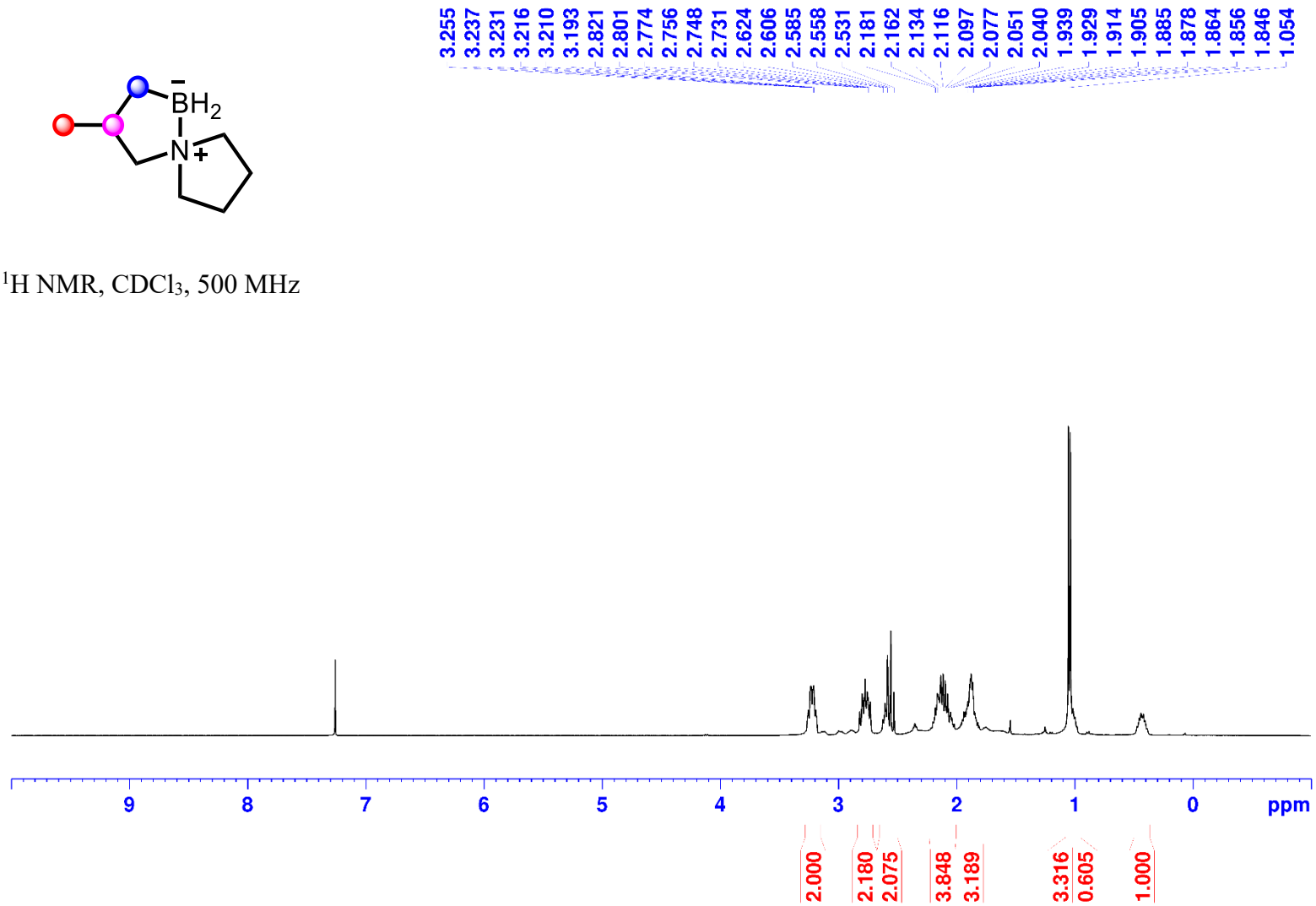
Cyclopropanes to Spirocyclic Amine-Boranes: Merging of C–H Bond Activation and C–C Bond Cleavage

^{1}H, ^{13}C, ^{11}B, ^{11}B{H} and ^{19}F NMR Spectra of SABs, Post-functionalized Products, and ^{2}H NMR Spectra of Deuterium Experiment

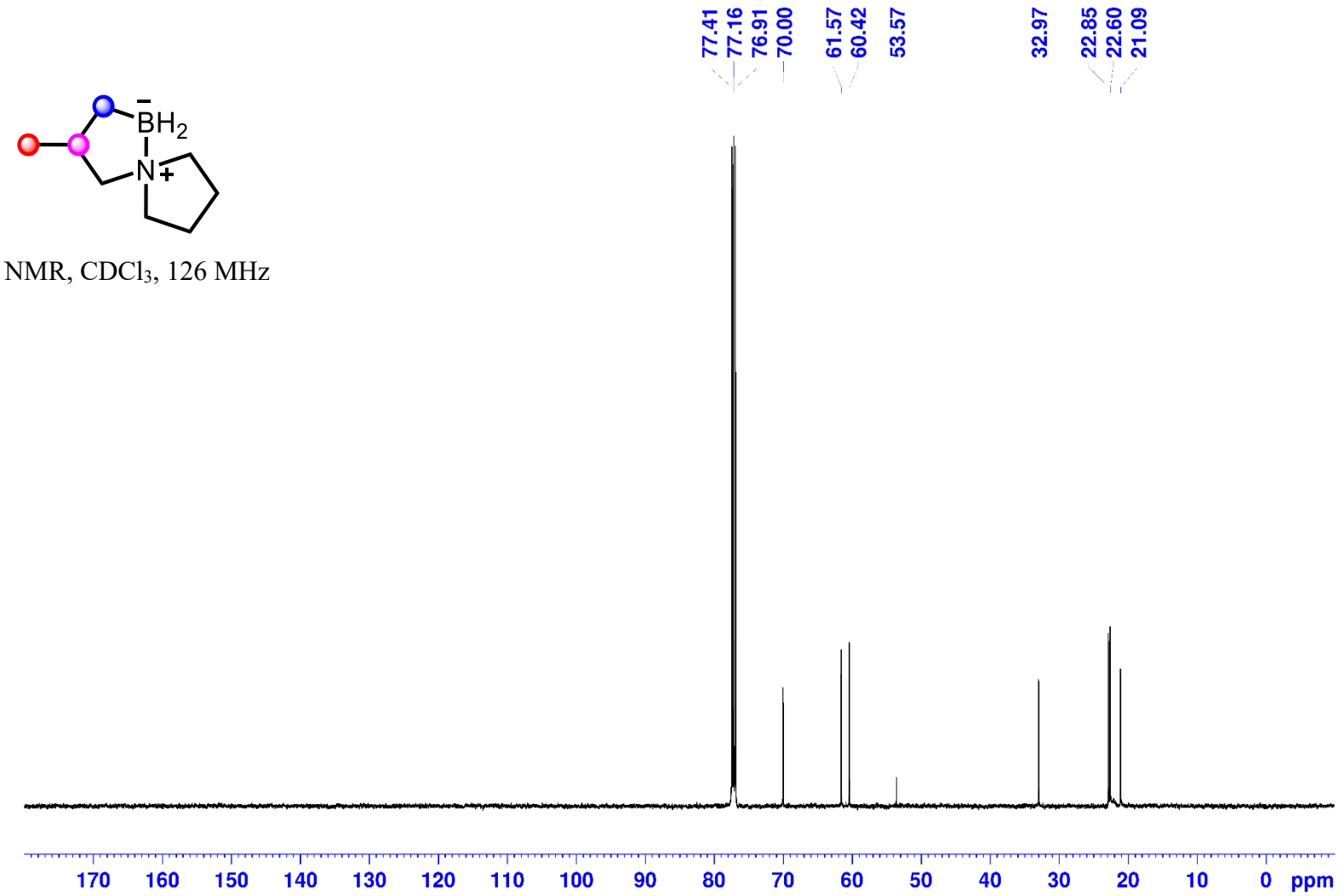
3-Methyl-5-aza-1-boraspiro[4.4]nonane (2a):

^{1}H NMR, $CDCl_3$, 500 MHz



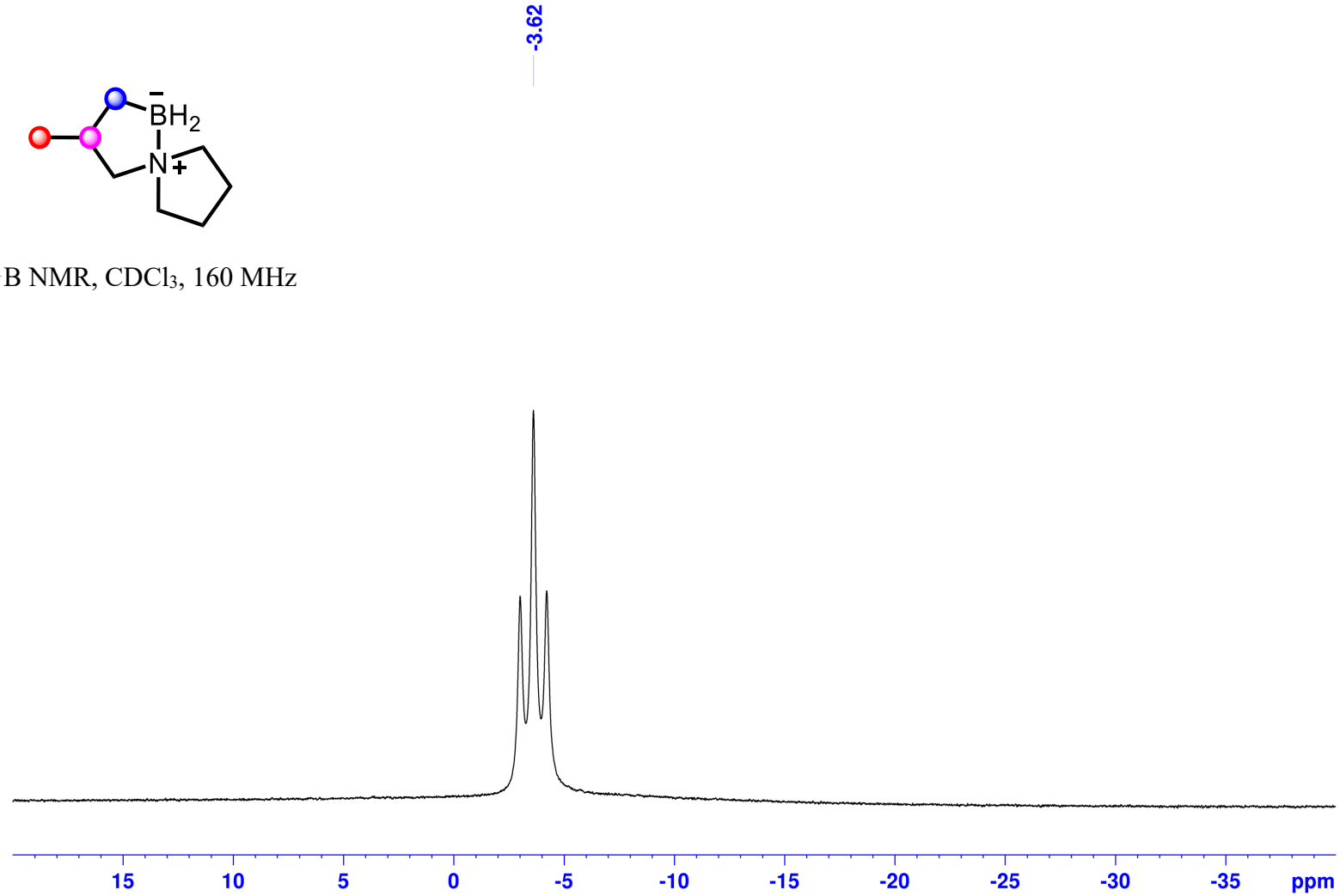
3-Methyl-5-aza-1-boraspiro[4.4]nonane (2a):

^{13}C NMR, $CDCl_3$, 126 MHz



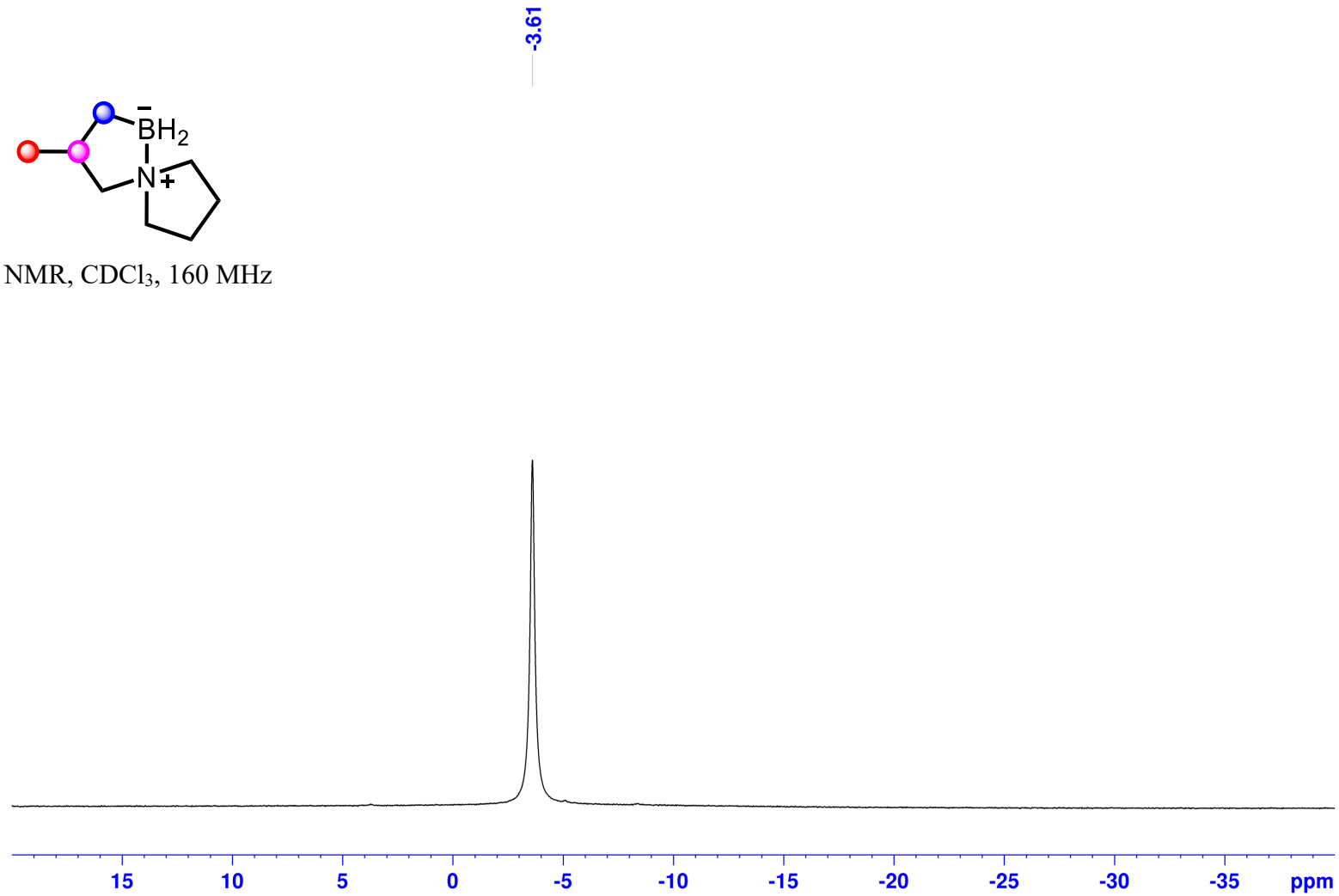
3-Methyl-5-aza-1-boraspiro[4.4]nonane (2a):

^{11}B NMR, $CDCl_3$, 160 MHz

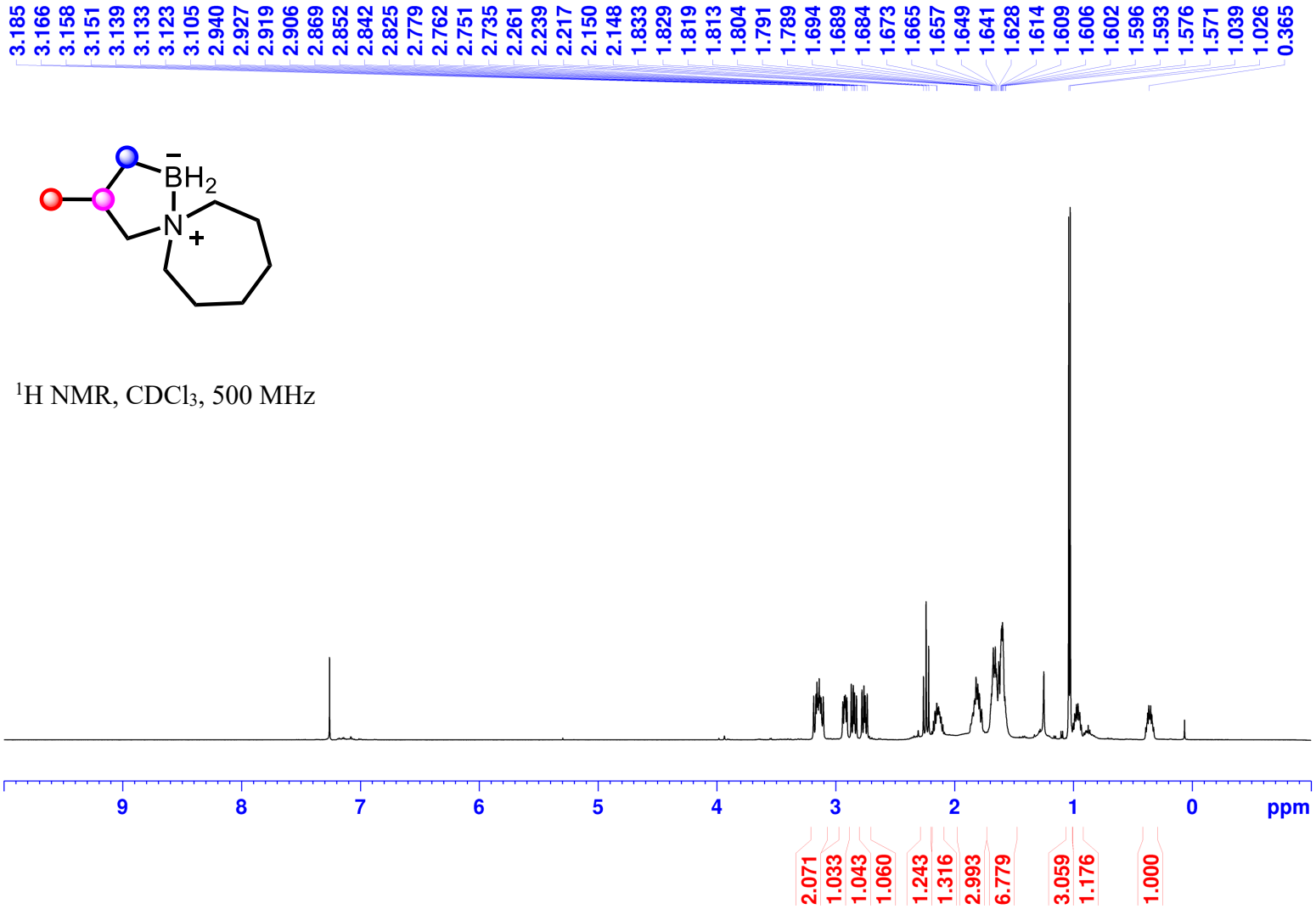


3-Methyl-5-aza-1-boraspiro[4.4]nonane (2a):

^{11}B NMR, $CDCl_3$, 160 MHz



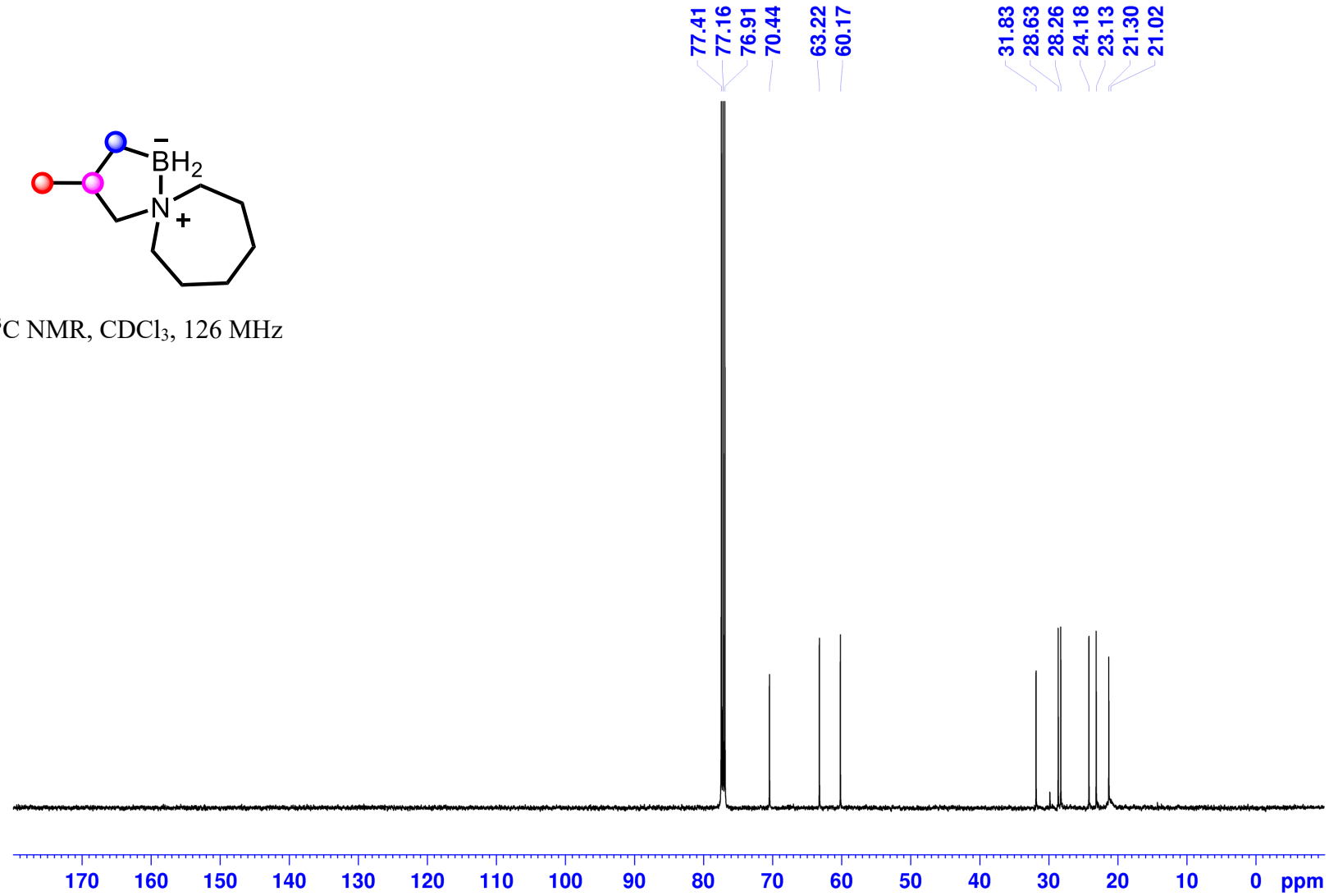
3-Methyl-5-aza-1-boraspiro[4.6]undecane (2b):



^{1}H NMR, $CDCl_3$, 500 MHz

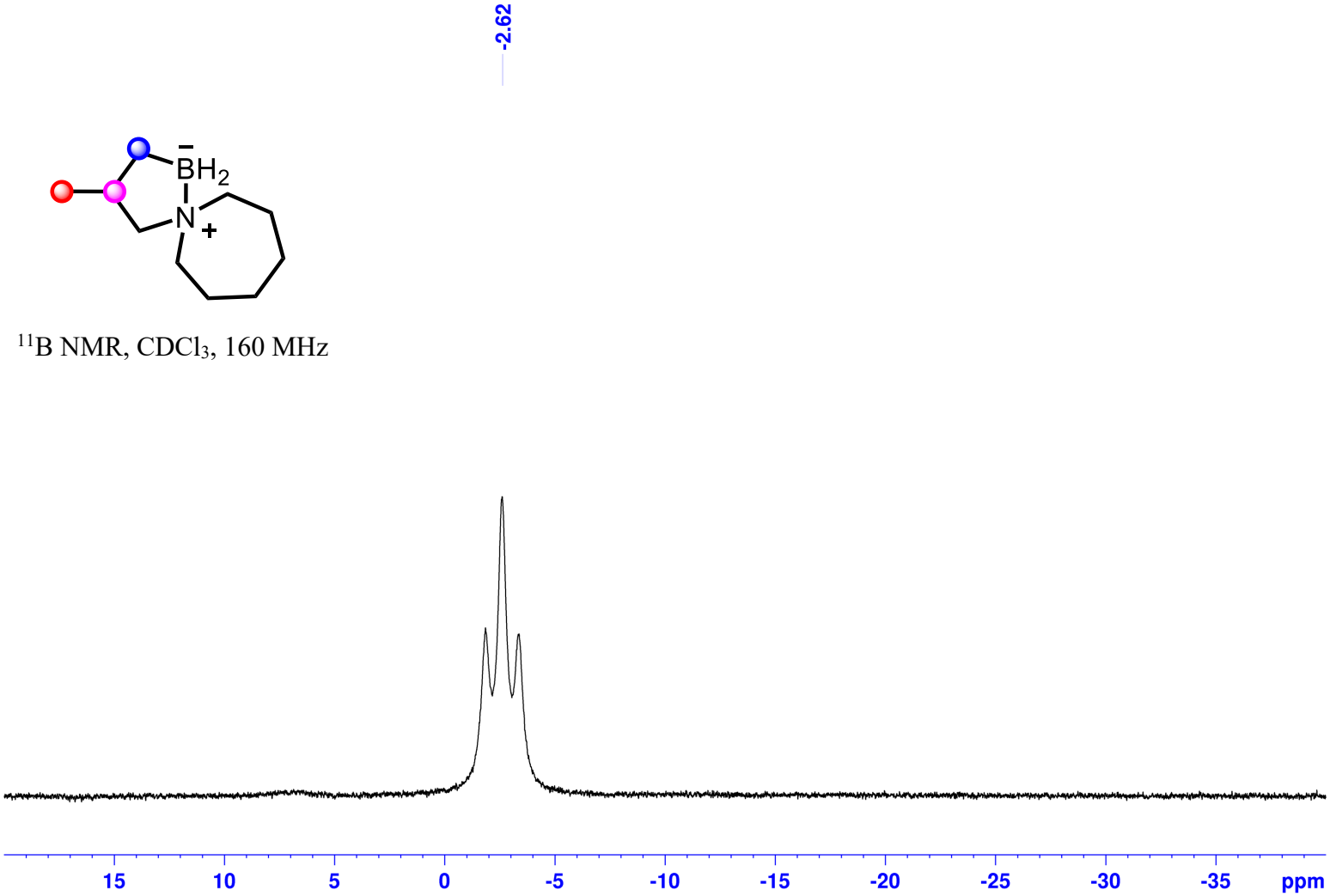
3-Methyl-5-aza-1-boraspiro[4.6]undecane (2b):

^{13}C NMR, $CDCl_3$, 126 MHz



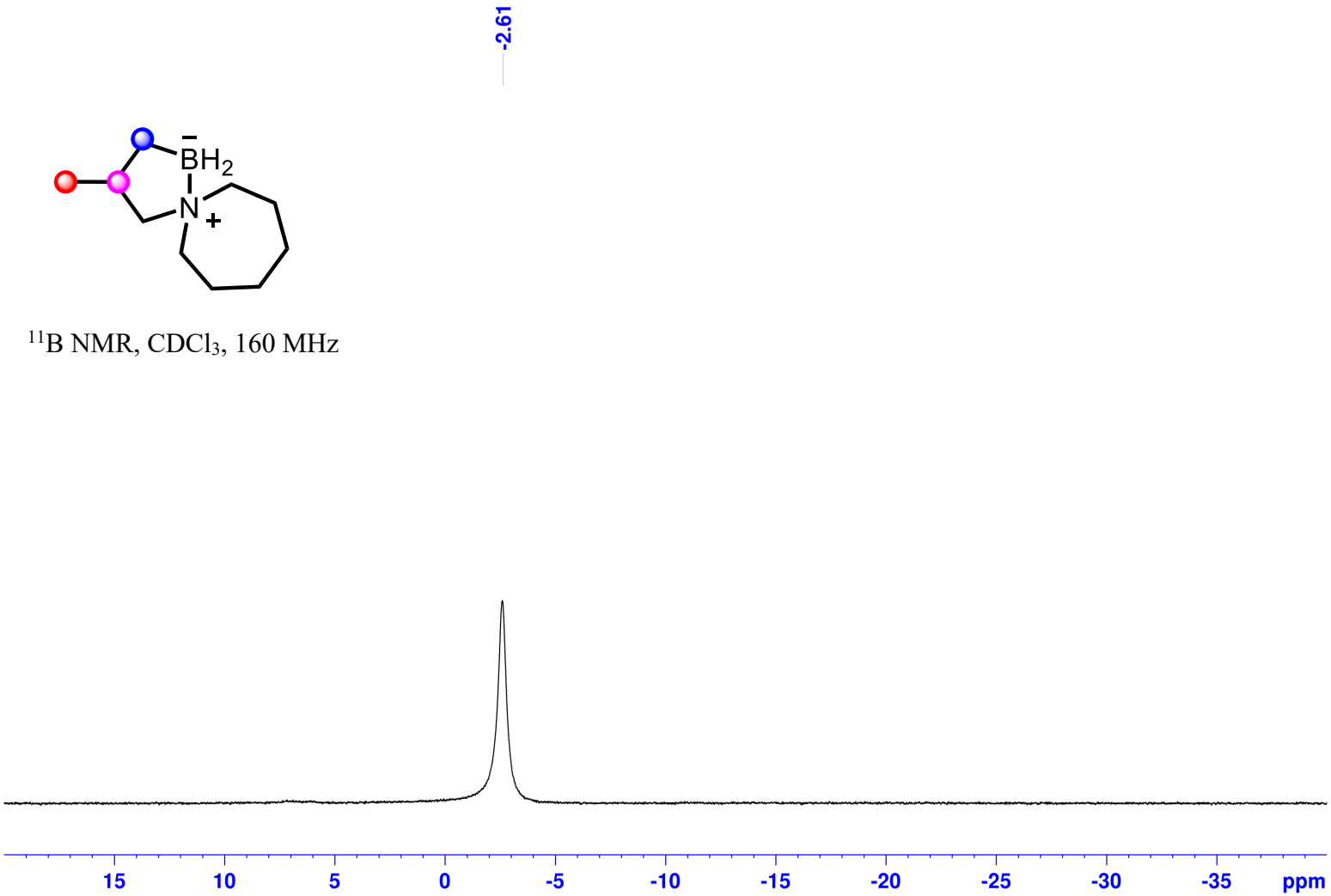
3-Methyl-5-aza-1-boraspiro[4.6]undecane (2b):

^{11}B NMR, $CDCl_3$, 160 MHz

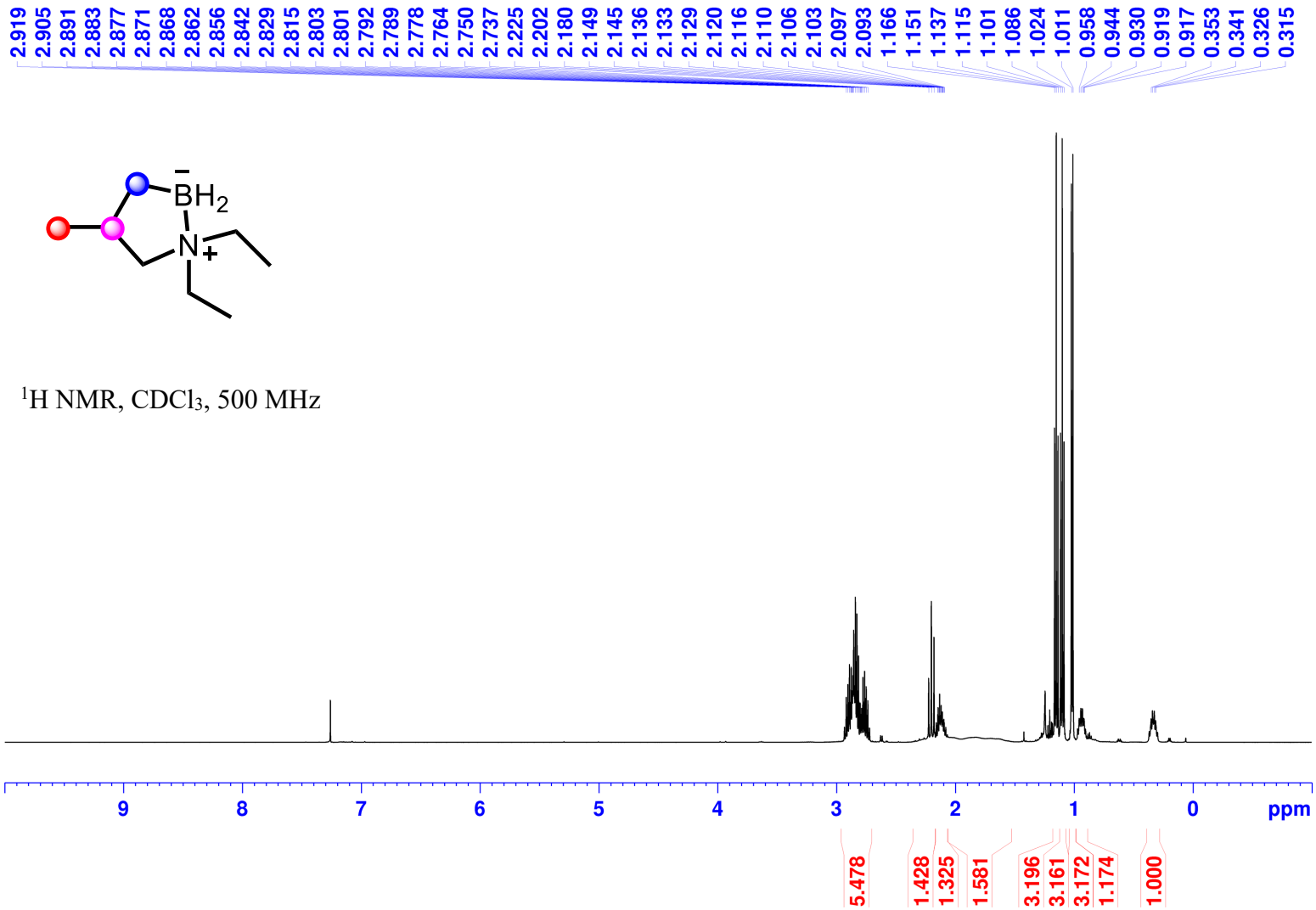


3-Methyl-5-aza-1-boraspiro[4.6]undecane (2b):

^{11}B NMR, $CDCl_3$, 160 MHz



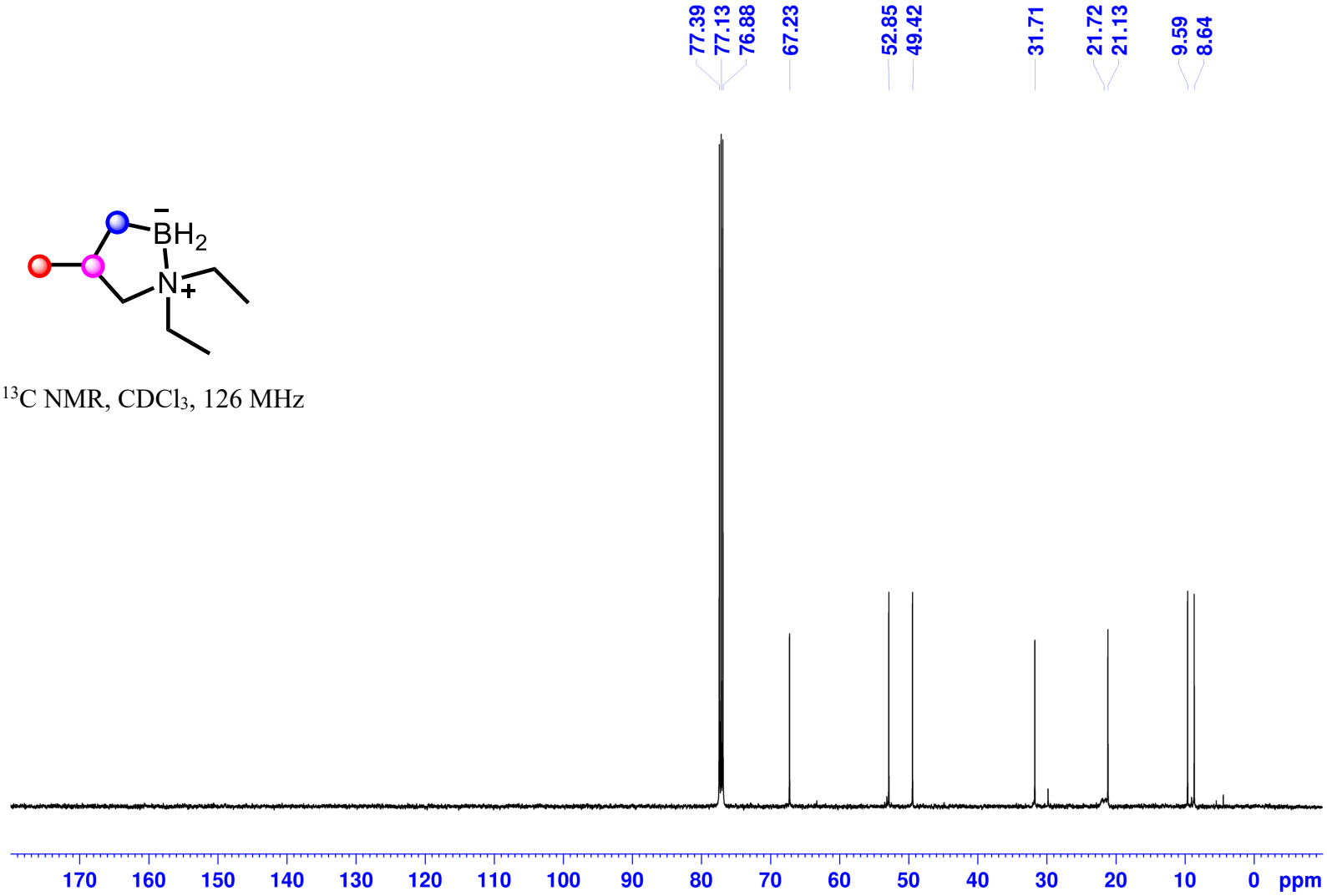
1,1-Diethyl-4-methyl-1,2-azaborolidine (2c):



^{1}H NMR, $CDCl_3$, 500 MHz

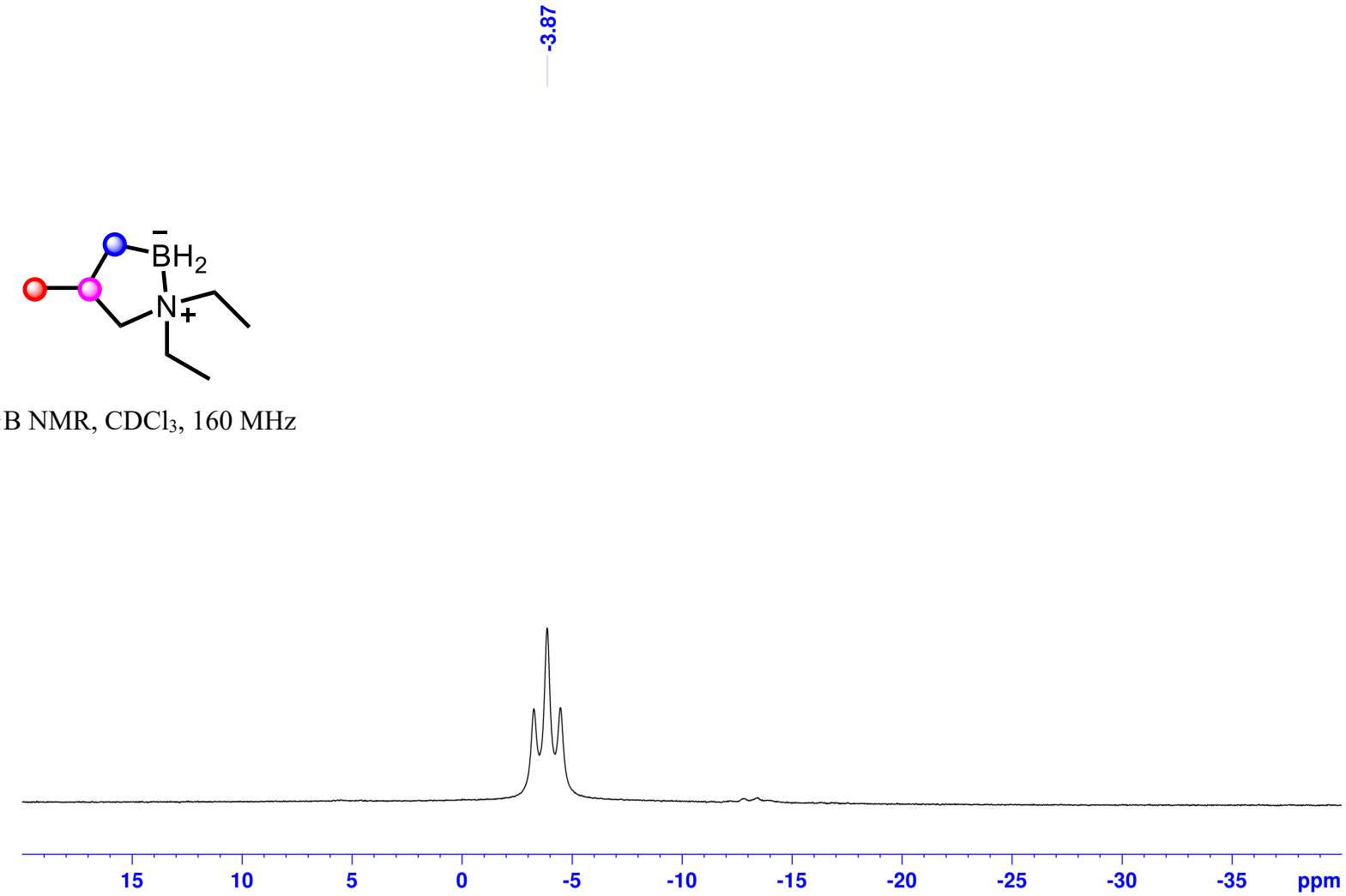
1,1-Diethyl-4-methyl-1,2-azaborolidine (2c):

^{13}C NMR, $CDCl_3$, 126 MHz



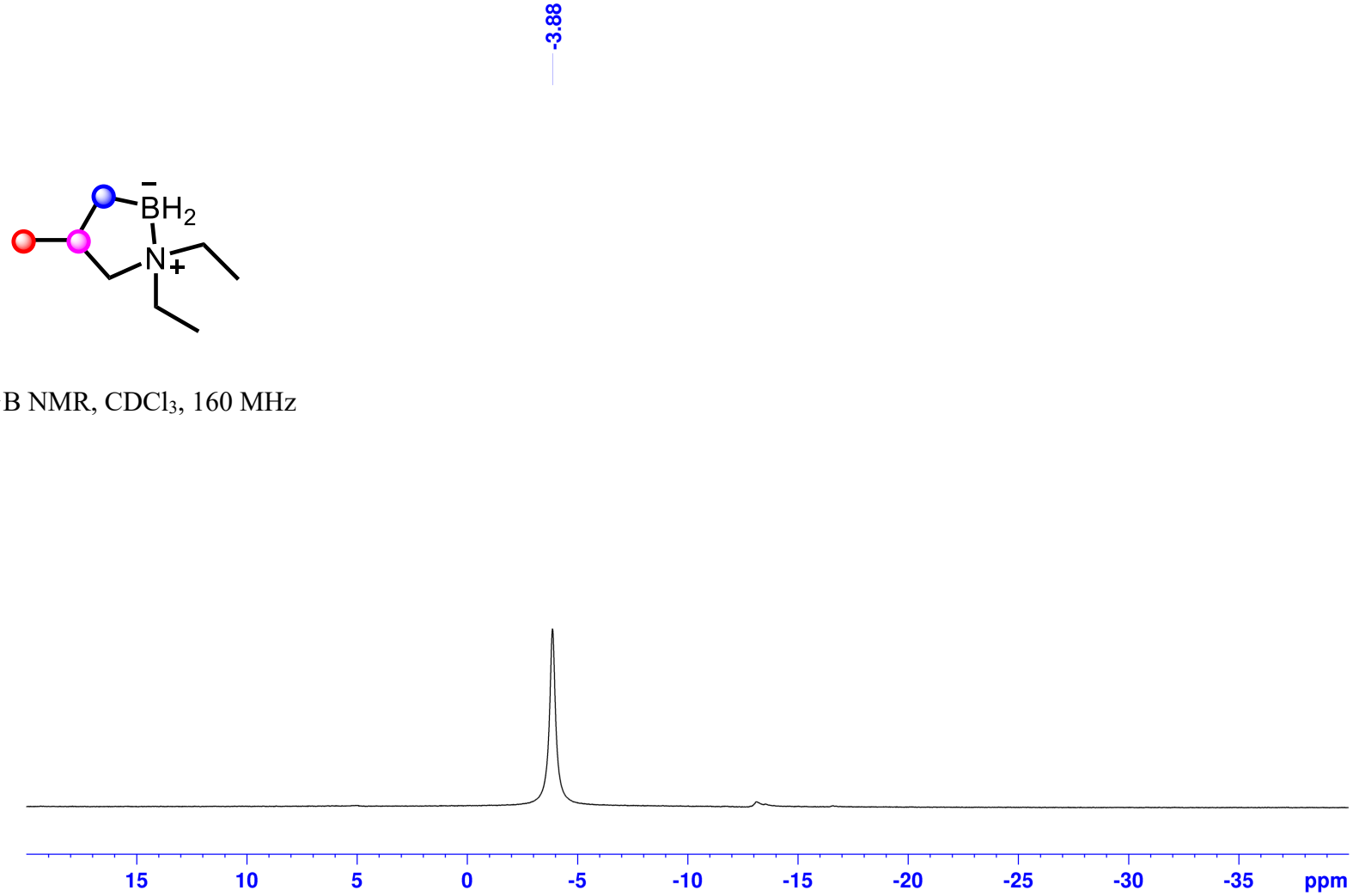
1,1-Diethyl-4-methyl-1,2-azaborolidine (2c):

^{11}B NMR, $CDCl_3$, 160 MHz

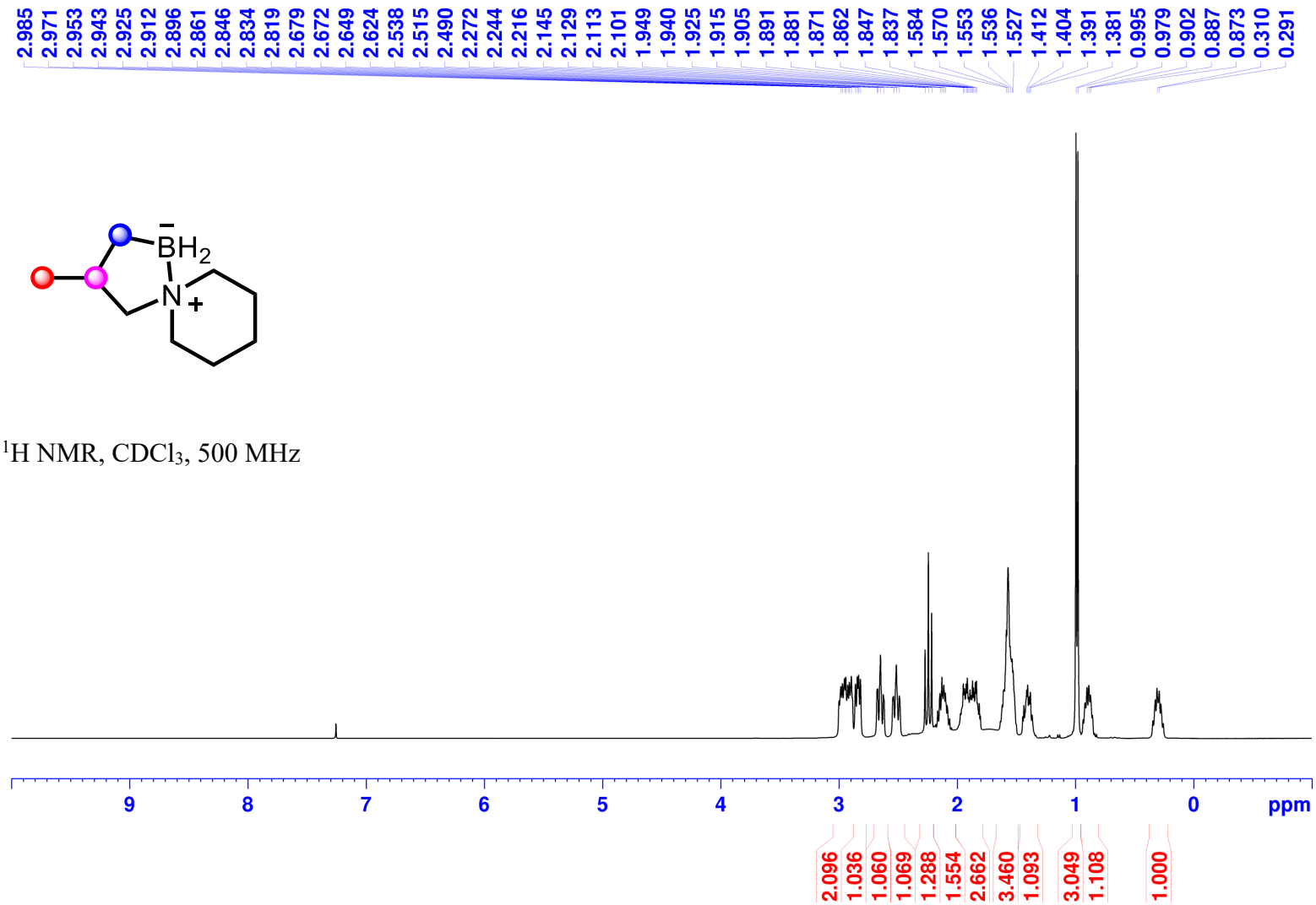


1,1-Diethyl-4-methyl-1,2-azaborolidine (2c):

^{11}B NMR, $CDCl_3$, 160 MHz



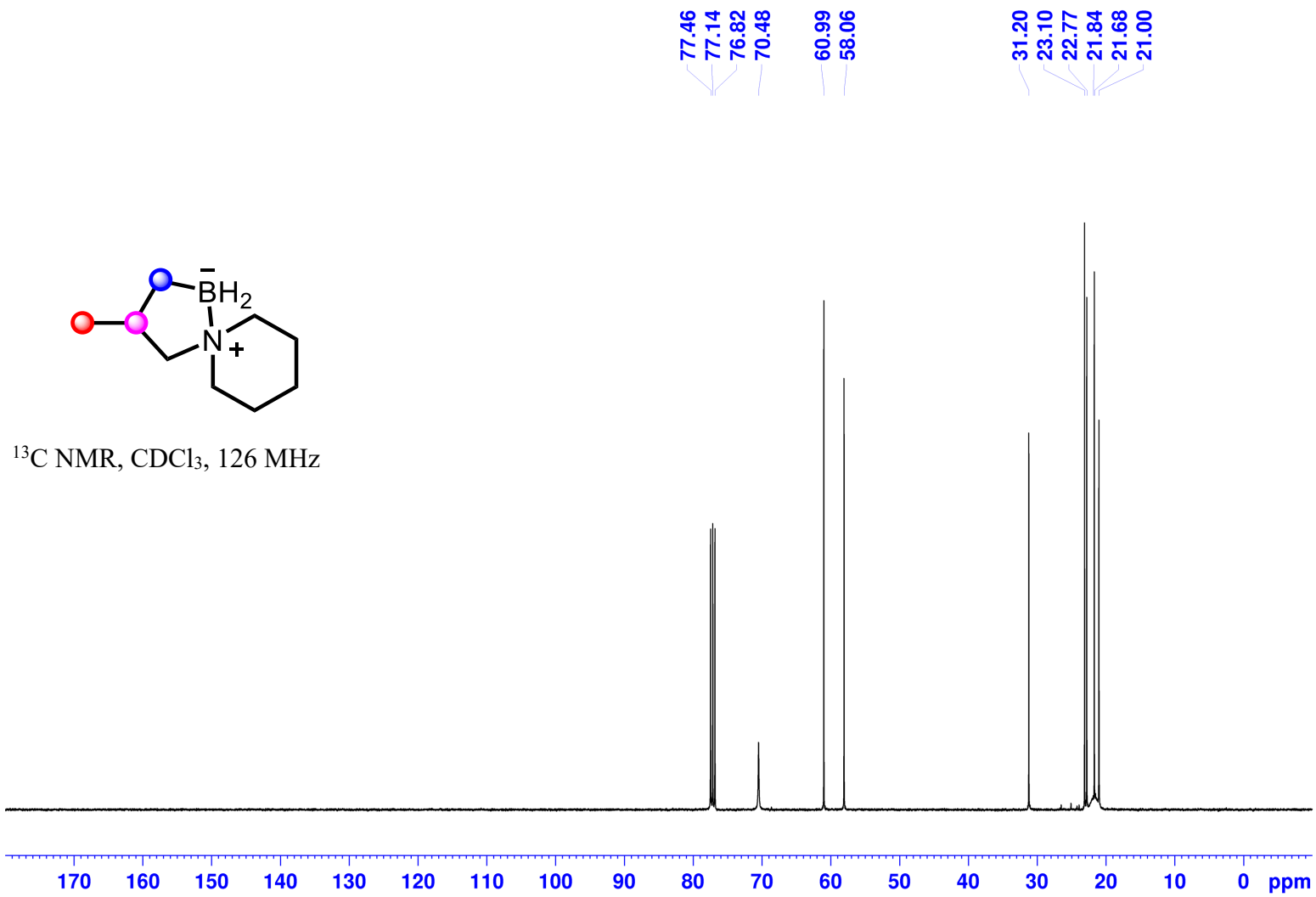
3-Methyl-5-aza-1-boraspiro[4.5]decane (2d):



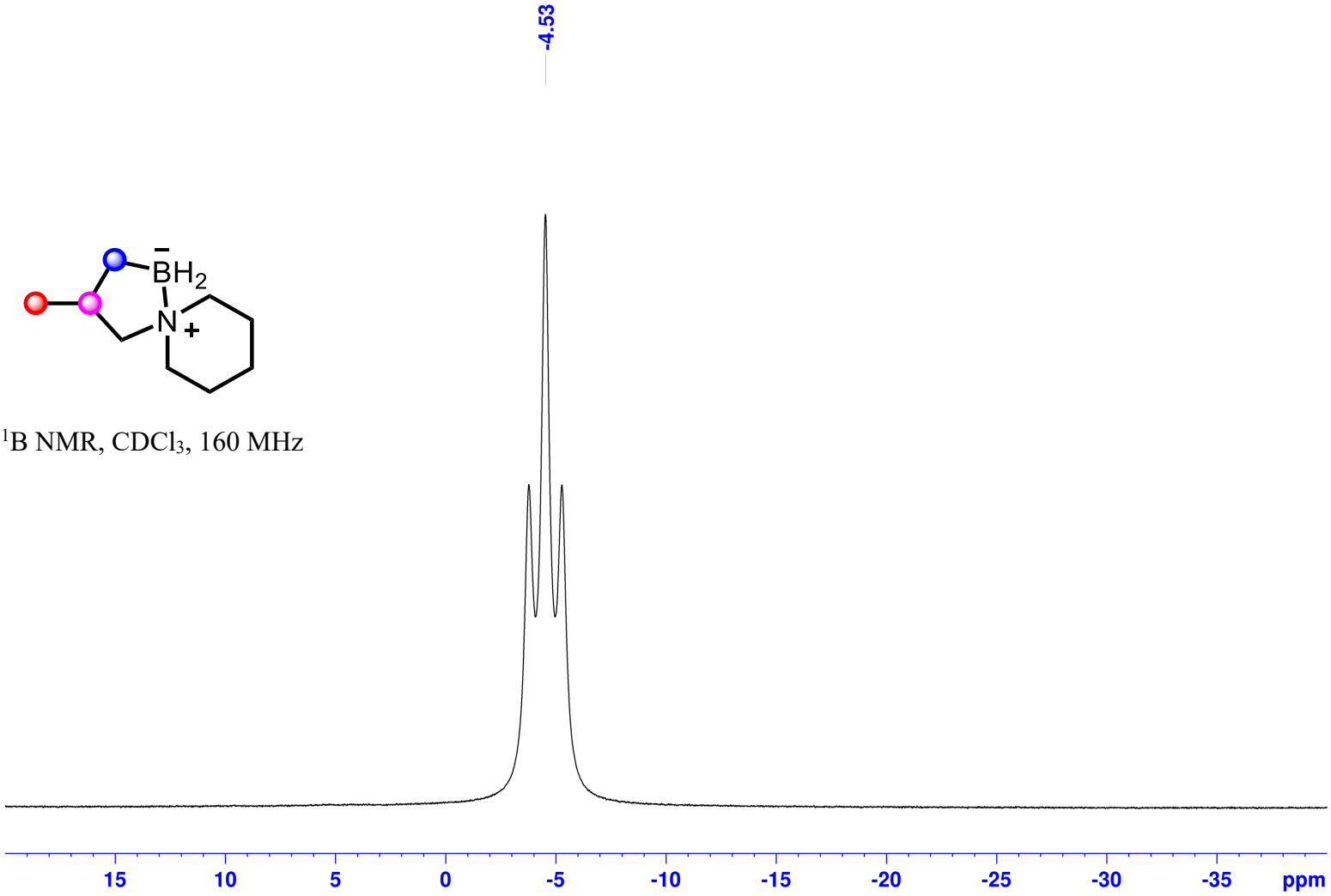
^{1}H NMR, $CDCl_3$, 500 MHz

3-Methyl-5-aza-1-boraspiro[4.5]decane (2d):

^{13}C NMR, $CDCl_3$, 126 MHz

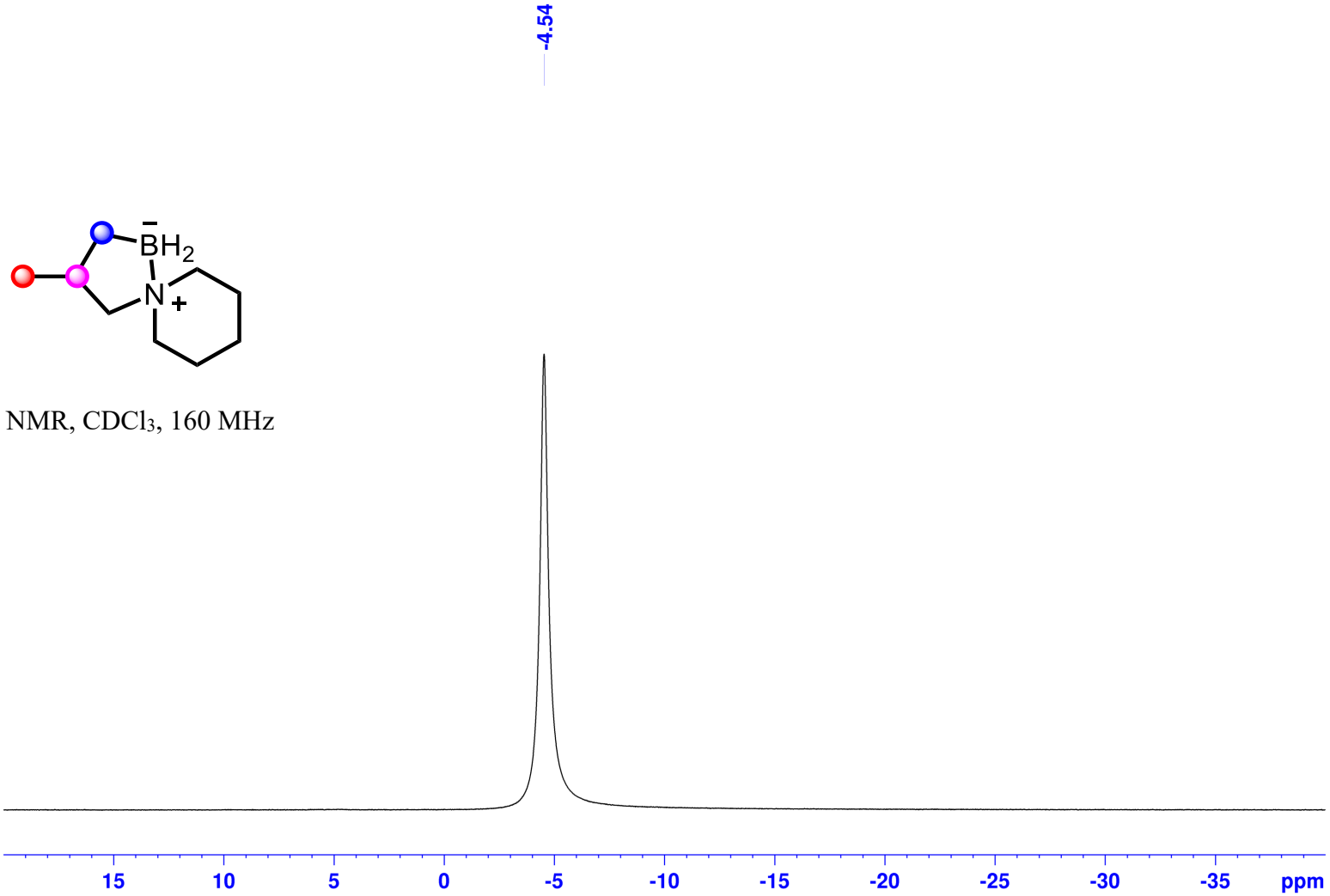


3-Methyl-5-aza-1-boraspiro[4.5]decane (2d):



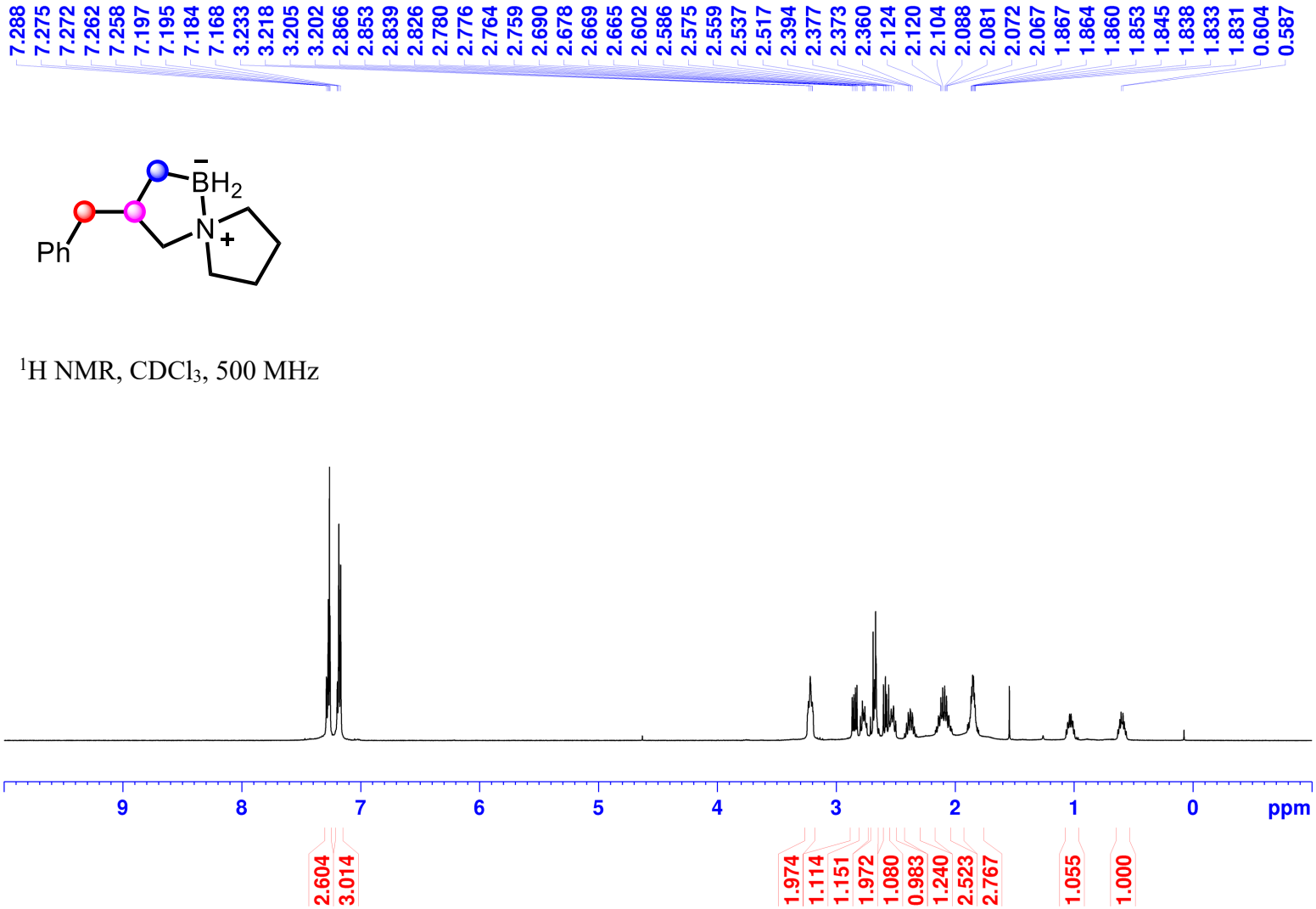
^{11}B NMR, $CDCl_3$, 160 MHz

3-Methyl-5-aza-1-boraspiro[4.5]decane (2d):



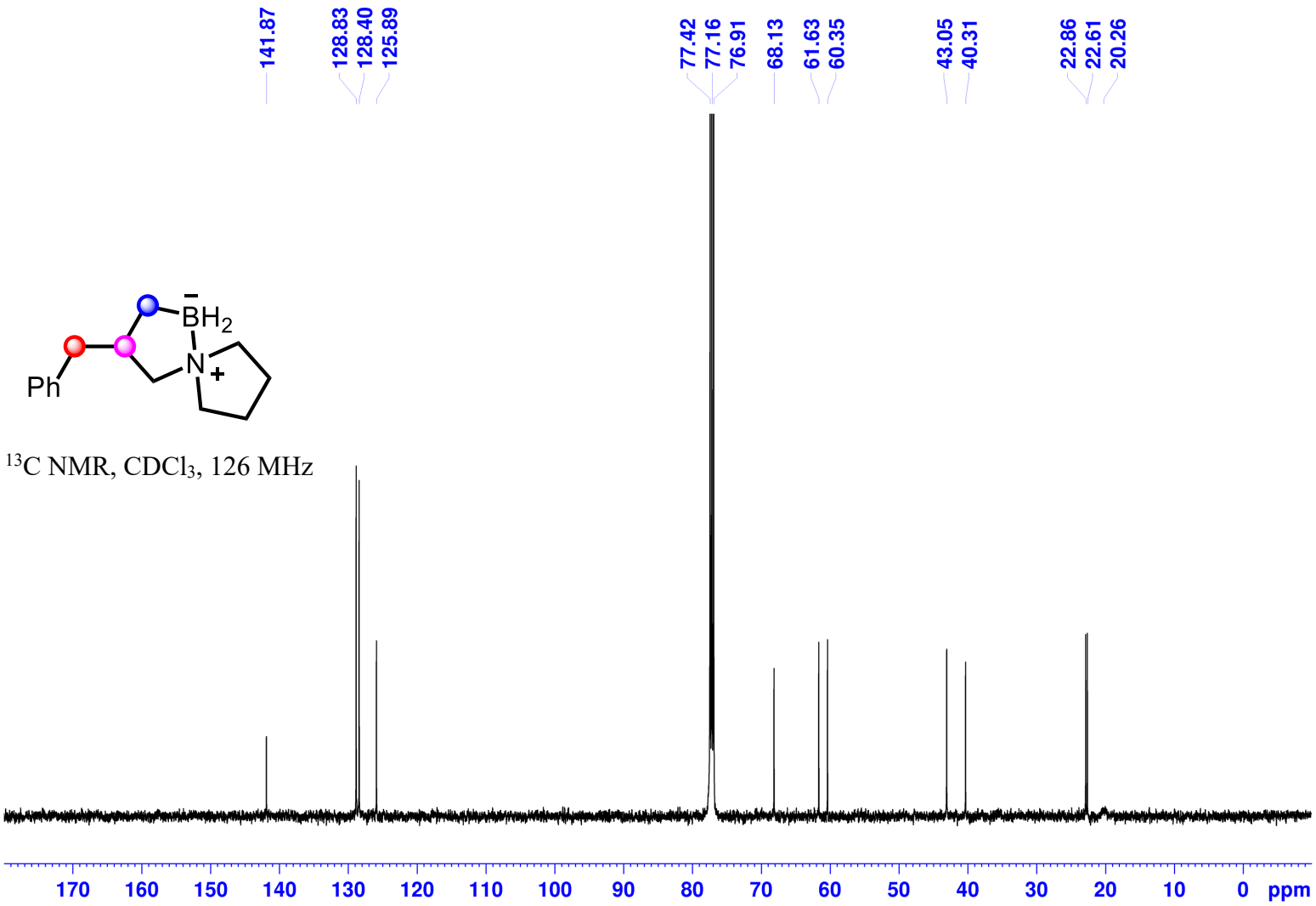
^{11}B NMR, $CDCl_3$, 160 MHz

3-Benzyl-5-aza-1-boraspiro[4.4]nonane (2e):



^{1}H NMR, $CDCl_3$, 500 MHz

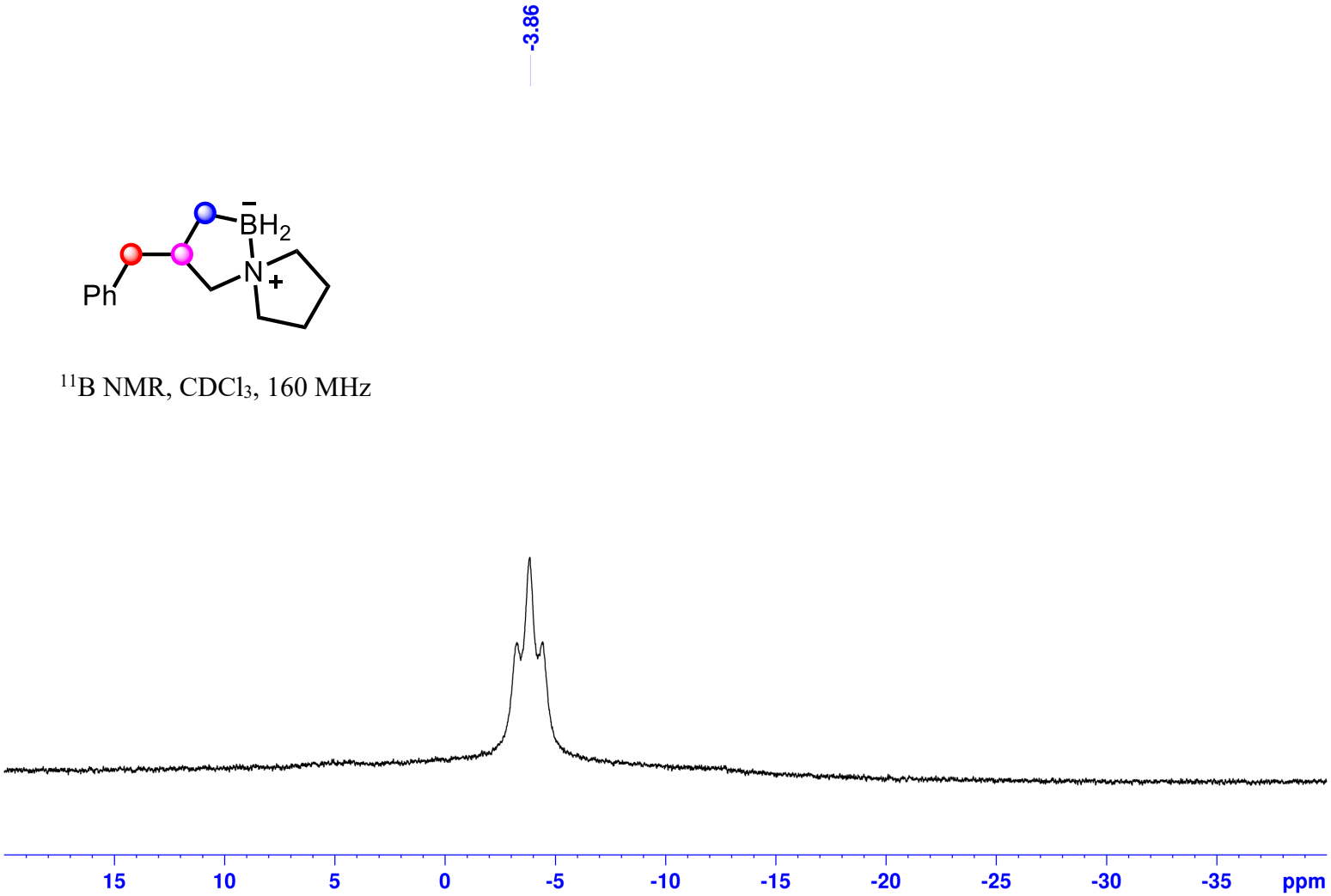
3-Benzyl-5-aza-1-boraspiro[4.4]nonane (2e):



^{13}C NMR, $CDCl_3$, 126 MHz

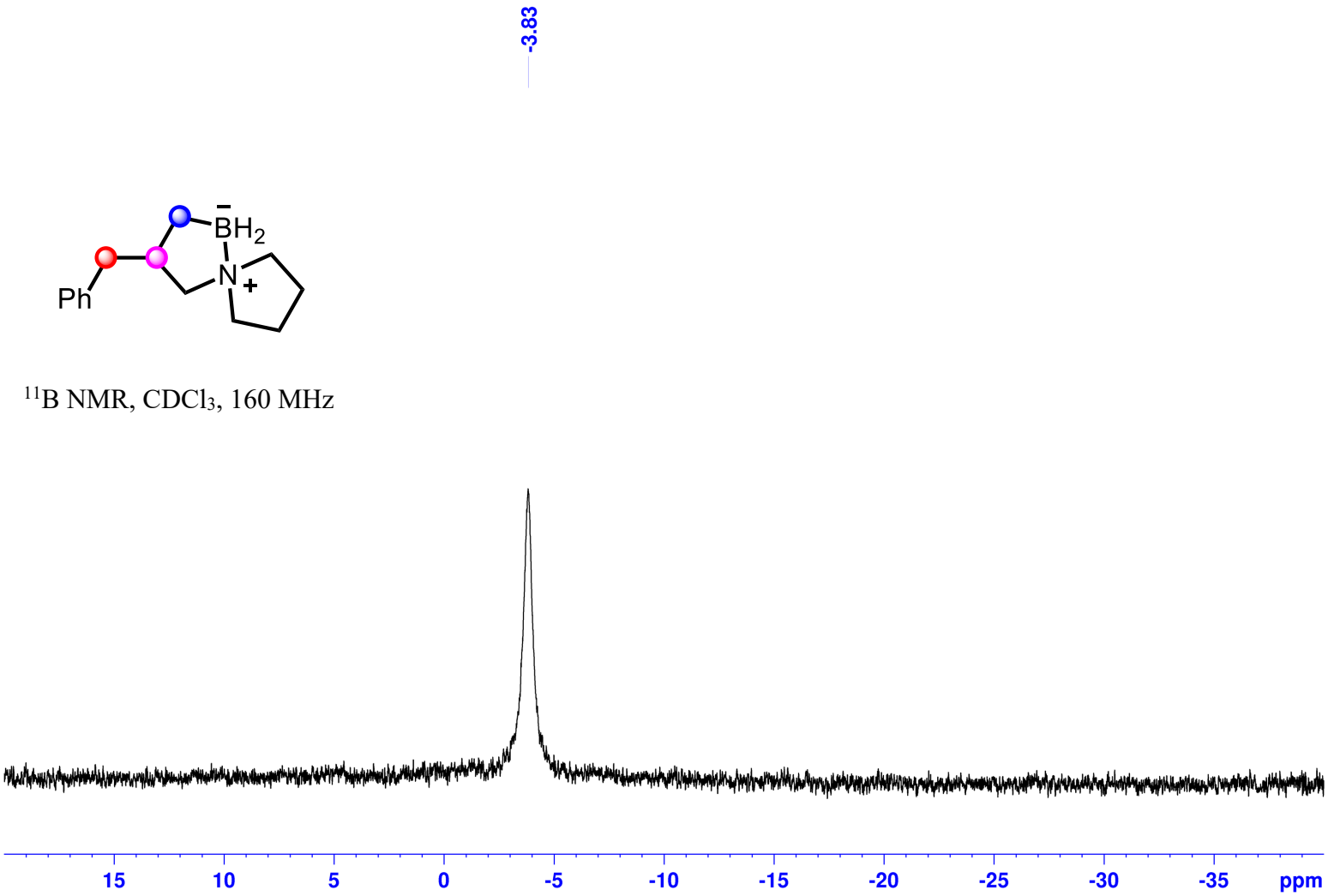
3-Benzyl-5-aza-1-boraspiro[4.4]nonane (2e):

^{11}B NMR, $CDCl_3$, 160 MHz

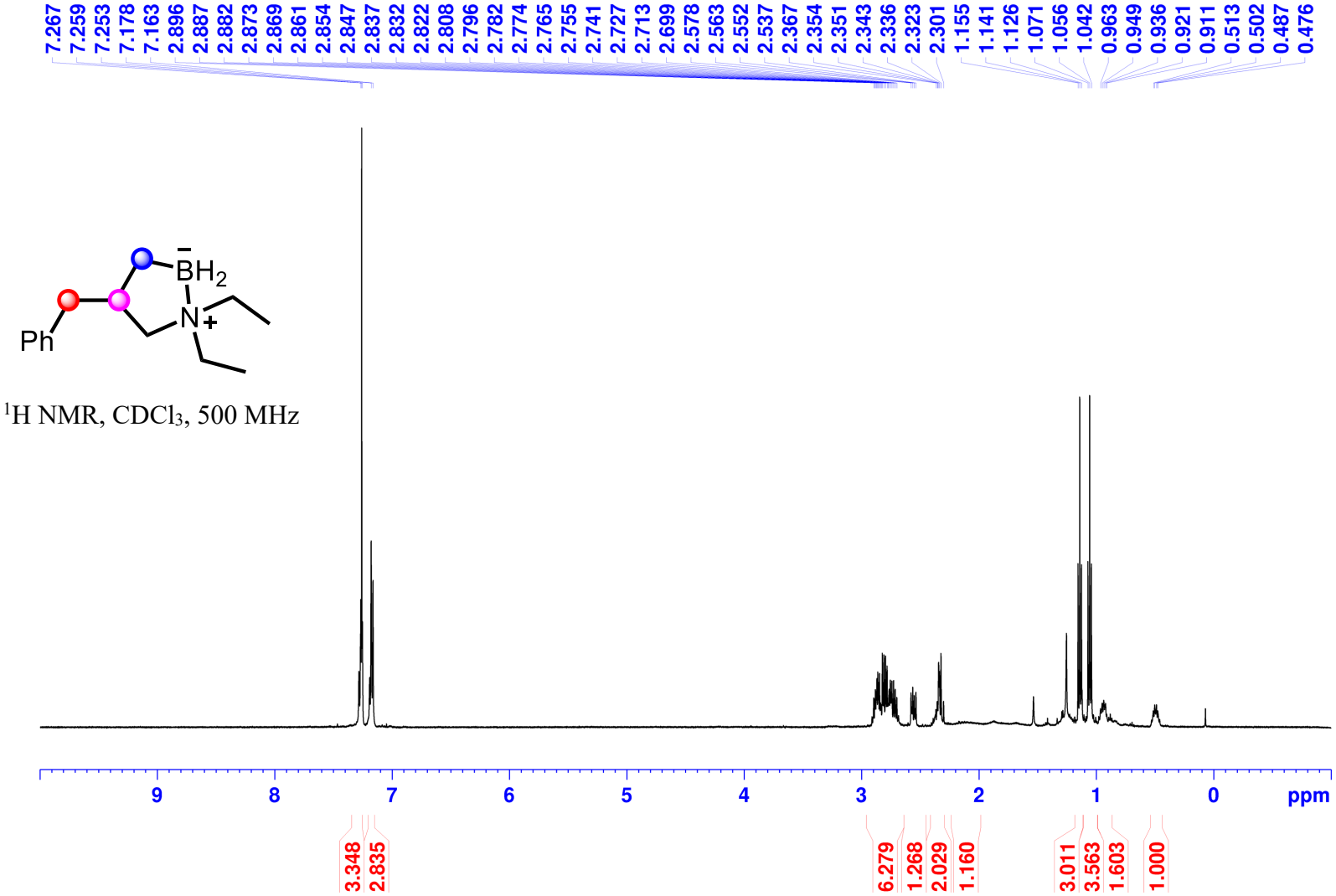


3-Benzyl-5-aza-1-boraspiro[4.4]nonane (2e):

^{11}B NMR, $CDCl_3$, 160 MHz

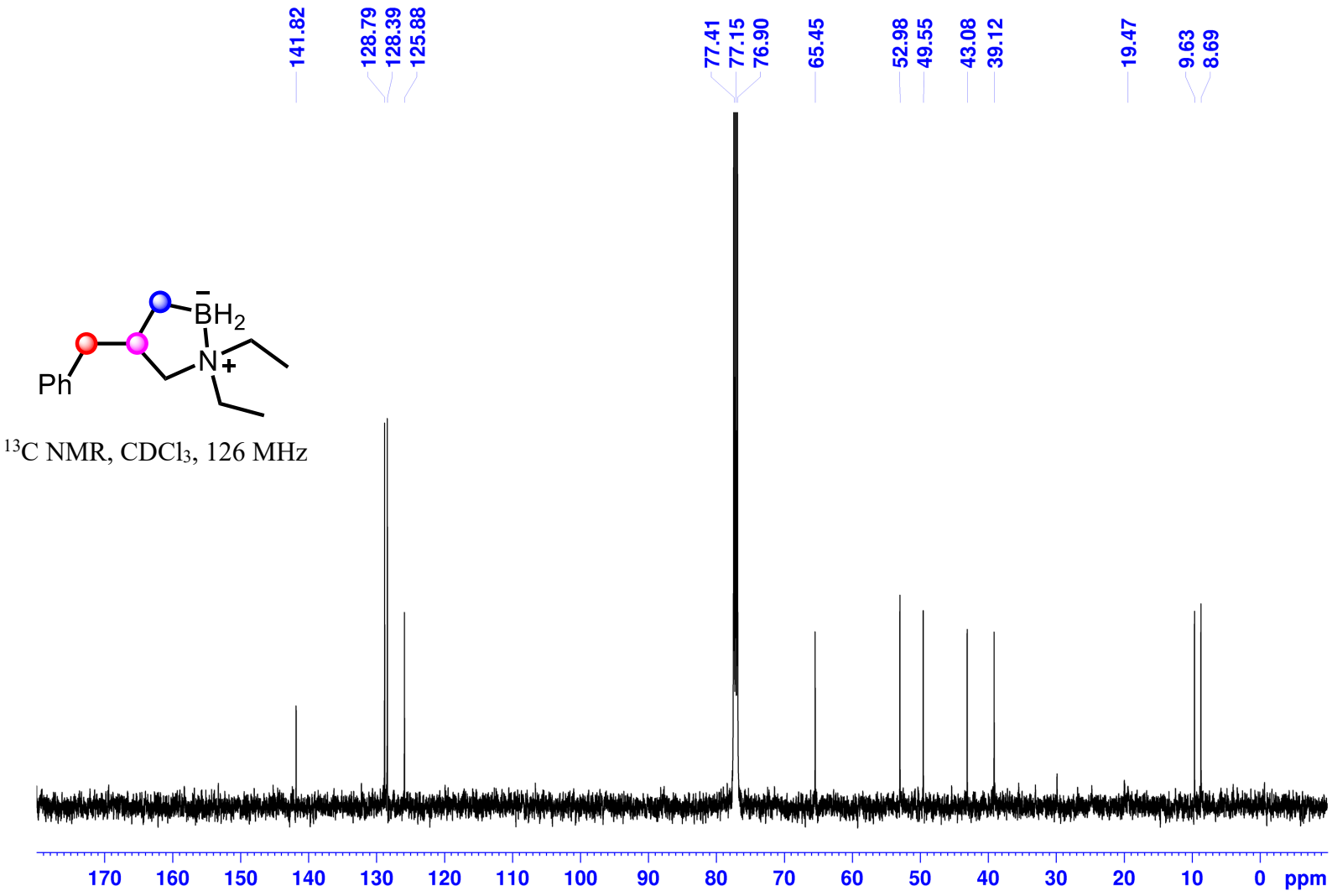


4-Benzyl-1,1-diethyl-1,2-azaborolidine (2f):



^{1}H NMR, $CDCl_3$, 500 MHz

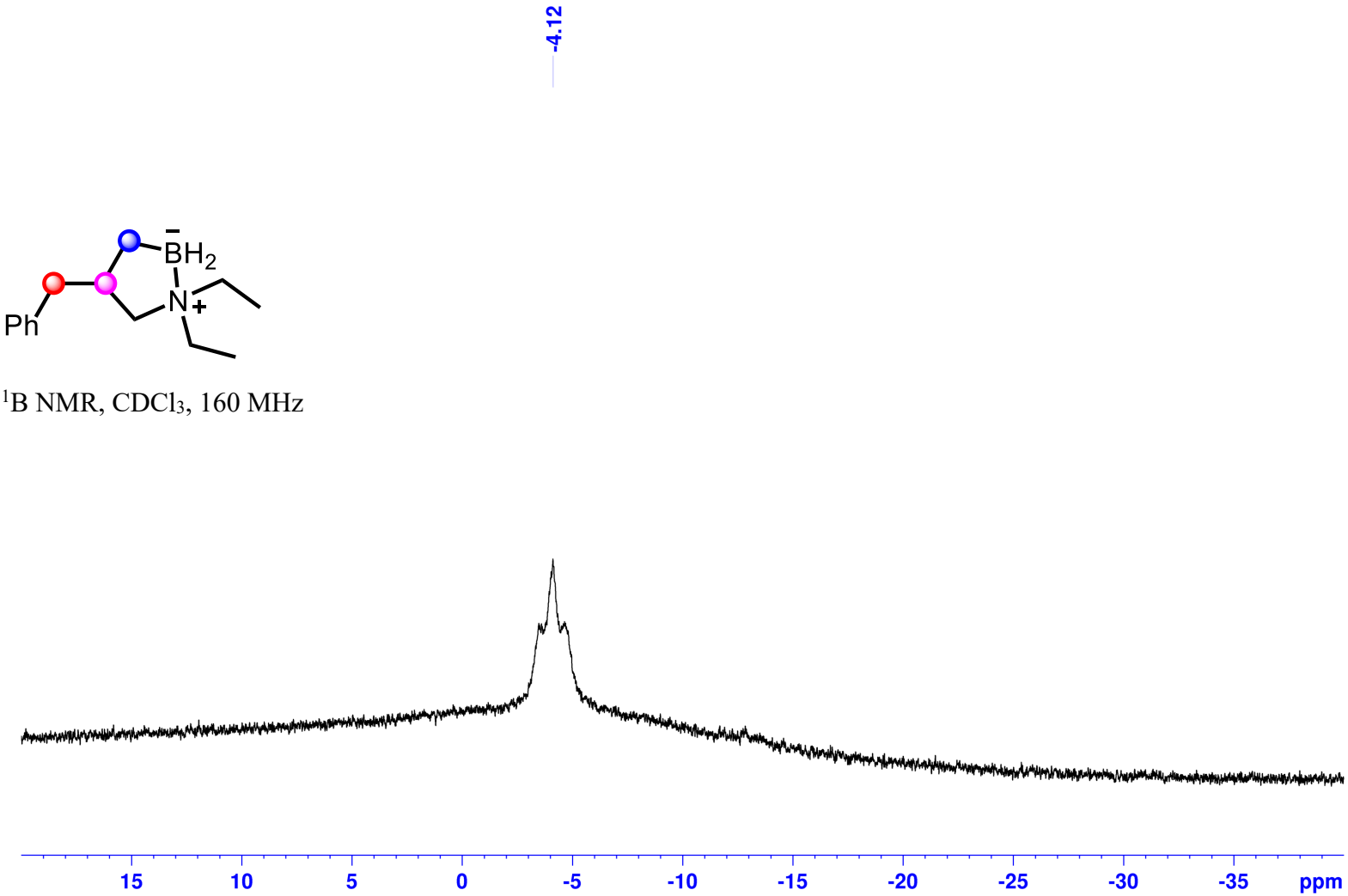
4-Benzyl-1,1-diethyl-1,2-azaborolidine (2f):



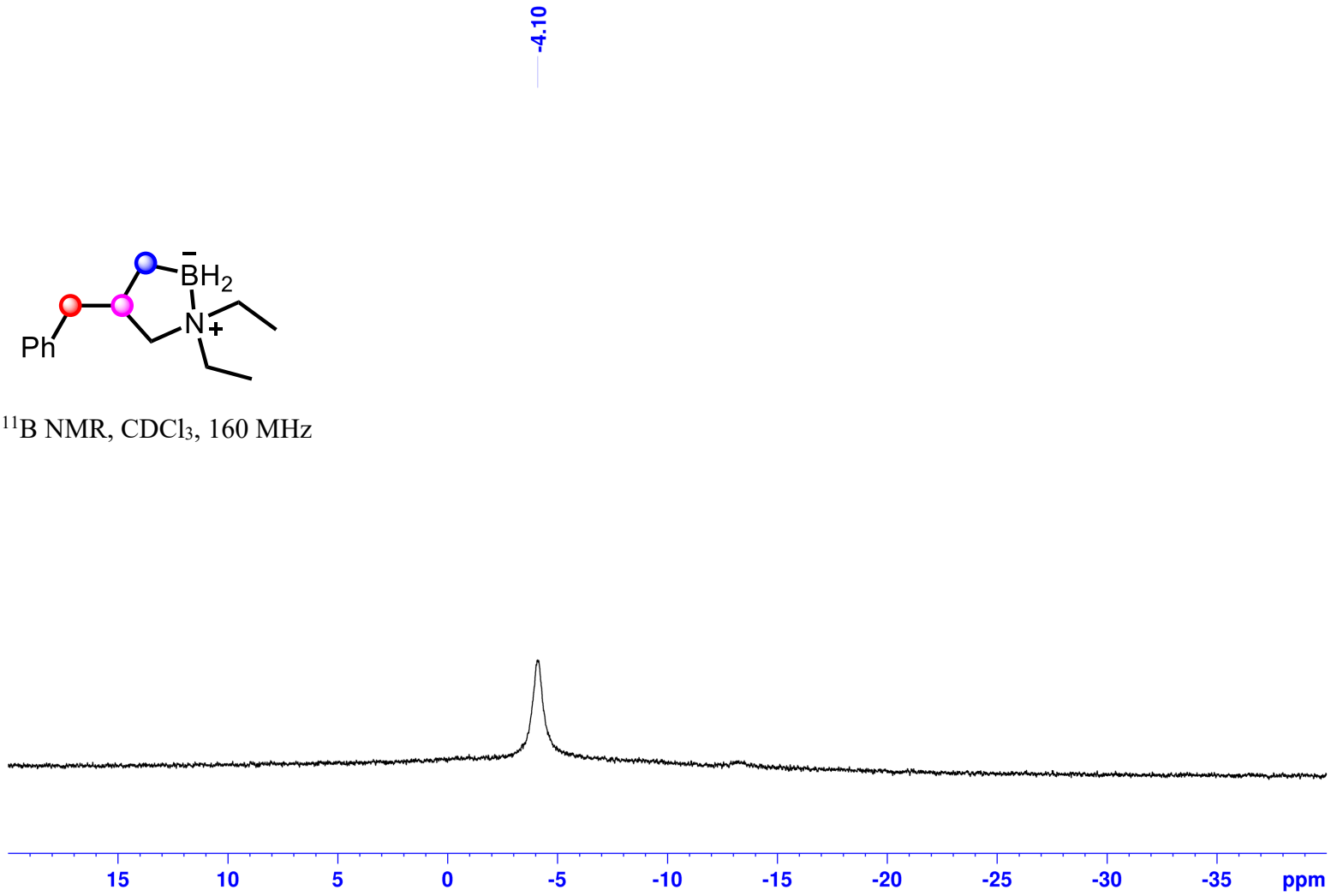
^{13}C NMR, $CDCl_3$, 126 MHz

4-Benzyl-1,1-diethyl-1,2-azaborolidine (2f):

^{11}B NMR, $CDCl_3$, 160 MHz

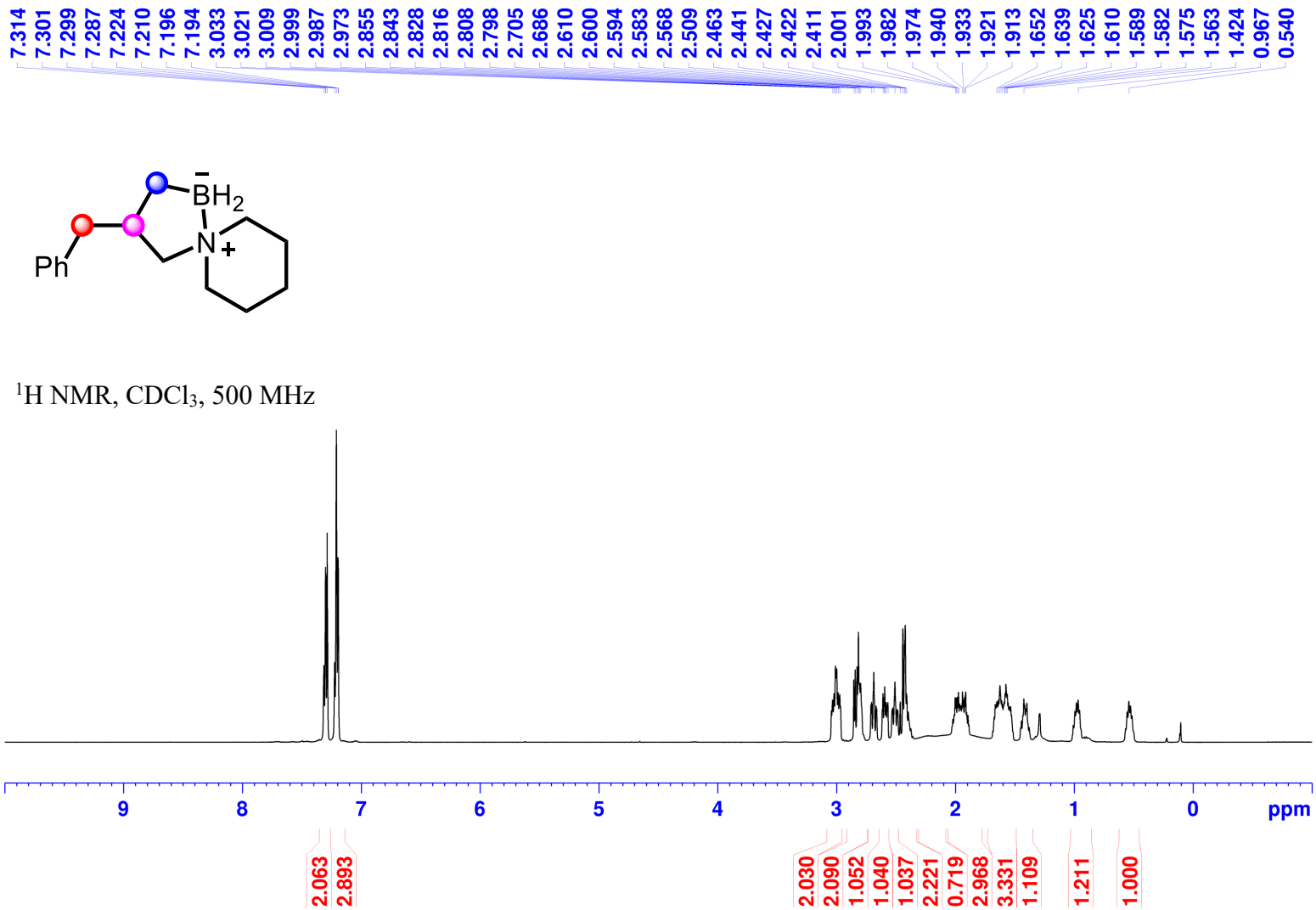


4-Benzyl-1,1-diethyl-1,2-azaborolidine (2f):



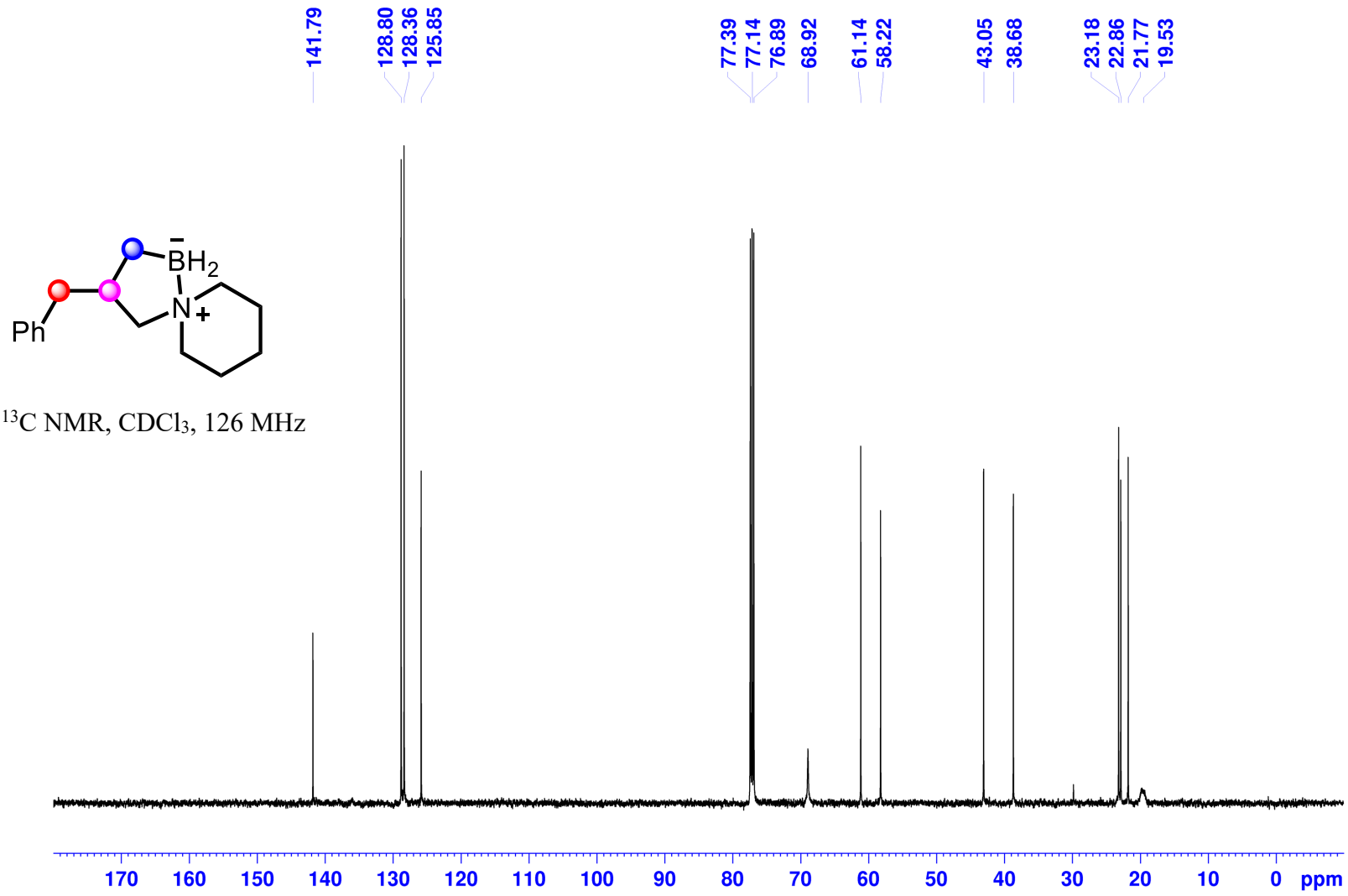
^{11}B NMR, $CDCl_3$, 160 MHz

3-Benzyl-5-aza-1-boraspiro[4.5]decane (2g):



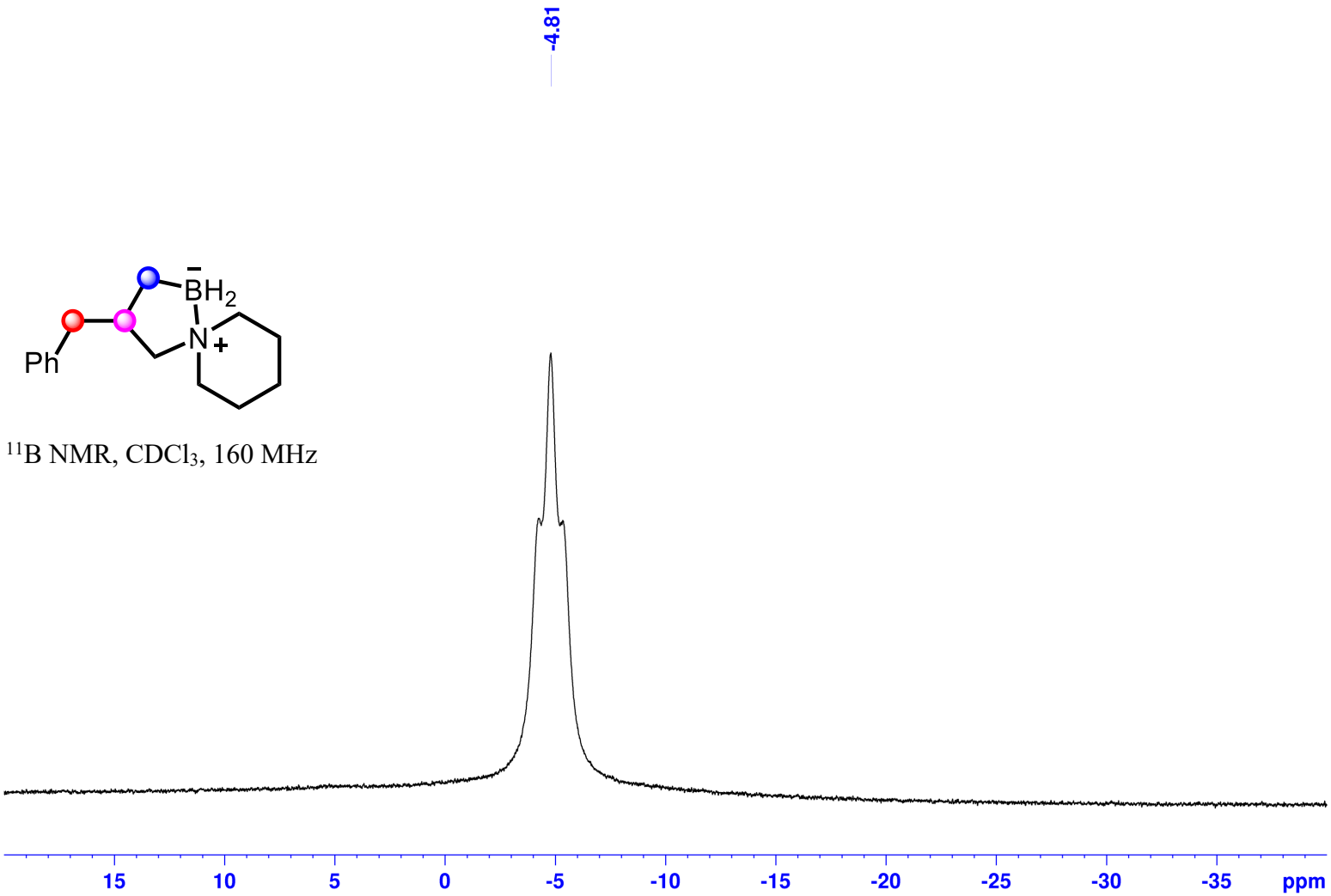
^{1}H NMR, $CDCl_3$, 500 MHz

3-Benzyl-5-aza-1-boraspiro[4.5]decane (2g):



^{13}C NMR, $CDCl_3$, 126 MHz

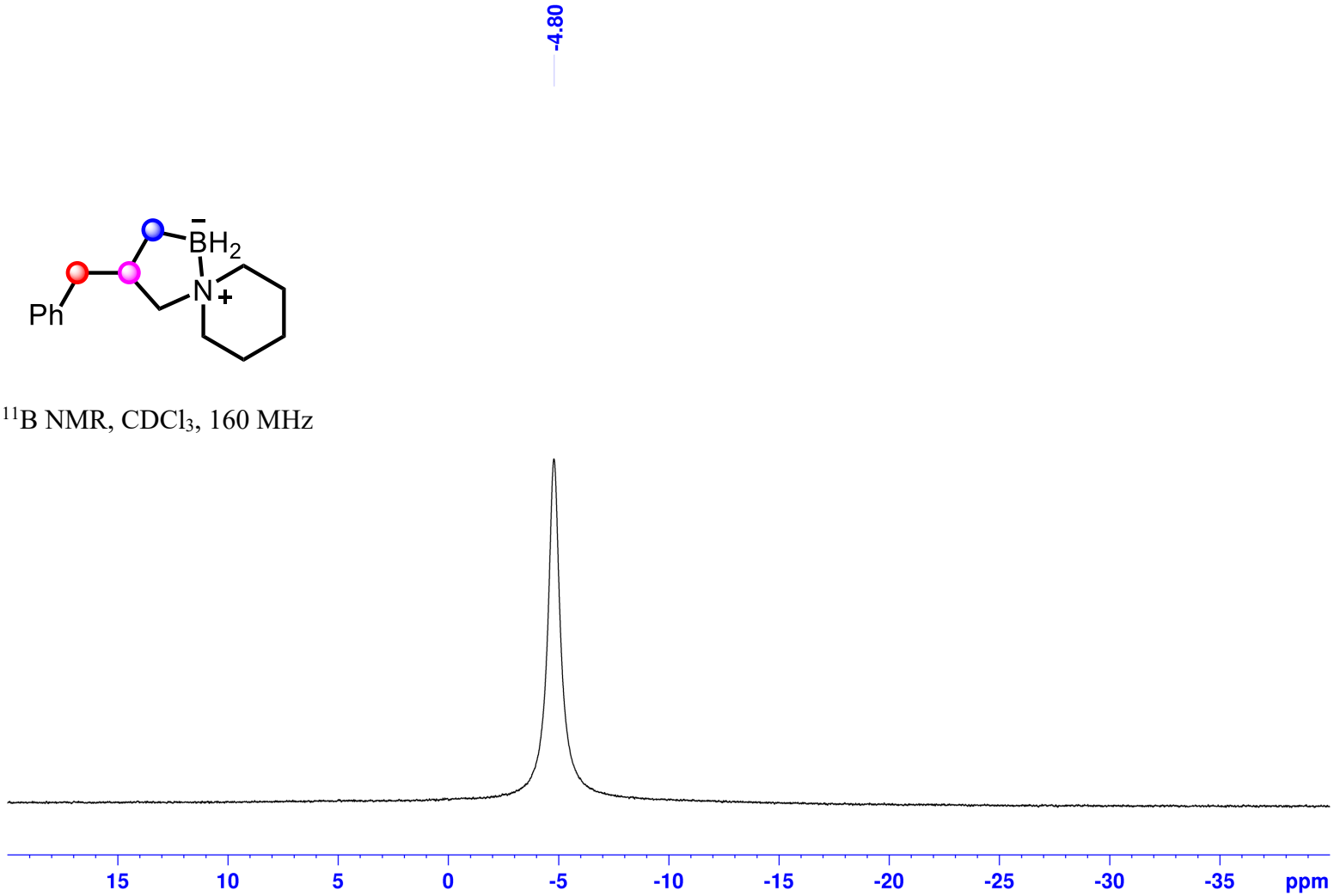
3-Benzyl-5-aza-1-boraspiro[4.5]decane (2g):



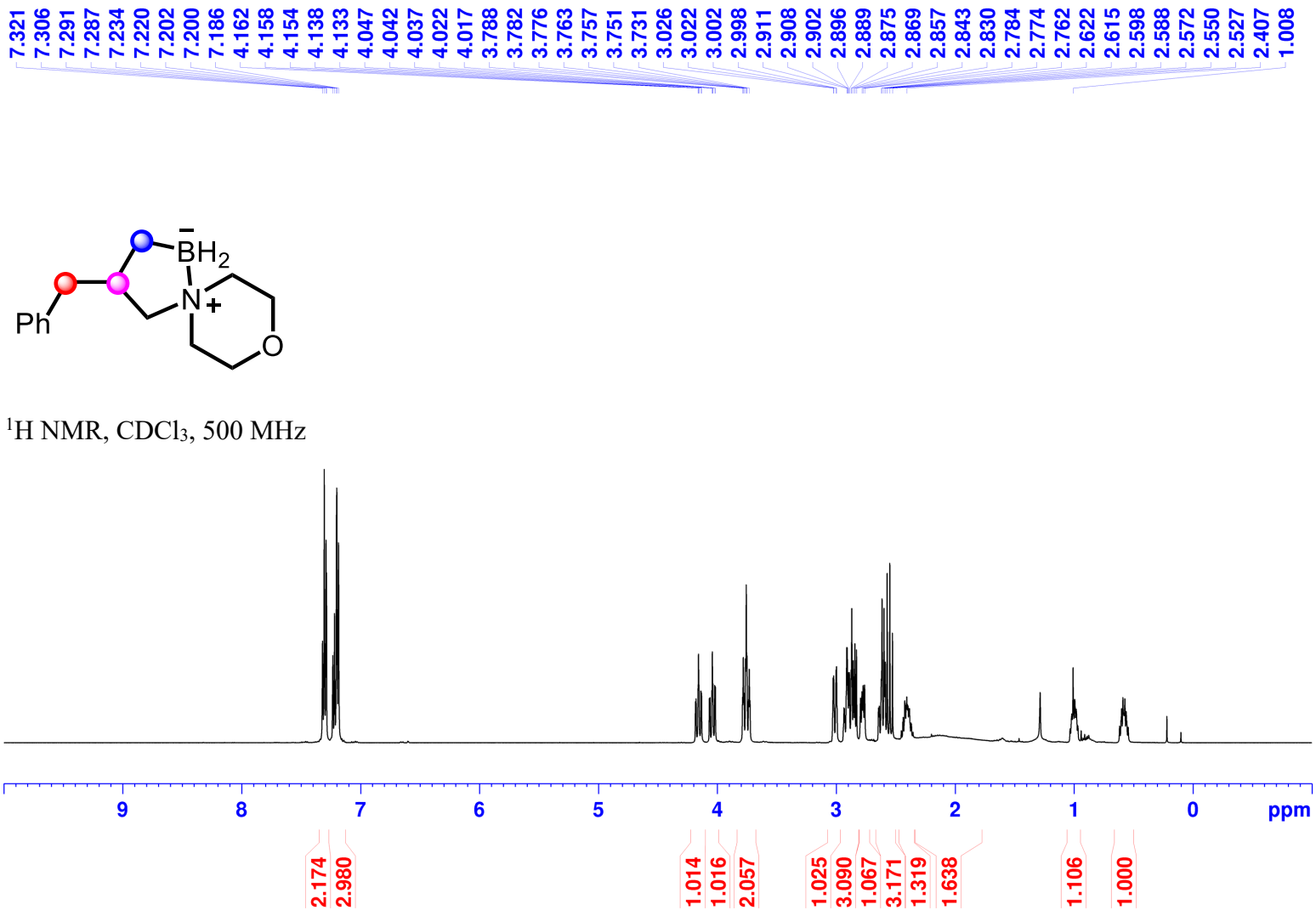
^{11}B NMR, $CDCl_3$, 160 MHz

3-Benzyl-5-aza-1-boraspiro[4.5]decane (2g):

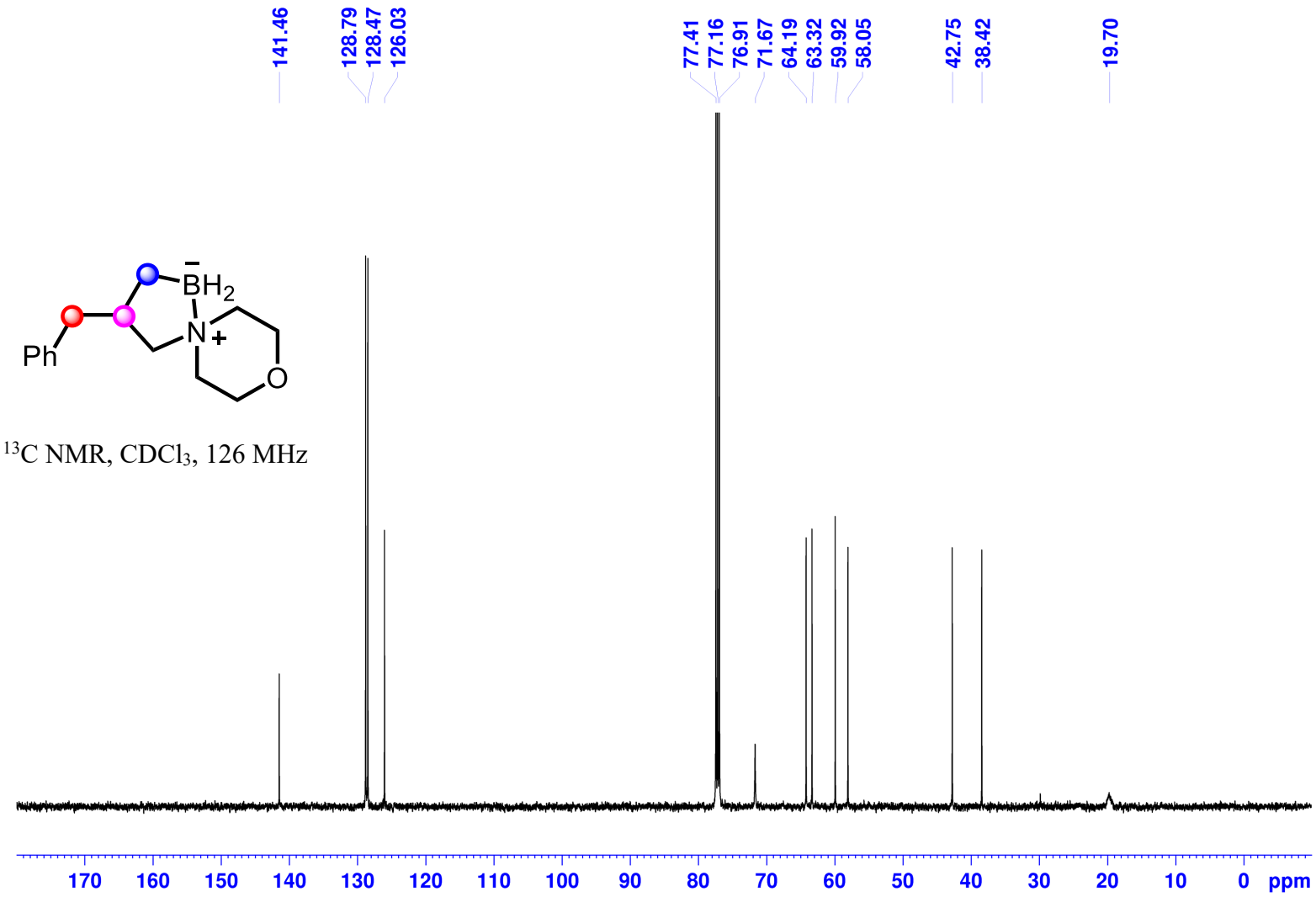
^{11}B NMR, $CDCl_3$, 160 MHz



3-Benzyl-8-oxa-5-aza-1-boraspiro[4.5]decane (2h):



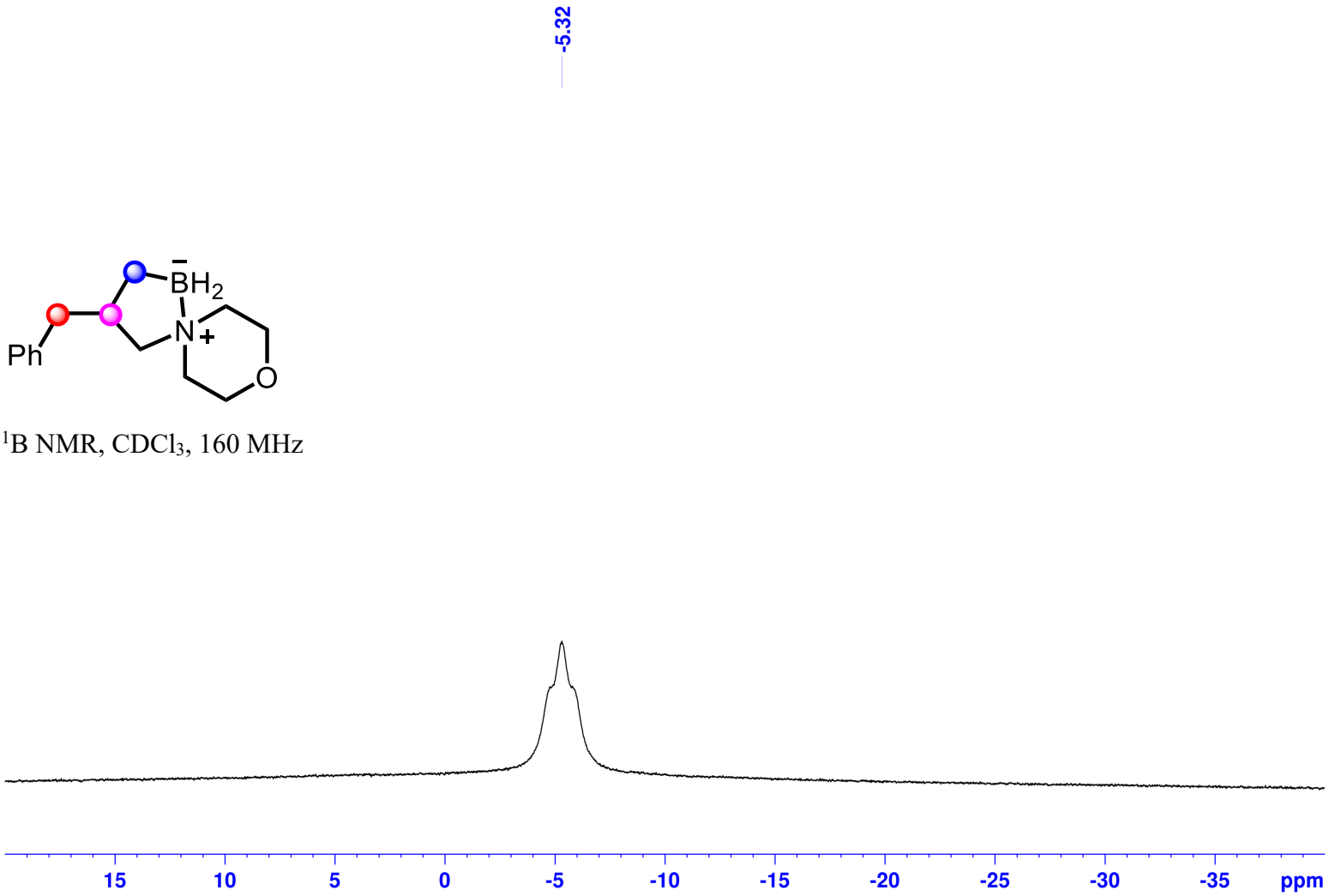
3-Benzyl-8-oxa-5-aza-1-boraspiro[4.5]decane (2h):



^{13}C NMR, $CDCl_3$, 126 MHz

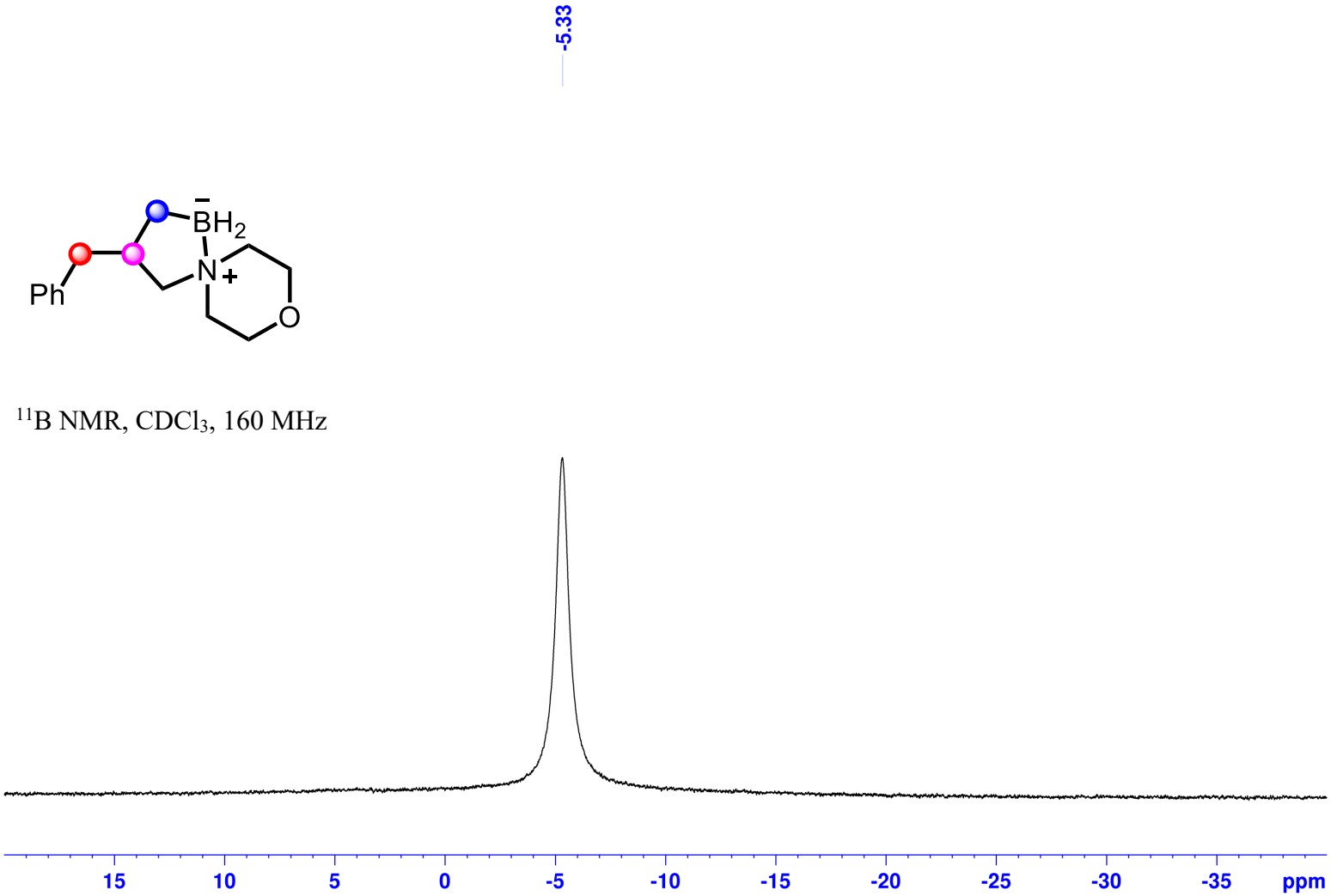
3-Benzyl-8-oxa-5-aza-1-boraspiro[4.5]decane (2h):

^{11}B NMR, $CDCl_3$, 160 MHz

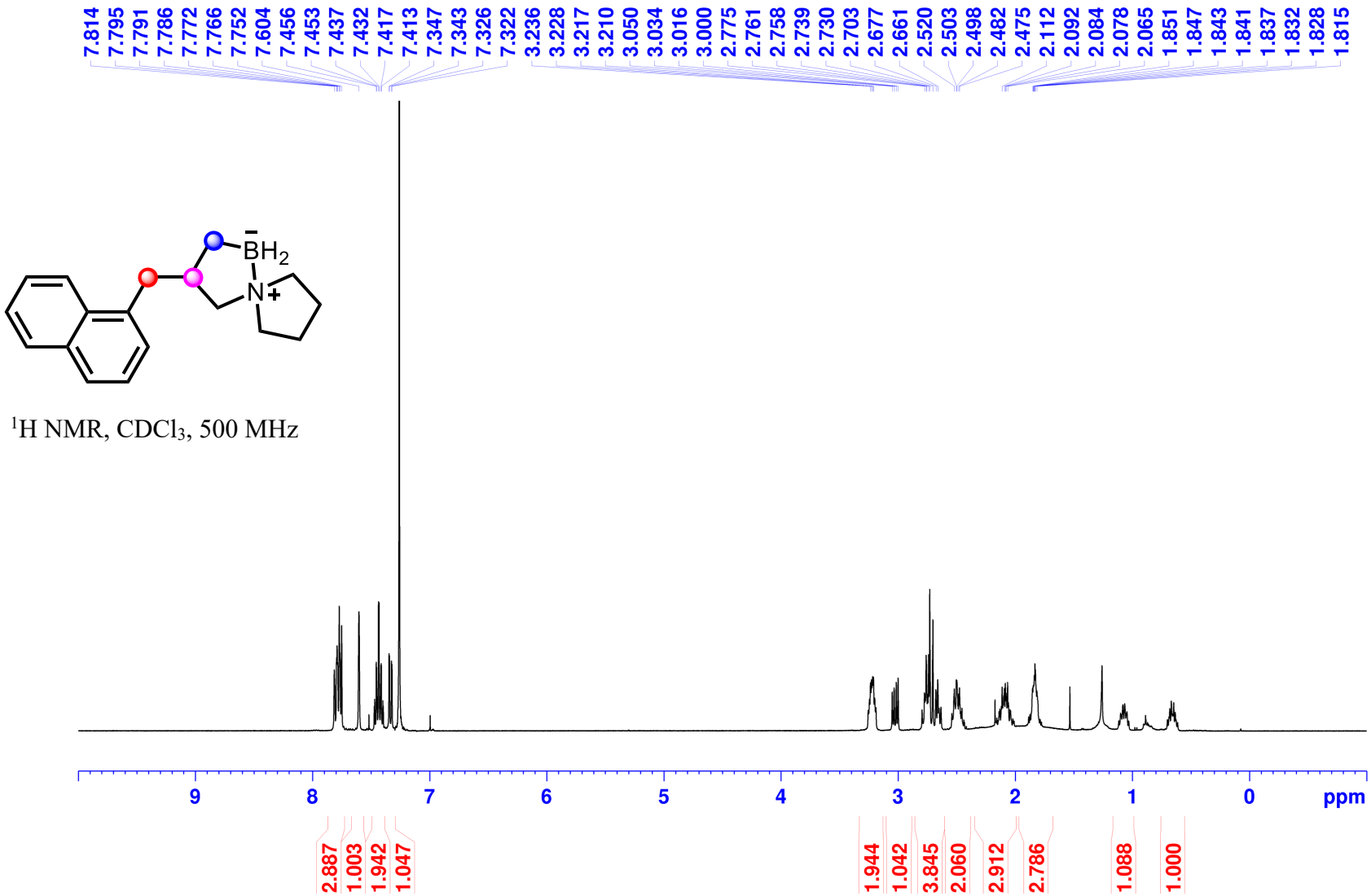


3-Benzyl-8-oxa-5-aza-1-boraspiro[4.5]decane (2h):

^{11}B NMR, $CDCl_3$, 160 MHz

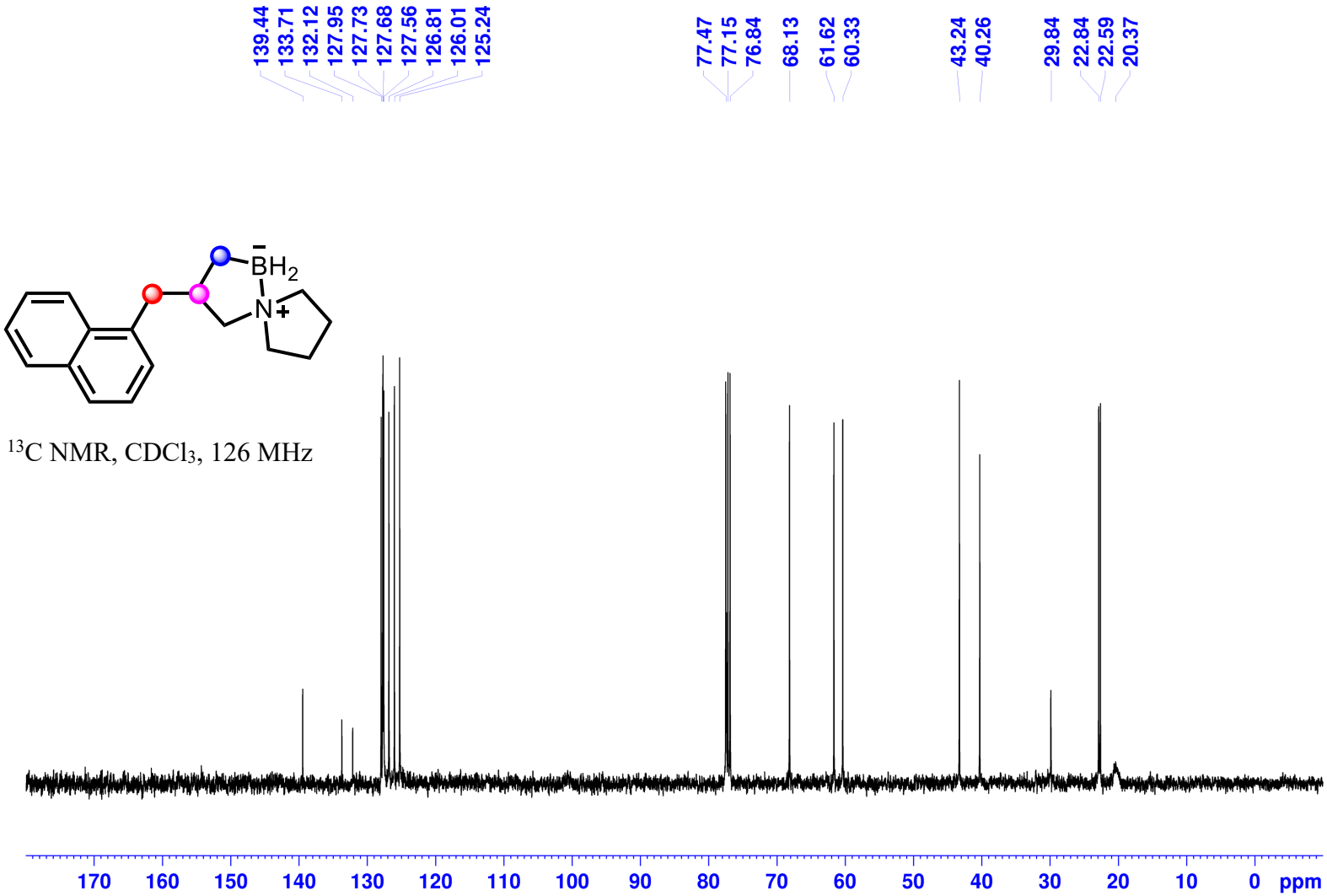


3-(Naphthalen-1-ylmethyl)-5-aza-1-boraspiro[4.4]nonane (2i):

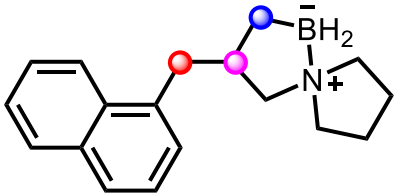


^{1}H NMR, $CDCl_3$, 500 MHz

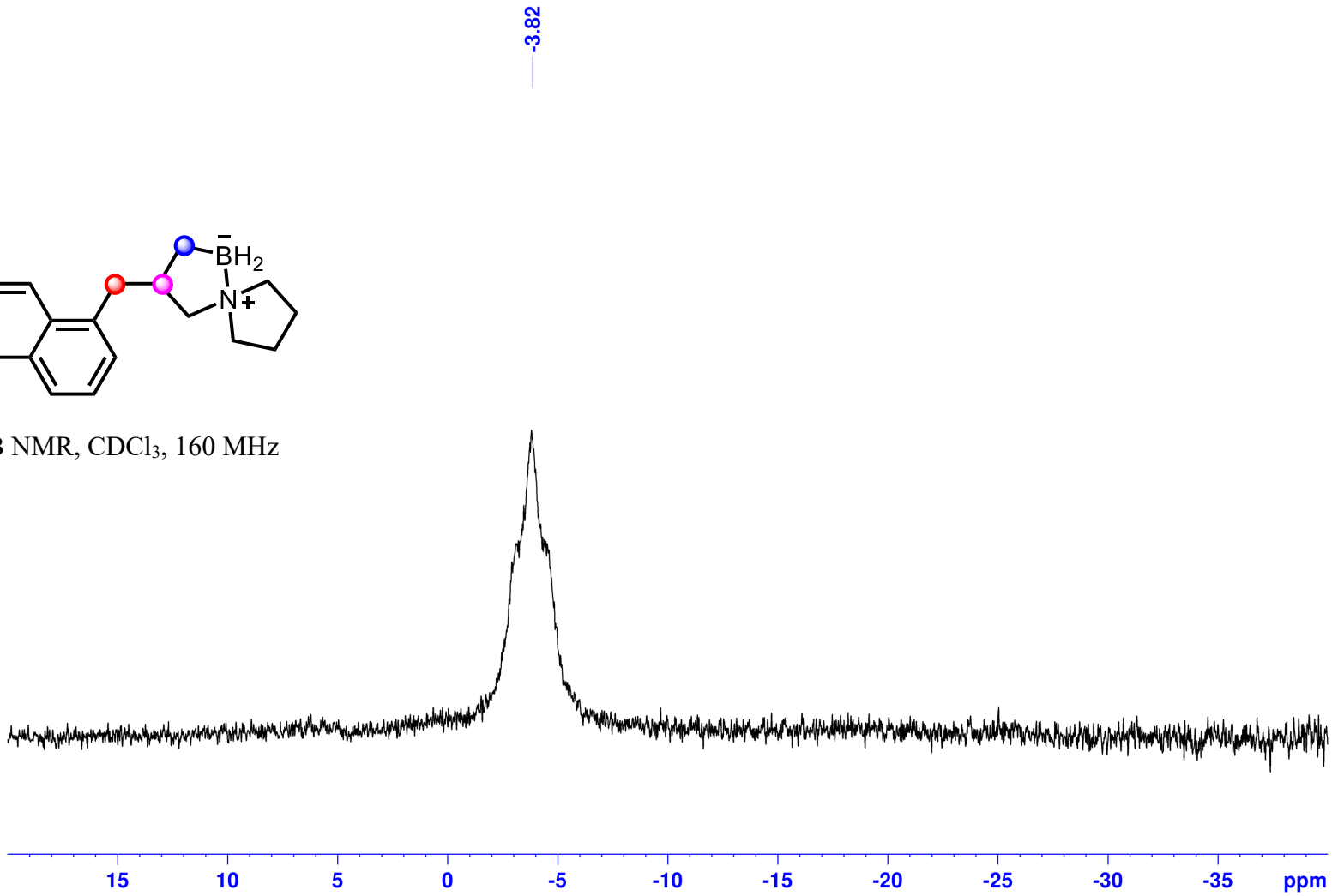
3-(Naphthalen-1-ylmethyl)-5-aza-1-boraspiro[4.4]nonane (2i):



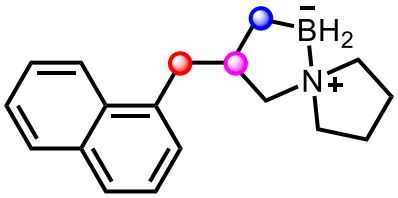
3-(Naphthalen-1-ylmethyl)-5-aza-1-boraspiro[4.4]nonane (2i):



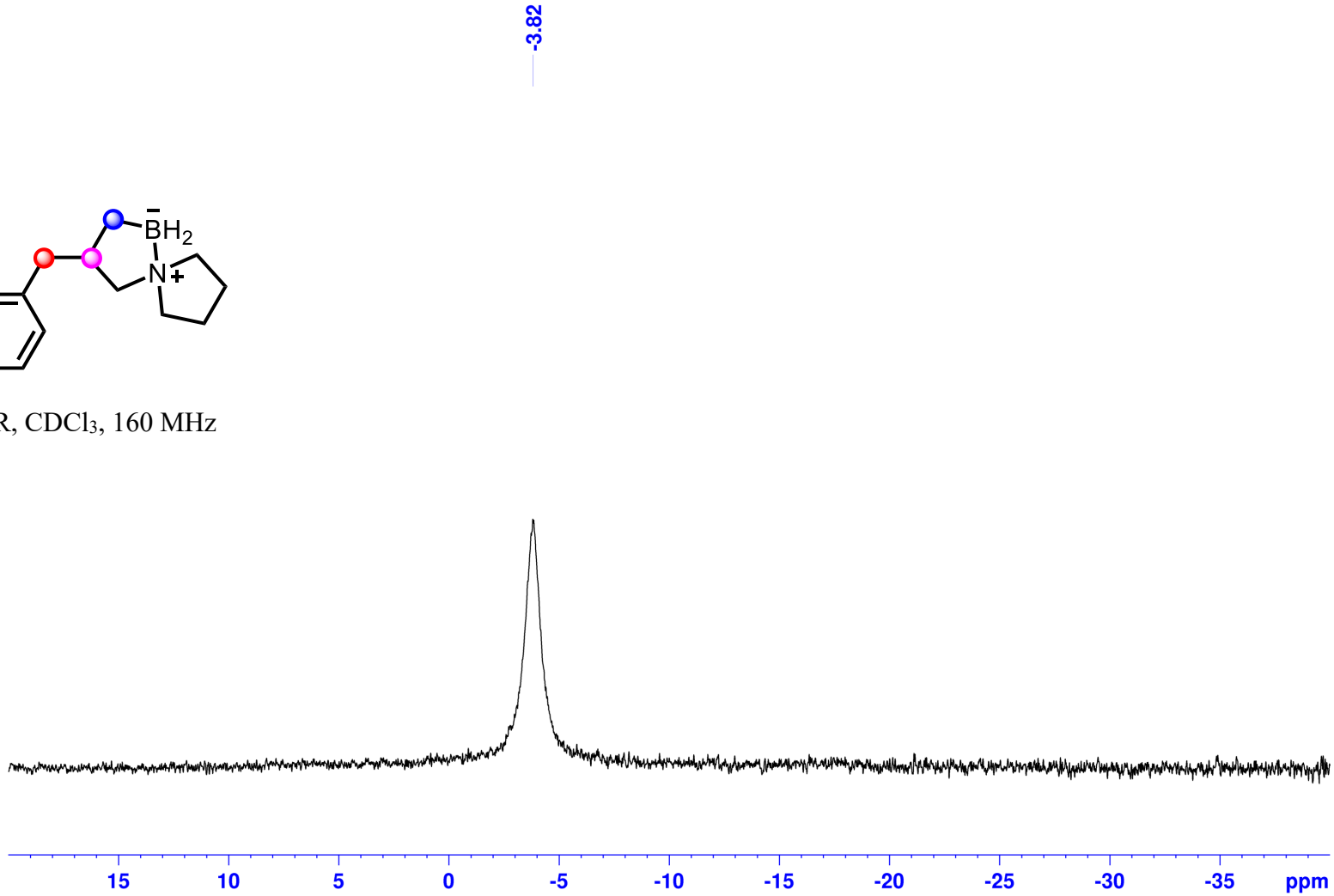
^{11}B NMR, $CDCl_3$, 160 MHz



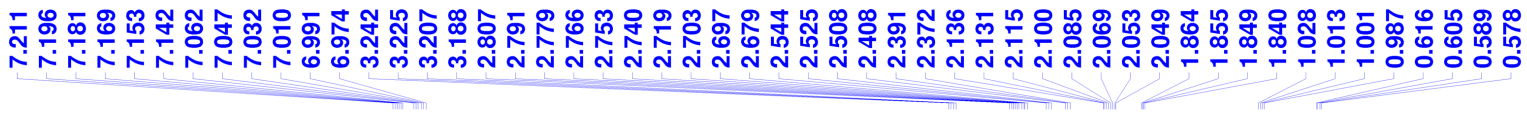
3-(Naphthalen-1-ylmethyl)-5-aza-1-boraspiro[4.4]nonane (2i):

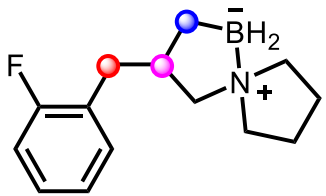


^{11}B NMR, $CDCl_3$, 160 MHz

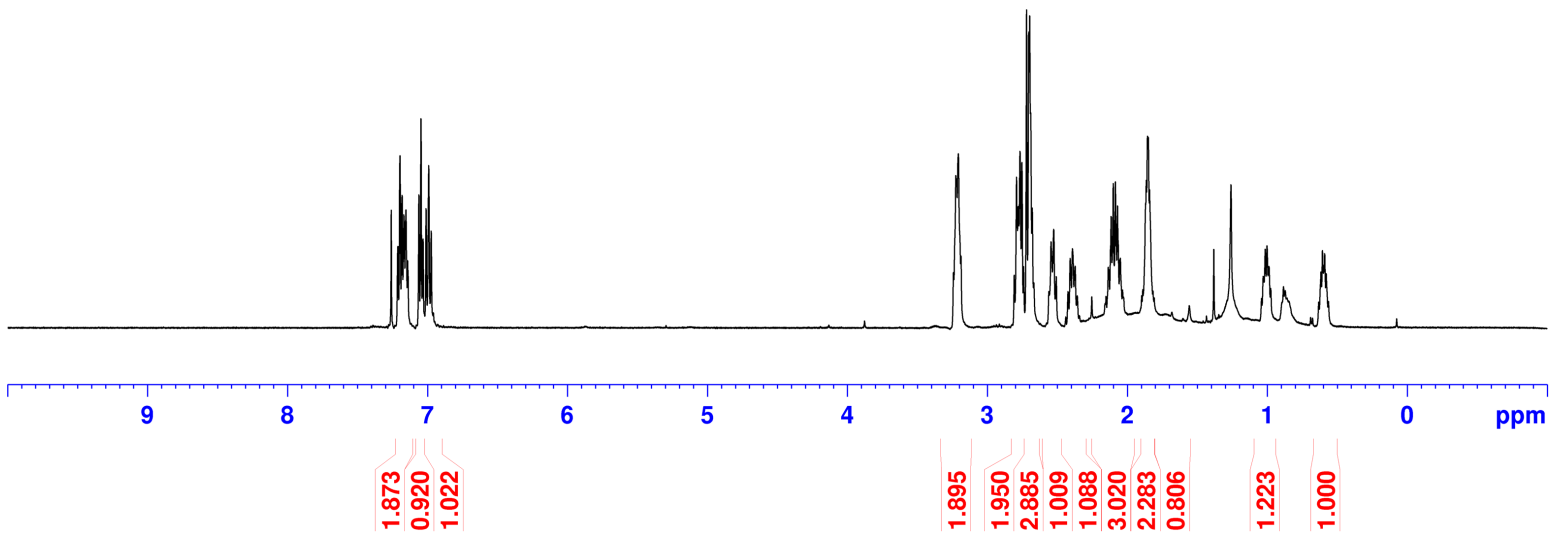


3-(2-Fluorobenzyl)-5-aza-1-boraspiro[4.4]nonane (2j):

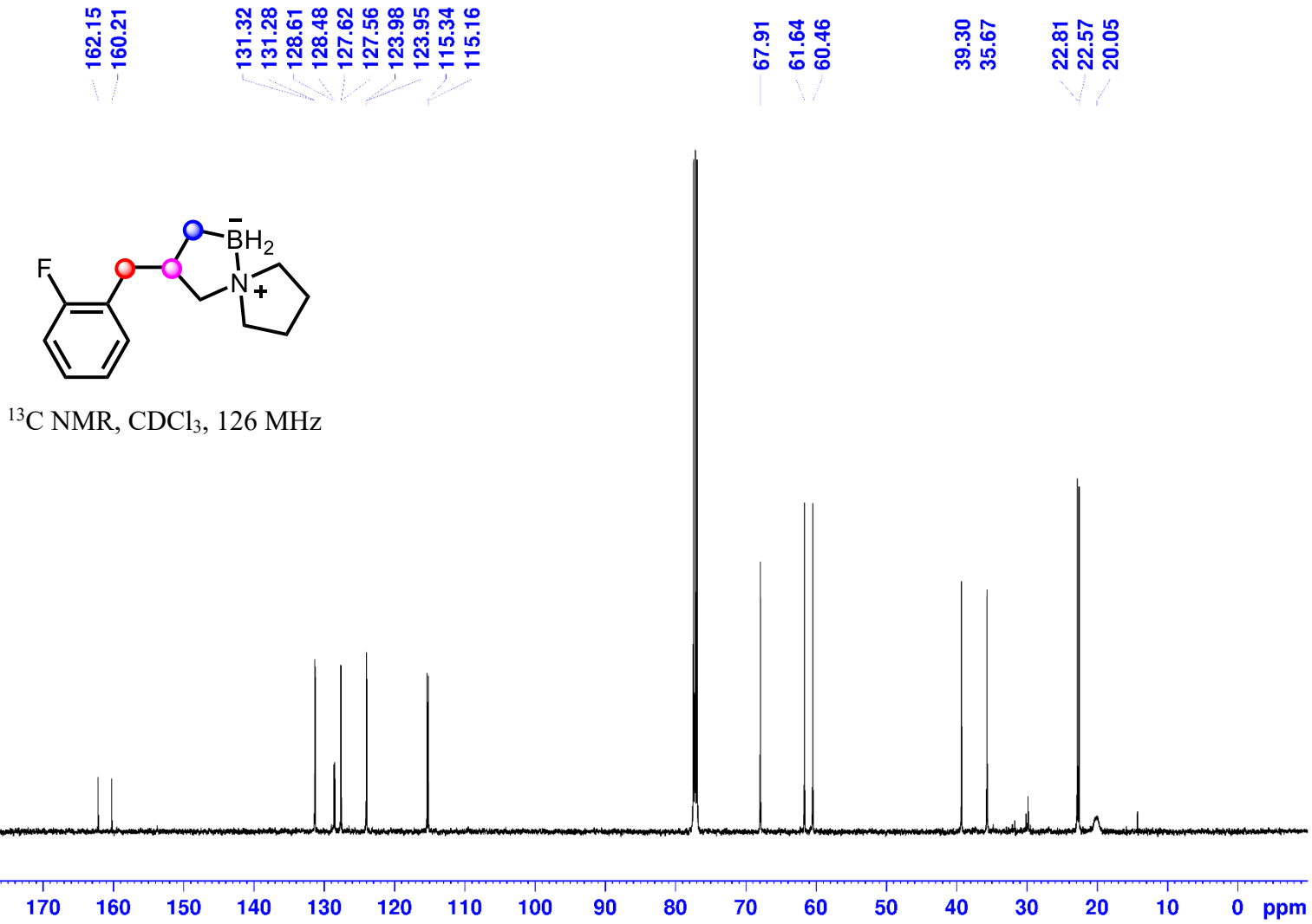




^{1}H NMR, $CDCl_3$, 500 MHz



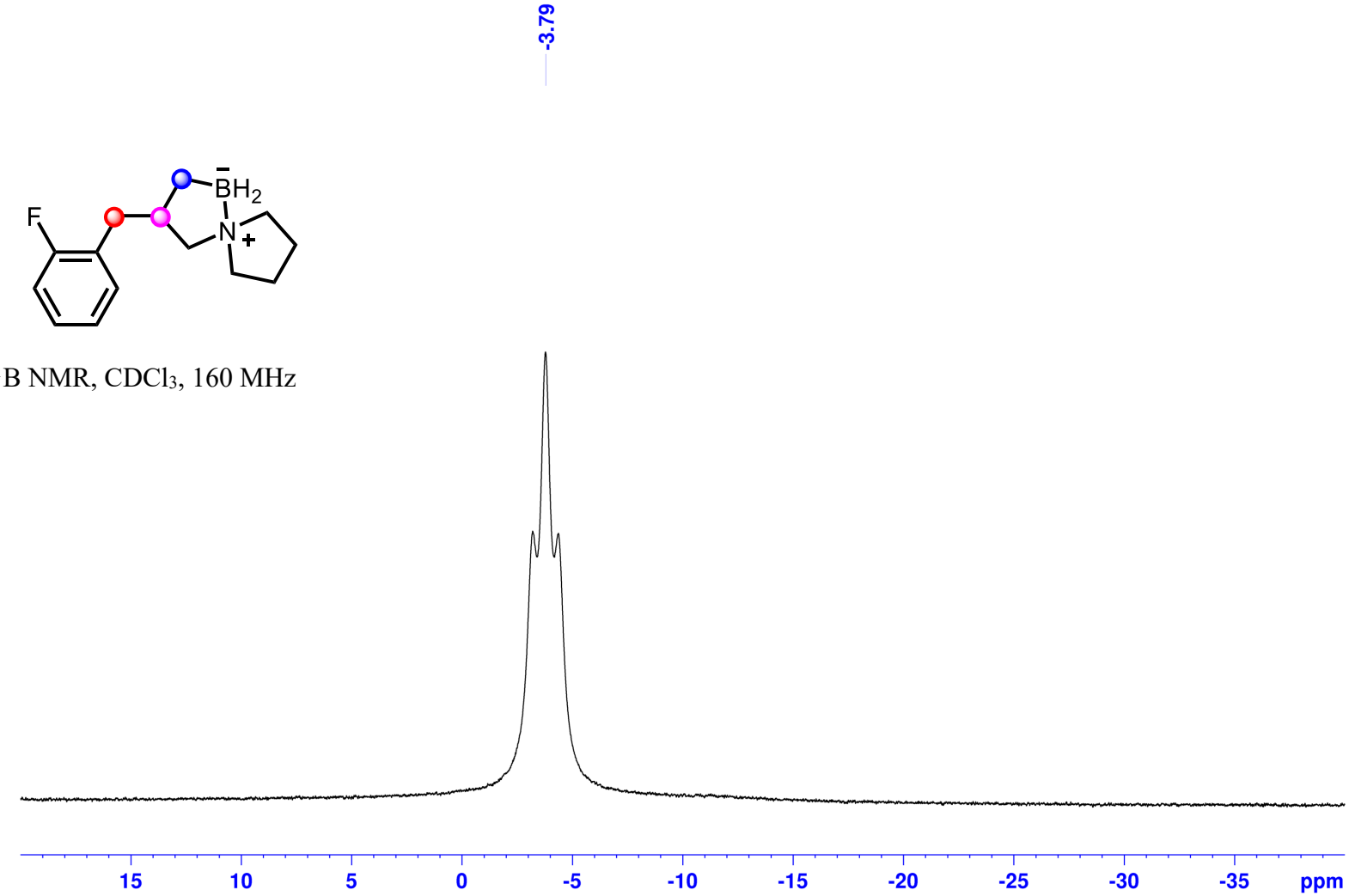
3-(2-Fluorobenzyl)-5-aza-1-boraspiro[4.4]nonane (2j):



^{13}C NMR, $CDCl_3$, 126 MHz

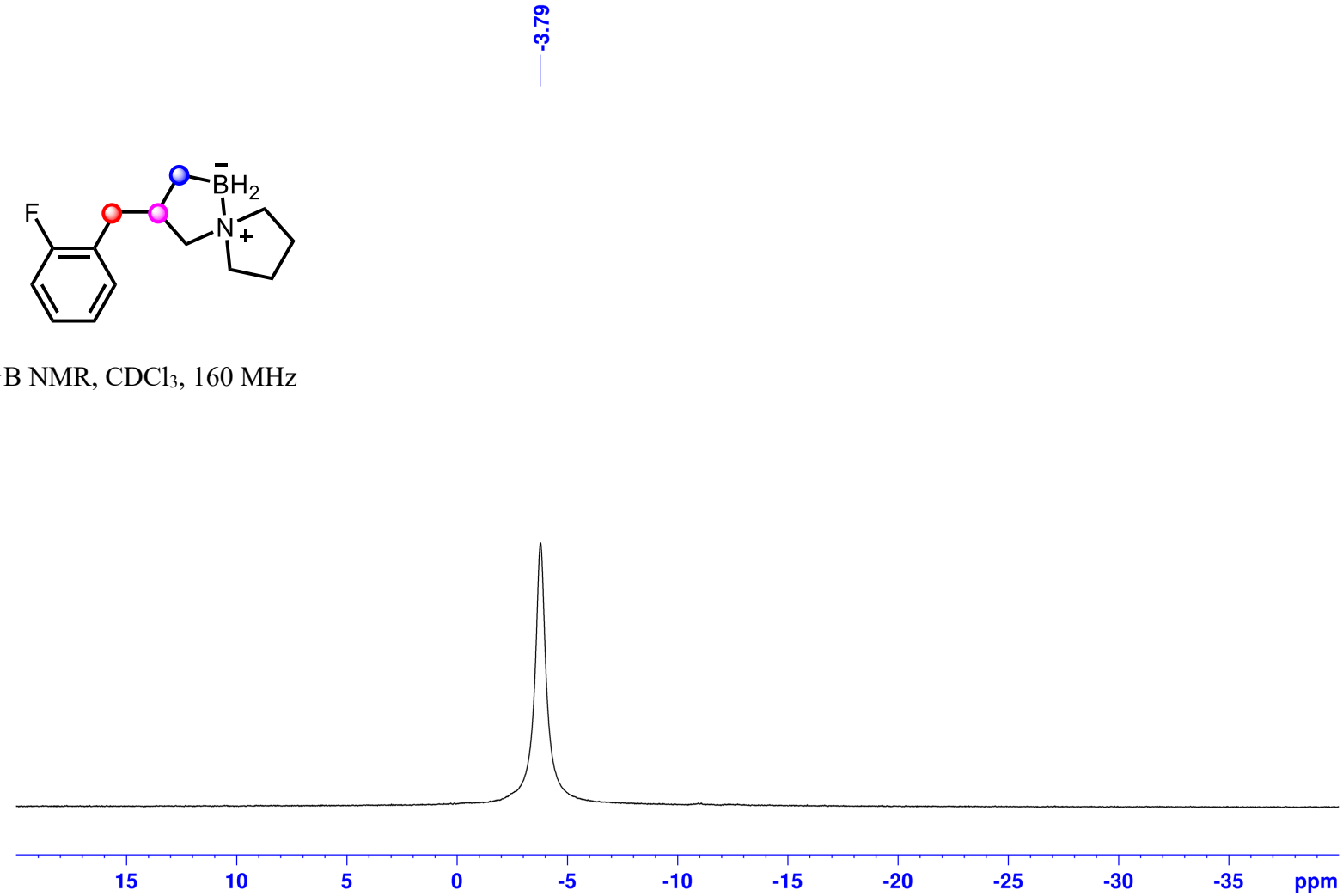
3-(2-Fluorobenzyl)-5-aza-1-boraspiro[4.4]nonane (2j):

^{11}B NMR, $CDCl_3$, 160 MHz

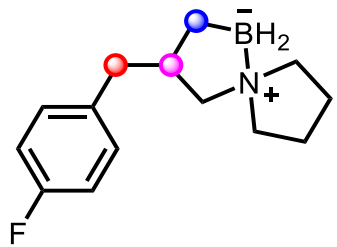


3-(2-Fluorobenzyl)-5-aza-1-boraspiro[4.4]nonane (2j):

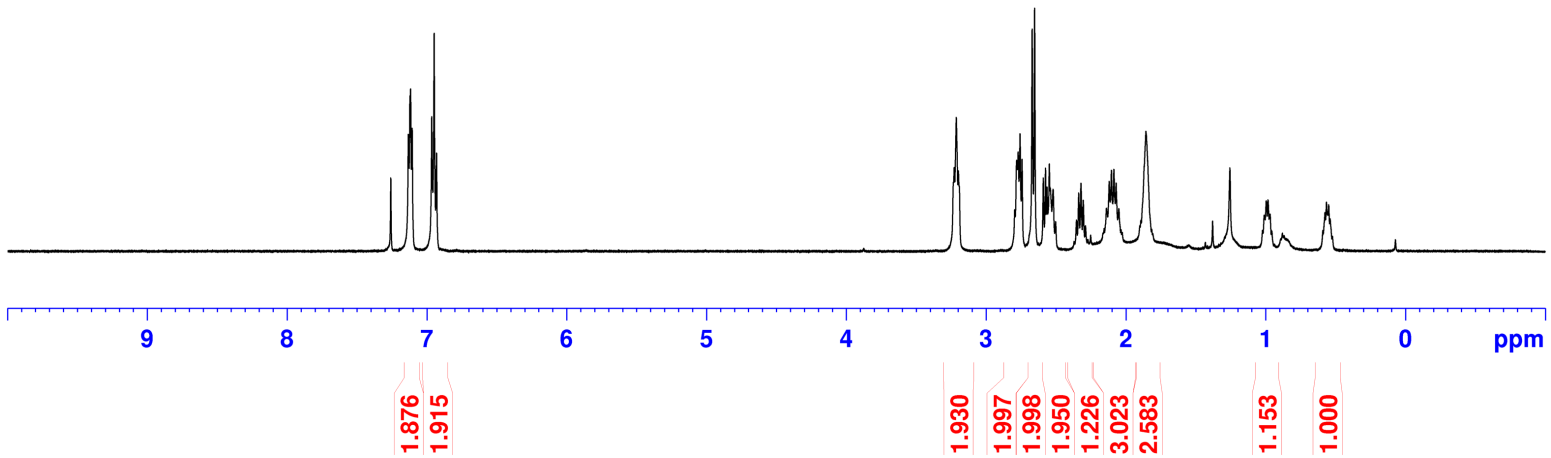
^{11}B NMR, $CDCl_3$, 160 MHz



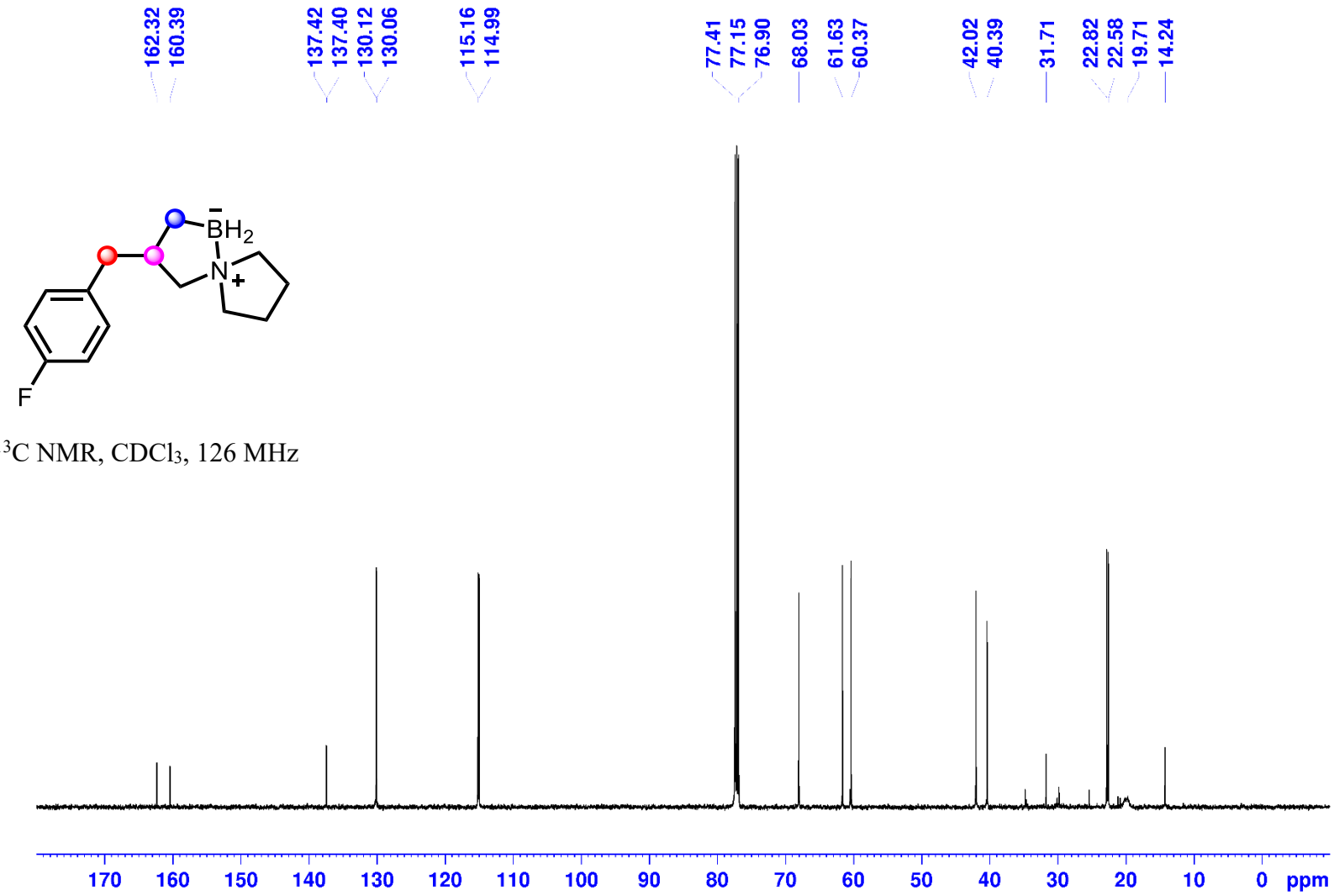
3-(4-Fluorobenzyl)-5-aza-1-boraspiro[4.4]nonane (2k):



^{1}H NMR, $CDCl_3$, 500 MHz

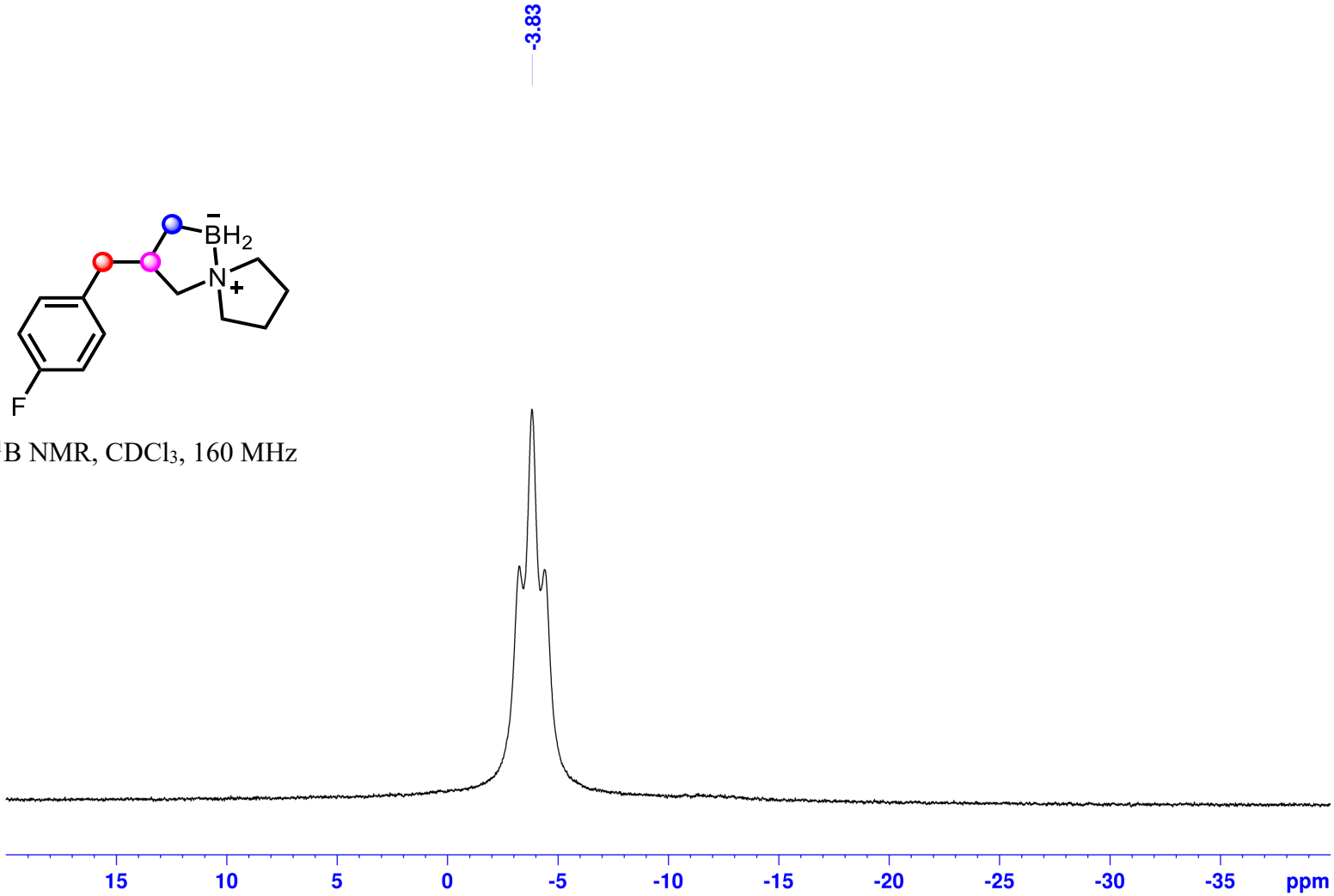


3-(4-Fluorobenzyl)-5-aza-1-boraspiro[4.4]nonane (2k):



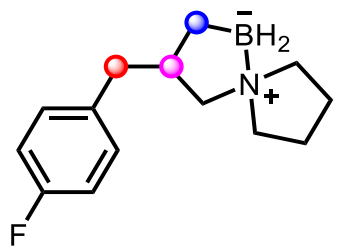
^{13}C NMR, $CDCl_3$, 126 MHz

3-(4-Fluorobenzyl)-5-aza-1-boraspiro[4.4]nonane (2k):

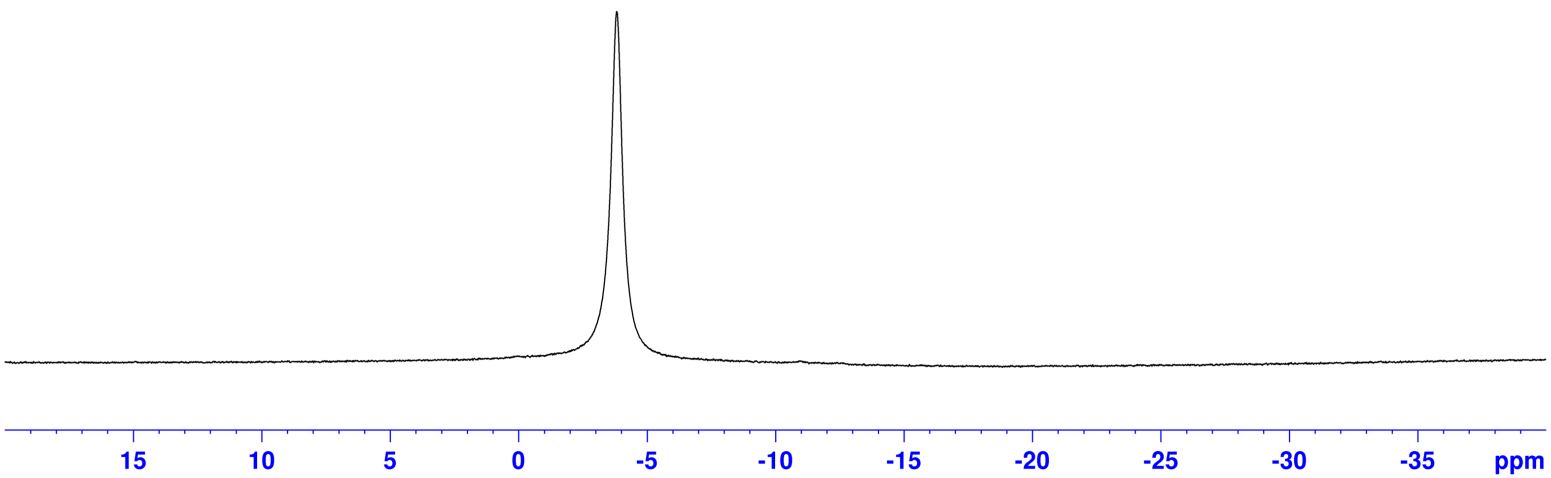


^{11}B NMR, $CDCl_3$, 160 MHz

3-(4-Fluorobenzyl)-5-aza-1-boraspiro[4.4]nonane (2k):

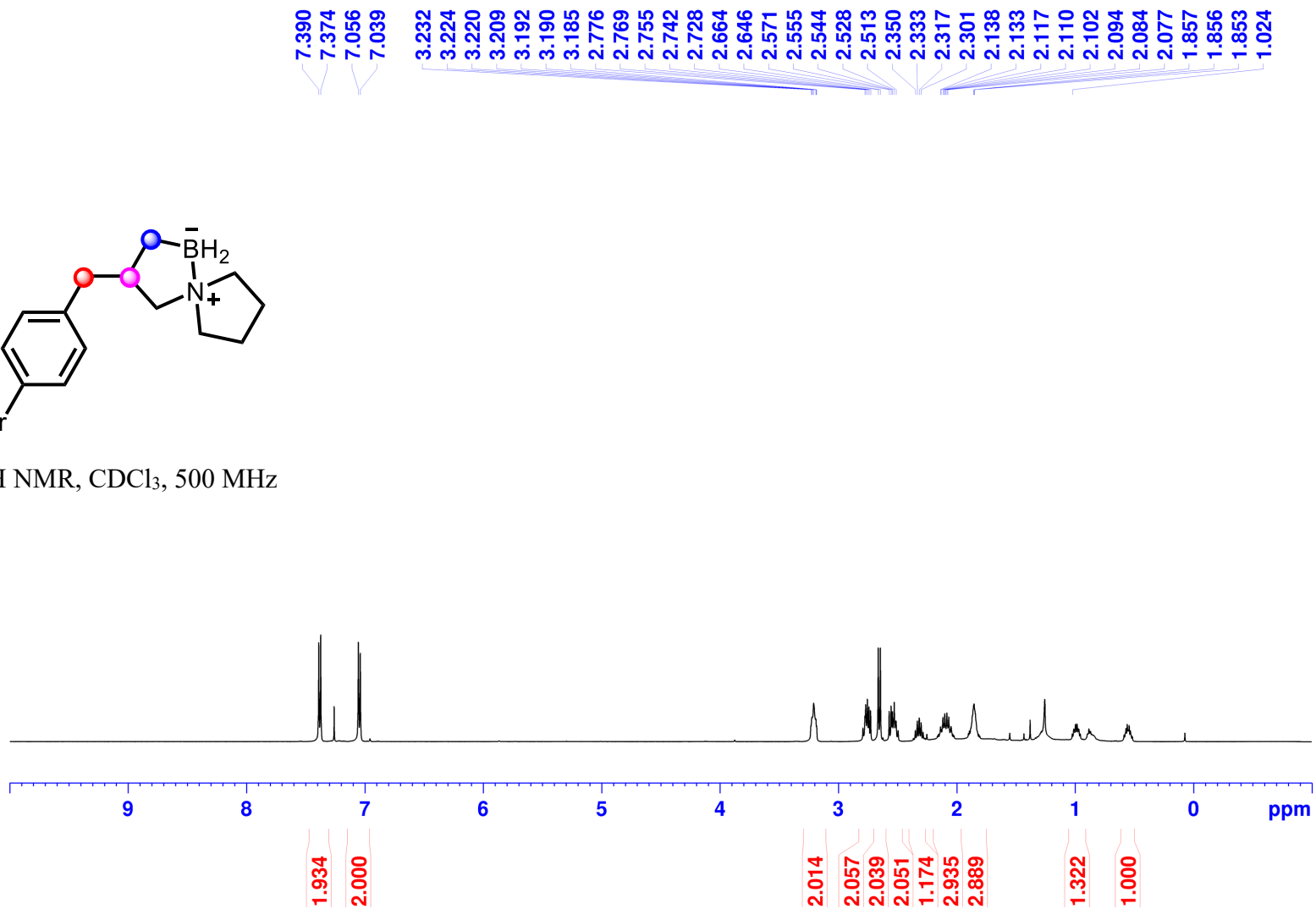


^{11}B NMR, $CDCl_3$, 160 MHz

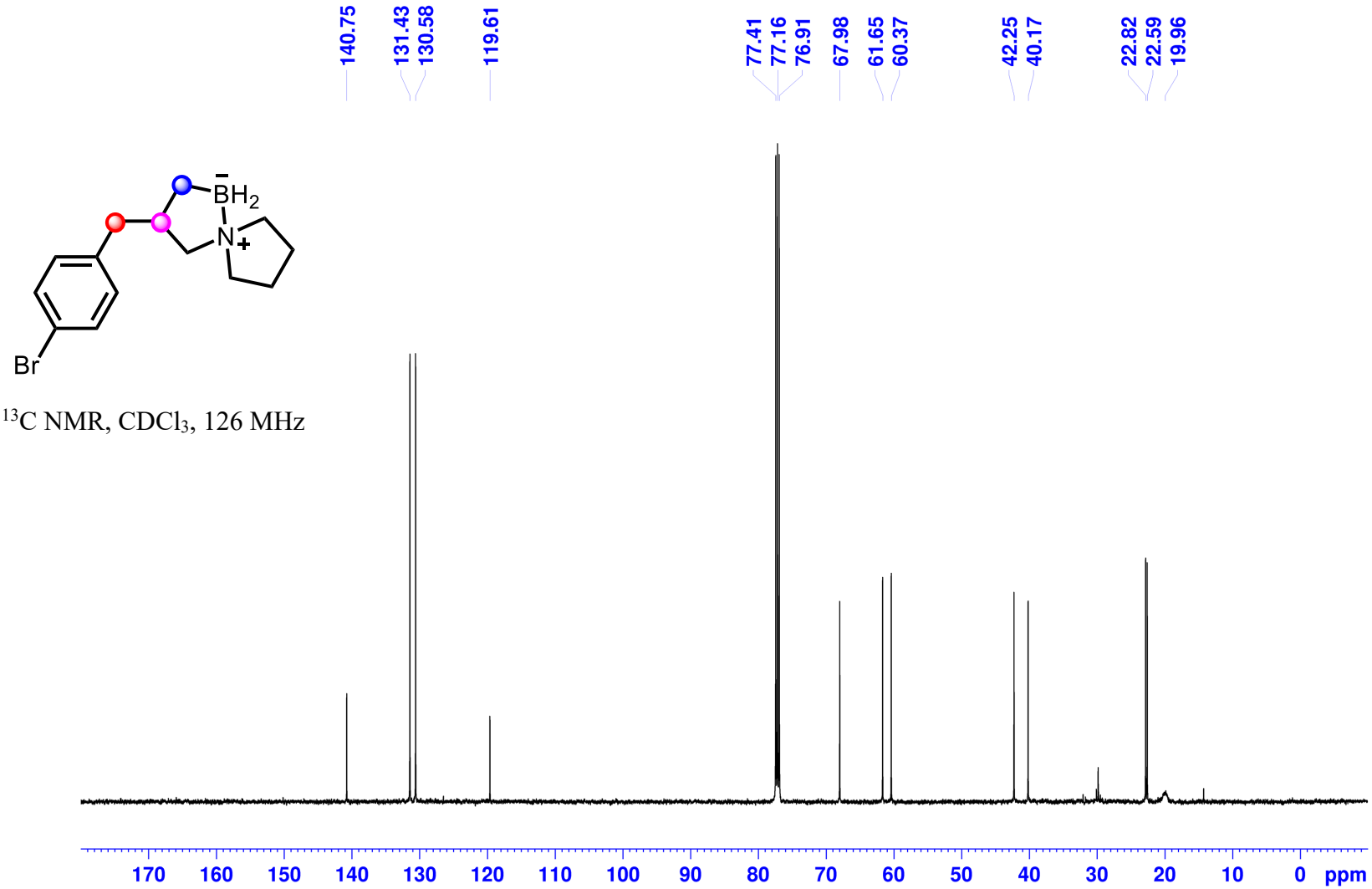


3-(4-Bromobenzyl)-5-aza-1-boraspiro[4.4]nonane (2l):

^{1}H NMR, $CDCl_3$, 500 MHz

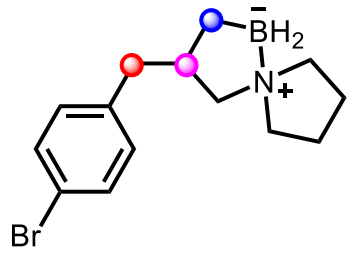


3-(4-Bromobenzyl)-5-aza-1-boraspiro[4.4]nonane (2l):

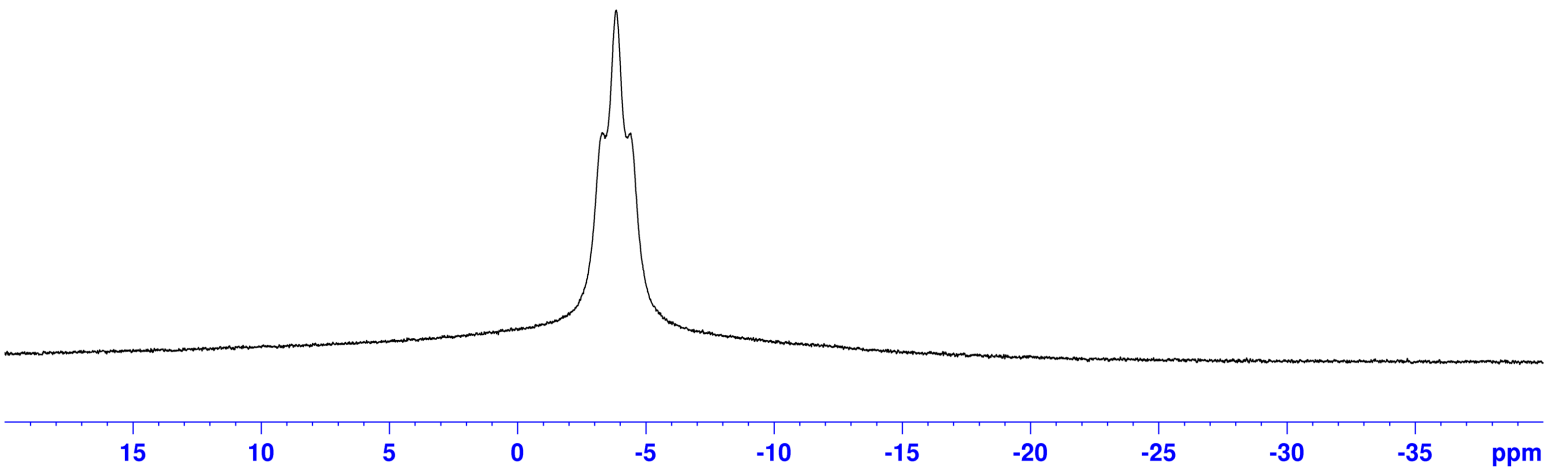


^{13}C NMR, $CDCl_3$, 126 MHz

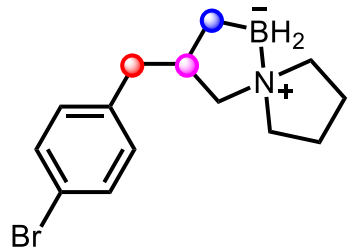
3-(4-Bromobenzyl)-5-aza-1-boraspiro[4.4]nonane (2l):



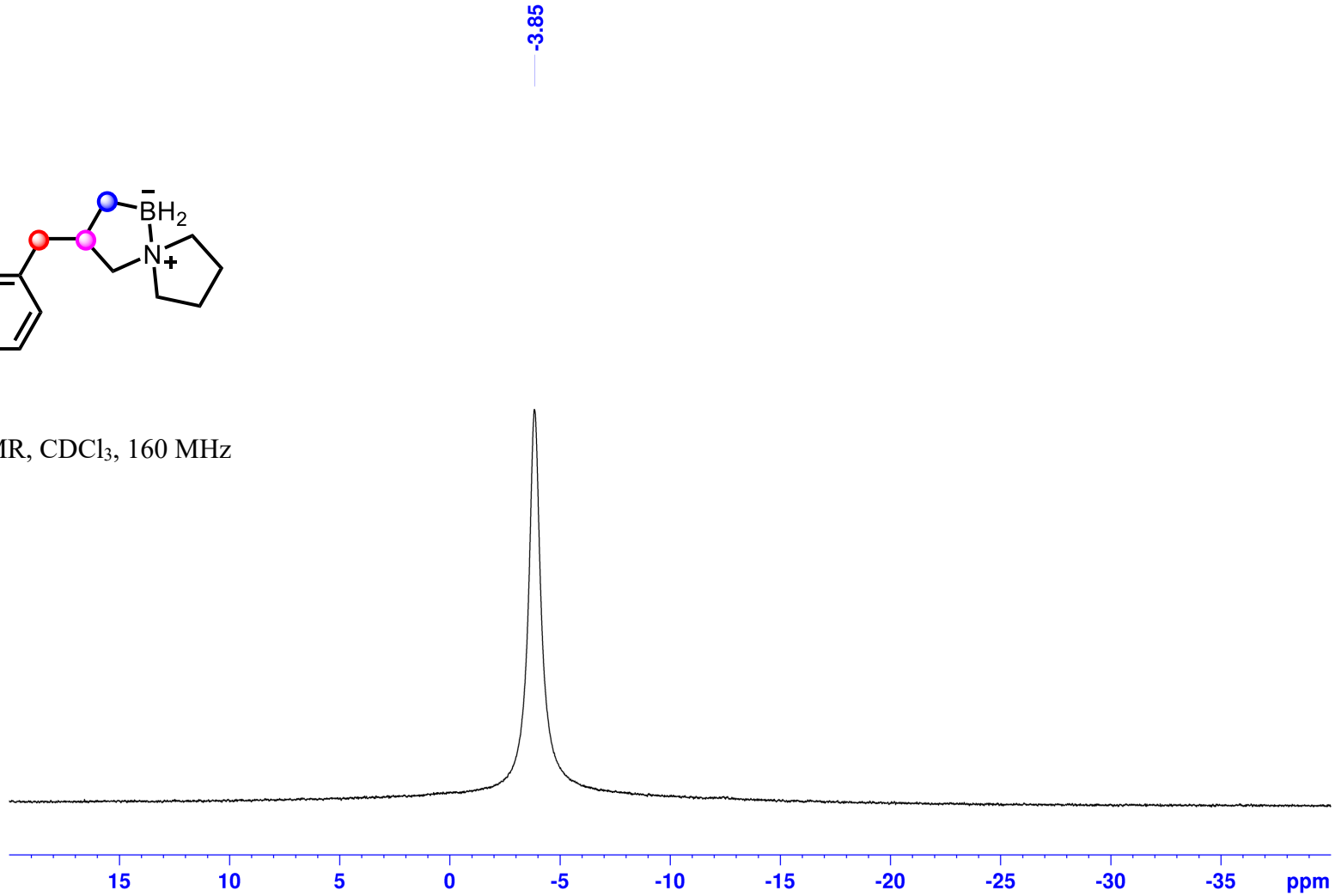
^{11}B NMR, $CDCl_3$, 160 MHz



3-(4-Bromobenzyl)-5-aza-1-boraspiro[4.4]nonane (2l):

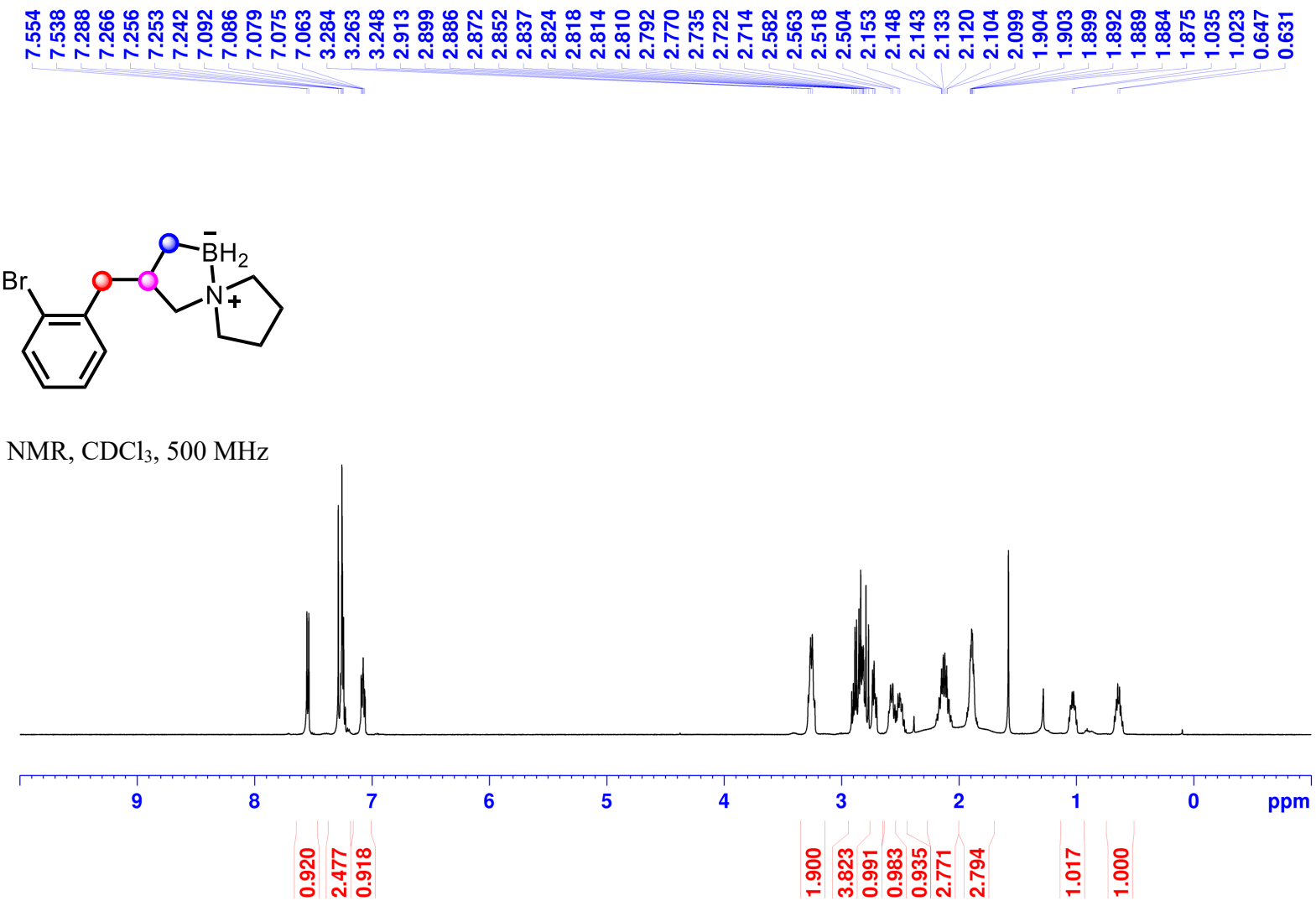


^{11}B NMR, $CDCl_3$, 160 MHz

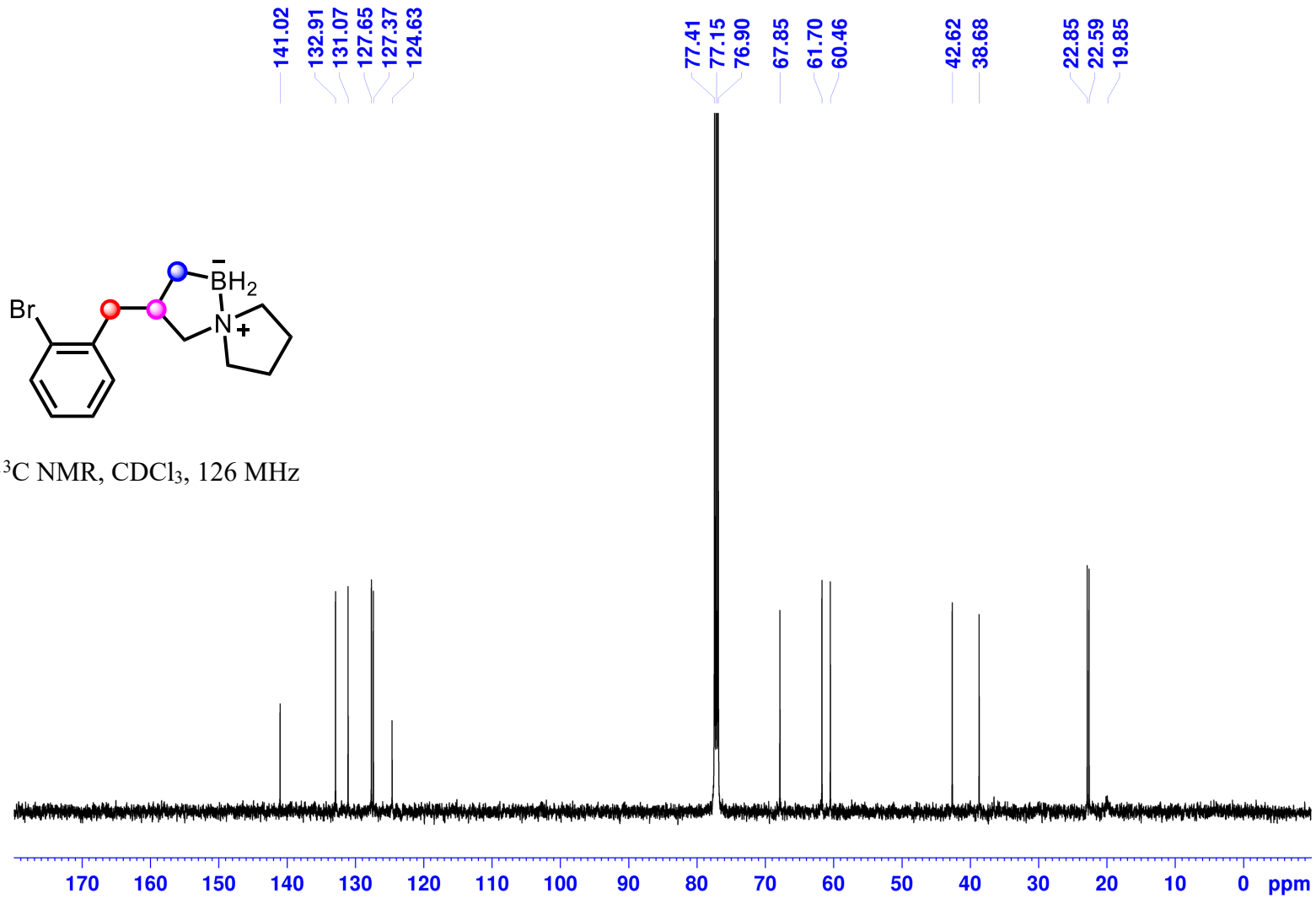


3-(2-Bromobenzyl)-5-aza-1-boraspiro[4.4]nonane (2m):

^{1}H NMR, $CDCl_3$, 500 MHz



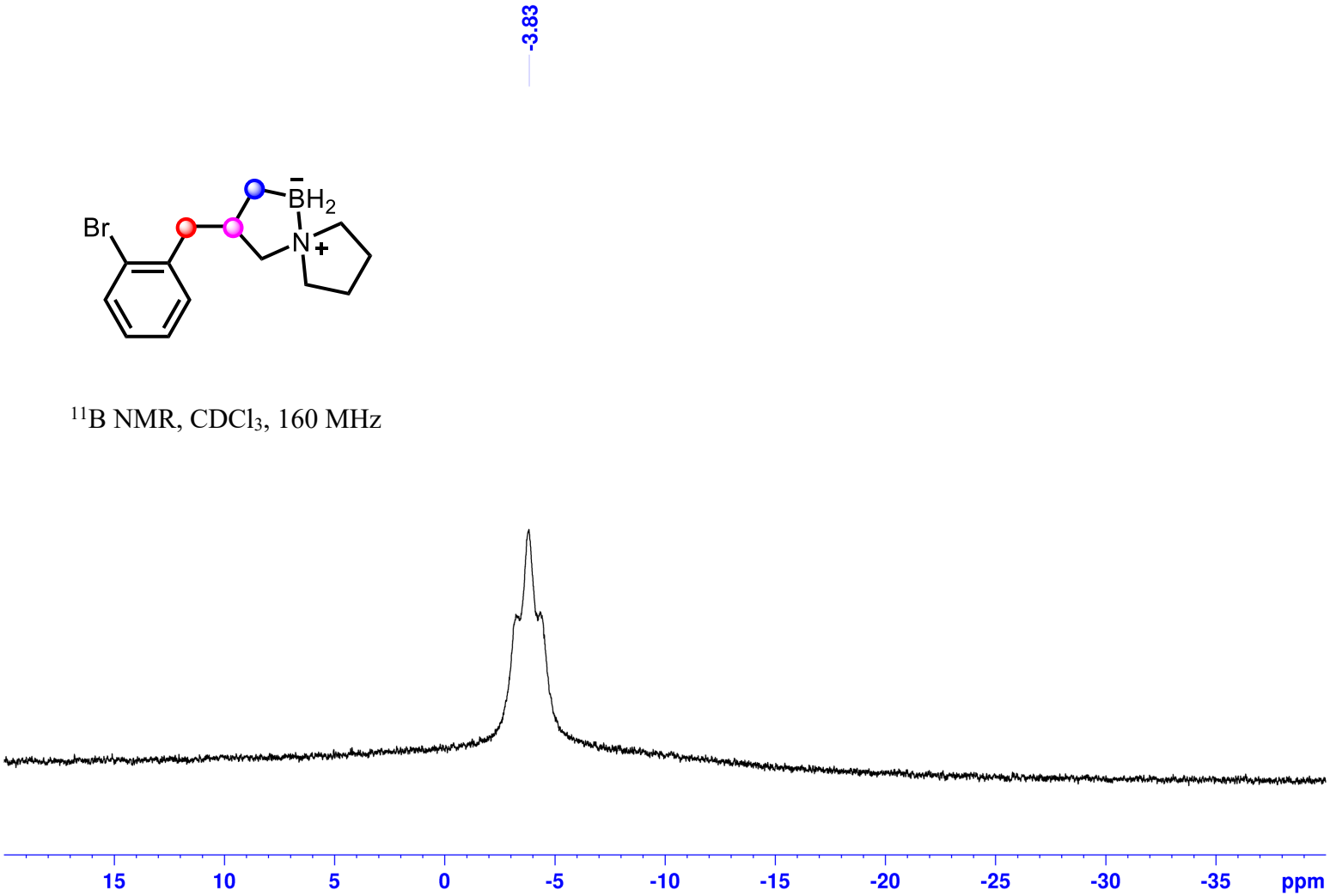
3-(2-Bromobenzyl)-5-aza-1-boraspiro[4.4]nonane (2m):



^{13}C NMR, $CDCl_3$, 126 MHz

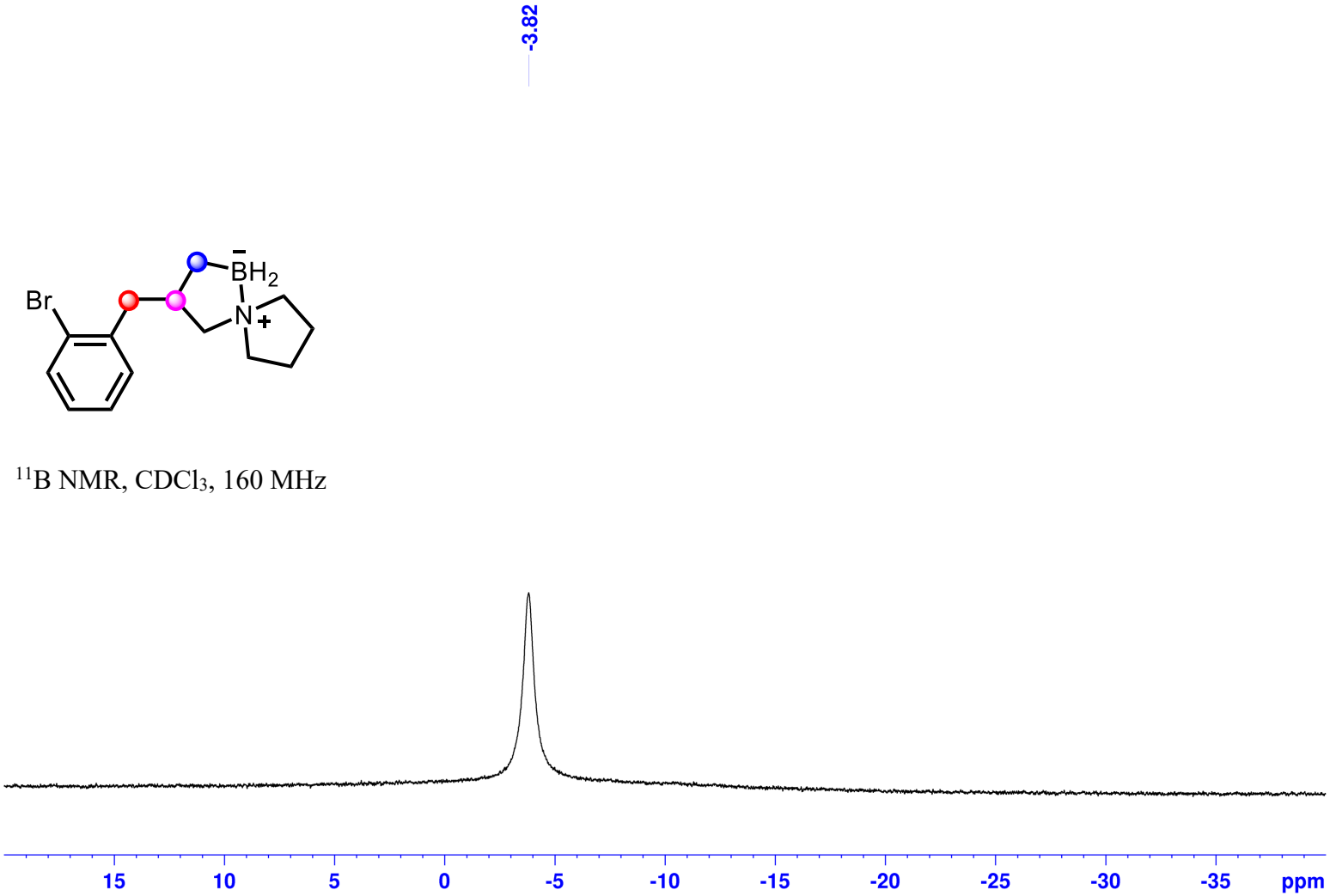
3-(2-Bromobenzyl)-5-aza-1-boraspiro[4.4]nonane (2m):

^{11}B NMR, $CDCl_3$, 160 MHz

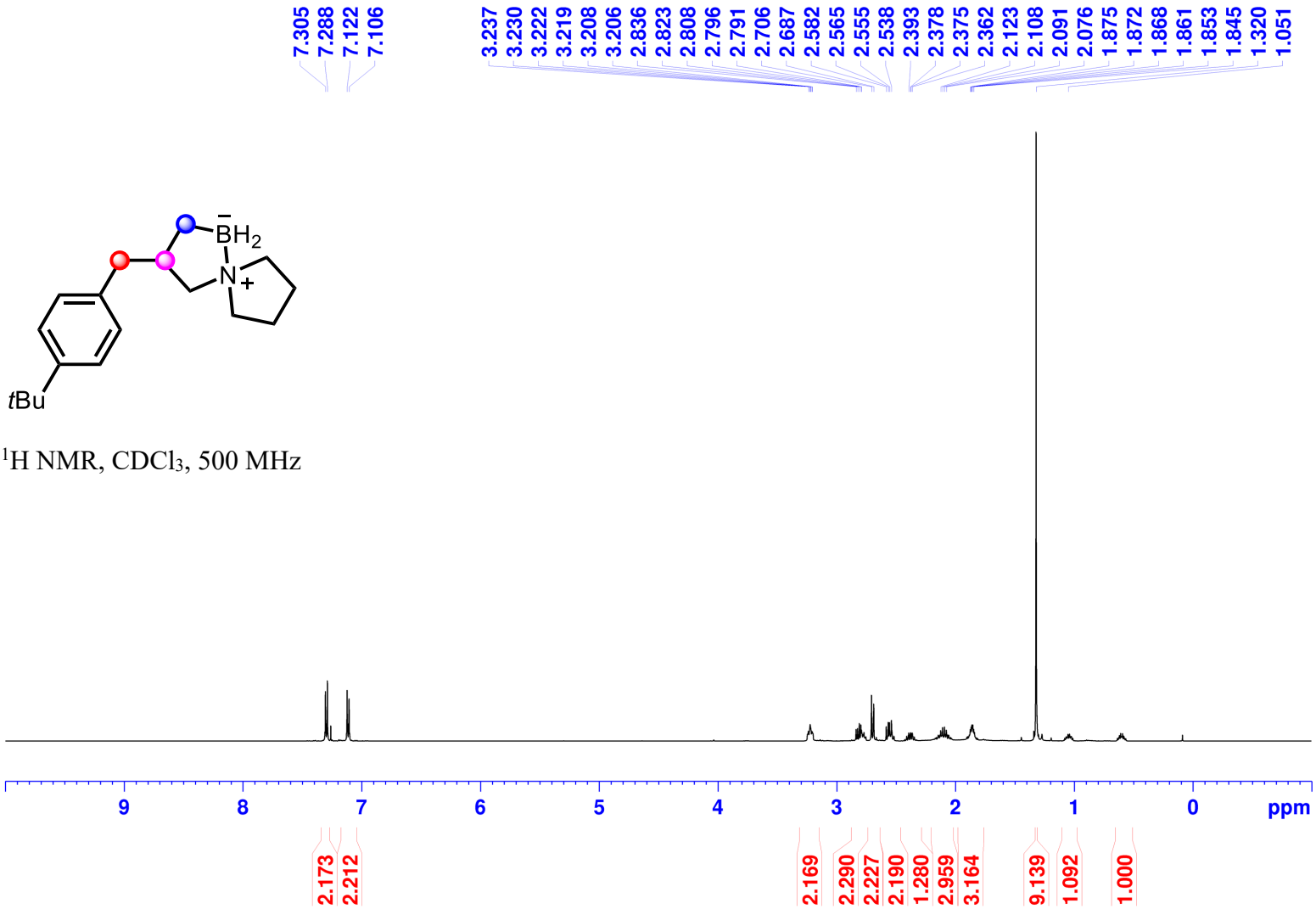


3-(2-Bromobenzyl)-5-aza-1-boraspiro[4.4]nonane (2m):

^{11}B NMR, $CDCl_3$, 160 MHz

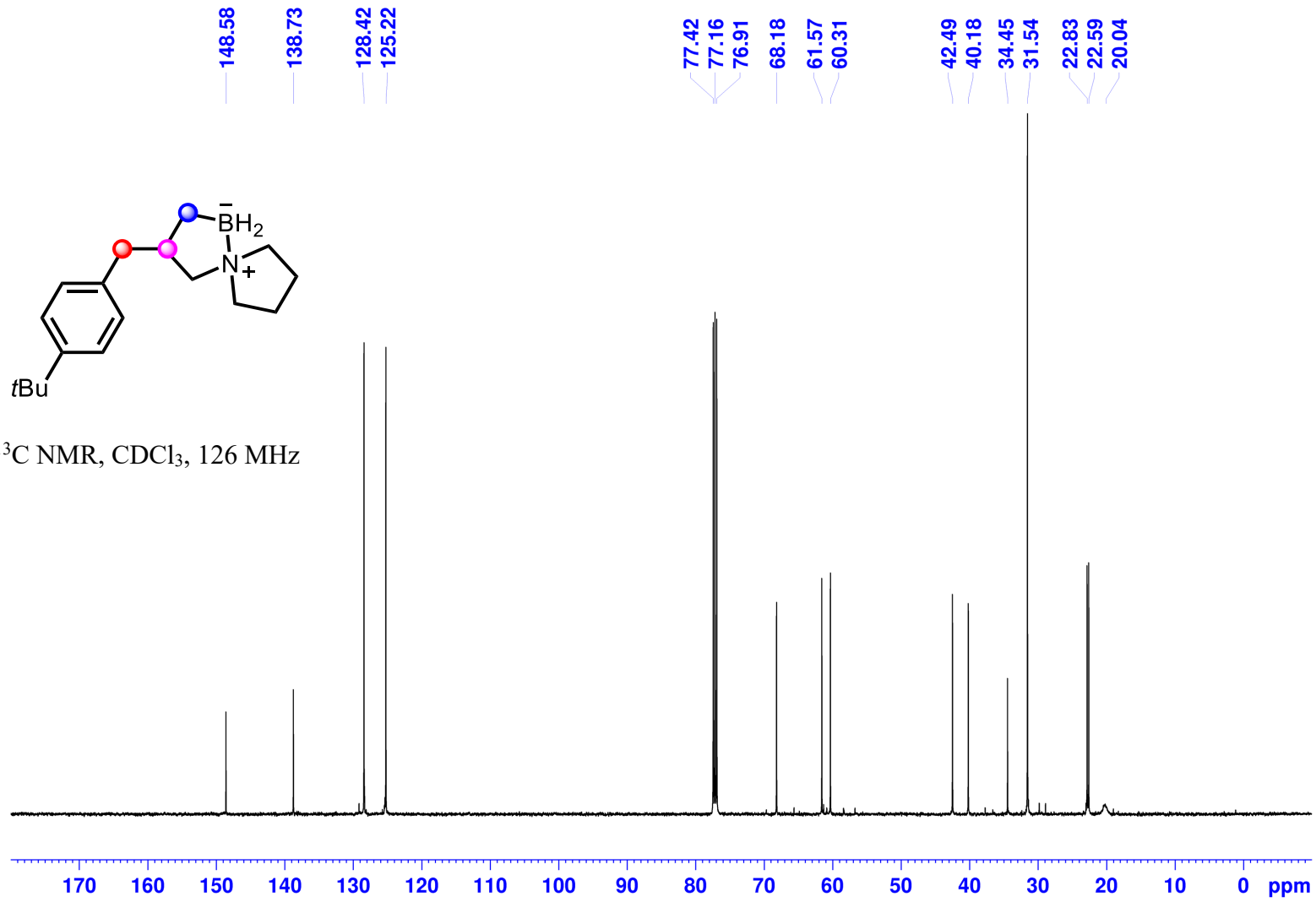


3-(4-(*tert*-Butyl)benzyl)-5-aza-1-boraspiro[4.4]nonane (2n):



^{1}H NMR, $CDCl_3$, 500 MHz

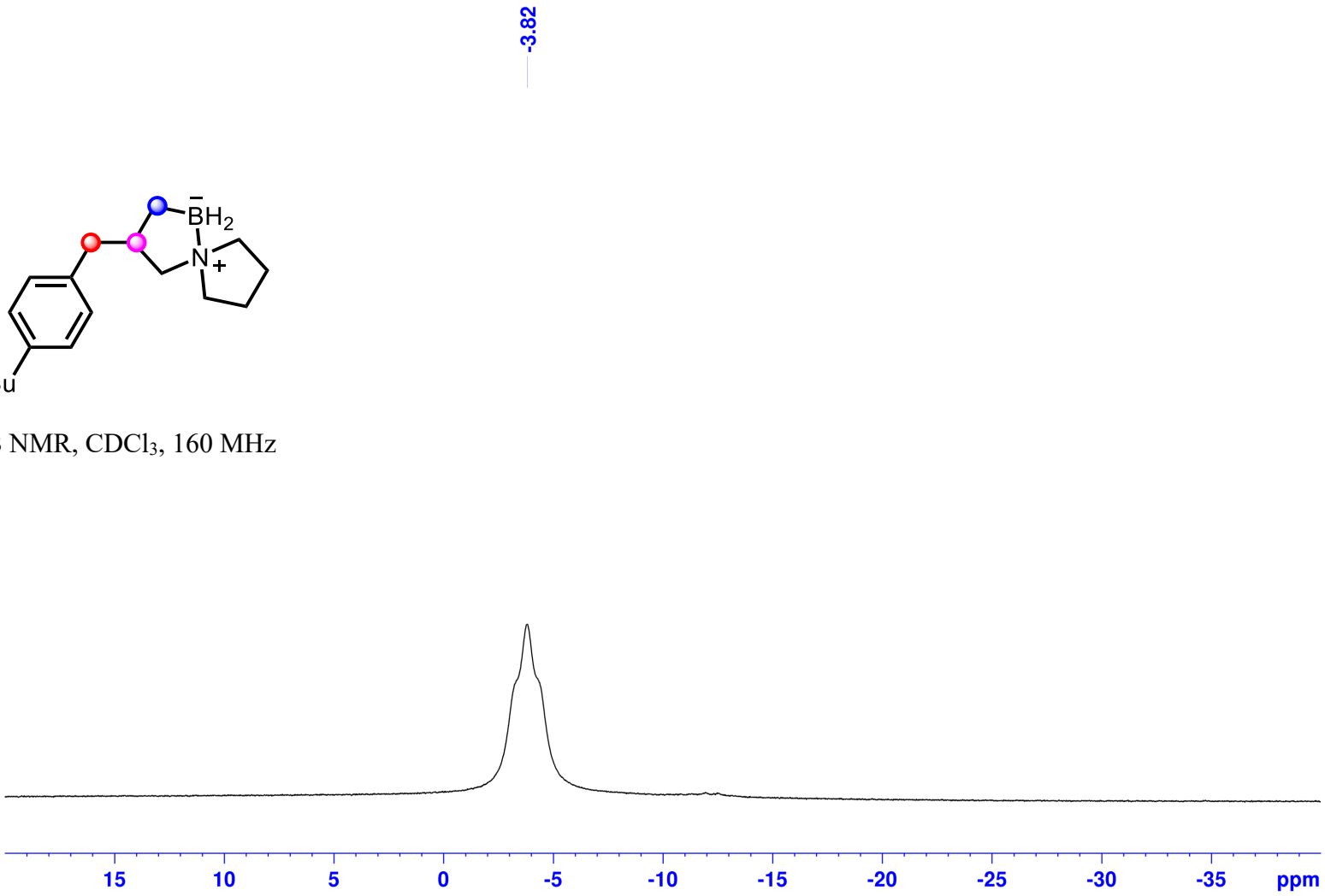
3-(4-(*tert*-Butyl)benzyl)-5-aza-1-boraspiro[4.4]nonane (2n):



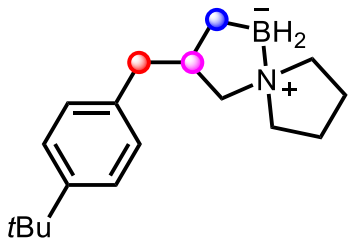
^{13}C NMR, $CDCl_3$, 126 MHz

3-(4-(*tert*-Butyl)benzyl)-5-aza-1-boraspiro[4.4]nonane (2n):

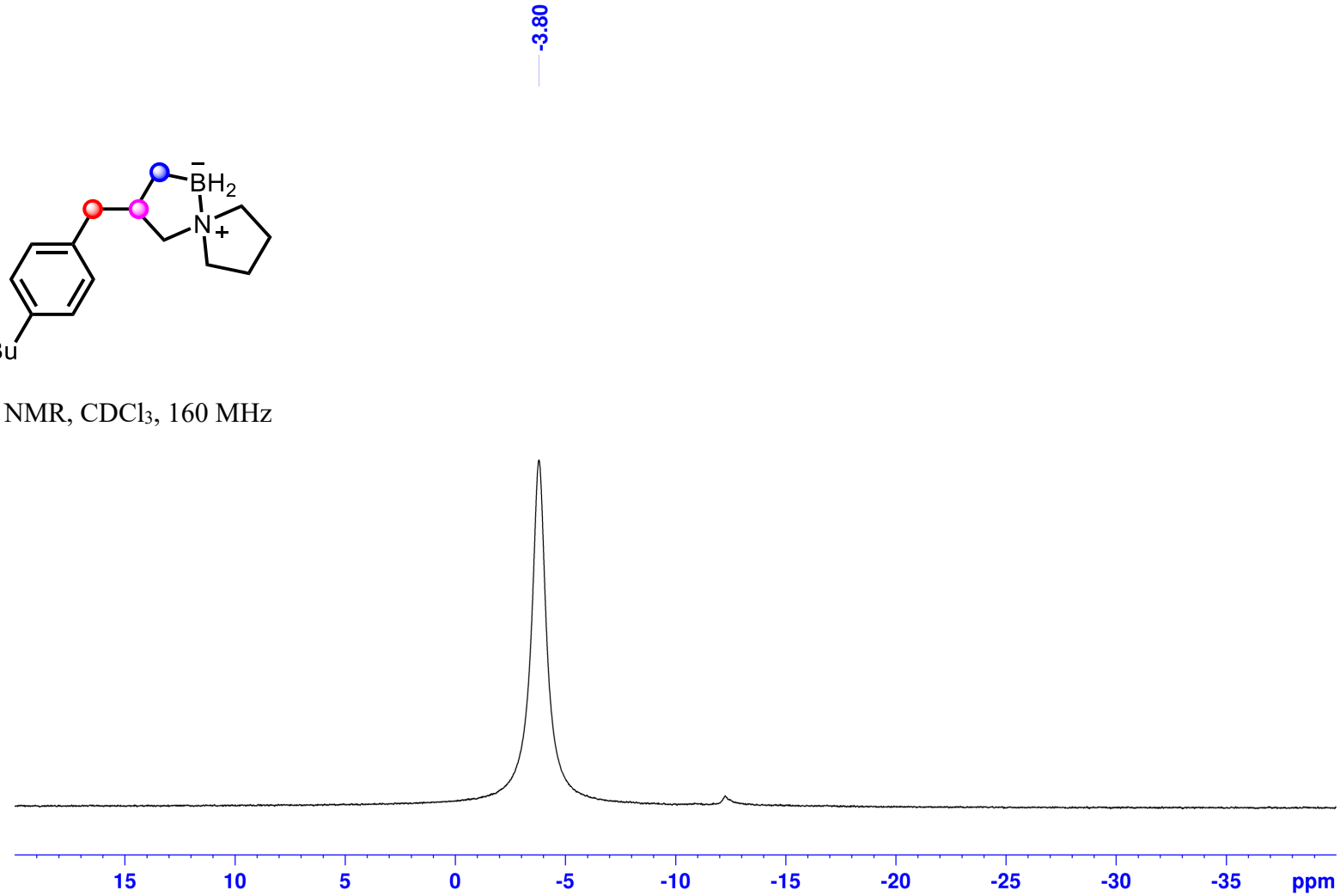
^{11}B NMR, $CDCl_3$, 160 MHz



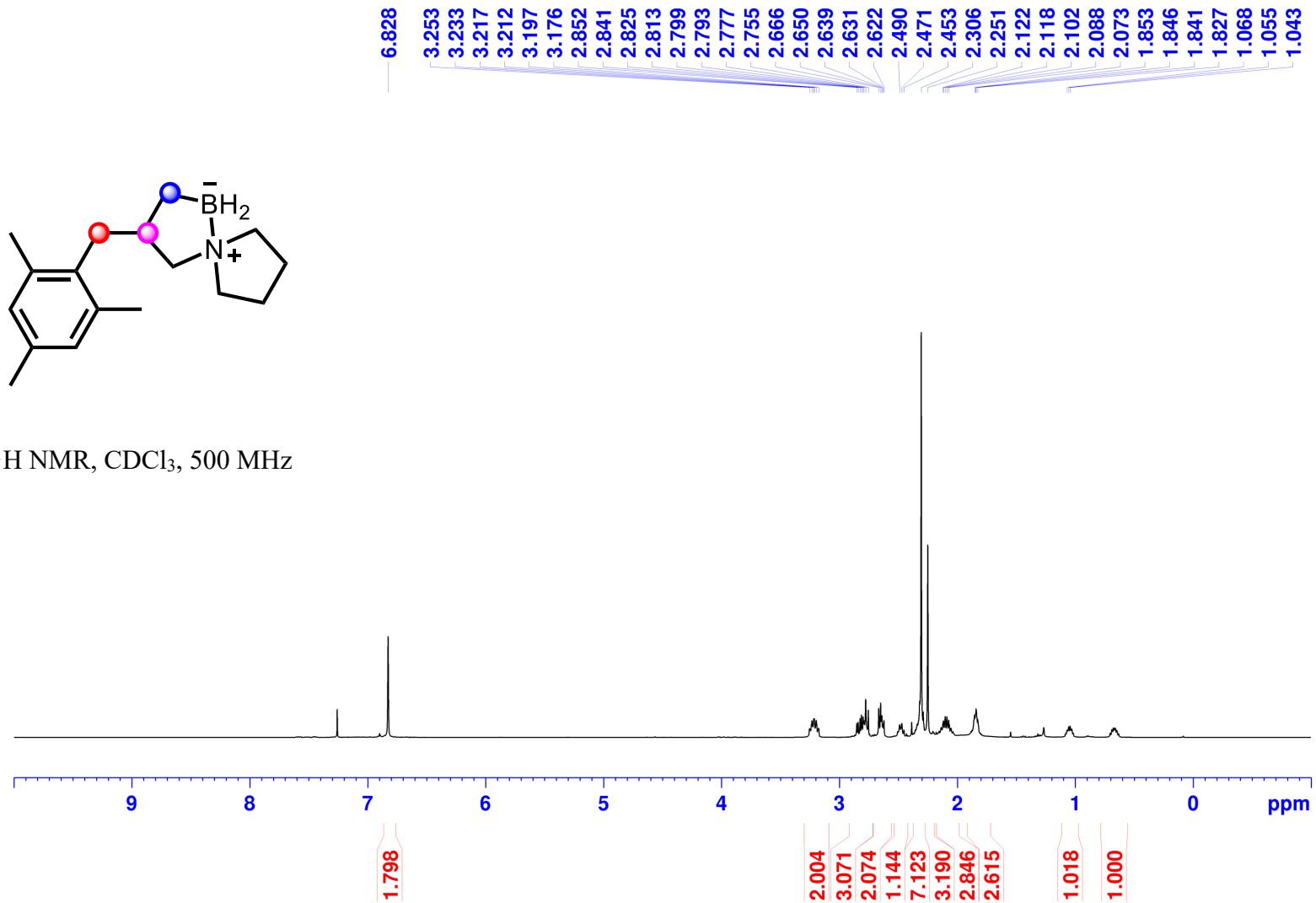
3-(4-(*tert*-Butyl)benzyl)-5-aza-1-boraspiro[4.4]nonane (2n):



^{11}B NMR, $CDCl_3$, 160 MHz

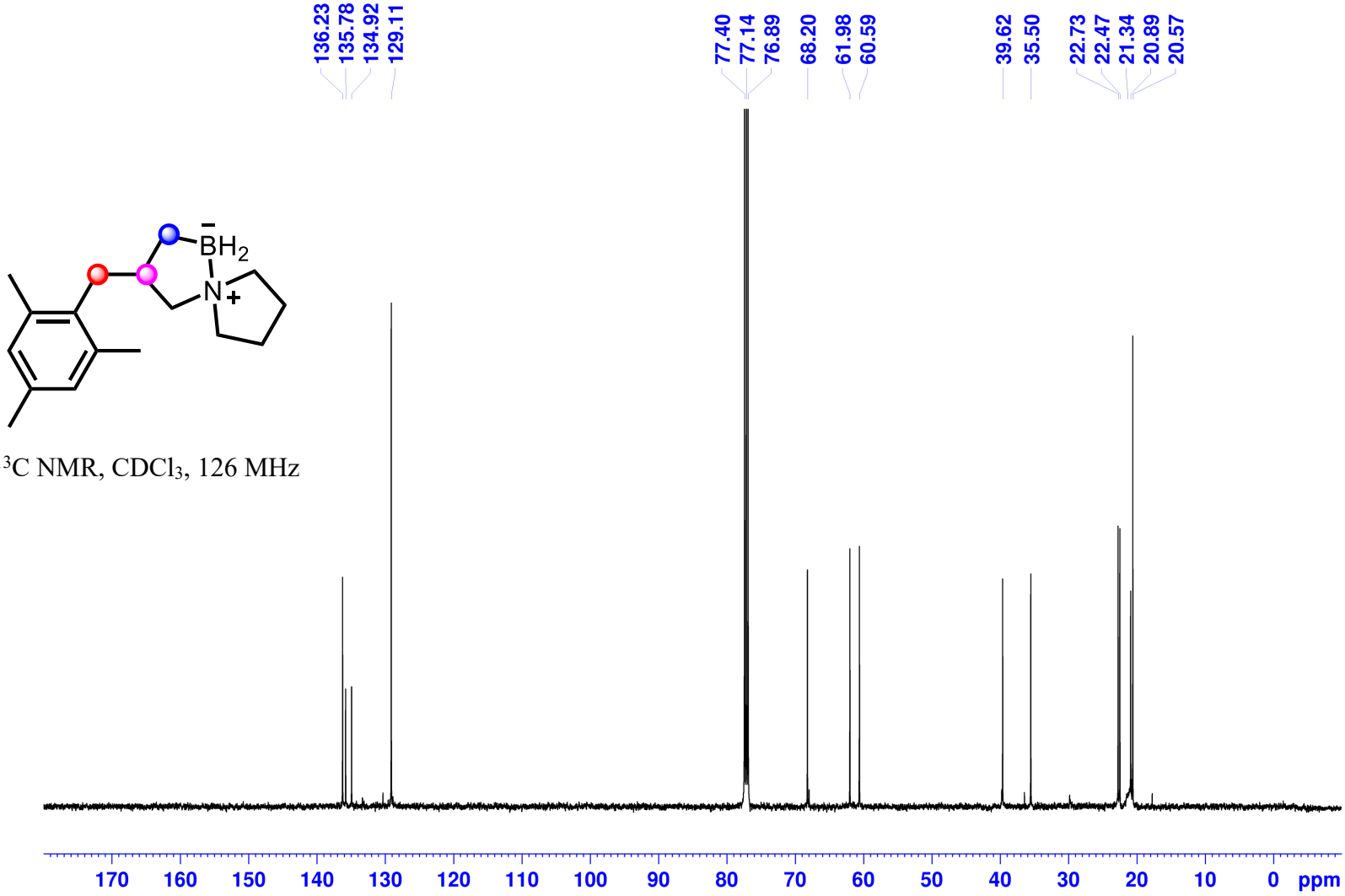


3-(2,4,6-Trimethylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2o):



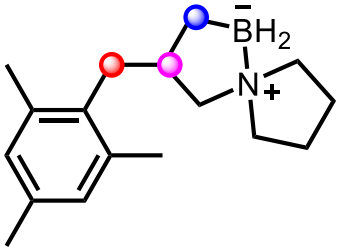
^{1}H NMR, $CDCl_3$, 500 MHz

3-(2,4,6-Trimethylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2o):

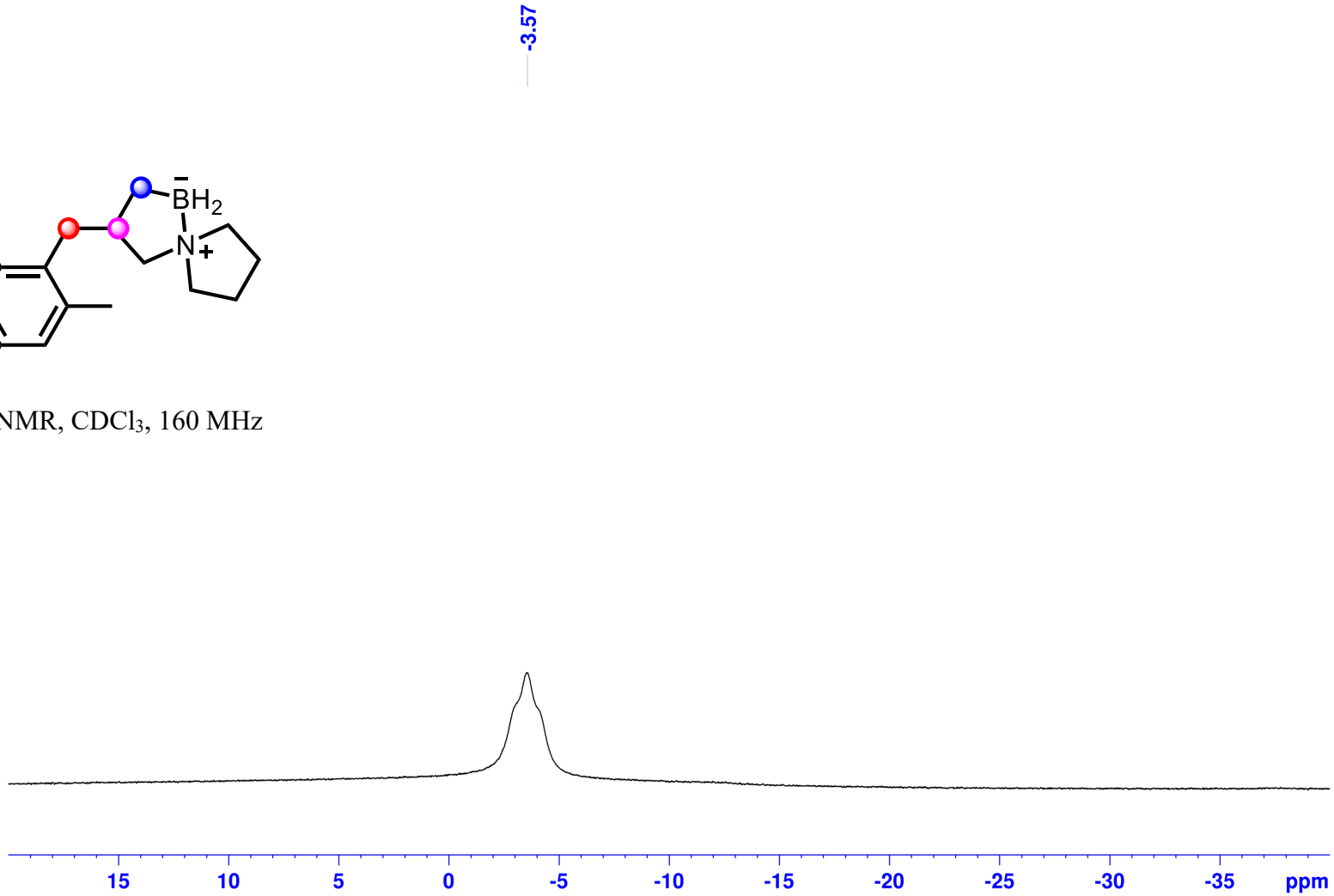


^{13}C NMR, $CDCl_3$, 126 MHz

3-(2,4,6-Trimethylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2o):

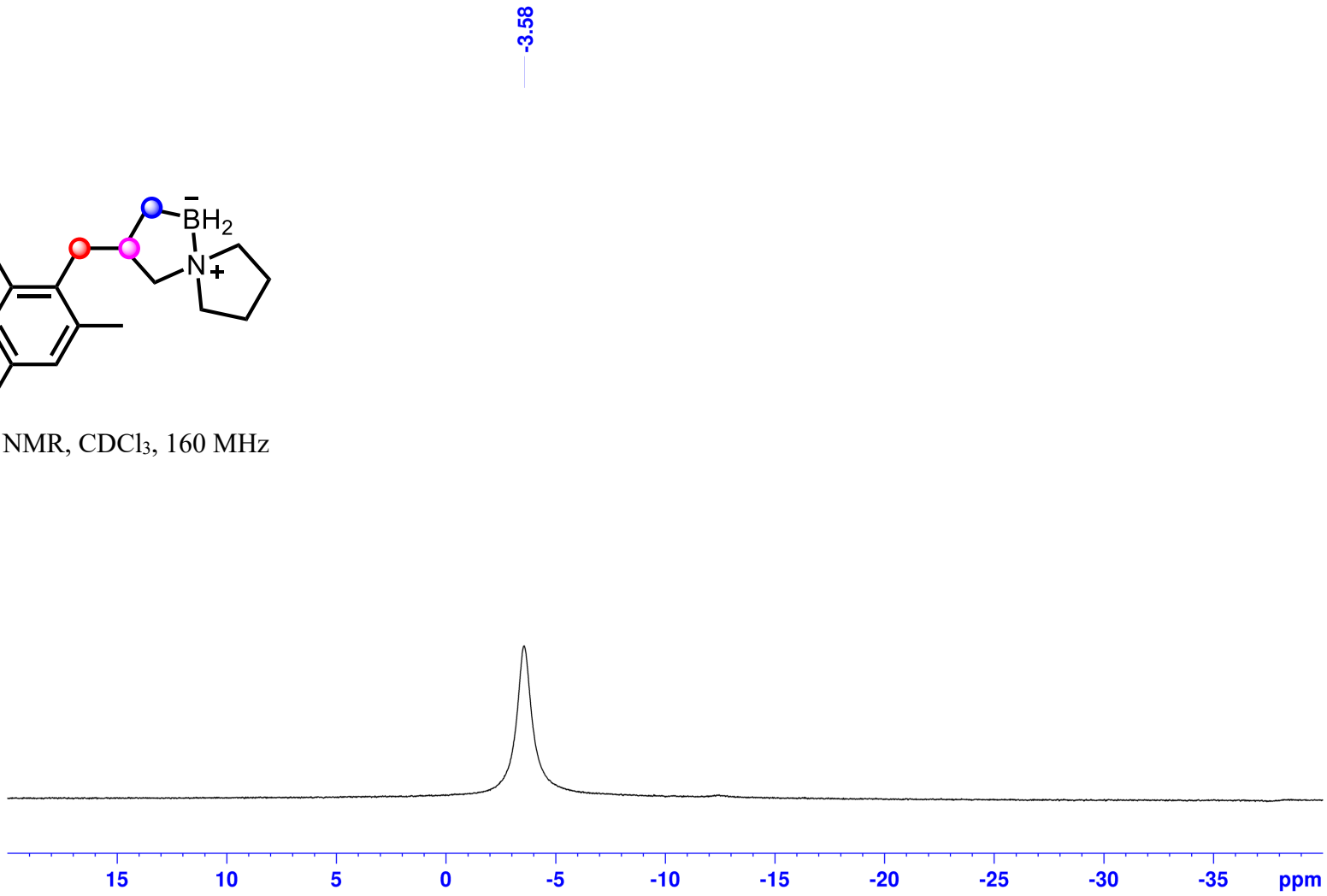


^{11}B NMR, $CDCl_3$, 160 MHz

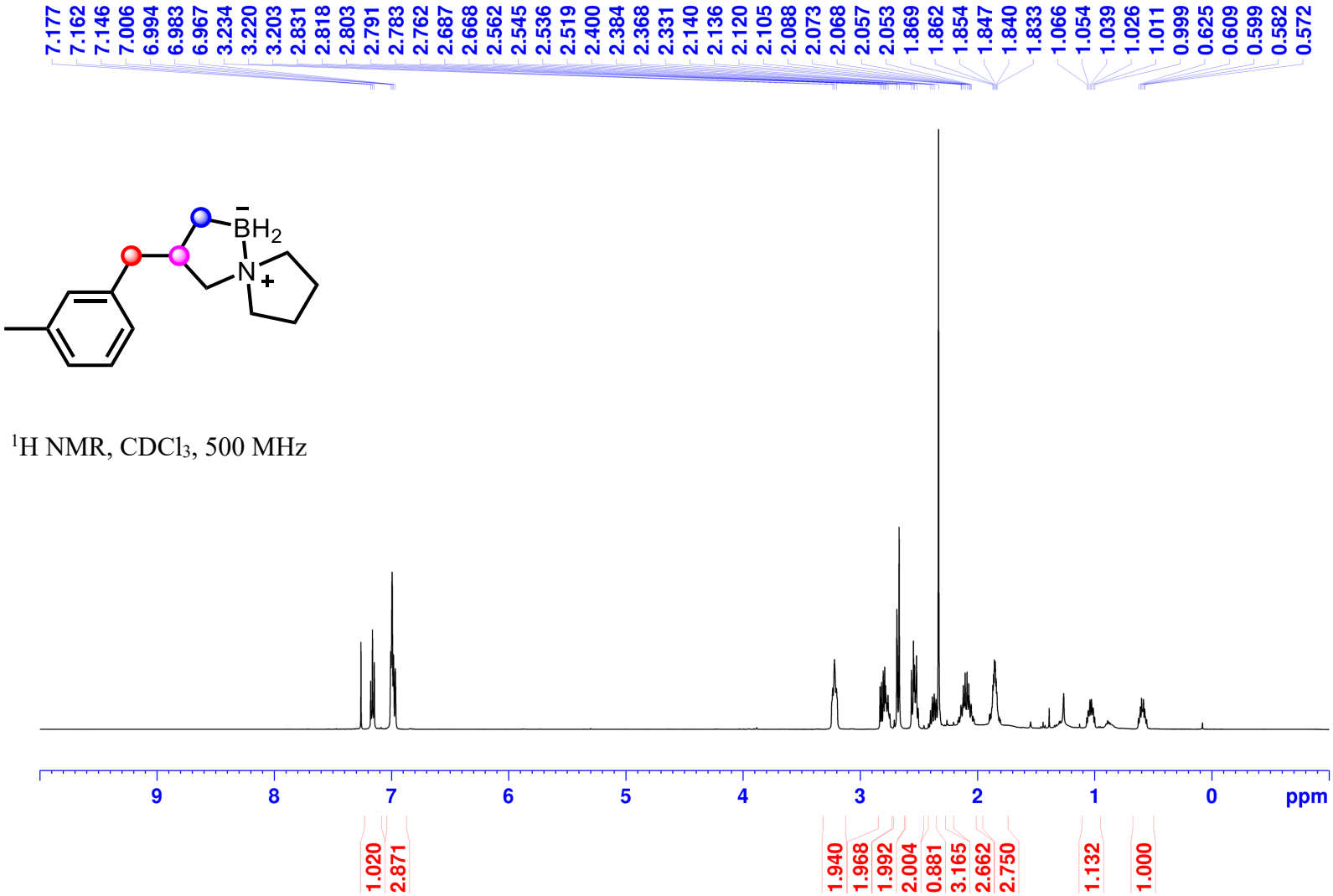


3-(2,4,6-Trimethylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2o):

^{11}B NMR, $CDCl_3$, 160 MHz

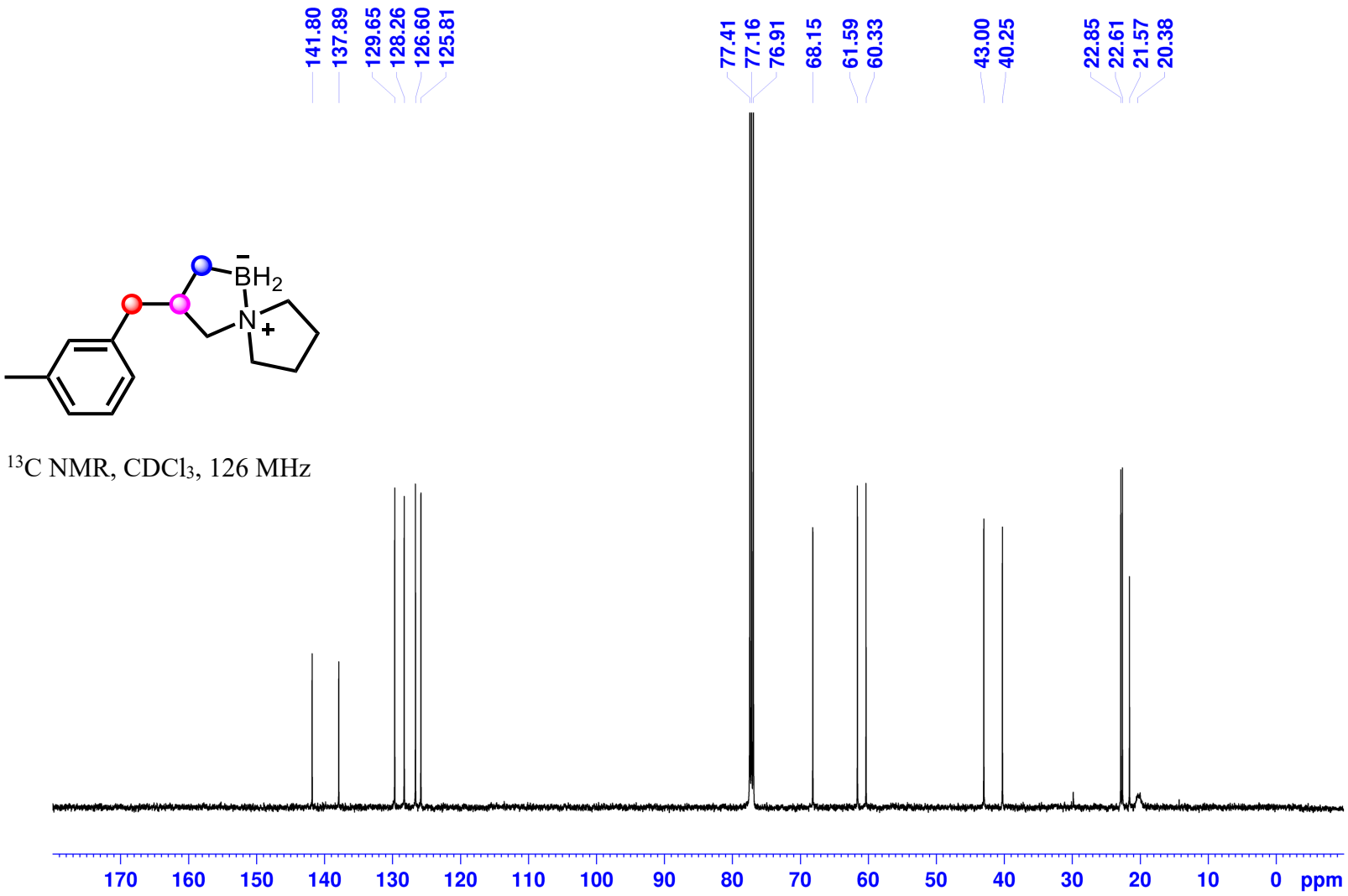


3-(3-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2p):

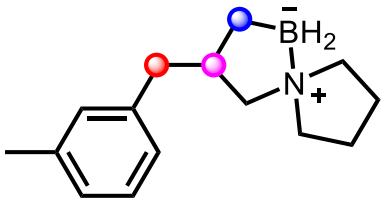


^{1}H NMR, $CDCl_3$, 500 MHz

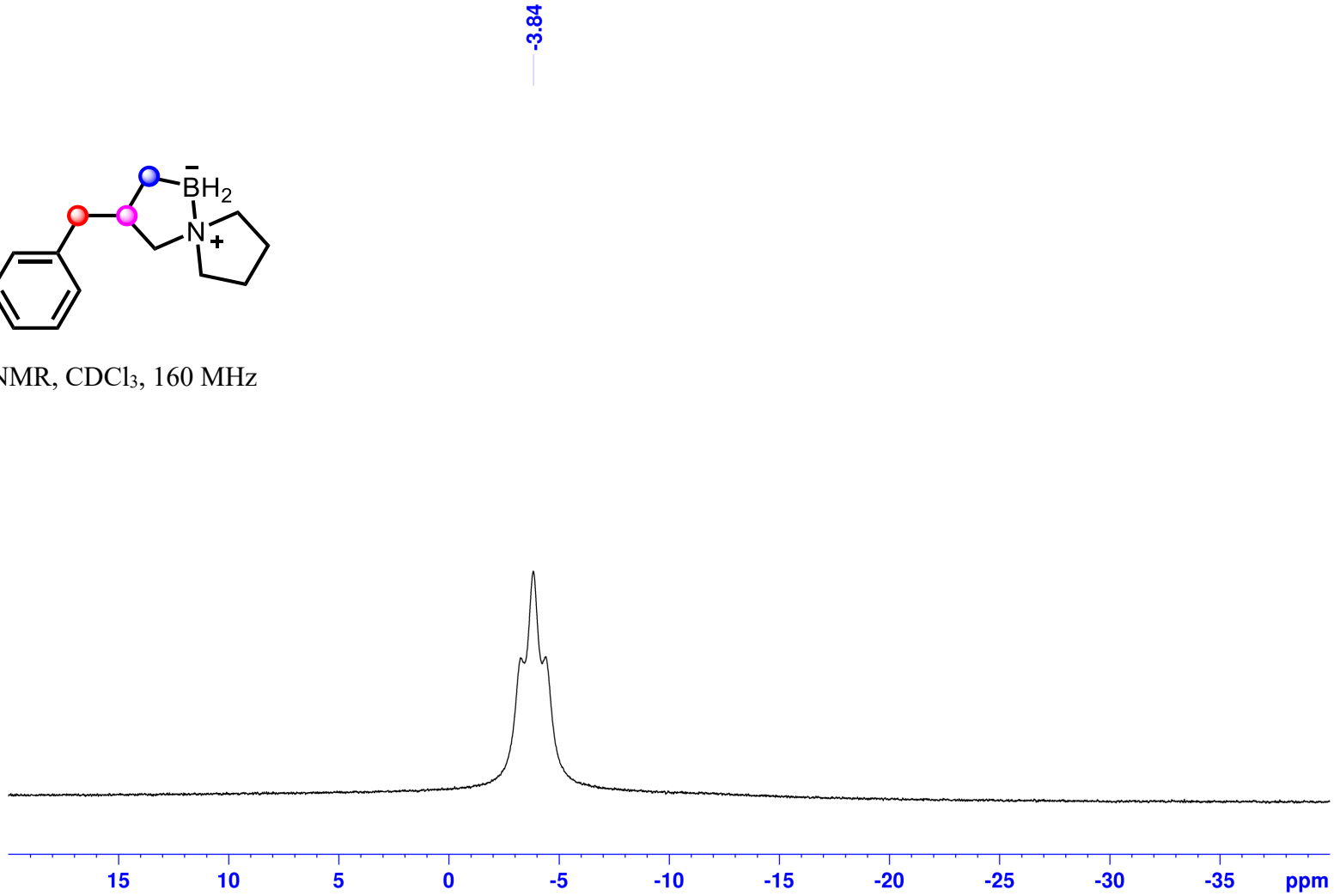
3-(3-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2p):



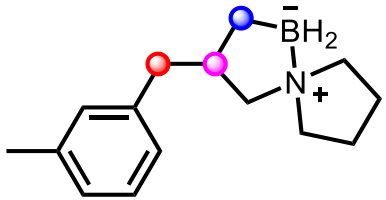
3-(3-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2p):



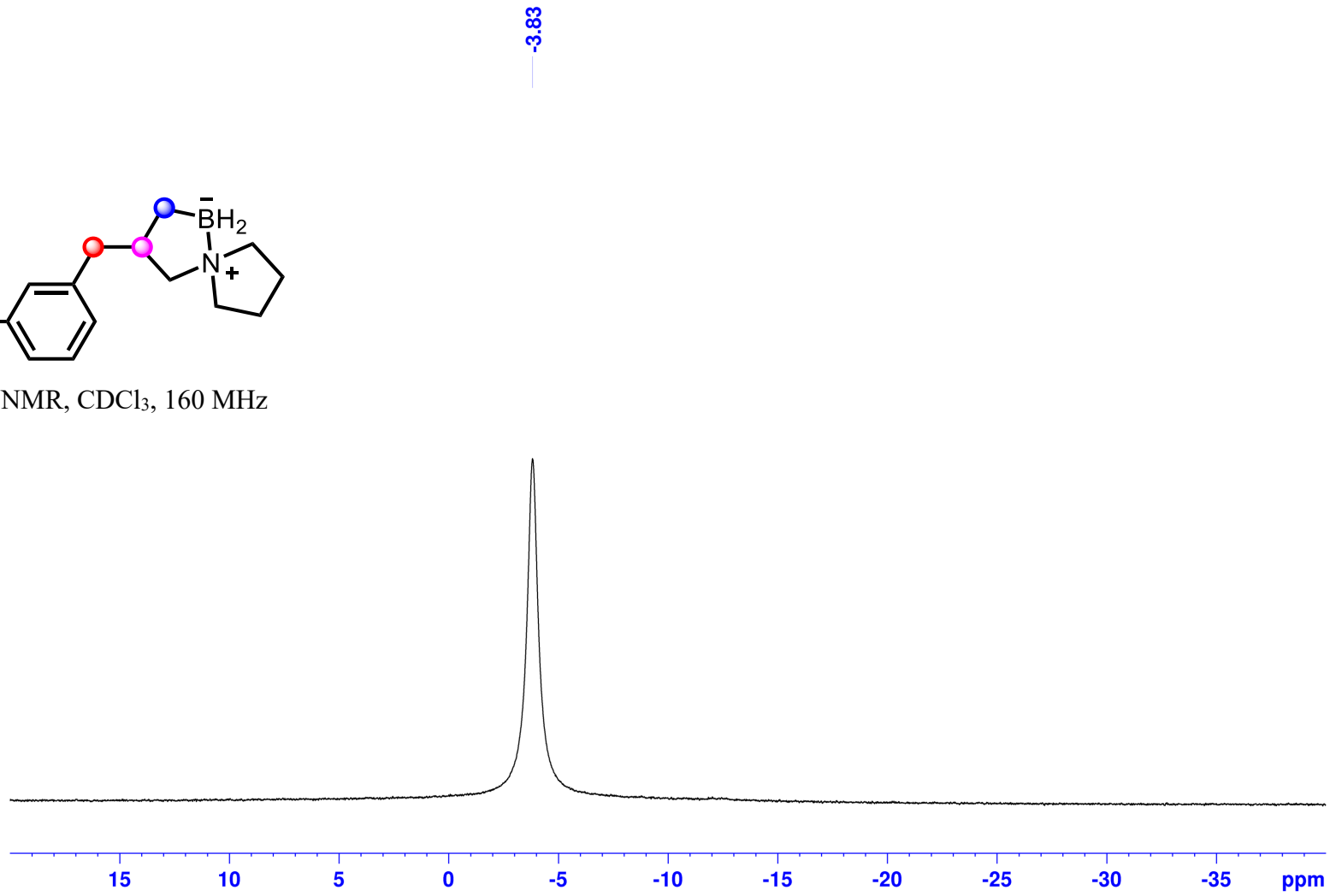
^{11}B NMR, $CDCl_3$, 160 MHz



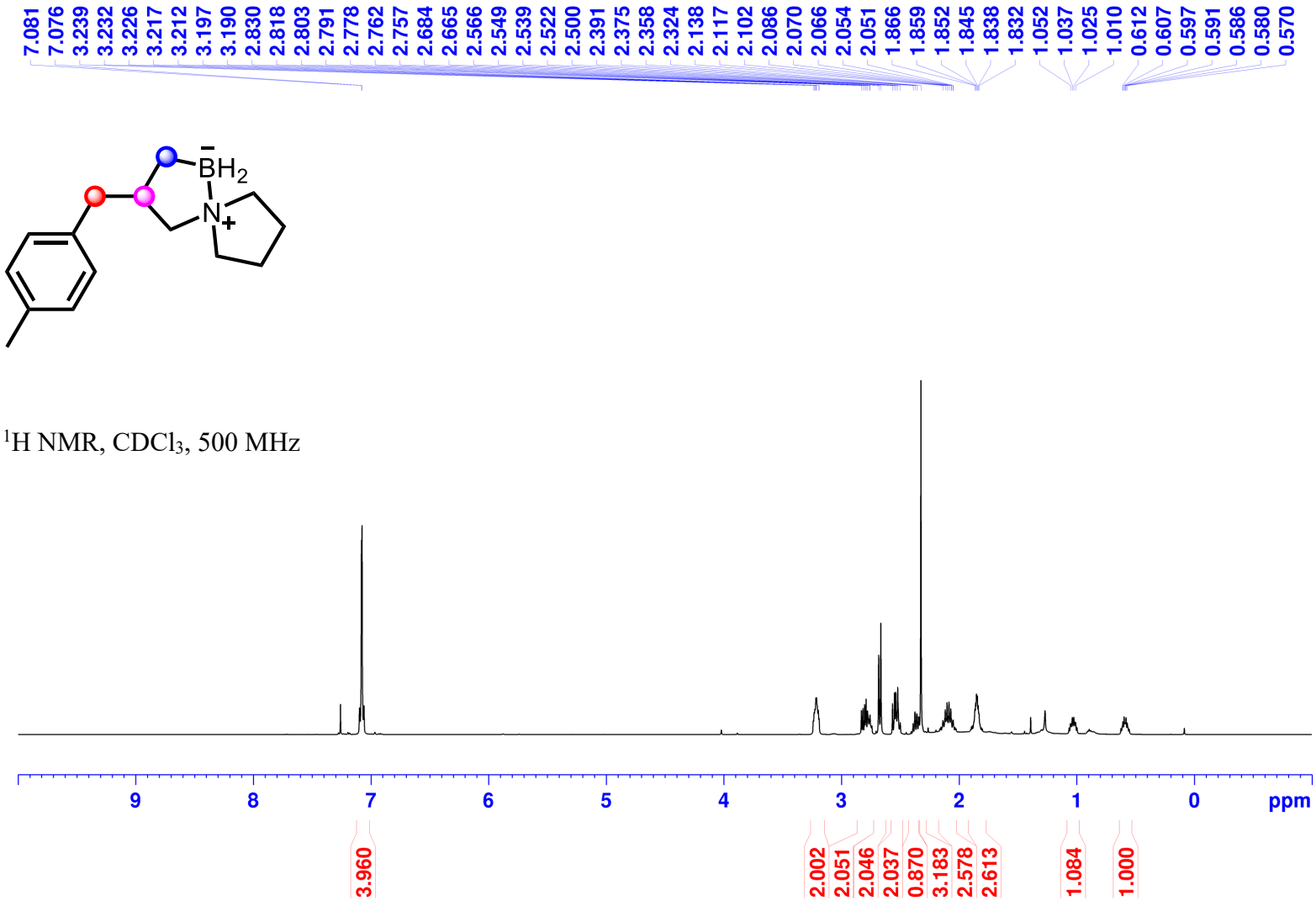
3-(3-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2p):



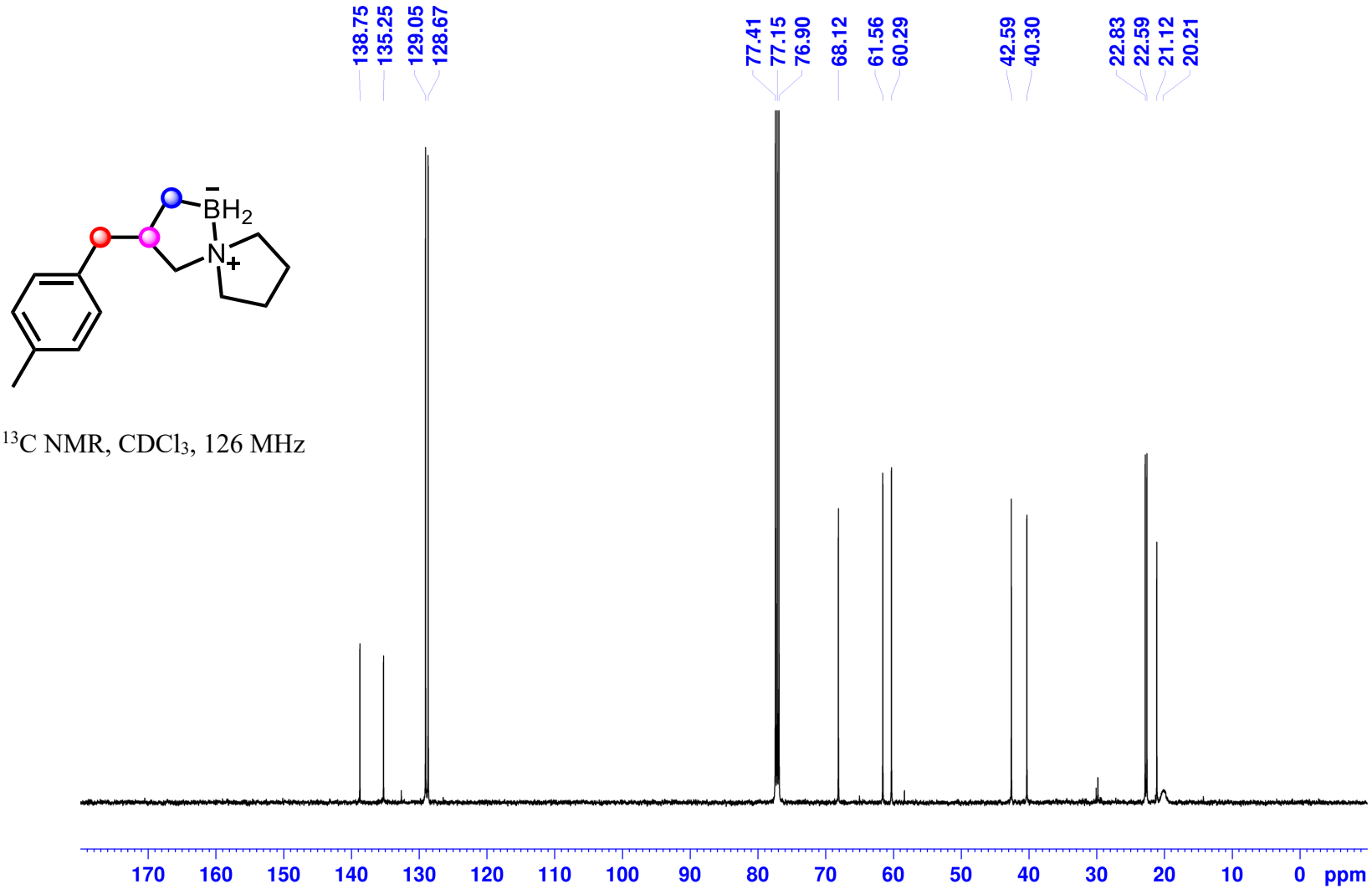
^{11}B NMR, $CDCl_3$, 160 MHz



3-(4-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2q):

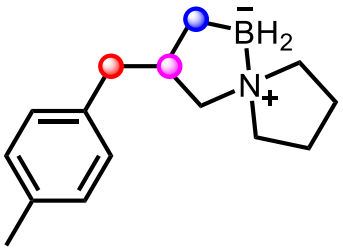


3-(4-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2q):

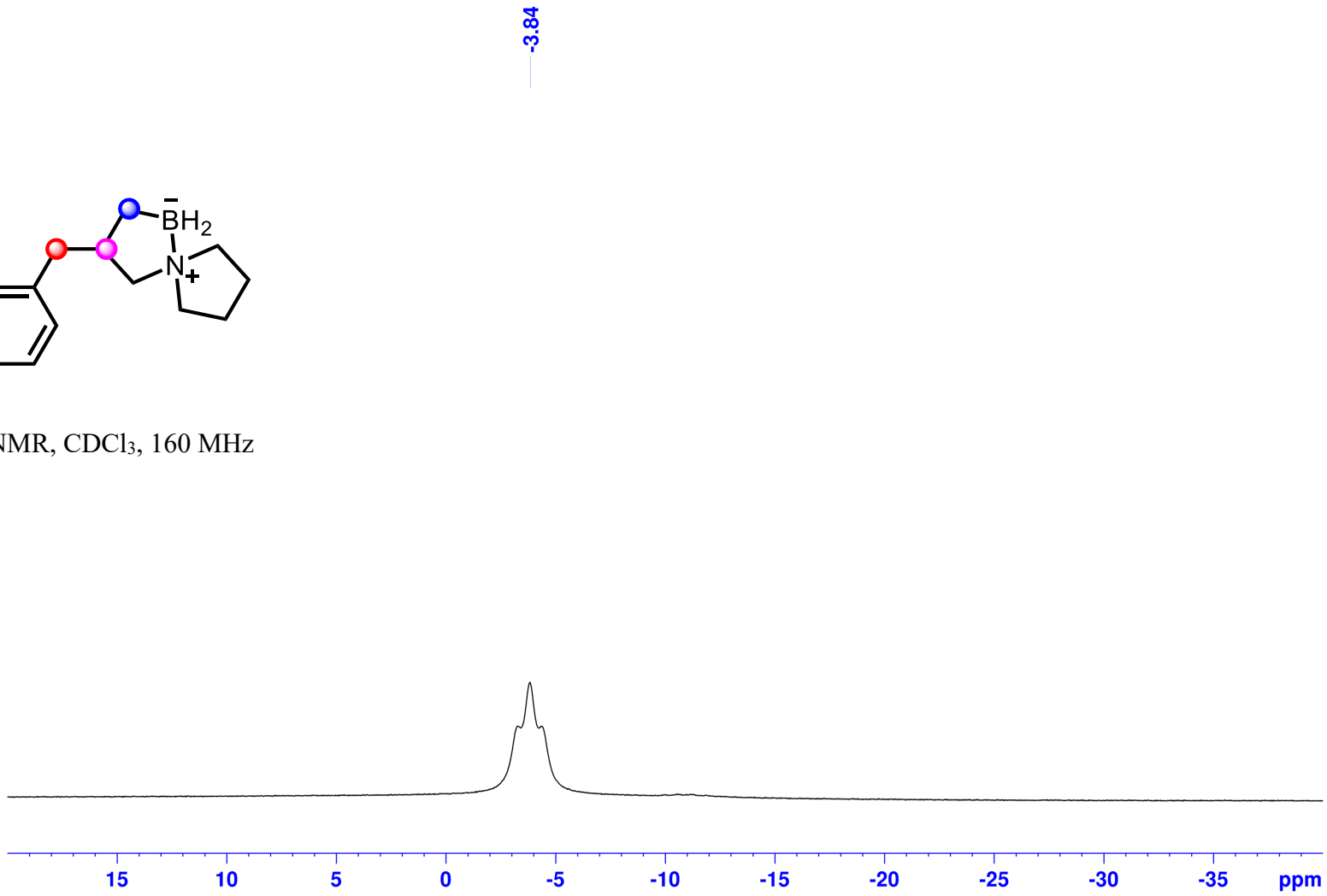


^{13}C NMR, $CDCl_3$, 126 MHz

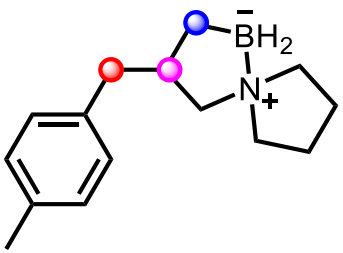
3-(4-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2q):



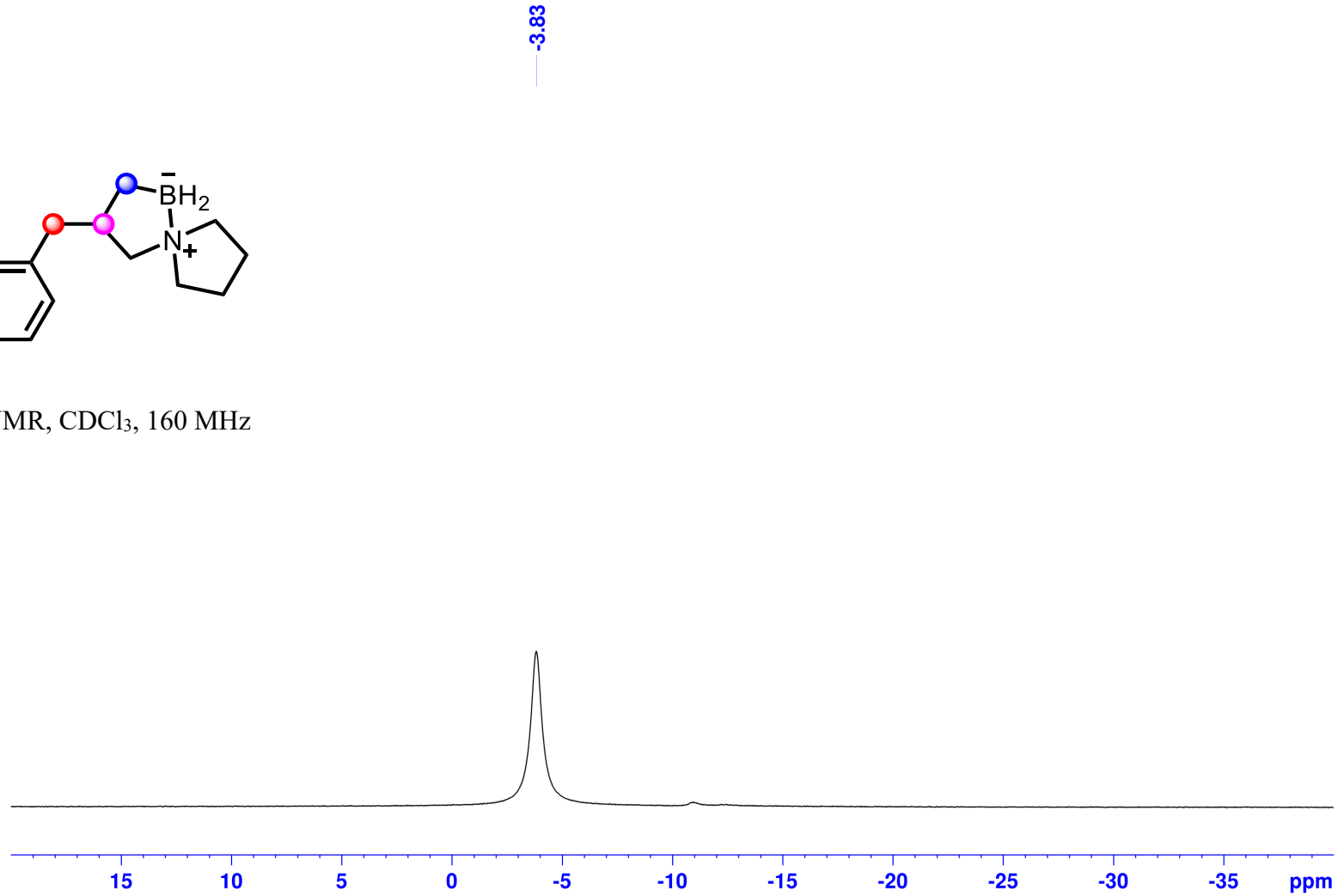
^{11}B NMR, $CDCl_3$, 160 MHz



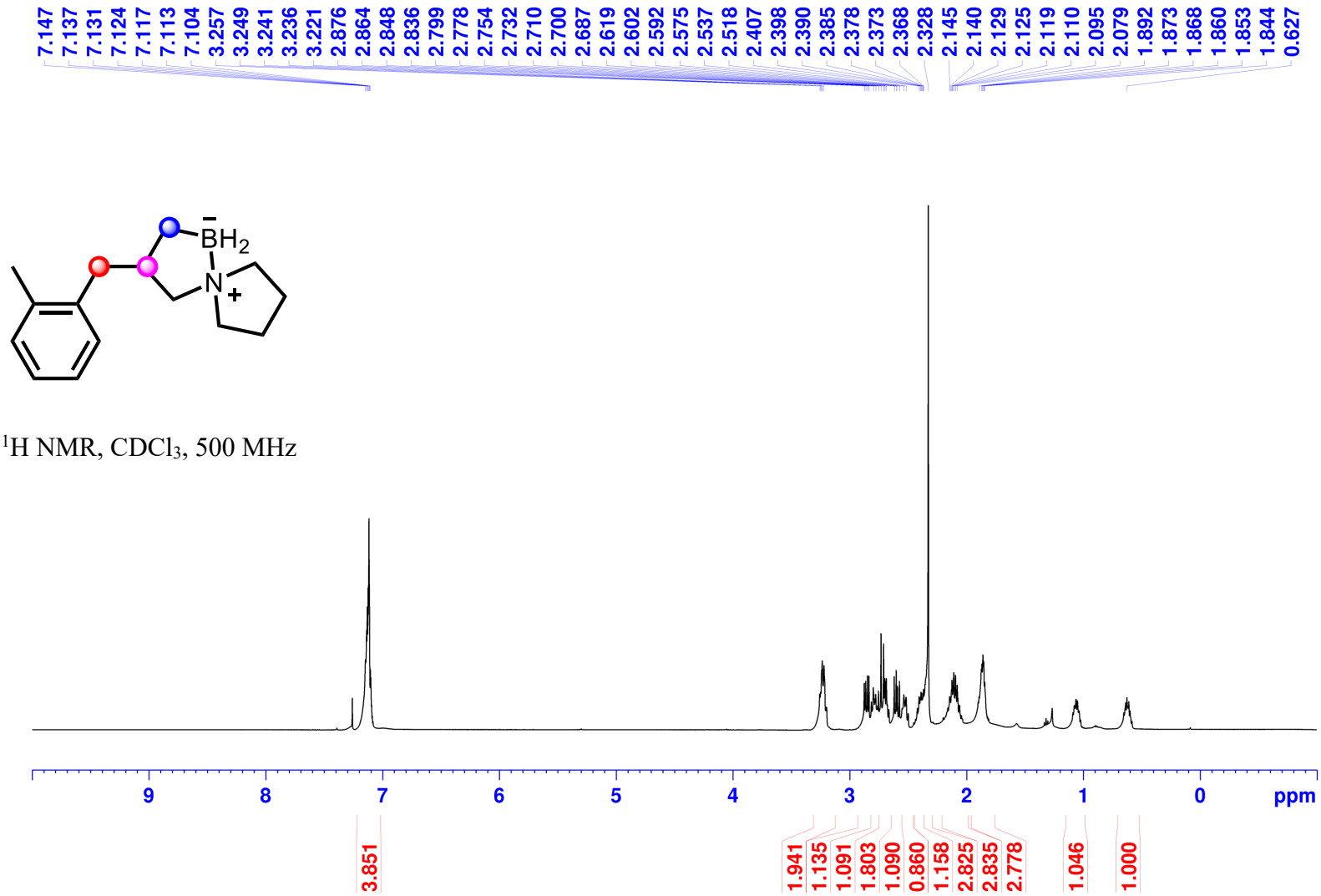
3-(4-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2q):



^{11}B NMR, $CDCl_3$, 160 MHz

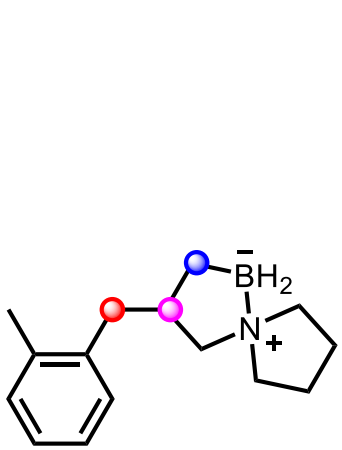


3-(2-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2r):

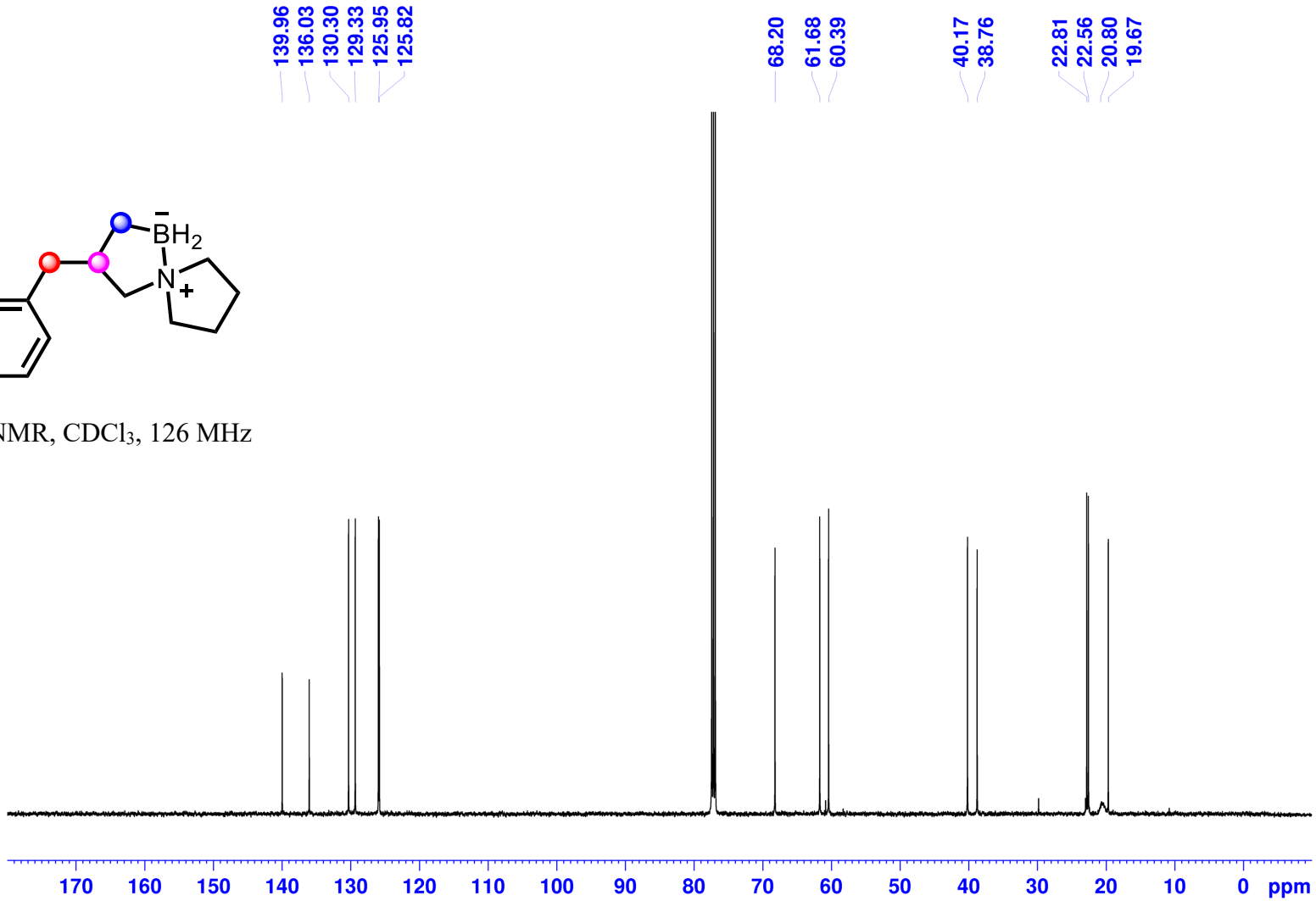


^{1}H NMR, $CDCl_3$, 500 MHz

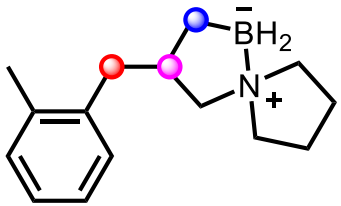
3-(2-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2r):



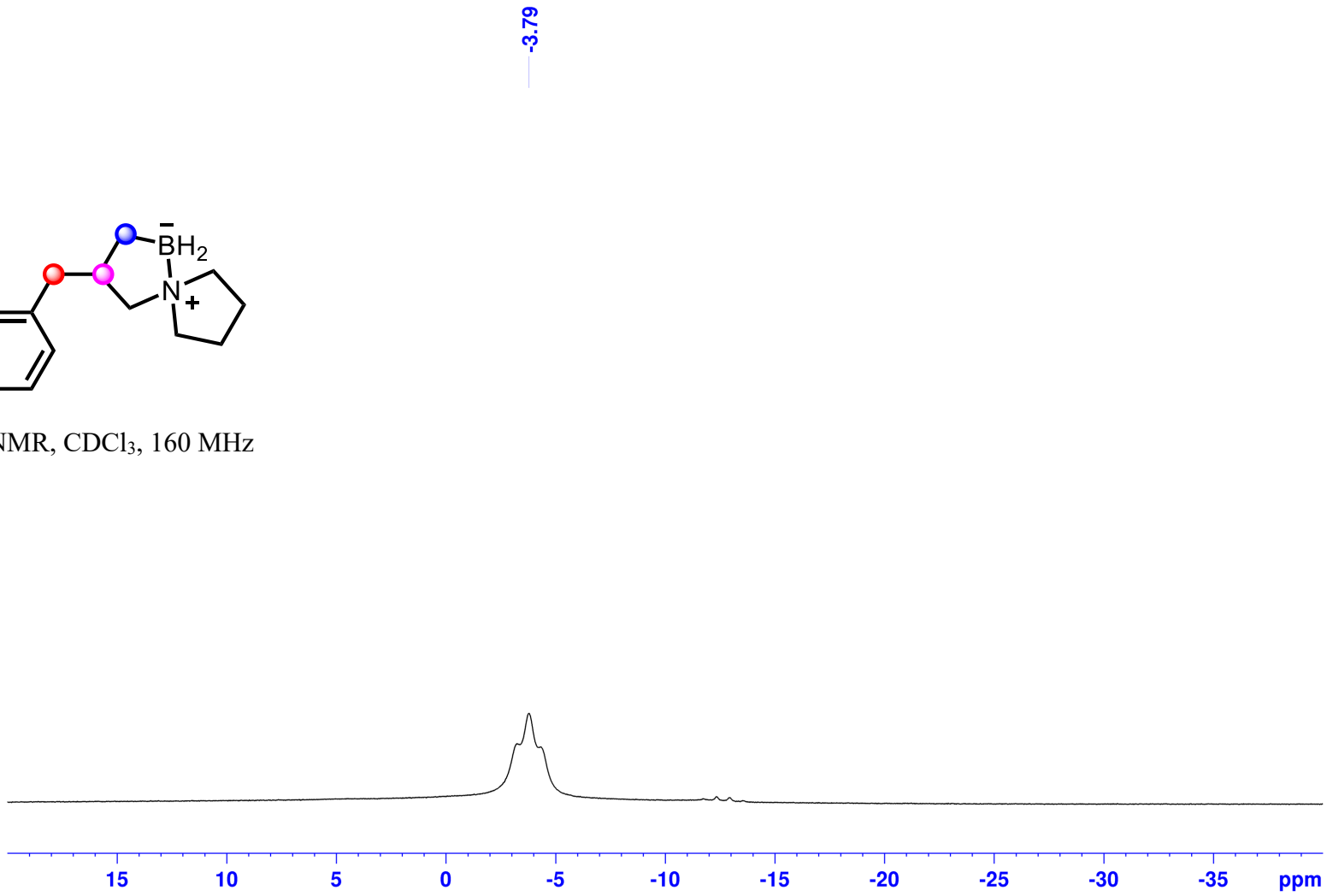
^{13}C NMR, $CDCl_3$, 126 MHz



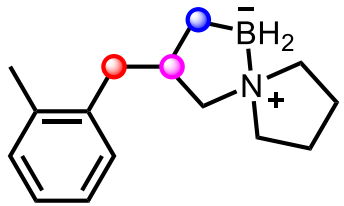
3-(2-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2r):



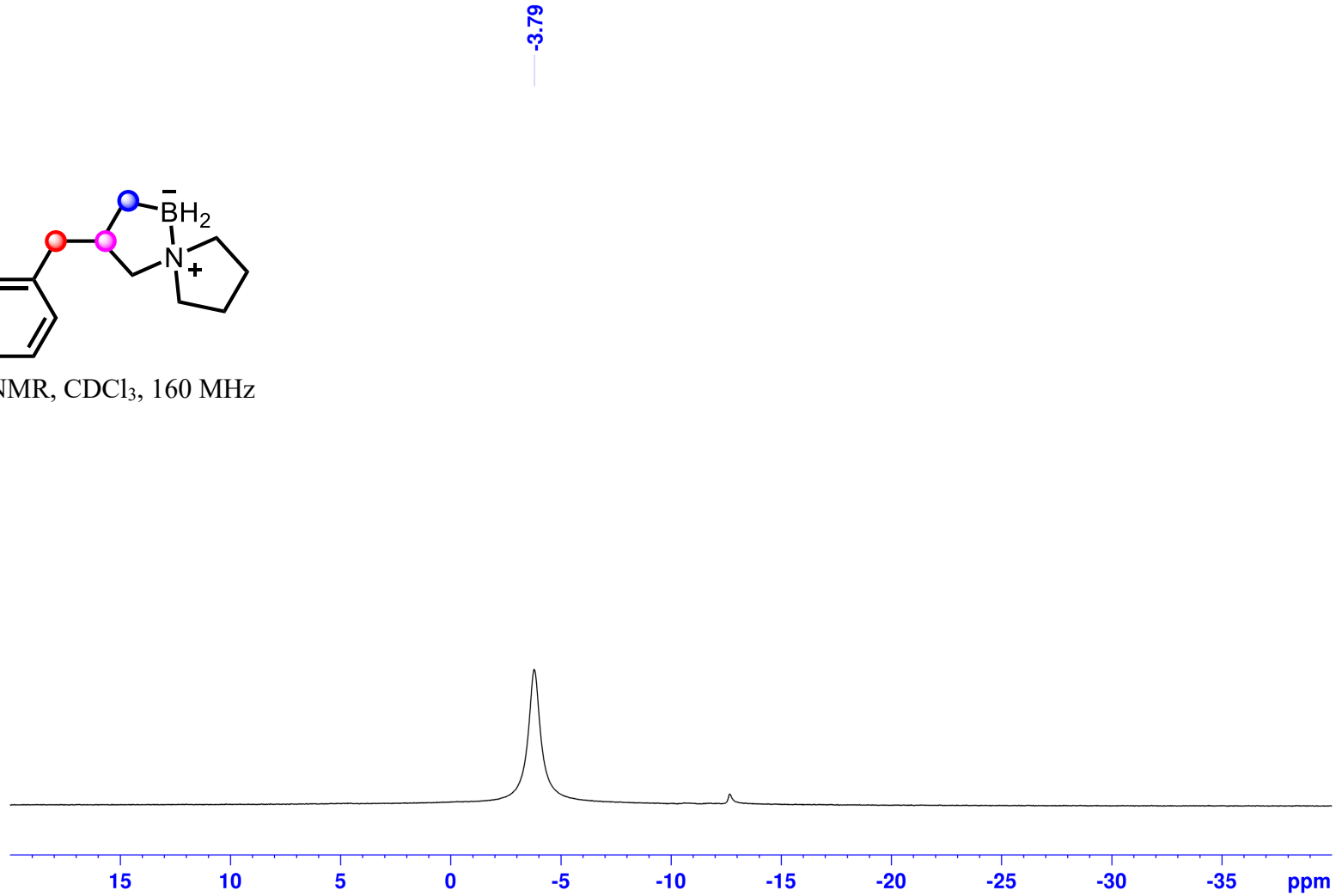
^{11}B NMR, $CDCl_3$, 160 MHz



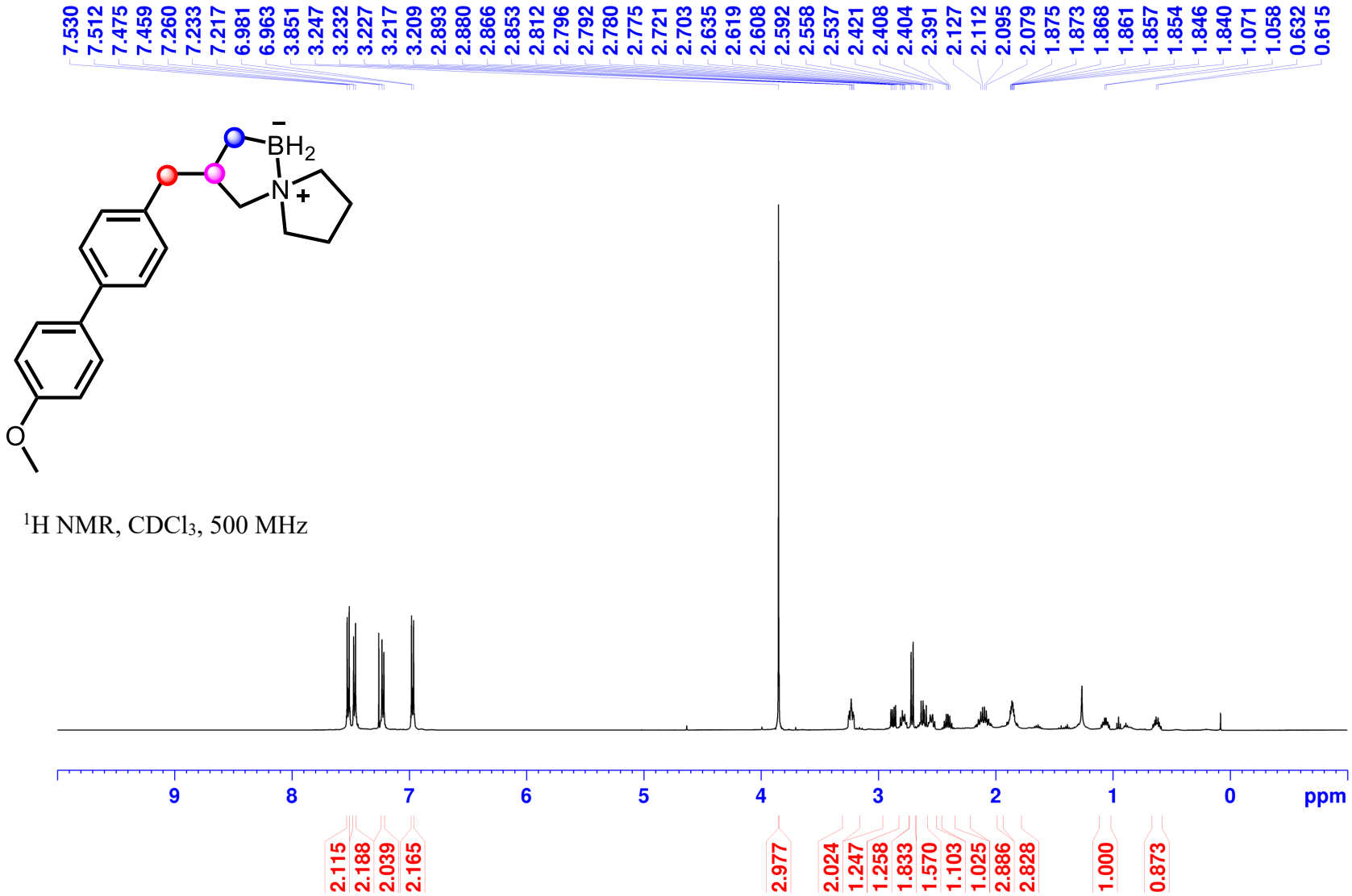
3-(2-Methylbenzyl)-5-aza-1-boraspiro[4.4]nonane (2r):



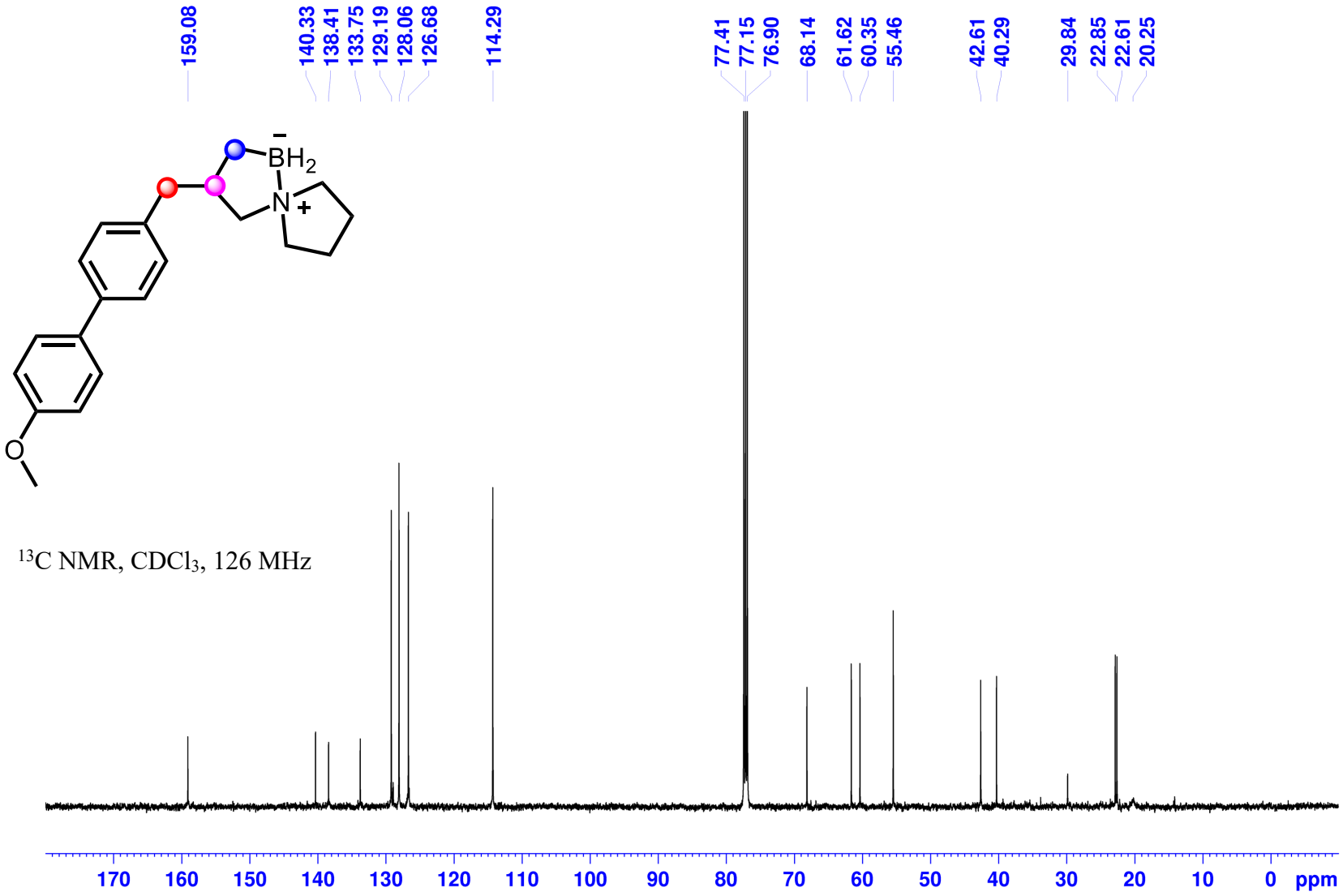
^{11}B NMR, $CDCl_3$, 160 MHz



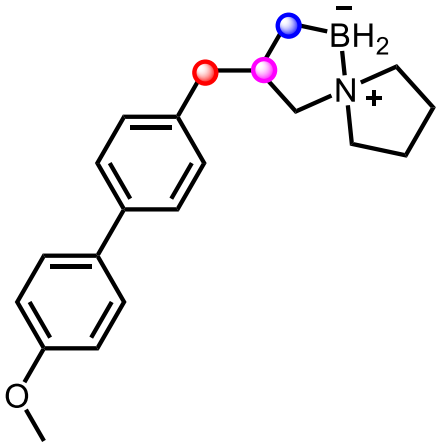
3-((4'-Methoxy-[1,1'-biphenyl]-4-yl)methyl)-5-aza-1-boraspiro[4.4]nonane (2s):



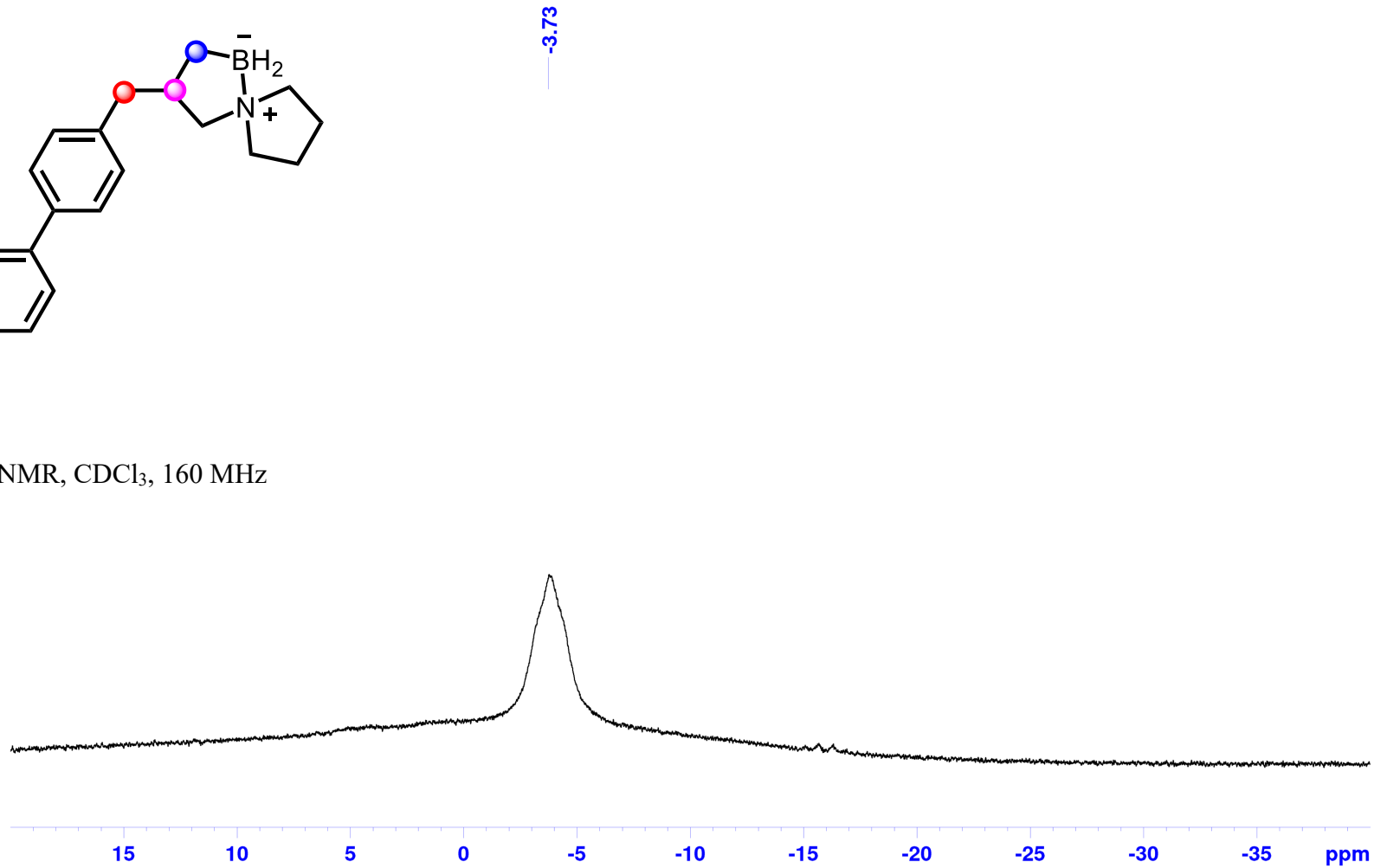
3-((4'-Methoxy-[1,1'-biphenyl]-4-yl)methyl)-5-aza-1-boraspiro[4.4]nonane (2s):



3-((4'-Methoxy-[1,1'-biphenyl]-4-yl)methyl)-5-aza-1-boraspiro[4.4]nonane (2s):

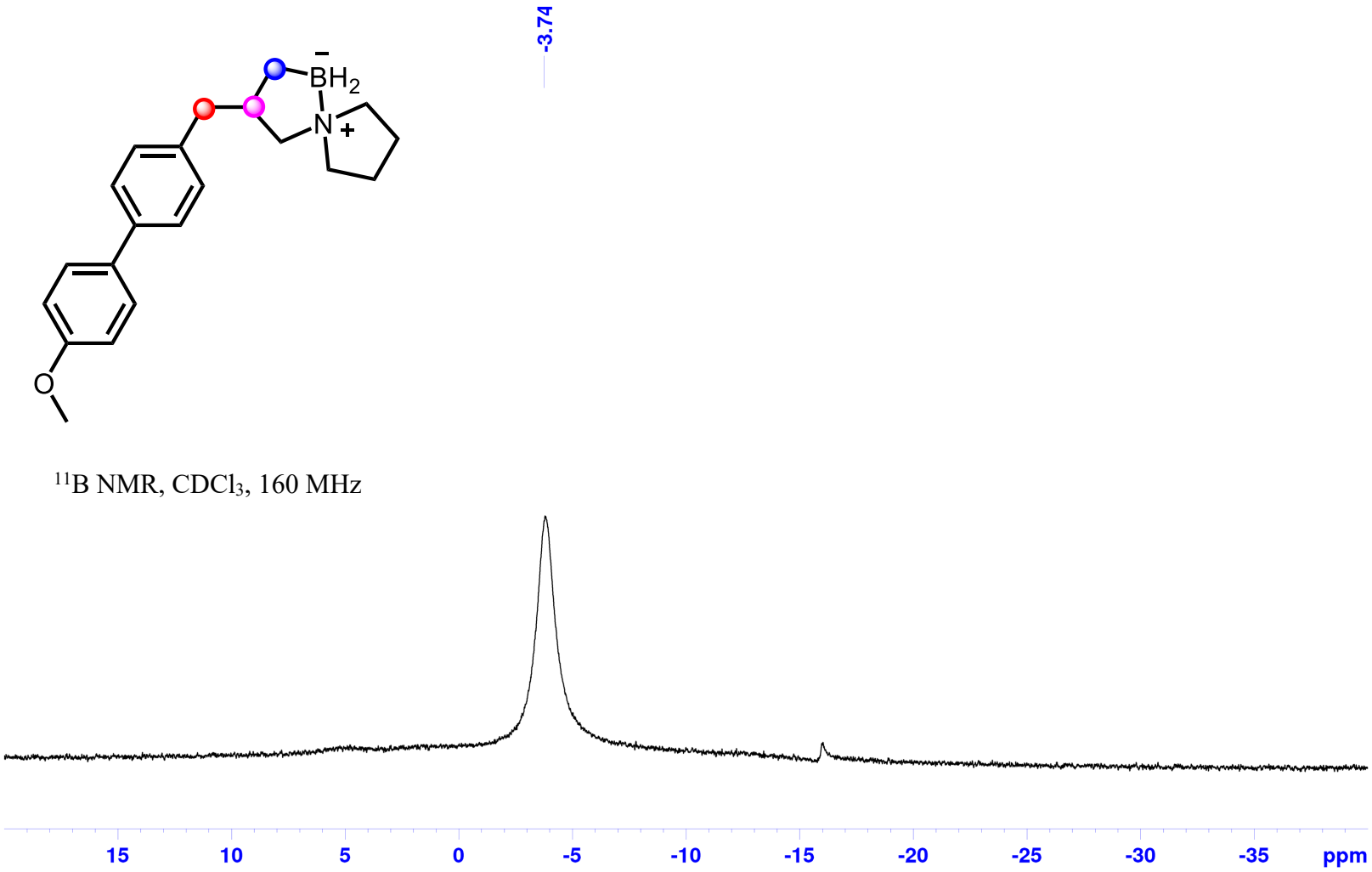


^{11}B NMR, $CDCl_3$, 160 MHz

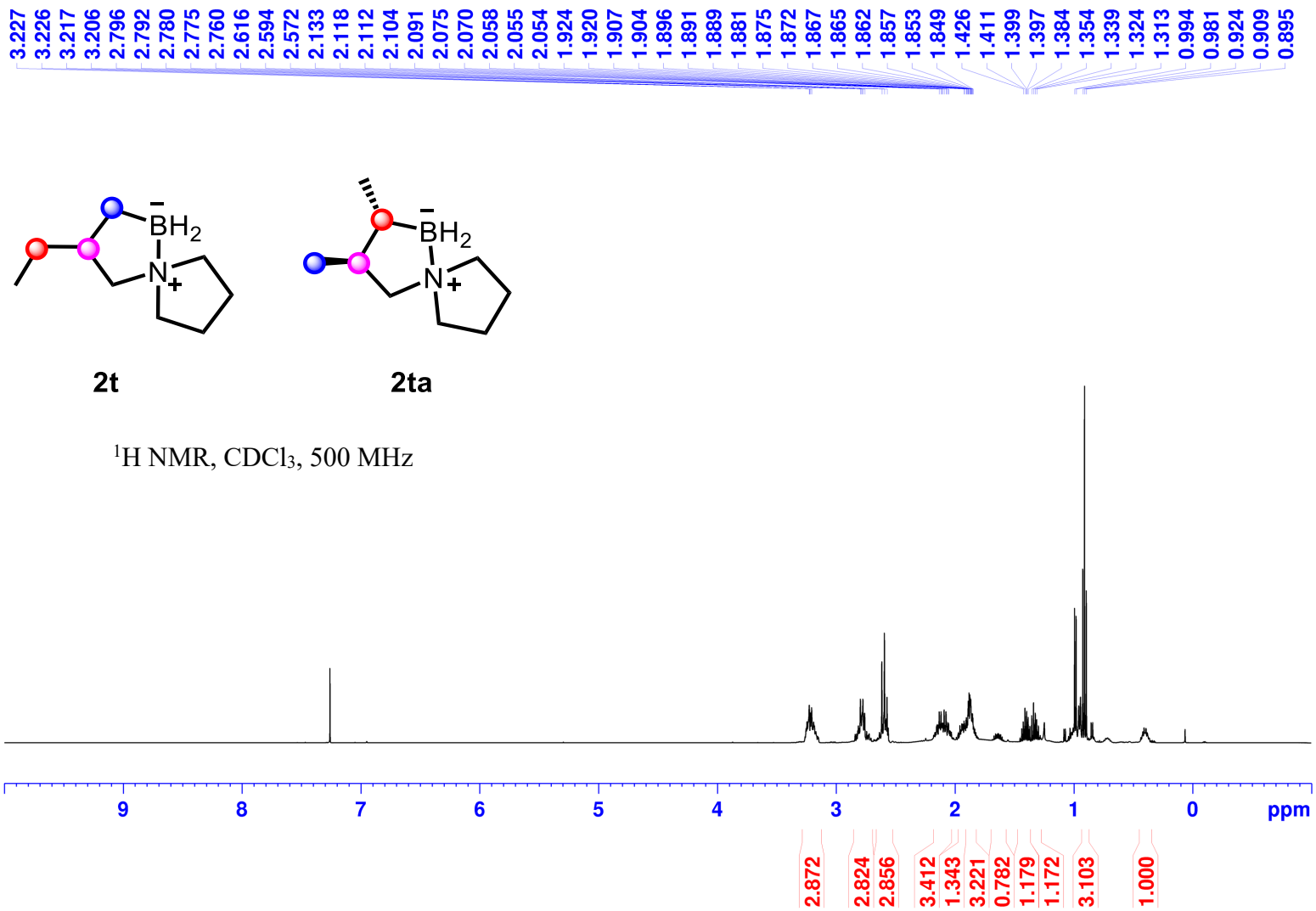


3-((4'-Methoxy-[1,1'-biphenyl]-4-yl)methyl)-5-aza-1-boraspiro[4.4]nonane (2s):

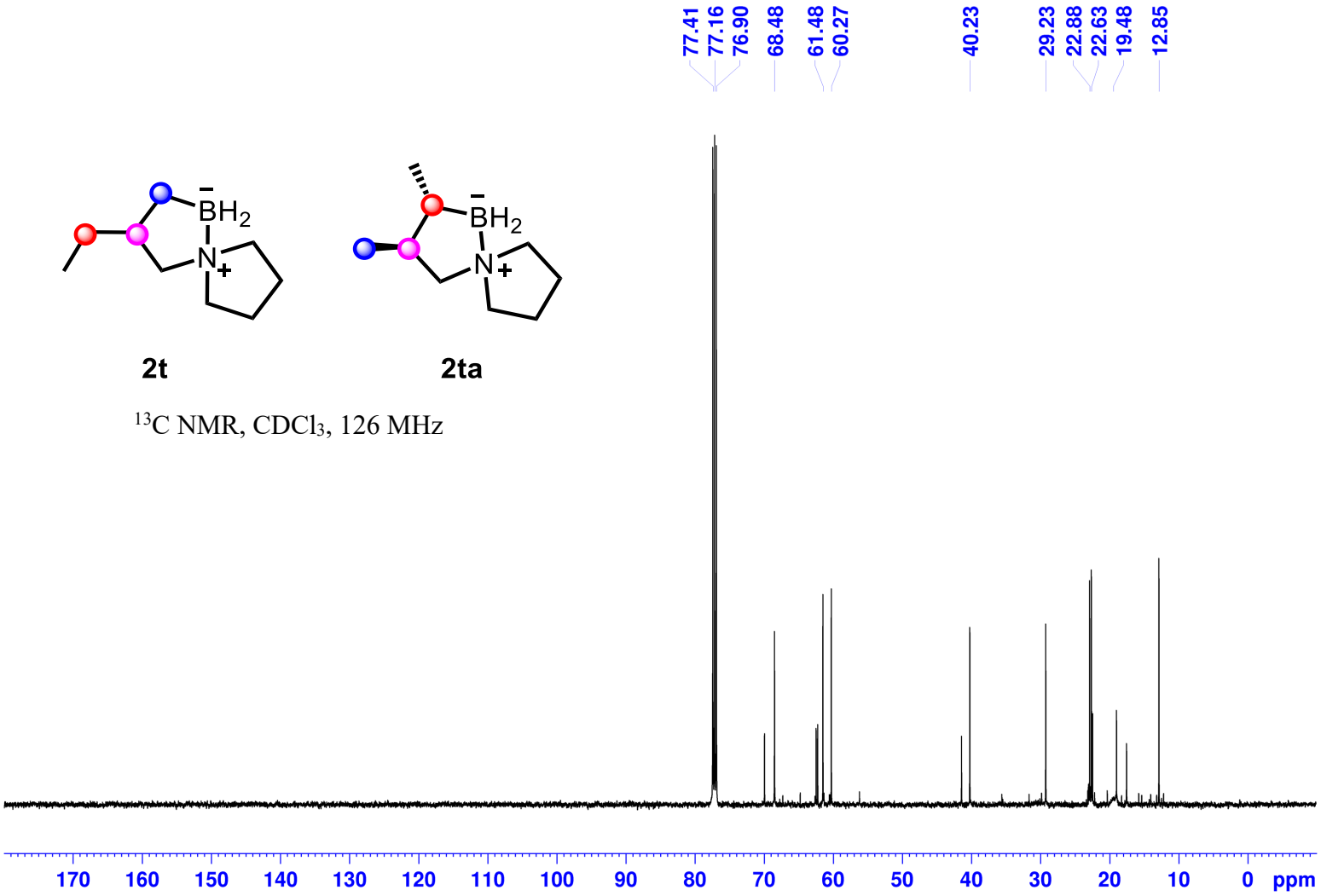
^{11}B NMR, $CDCl_3$, 160 MHz



3-Ethyl-5-aza-1-boraspiro[4.4]nonane (2t) and (2*S*,3*S*)-2,3-dimethyl-5-aza-1-boraspiro[4.4]nonane (2ta):

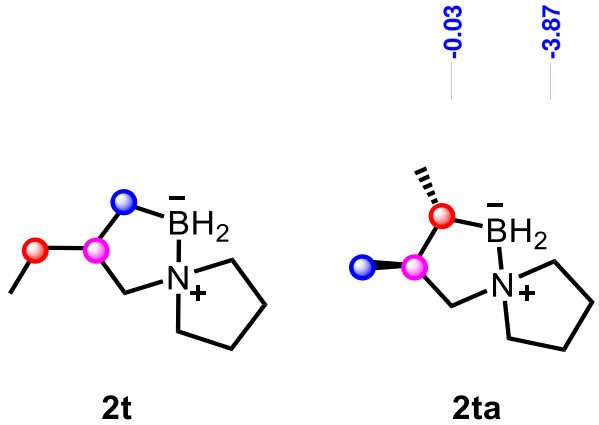


3-Ethyl-5-aza-1-boraspiro[4.4]nonane (2t) and (2*S*,3*S*)-2,3-dimethyl-5-aza-1-boraspiro[4.4]nonane (2ta):

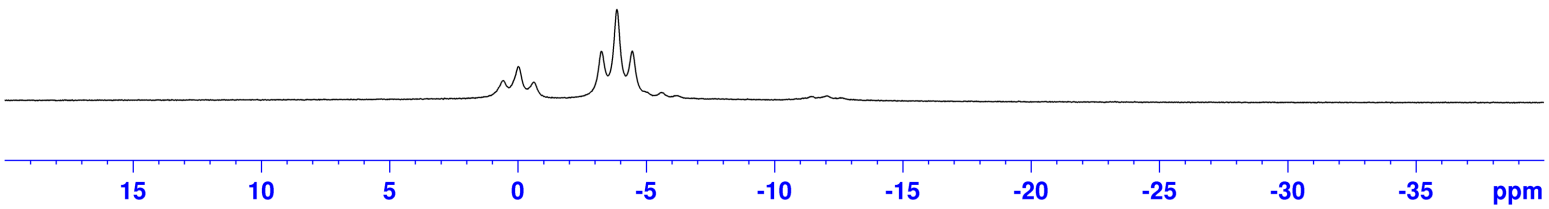


^{13}C NMR, $CDCl_3$, 126 MHz

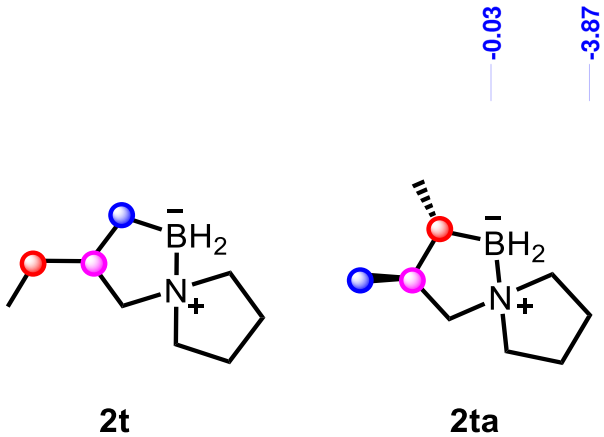
3-Ethyl-5-aza-1-boraspiro[4.4]nonane (2t) and (2*S*,3*S*)-2,3-dimethyl-5-aza-1-boraspiro[4.4]nonane (2ta):



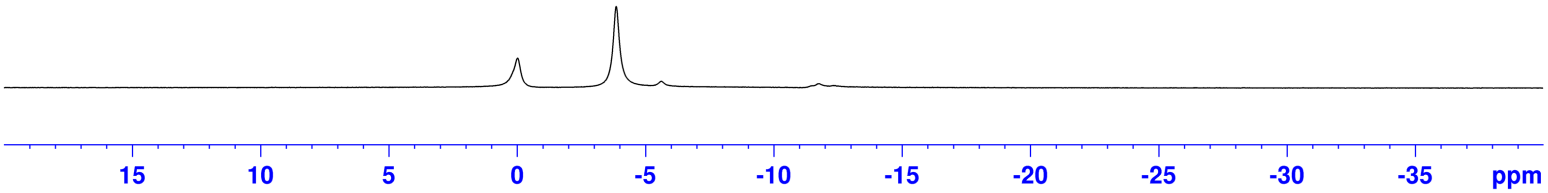
^{11}B NMR, $CDCl_3$, 160 MHz



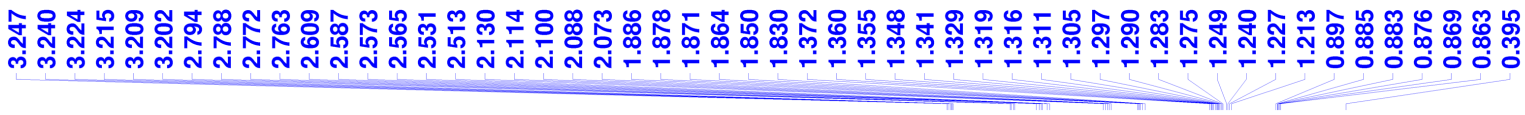
3-Ethyl-5-aza-1-boraspiro[4.4]nonane (2t) and (2*S*,3*S*)-2,3-dimethyl-5-aza-1-boraspiro[4.4]nonane (2ta):

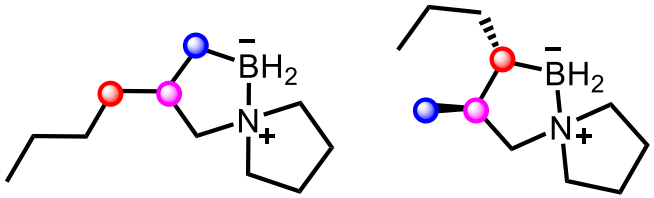


^{11}B NMR, $CDCl_3$, 160 MHz



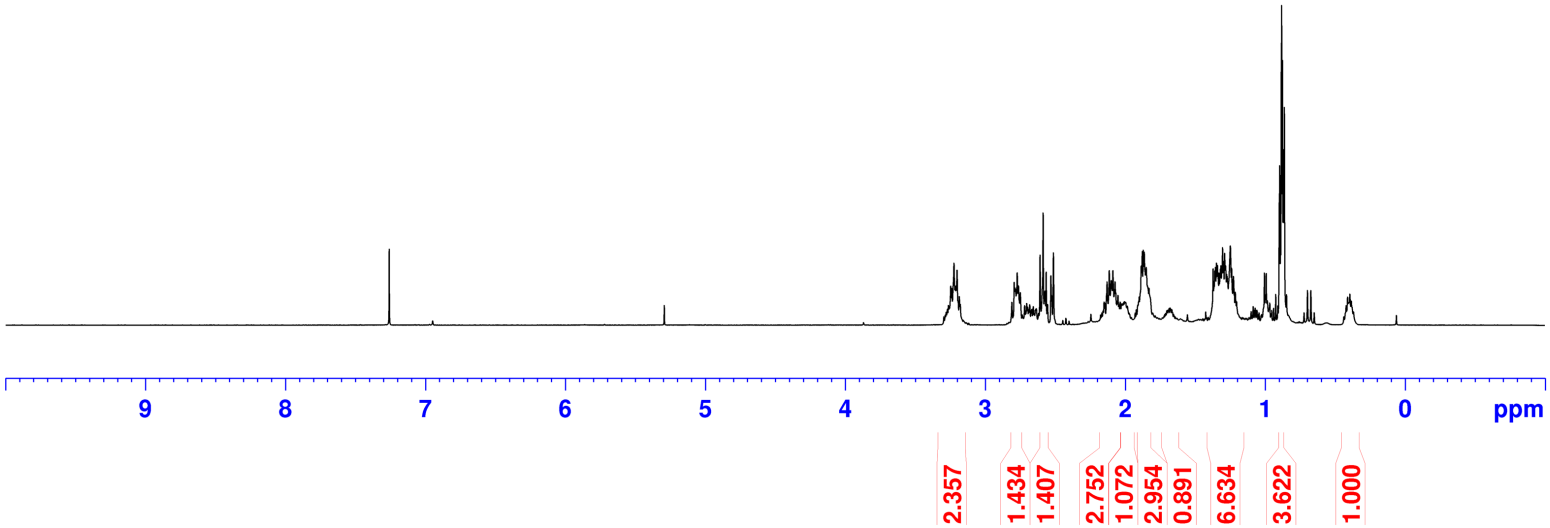
3-Butyl-5-aza-1-boraspiro[4.4]nonane (2u) and (2*S*,3*S*)-3-methyl-2-propyl-5-aza-1-boraspiro[4.4]nonane (2ua):



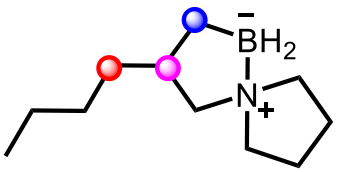


2u **2ua**

^{1}H NMR, $CDCl_3$, 500 MHz



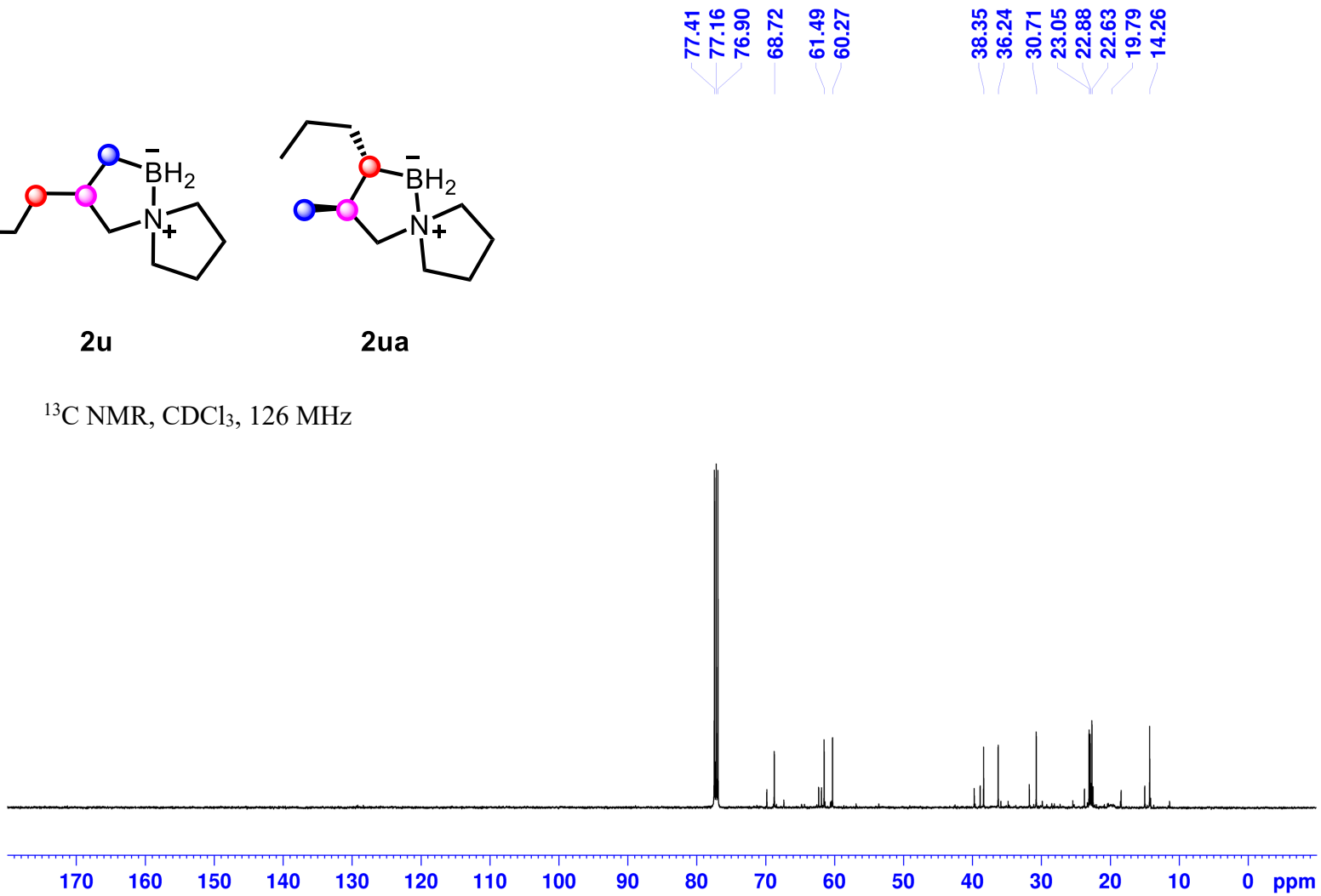
3-Butyl-5-aza-1-boraspiro[4.4]nonane (2u) and (2*S*,3*S*)-3-methyl-2-propyl-5-aza-1-boraspiro[4.4]nonane (2ua):



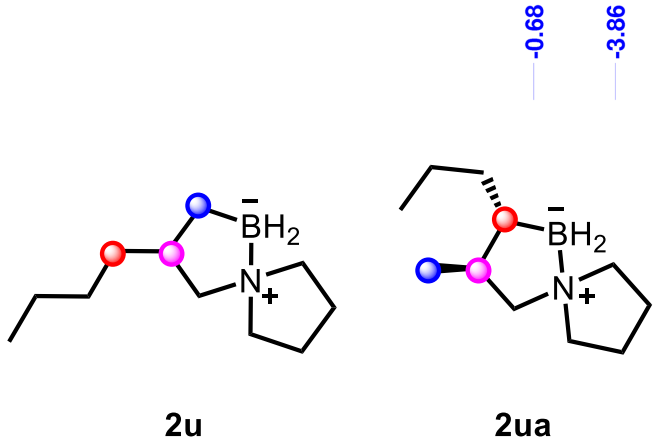
2u

2ua

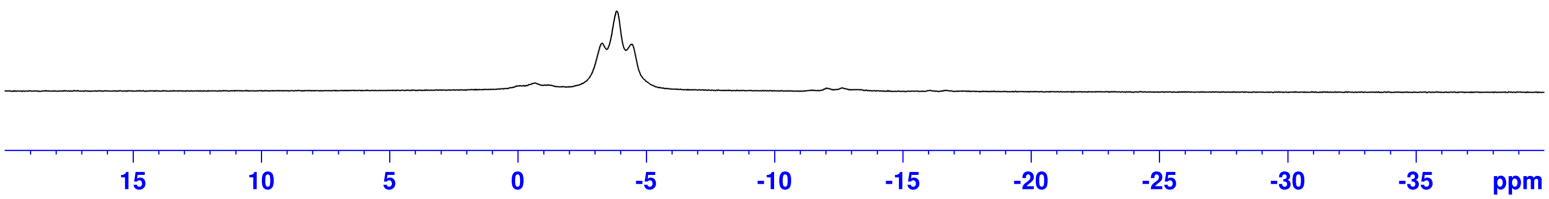
^{13}C NMR, $CDCl_3$, 126 MHz



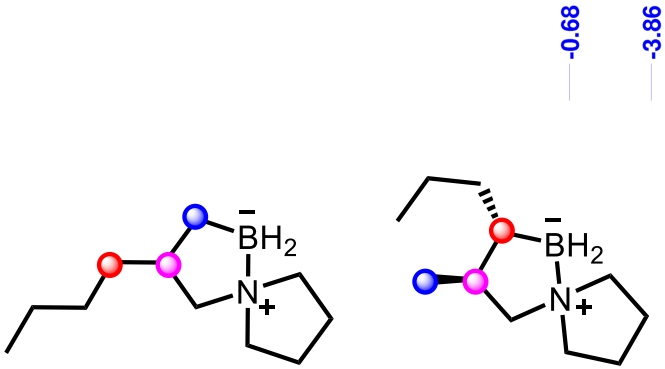
3-Butyl-5-aza-1-boraspiro[4.4]nonane (2u) and (2*S*,3*S*)-3-methyl-2-propyl-5-aza-1-boraspiro[4.4]nonane (2ua):



^{11}B NMR, $CDCl_3$, 160 MHz

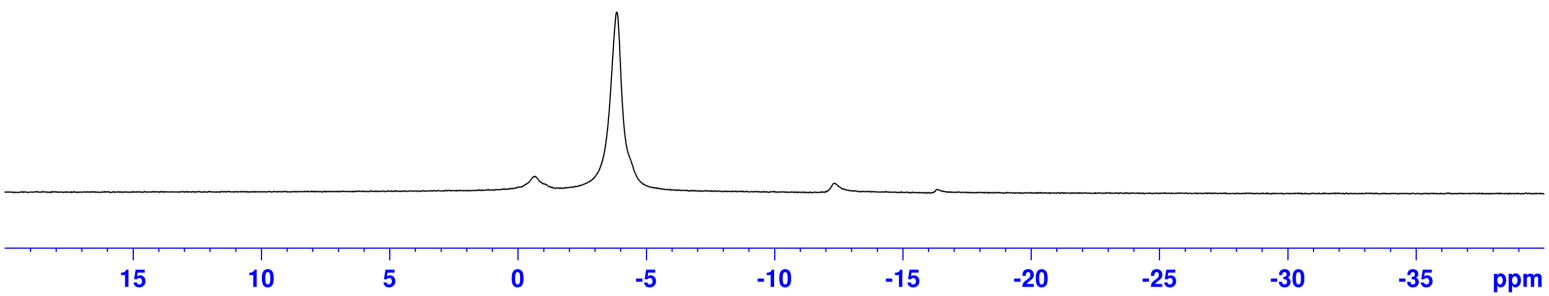


3-Butyl-5-aza-1-boraspiro[4.4]nonane (2u) and (2*S*,3*S*)-3-methyl-2-propyl-5-aza-1-boraspiro[4.4]nonane (2ua):

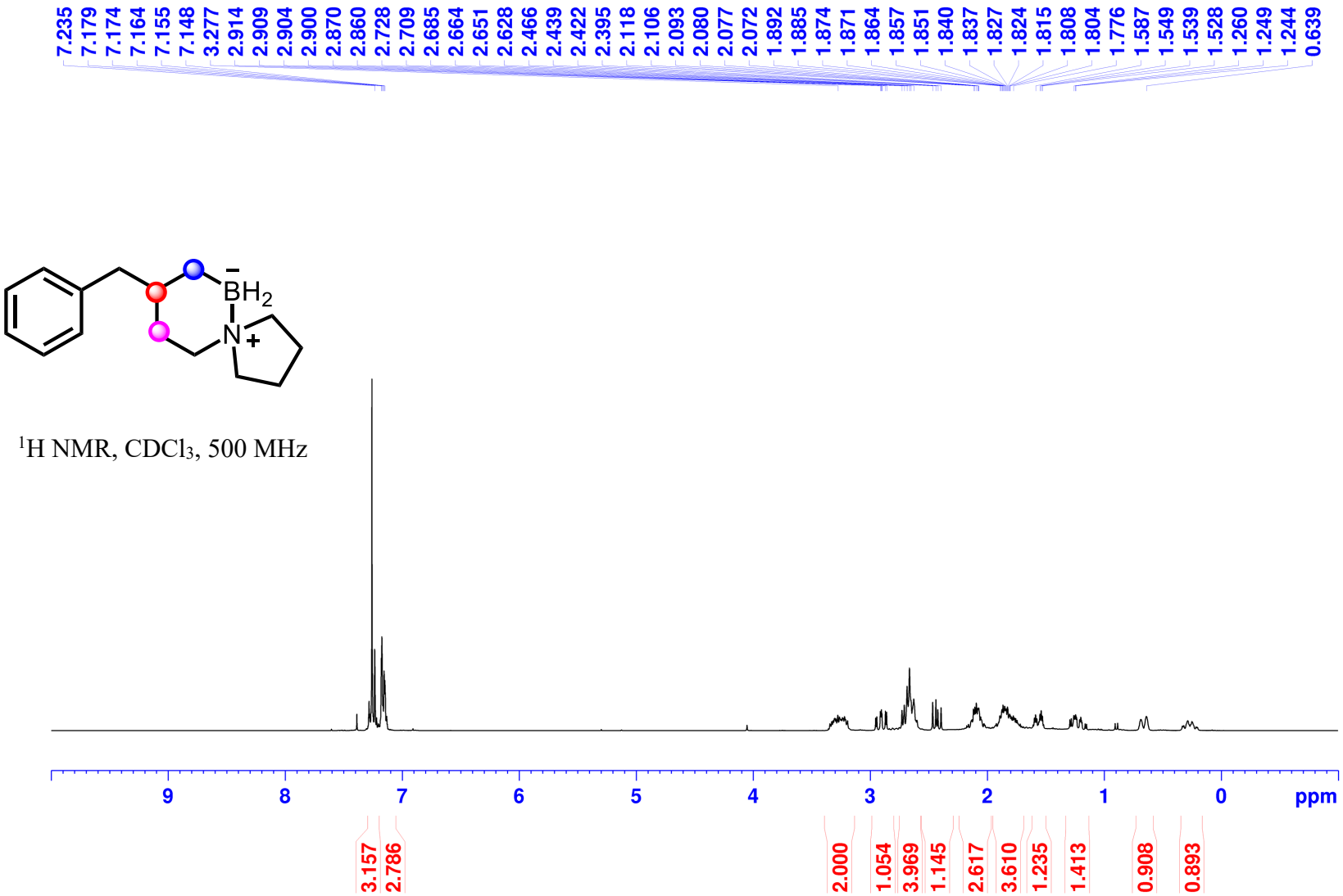


2u **2ua**

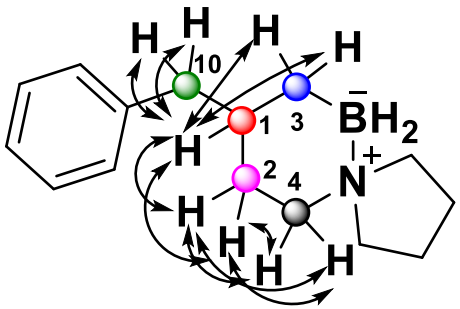
^{11}B NMR, $CDCl_3$, 160 MHz

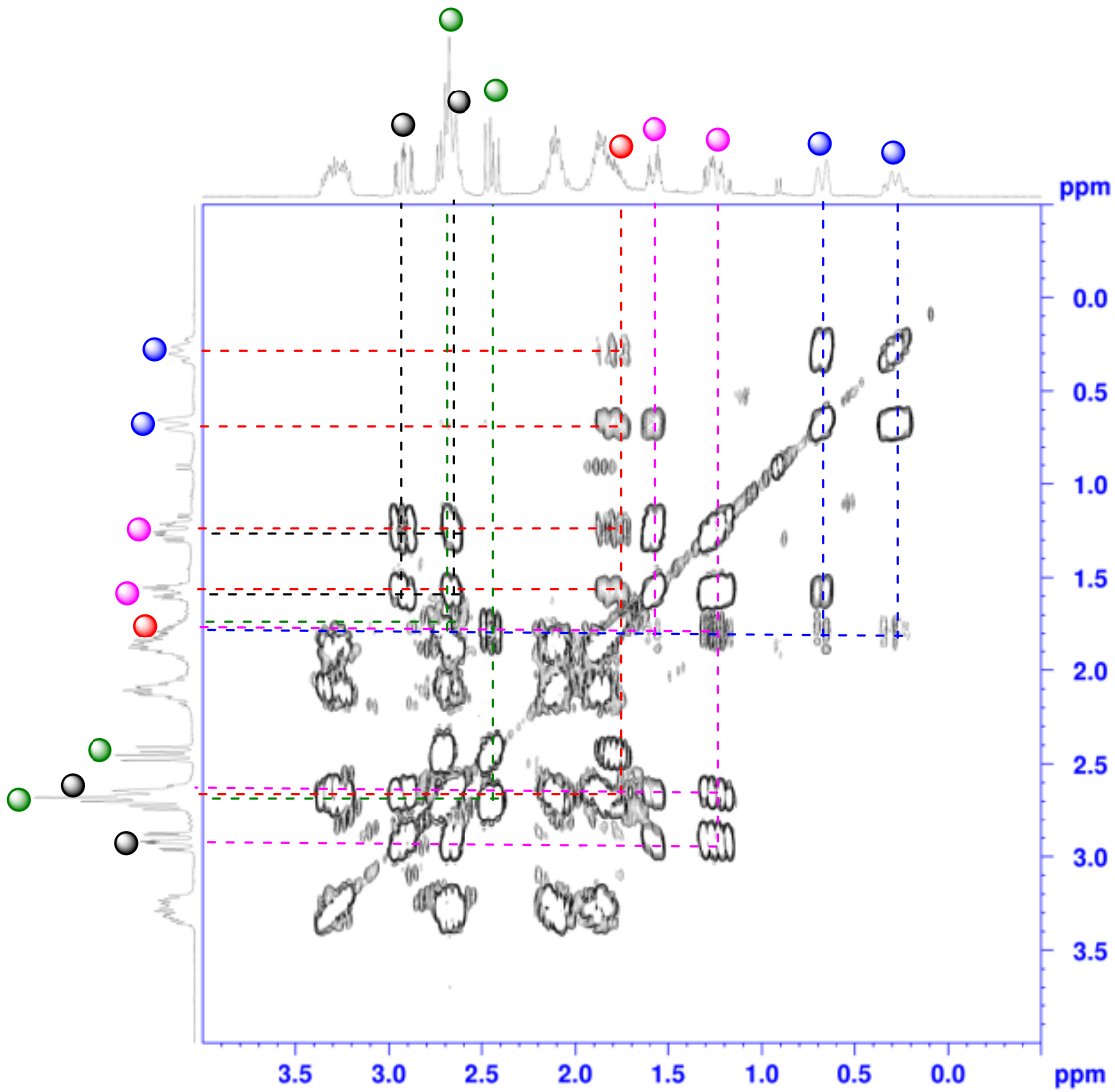


8-Benzyl-5-aza-6-boraspiro[4.5]decane (2v):

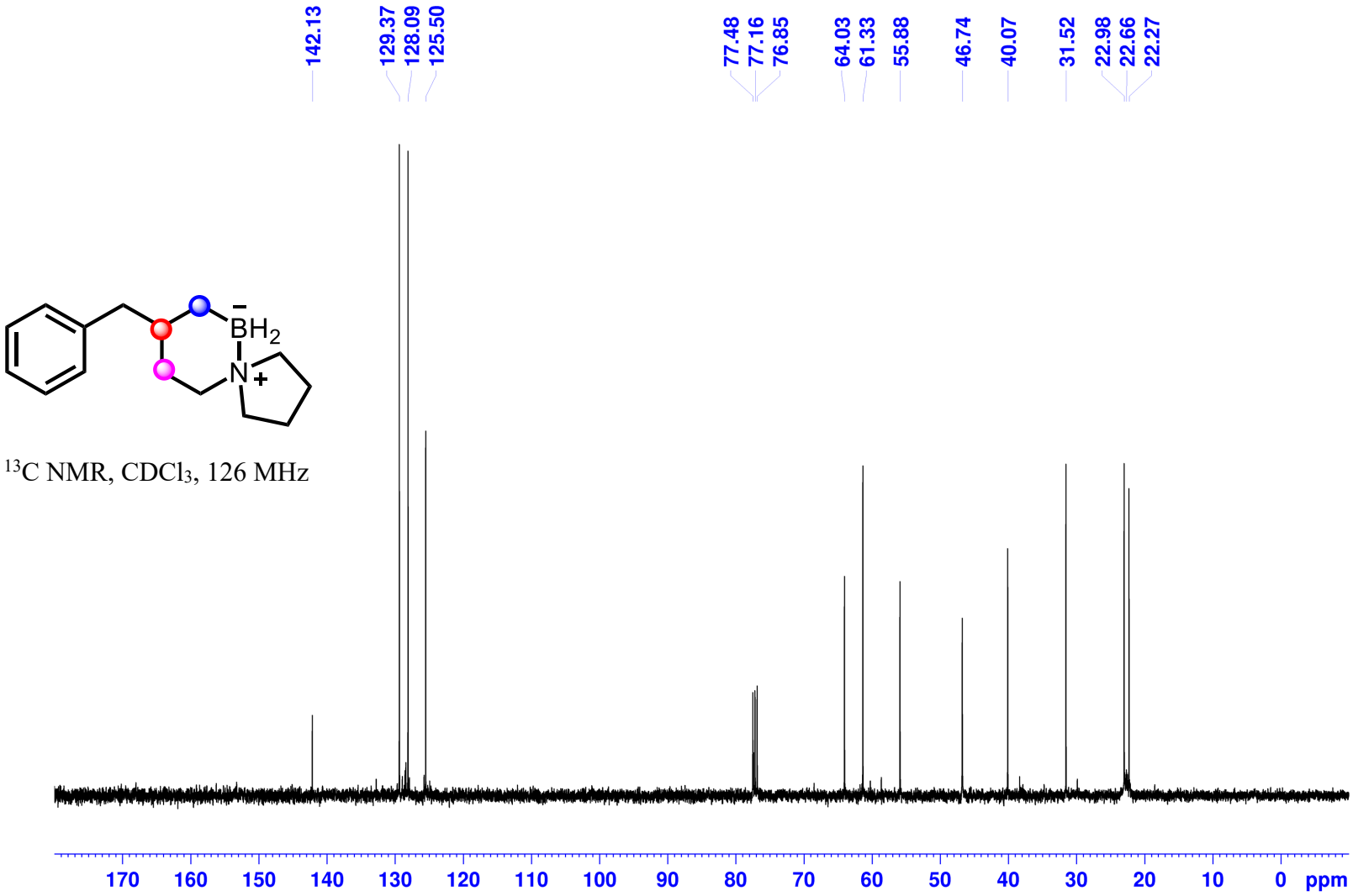


8-Benzyl-5-aza-6-boraspiro[4.5]decane (2v): 2D COSY





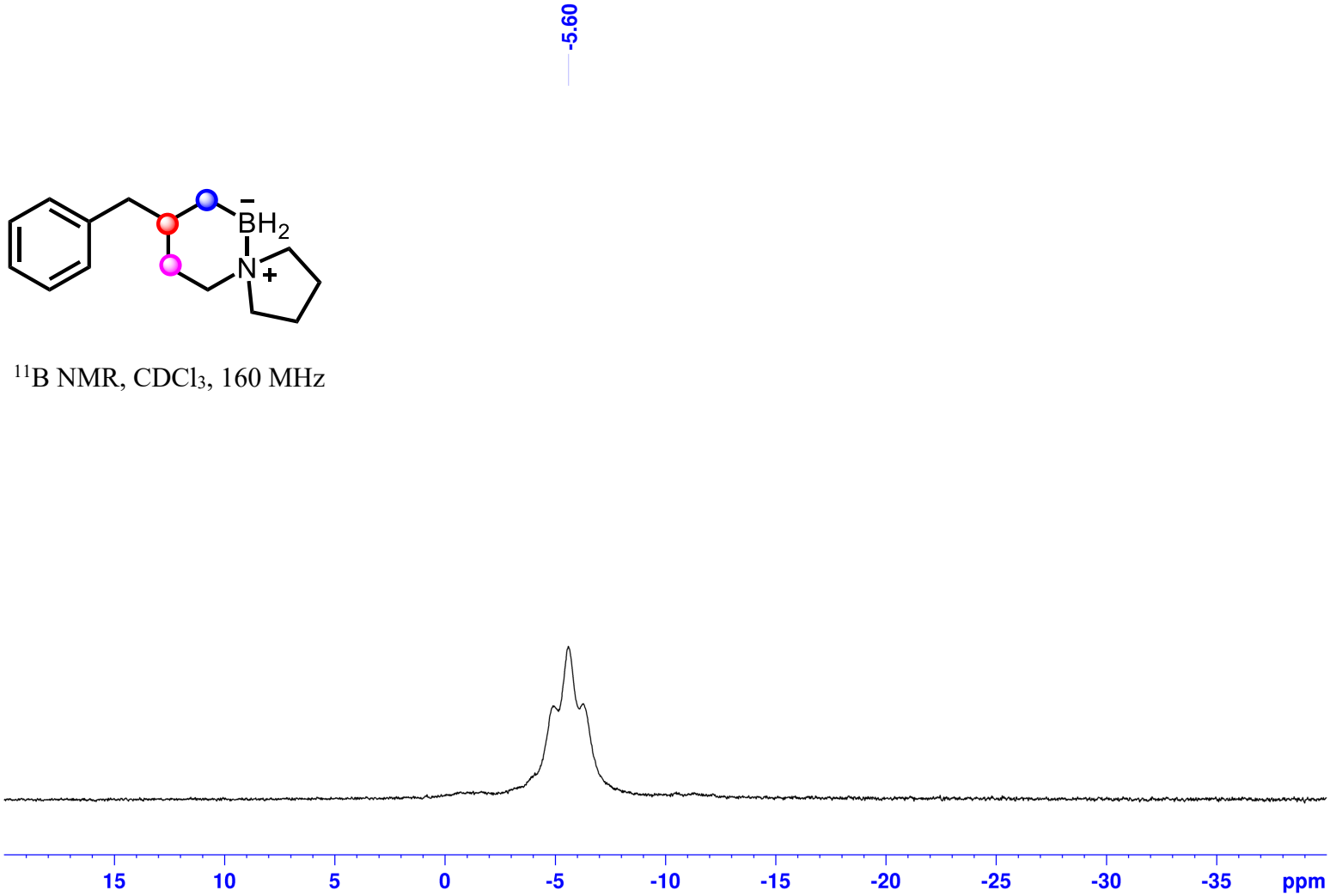
8-Benzyl-5-aza-6-boraspiro[4.5]decane (2v):



^{13}C NMR, $CDCl_3$, 126 MHz

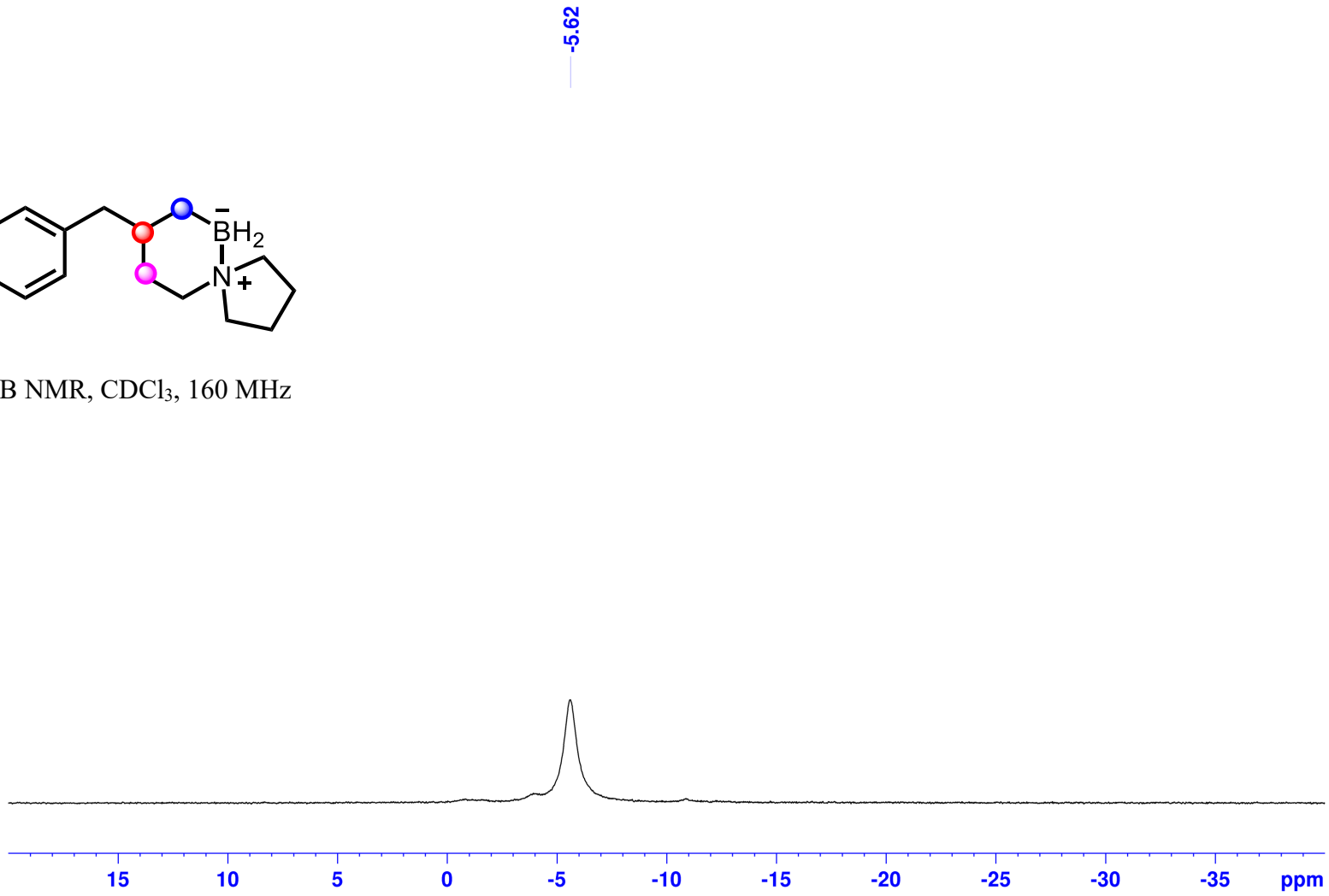
8-Benzyl-5-aza-6-boraspiro[4.5]decane (2v):

^{11}B NMR, $CDCl_3$, 160 MHz

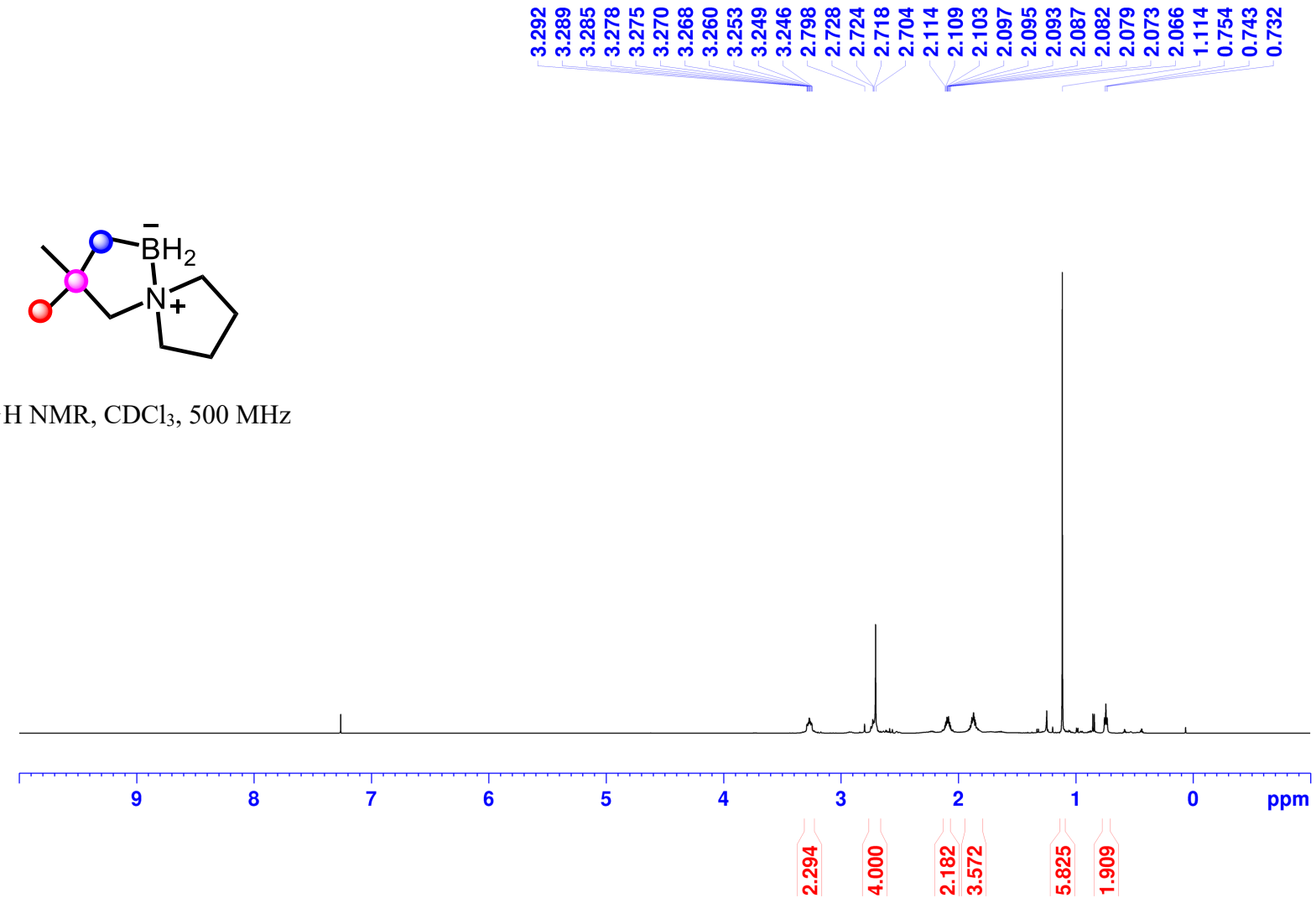


8-Benzyl-5-aza-6-boraspiro[4.5]decane (2v):

^{11}B NMR, $CDCl_3$, 160 MHz



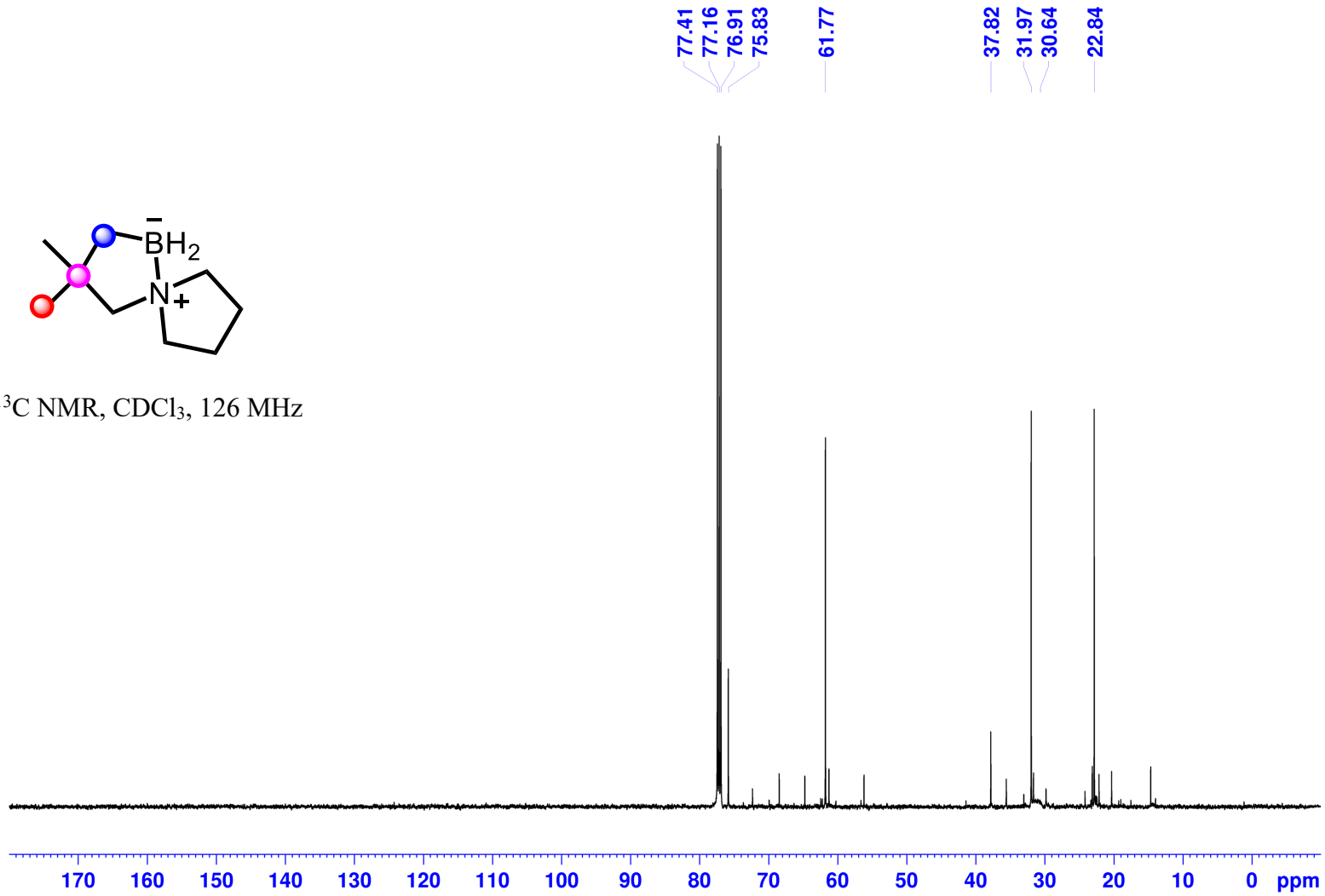
3,3-Dimethyl-5-aza-1-boraspiro[4.4]nonane (2w):



^{1}H NMR, $CDCl_3$, 500 MHz

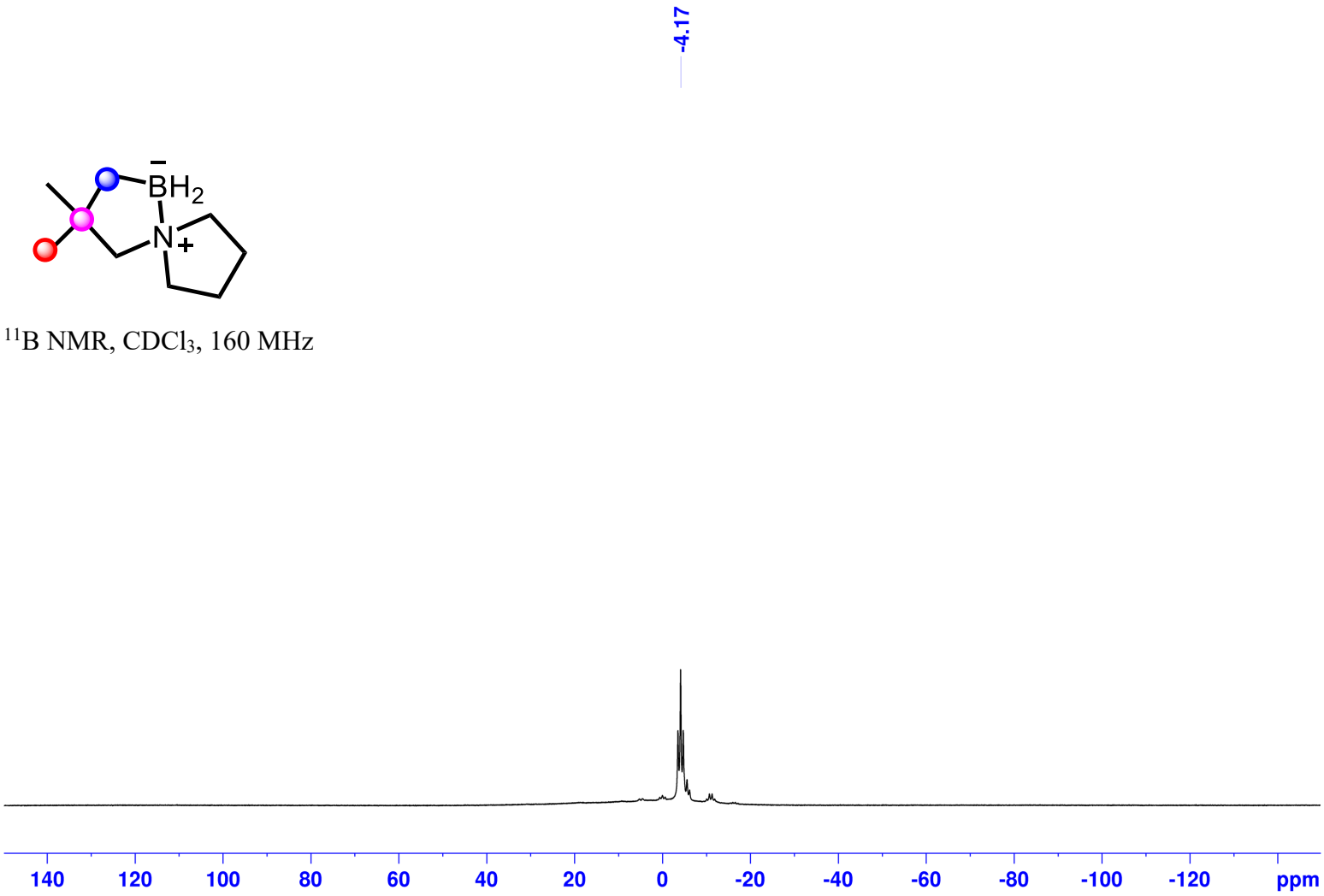
3,3-Dimethyl-5-aza-1-boraspiro[4.4]nonane (2w):

^{13}C NMR, $CDCl_3$, 126 MHz



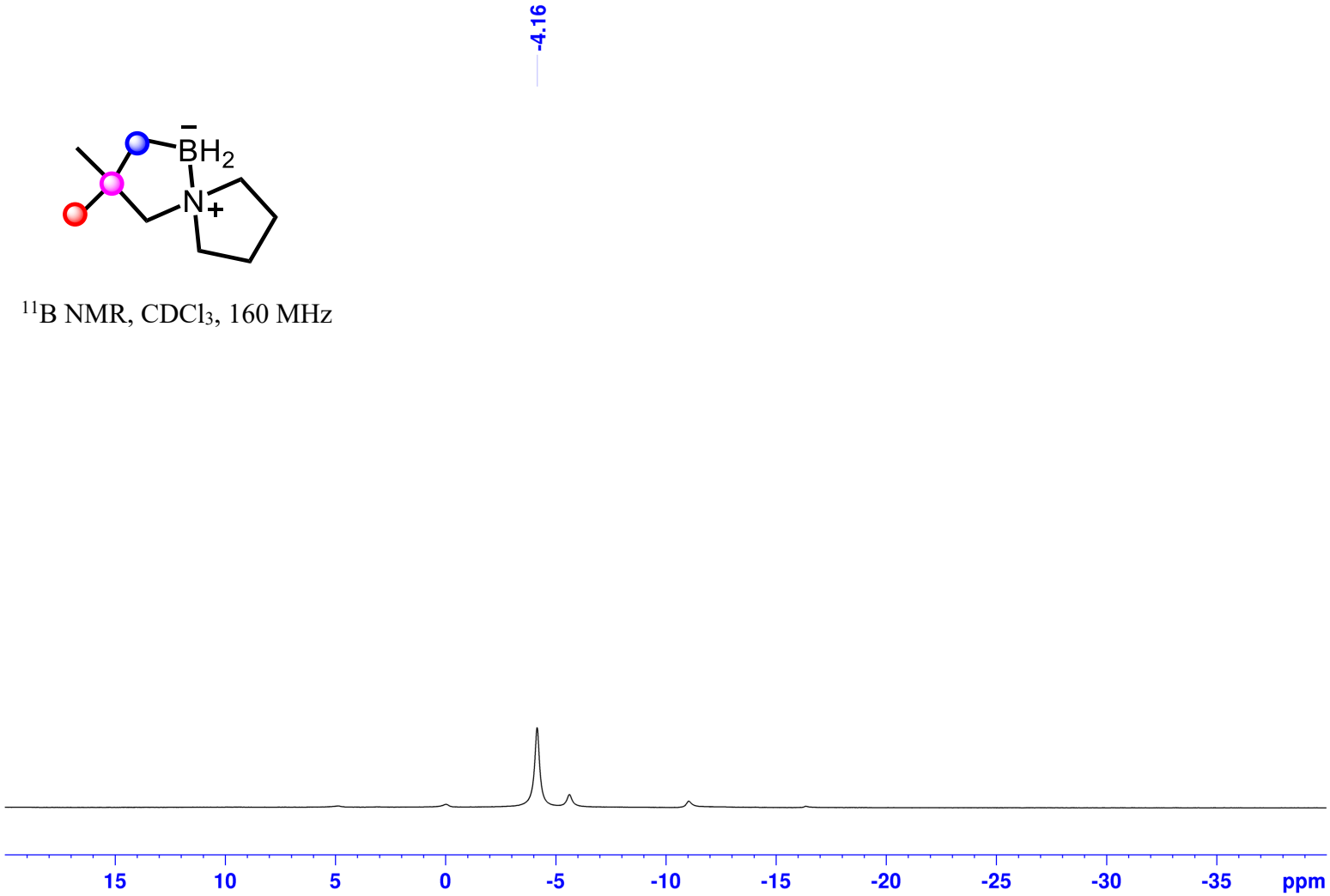
3,3-Dimethyl-5-aza-1-boraspiro[4.4]nonane (2w):

^{11}B NMR, $CDCl_3$, 160 MHz

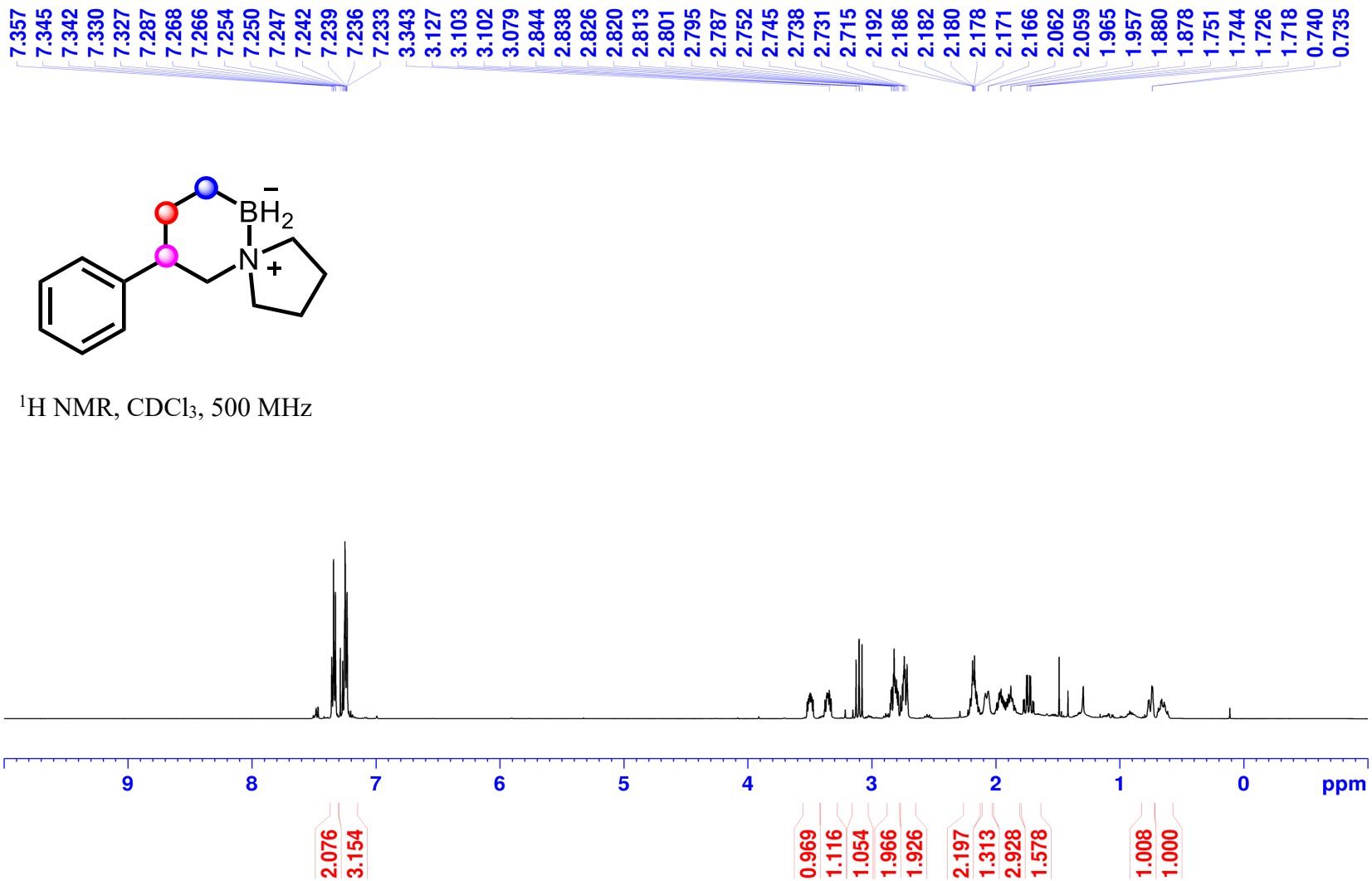


3,3-Dimethyl-5-aza-1-boraspiro[4.4]nonane (2w):

^{11}B NMR, $CDCl_3$, 160 MHz

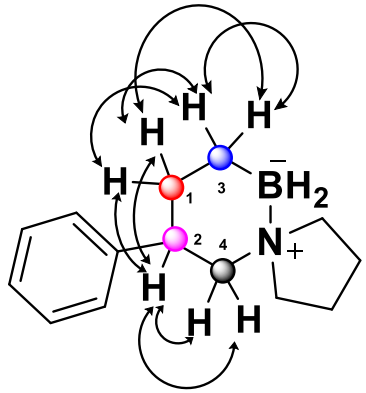


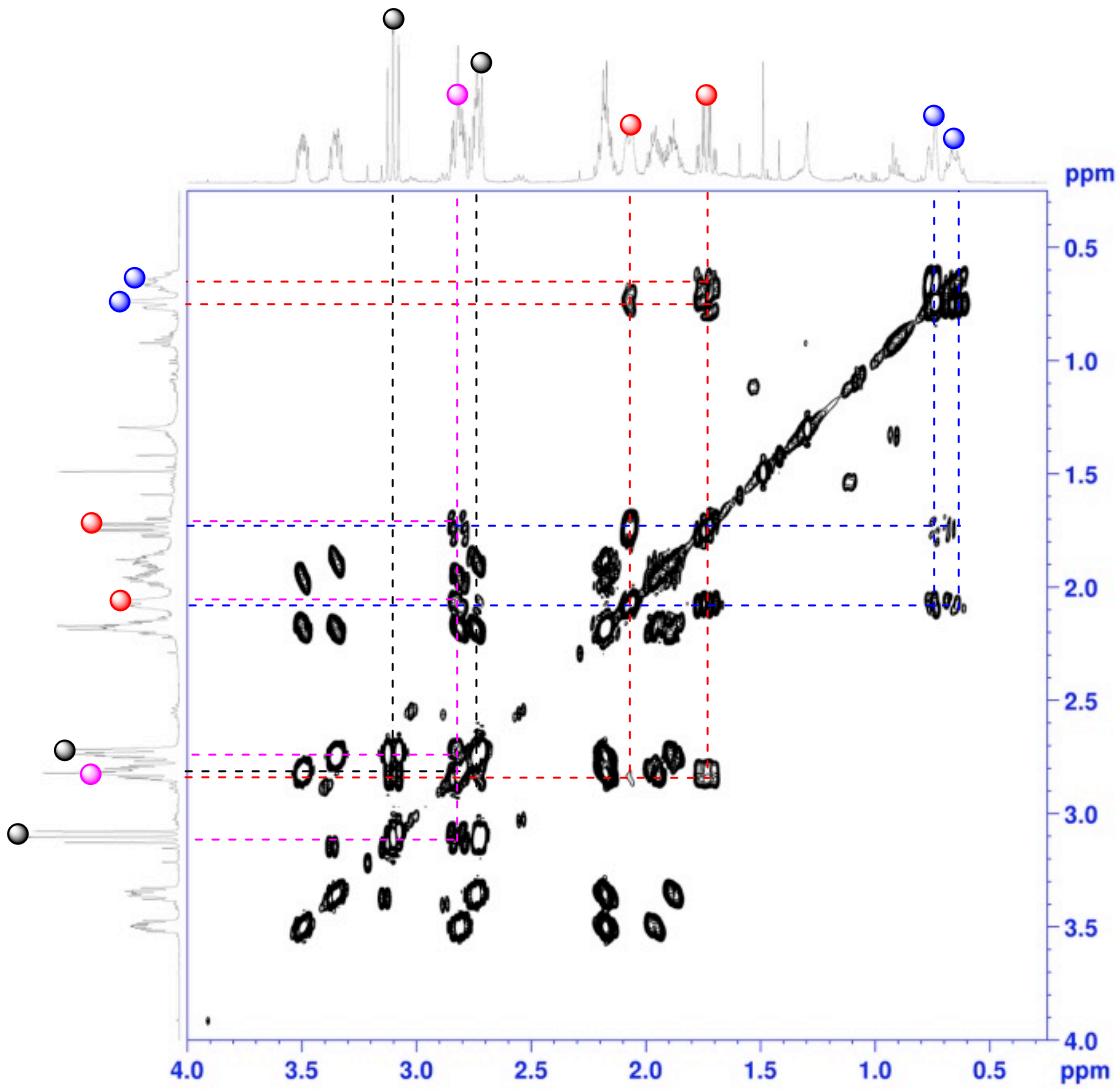
9-Phenyl-5-aza-6-boraspiro[4.5]decane (2x):



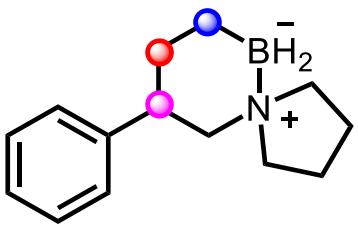
^{1}H NMR, $CDCl_3$, 500 MHz

9-Phenyl-5-aza-6-boraspiro[4.5]decane (2x): 2D COSY

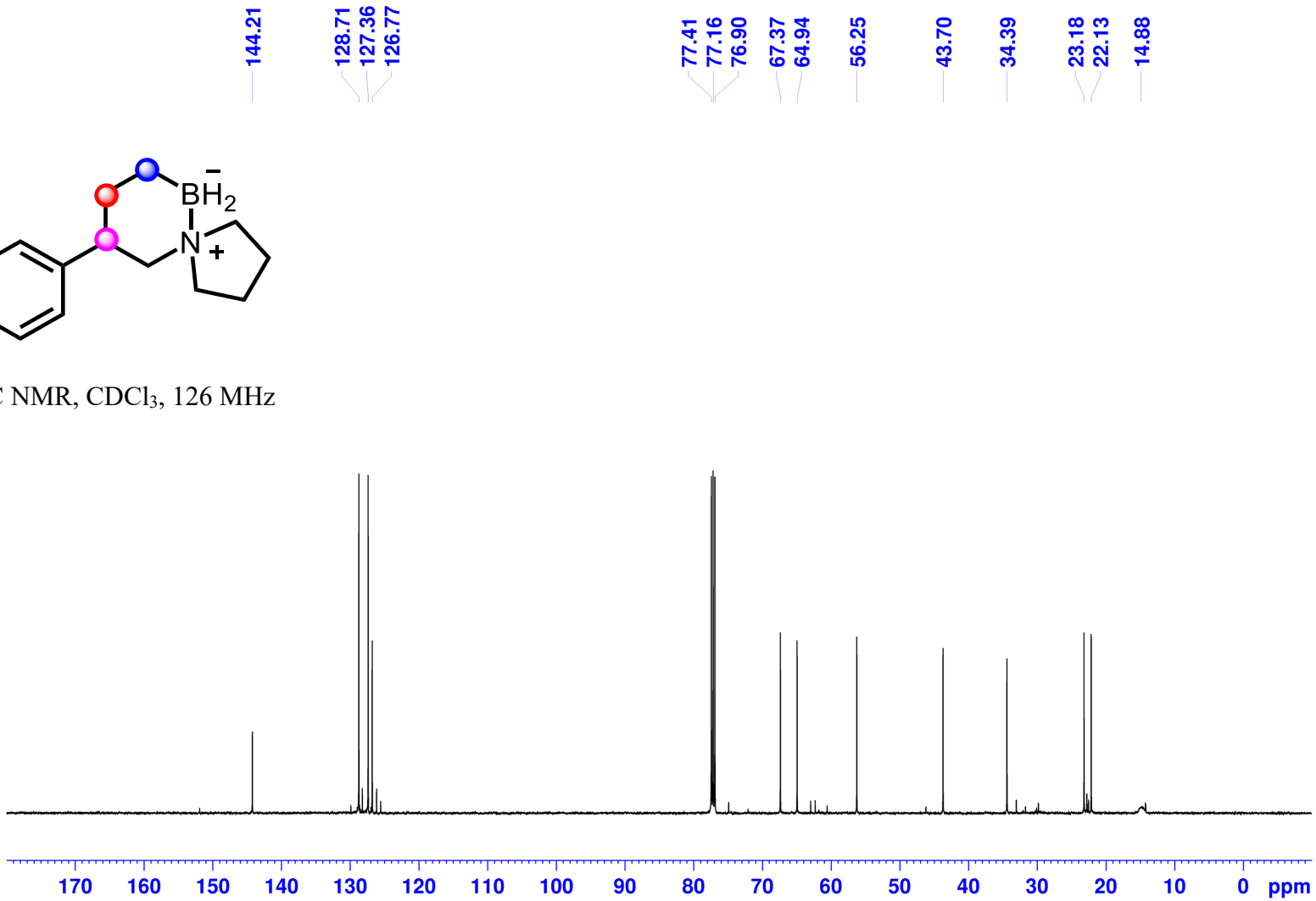




9-Phenyl-5-aza-6-boraspiro[4.5]decane (2x):

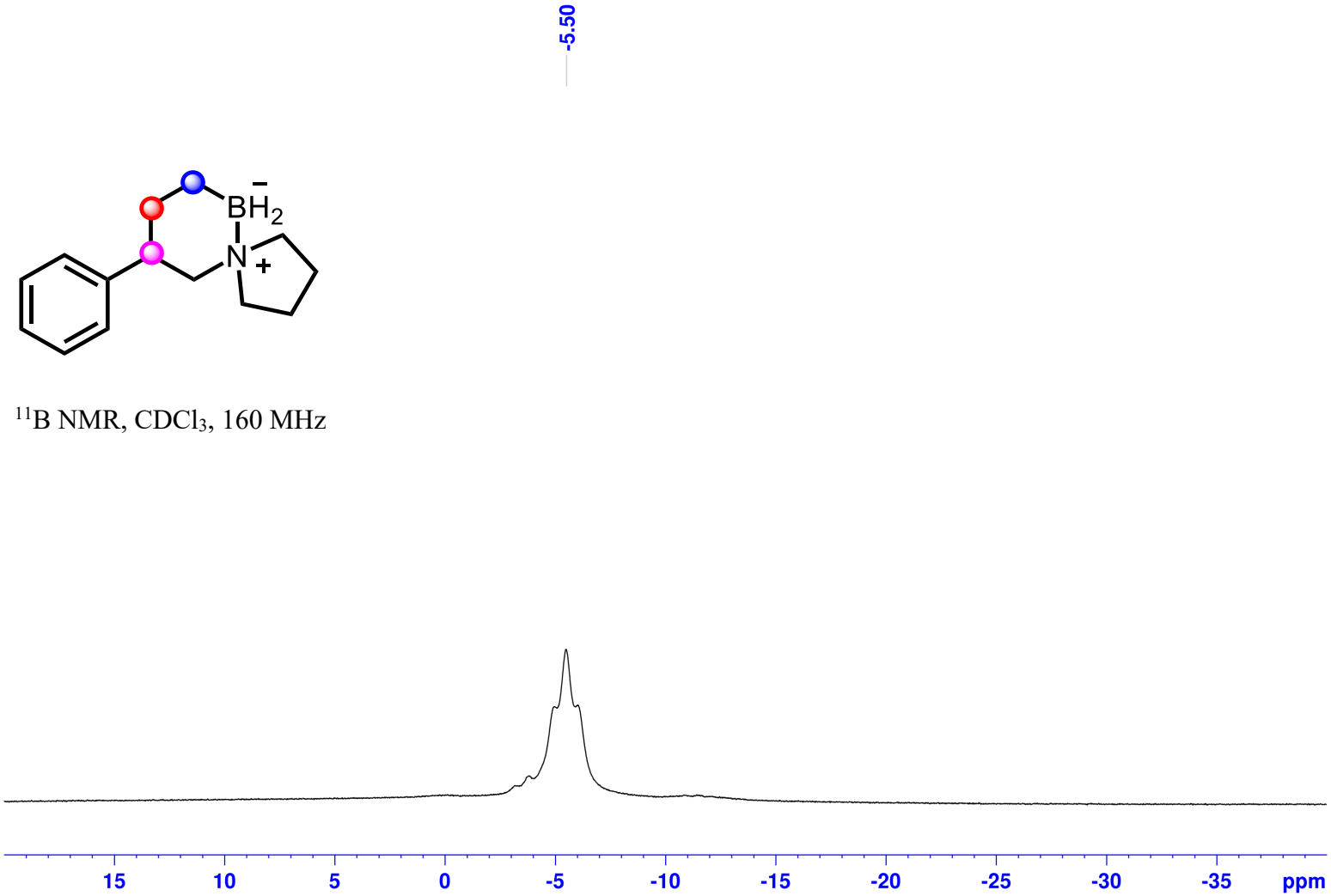


^{13}C NMR, $CDCl_3$, 126 MHz



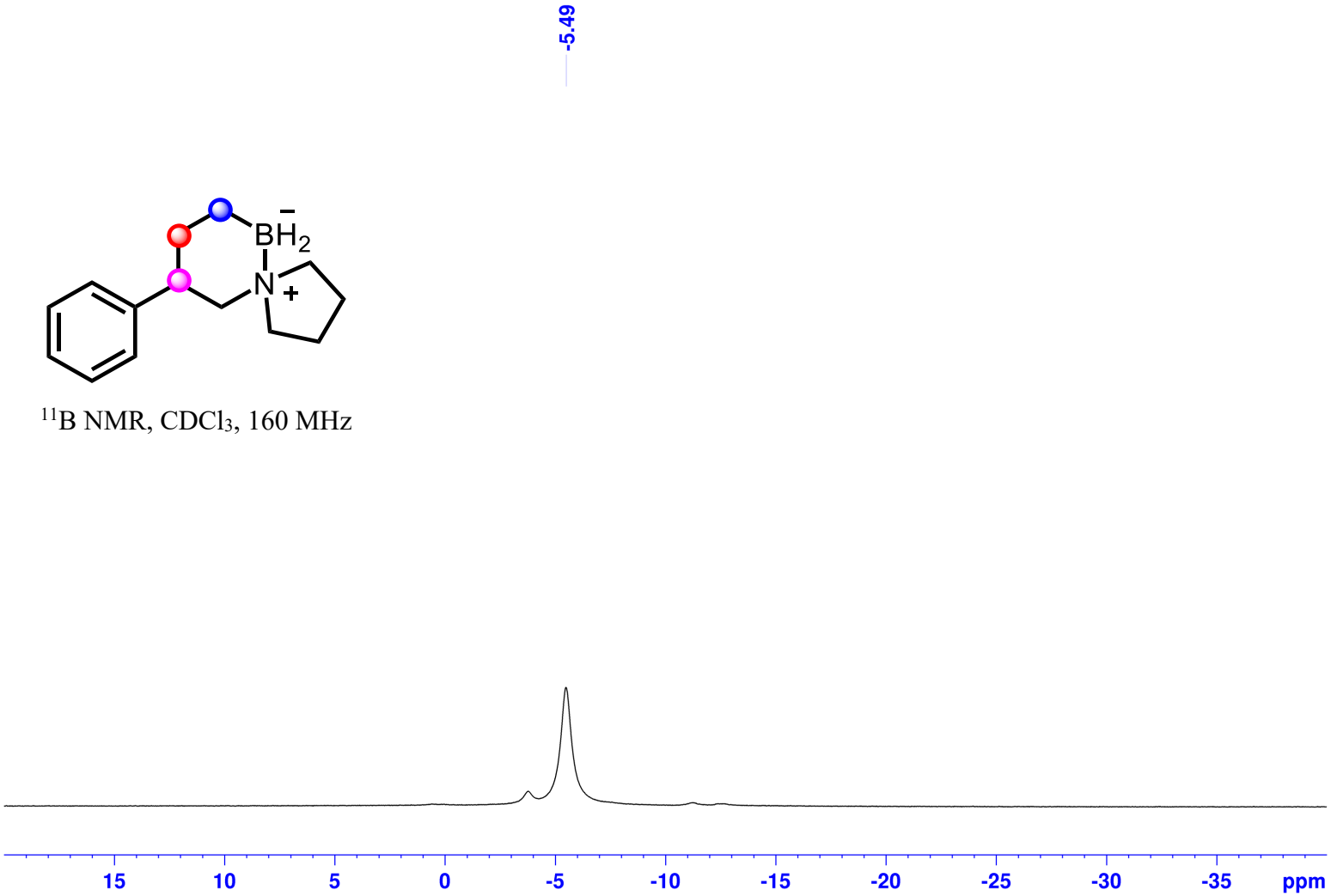
9-Phenyl-5-aza-6-boraspiro[4.5]decane (2x):

^{11}B NMR, $CDCl_3$, 160 MHz

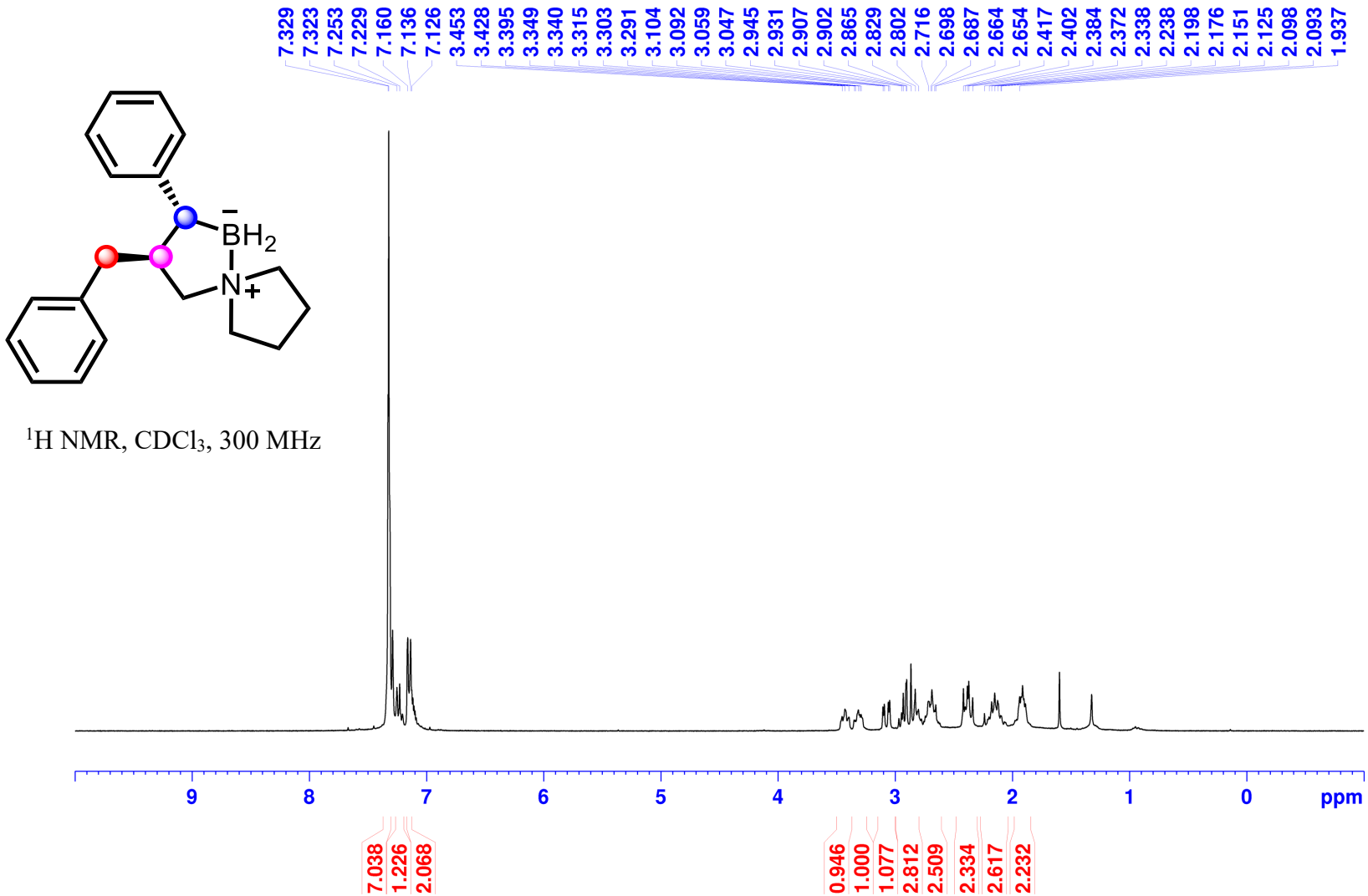


9-Phenyl-5-aza-6-boraspiro[4.5]decane (2x):

^{11}B NMR, $CDCl_3$, 160 MHz

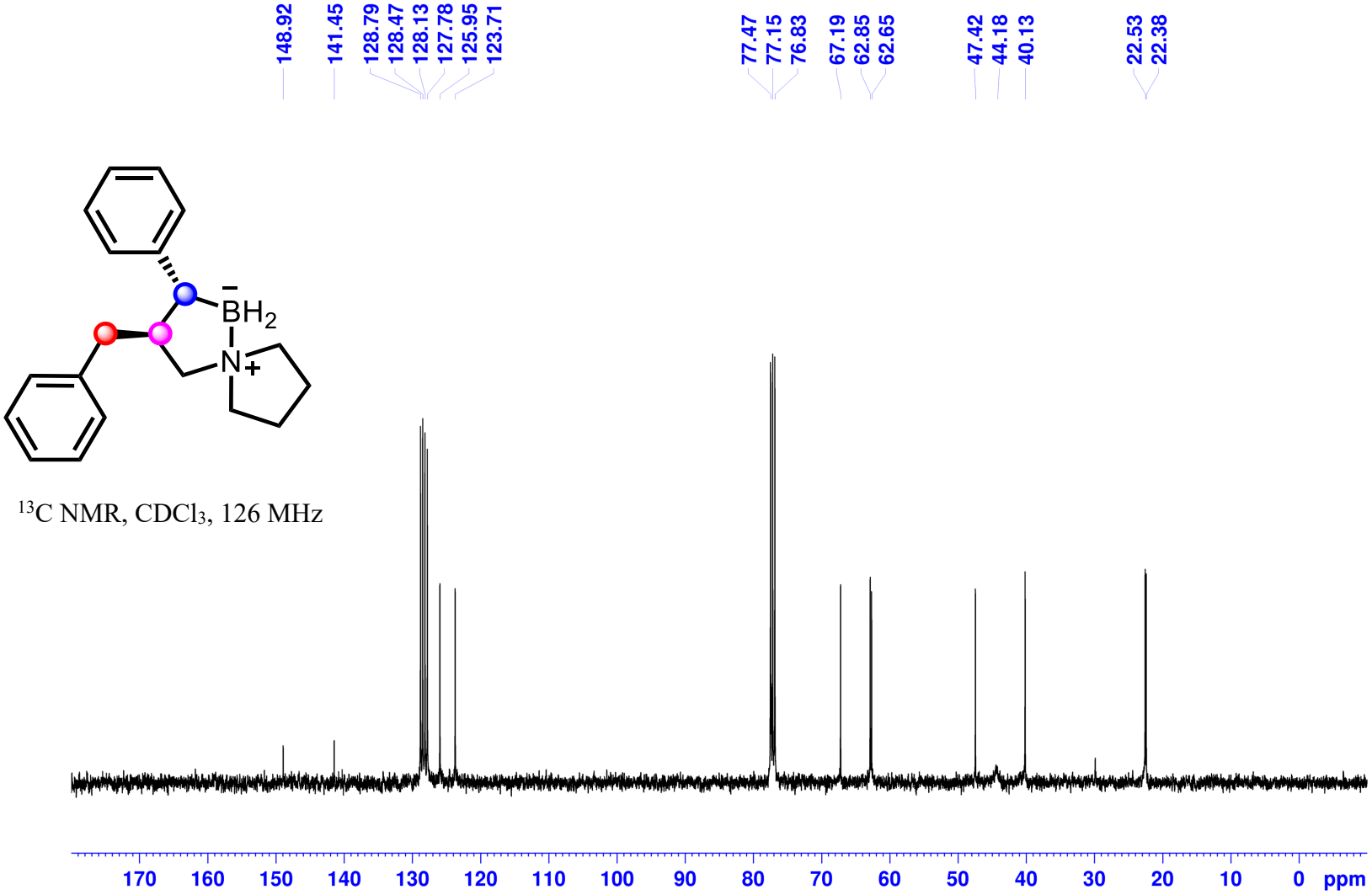


3-Benzyl-2-phenyl-5-aza-1-boraspiro[4.4]nonane (2y):



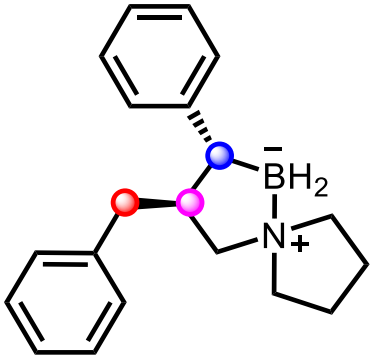
^{1}H NMR, $CDCl_3$, 300 MHz

3-Benzyl-2-phenyl-5-aza-1-boraspiro[4.4]nonane (2y):

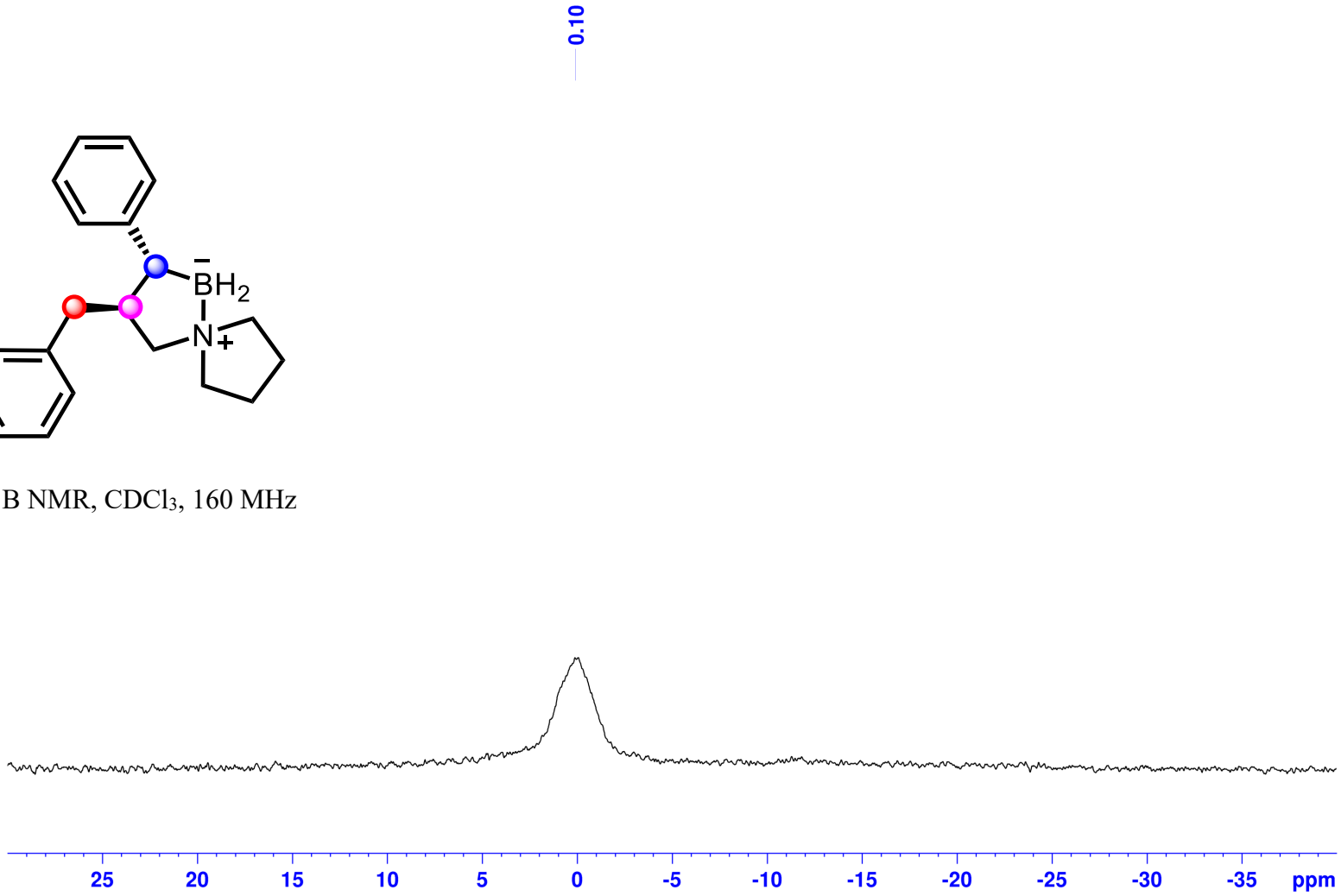


^{13}C NMR, $CDCl_3$, 126 MHz

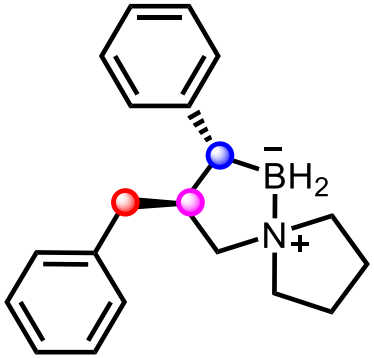
3-Benzyl-2-phenyl-5-aza-1-boraspiro[4.4]nonane (2y):



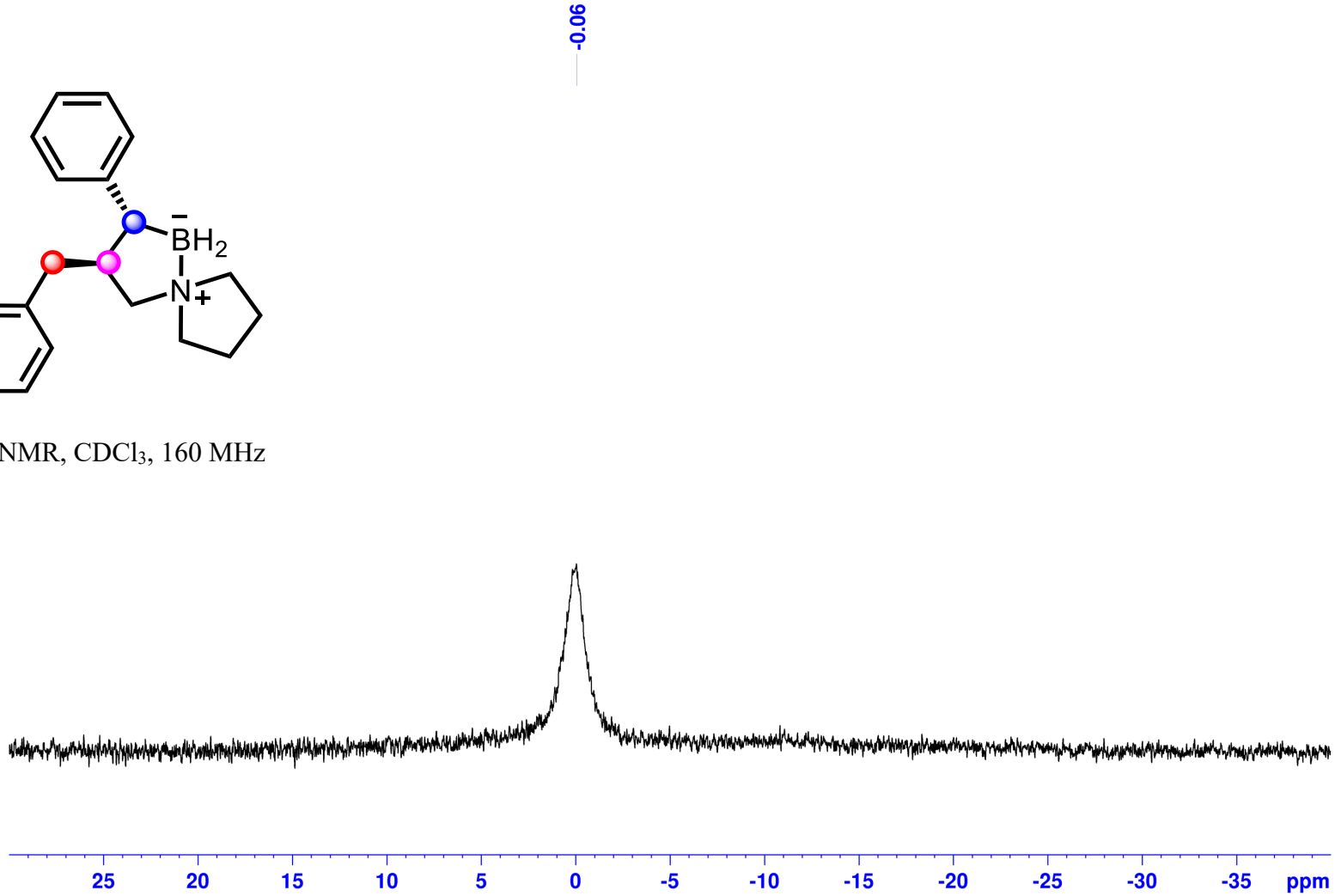
^{11}B NMR, $CDCl_3$, 160 MHz



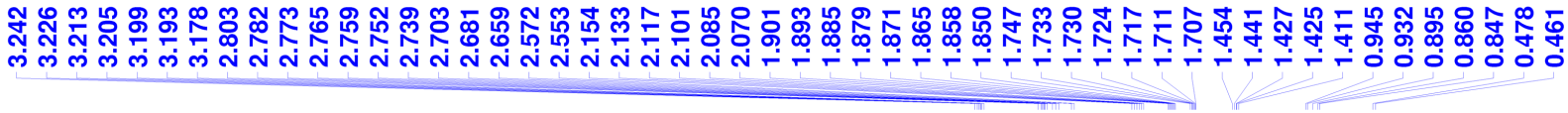
3-Benzyl-2-phenyl-5-aza-1-boraspiro[4.4]nonane (2y):

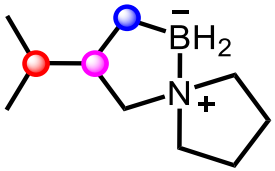


^{11}B NMR, $CDCl_3$, 160 MHz

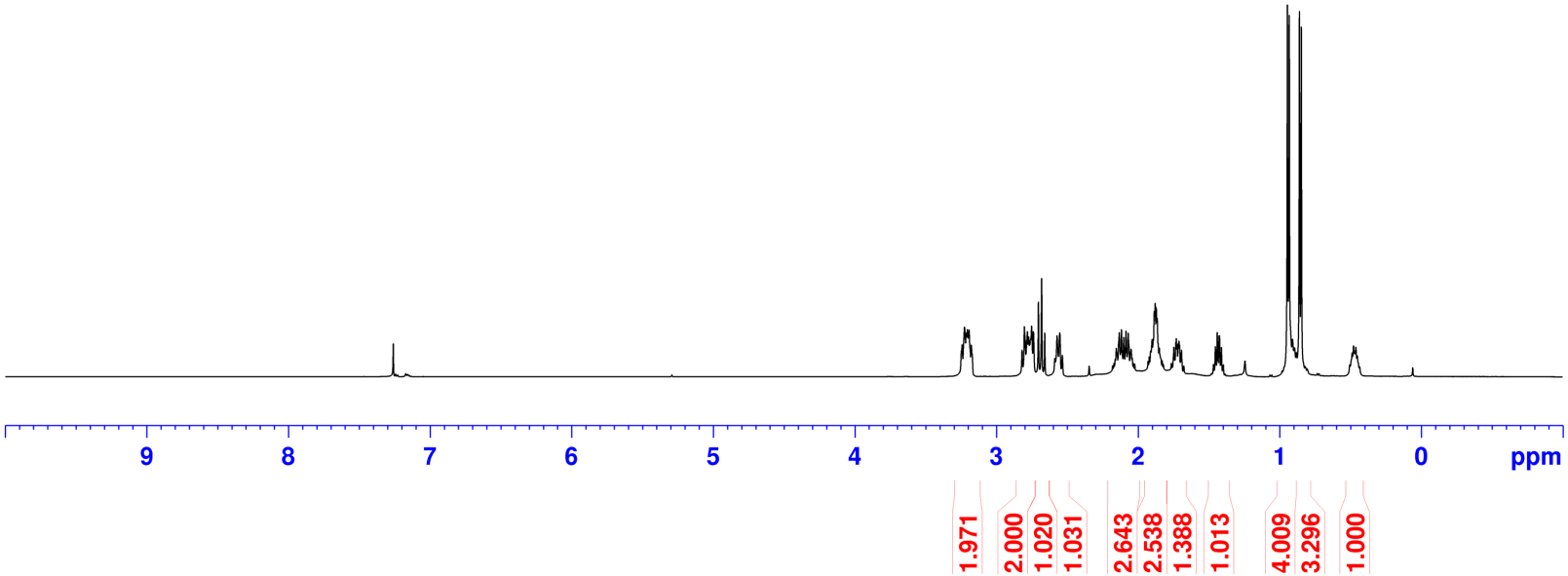


3-Isopropyl-5-aza-1-boraspiro[4.4]nonane (2z):



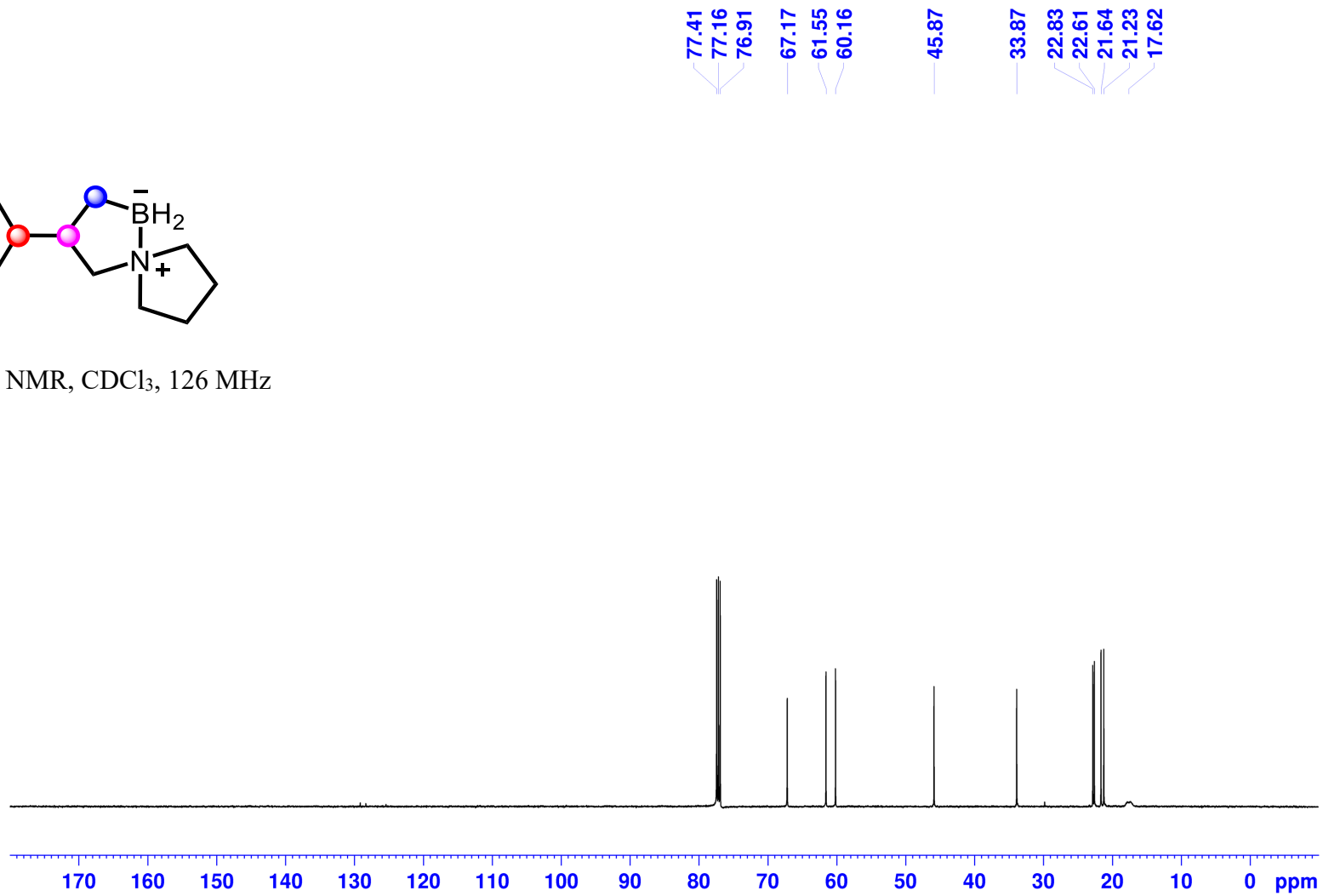


^{1}H NMR, $CDCl_3$, 500 MHz



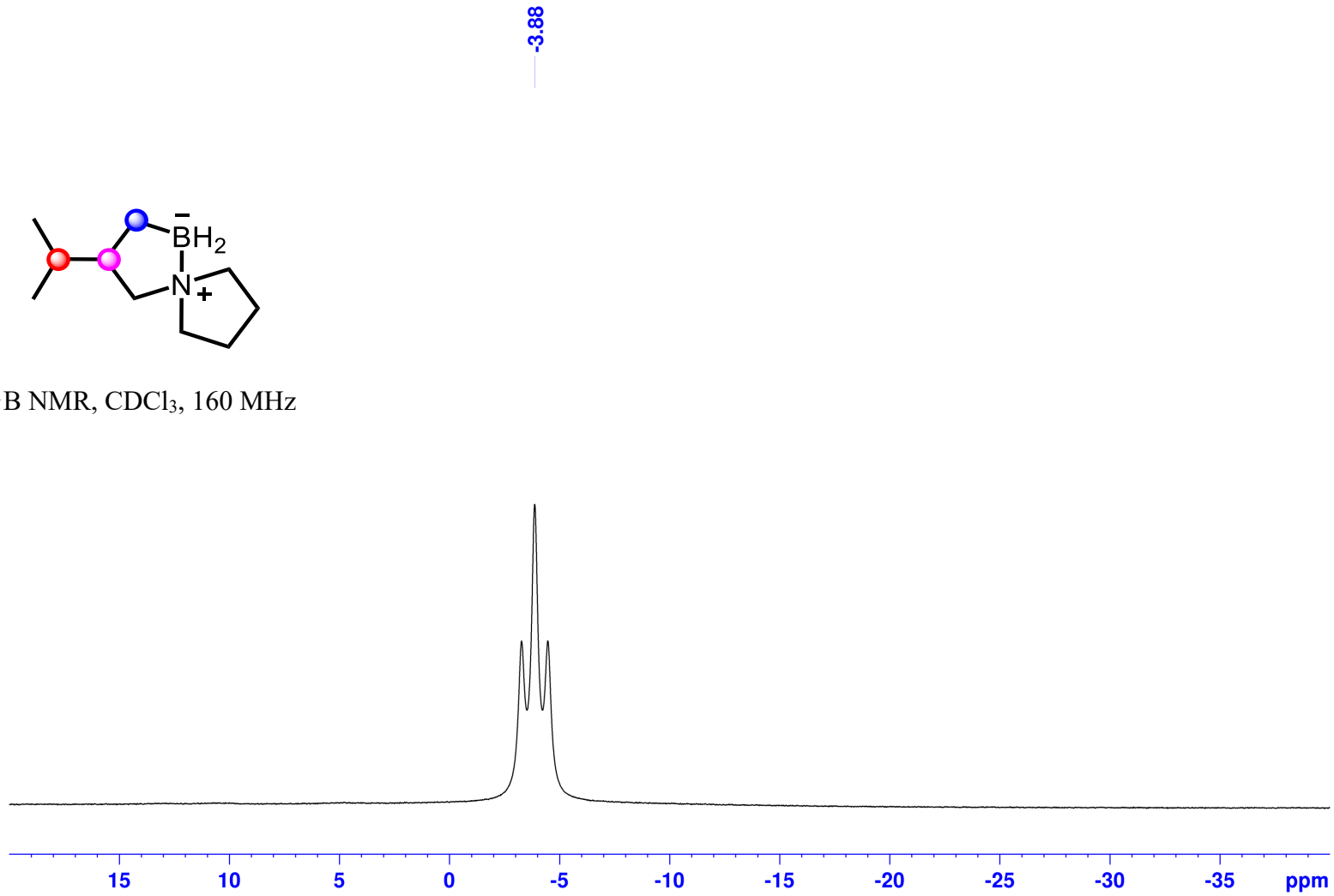
3-Isopropyl-5-aza-1-boraspiro[4.4]nonane (2z):

^{13}C NMR, $CDCl_3$, 126 MHz



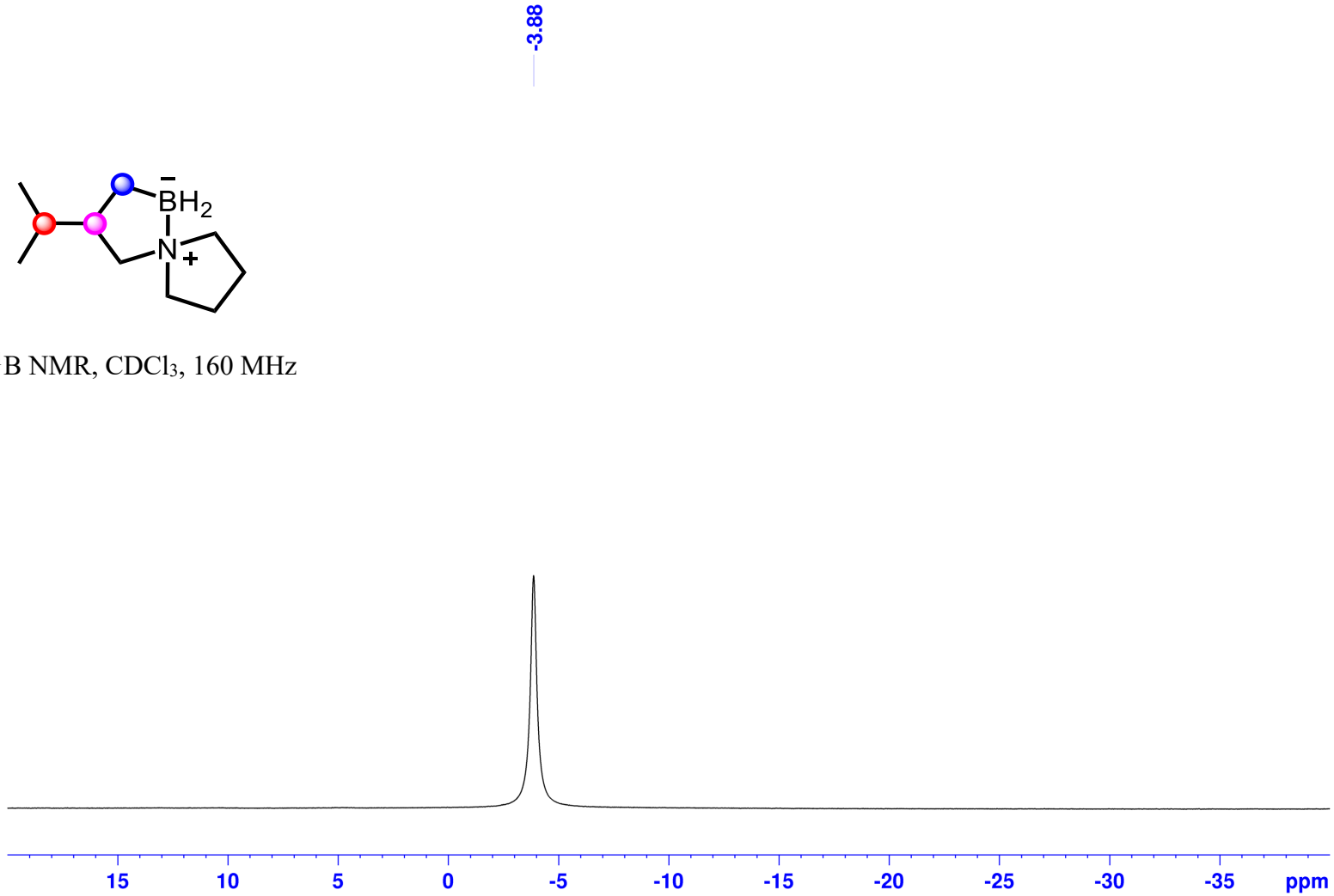
3-Isopropyl-5-aza-1-boraspiro[4.4]nonane (2z):

^{11}B NMR, $CDCl_3$, 160 MHz

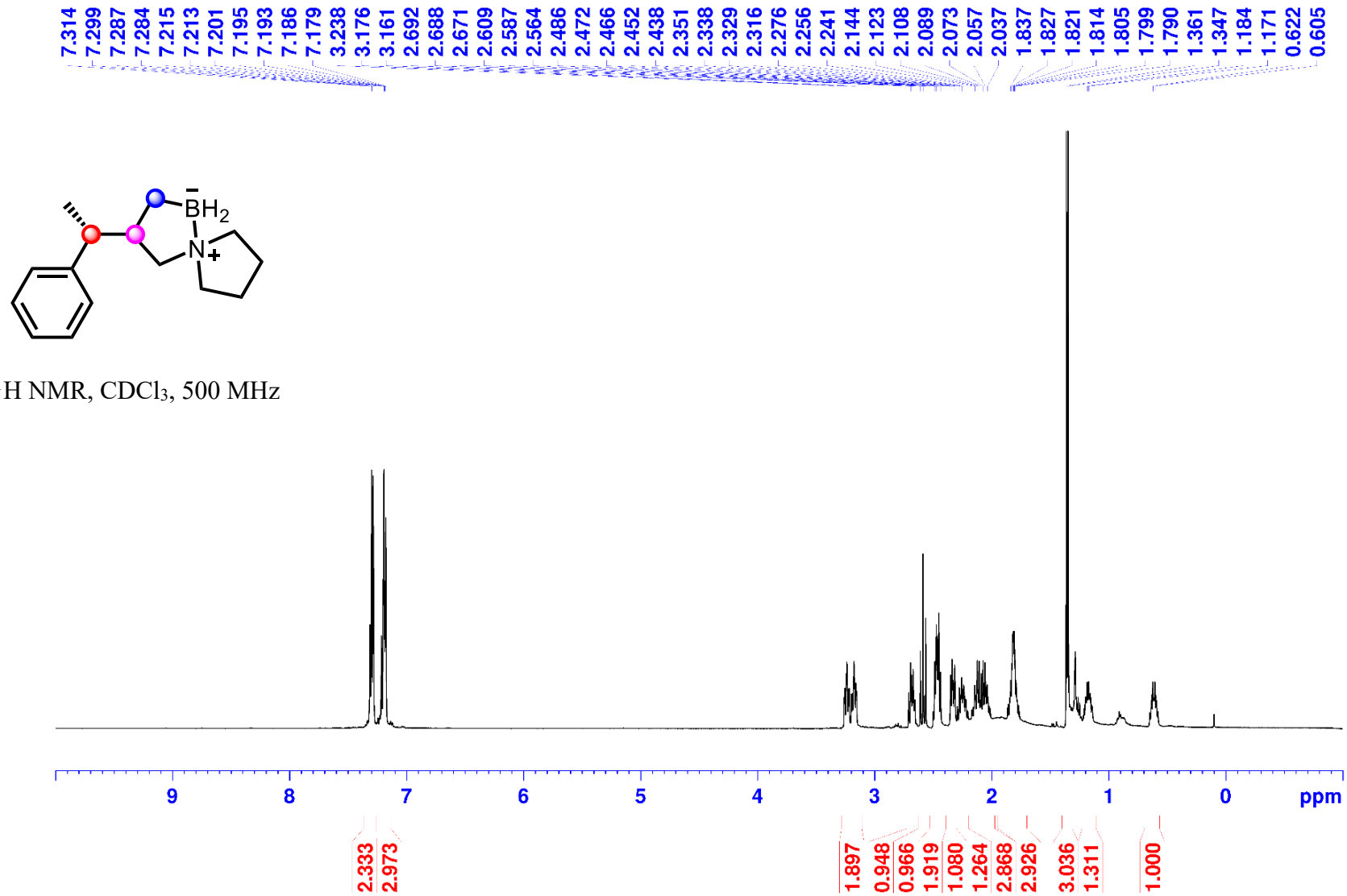


3-Isopropyl-5-aza-1-boraspiro[4.4]nonane (2z):

^{11}B NMR, $CDCl_3$, 160 MHz

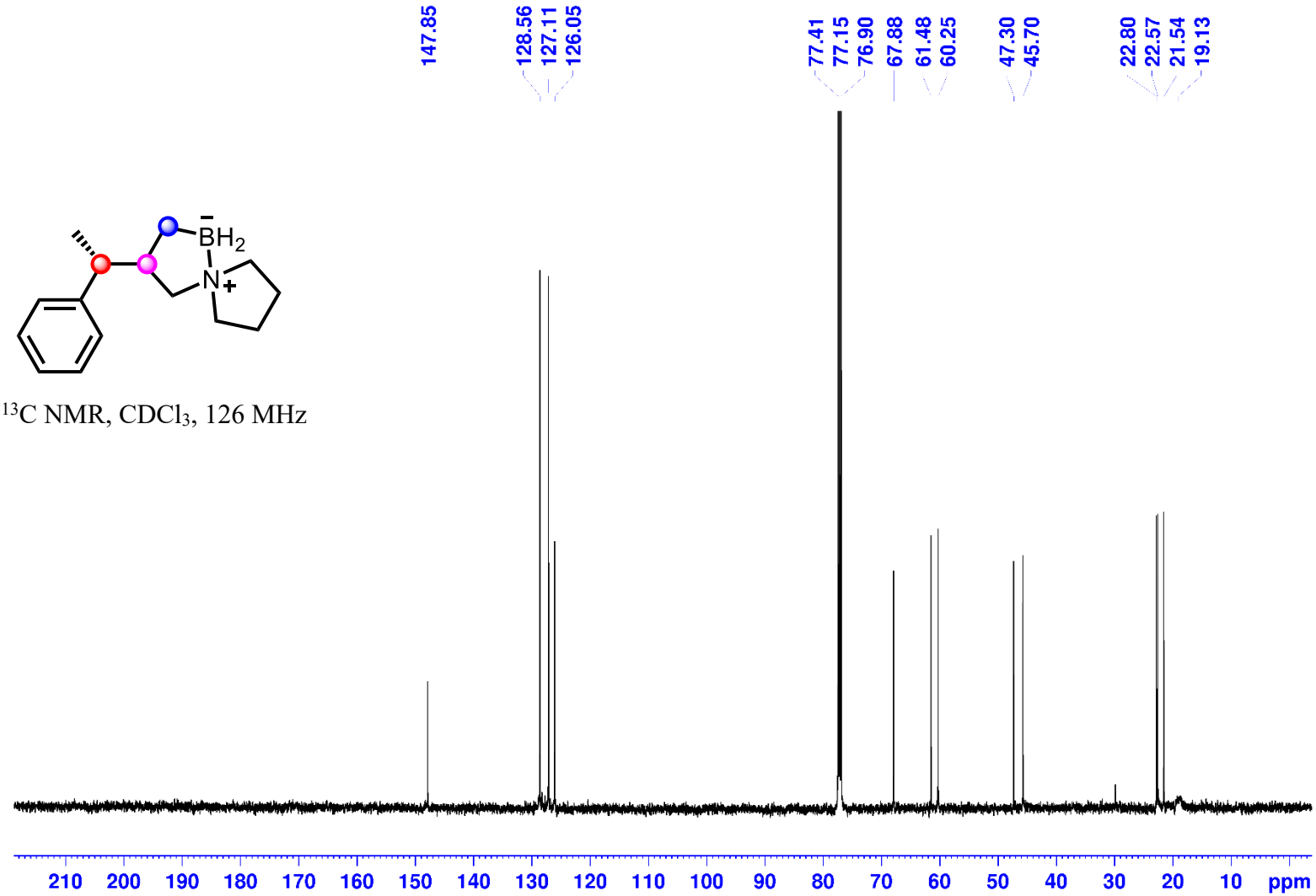


3-((S)-1-Phenylethyl)-5-aza-1-boraspiro[4.4]nonane (2aa):



^{1}H NMR, $CDCl_3$, 500 MHz

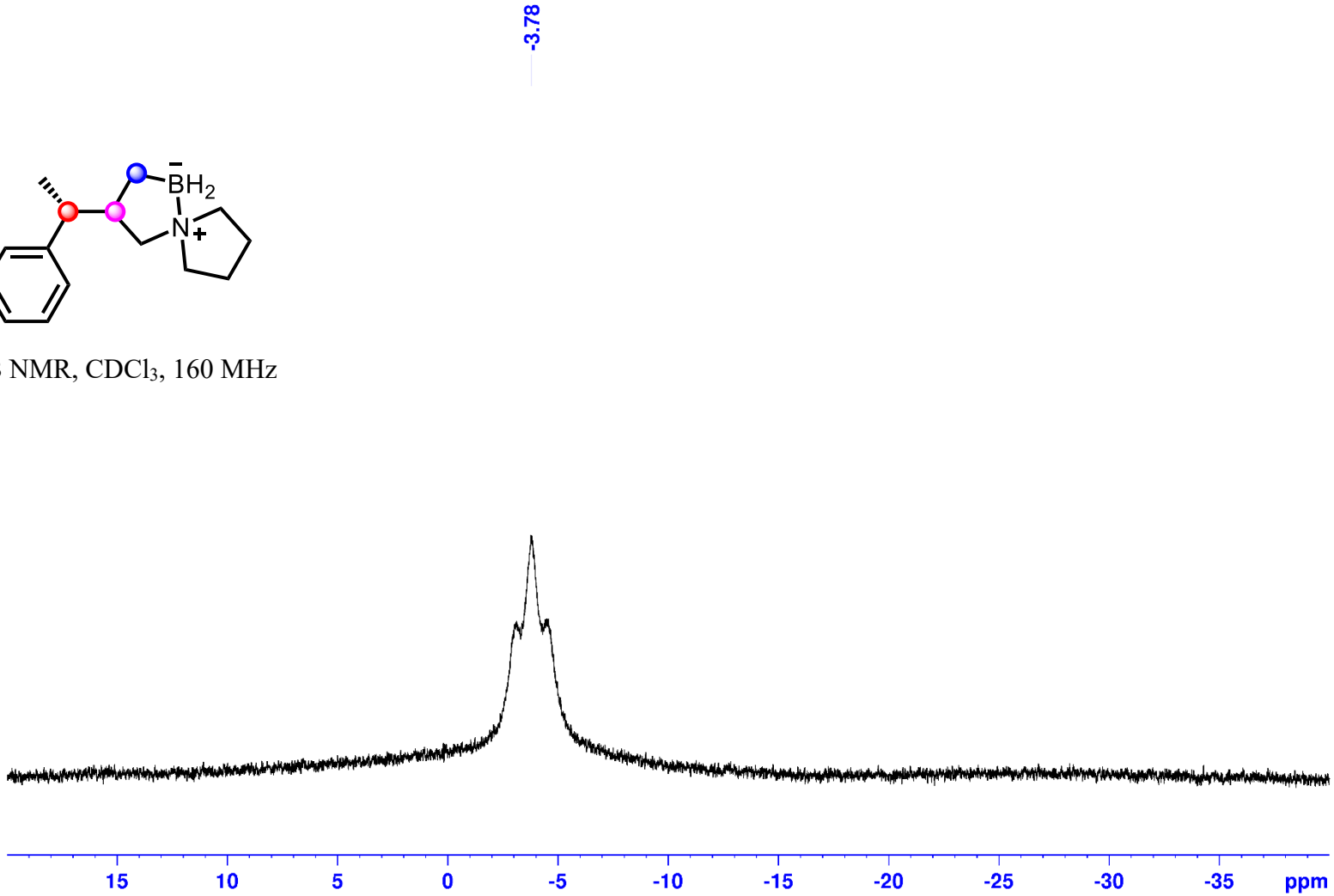
3-((S)-1-Phenylethyl)-5-aza-1-boraspiro[4.4]nonane (2aa):



^{13}C NMR, $CDCl_3$, 126 MHz

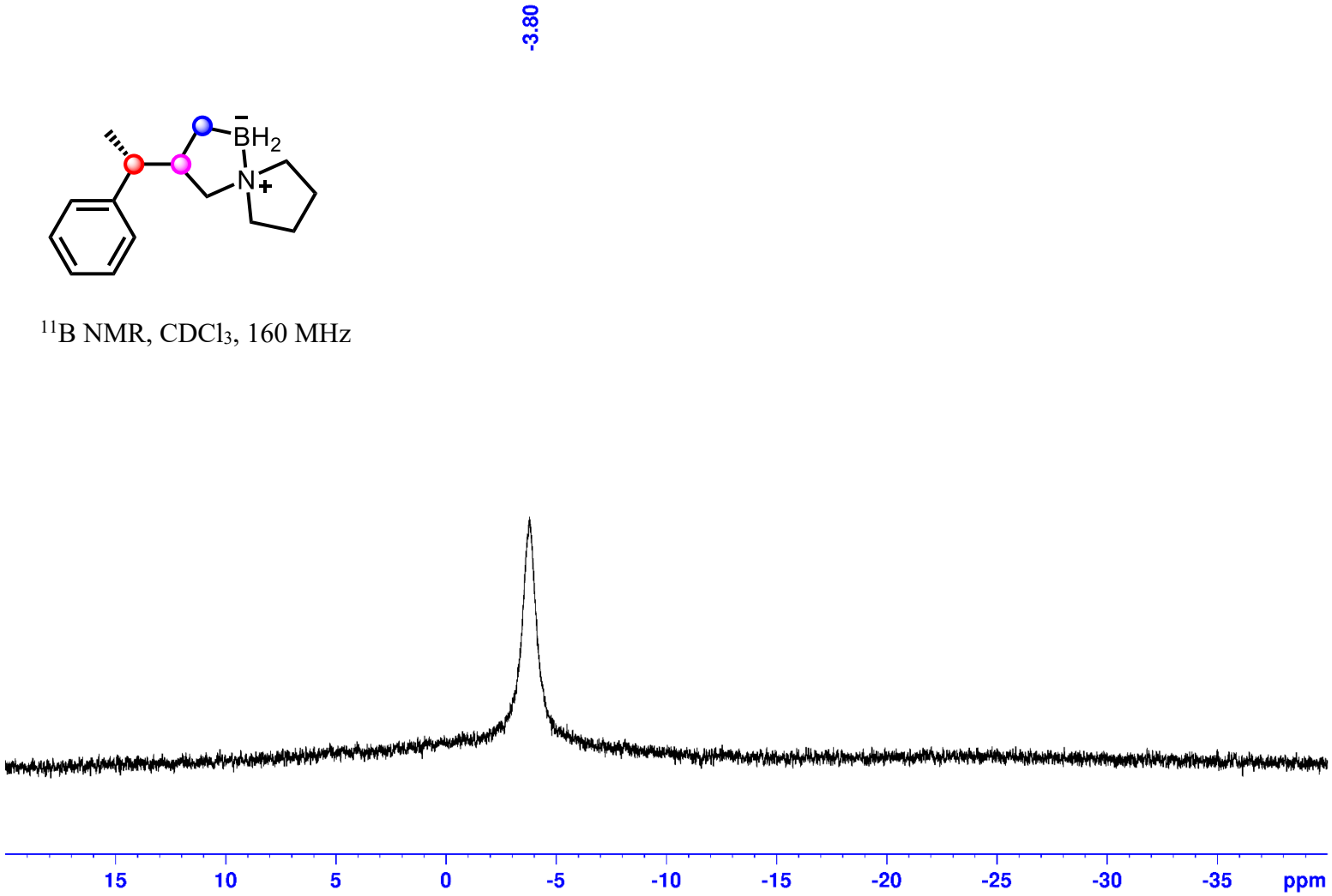
3-((S)-1-Phenylethyl)-5-aza-1-boraspiro[4.4]nonane (2aa):

^{11}B NMR, $CDCl_3$, 160 MHz

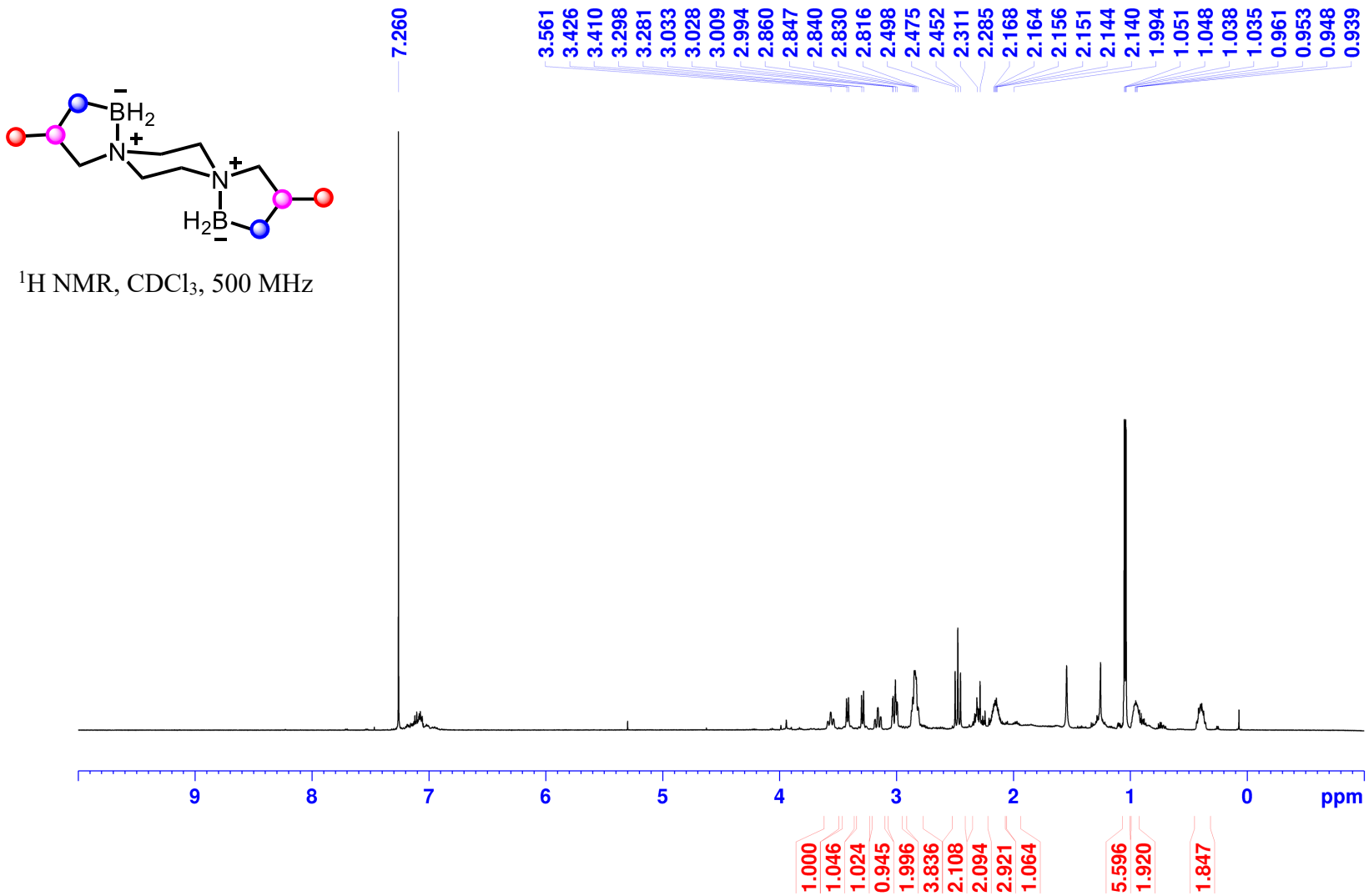


3-((S)-1-Phenylethyl)-5-aza-1-boraspiro[4.4]nonane (2aa):

^{11}B NMR, $CDCl_3$, 160 MHz

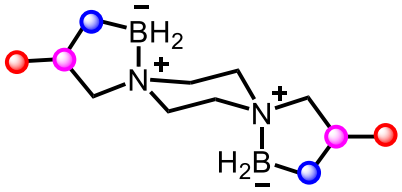


3-Methyl-5-aza-1-boraspiro[4.4]nonane (2ab):

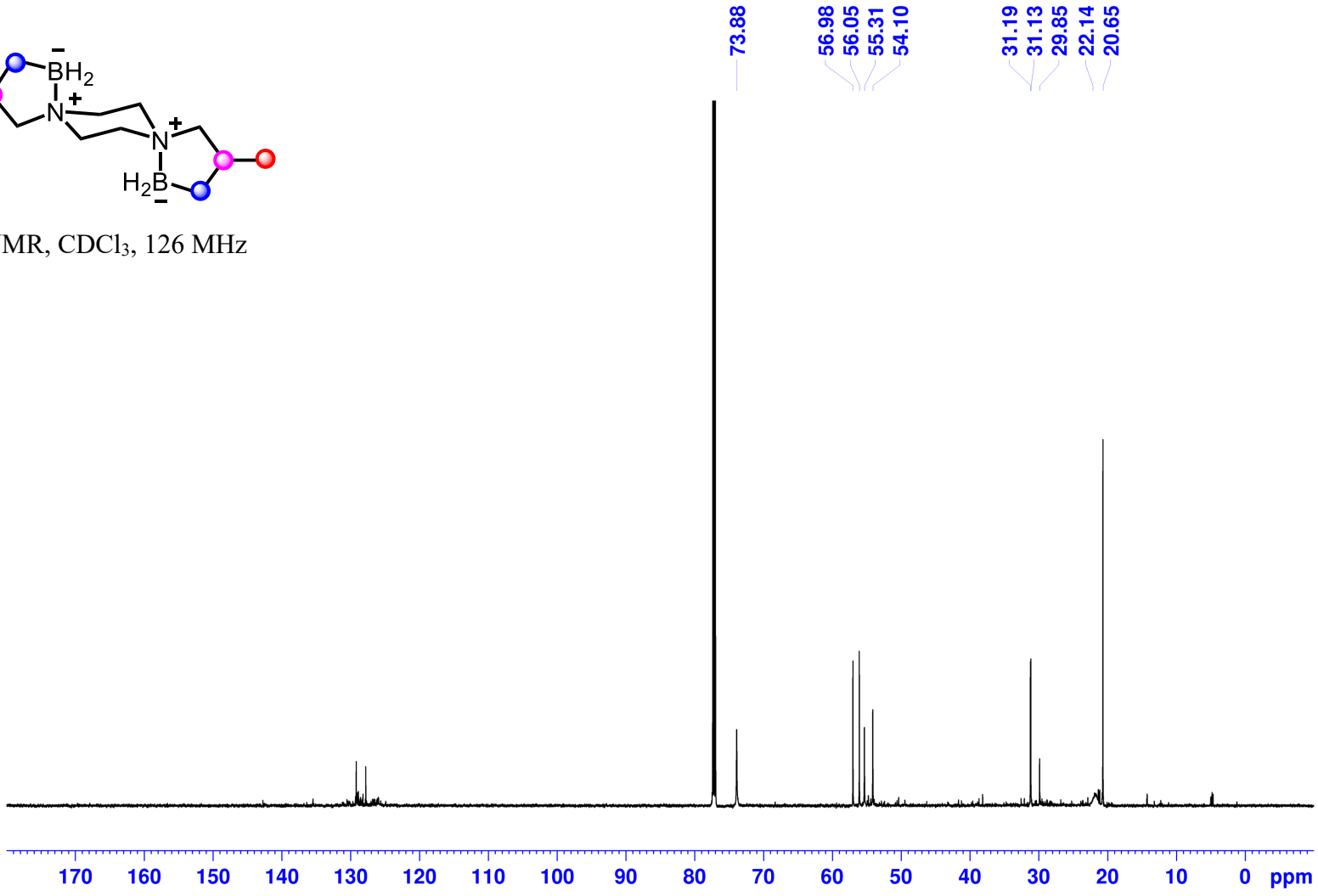


^{1}H NMR, $CDCl_3$, 500 MHz

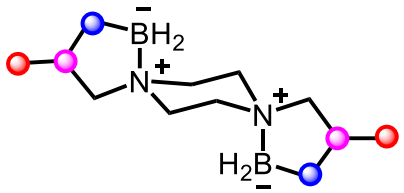
3-Methyl-5-aza-1-boraspiro[4.4]nonane (2ab):



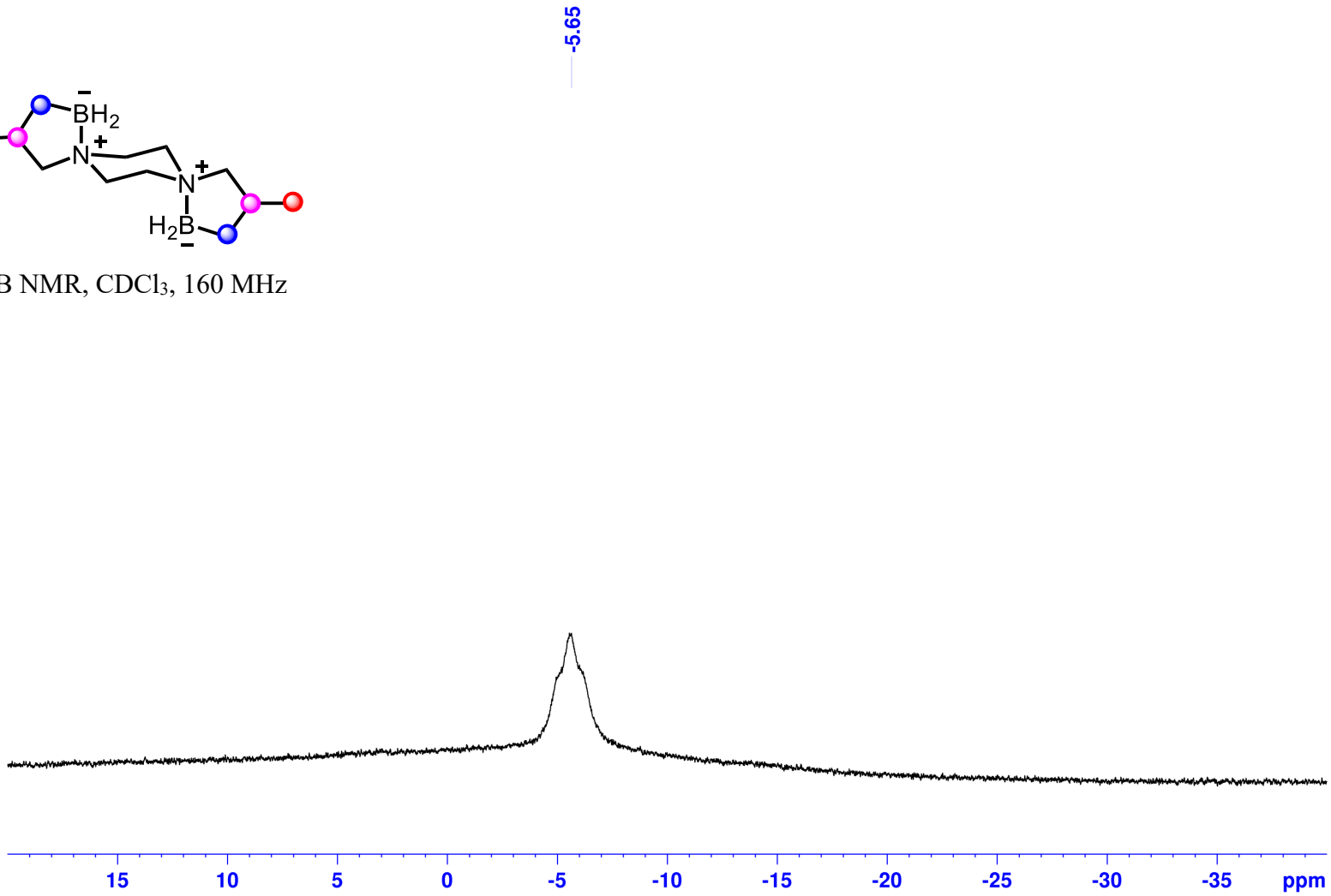
^{13}C NMR, $CDCl_3$, 126 MHz



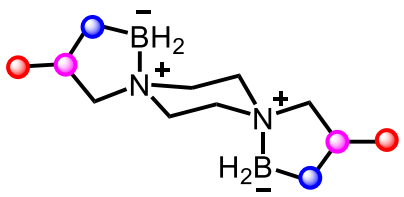
3-Methyl-5-aza-1-boraspiro[4.4]nonane (2ab):



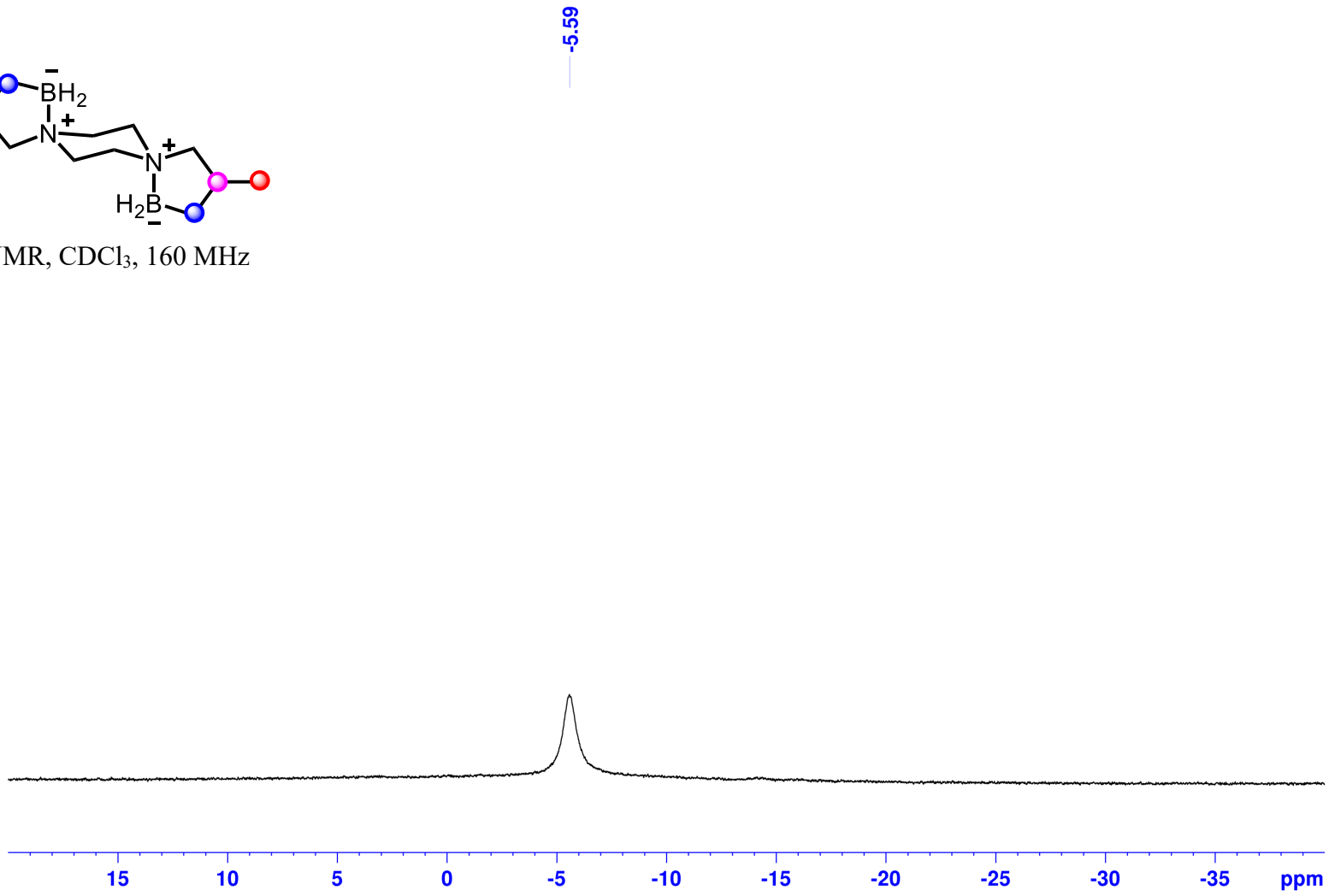
^{11}B NMR, $CDCl_3$, 160 MHz



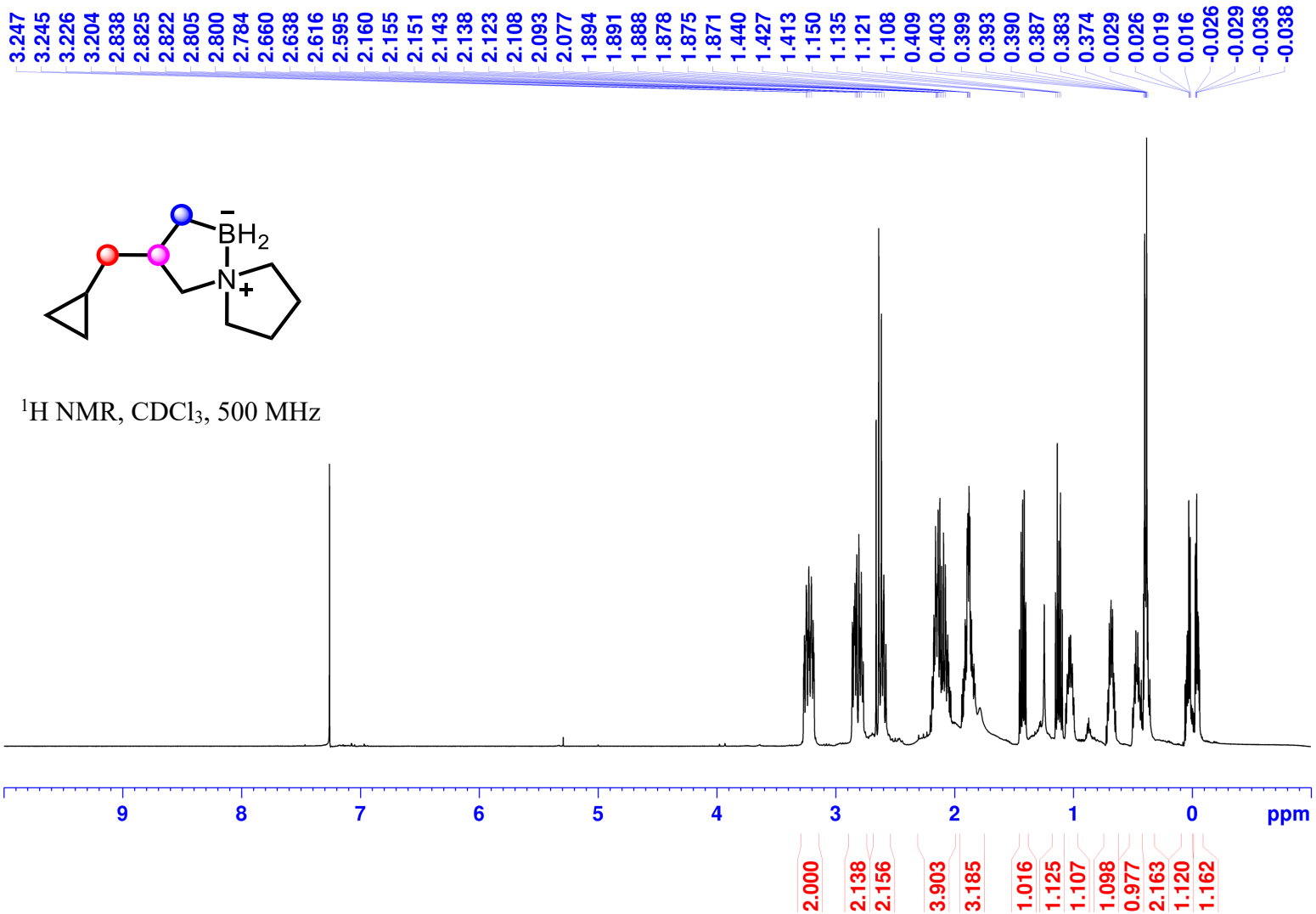
3-Methyl-5-aza-1-boraspiro[4.4]nonane (2ab):



^{11}B NMR, $CDCl_3$, 160 MHz



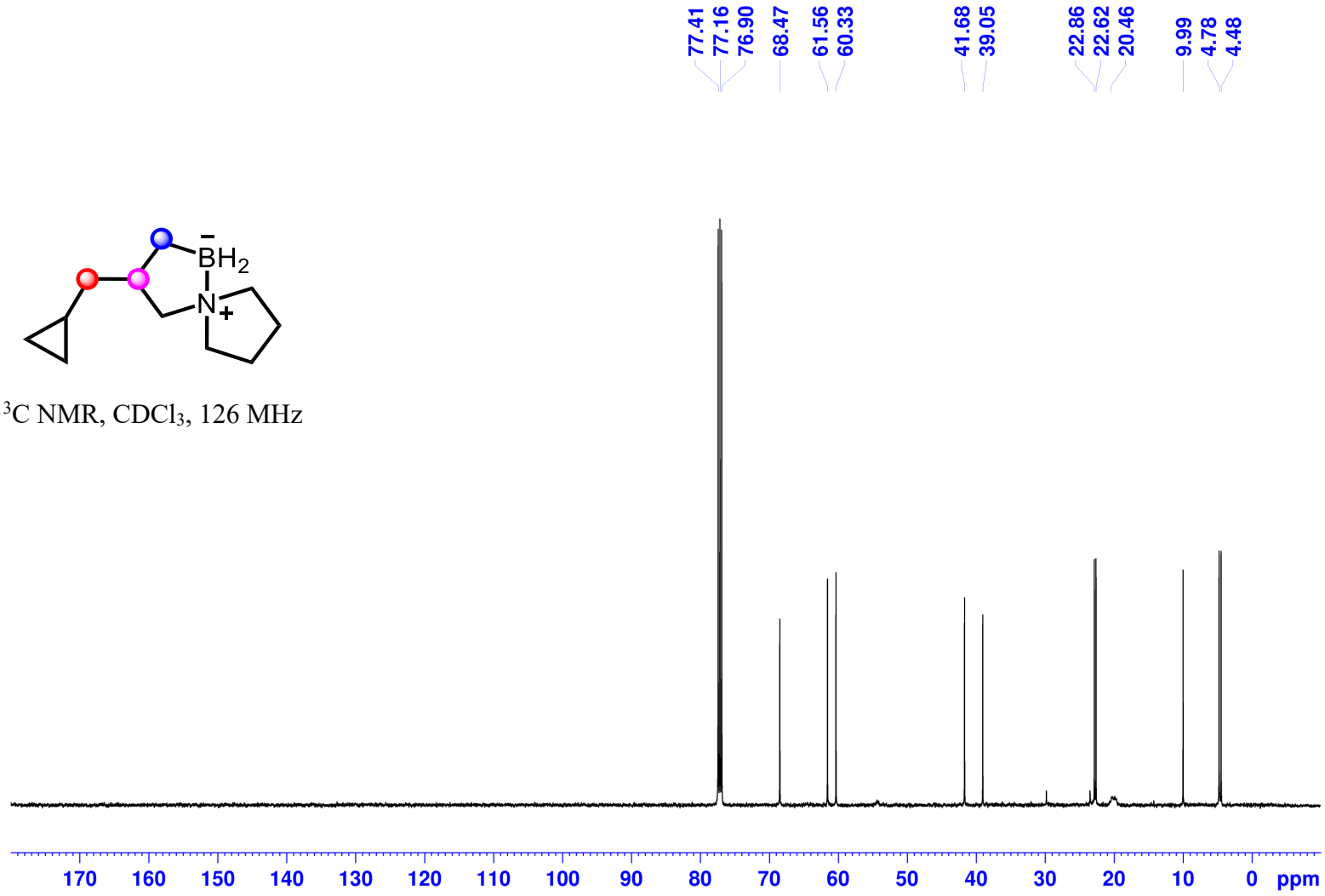
3-(Cyclopropylmethyl)-5-aza-1-boraspiro[4.4]nonane (2ac):



^{1}H NMR, $CDCl_3$, 500 MHz

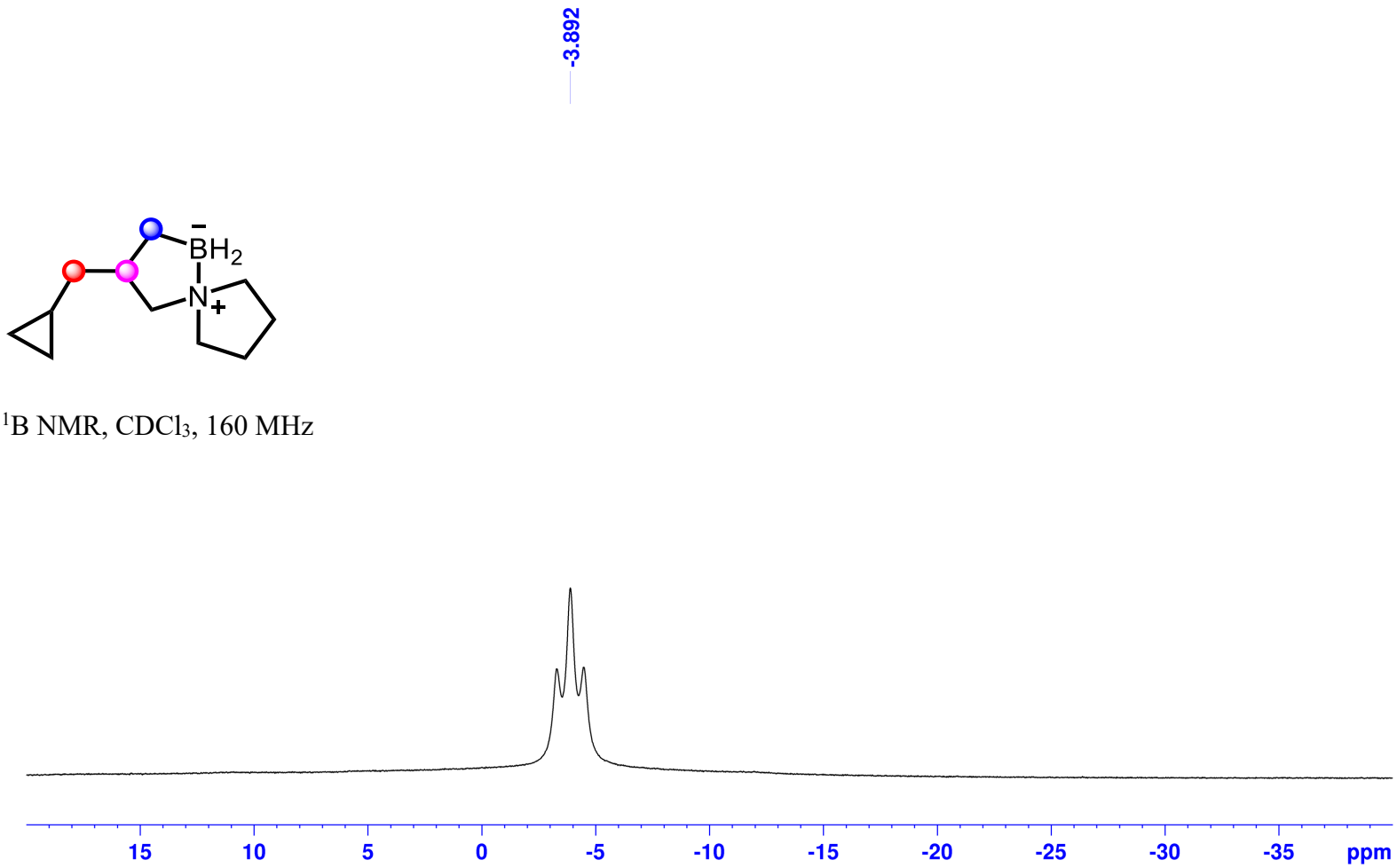
3-(Cyclopropylmethyl)-5-aza-1-boraspiro[4.4]nonane (2ac):

^{13}C NMR, $CDCl_3$, 126 MHz

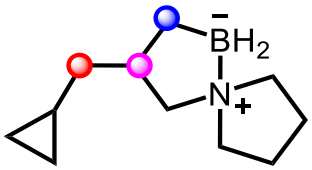


3-(Cyclopropylmethyl)-5-aza-1-boraspiro[4.4]nonane (2ac):

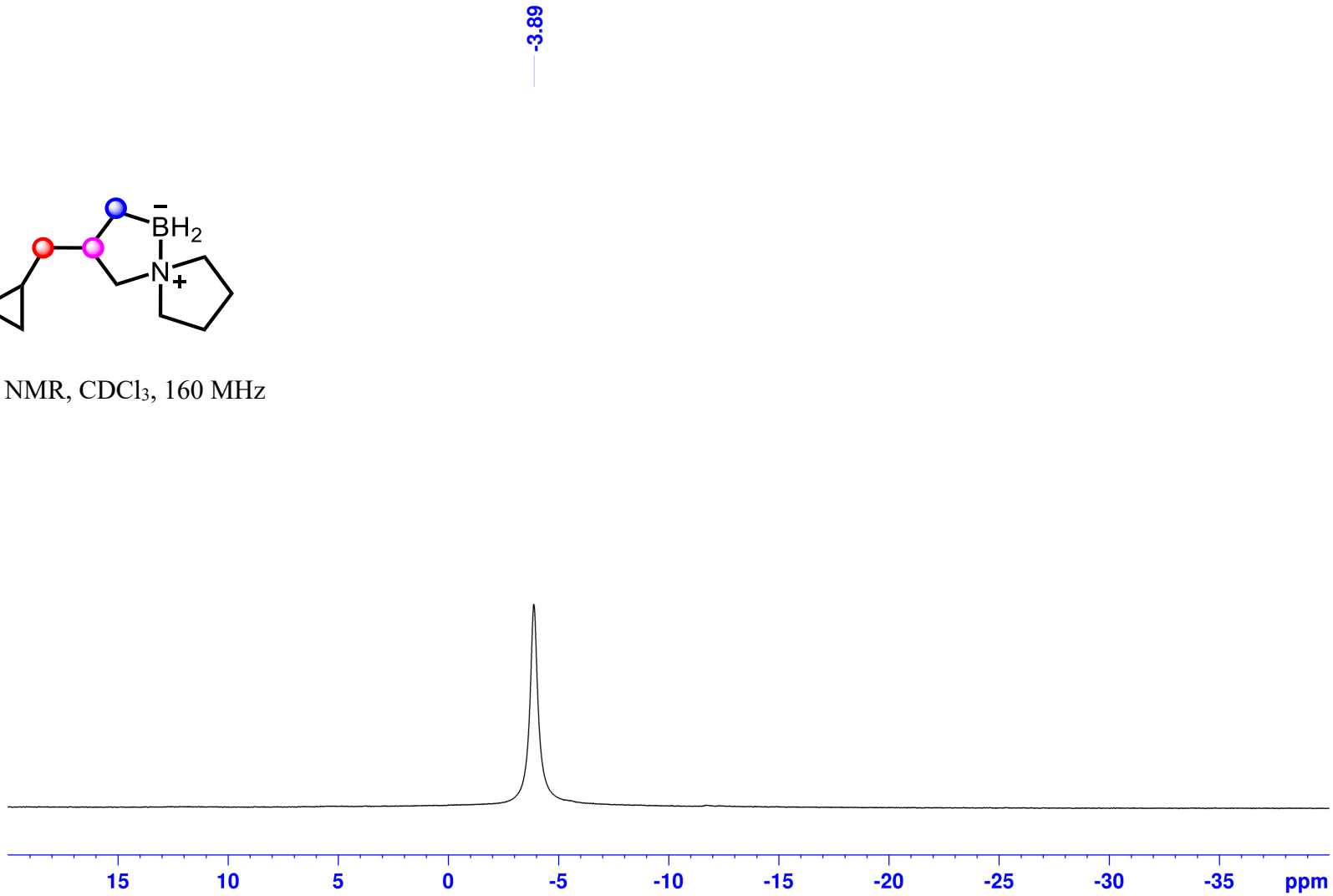
^{11}B NMR, $CDCl_3$, 160 MHz



3-(Cyclopropylmethyl)-5-aza-1-boraspiro[4.4]nonane (2ac):

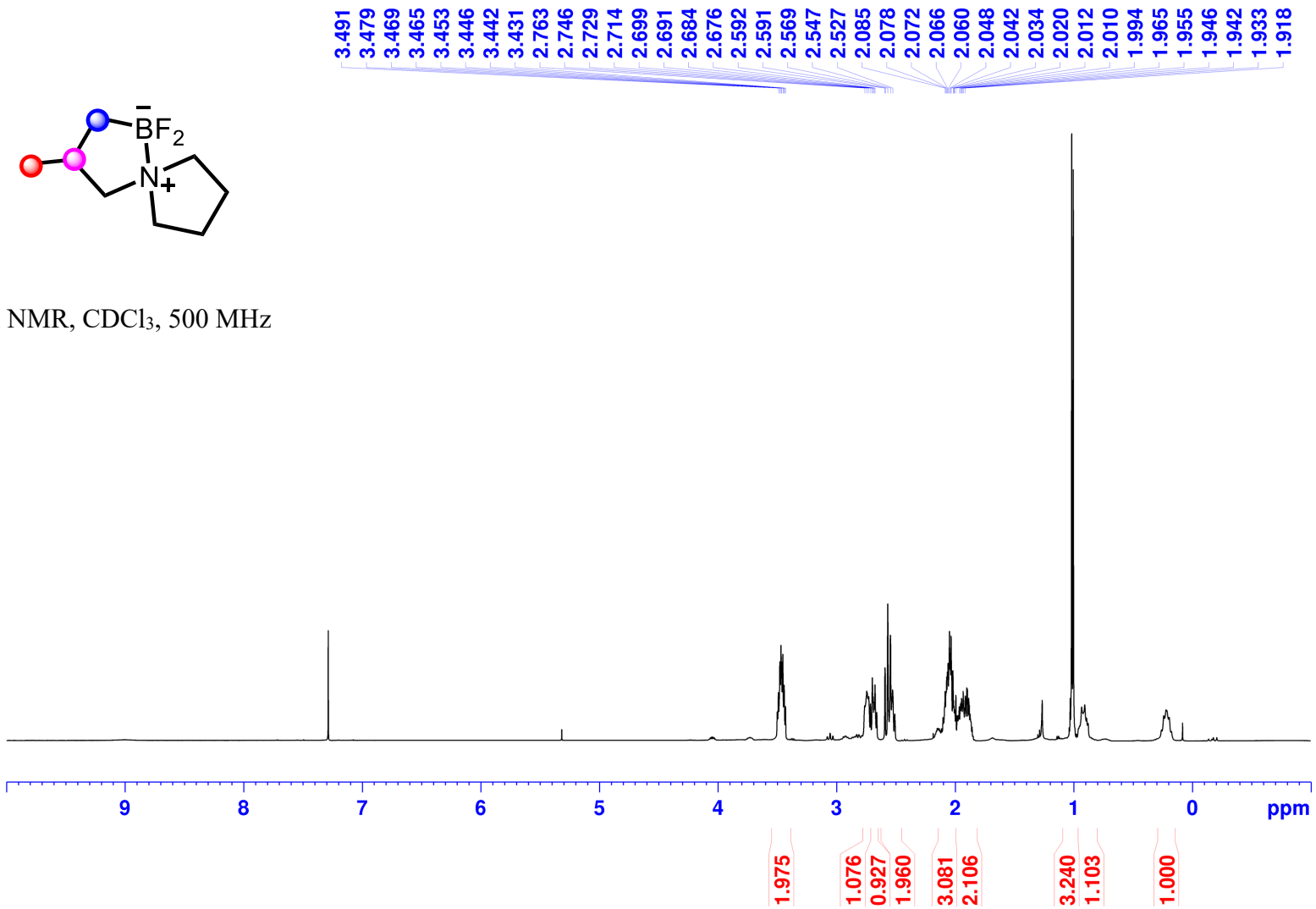


^{11}B NMR, $CDCl_3$, 160 MHz



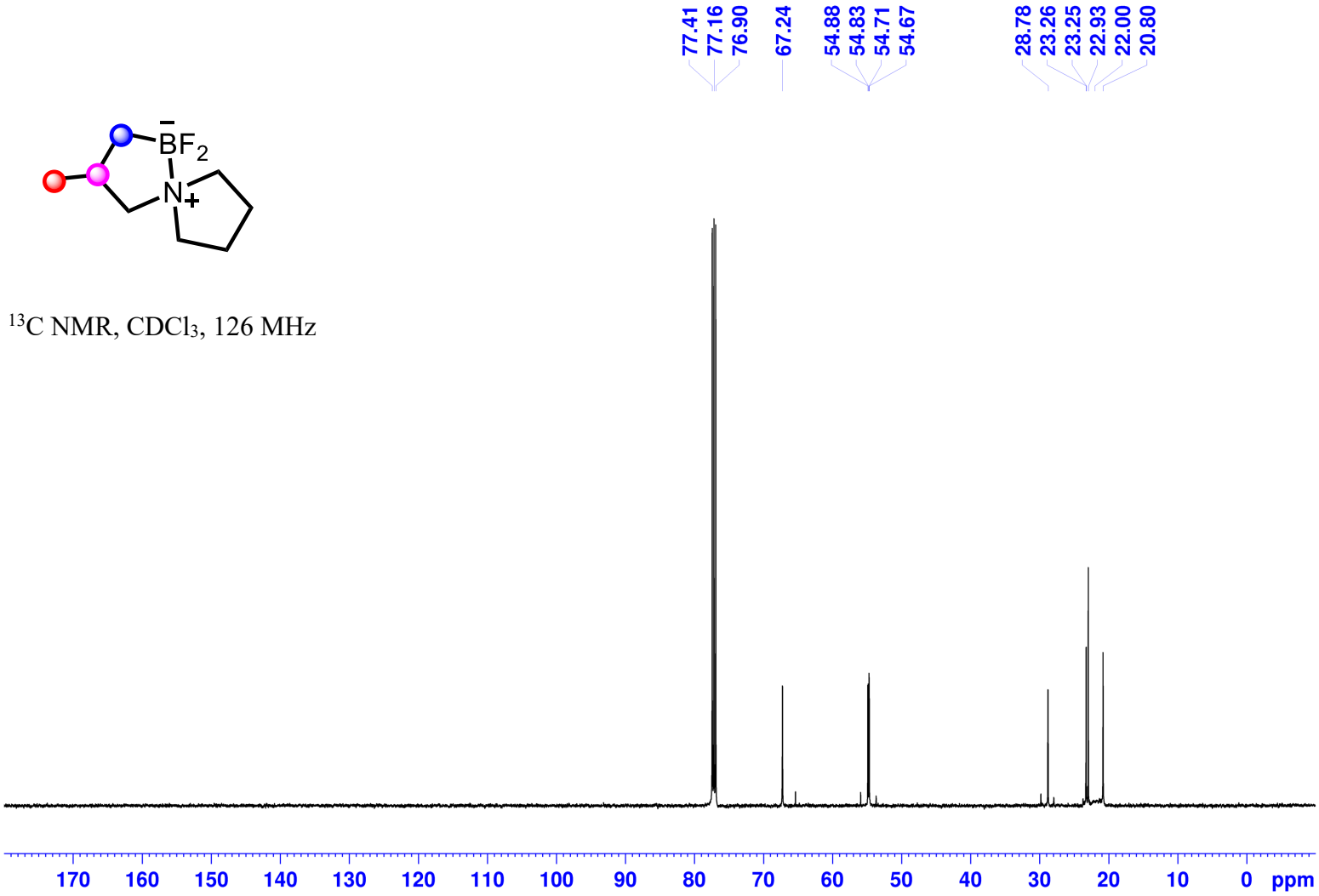
1,1-Difluoro-3-methyl-5-aza-1-boraspiro[4.4]nonane (3a):

^{1}H NMR, $CDCl_3$, 500 MHz



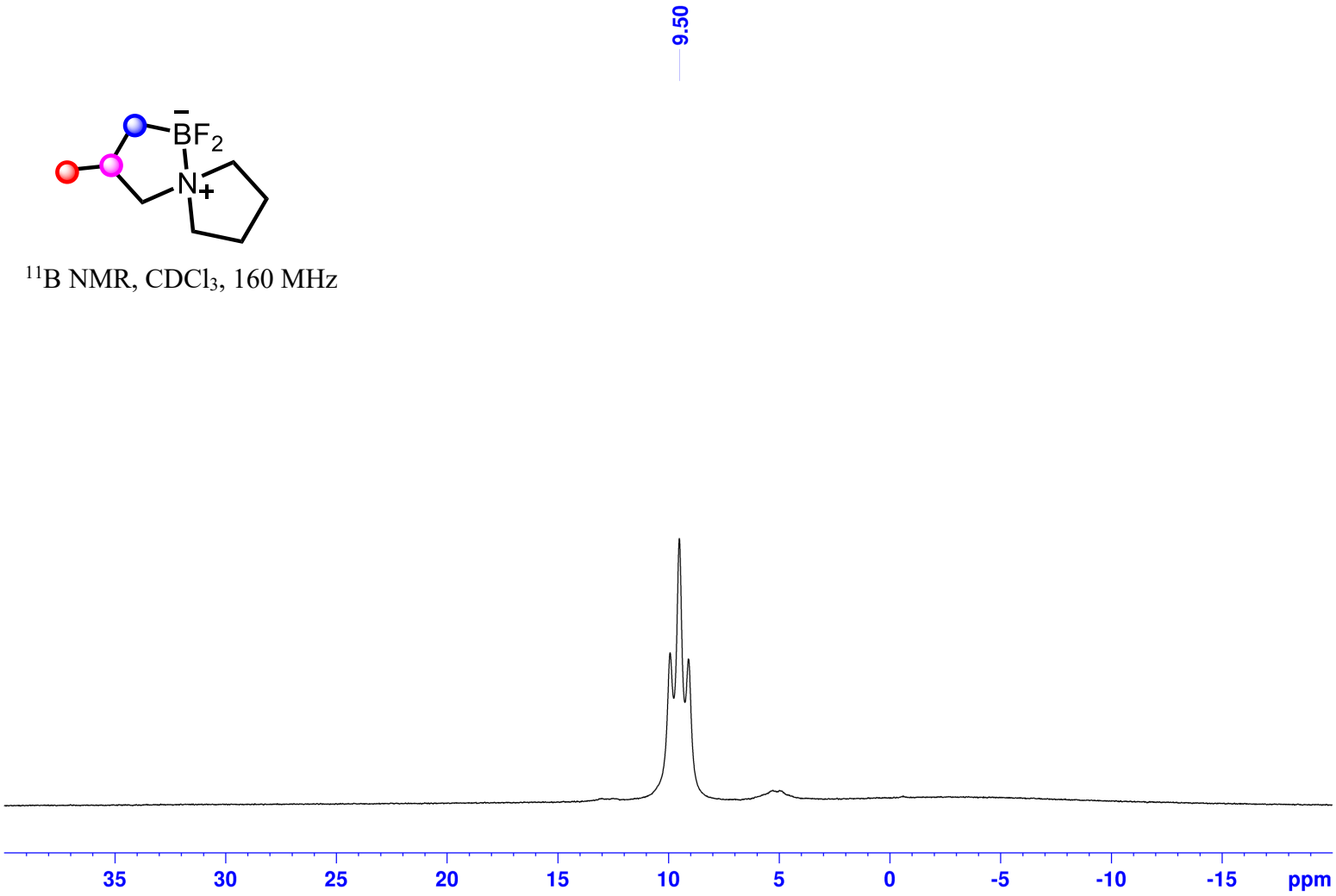
1,1-Difluoro-3-methyl-5-aza-1-boraspiro[4.4]nonane (3a):

^{13}C NMR, $CDCl_3$, 126 MHz

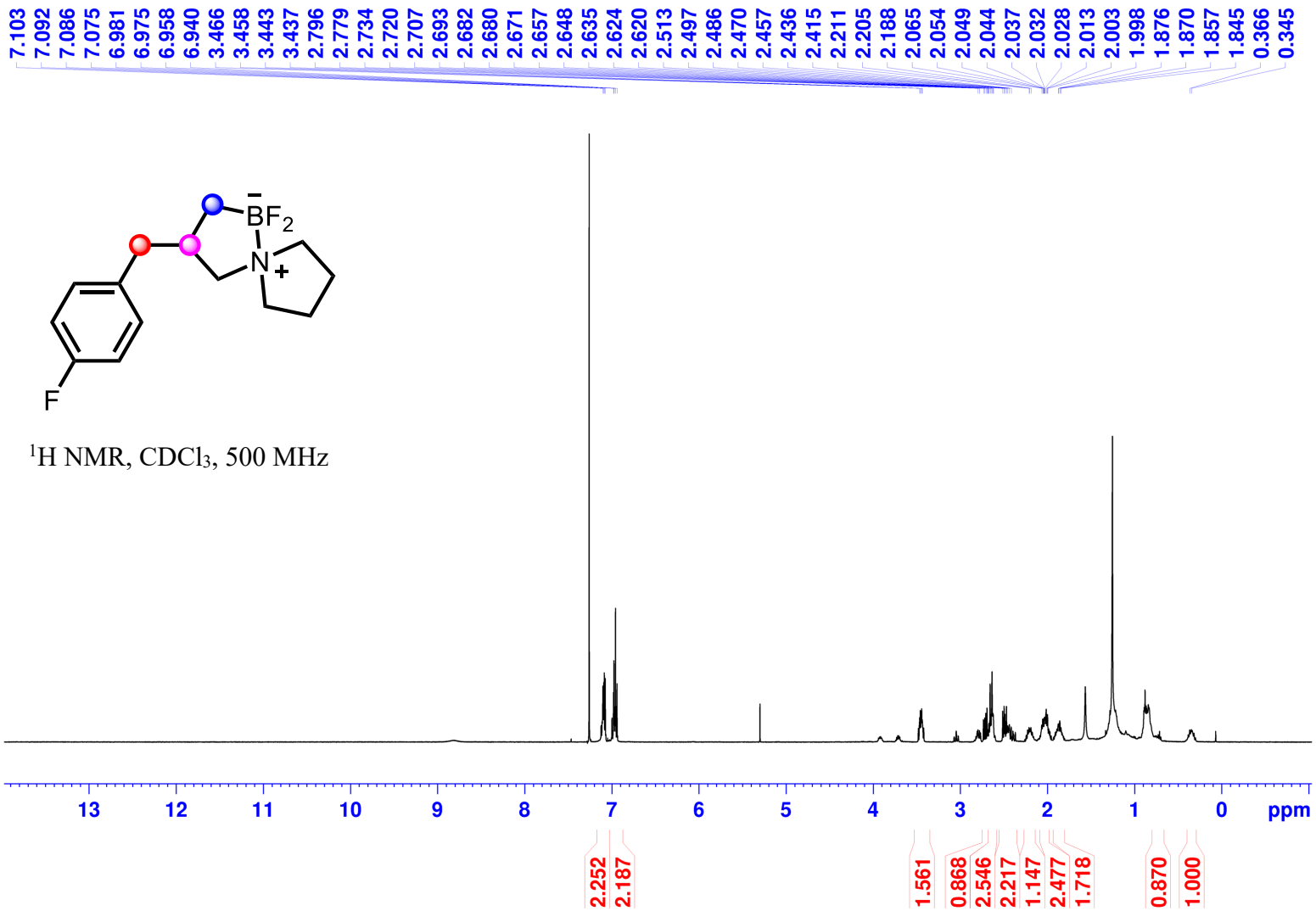


1,1-Difluoro-3-methyl-5-aza-1-boraspiro[4.4]nonane (3a):

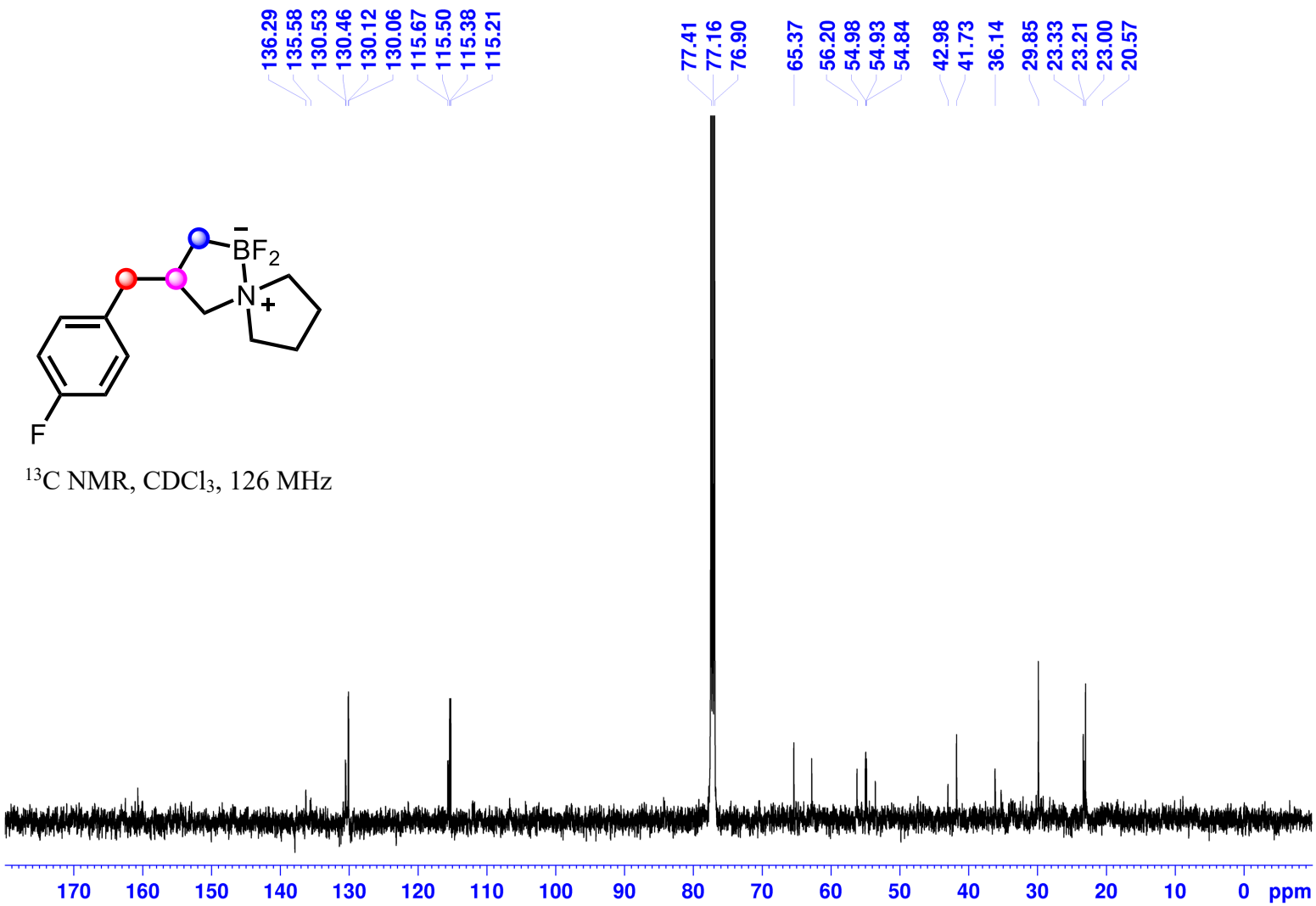
^{11}B NMR, $CDCl_3$, 160 MHz



1,1-Difluoro-3-(4-fluorobenzyl)-5-aza-1-boraspiro[4.4]nonane (3b):



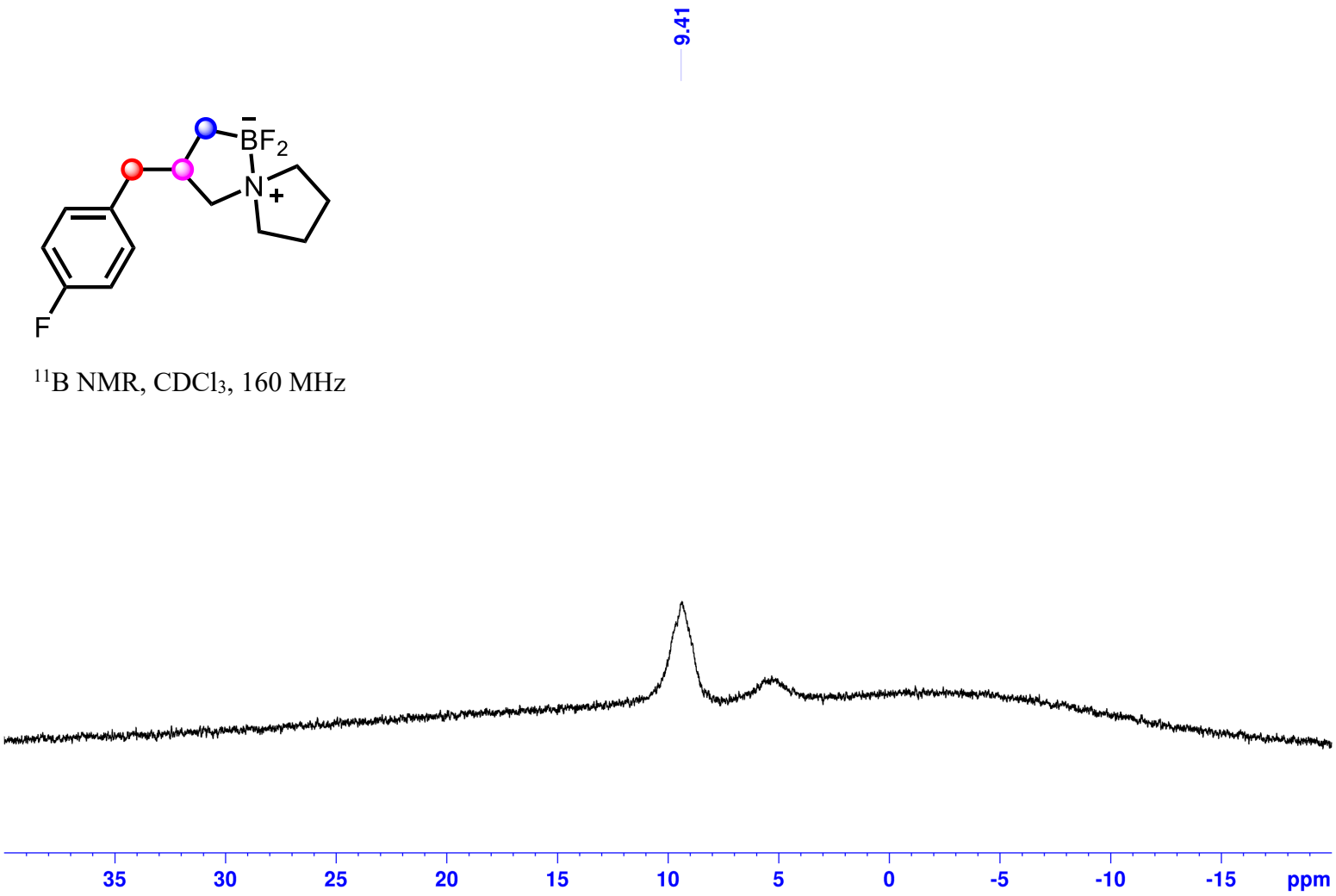
1,1-Difluoro-3-(4-fluorobenzyl)-5-aza-1-boraspiro[4.4]nonane (3b):



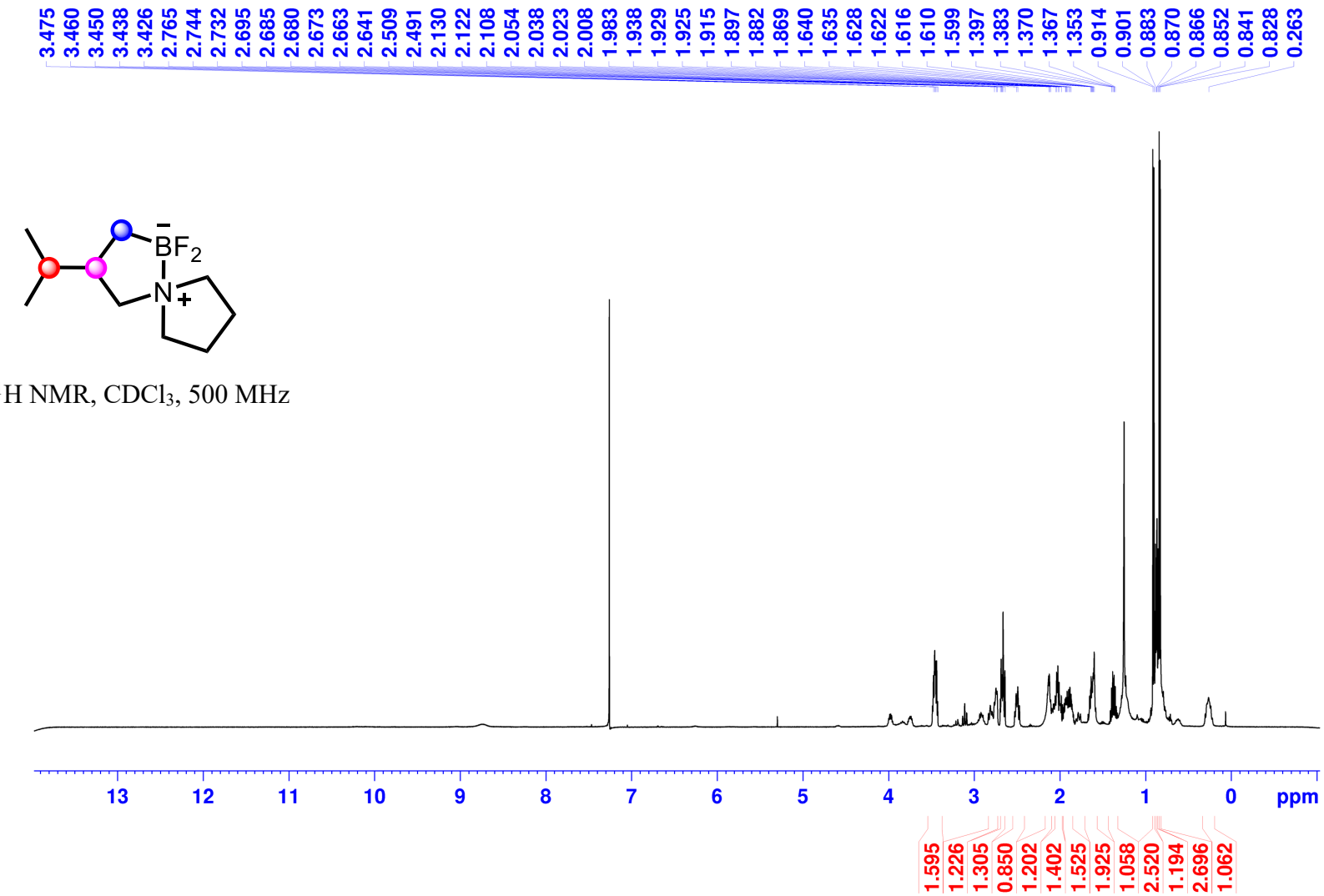
^{13}C NMR, $CDCl_3$, 126 MHz

1,1-Difluoro-3-(4-fluorobenzyl)-5-aza-1-boraspiro[4.4]nonane (3b):

^{11}B NMR, $CDCl_3$, 160 MHz



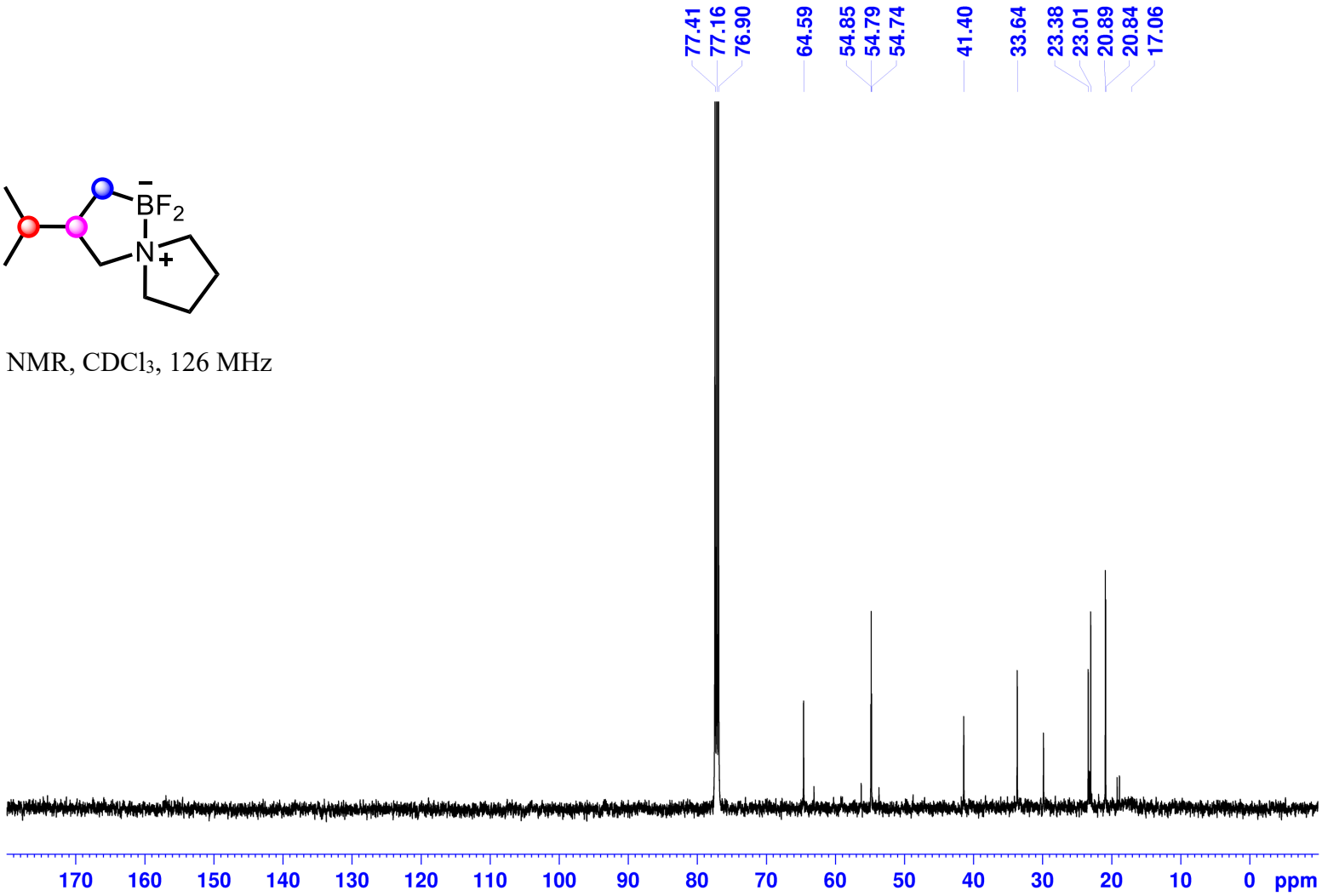
1,1-Difluoro-3-isopropyl-5-aza-1-boraspiro[4.4]nonane (3c)



^{1}H NMR, $CDCl_3$, 500 MHz

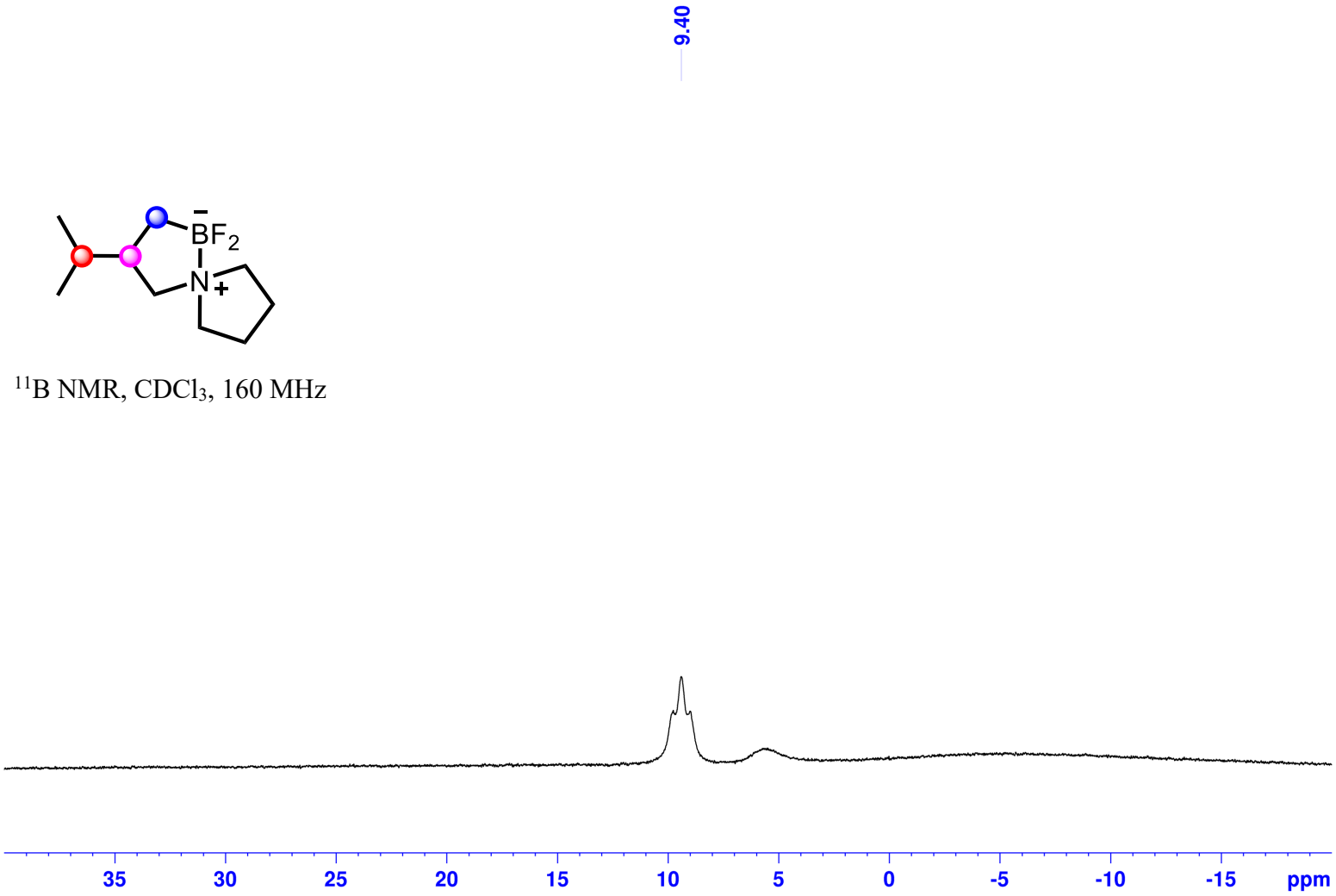
1,1-Difluoro-3-isopropyl-5-aza-1-boraspiro[4.4]nonane (3c)

^{13}C NMR, $CDCl_3$, 126 MHz

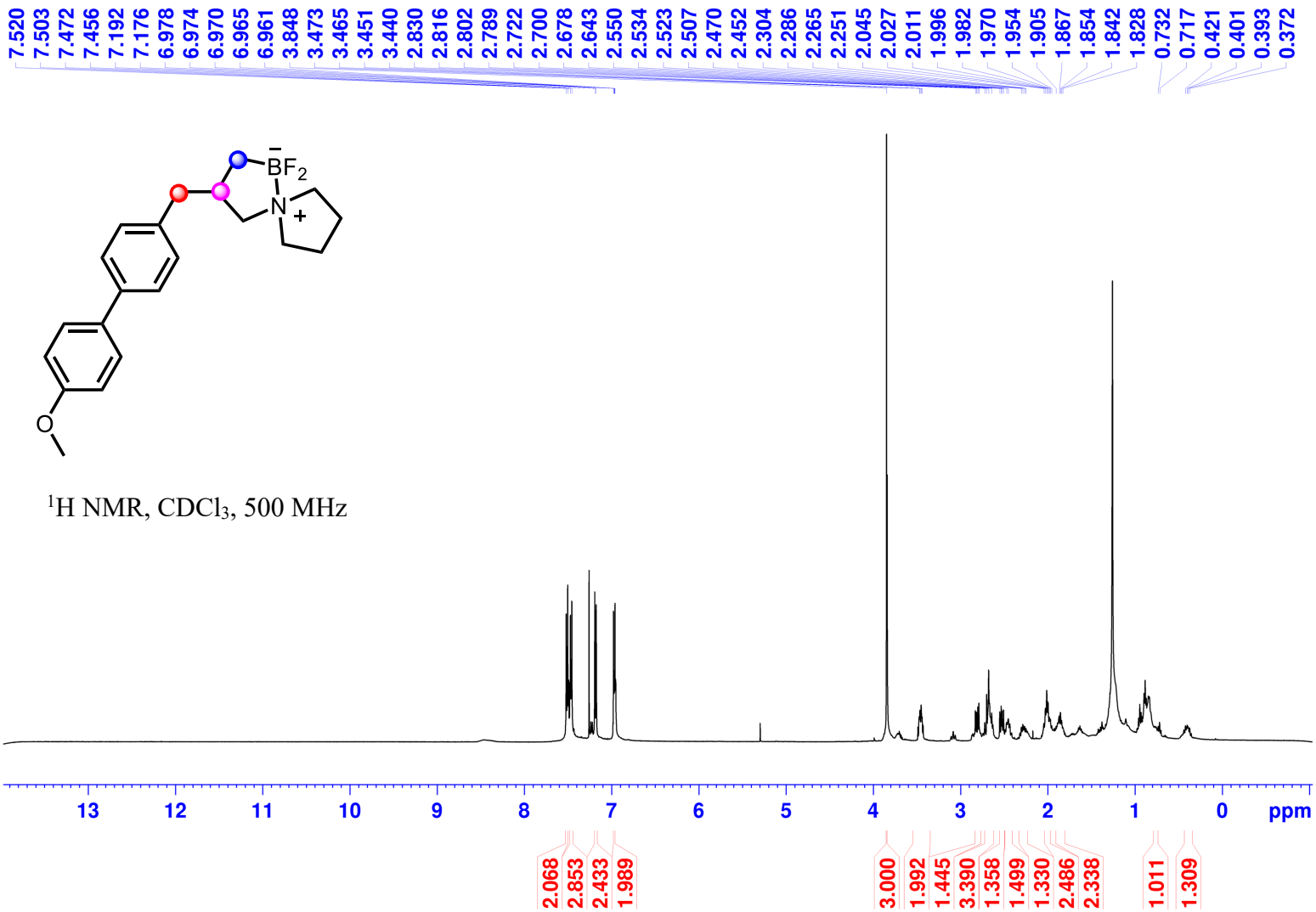


1,1-Difluoro-3-isopropyl-5-aza-1-boraspiro[4.4]nonane (3c)

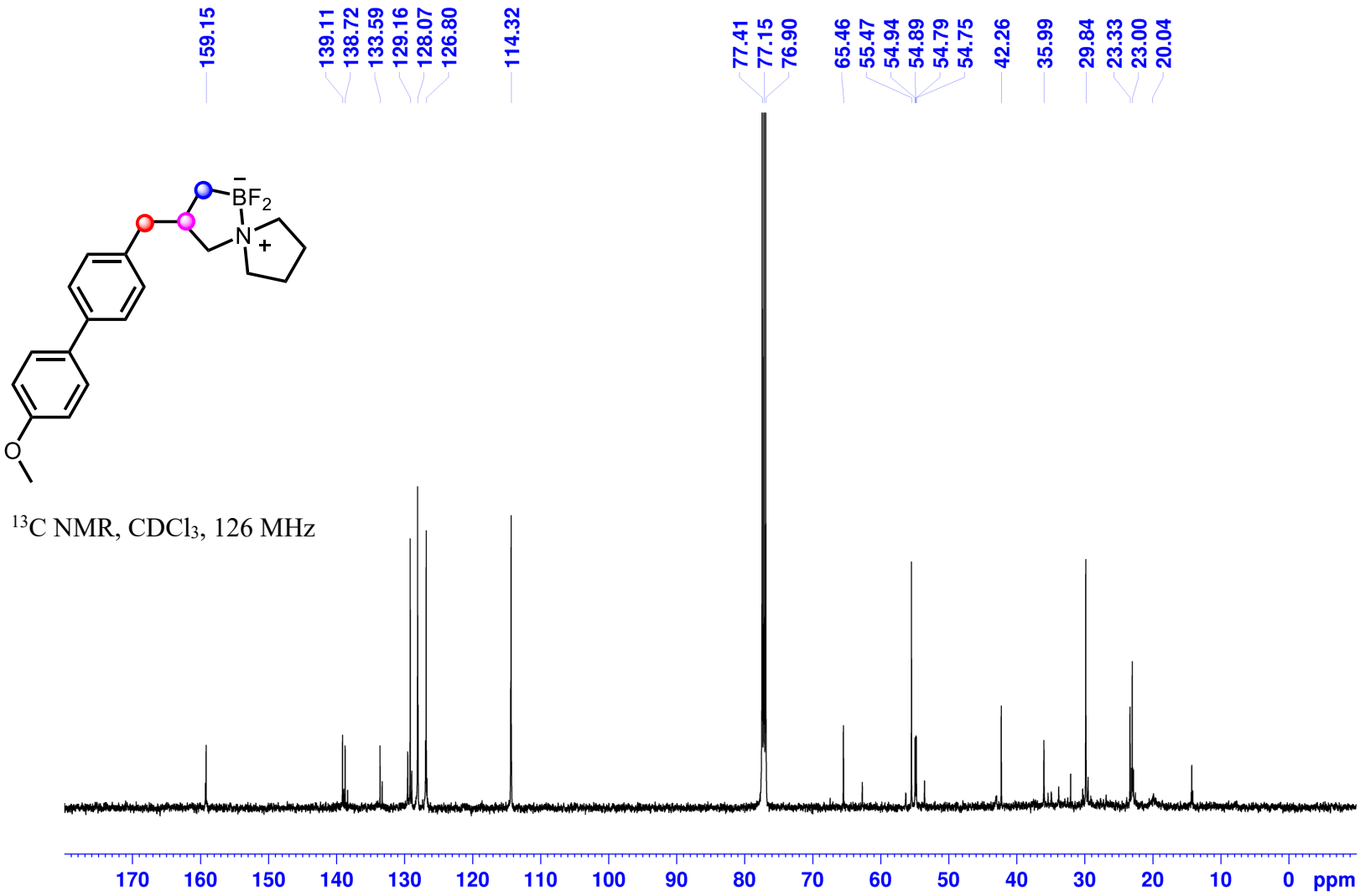
^{11}B NMR, $CDCl_3$, 160 MHz



1,1-Difluoro-3-((4'-methoxy-[1,1'-biphenyl]-4-yl)methyl)-5-aza-1-boraspiro[4.4]nonane (3d):

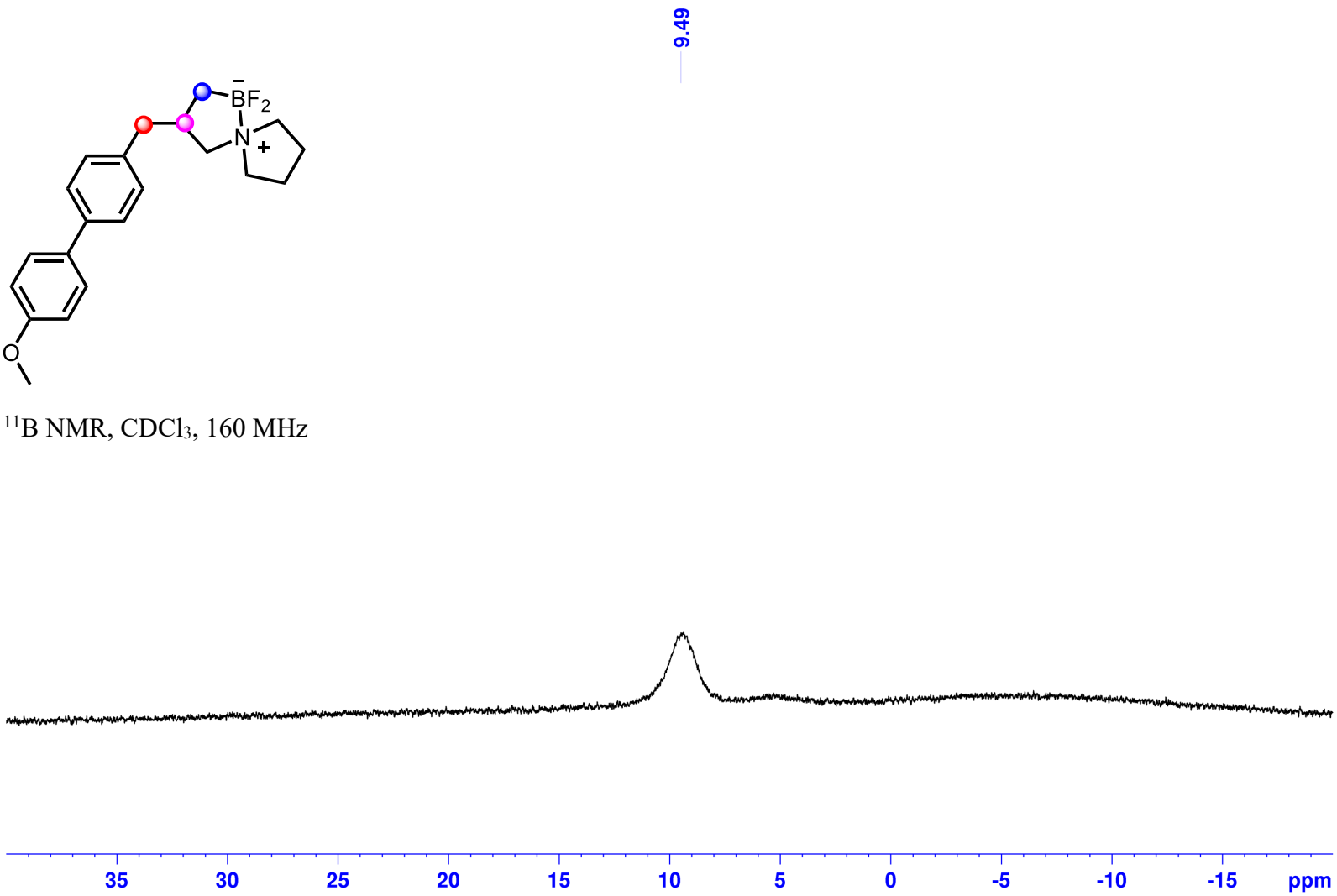


1,1-Difluoro-3-((4'-methoxy-[1,1'-biphenyl]-4-yl)methyl)-5-aza-1-boraspiro[4.4]nonane (3d):

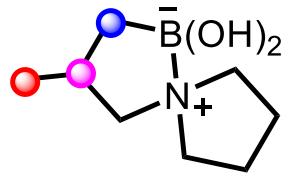


1,1-Difluoro-3-((4'-methoxy-[1,1'-biphenyl]-4-yl)methyl)-5-aza-1-boraspiro[4.4]nonane (3d):

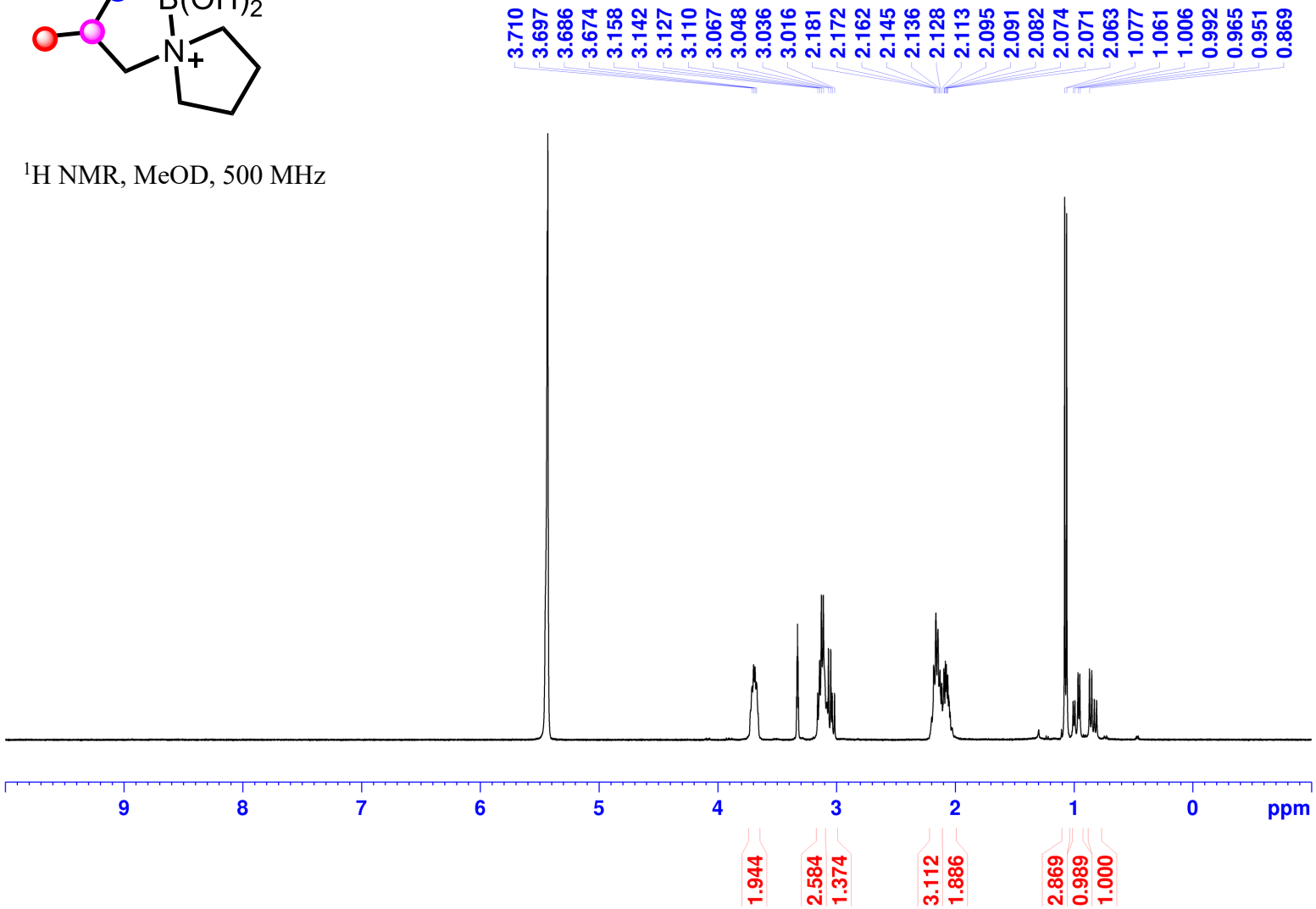
^{11}B NMR, $CDCl_3$, 160 MHz



3-Methyl-5-aza-1-boraspiro[4.4]nonane-1,1-diol (3e) :

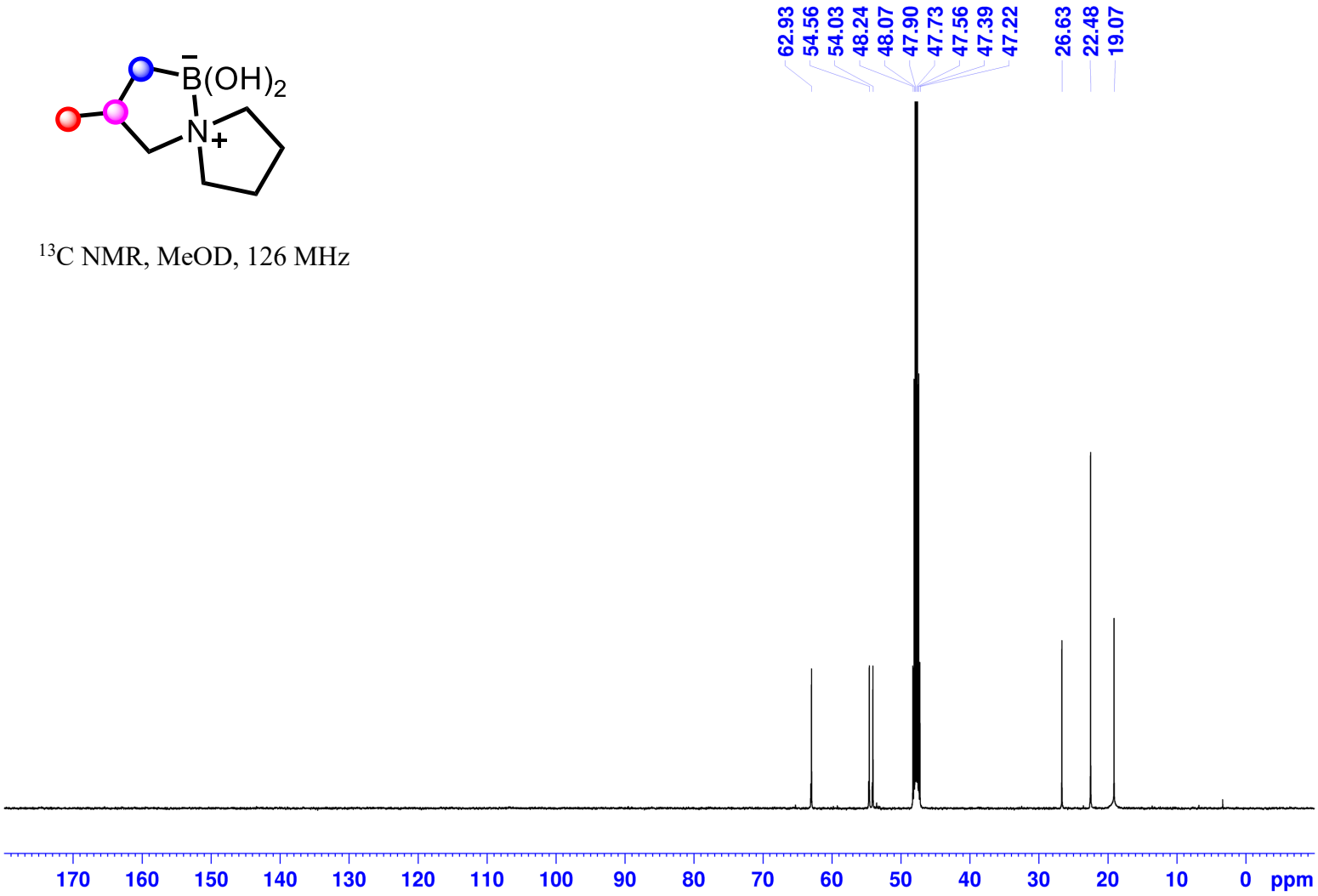


^{1}H NMR, MeOD, 500 MHz



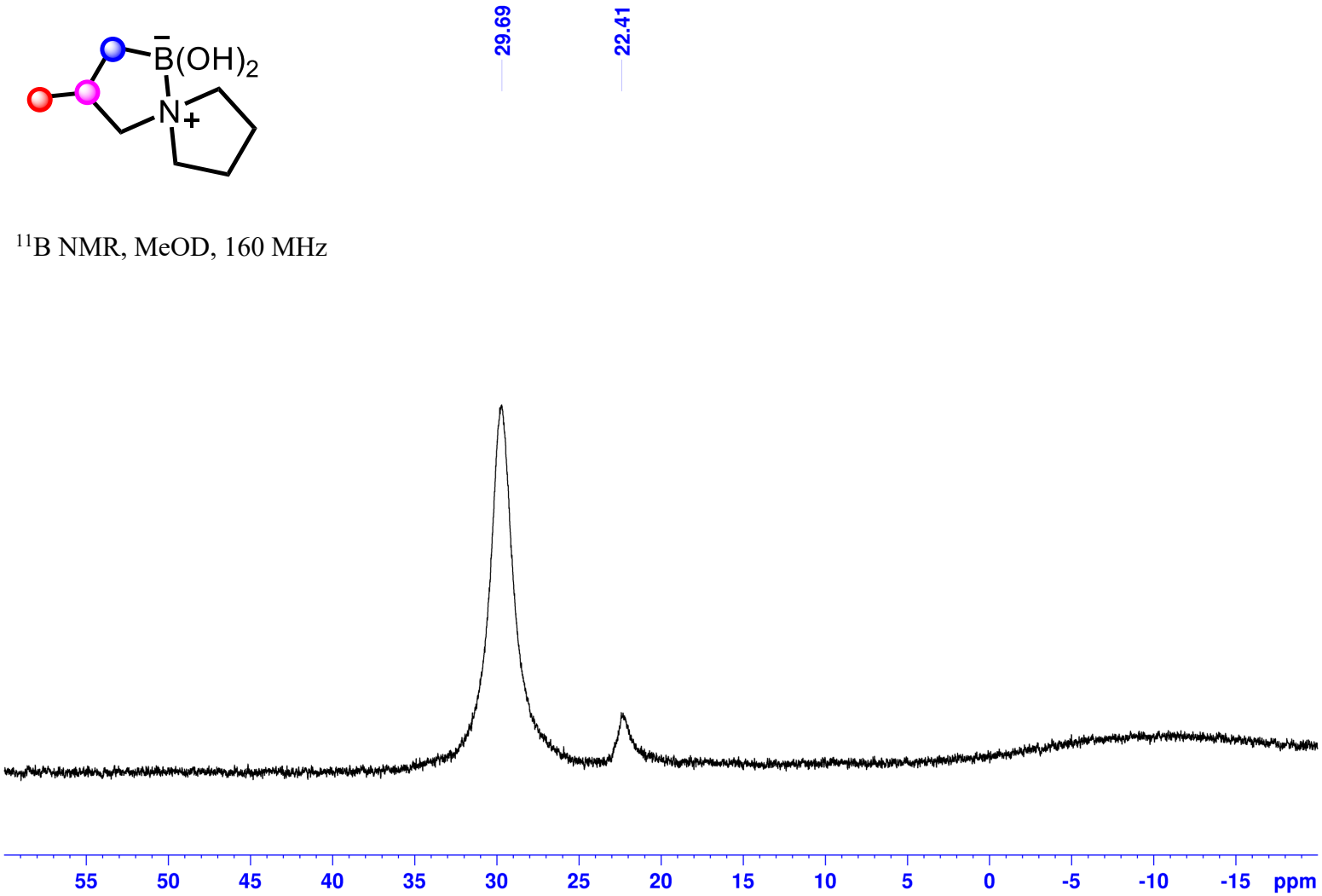
3-Methyl-5-aza-1-boraspiro[4.4]nonane-1,1-diol (3e) :

^{13}C NMR, MeOD, 126 MHz

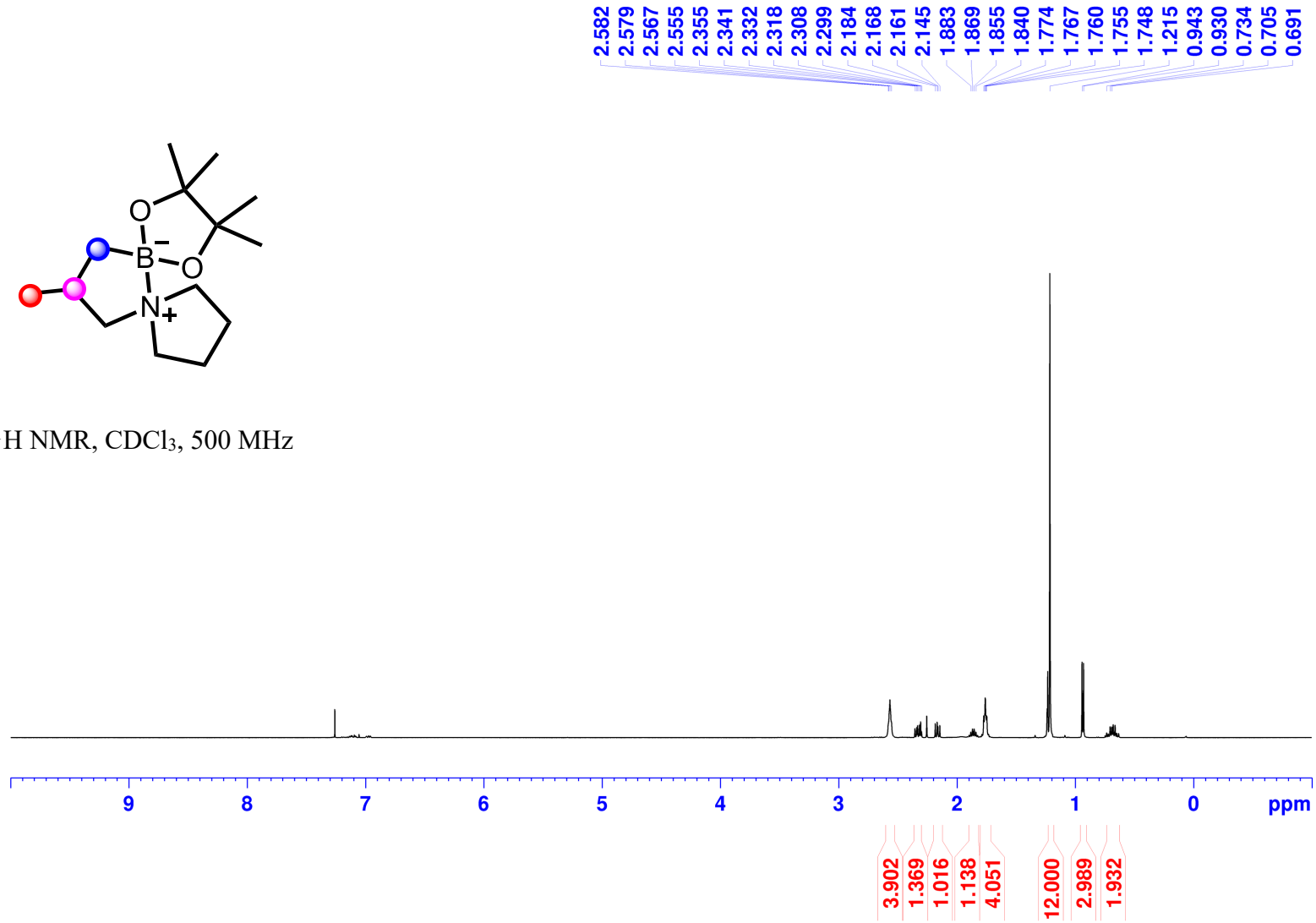


3-Methyl-5-aza-1-boraspiro[4.4]nonane-1,1-diol (3e) :

^{11}B NMR, MeOD, 160 MHz



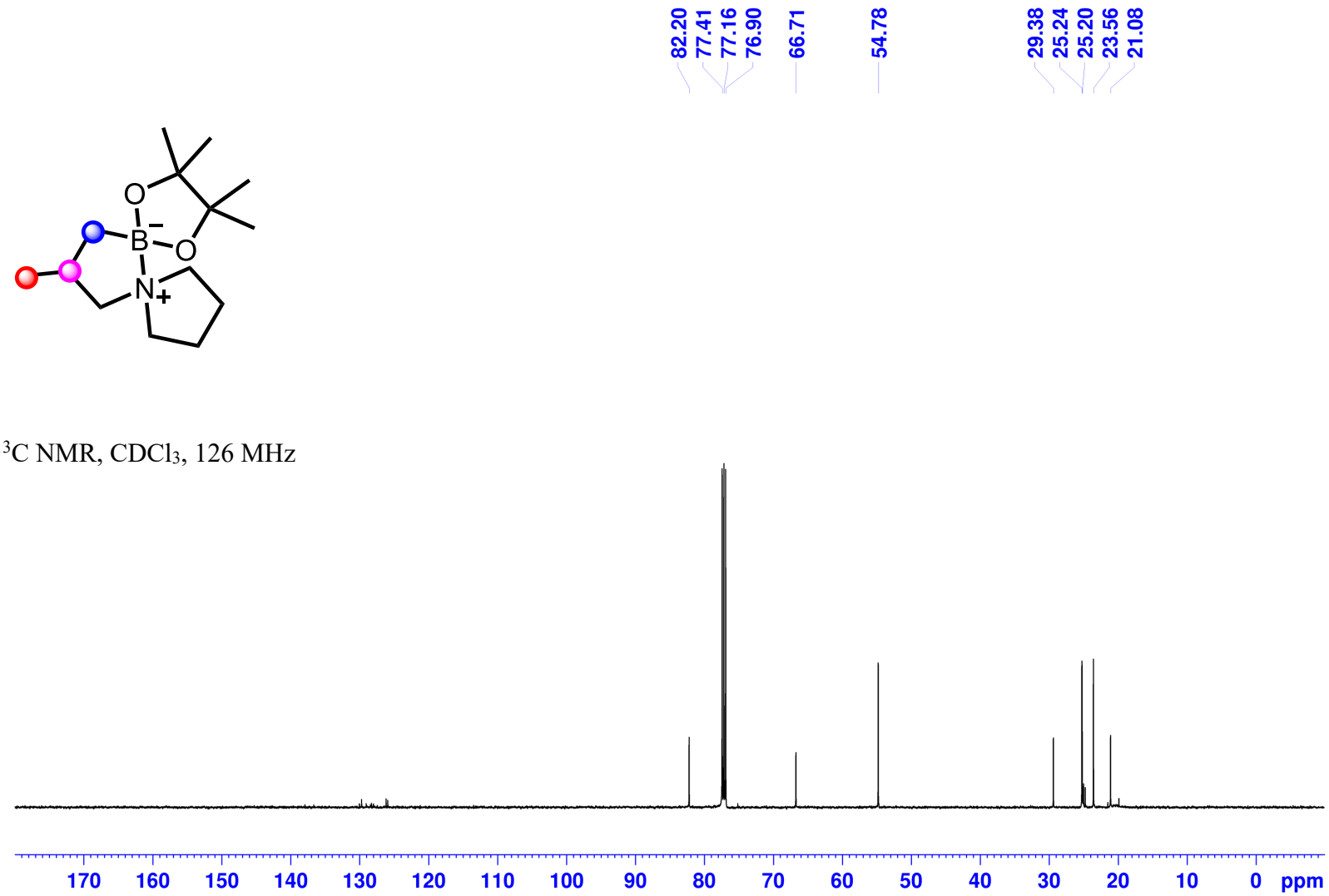
1-(2-Methyl-3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)propyl)pyrrolidine (3f):



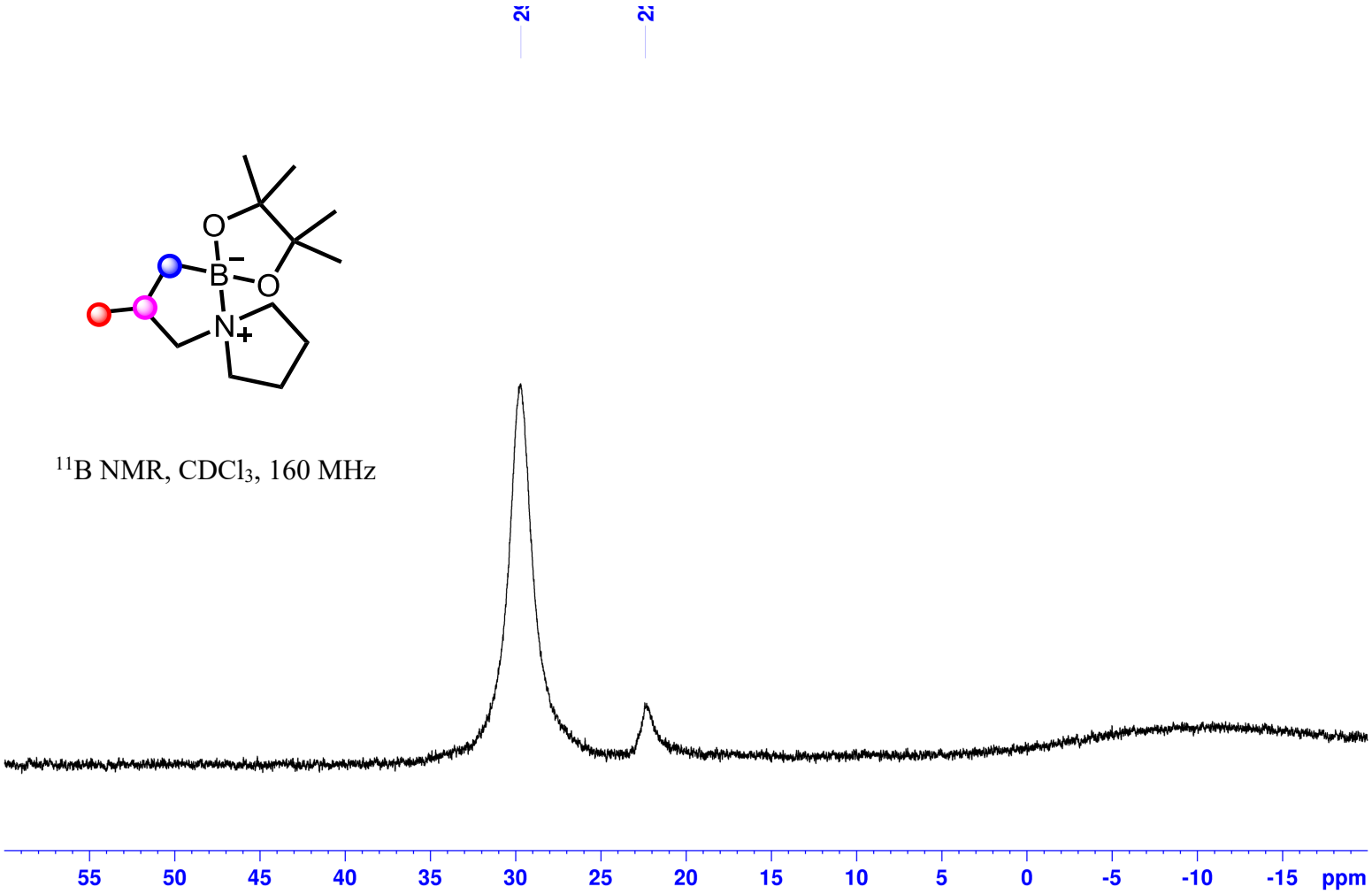
^{1}H NMR, $CDCl_3$, 500 MHz

1-(2-Methyl-3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)propyl)pyrrolidine (3f):

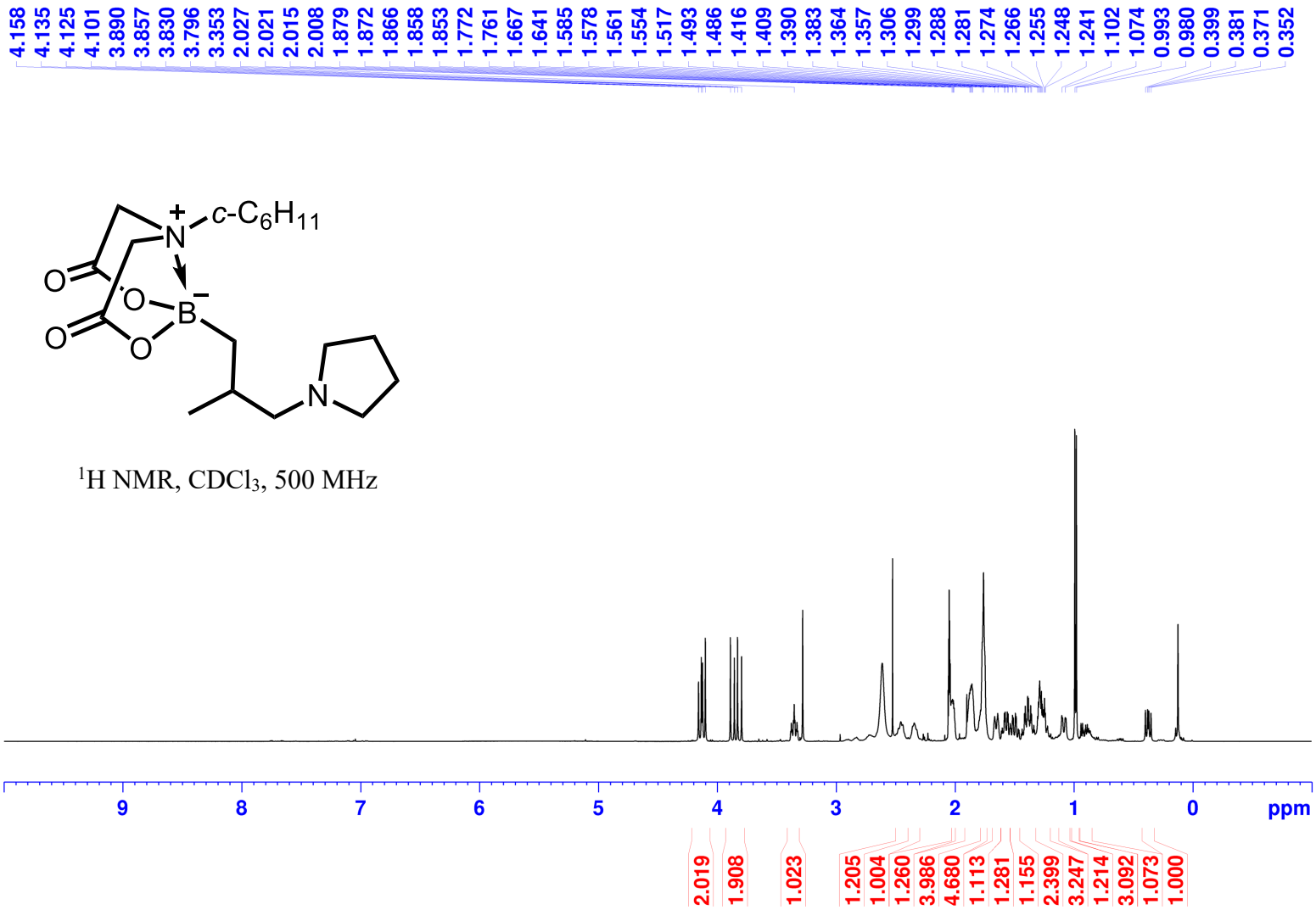
^{13}C NMR, $CDCl_3$, 126 MHz



1-(2-Methyl-3-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)propyl)pyrrolidine (3f):

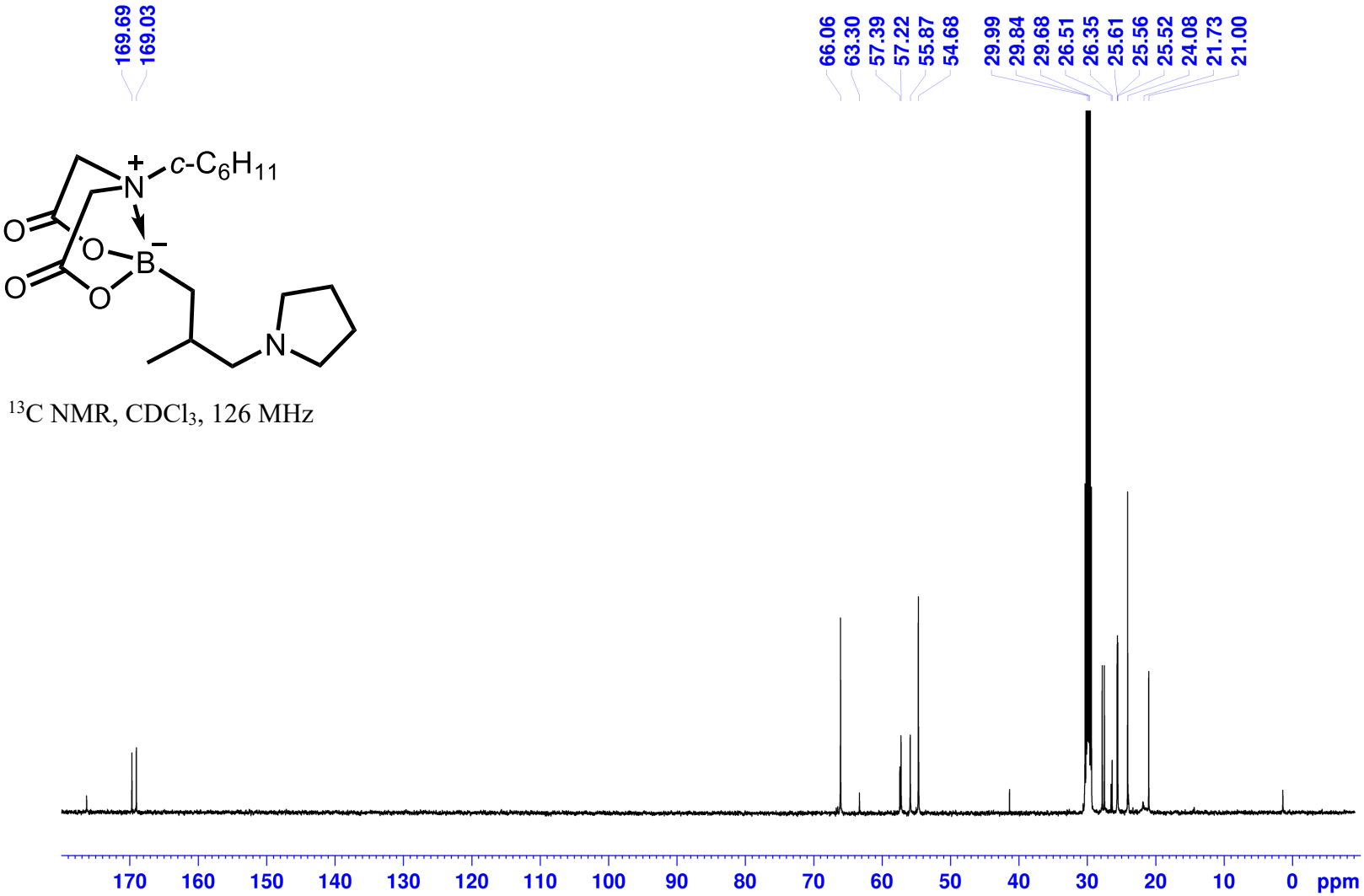


6-Cyclohexyl-2-(2-methyl-3-(pyrrolidin-1-yl)propyl)-1,3,6,2-dioxazaborocane-4,8-dione (3g):



^{1}H NMR, $CDCl_3$, 500 MHz

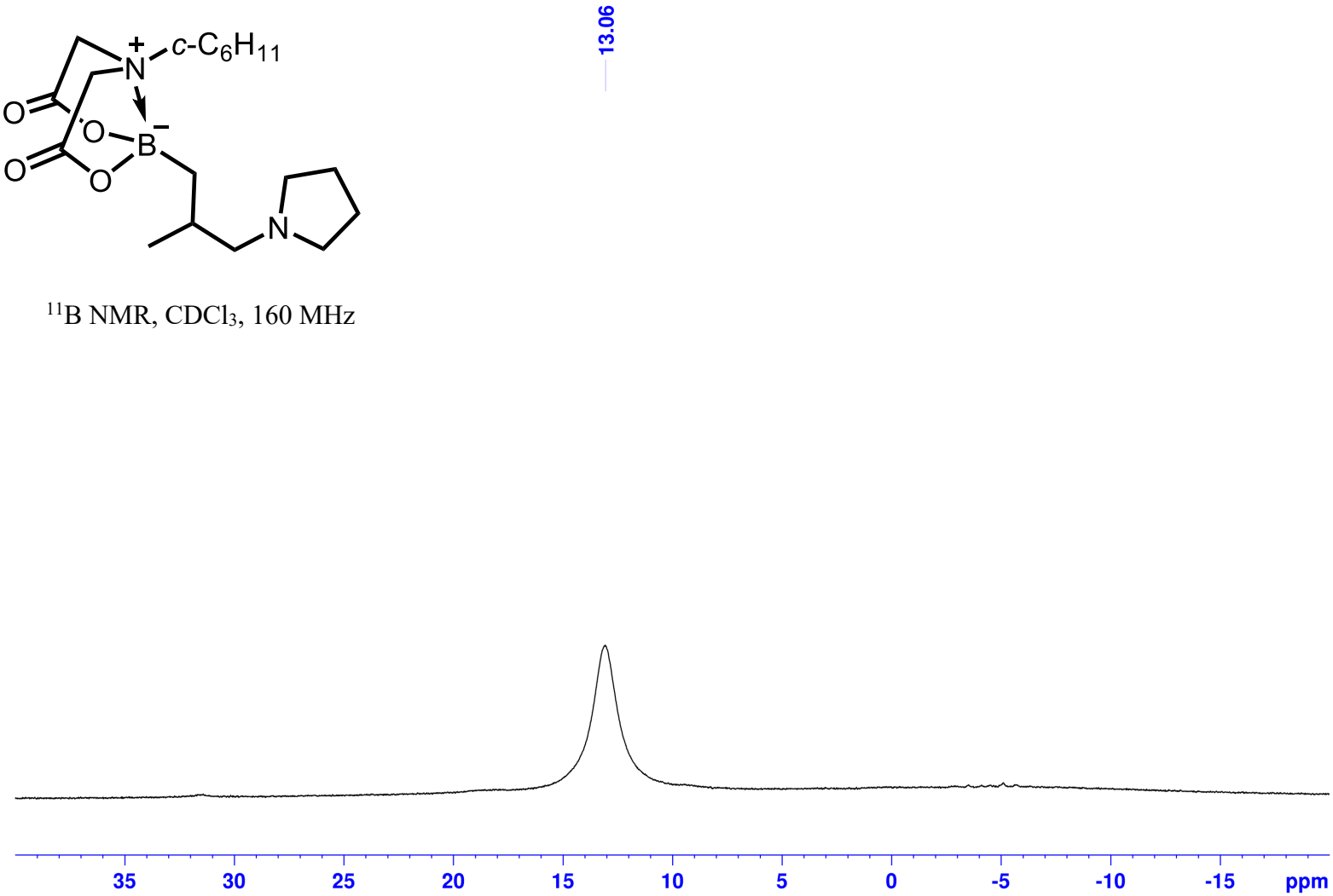
6-Cyclohexyl-2-(2-methyl-3-(pyrrolidin-1-yl)propyl)-1,3,6,2-dioxazaborocane-4,8-dione (3g):



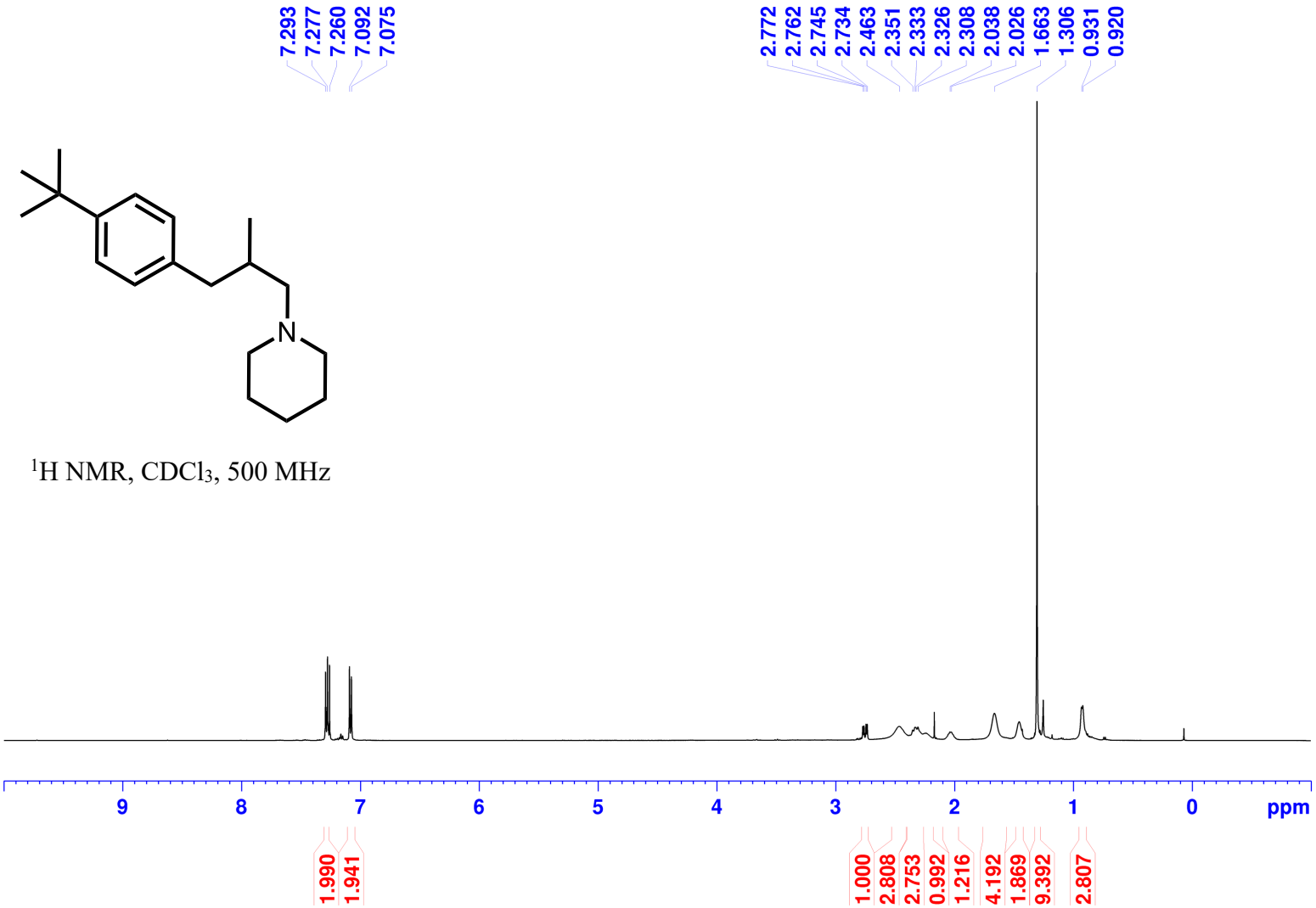
^{13}C NMR, $CDCl_3$, 126 MHz

6-Cyclohexyl-2-(2-methyl-3-(pyrrolidin-1-yl)propyl)-1,3,6,2-dioxazaborocane-4,8-dione (3g):

^{11}B NMR, $CDCl_3$, 160 MHz

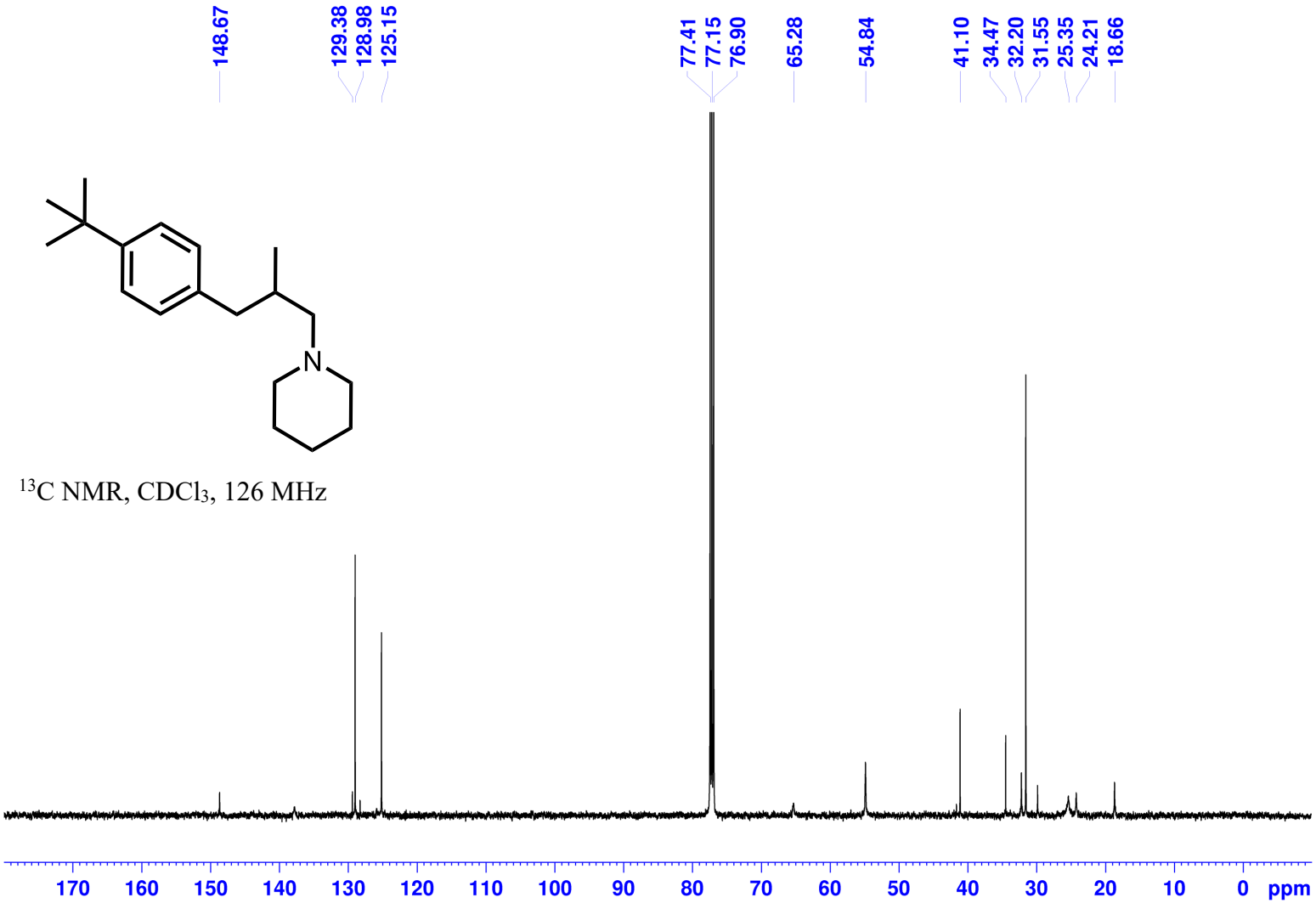


1-(3-(4-(*tert*-Butyl)phenyl)-2-methylpropyl)piperidine 1766 (3h):



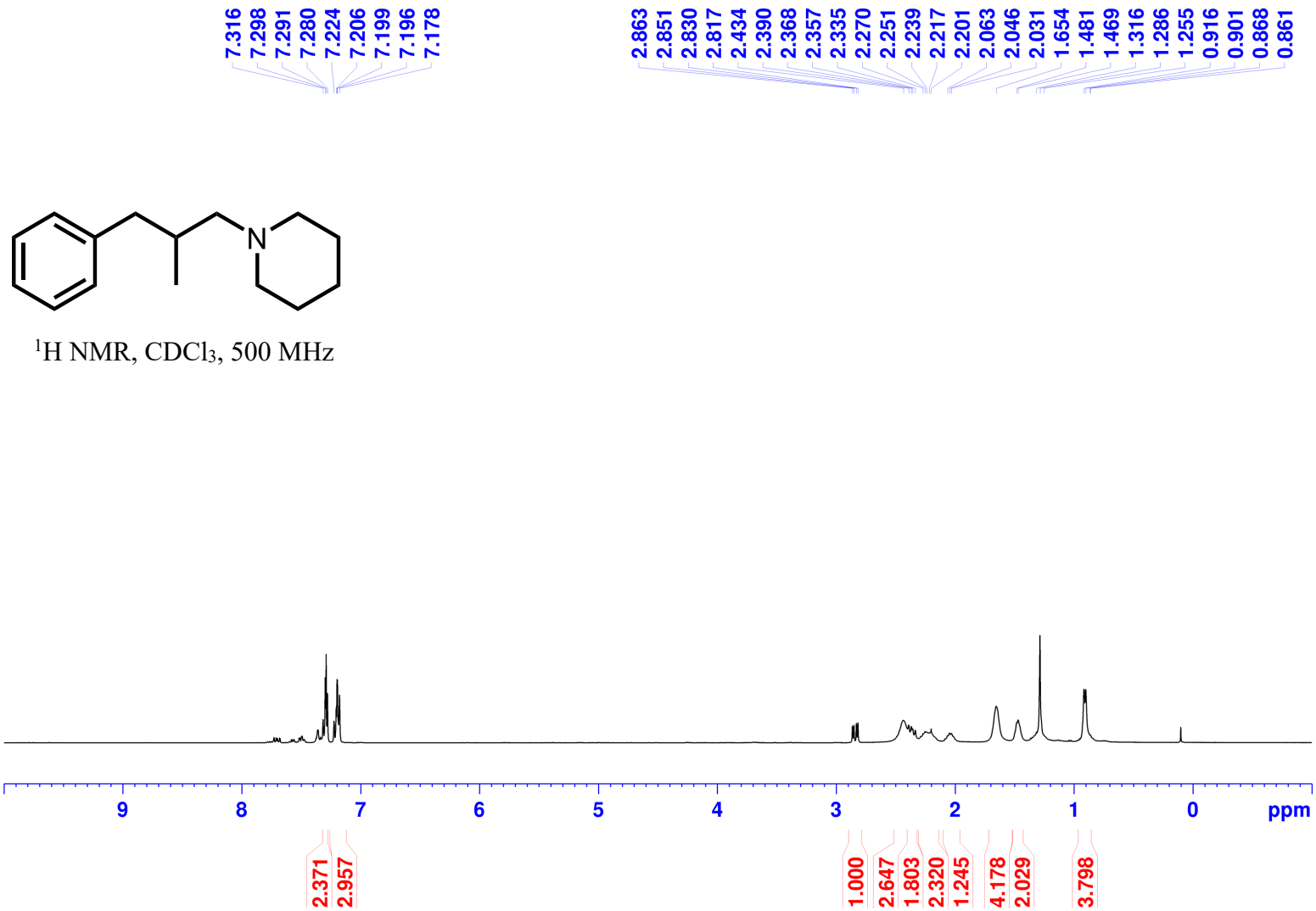
^{1}H NMR, $CDCl_3$, 500 MHz

1-(3-(4-(*tert*-Butyl)phenyl)-2-methylpropyl)piperidine 1766 (3h):



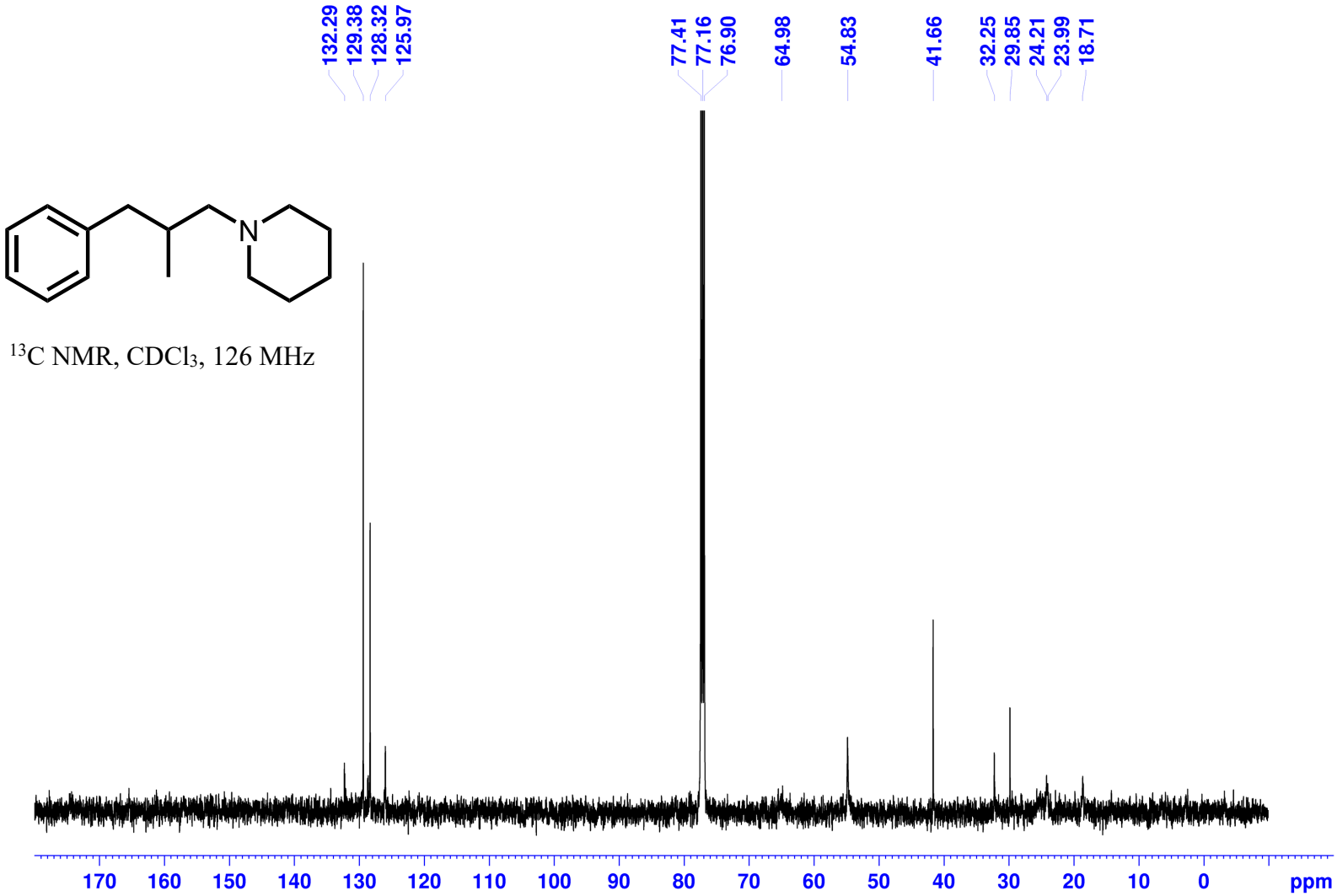
^{13}C NMR, $CDCl_3$, 126 MHz

1-(2-Methyl-3-phenylpropyl)piperidine (3i):

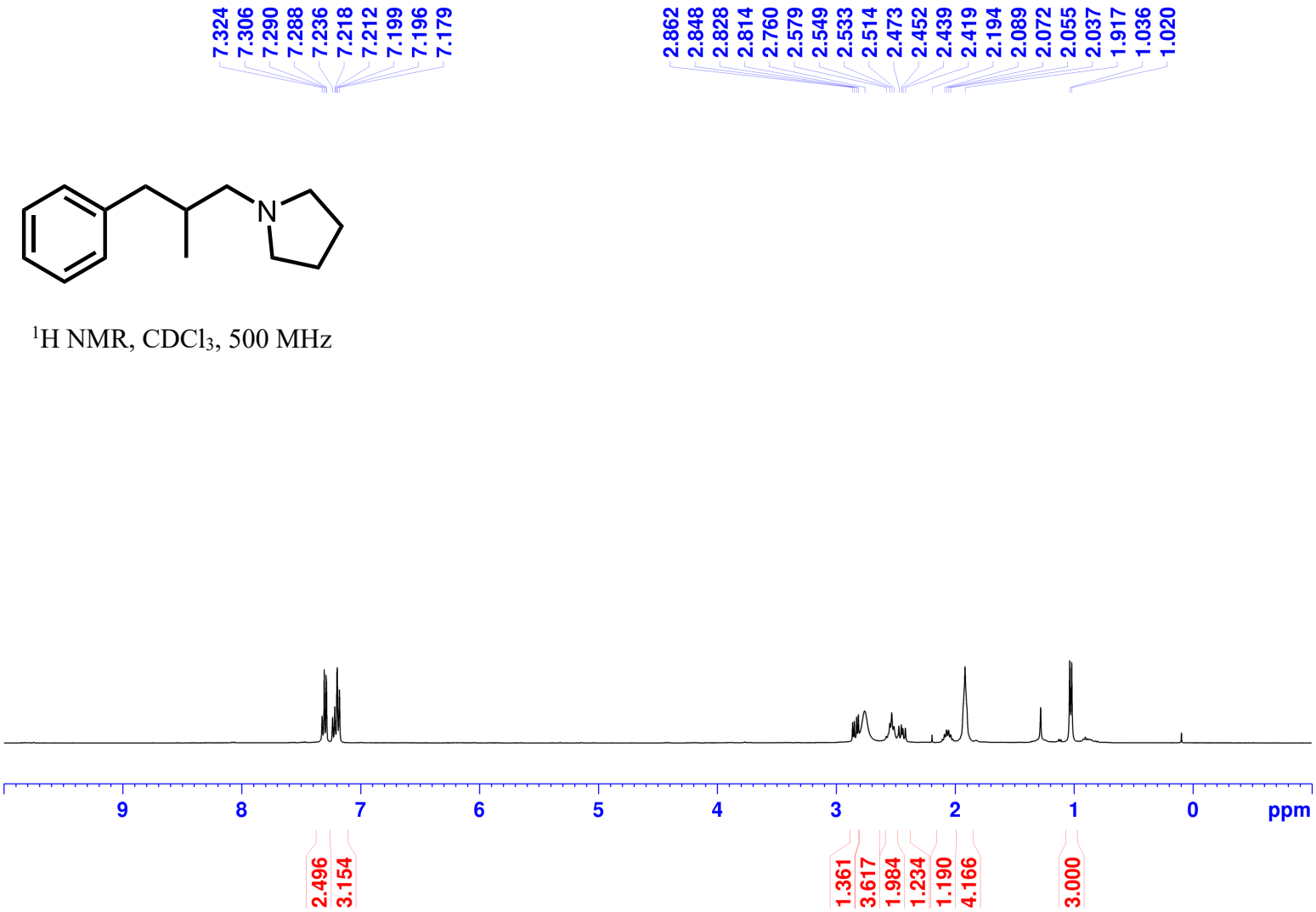


^{1}H NMR, $CDCl_3$, 500 MHz

1-(2-Methyl-3-phenylpropyl)piperidine (3i):

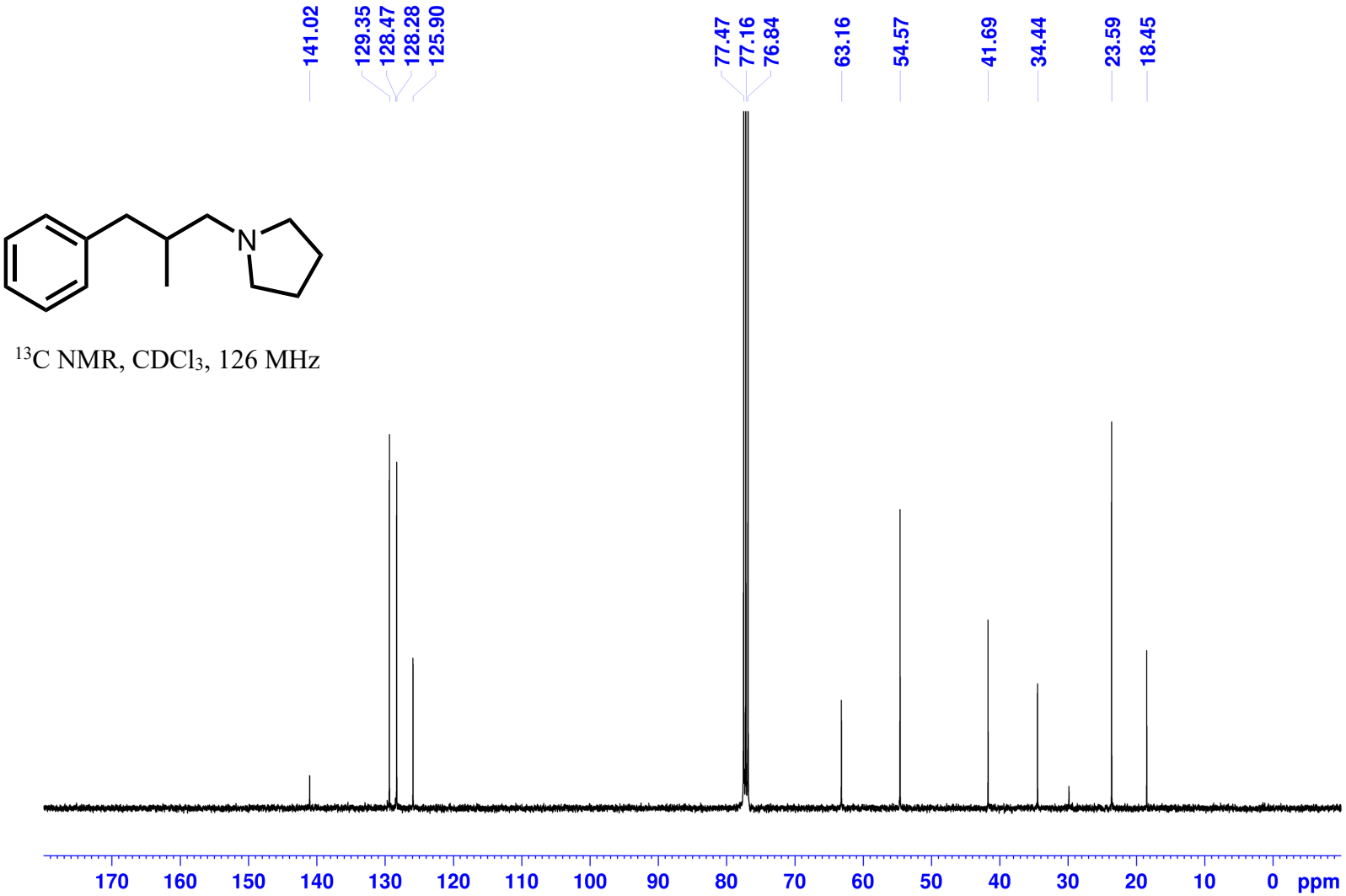


1-(2-Methyl-3-phenylpropyl)pyrrolidine (3j):



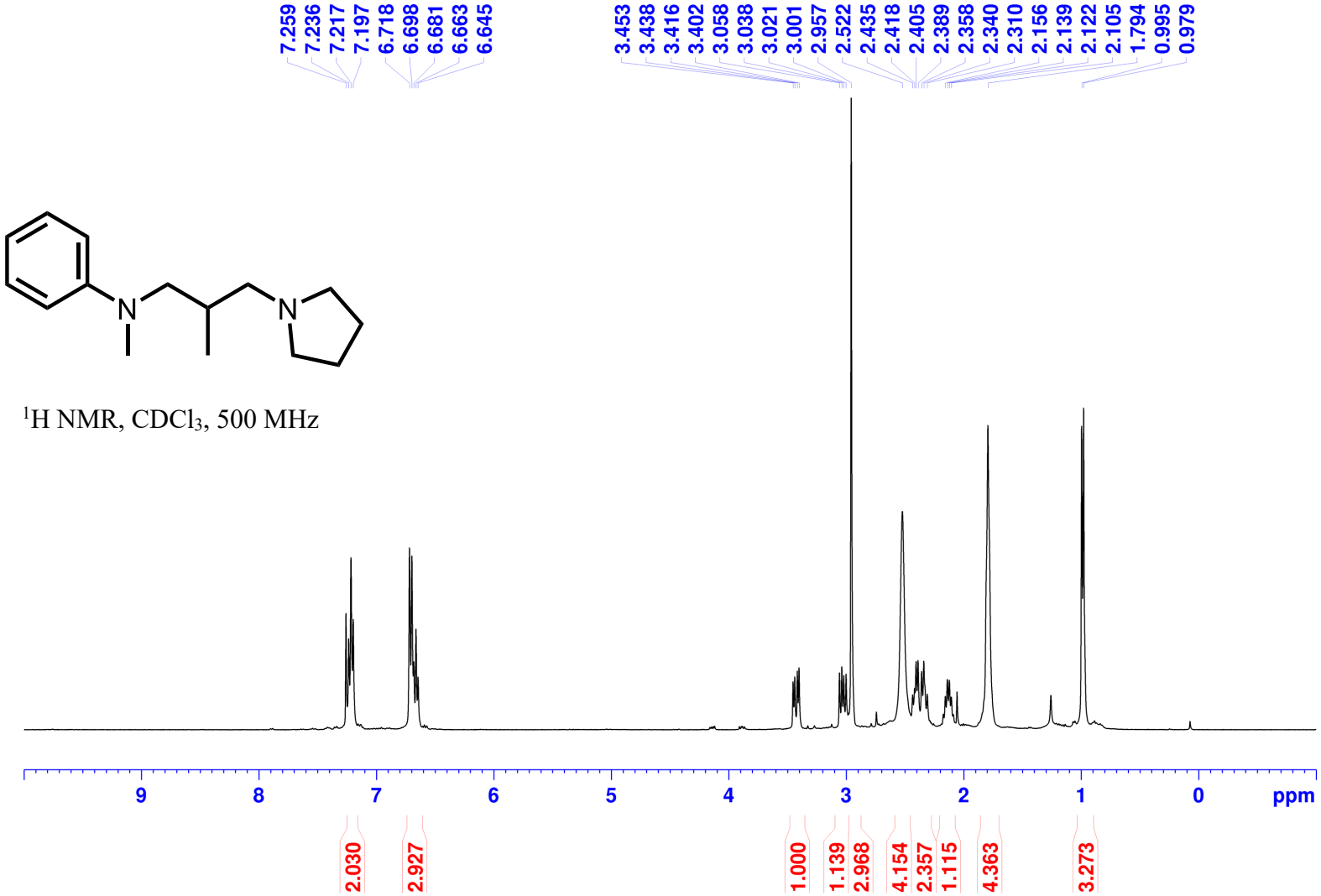
^{1}H NMR, $CDCl_3$, 500 MHz

1-(2-Methyl-3-phenylpropyl)pyrrolidine (3j):

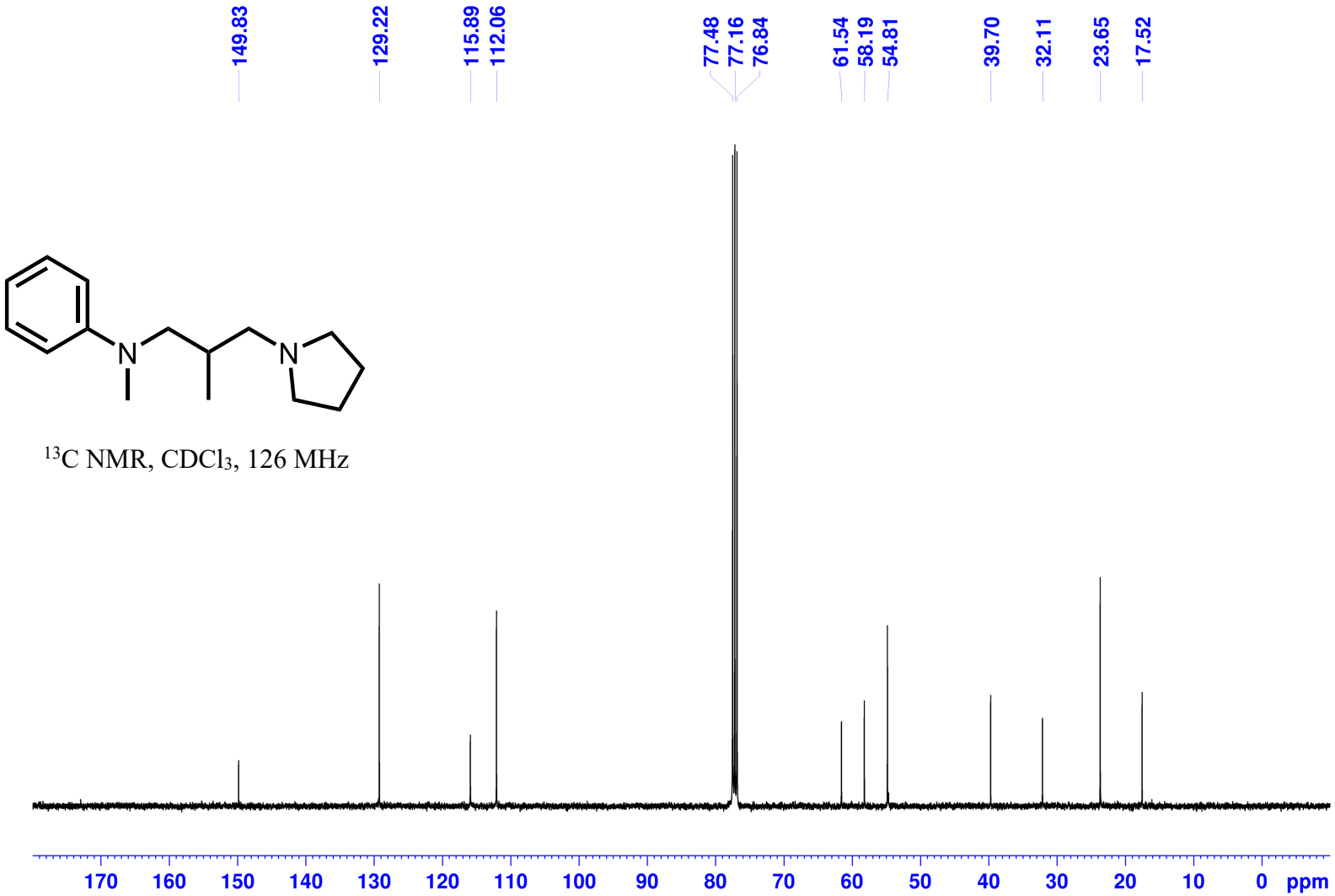


^{13}C NMR, $CDCl_3$, 126 MHz

***N*-Methyl-*N*-(2-methyl-3-(pyrrolidin-1-yl)propyl)aniline (3k):**

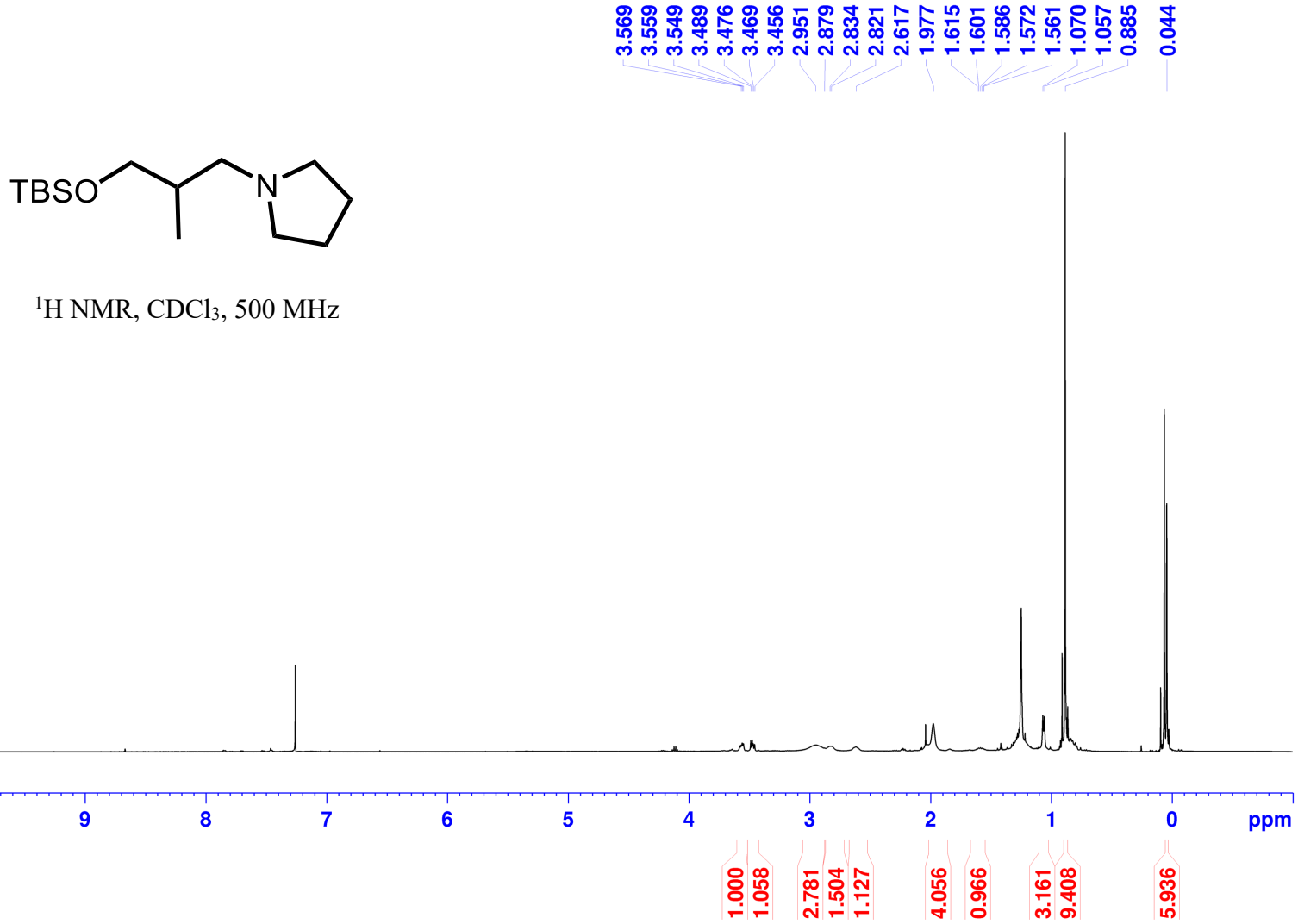


***N*-Methyl-*N*-(2-methyl-3-(pyrrolidin-1-yl)propyl)aniline (3k):**



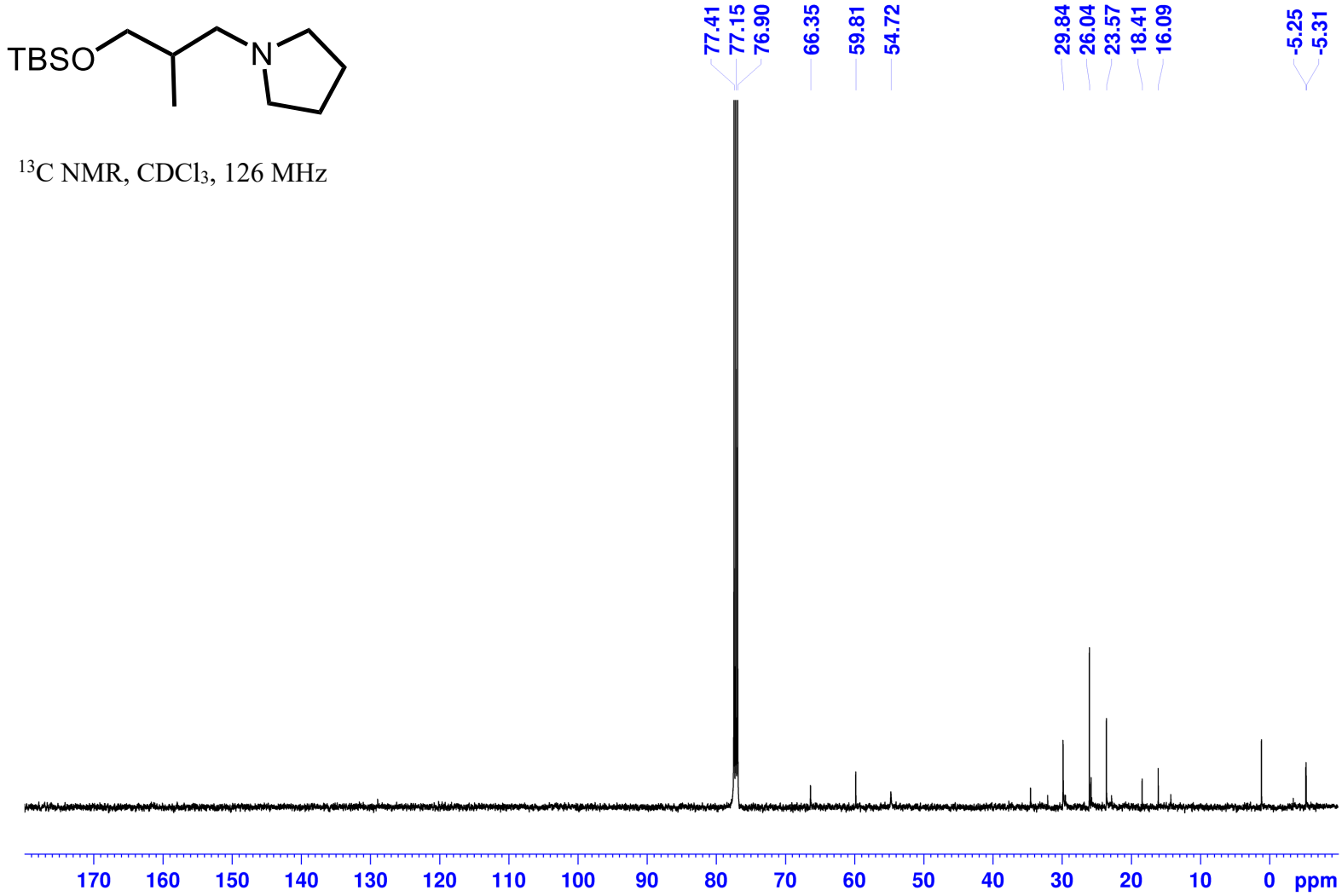
^{13}C NMR, $CDCl_3$, 126 MHz

1-(3-((*tert*-Butyldimethylsilyl)oxy)-2-methylpropyl)pyrrolidine (3l):

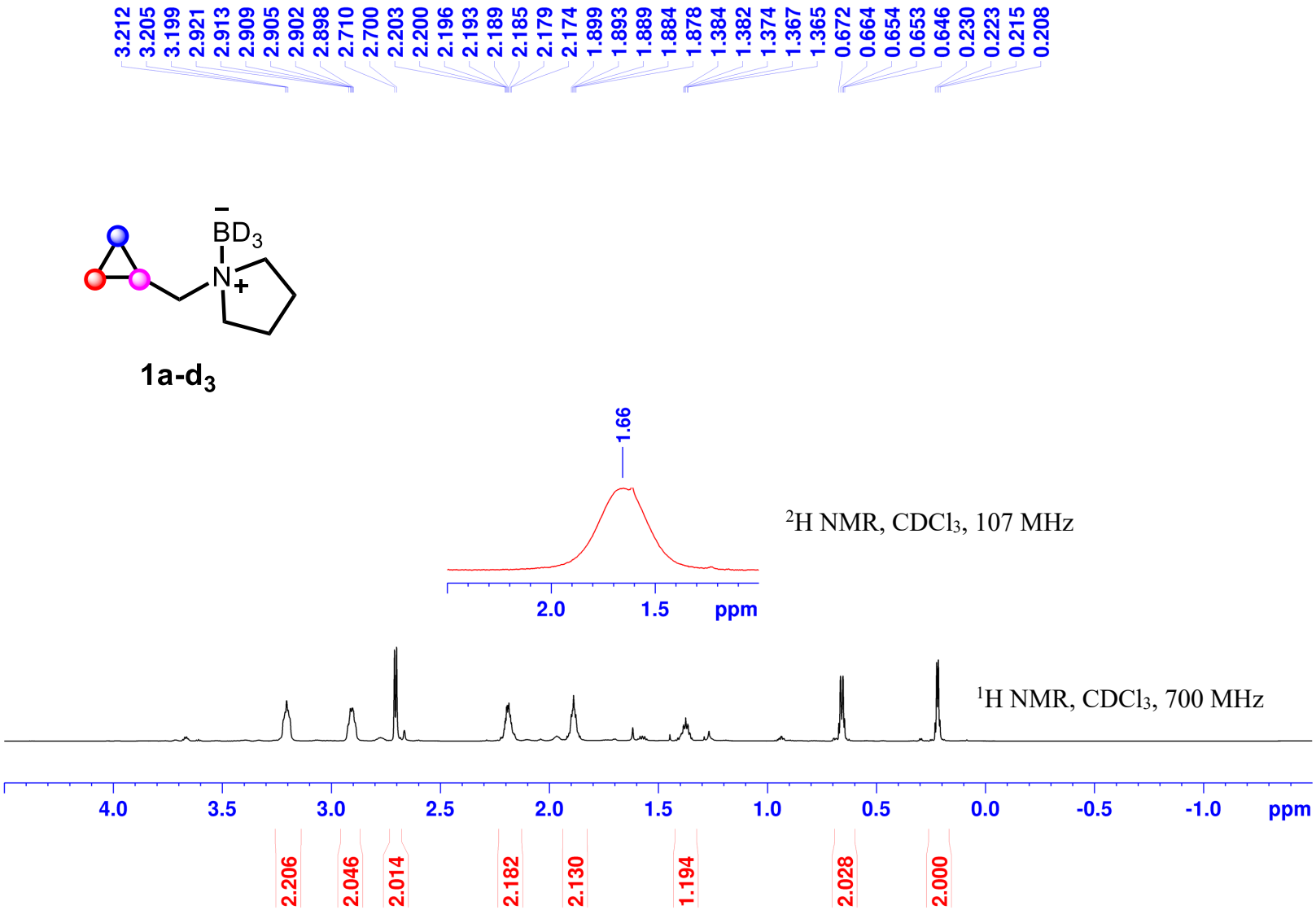


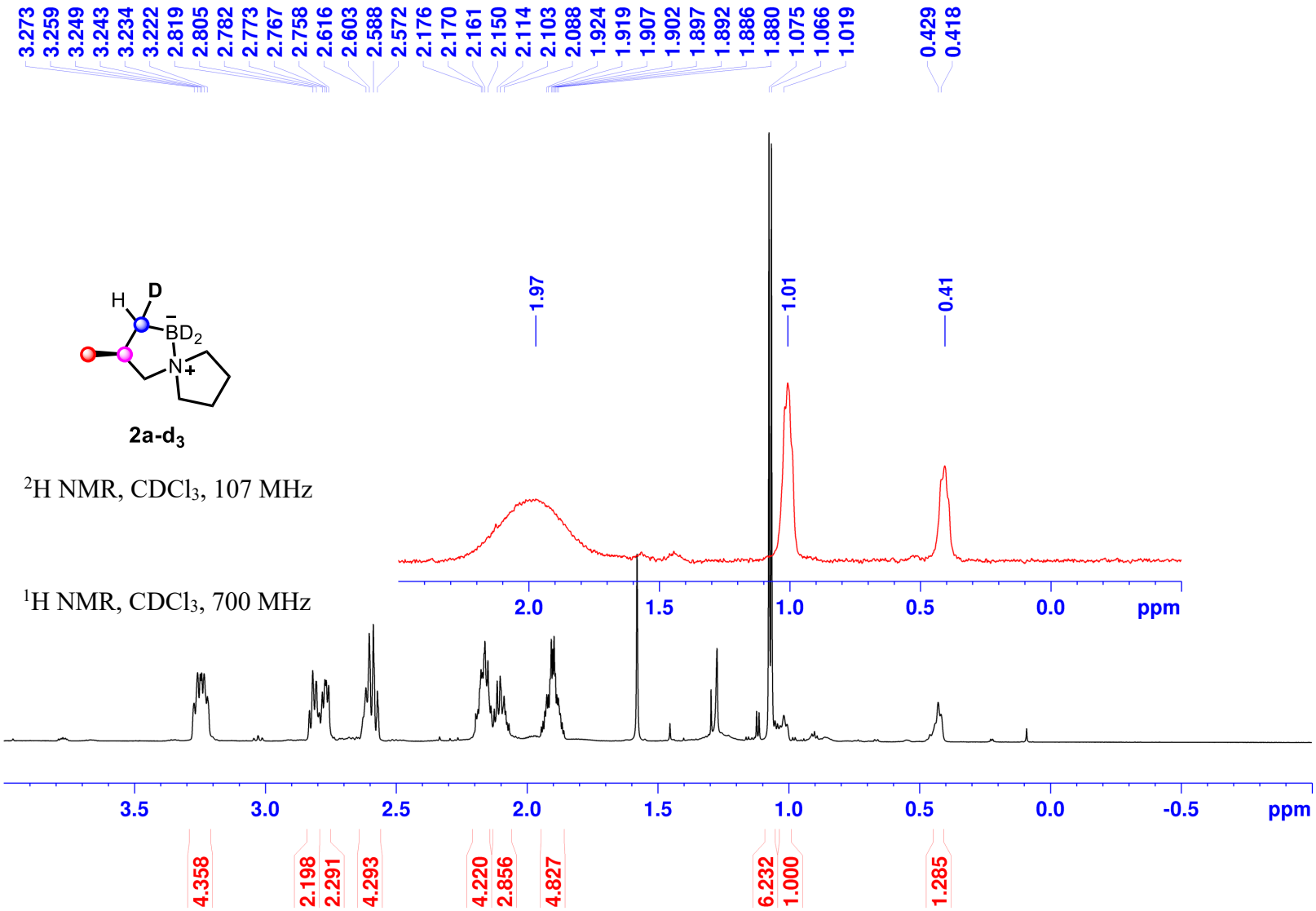
^{1}H NMR, $CDCl_3$, 500 MHz

1-(3-((*tert*-Butyldimethylsilyl)oxy)-2-methylpropyl)pyrrolidine (3l):



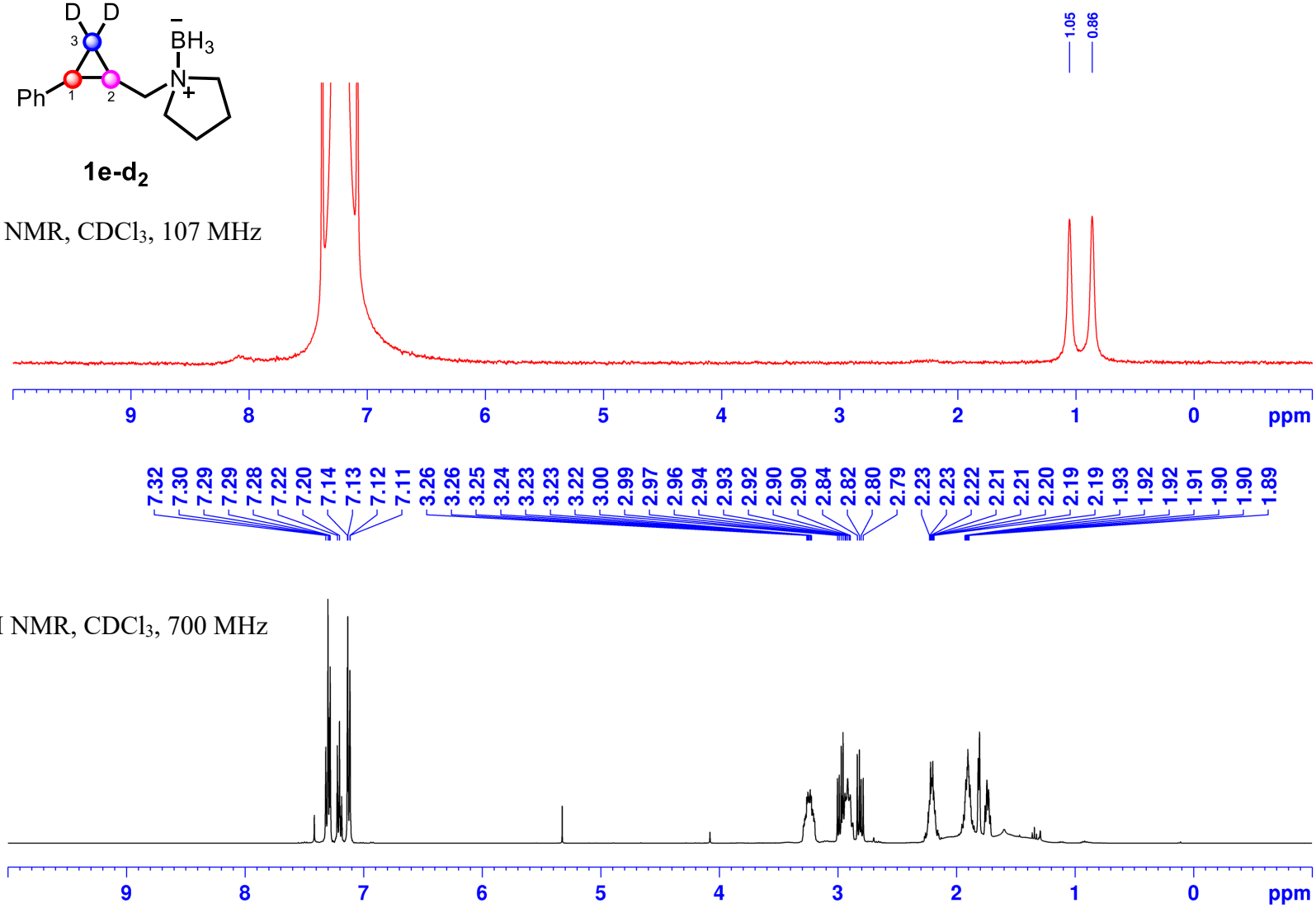
NMR Spectra of Deuterium Experiments


3.212
3.205
3.199
2.921
2.913
2.909
2.905
2.902
2.898
2.710
2.700
2.203
2.200
2.196
2.193
2.189
2.185
2.179
2.174
1.899
1.893
1.889
1.884
1.878
1.384
1.382
1.374
1.367
1.365
0.672
0.664
0.654
0.653
0.646
0.230
0.223
0.215
0.208
BD3
N+
1a-d3
1.66
2.0
1.5
ppm
2H NMR, CDCl3, 107 MHz
1H NMR, CDCl3, 700 MHz
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
ppm
2.206
2.046
2.014
2.182
2.130
1.194
2.028
2.000

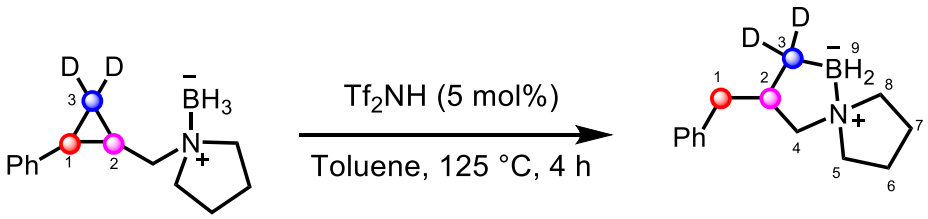

3.273
3.259
3.249
3.243
3.234
3.222
2.819
2.805
2.782
2.773
2.767
2.758
2.616
2.603
2.588
2.572
2.176
2.170
2.161
2.150
2.114
2.103
2.088
1.924
1.919
1.907
1.902
1.897
1.892
1.886
1.880
1.075
1.066
1.019
0.429
0.418
H
D
BD2
N+
2a-d3
2H NMR, CDCl3, 107 MHz
1H NMR, CDCl3, 700 MHz
1.97
1.01
0.41
2.0
1.5
1.0
0.5
0.0
ppm
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
ppm
4.358
2.198
2.291
4.293
4.220
2.856
4.827
6.232
1.000
1.285

1e-d$_2$

^{2}H NMR, $CDCl_3$, 107 MHz



^{1}H NMR, $CDCl_3$, 700 MHz



1e-d$_2$

2e-d$_2$
~22% yield