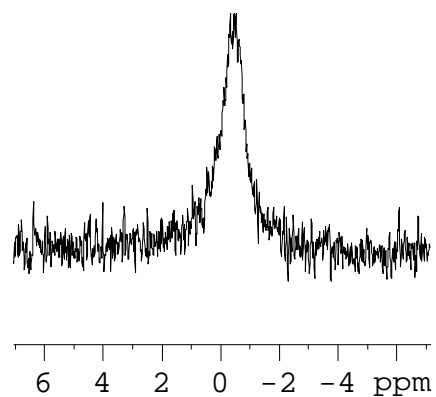
**25**  
<sup>19</sup>F NMR Spectrum  
282 MHz, D<sub>2</sub>O  
Small peaks arise from traces of **24**



25  
 $^{31}\text{P}$  NMR Spectra  
121 MHz,  $\text{D}_2\text{O}$



$^{31}\text{P}$  NMR Spectrum



$\{^1\text{H}\}^{31}\text{P}$  NMR  
Spectrum

