

HFIP solvent enables alcohols to act as alkylating agents in stereoselective heterocyclization

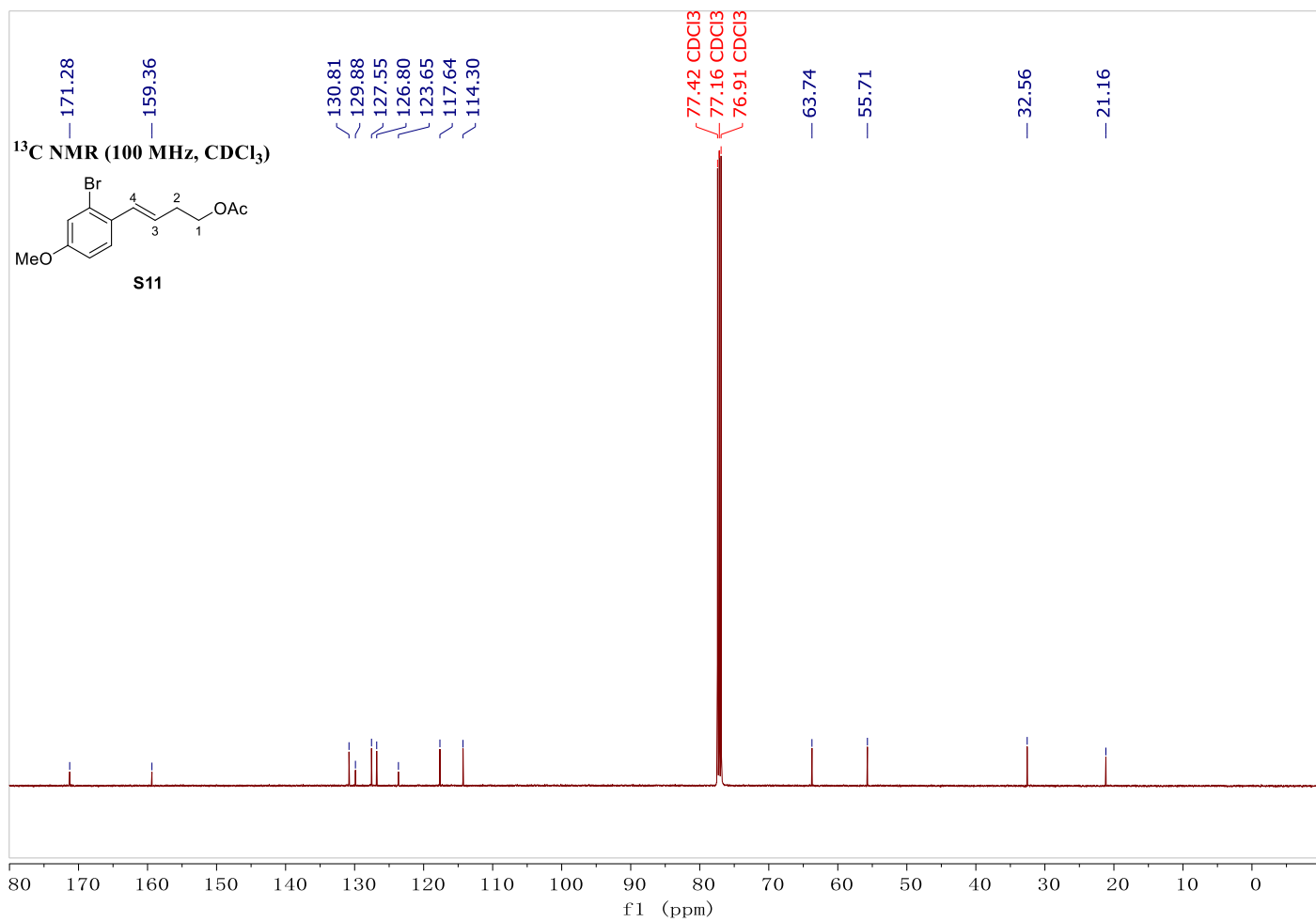
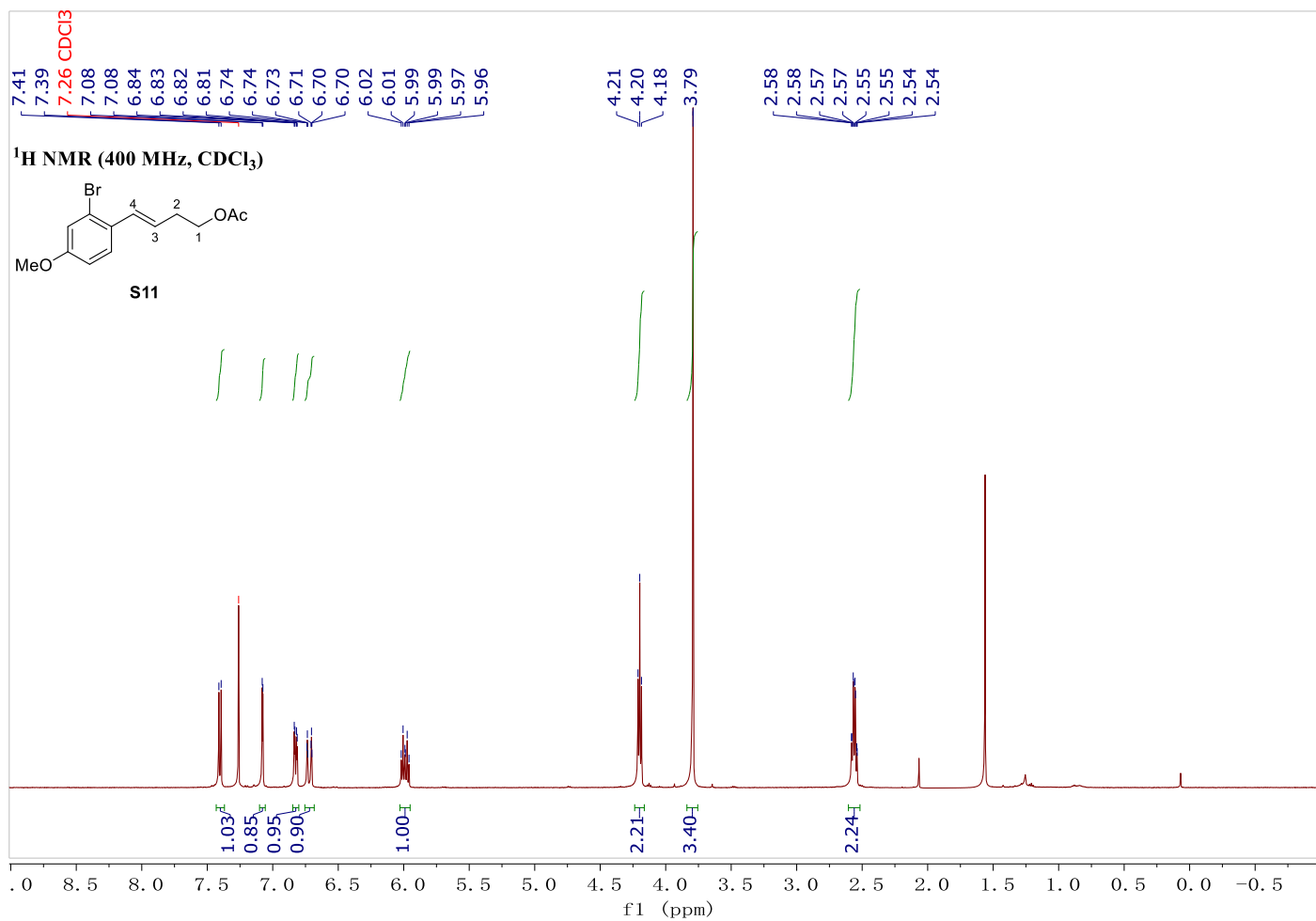
Yuxiang Zhu, Ignacio Colomer, Amber L. Thompson and Timothy J. Donohoe*

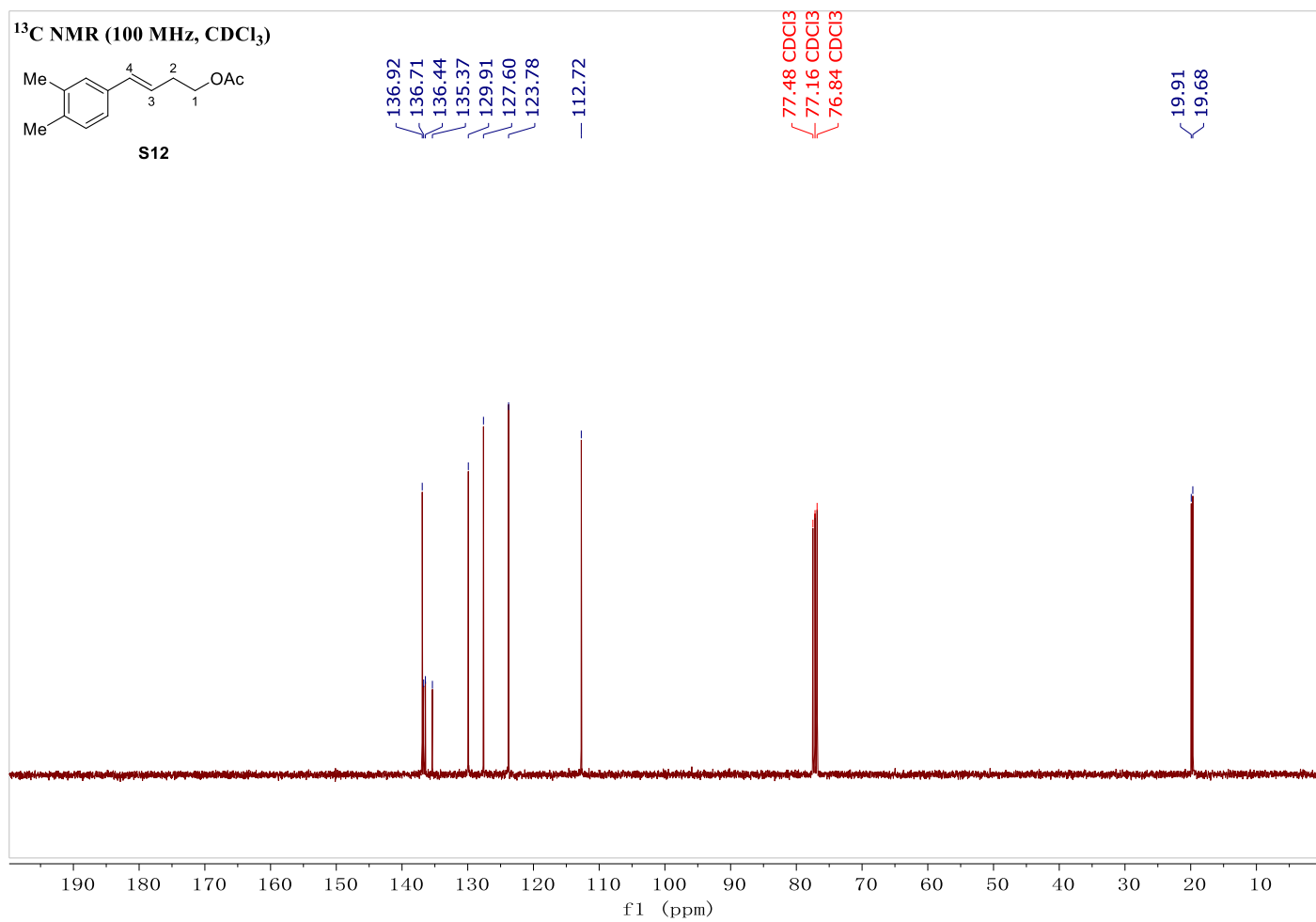
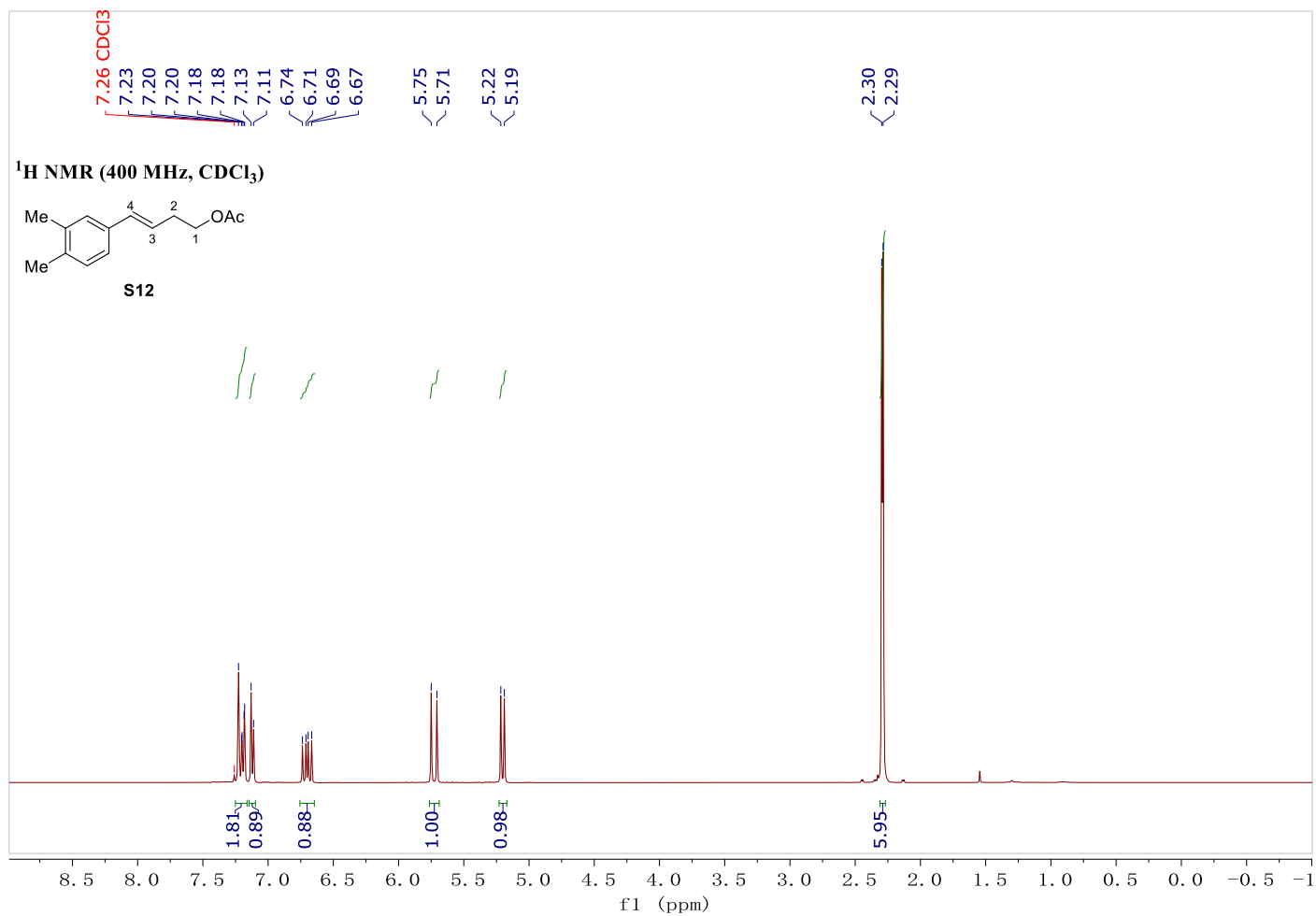
[*] Yuxiang Zhu, Dr I. Colomer, Amber L. Thompson and Prof. T. J. Donohoe,
Department of Chemistry,
University of Oxford,
Chemistry Research Laboratory,
Mansfield Road,
Oxford,
OX1 3TA (UK)
E-mail: timothy.donohoe@chem.ox.ac.uk

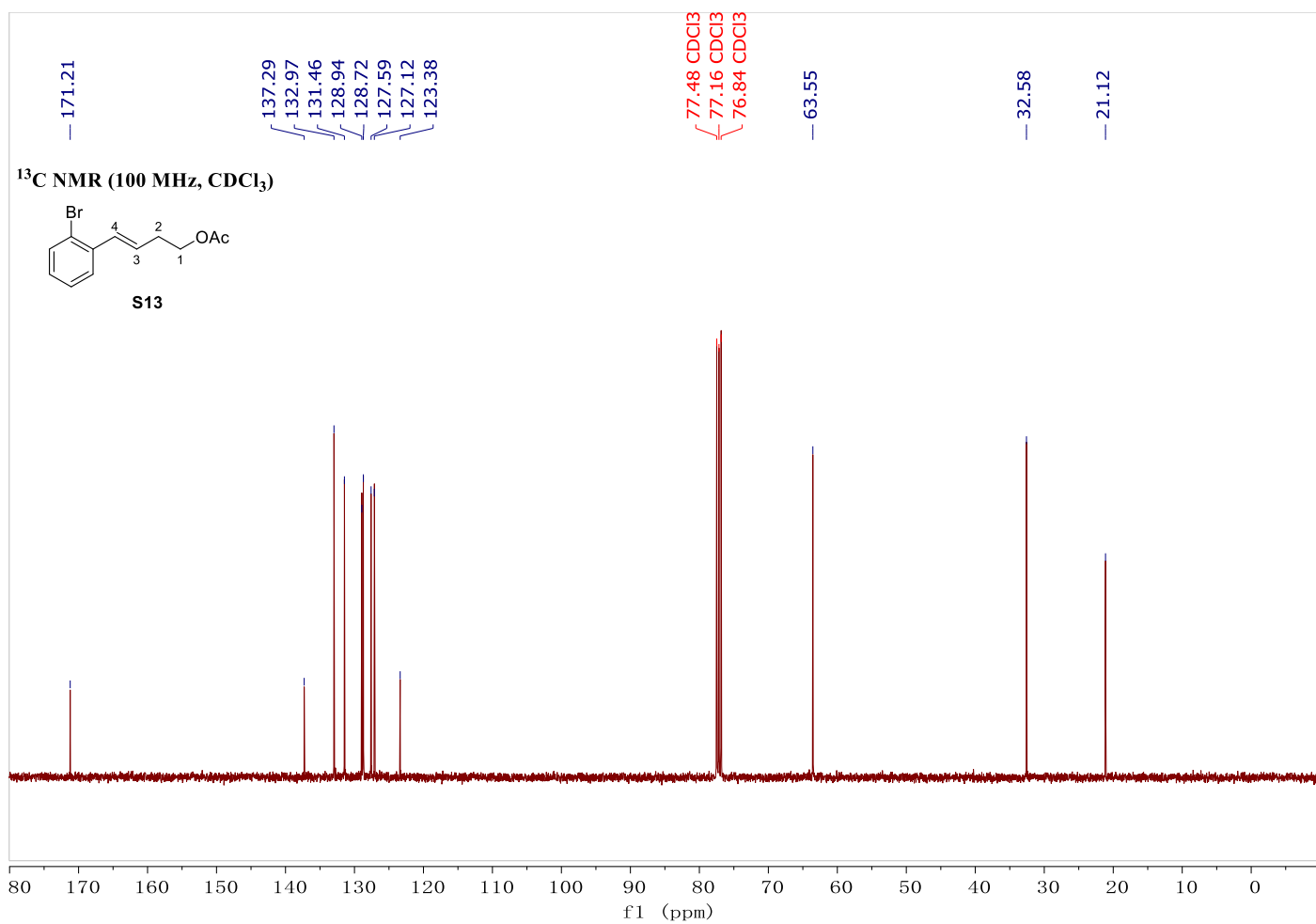
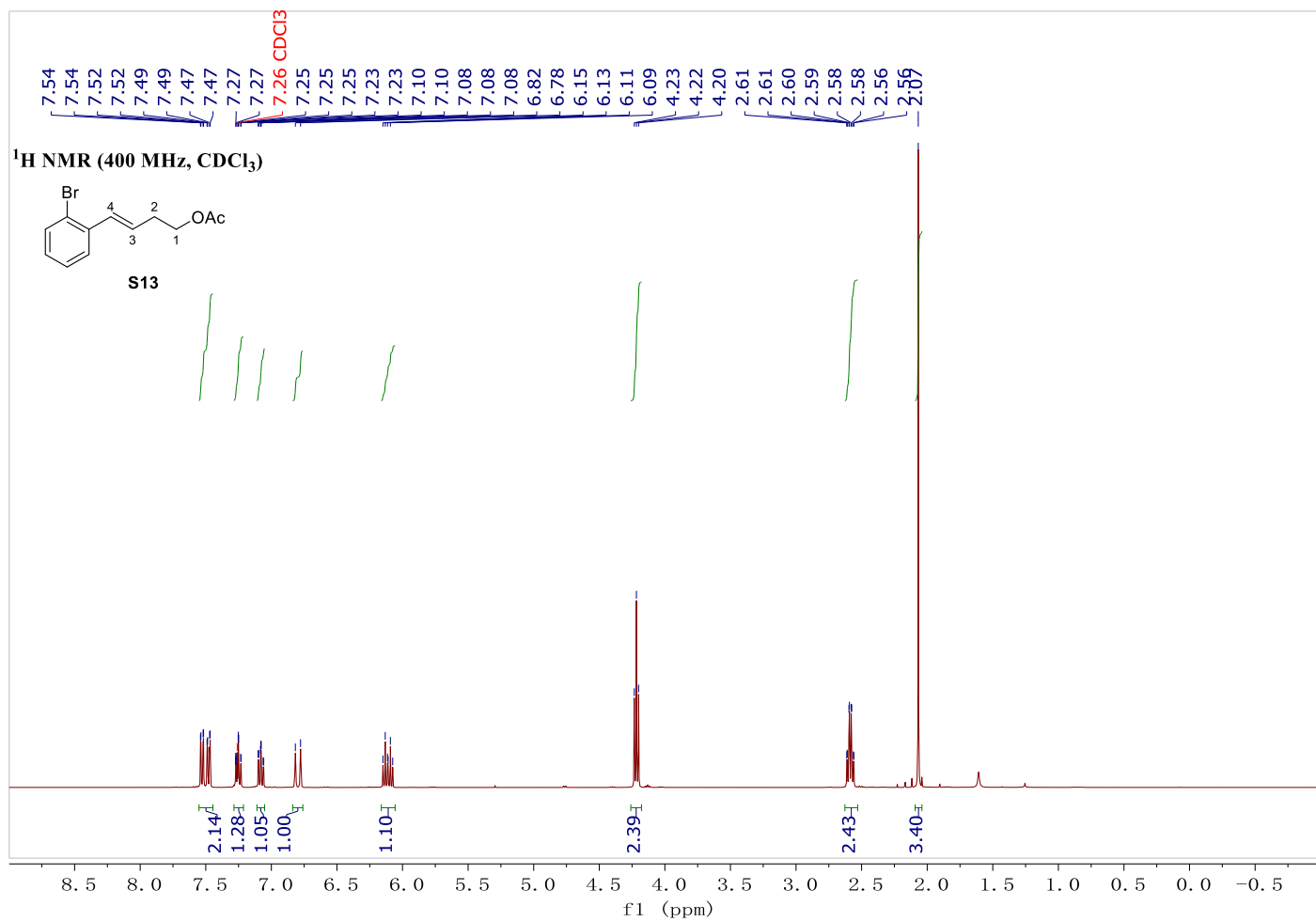
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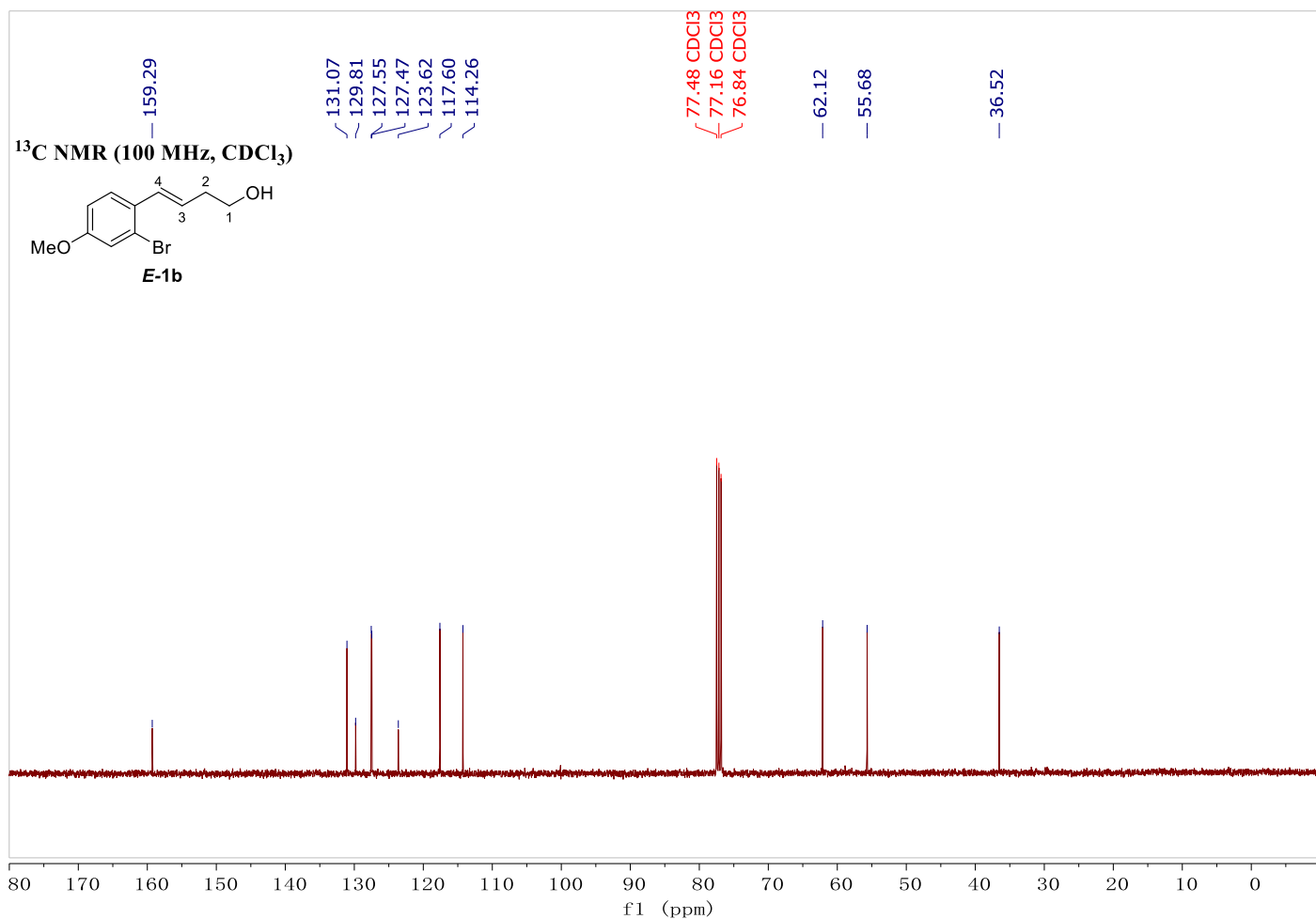
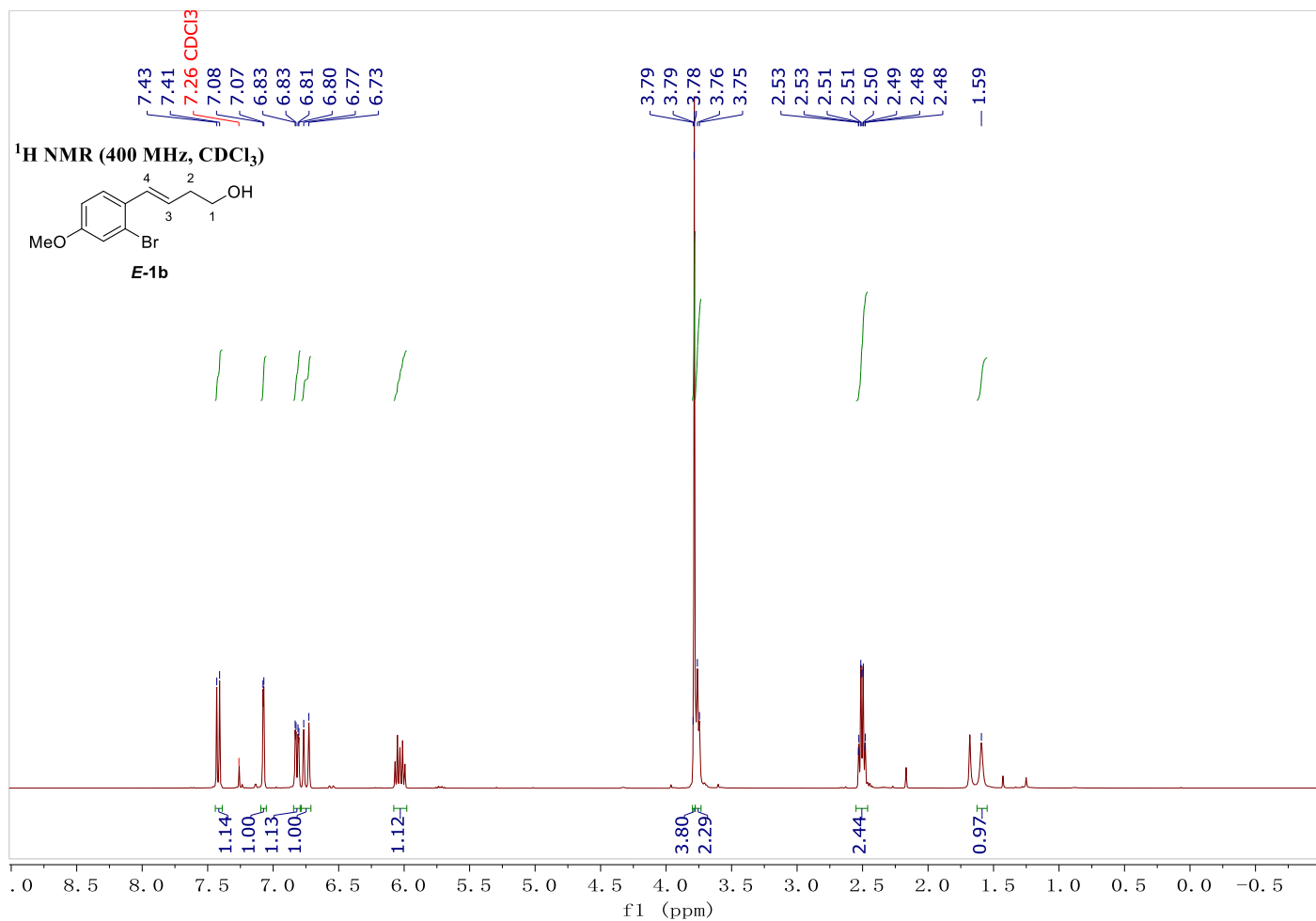
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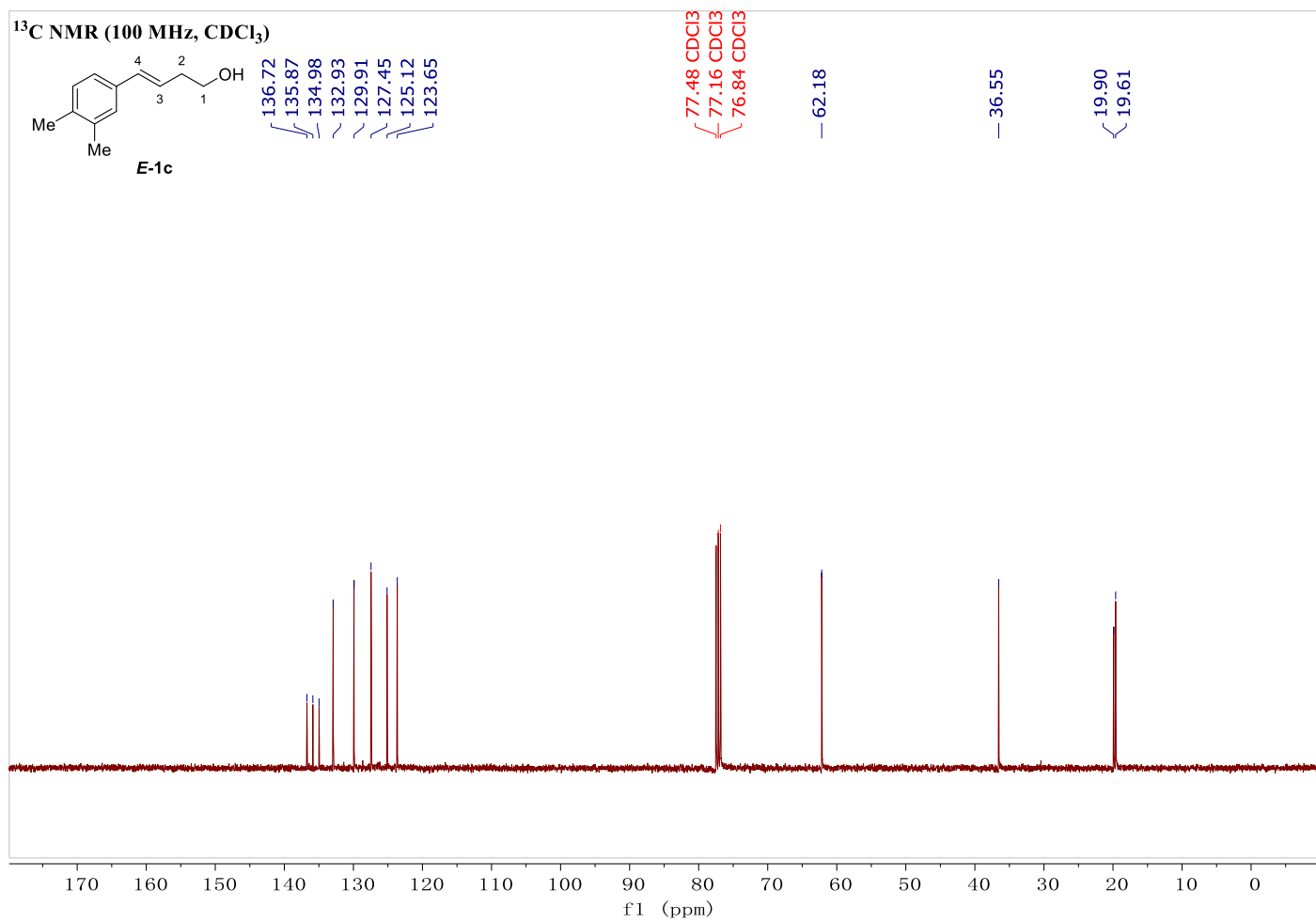
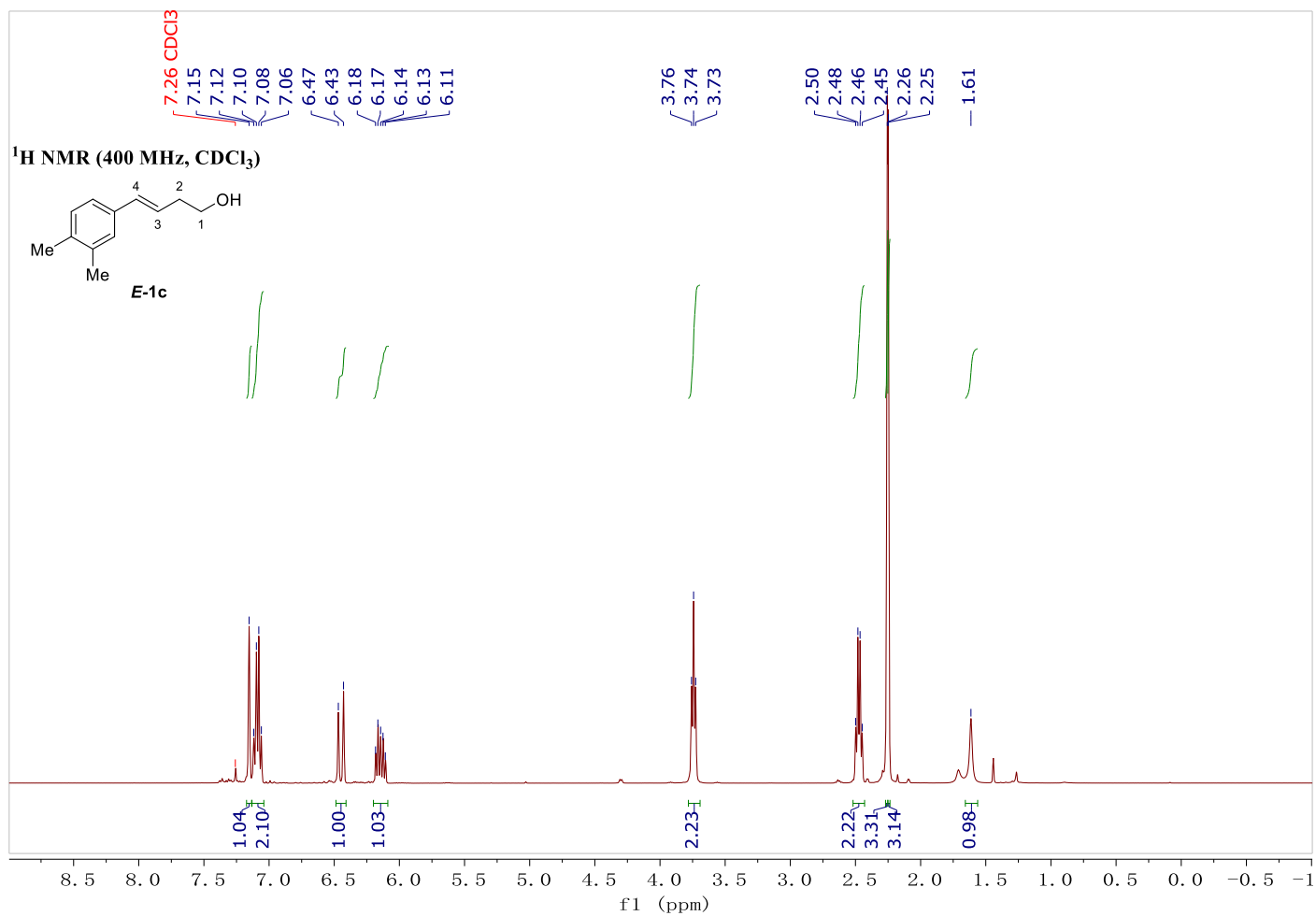
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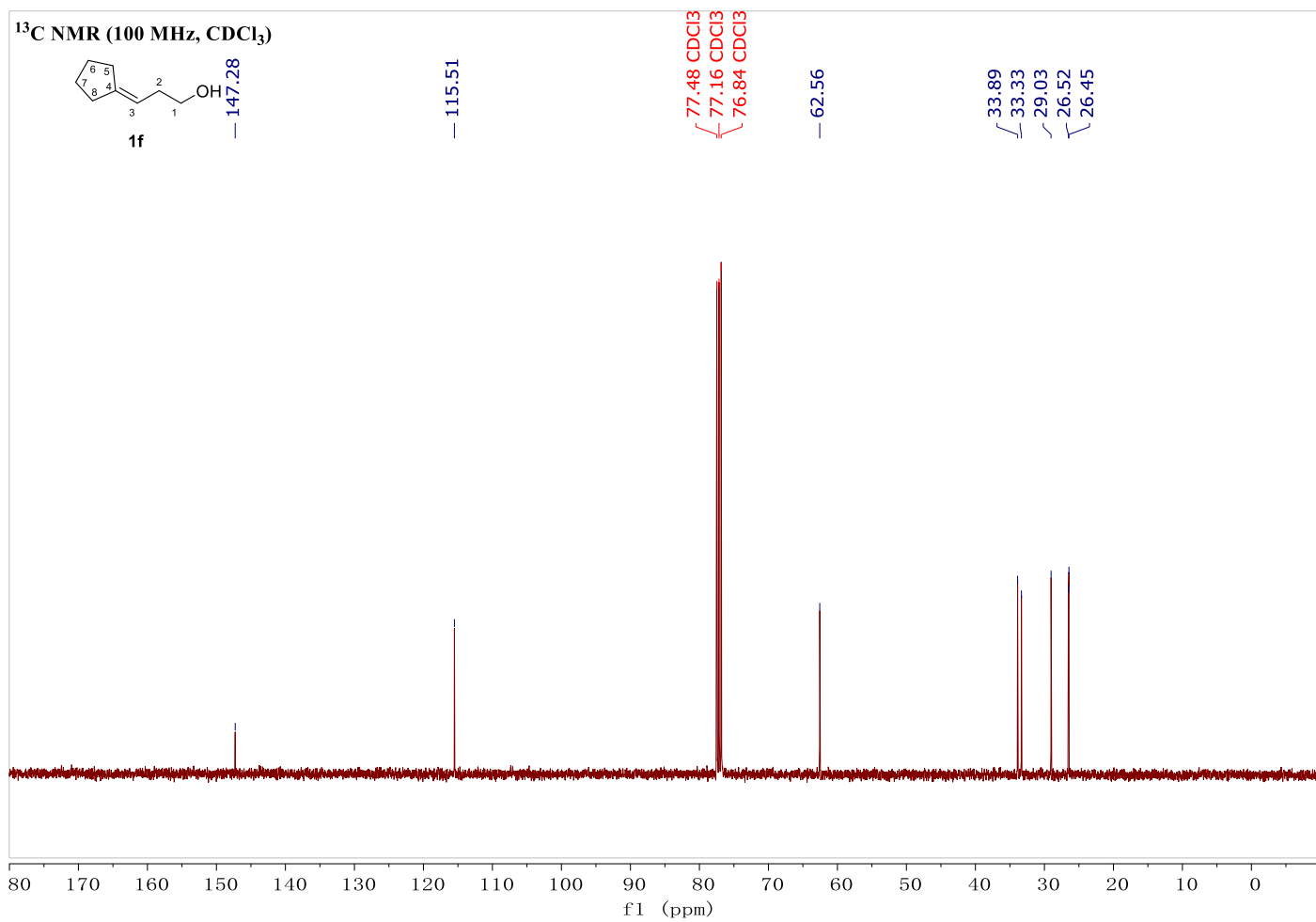
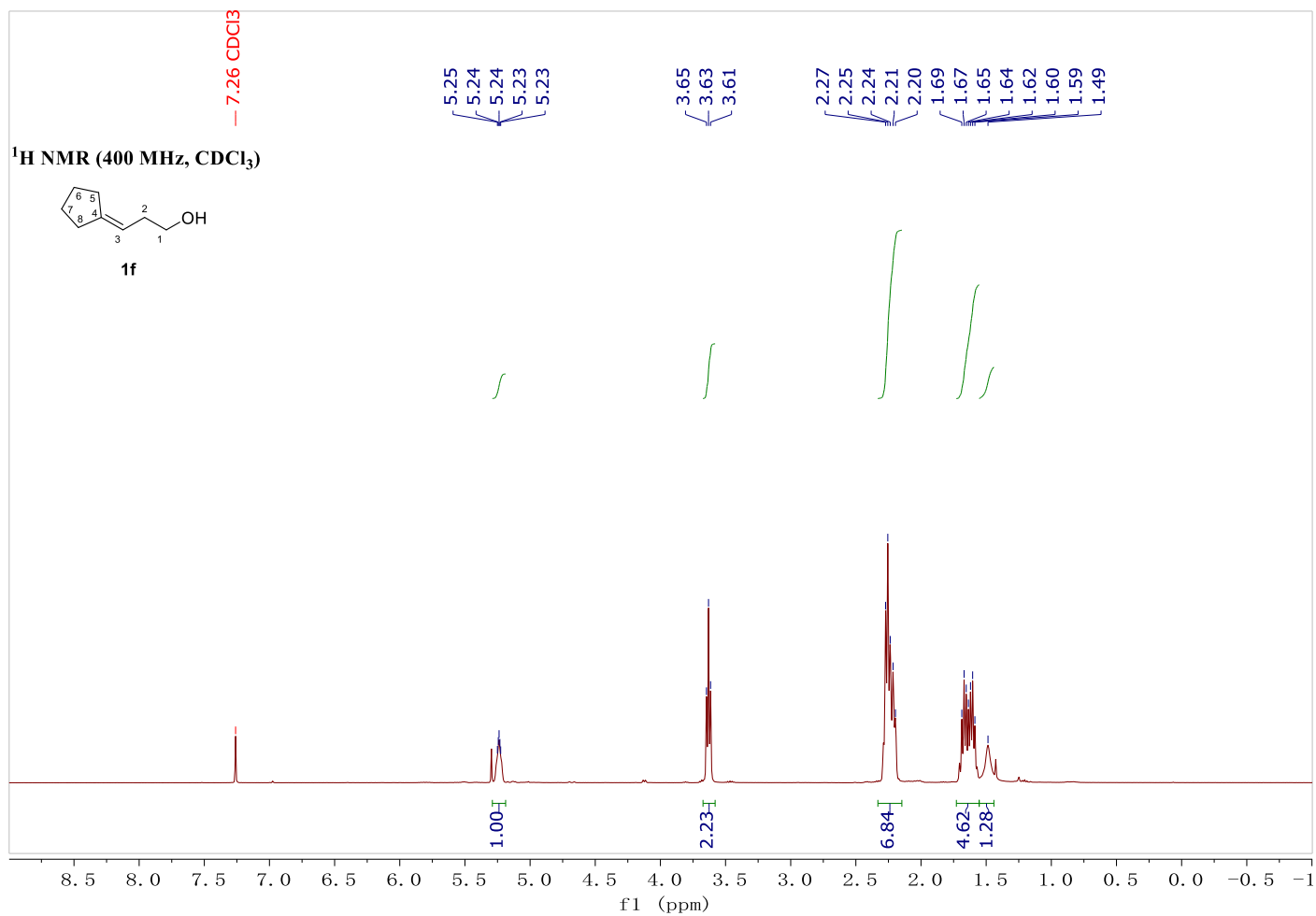


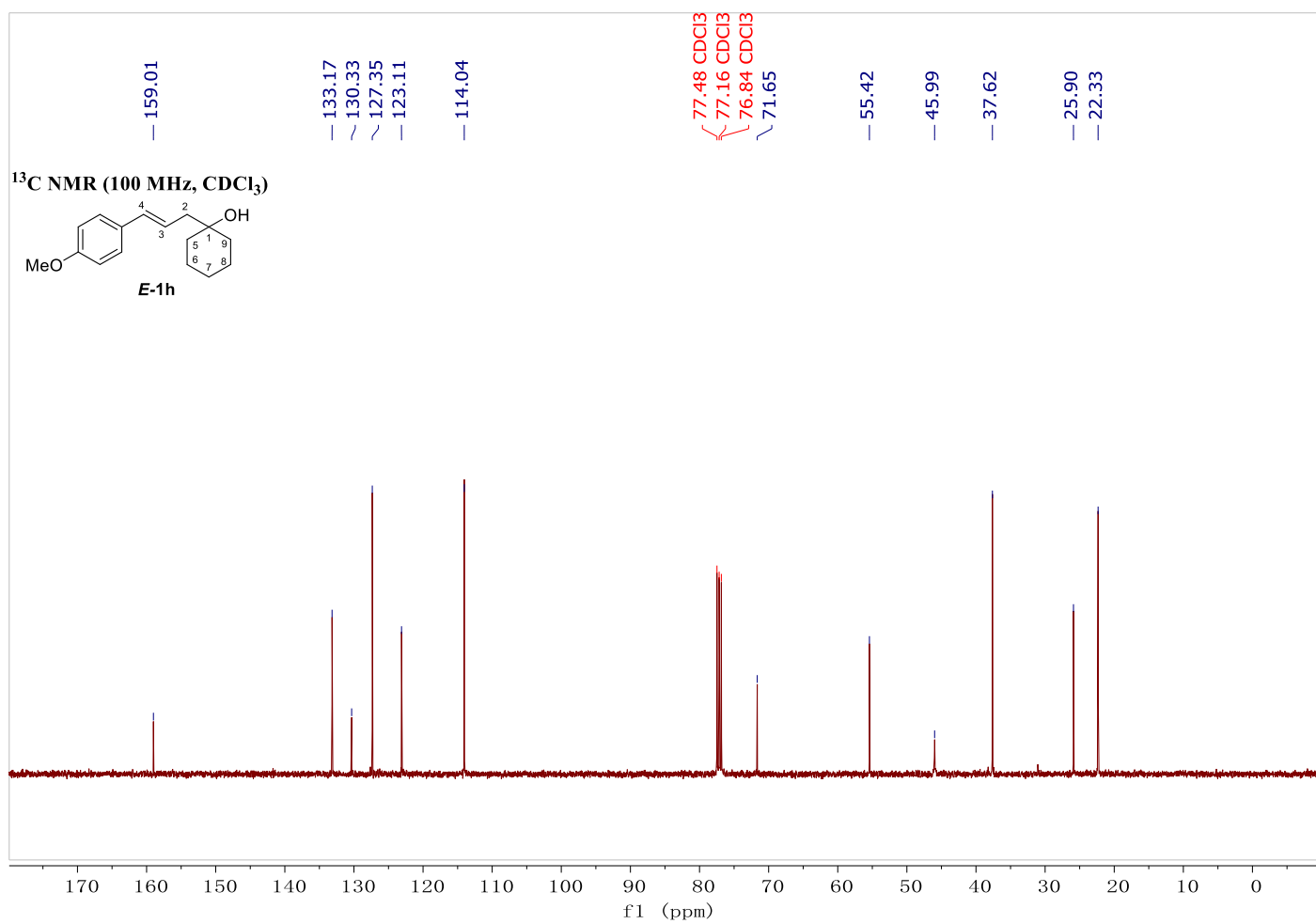
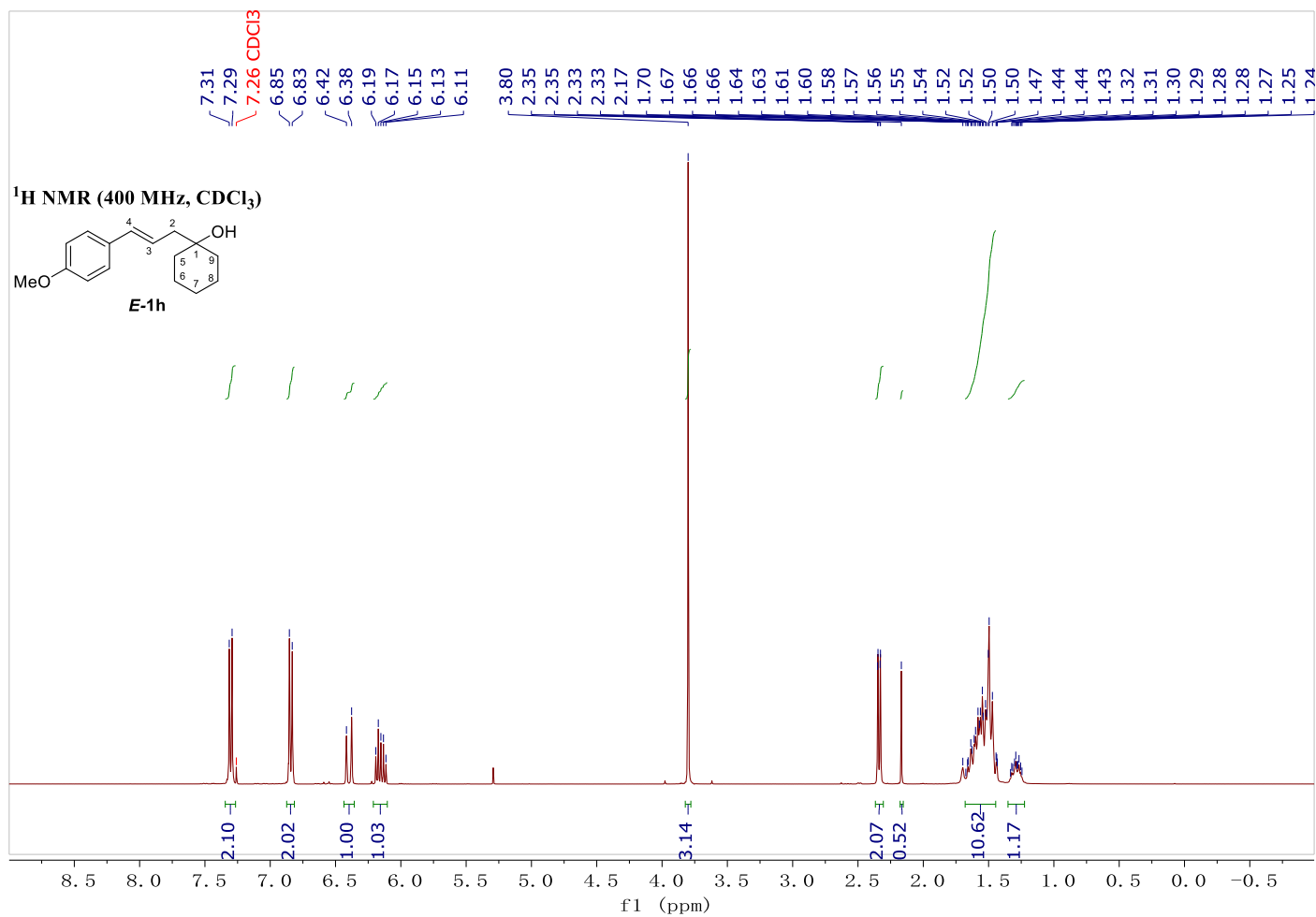


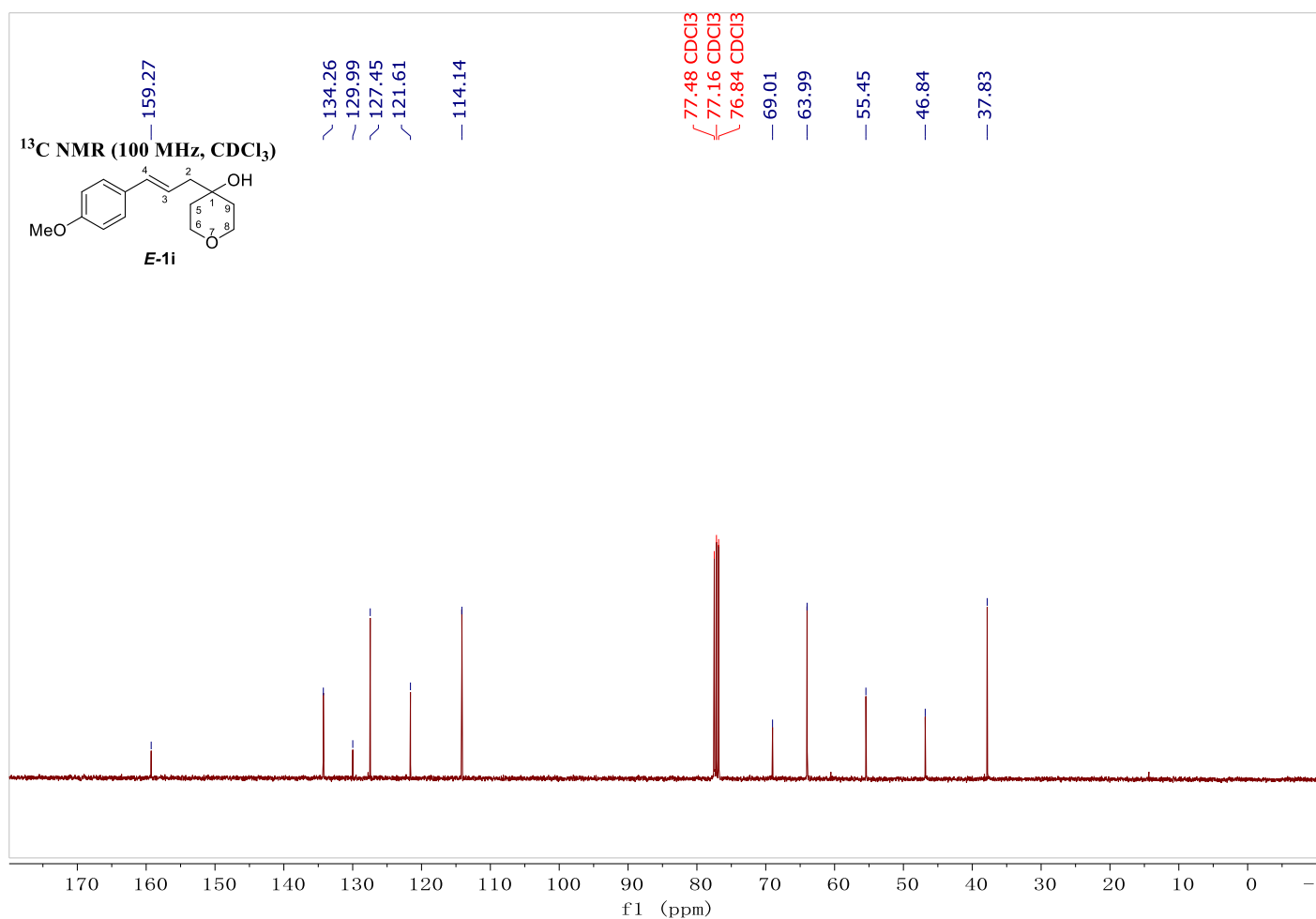
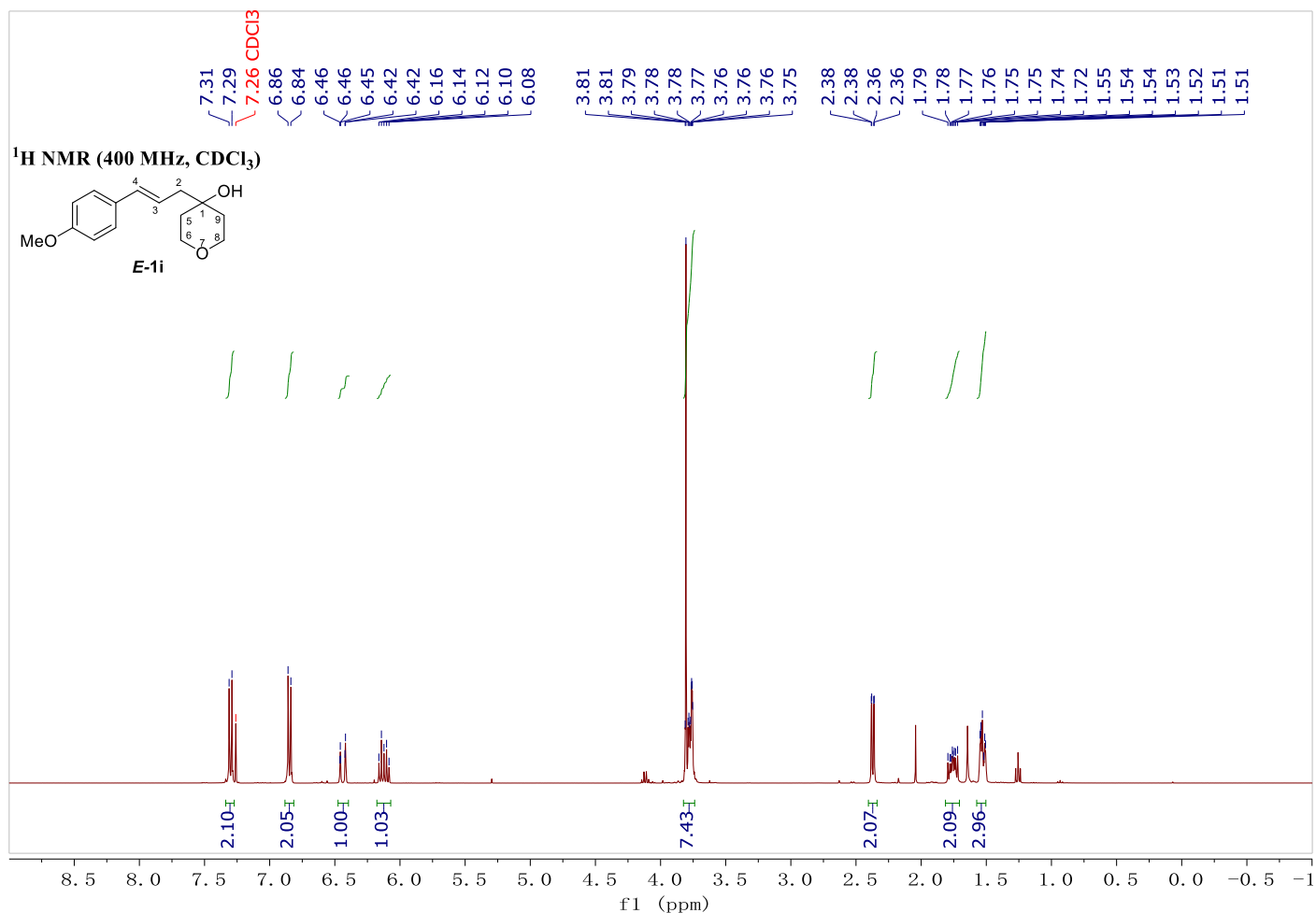


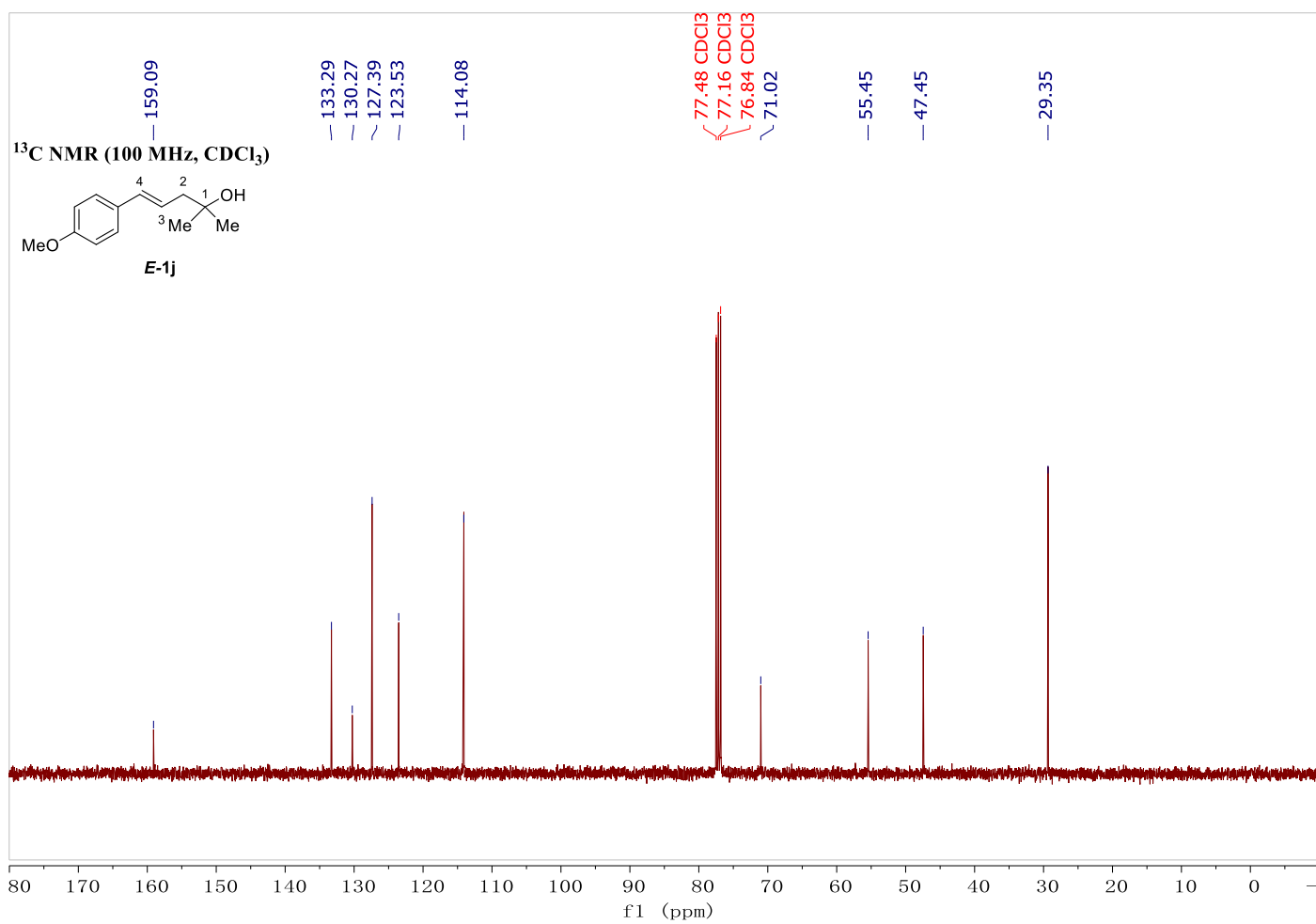
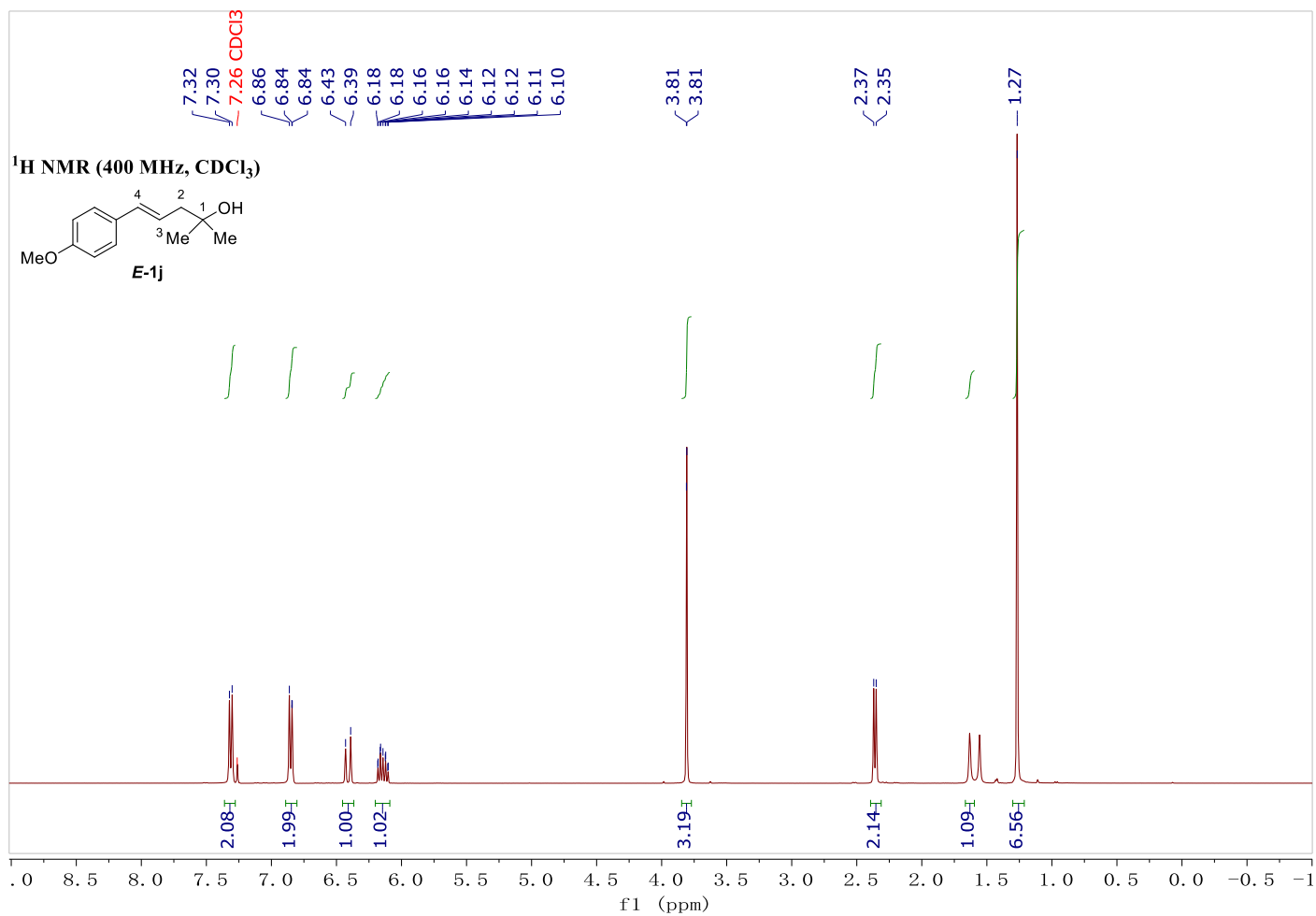


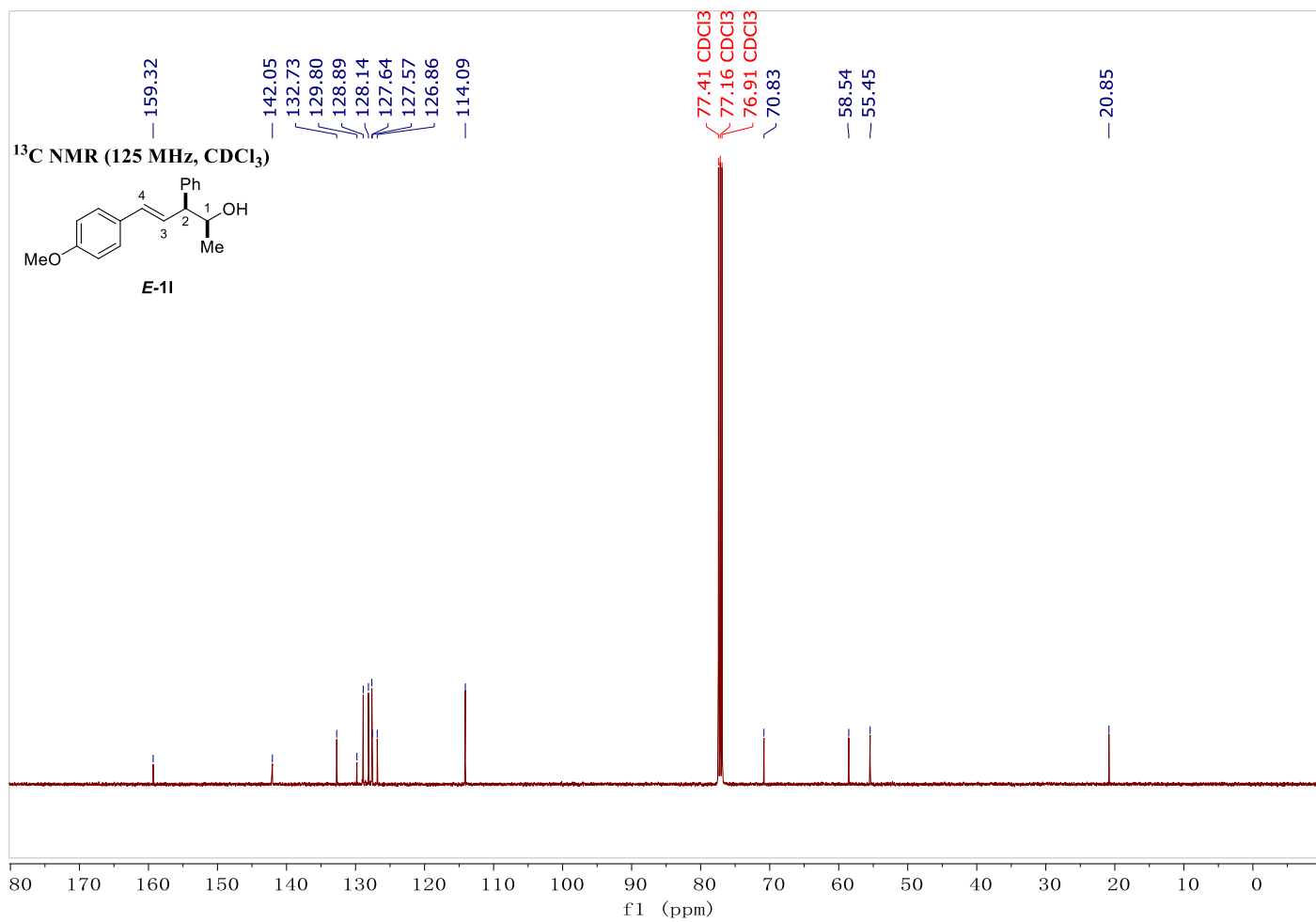
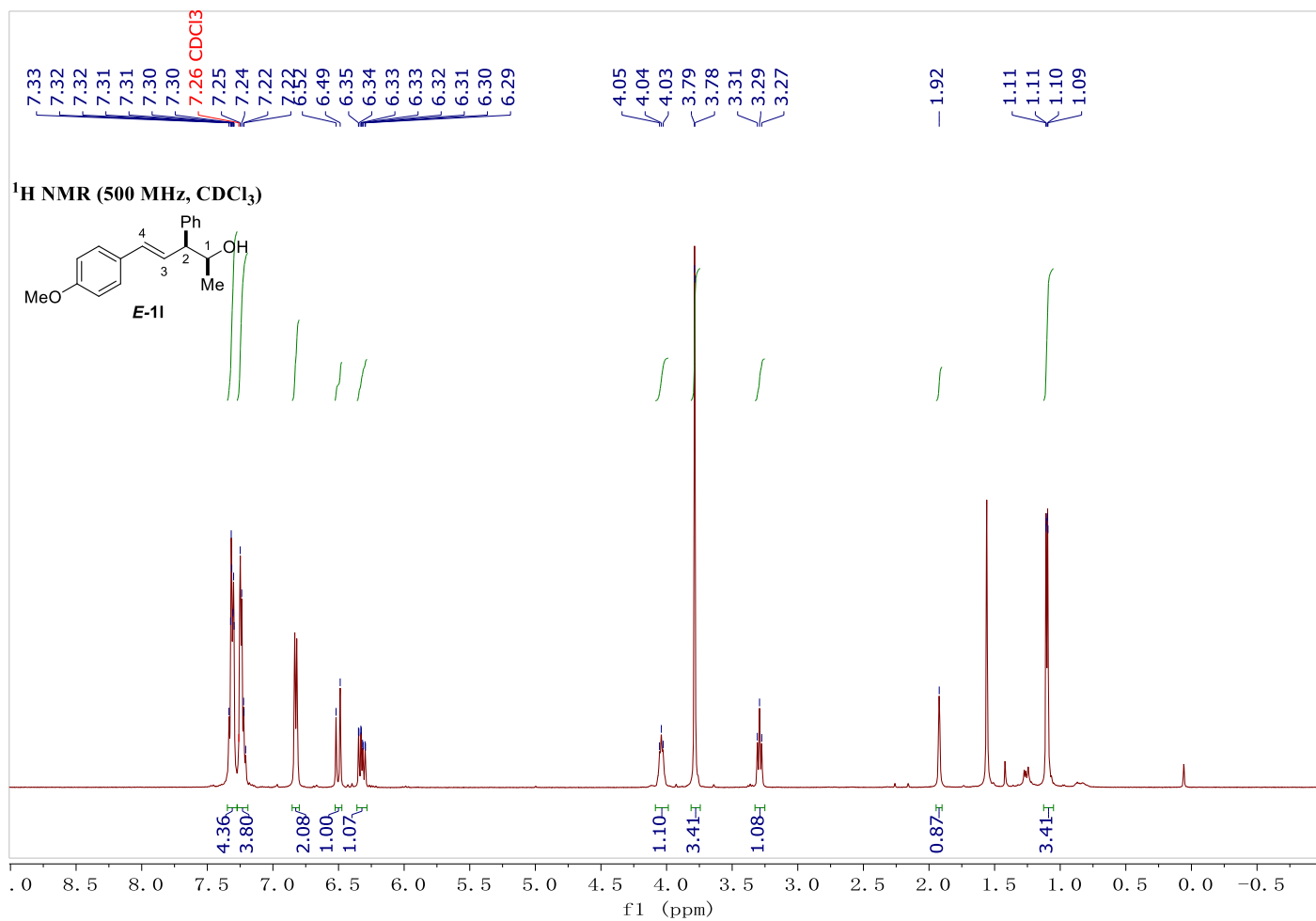


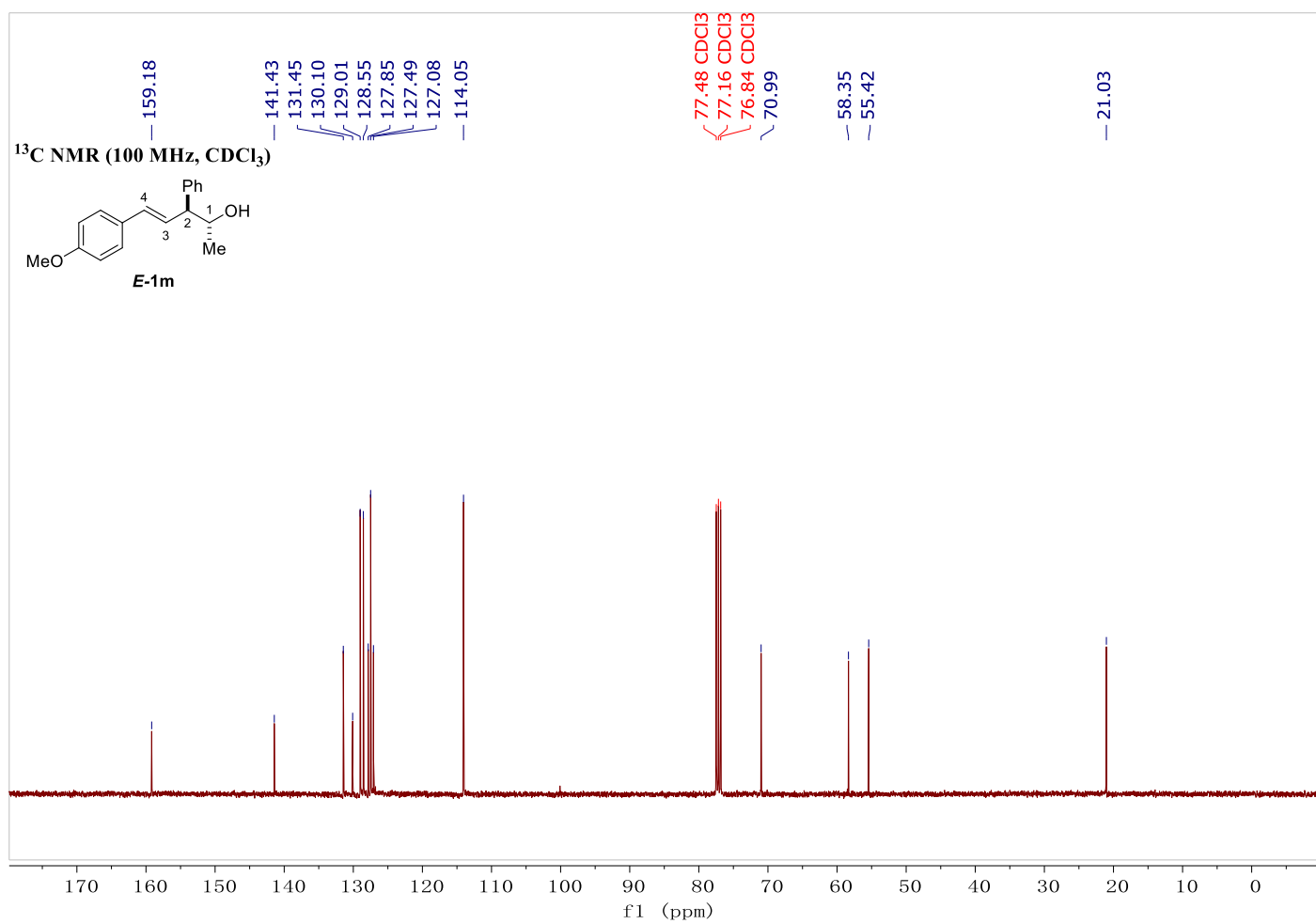
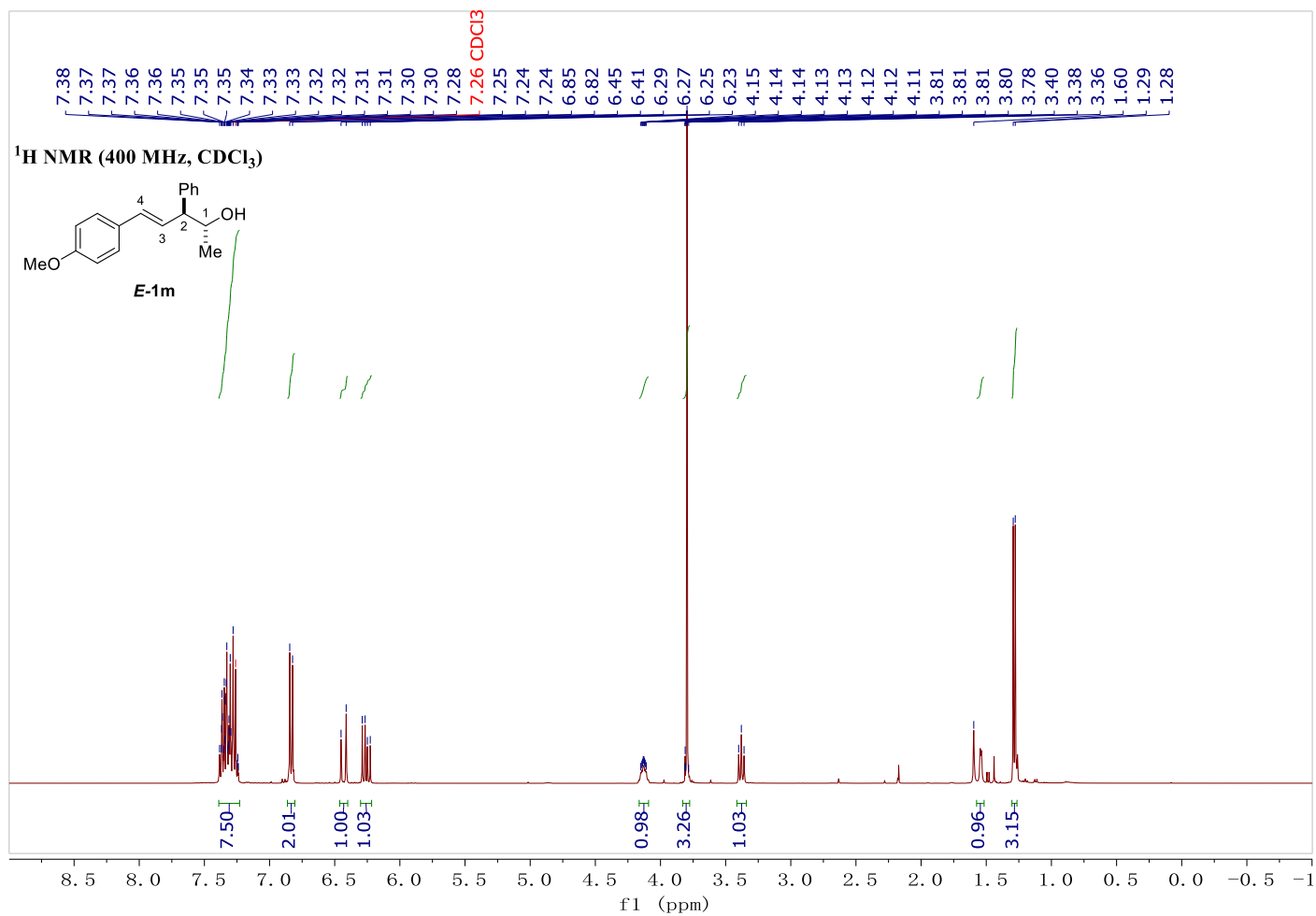


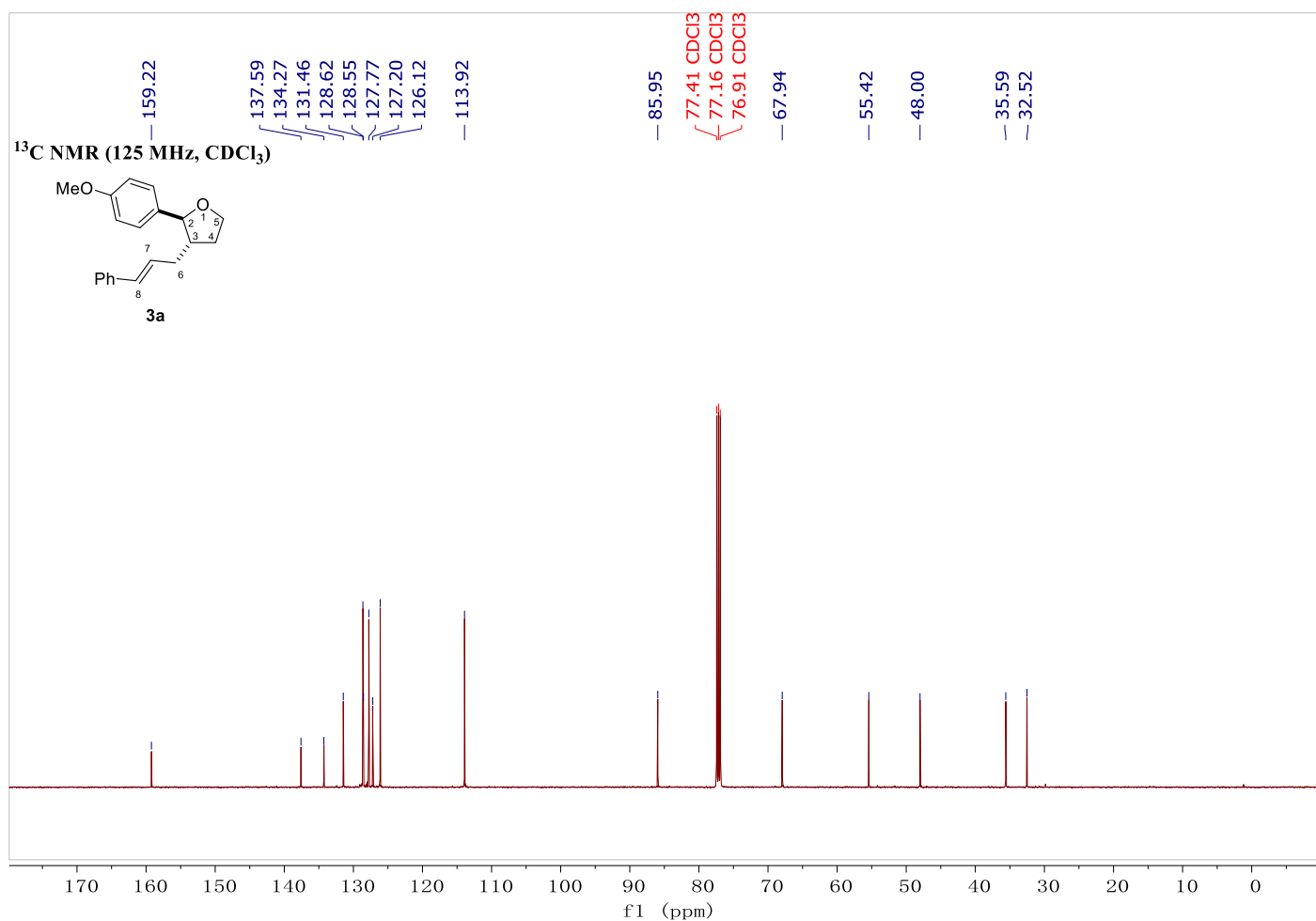
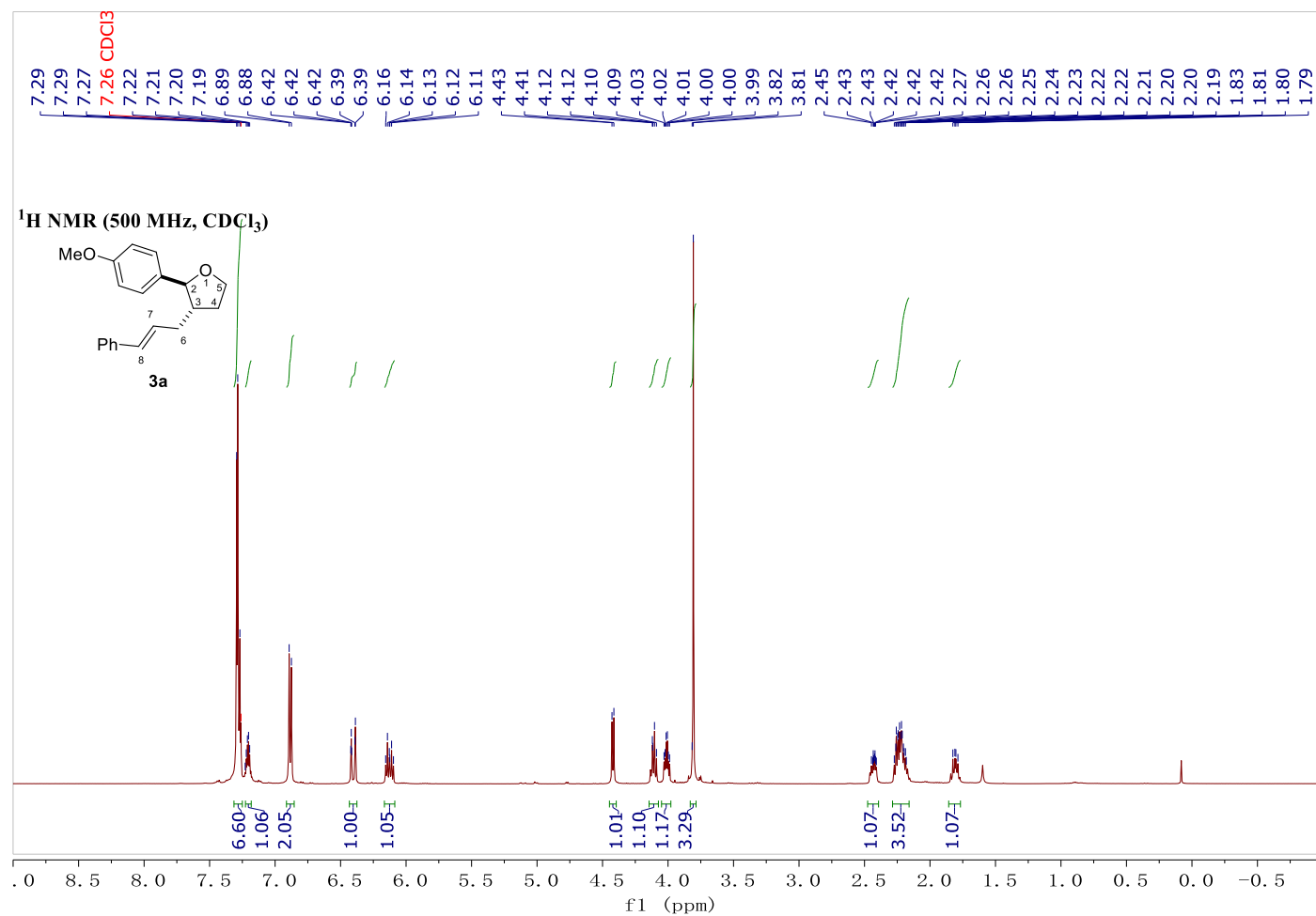


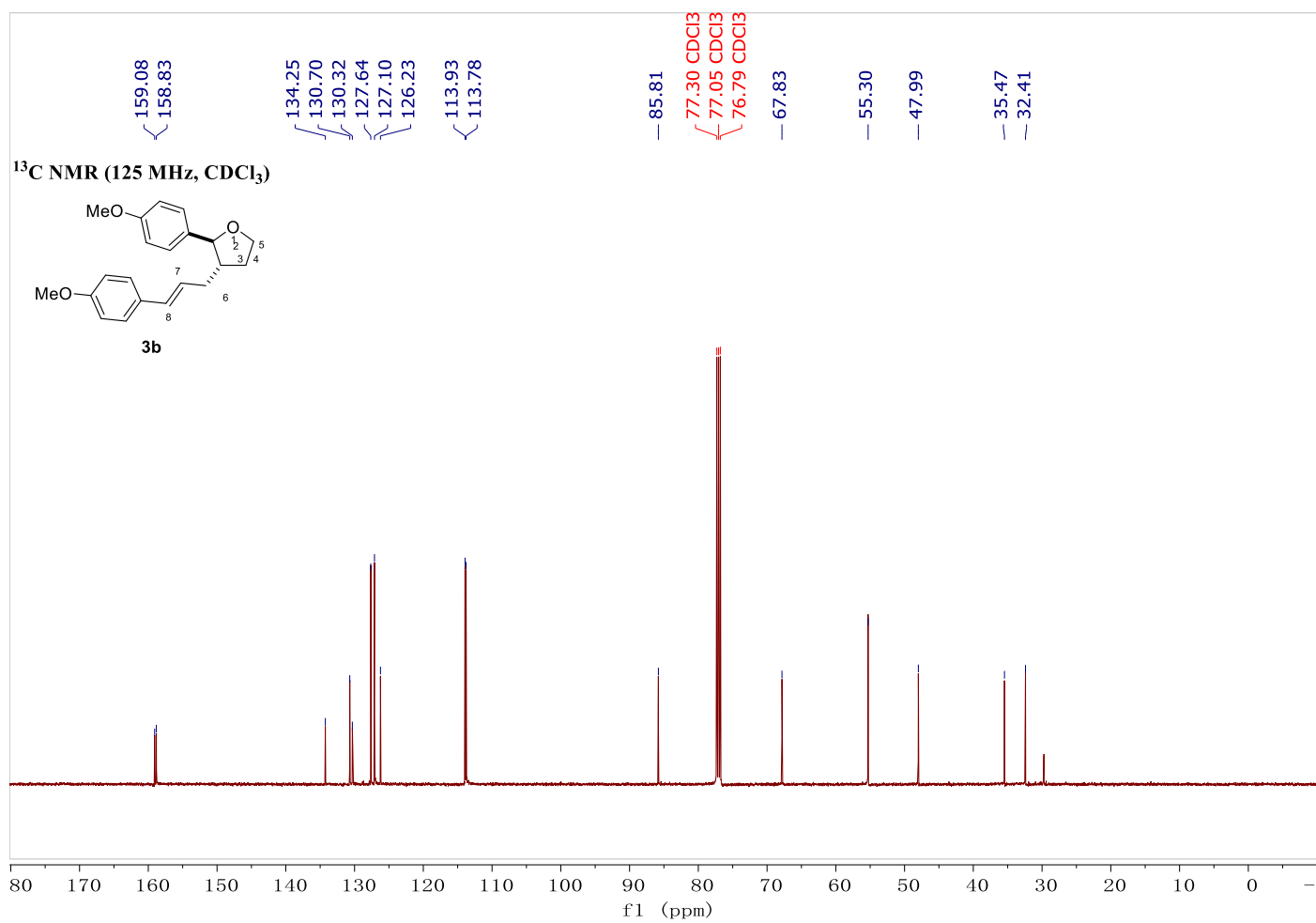
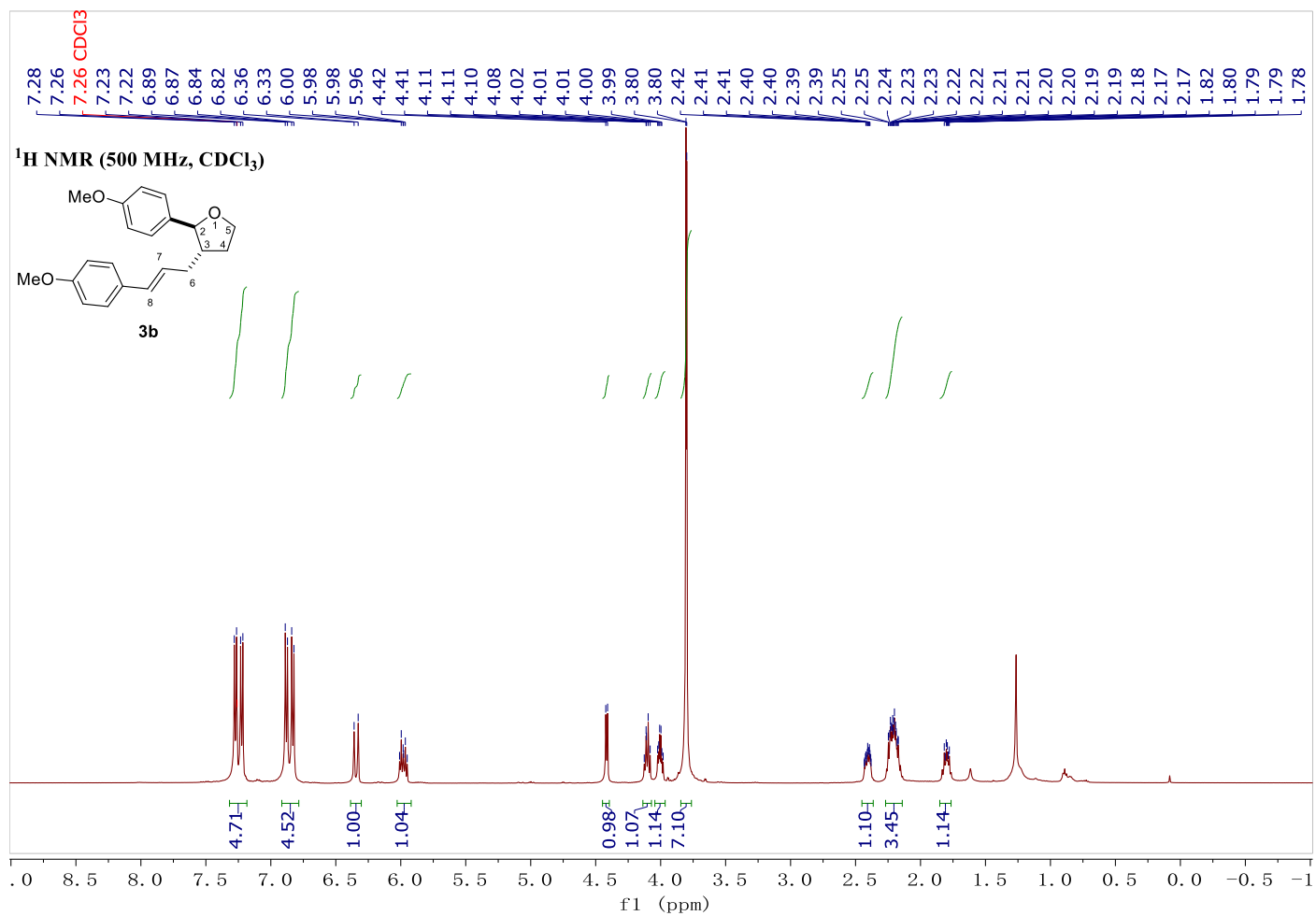




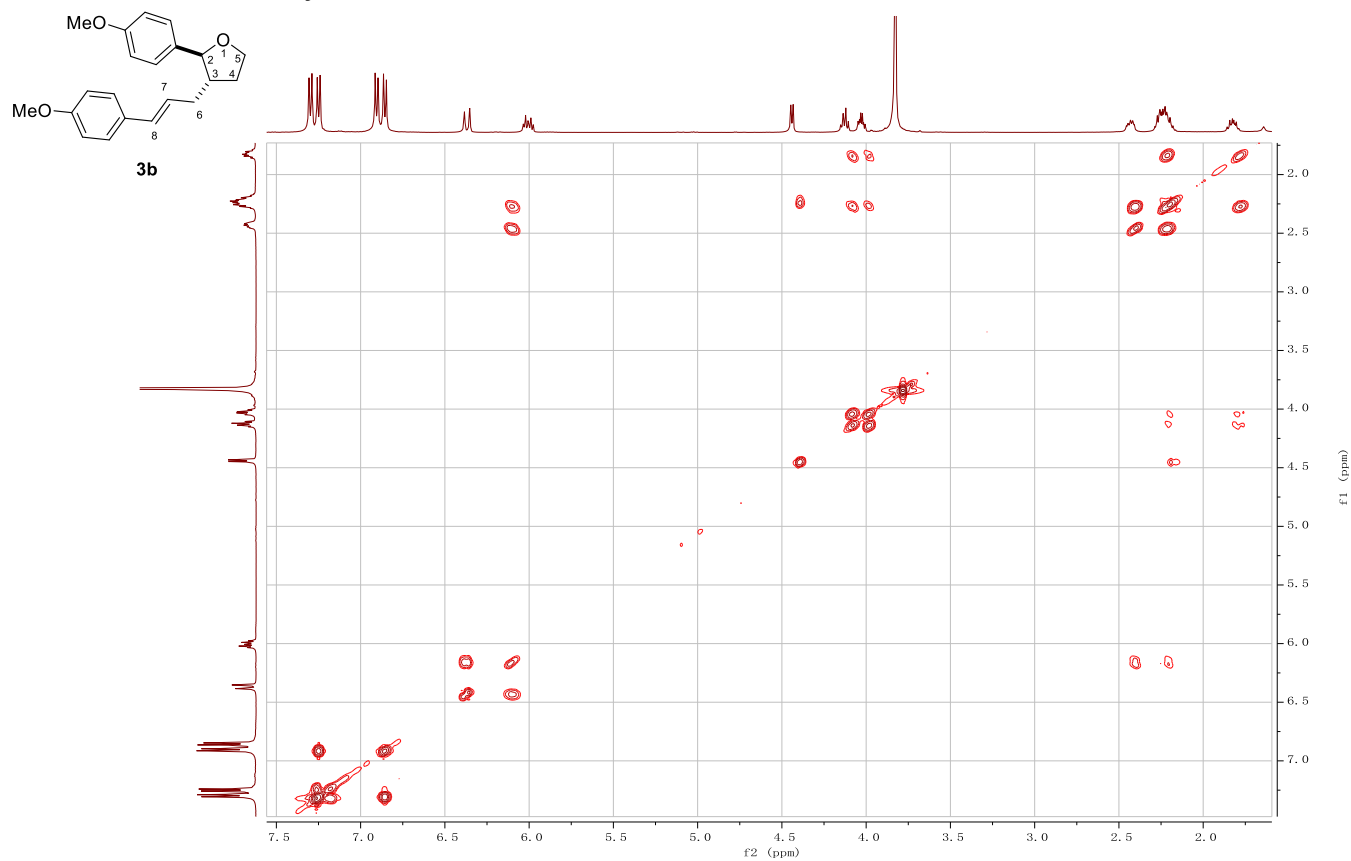




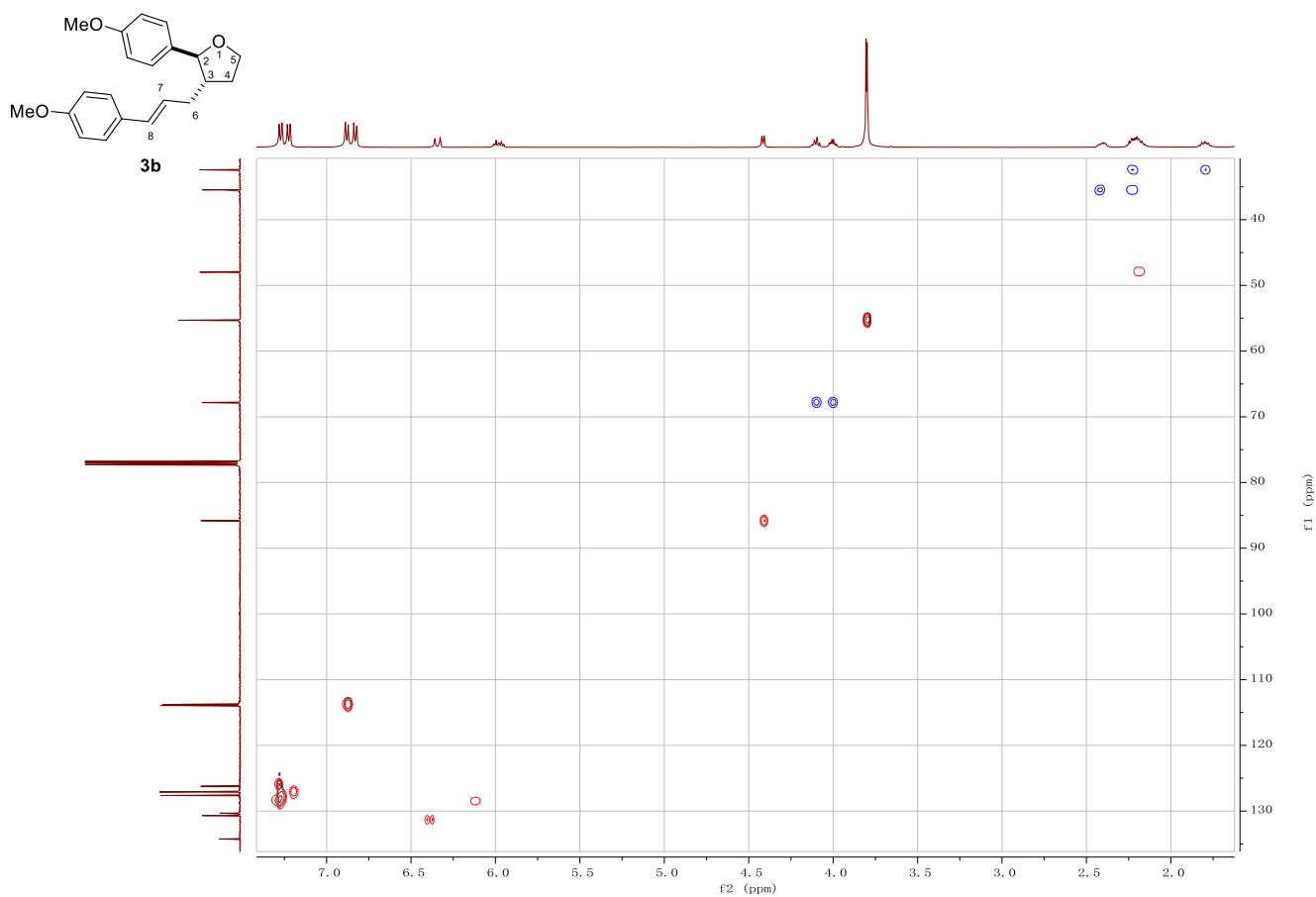




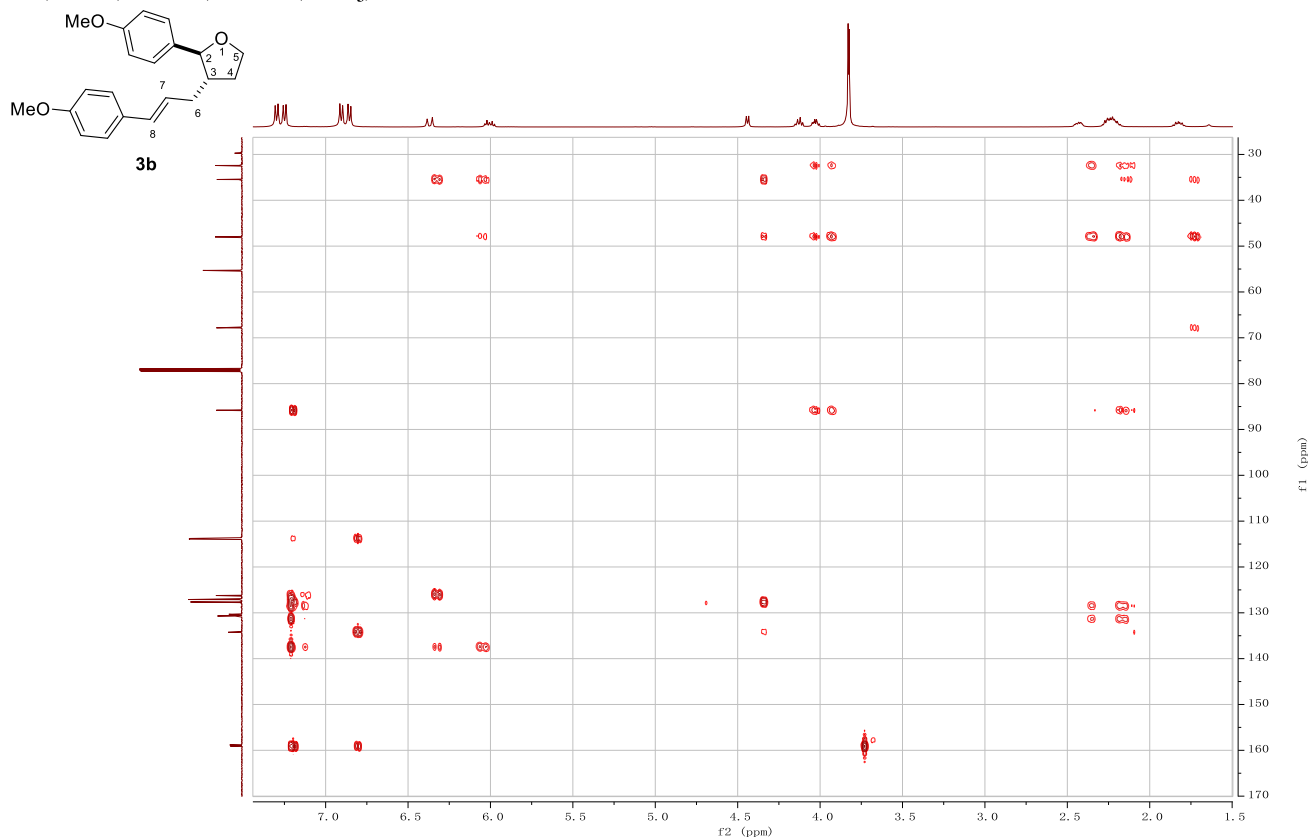
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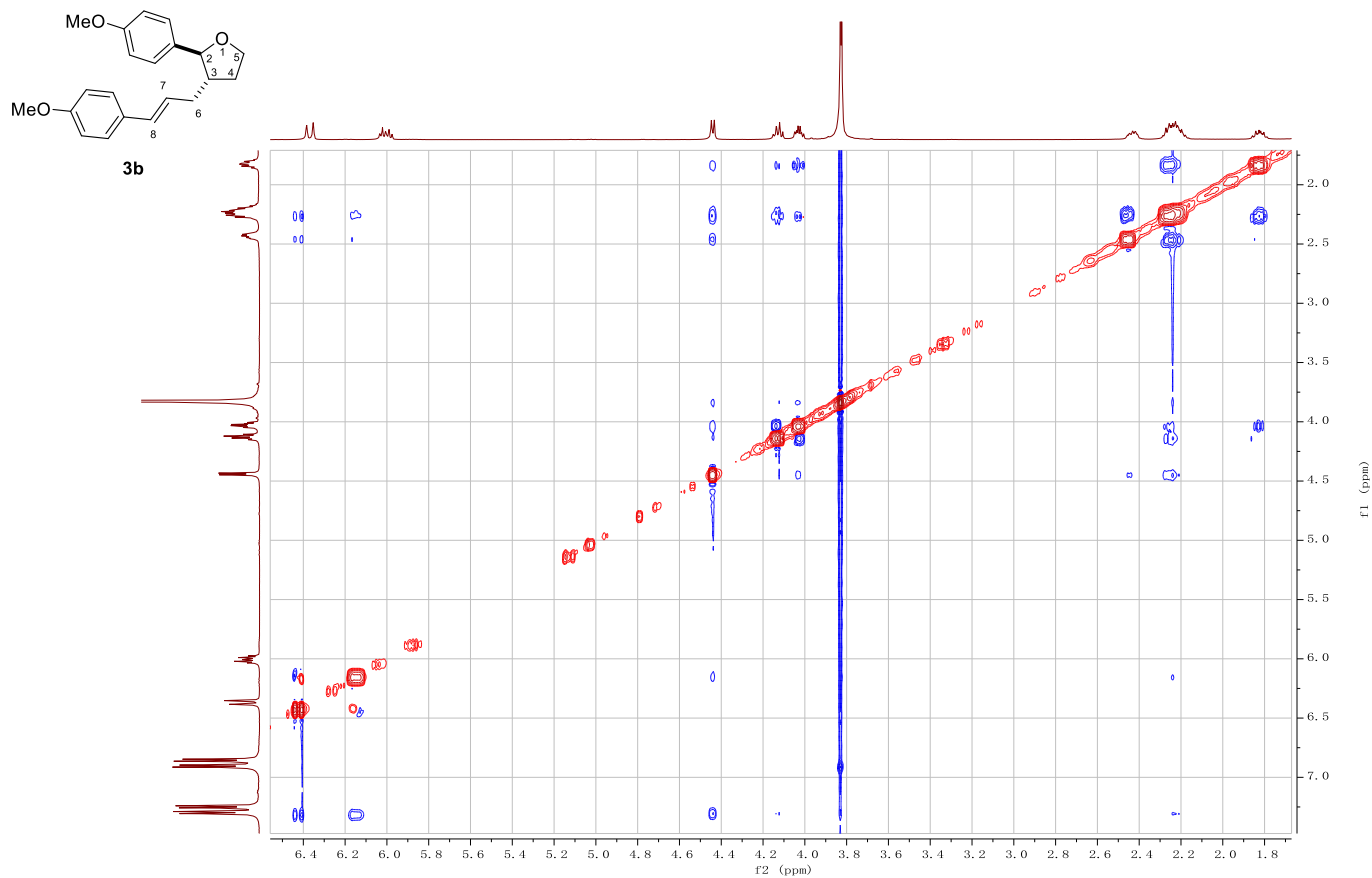
^1H (500 MHz) - ^{13}C (125 MHz) HSQC (CDCl_3)

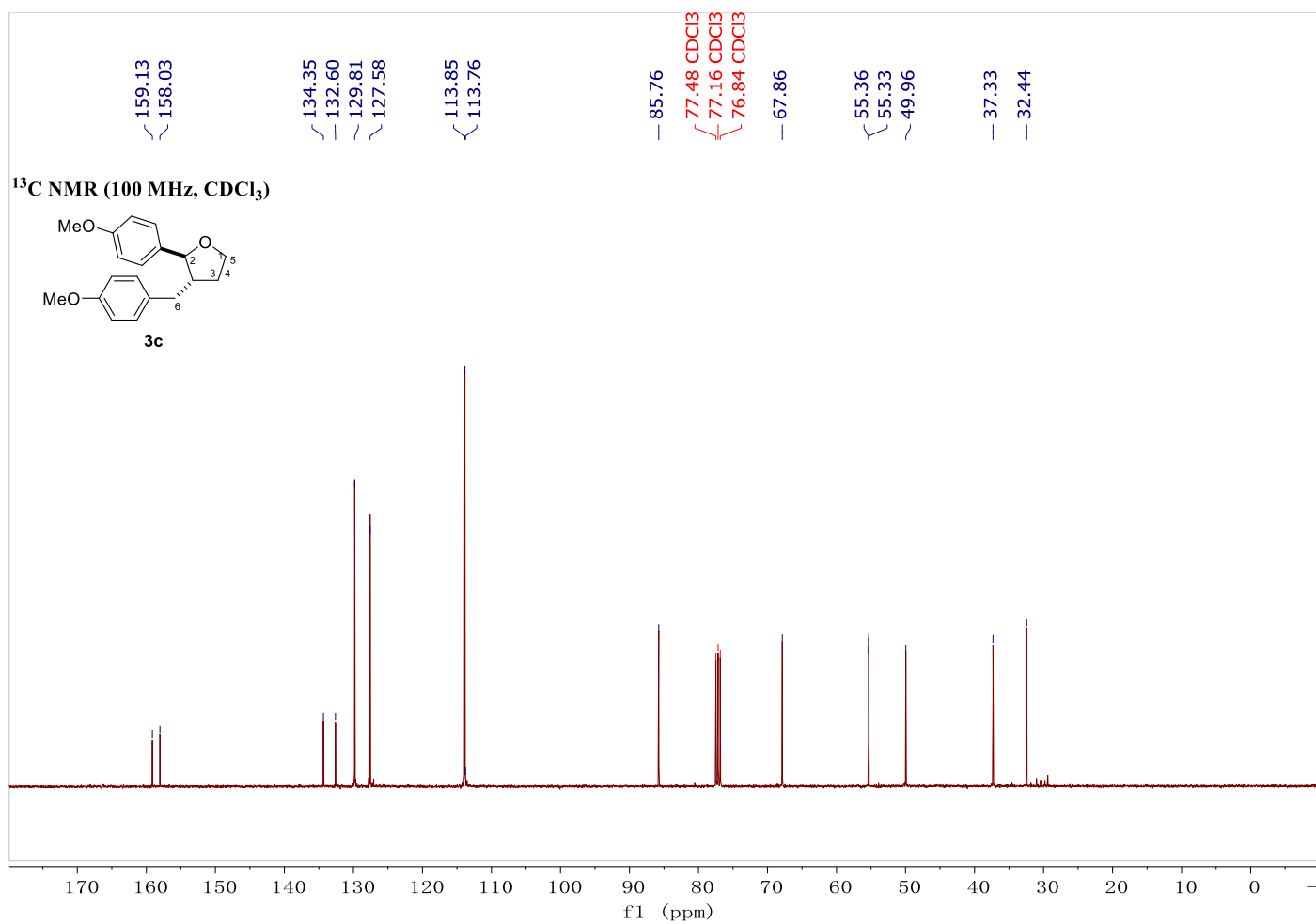
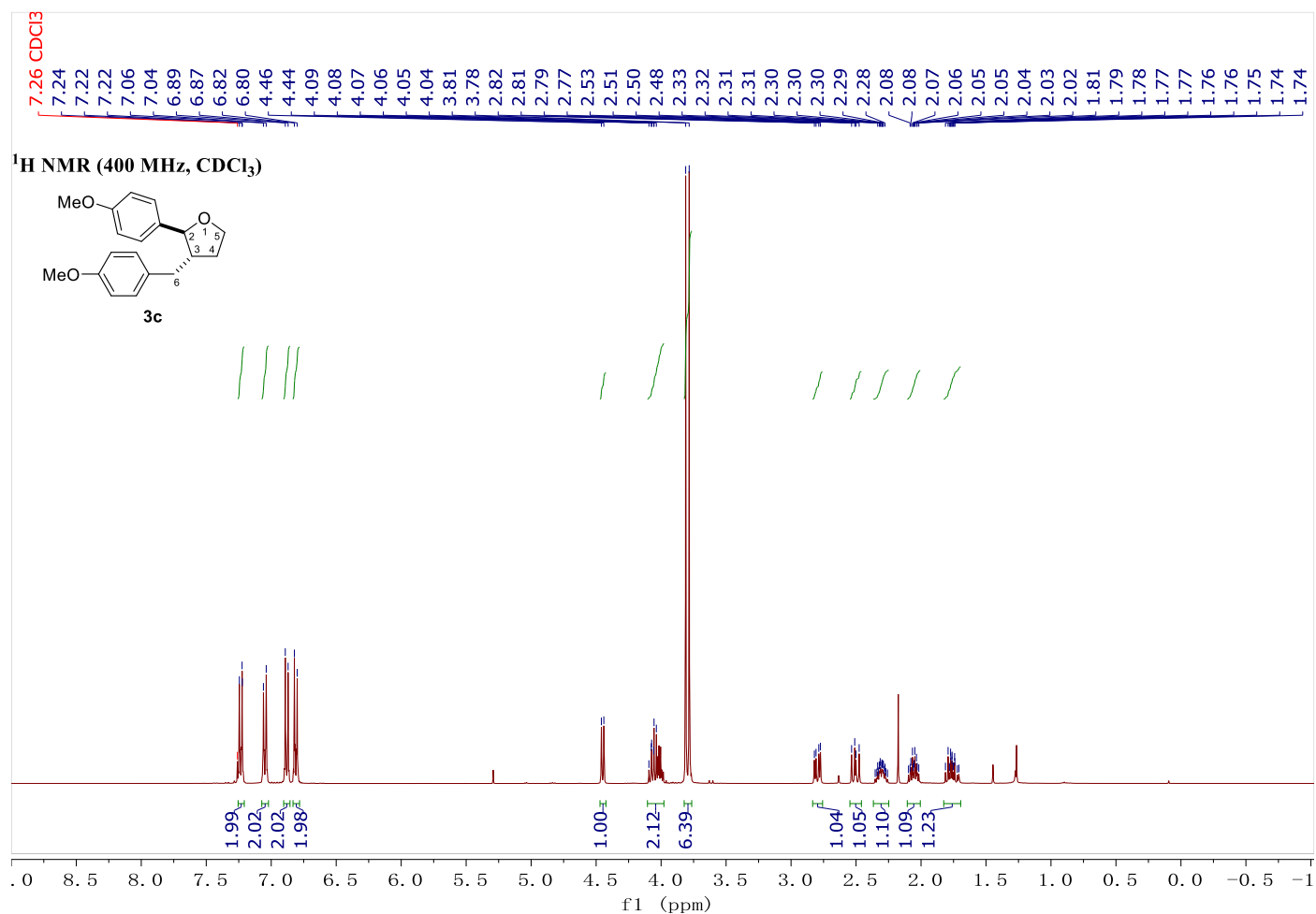


^1H (500 MHz) - ^{13}C (125 MHz) HMBC (CDCl_3)

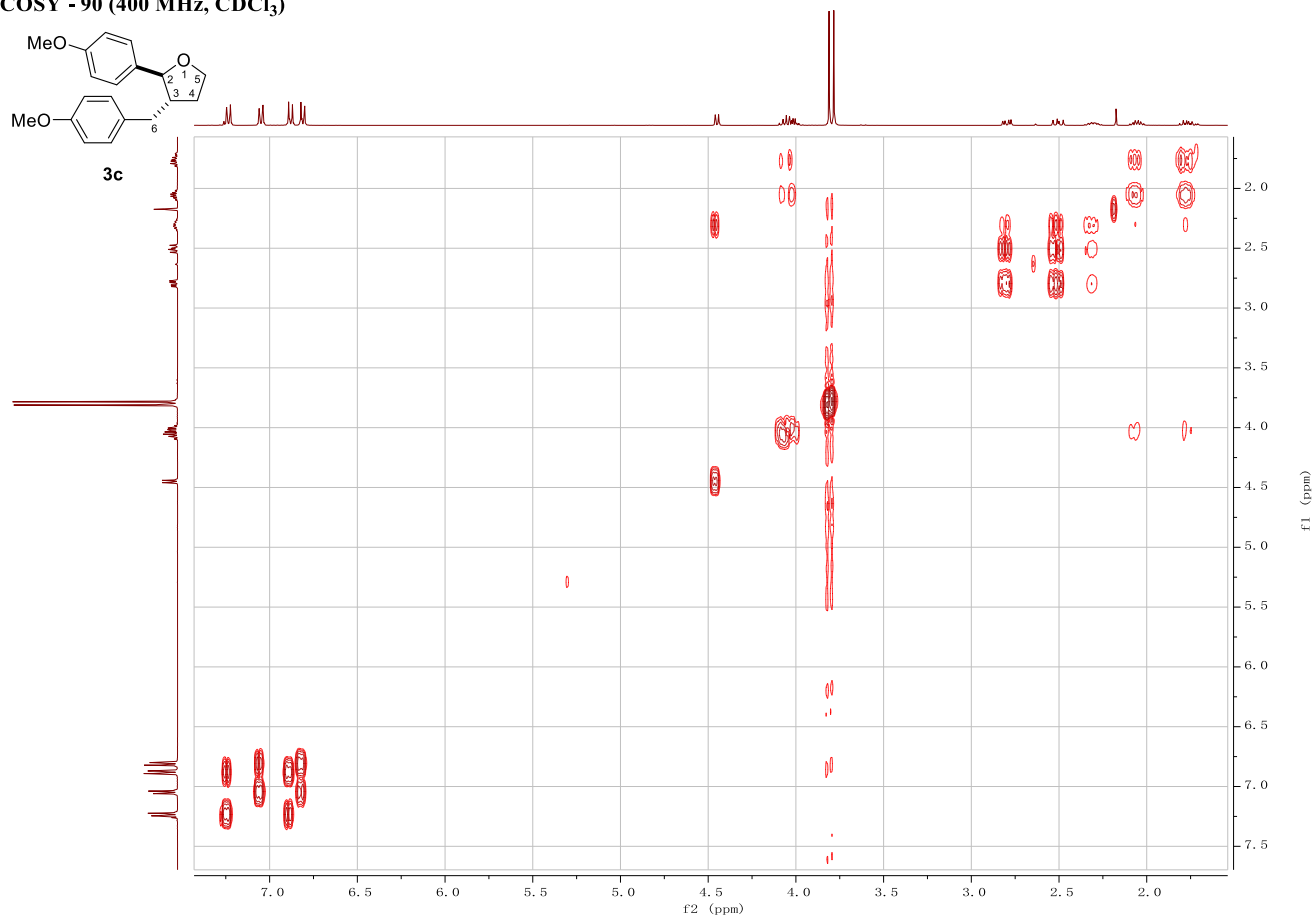


NOESY-2D (500 MHz, CDCl_3)

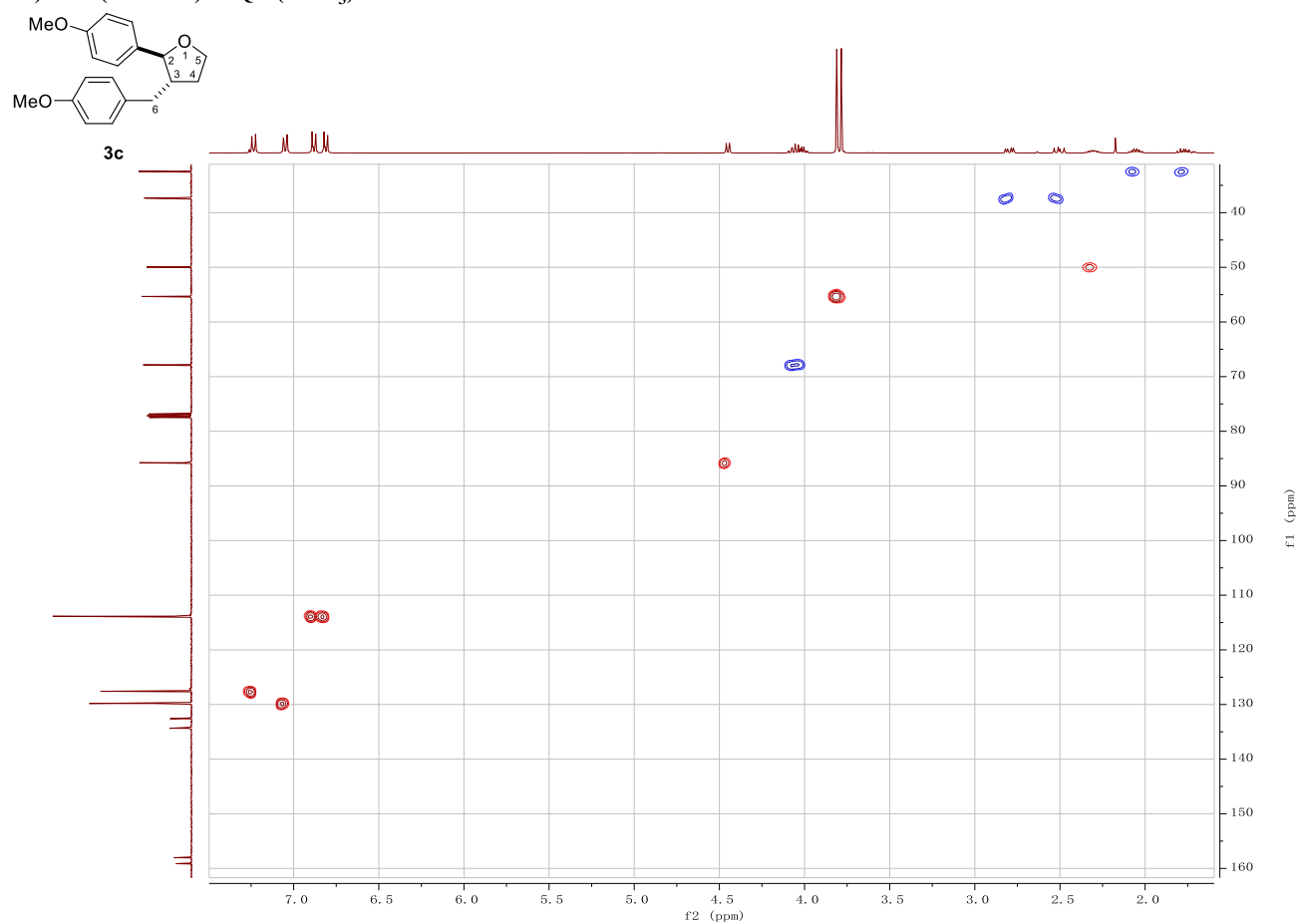




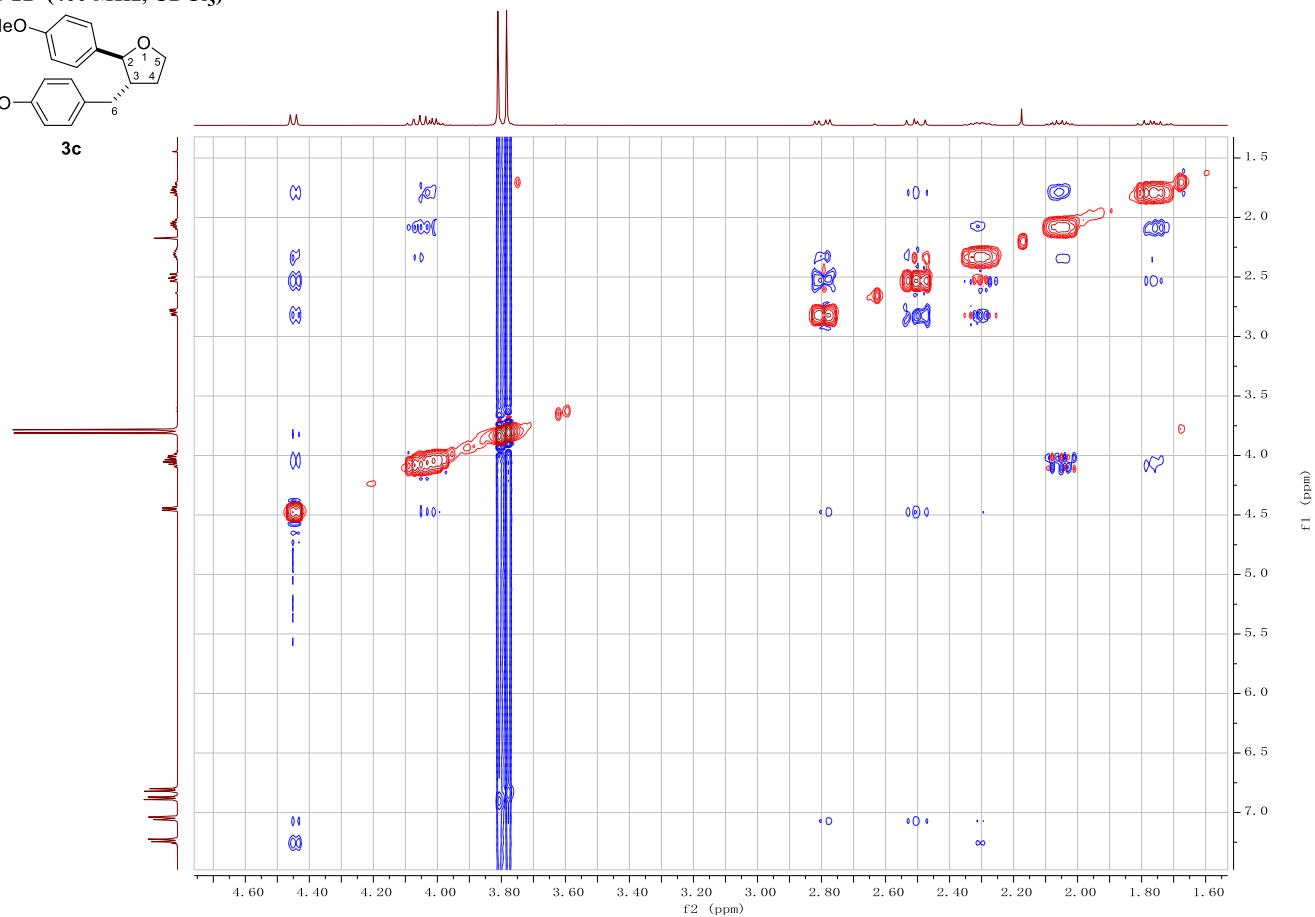
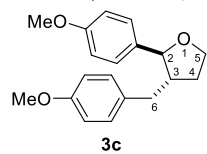
$^1\text{H} - ^1\text{H}$ COSY - 90 (400 MHz, CDCl_3)

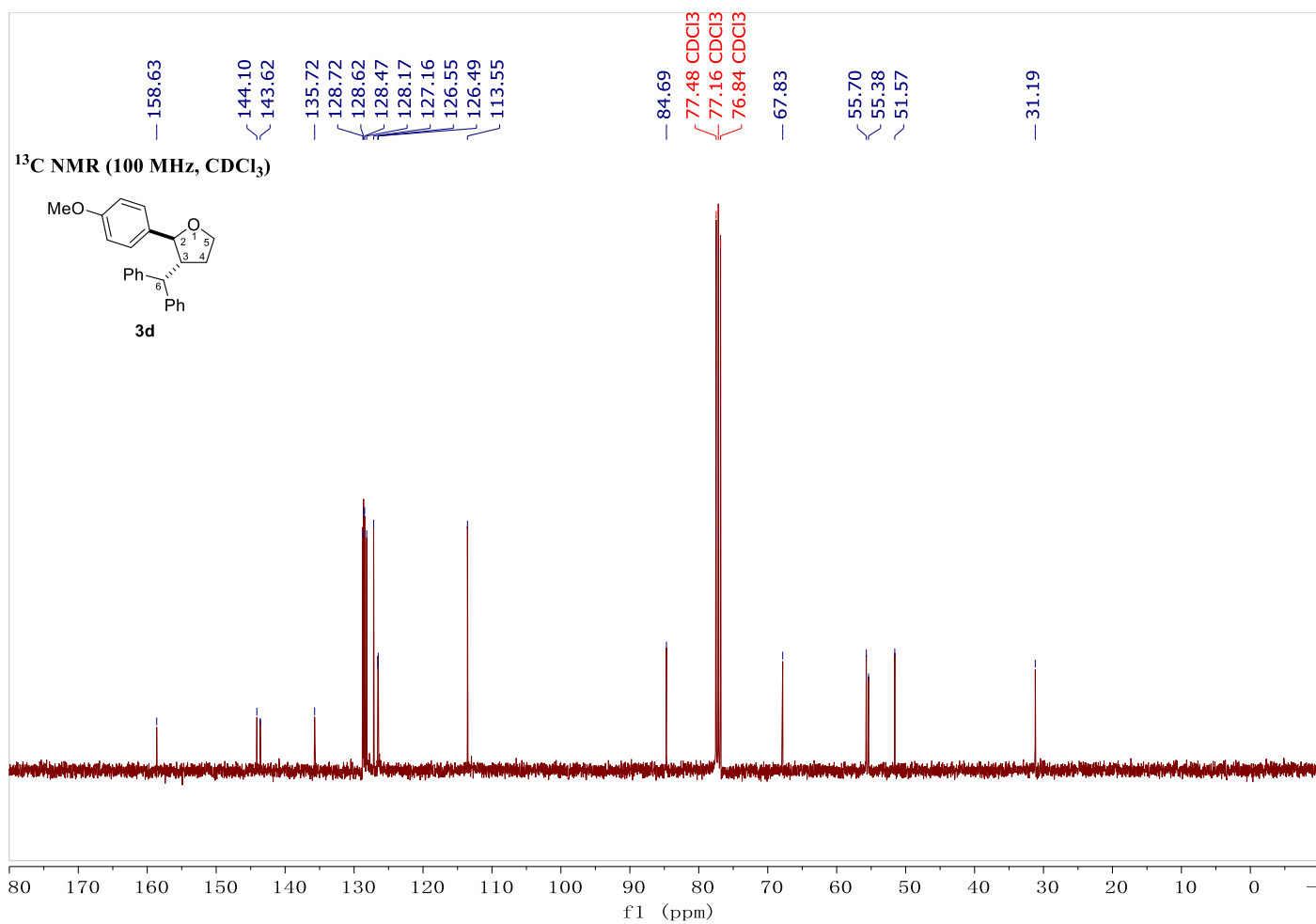
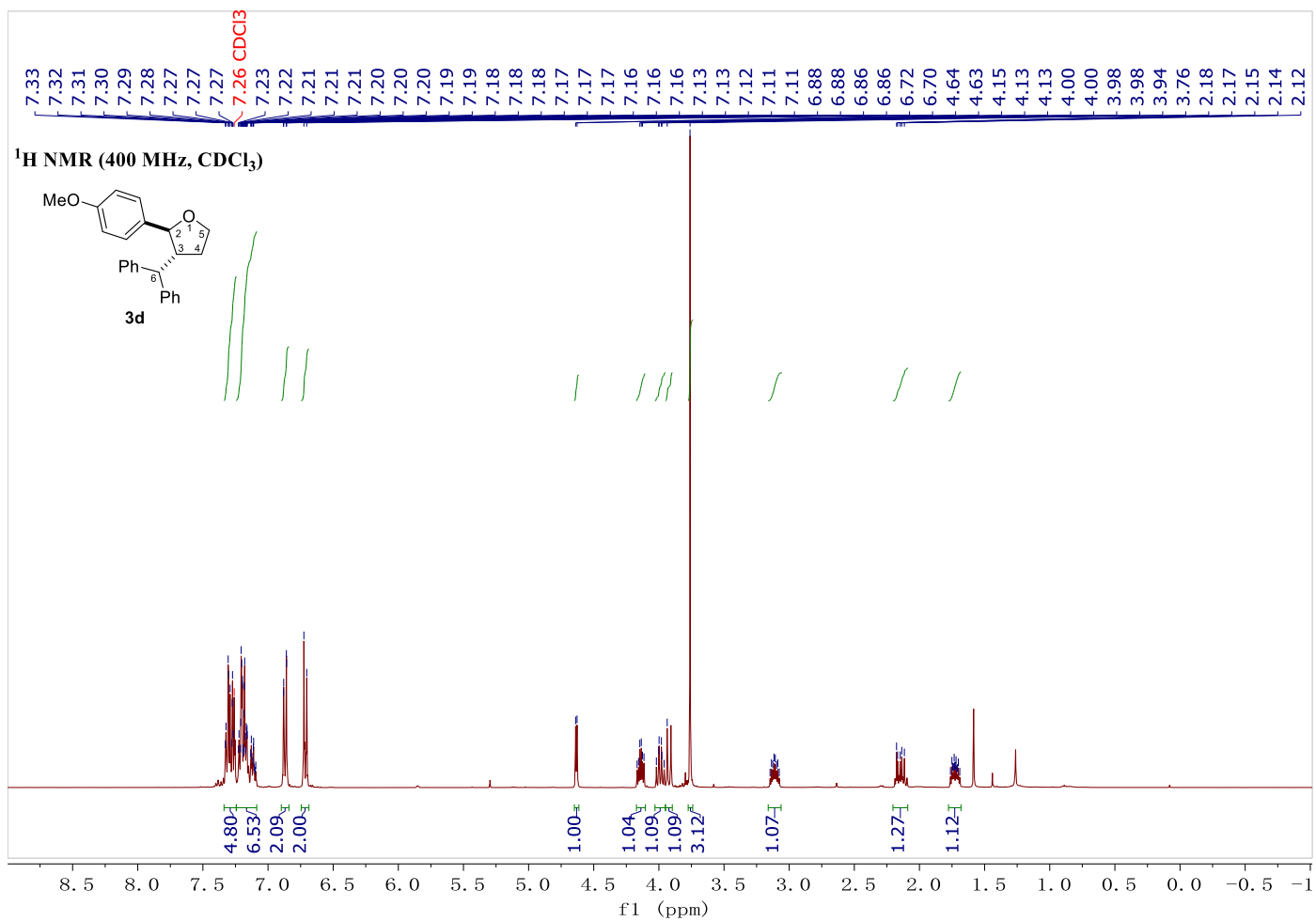


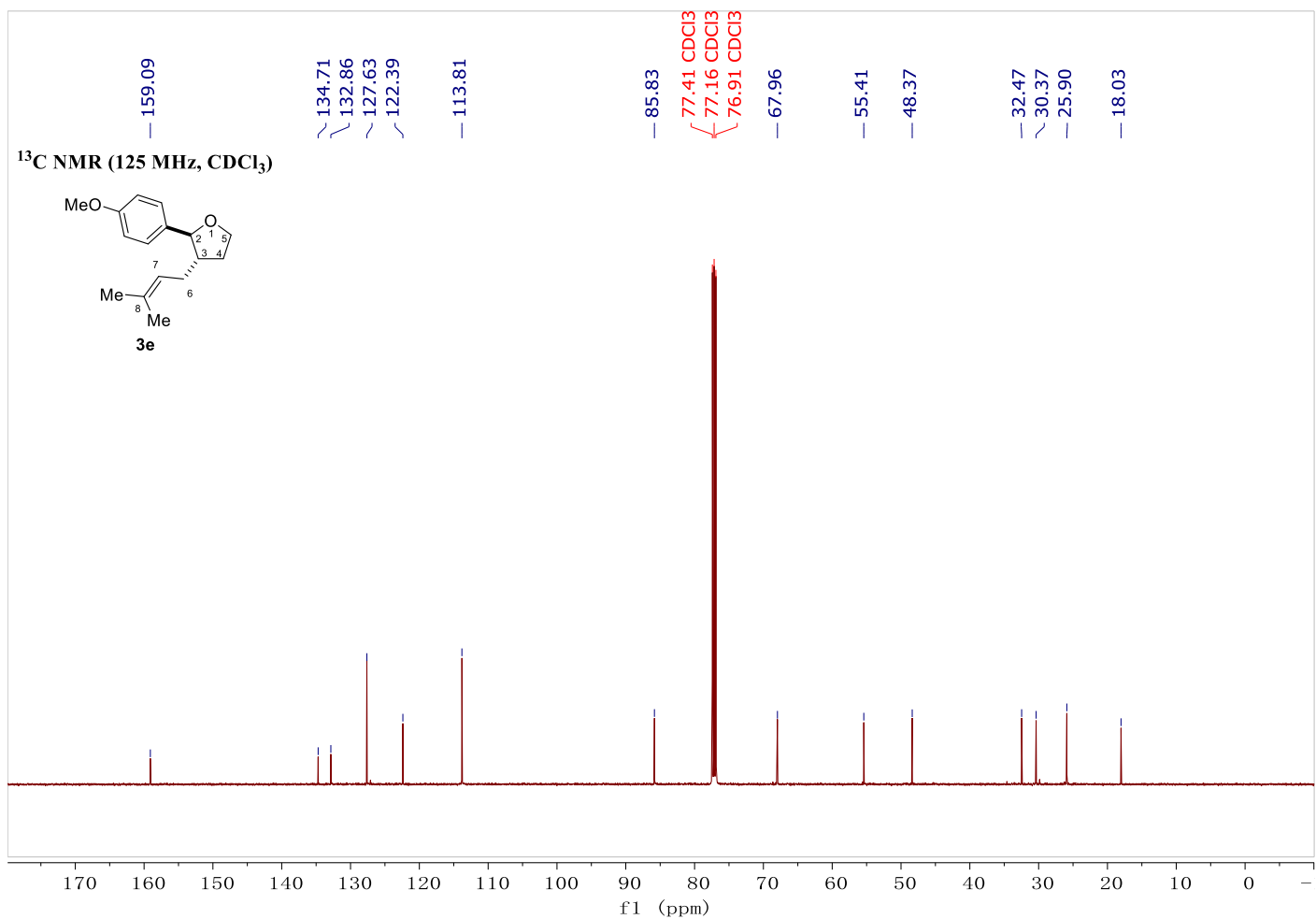
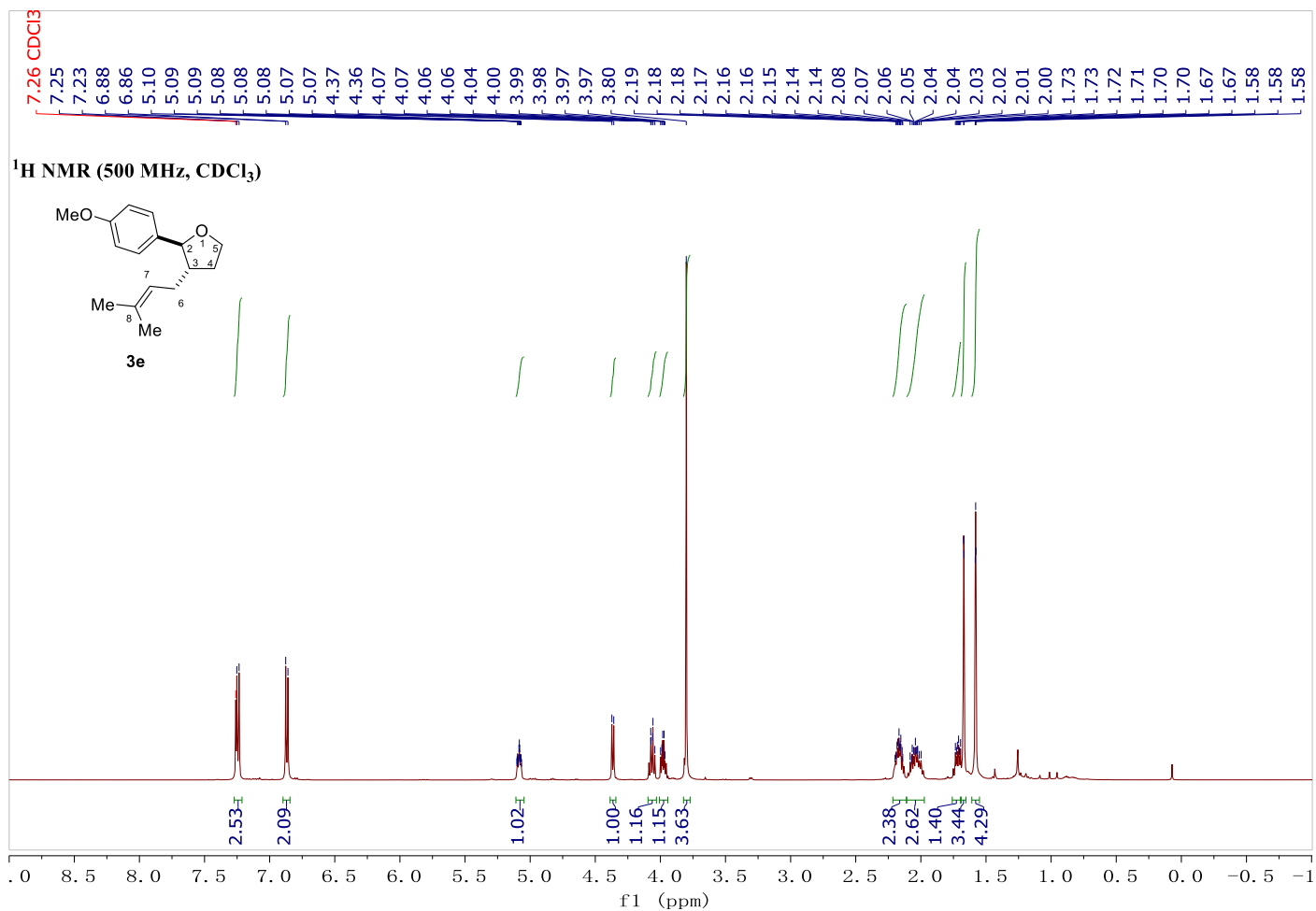
^1H (400 MHz) - ^{13}C (100 MHz) HSQC (CDCl_3)

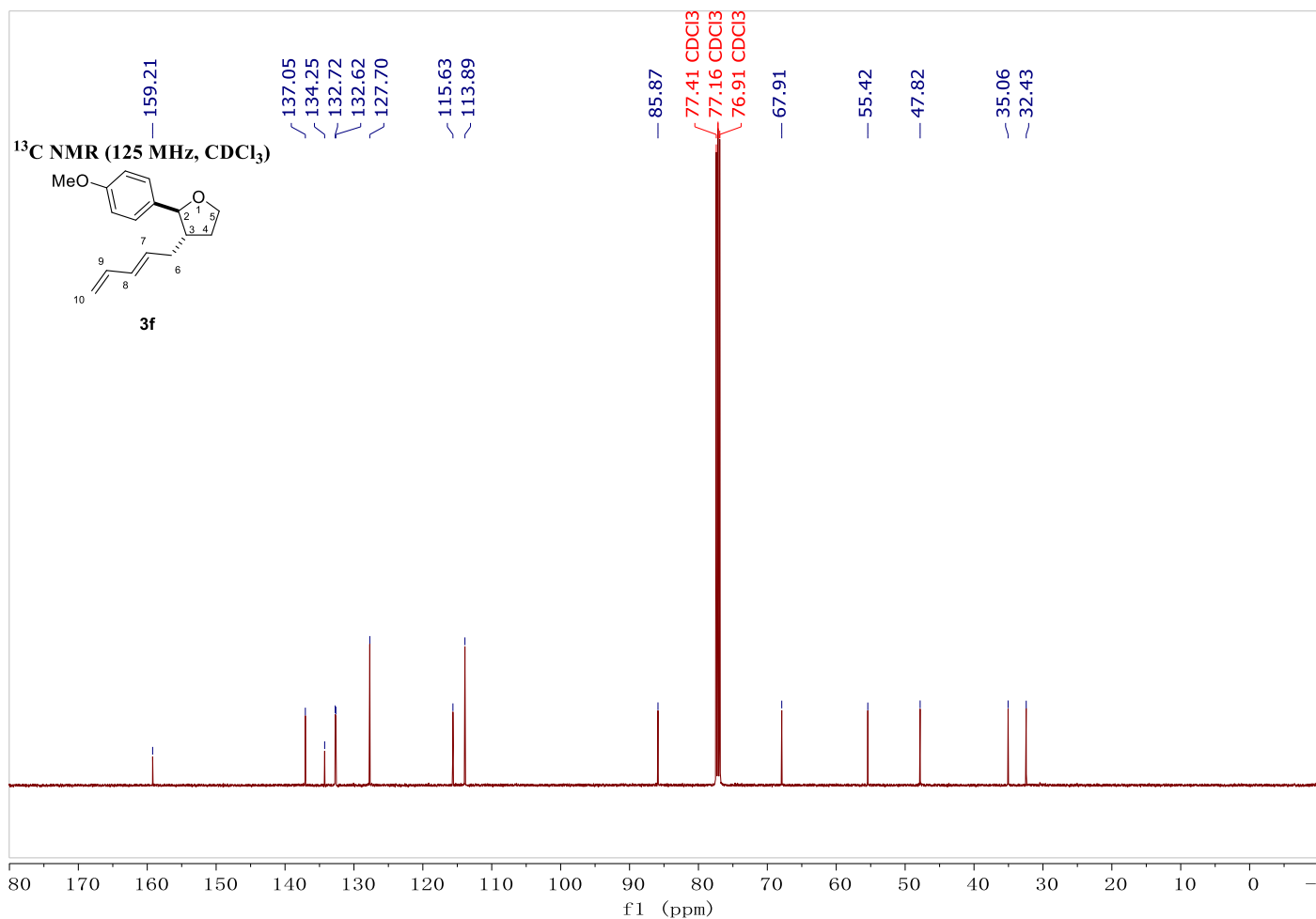
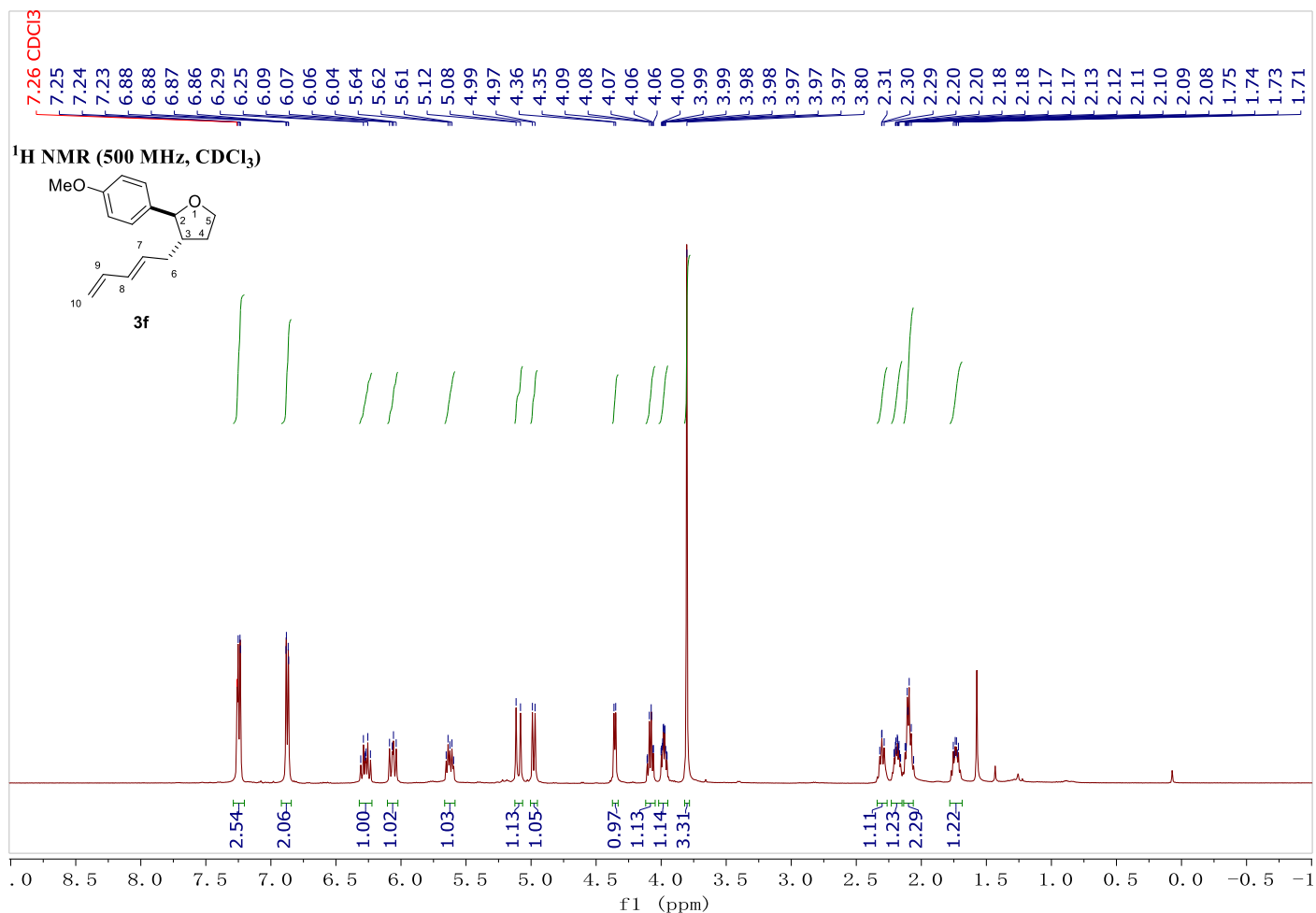


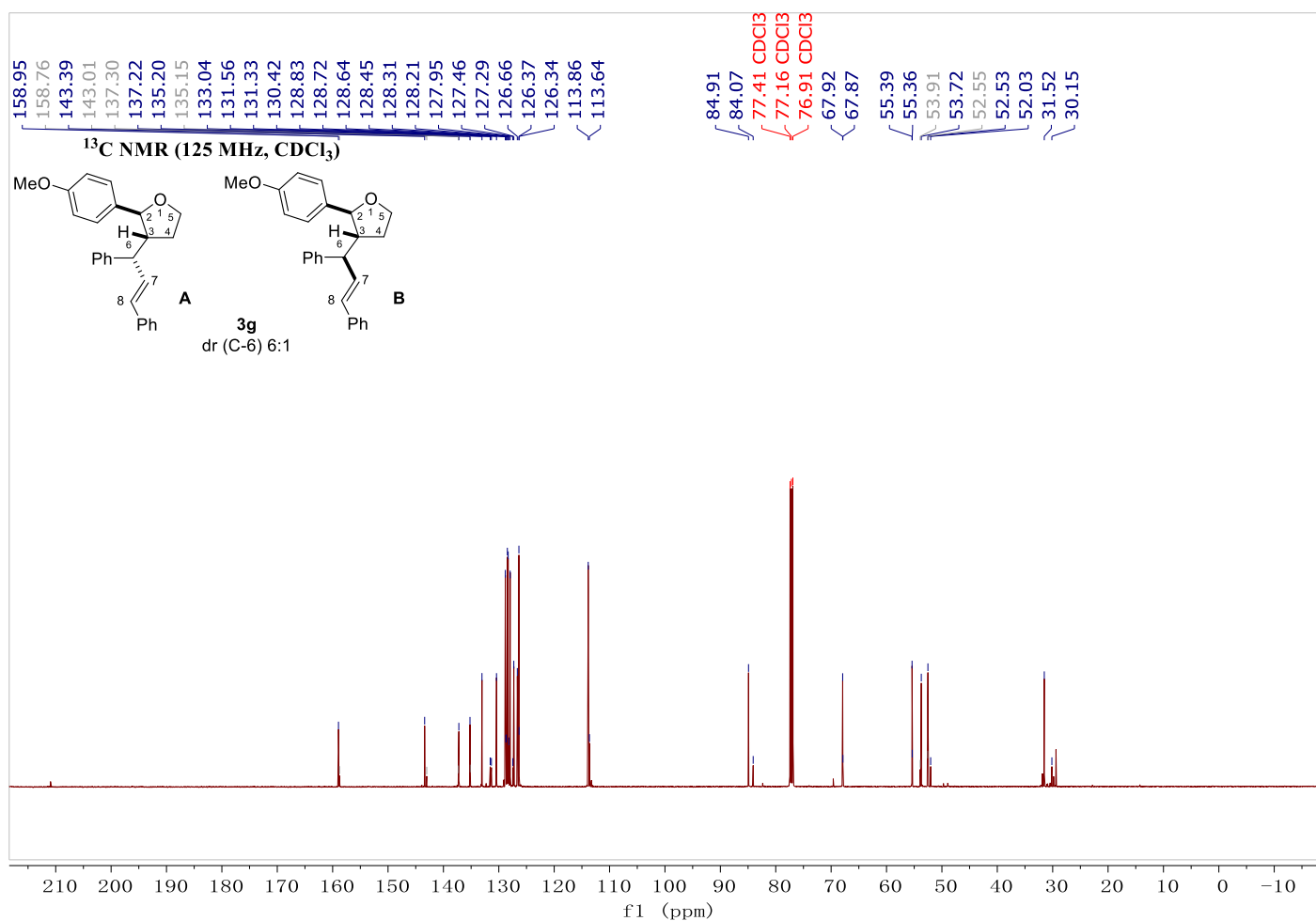
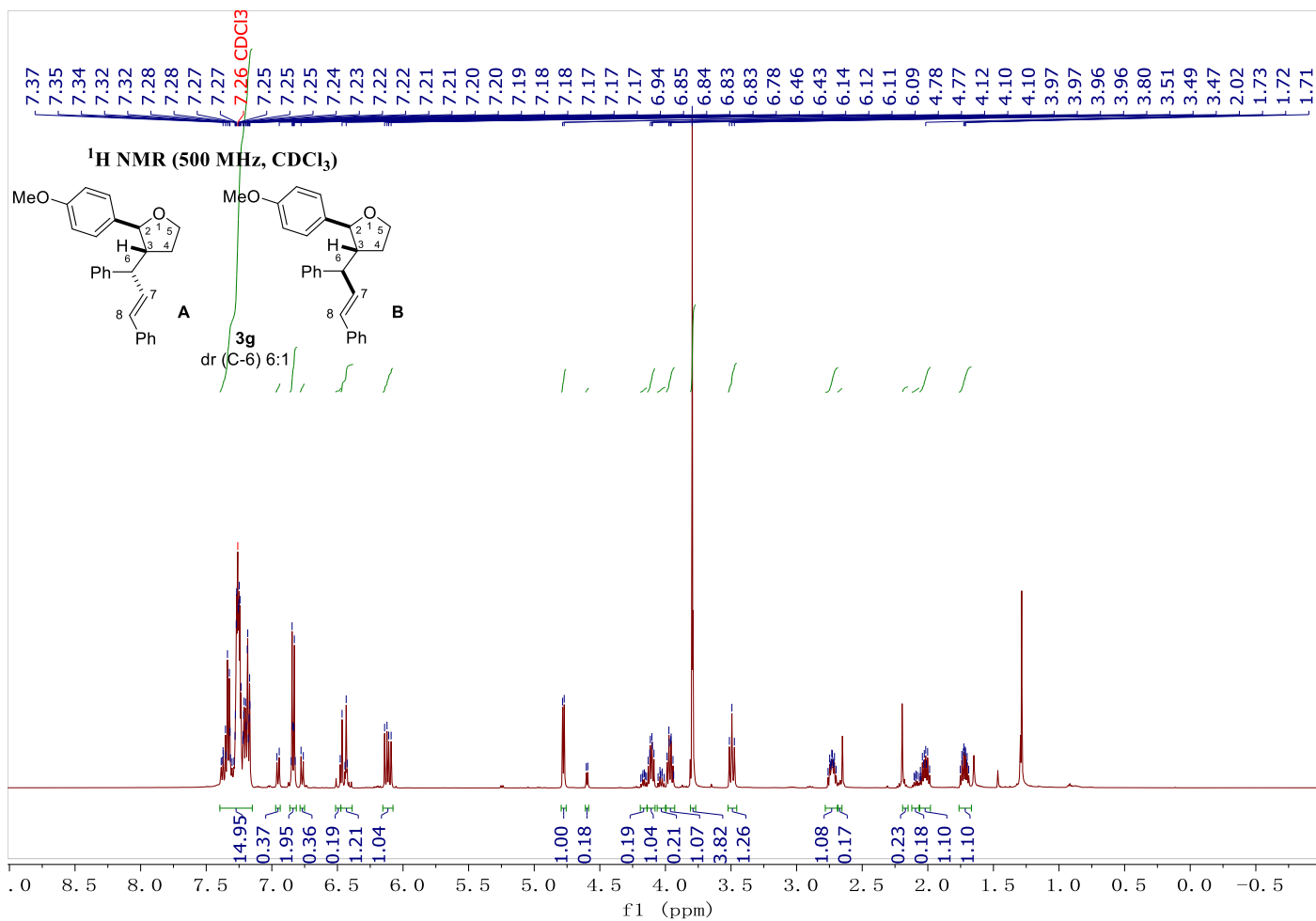
NOESY-2D (400 MHz, CDCl₃)

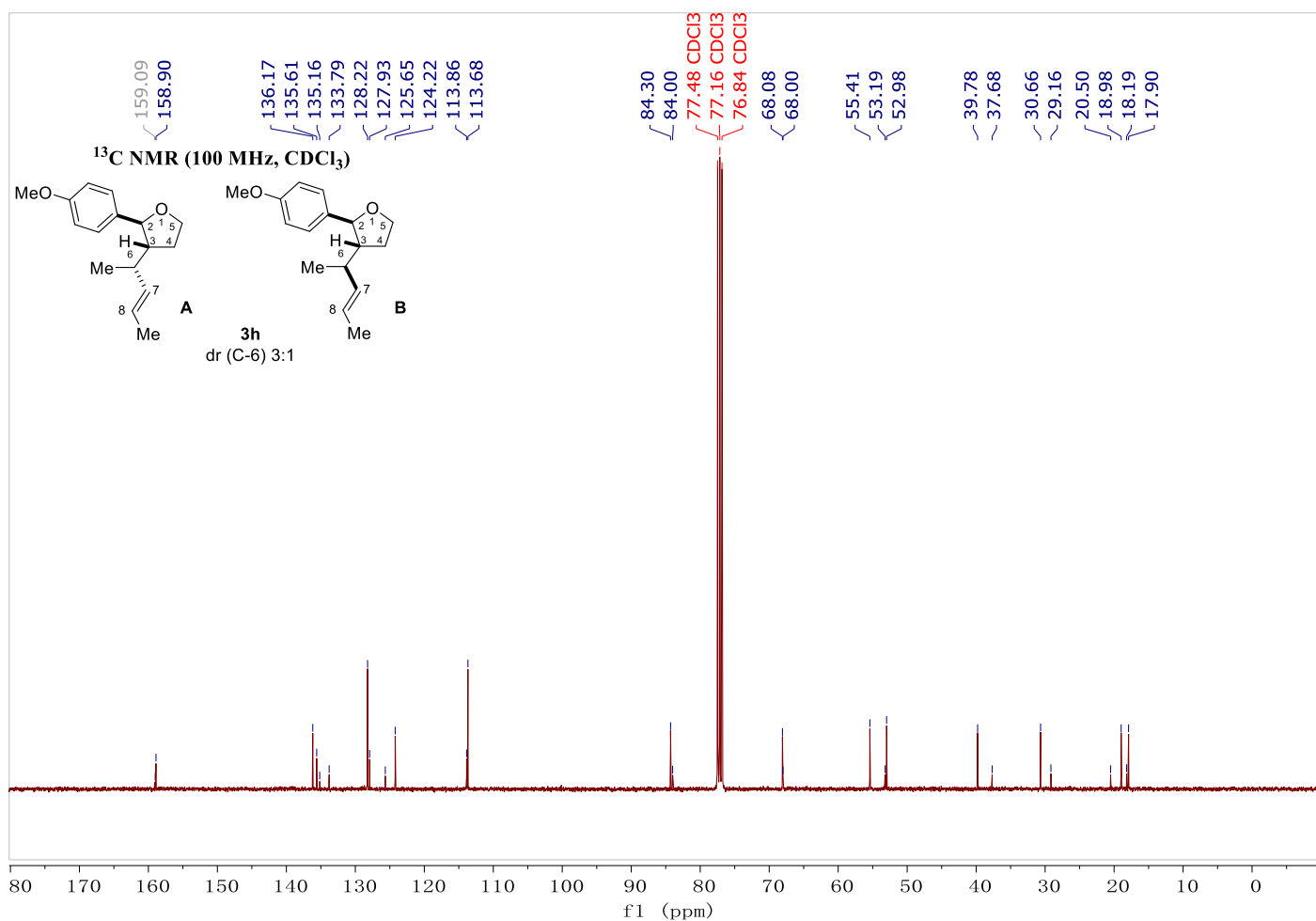
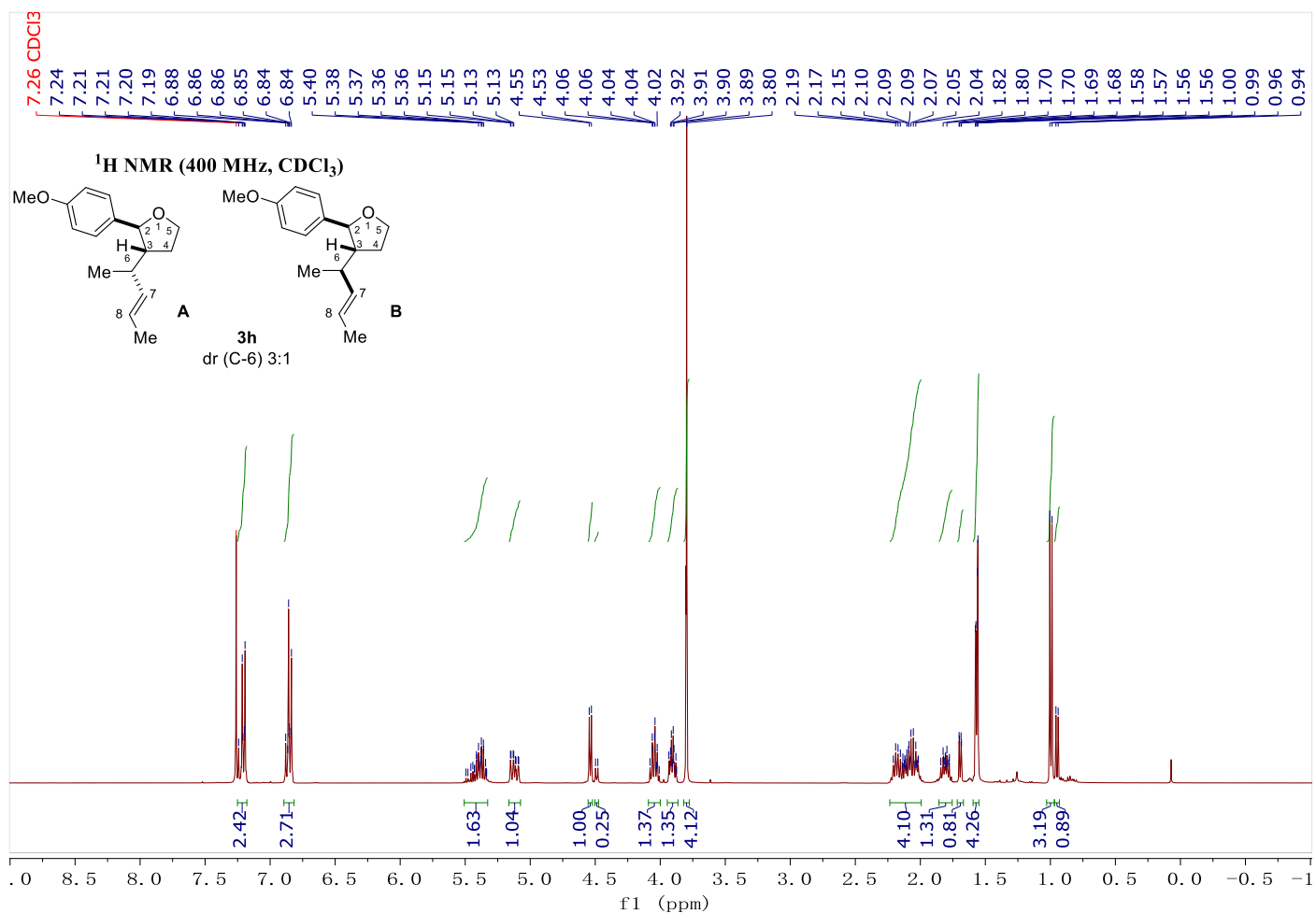


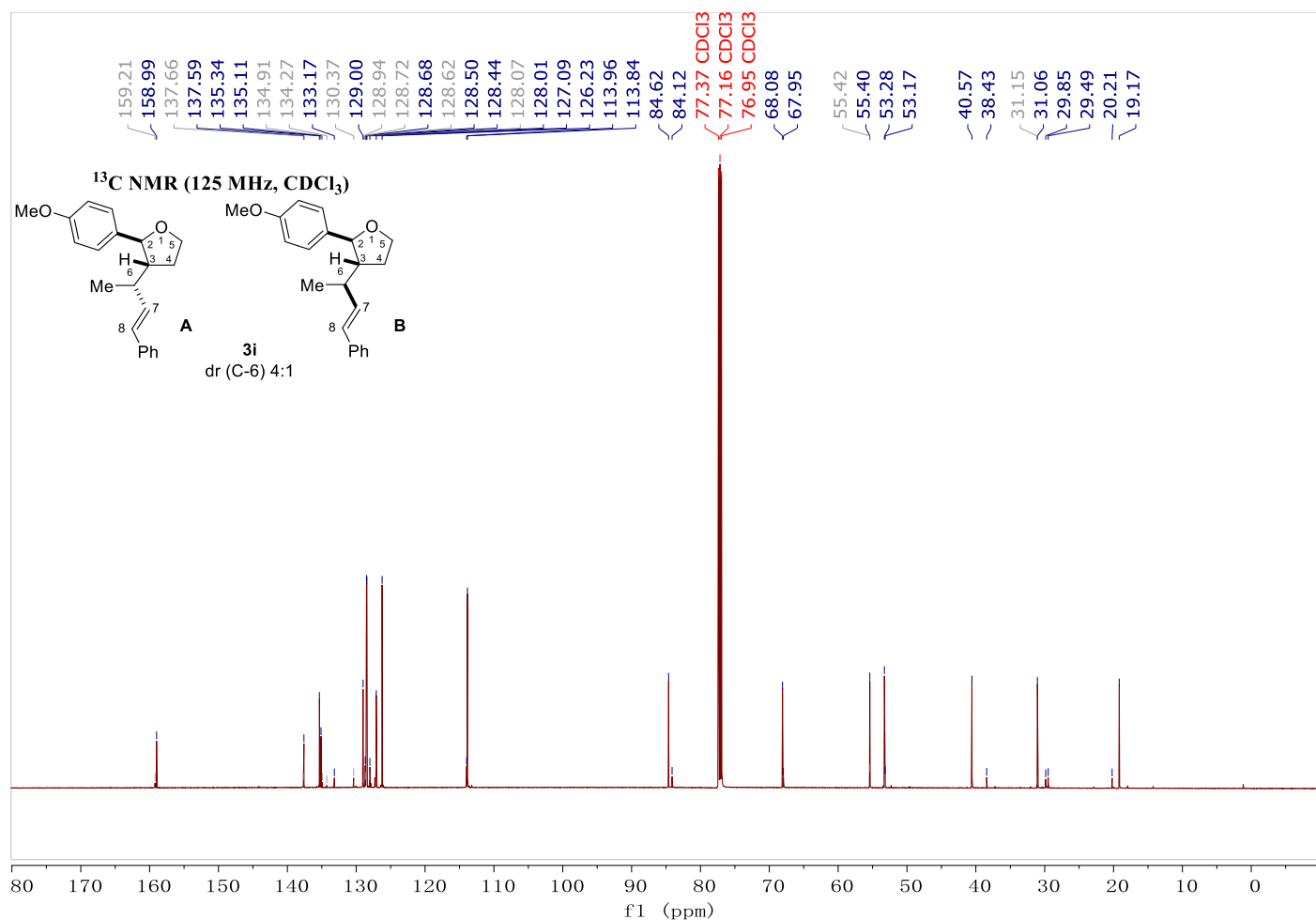
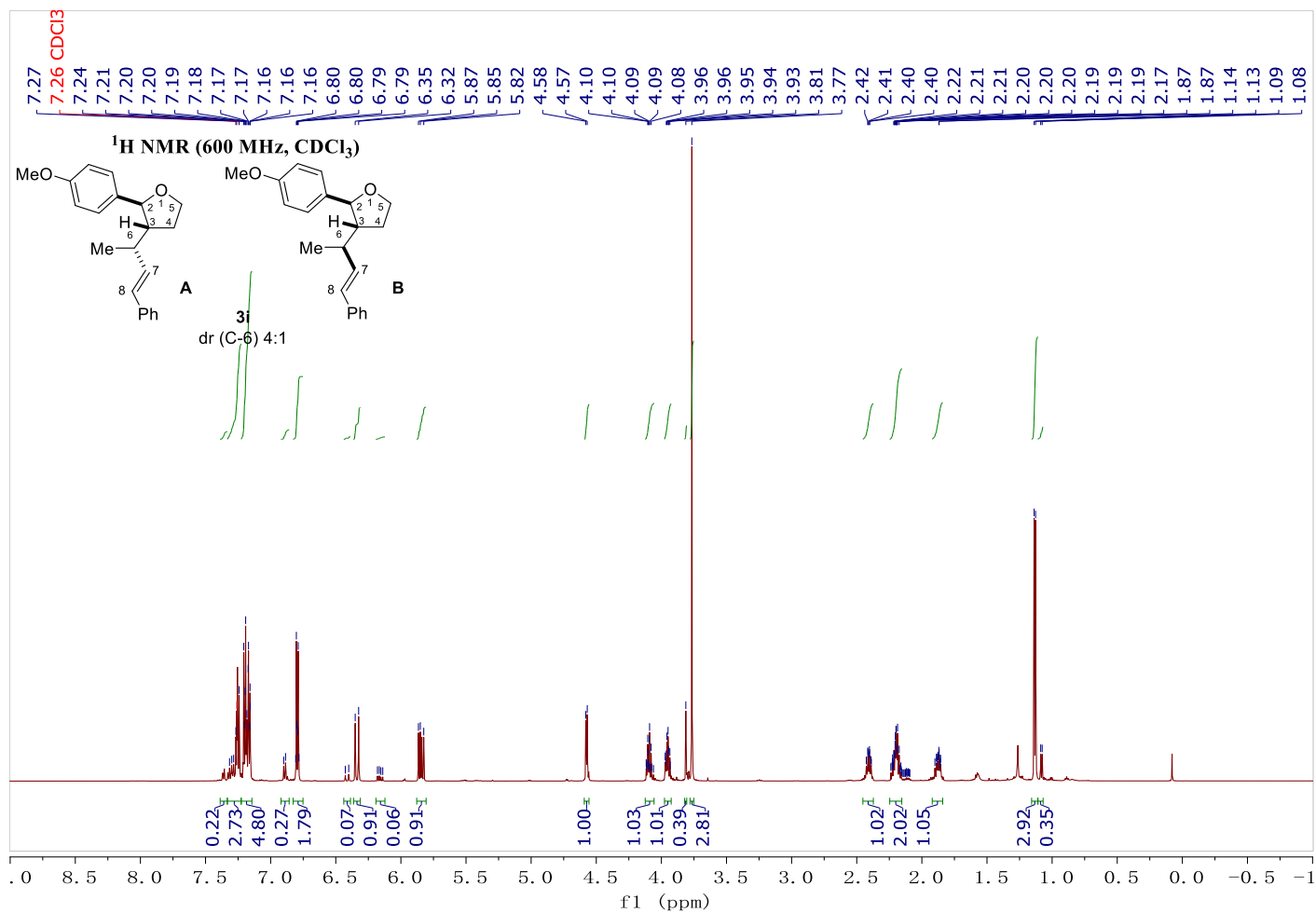




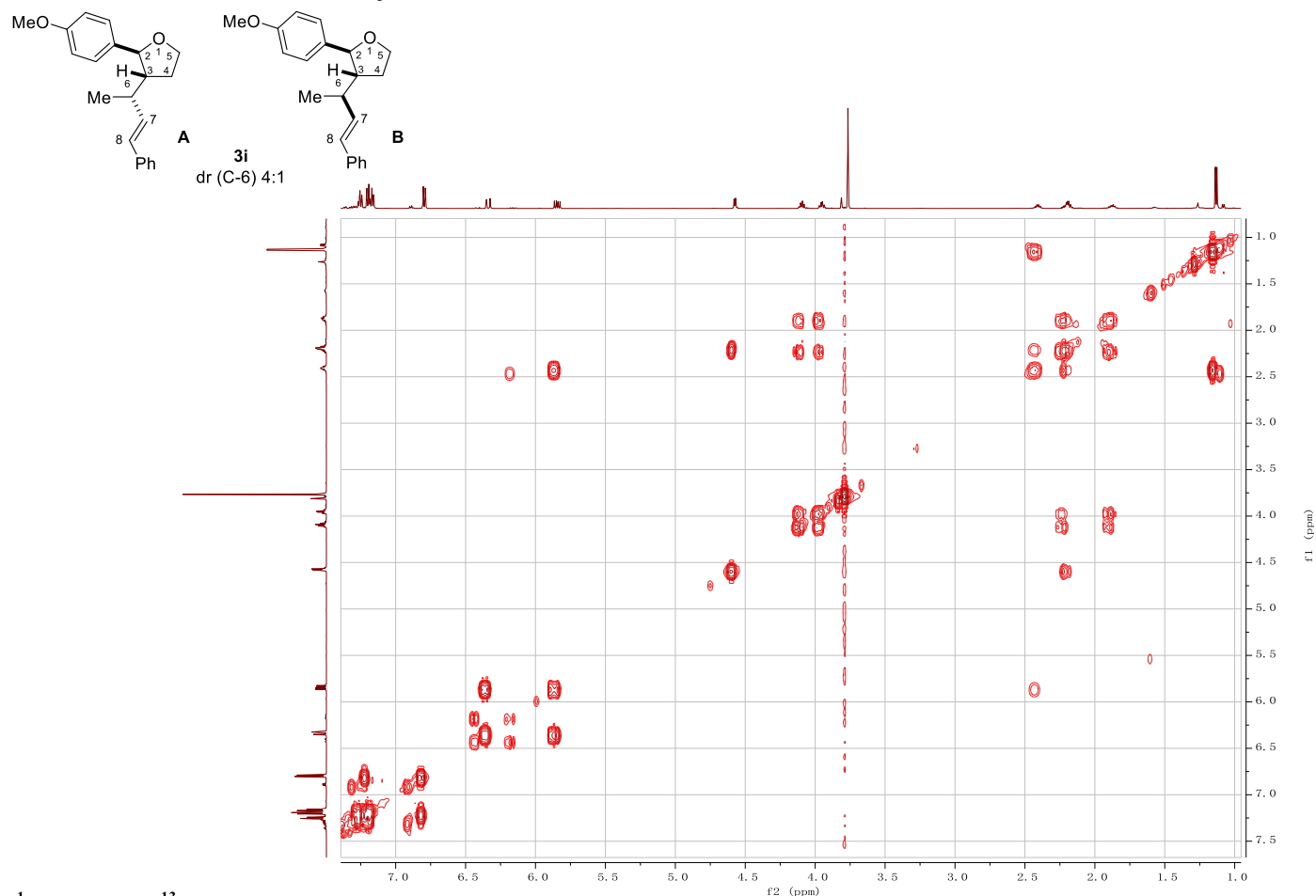




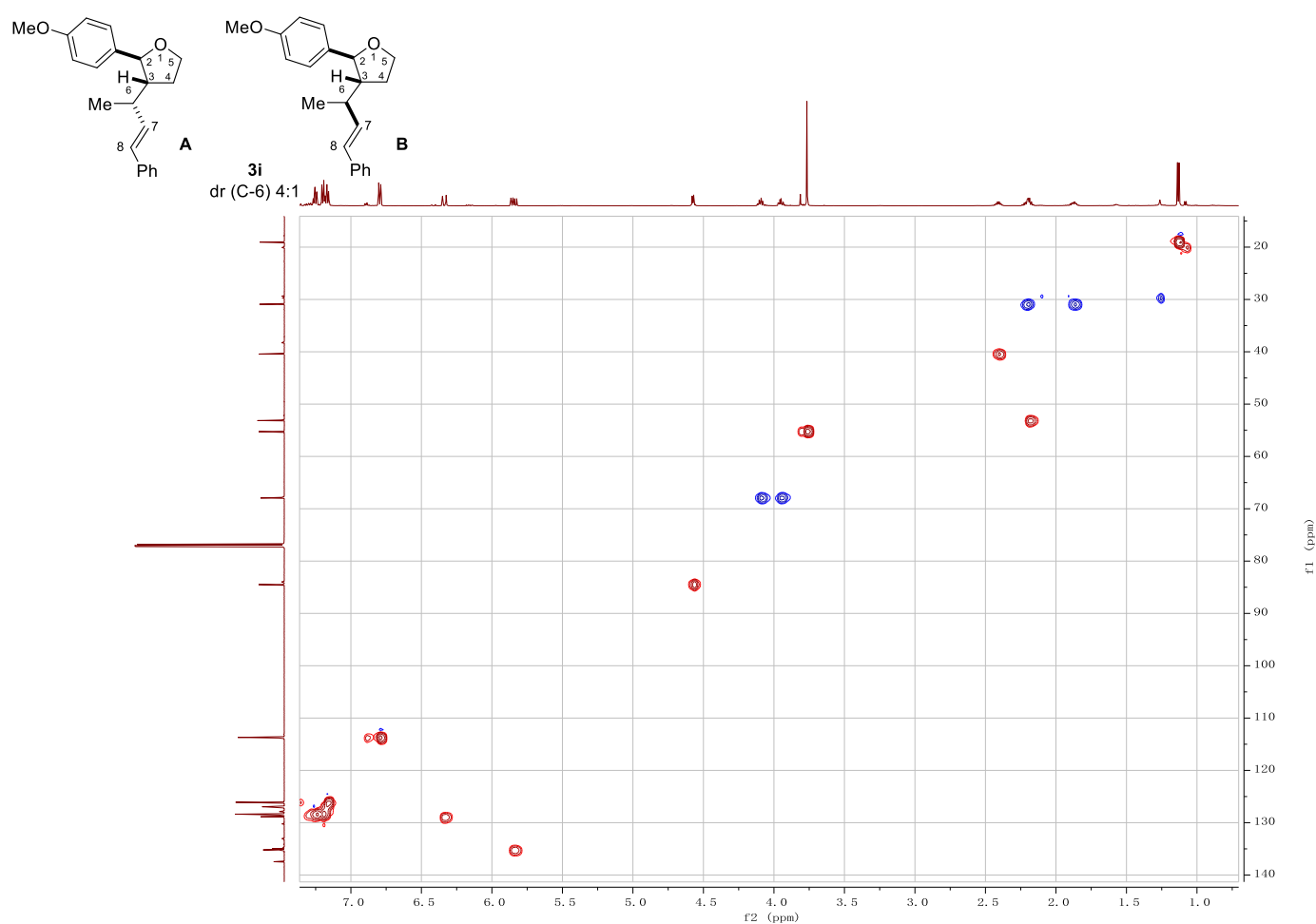




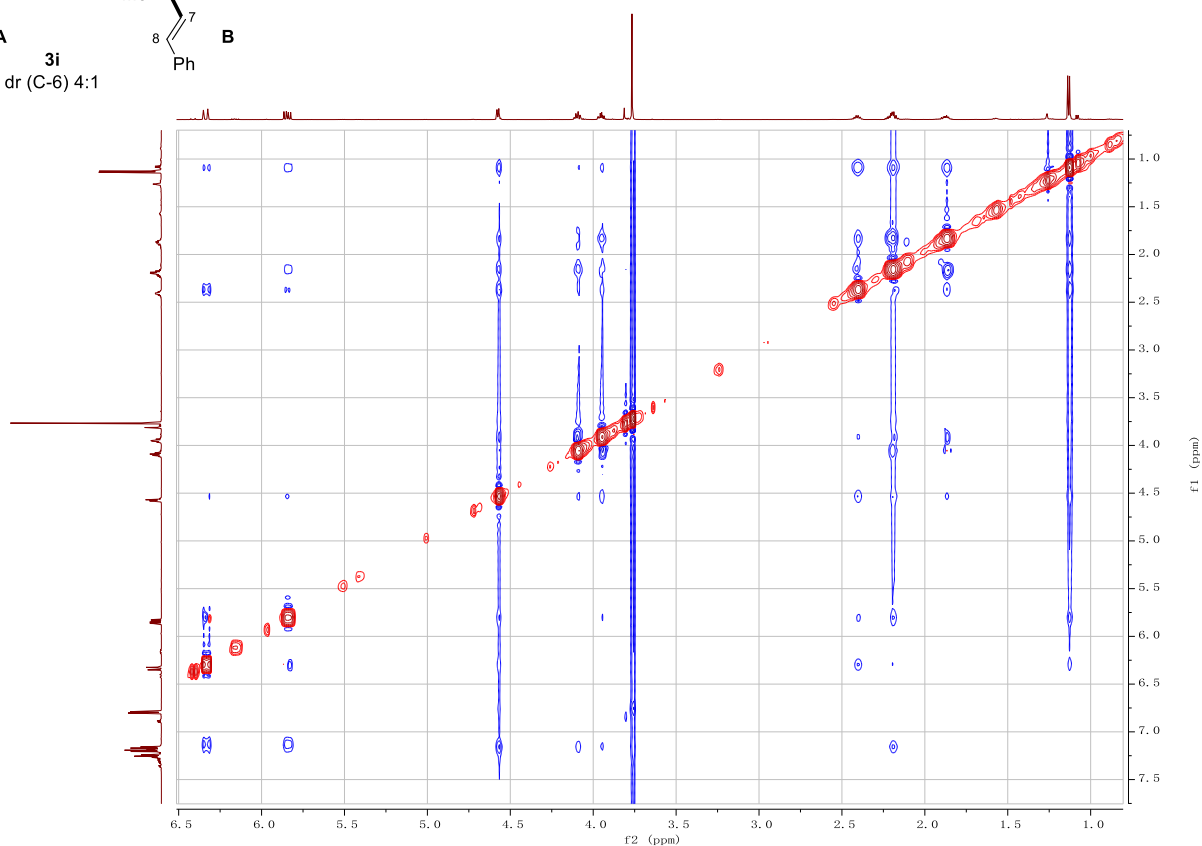
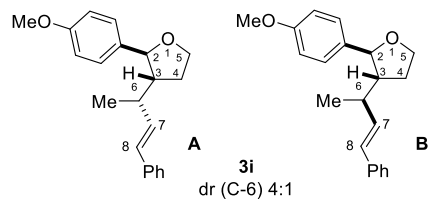
¹H - ¹H COSY - 90 (600 MHz, CDCl₃)

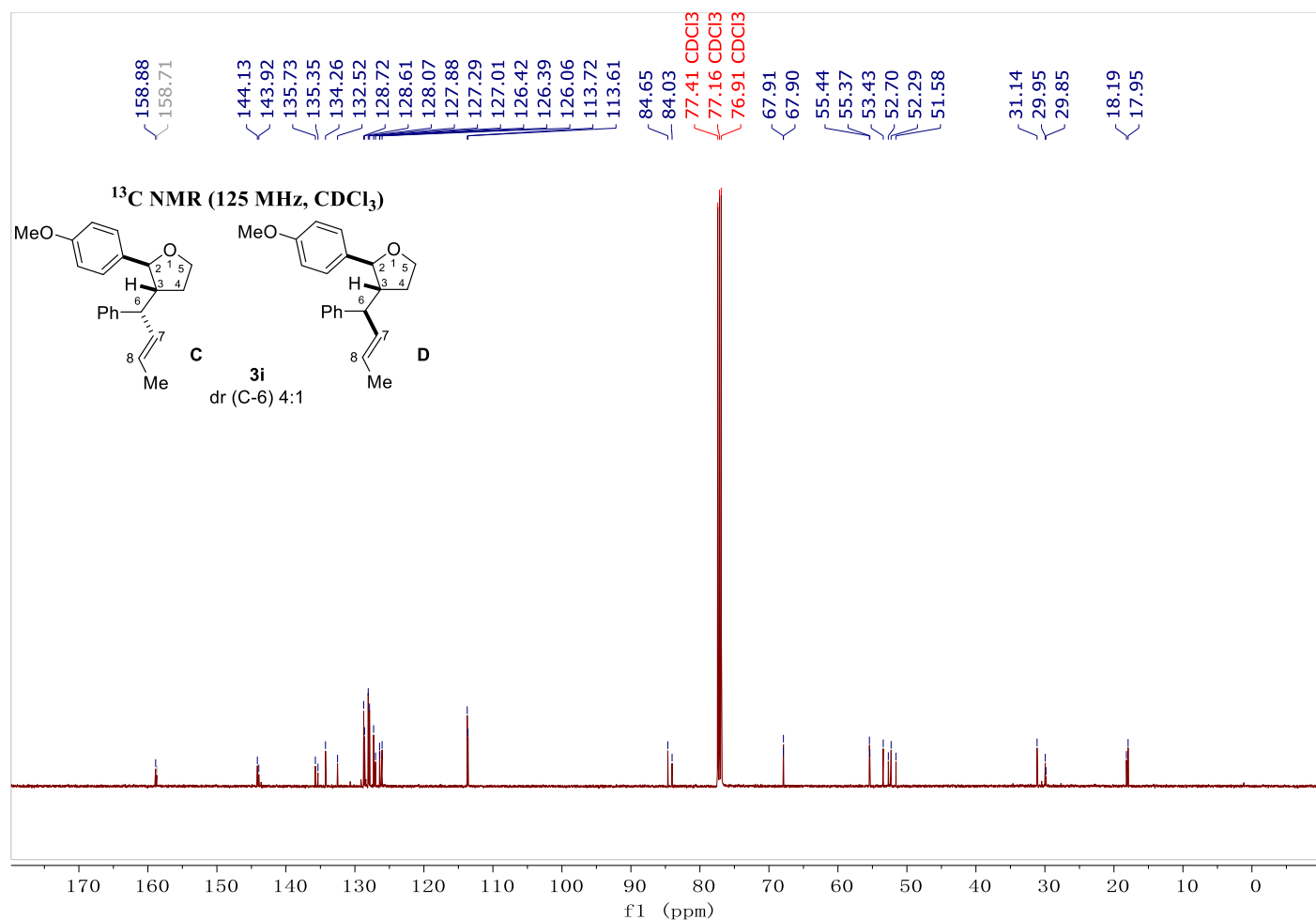
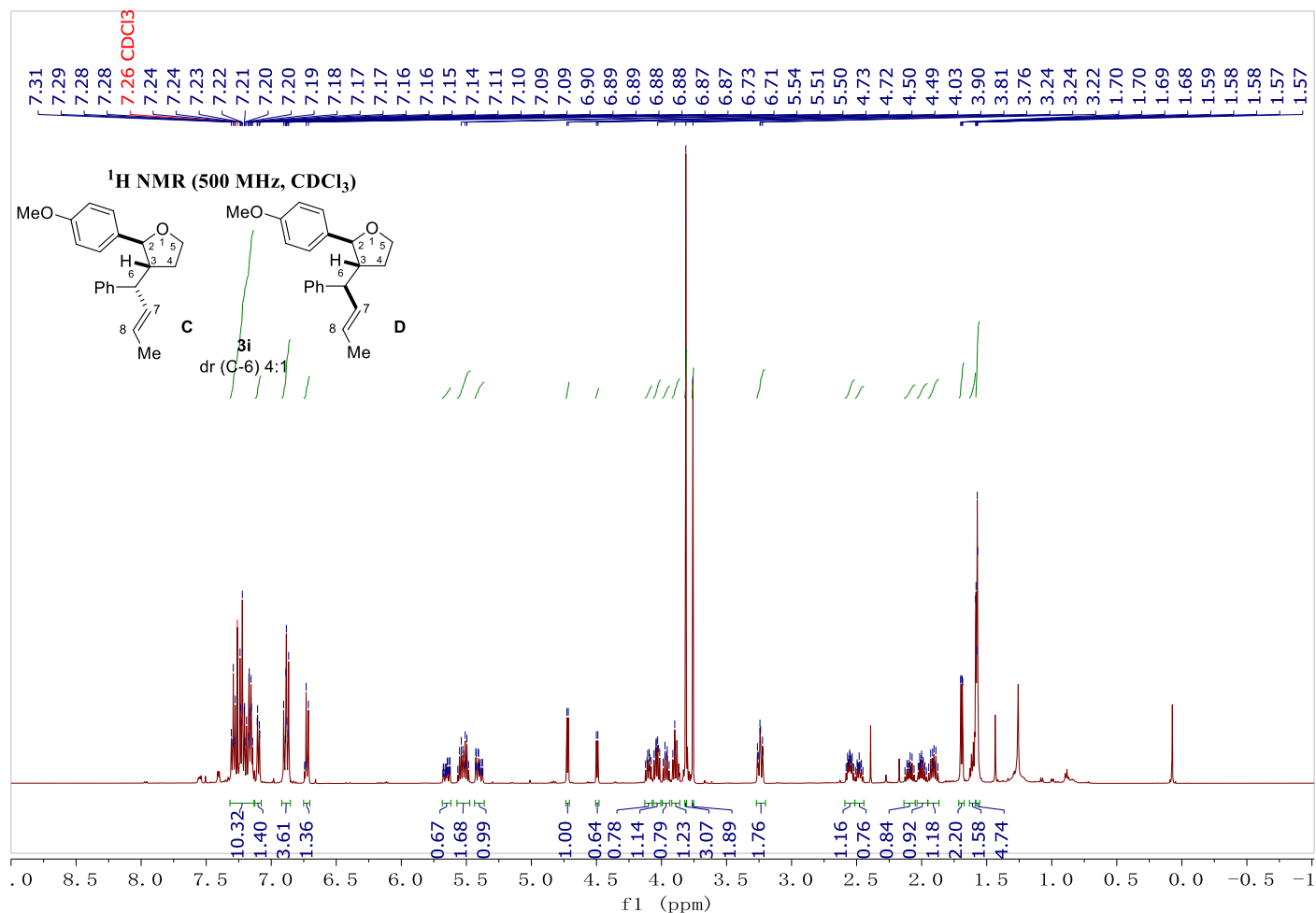


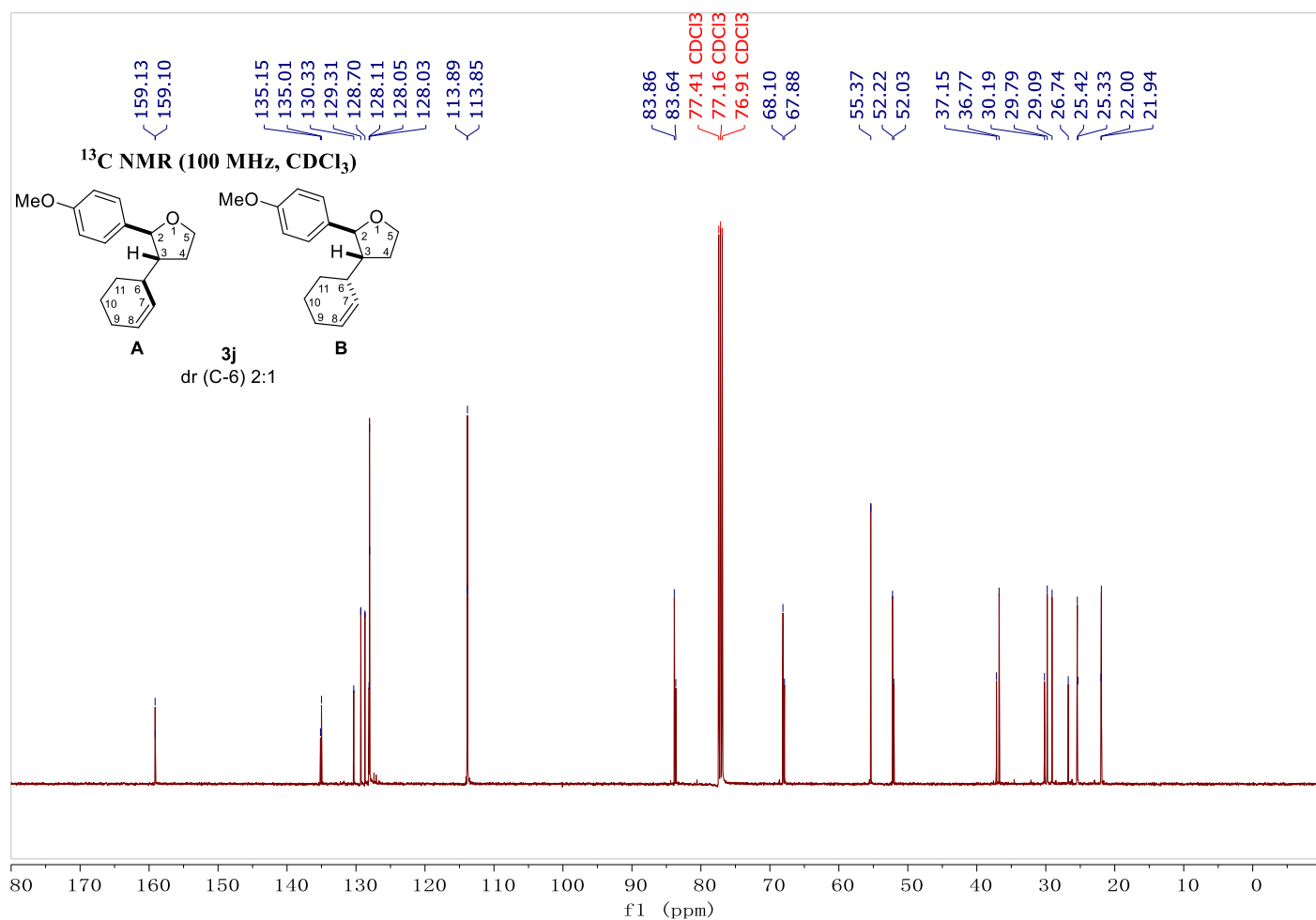
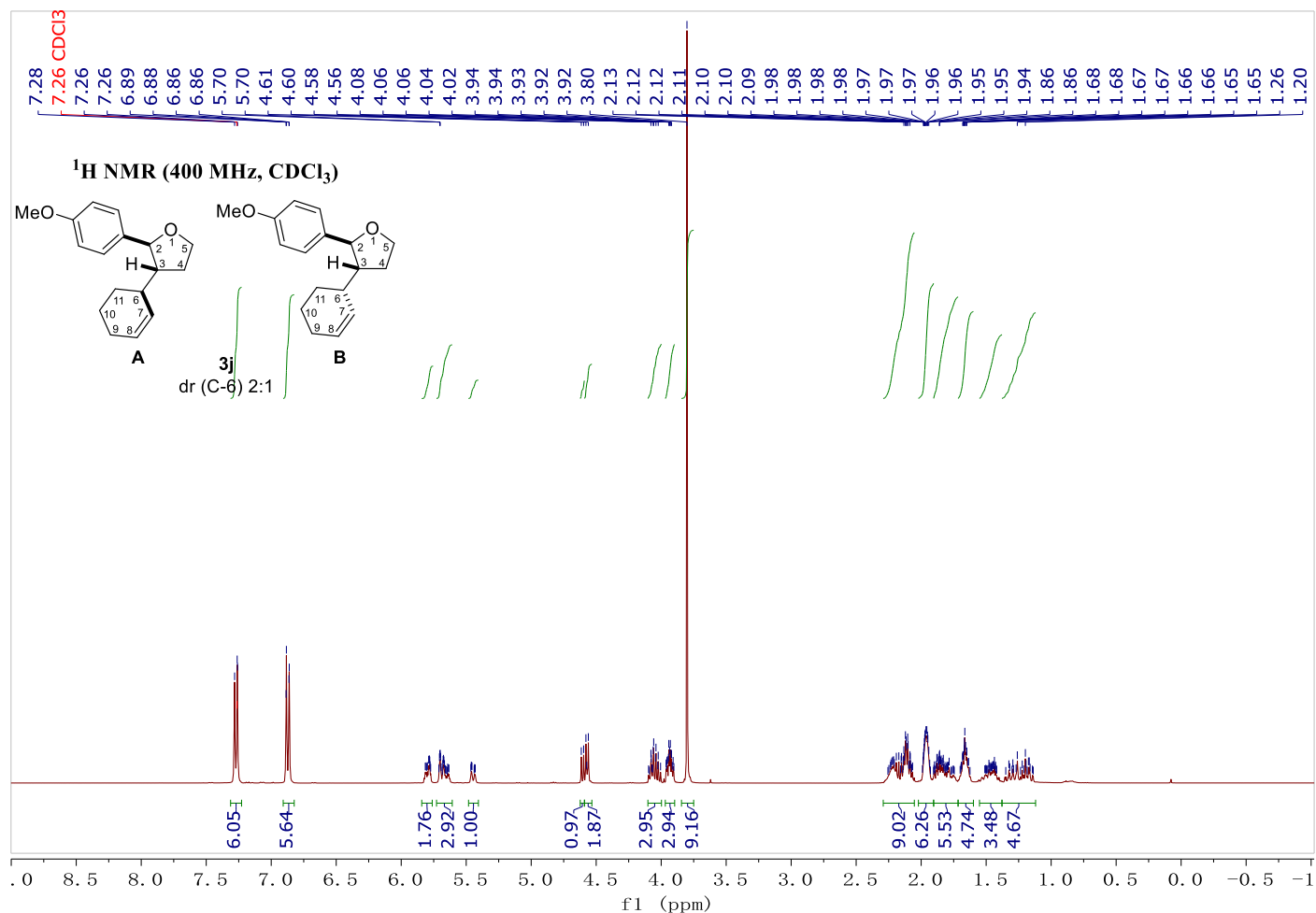
¹H (600 MHz) - ¹³C (125 MHz) HSQC (CDCl₃)

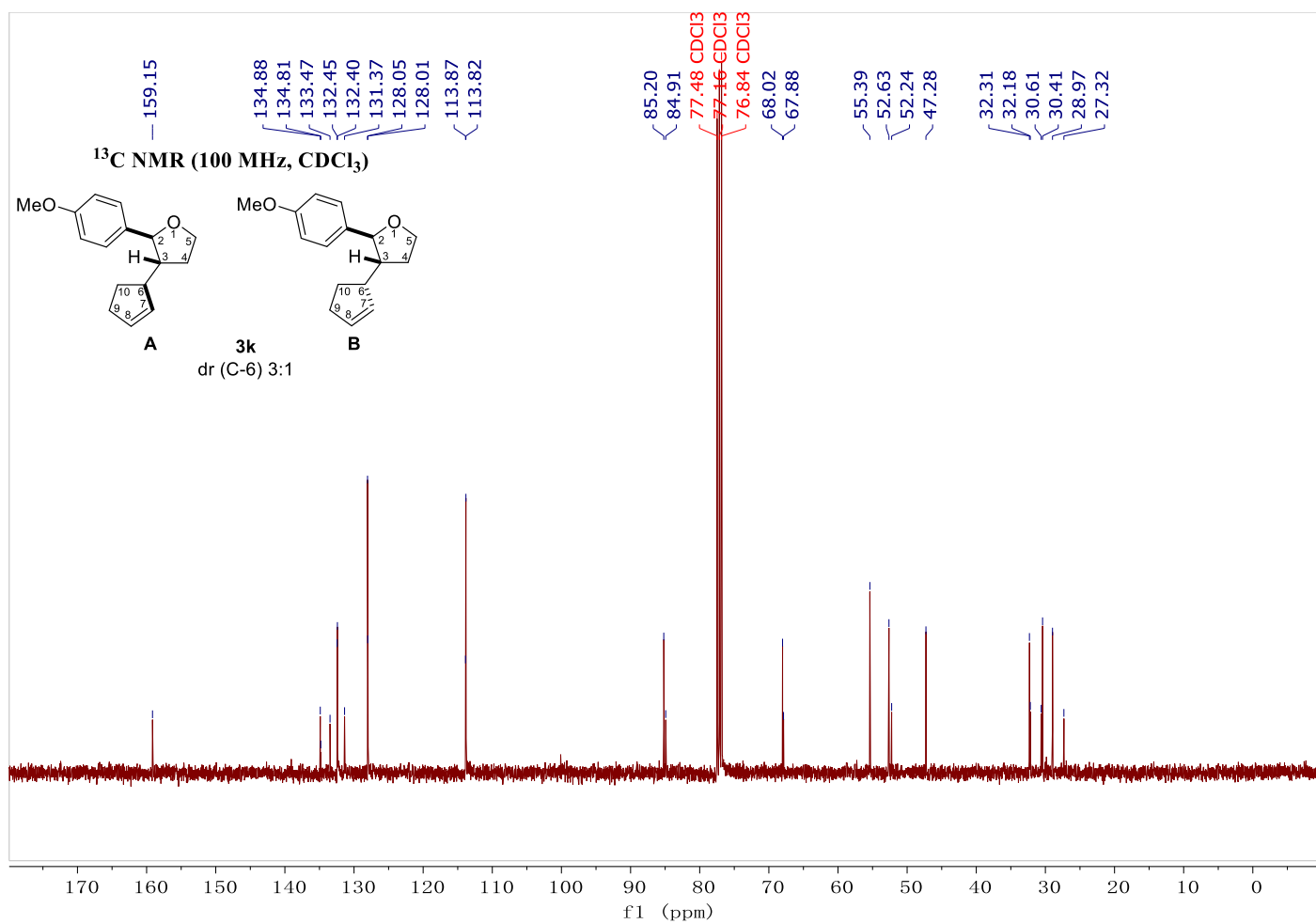
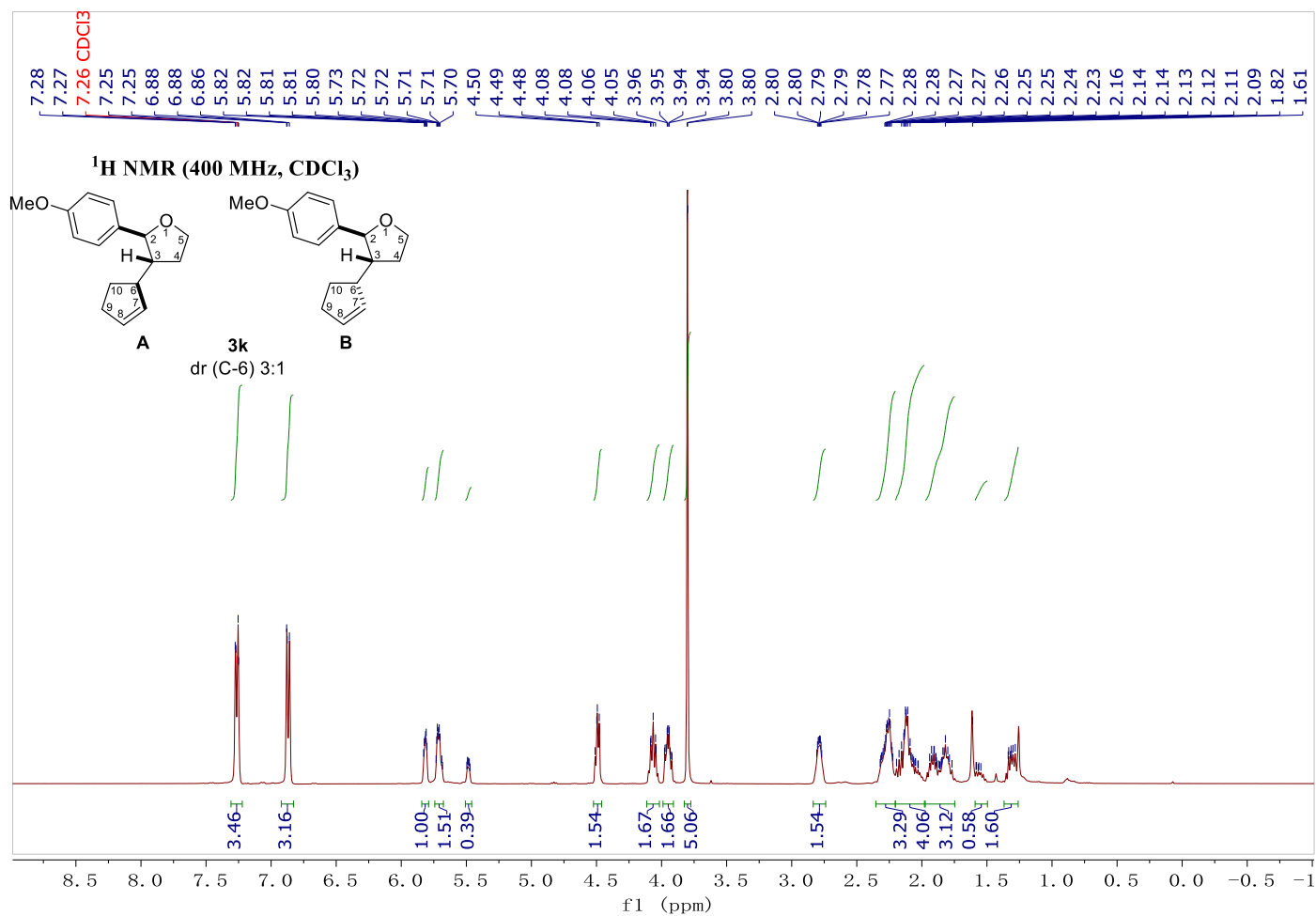


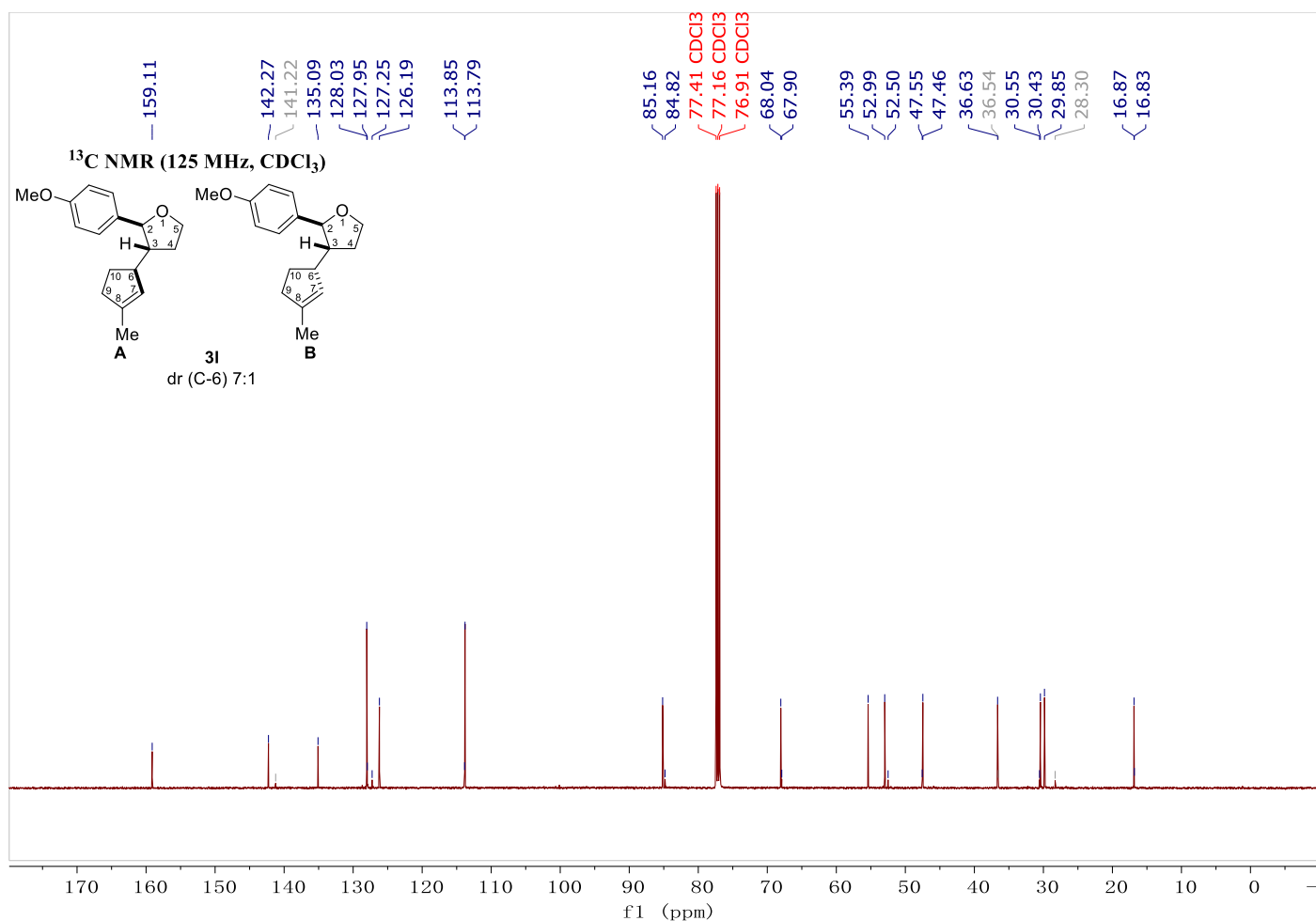
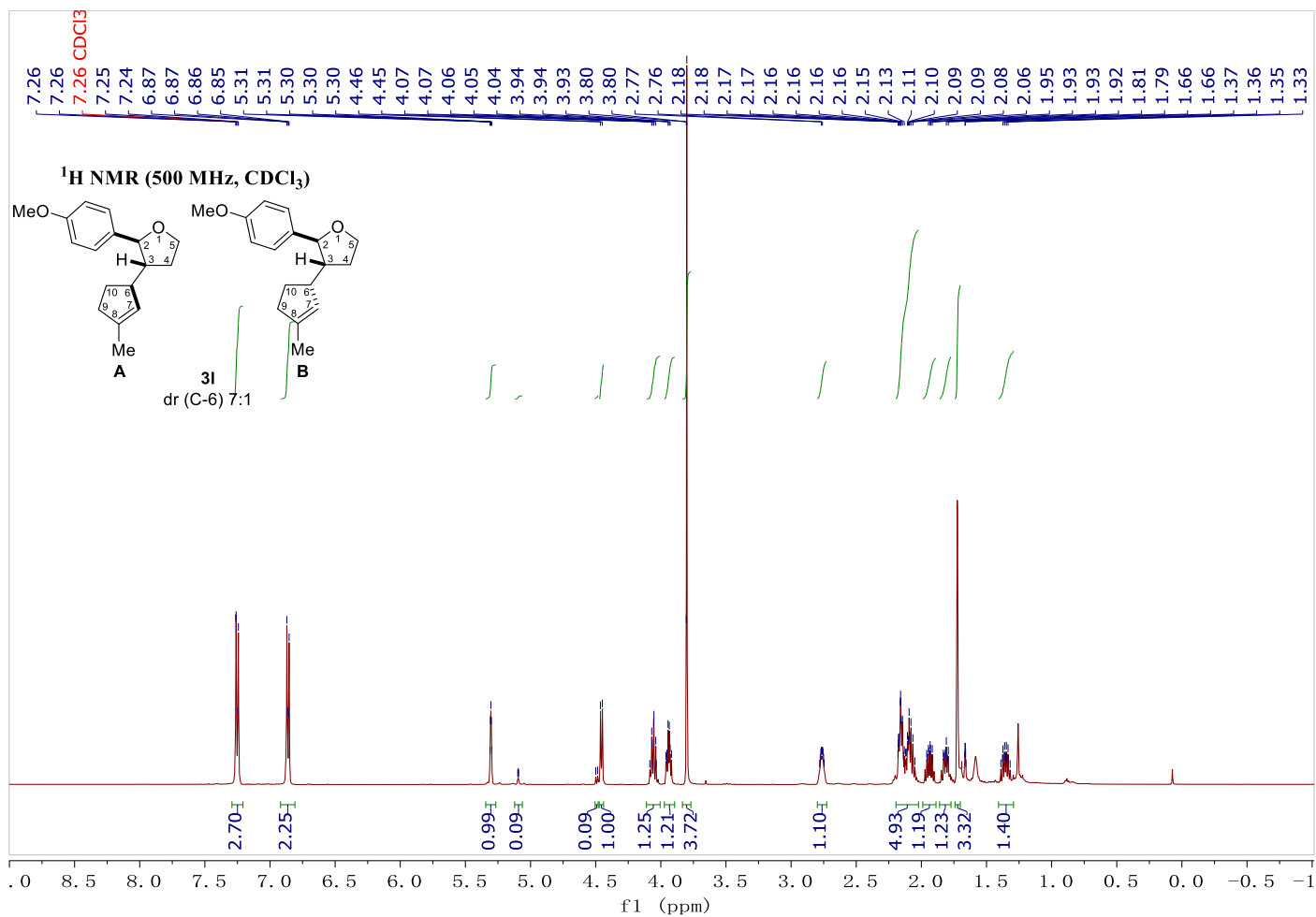
NOESY-2D (600 MHz, CDCl₃)

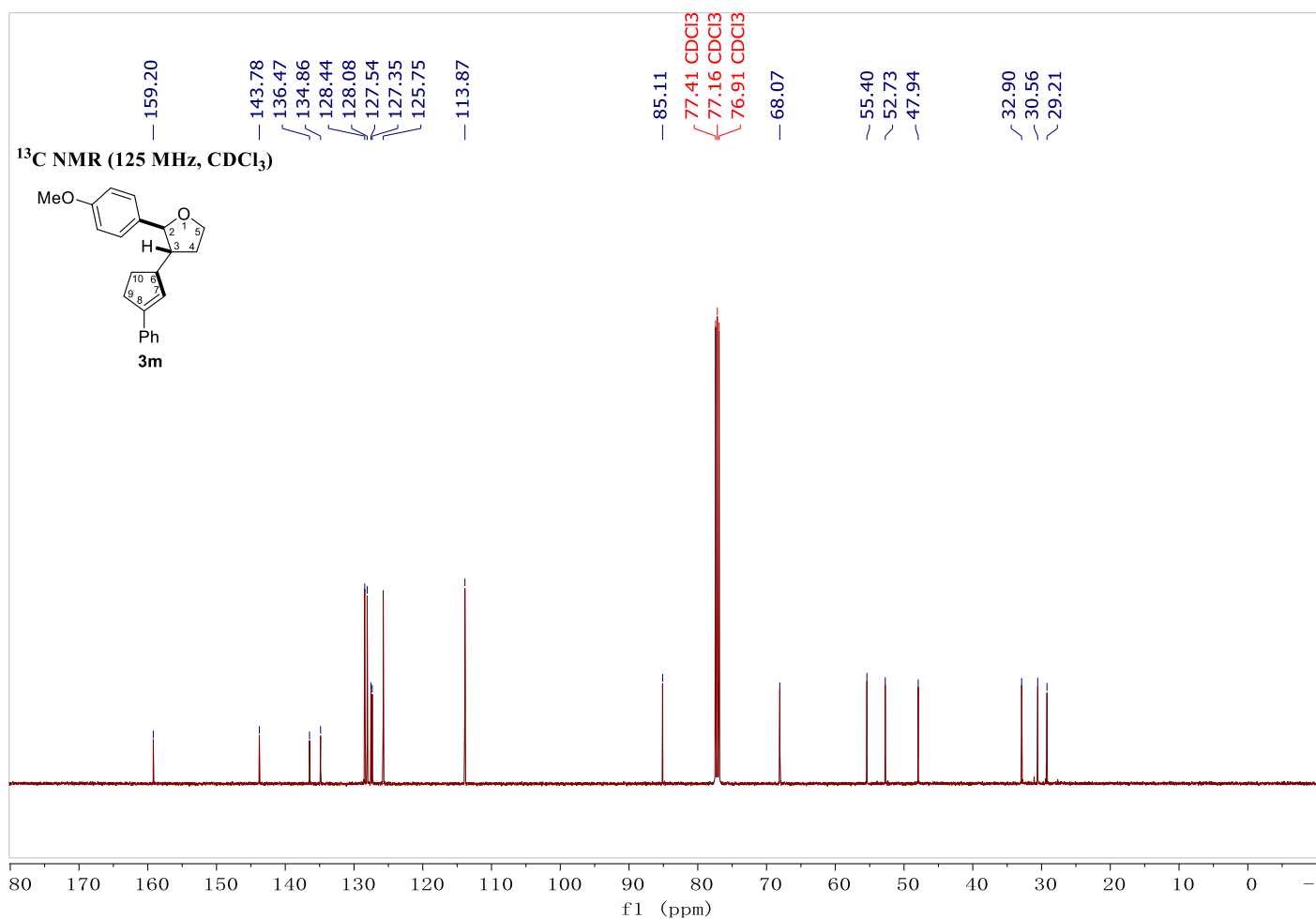
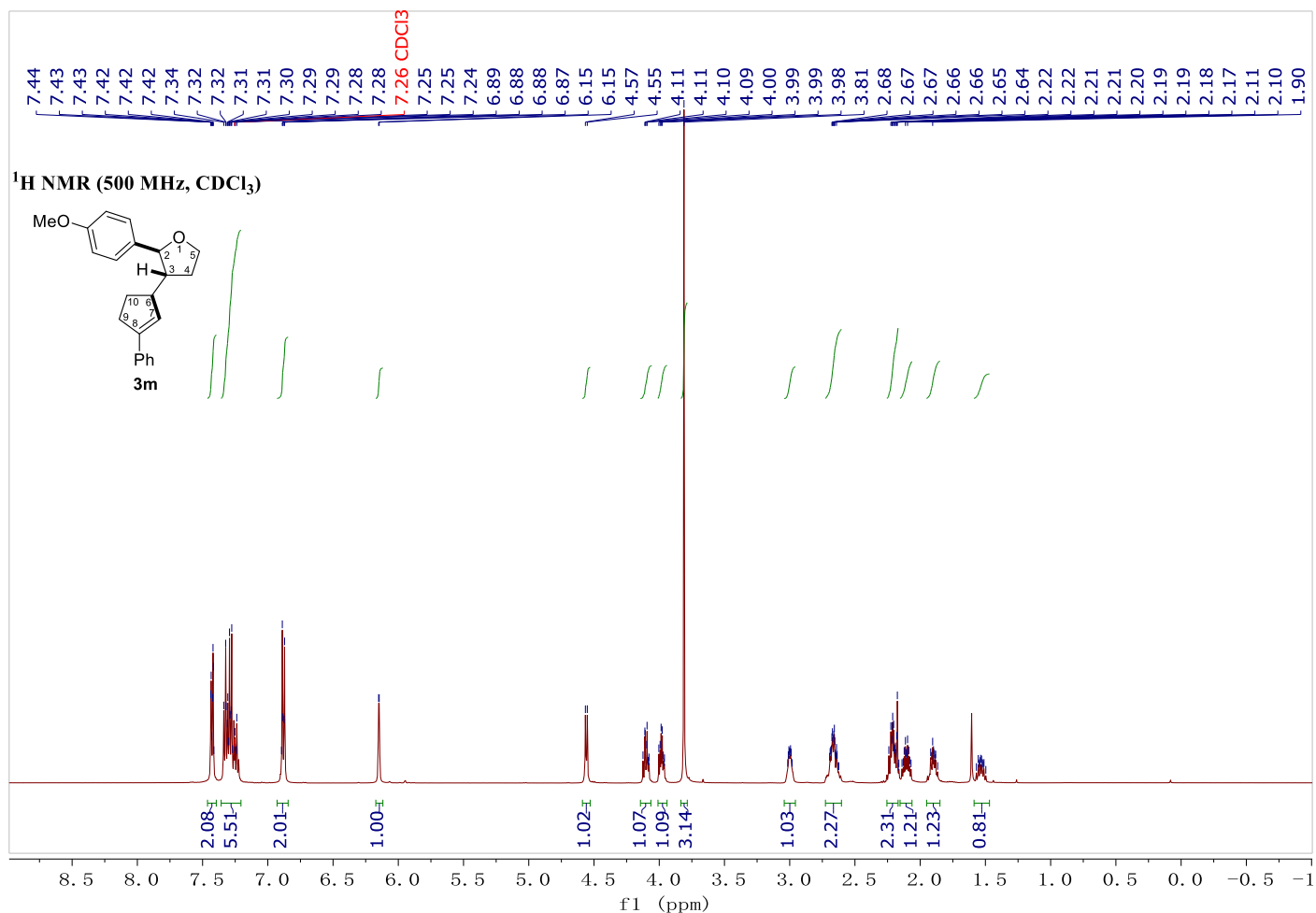




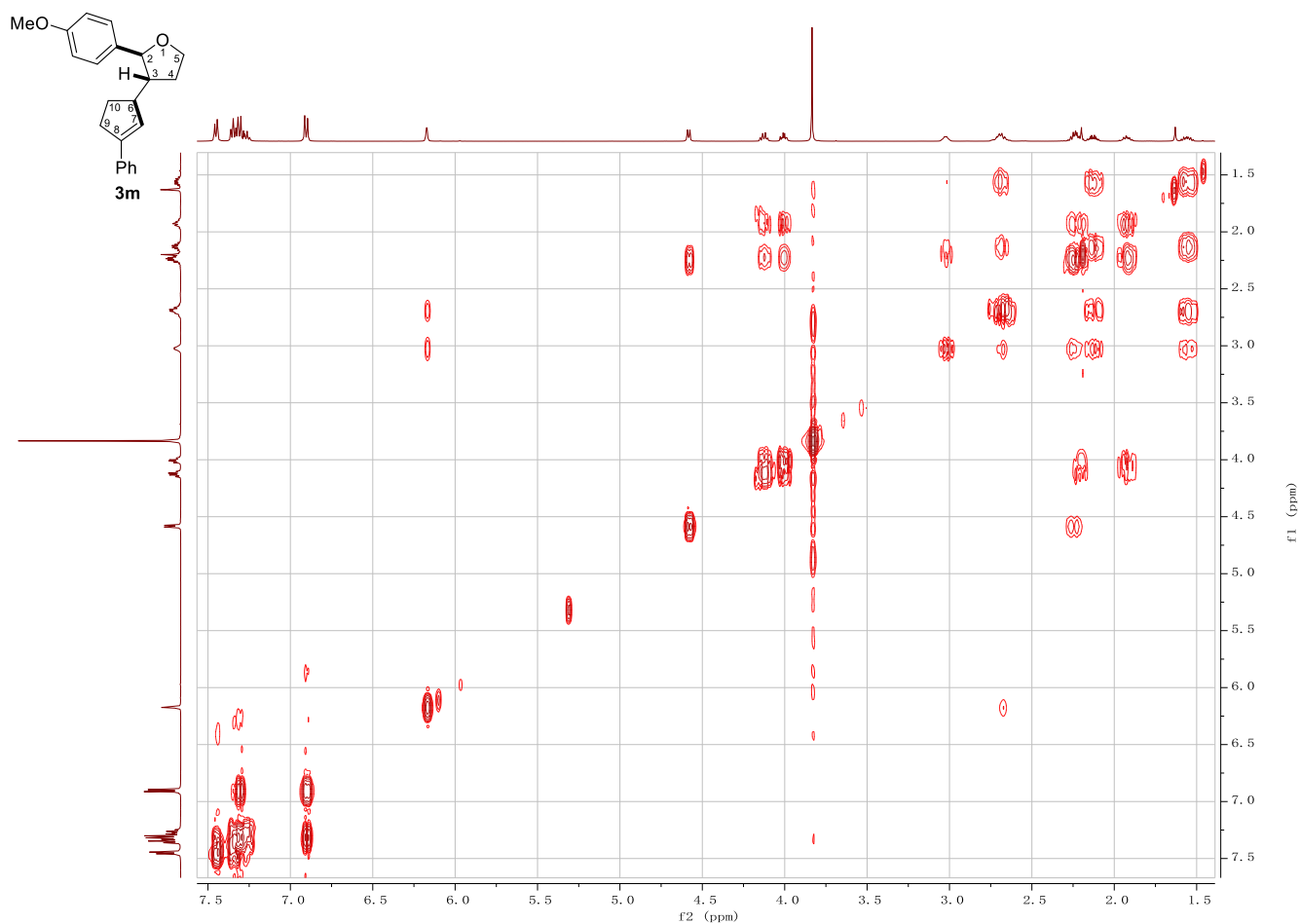




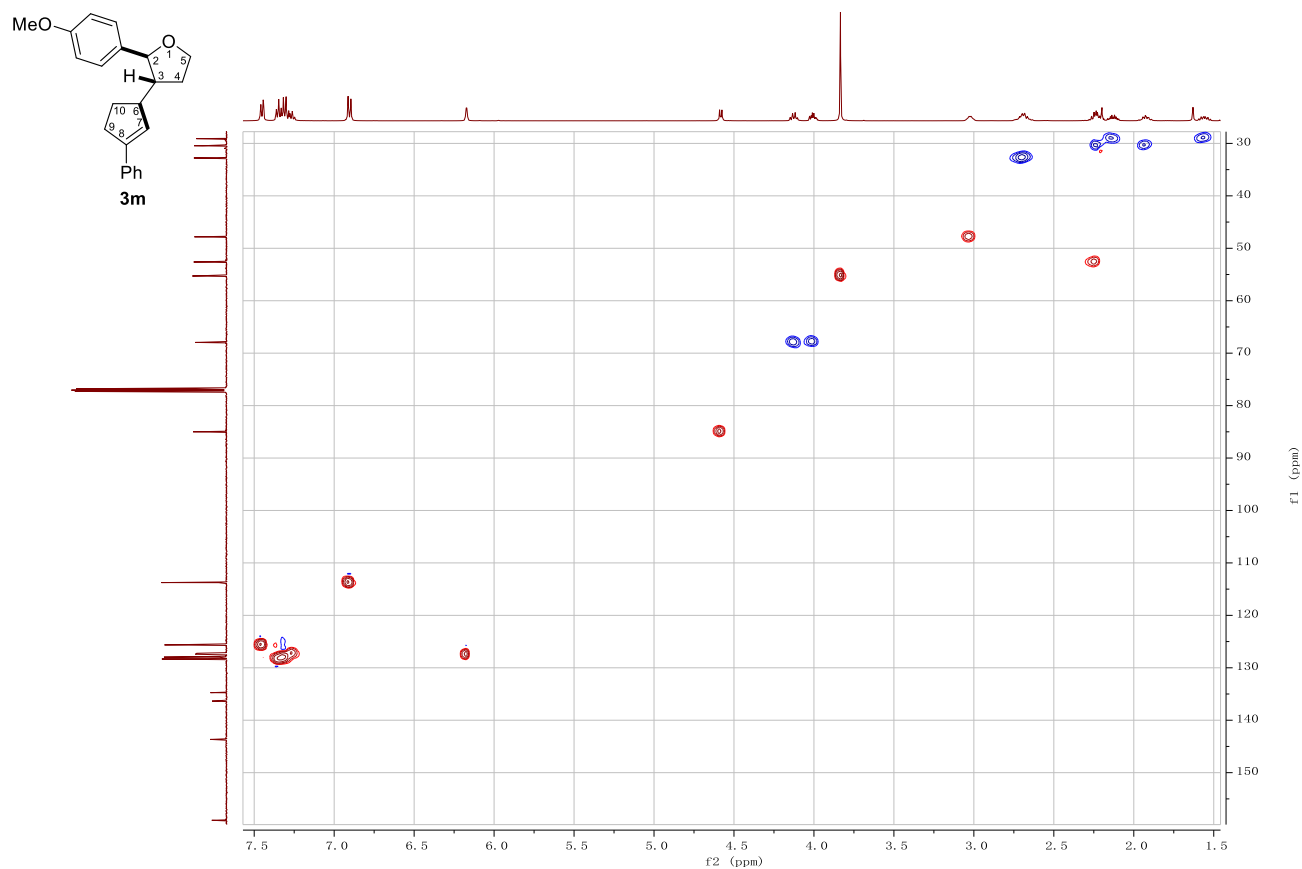




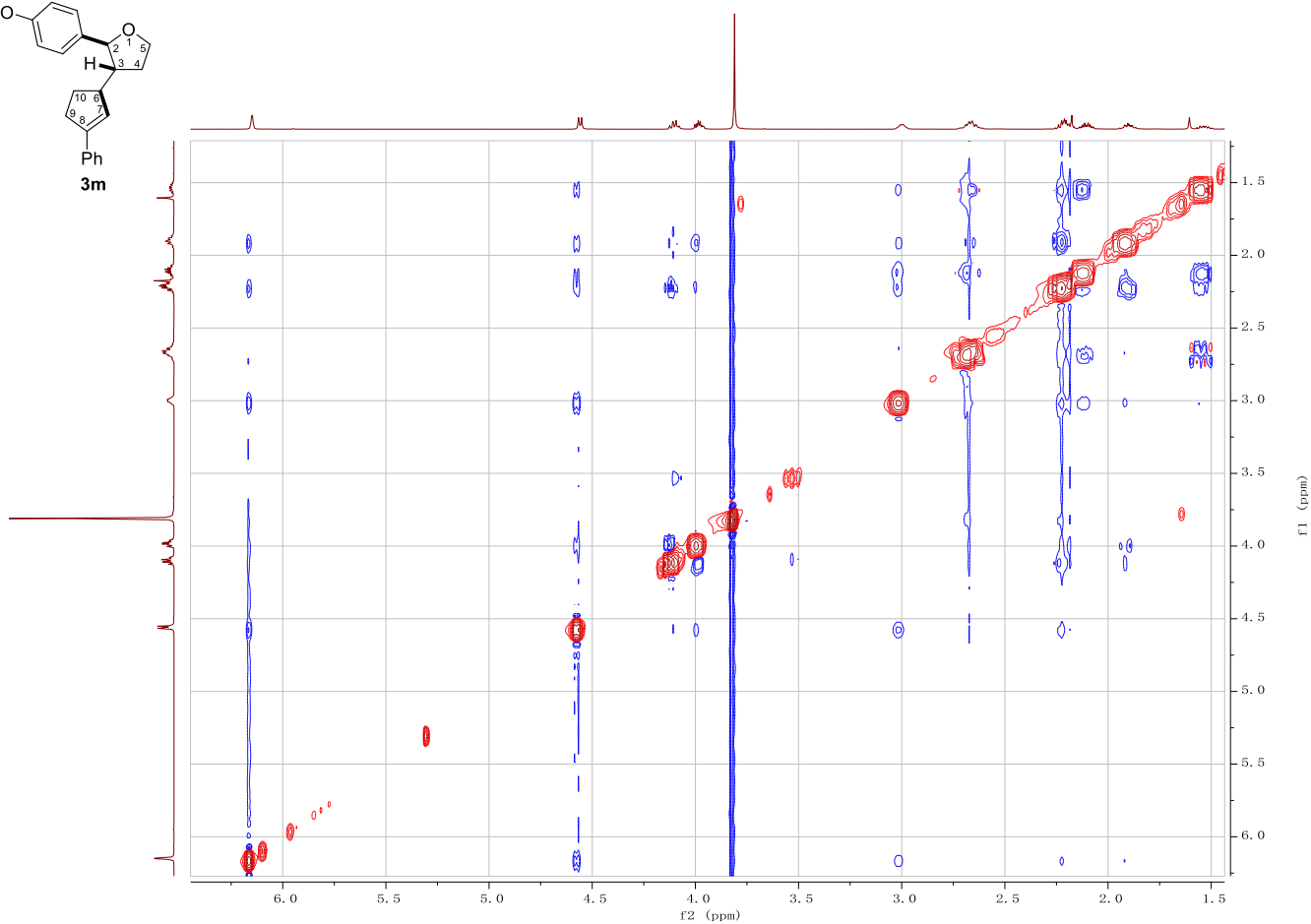
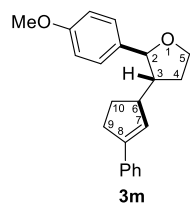
$^1\text{H} - ^1\text{H}$ COSY - 90 (500 MHz, CDCl_3)

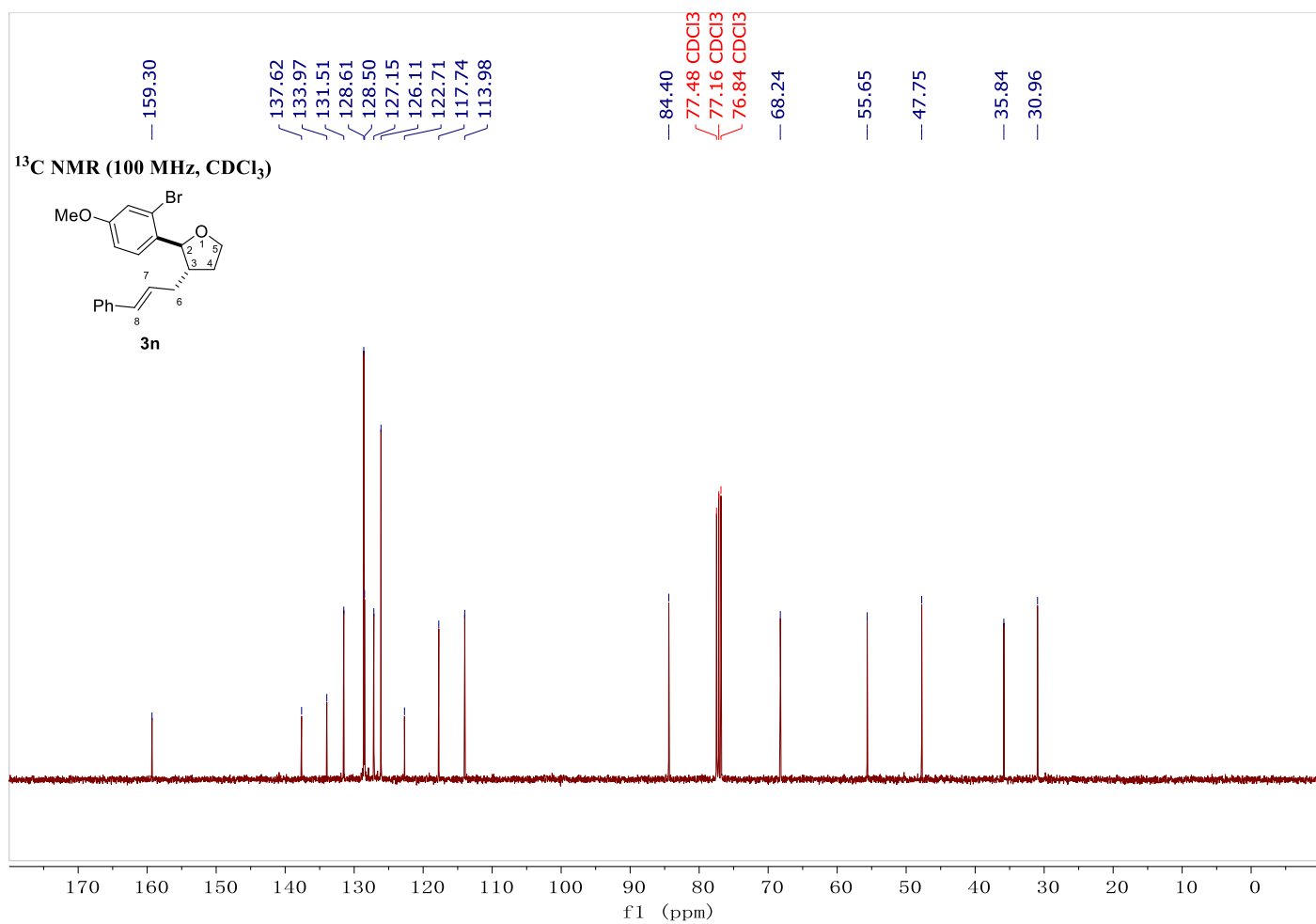
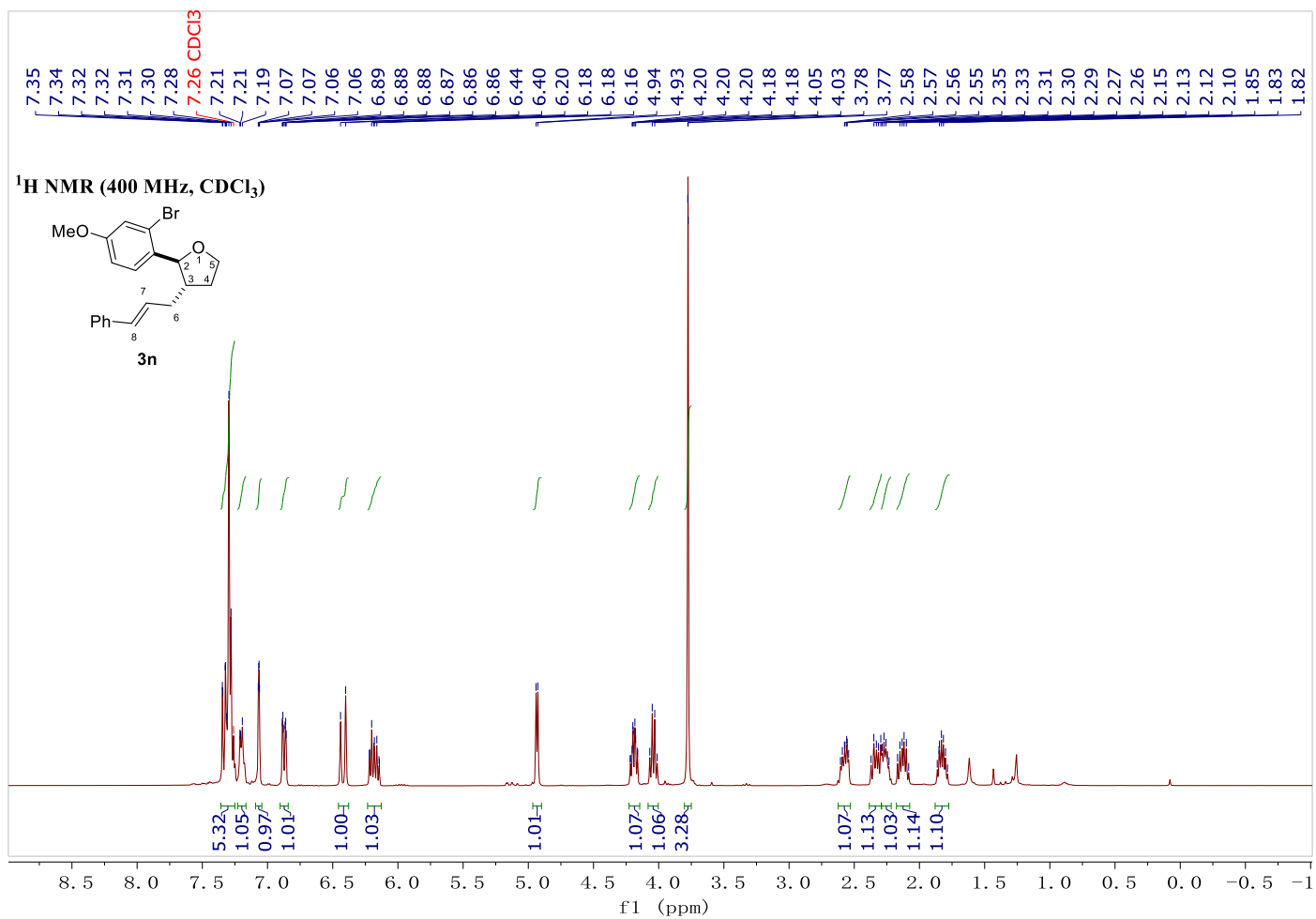


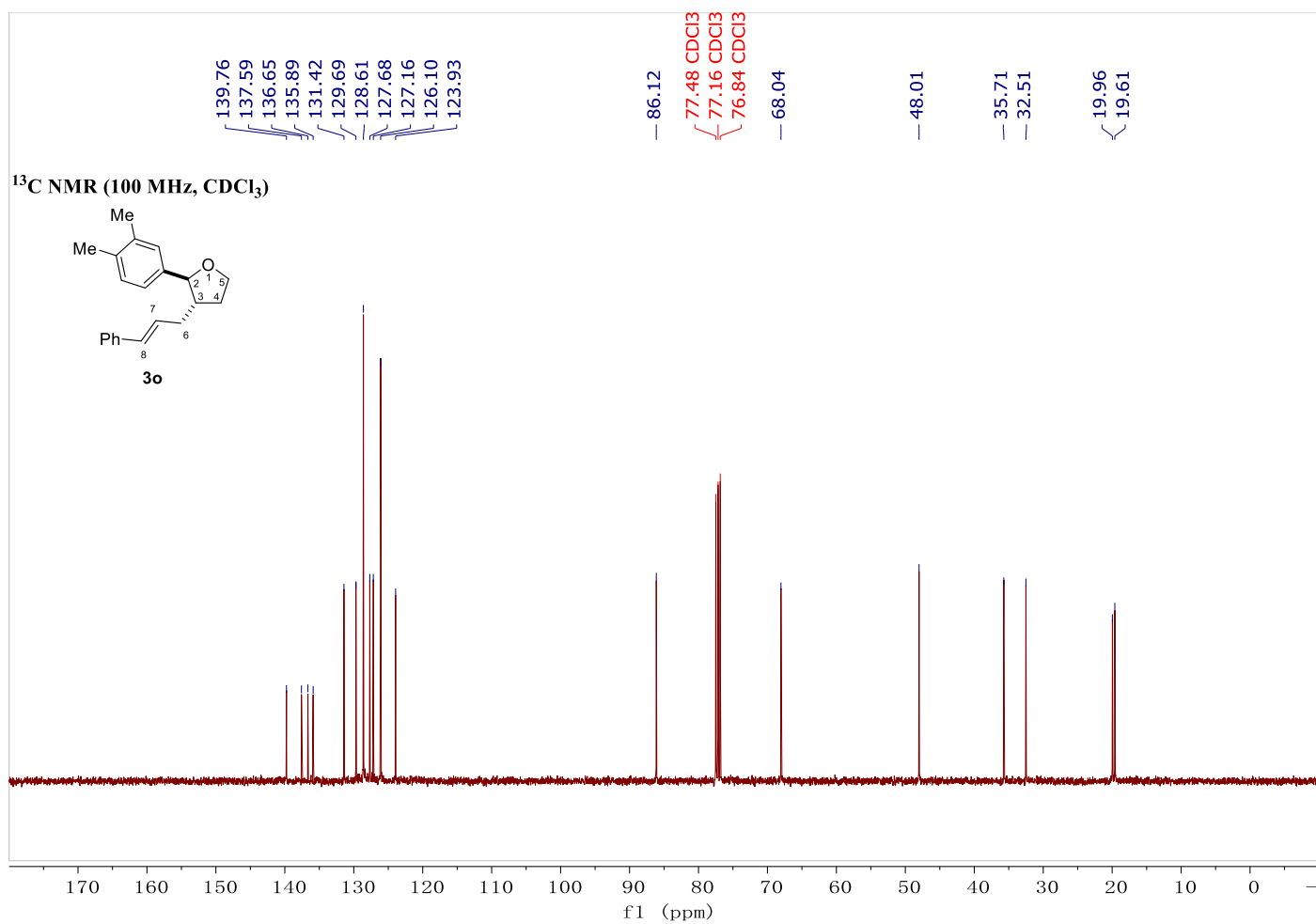
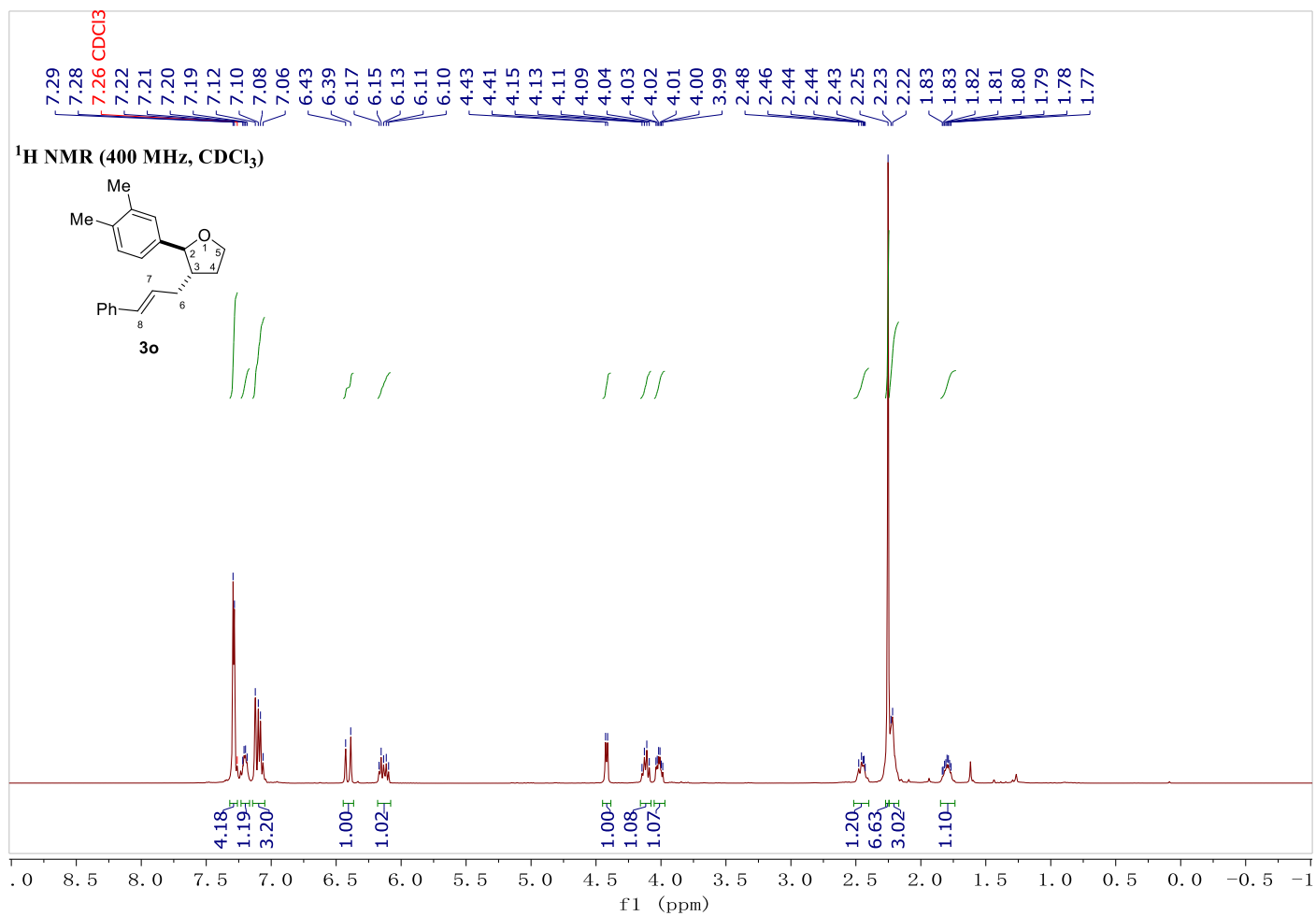
^1H (500 MHz) - ^{13}C (125 MHz) HSQC (CDCl_3)

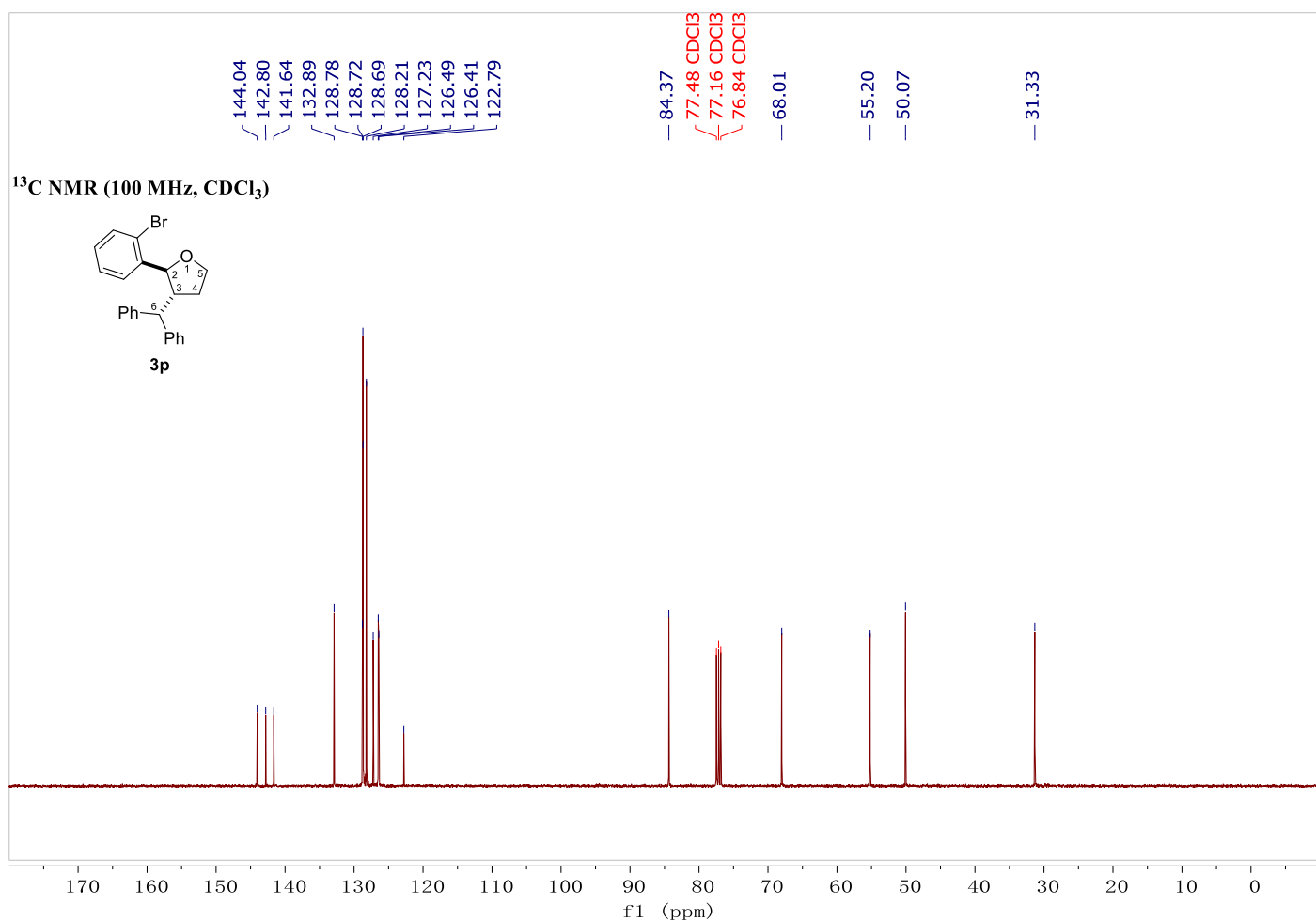
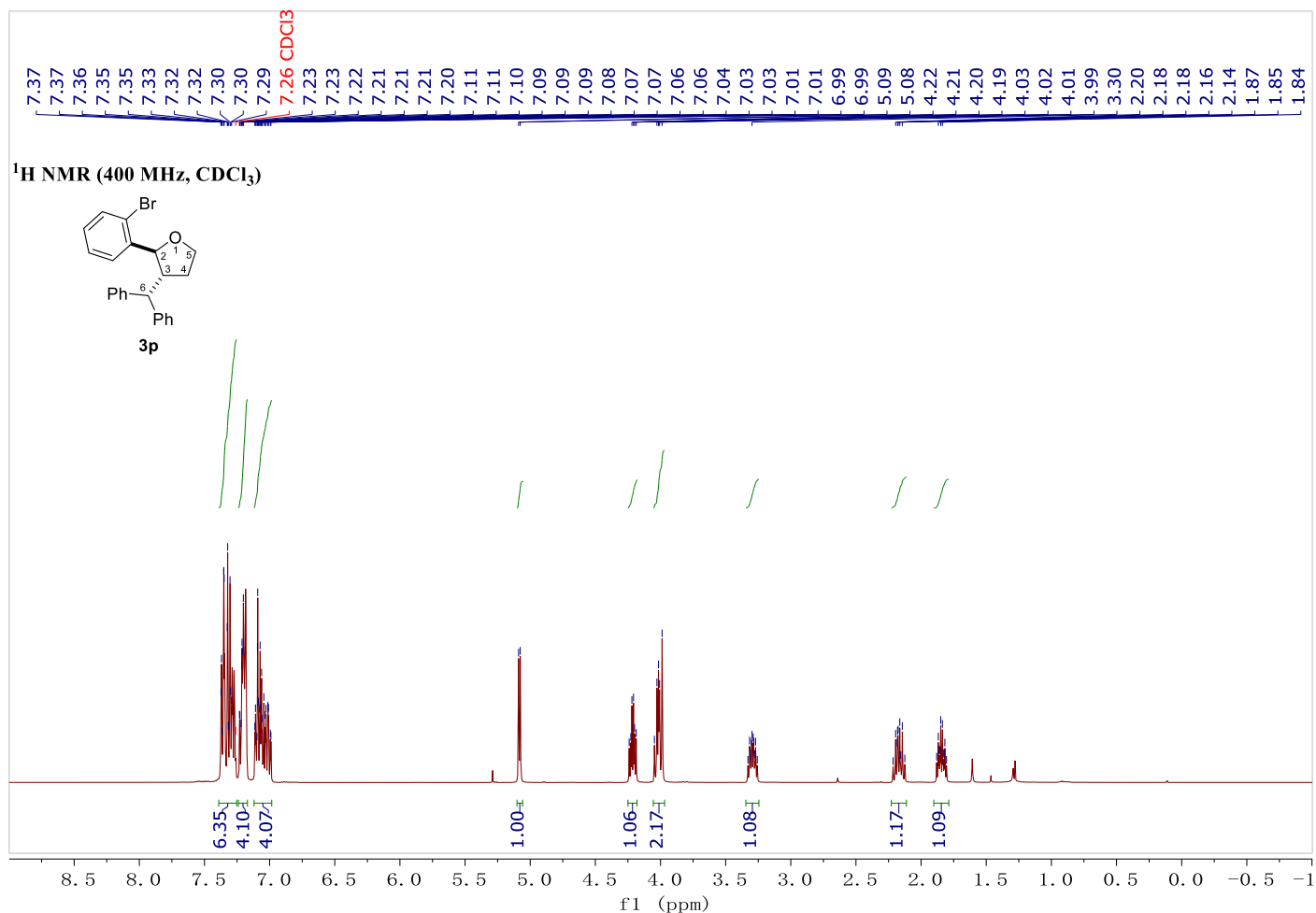


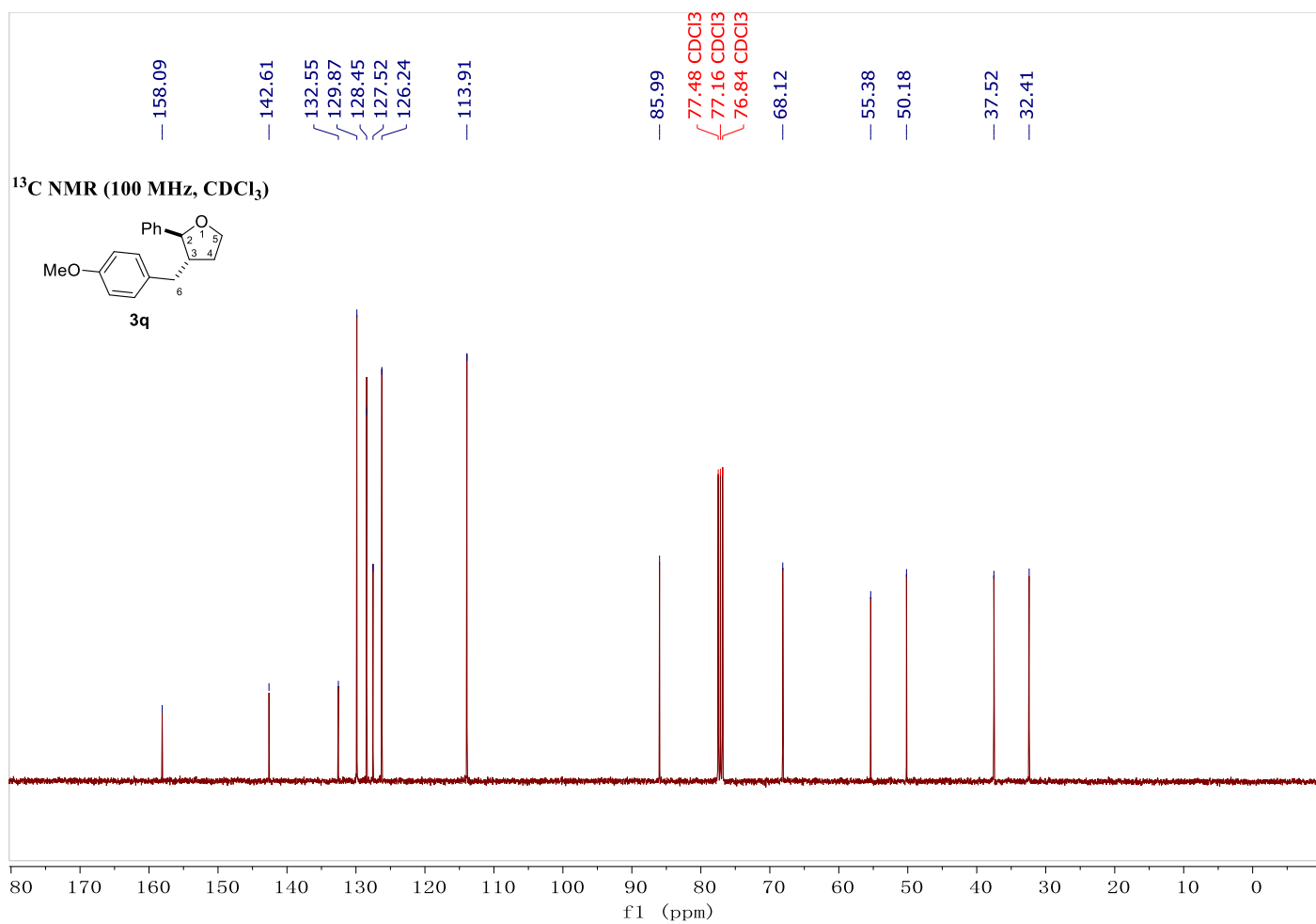
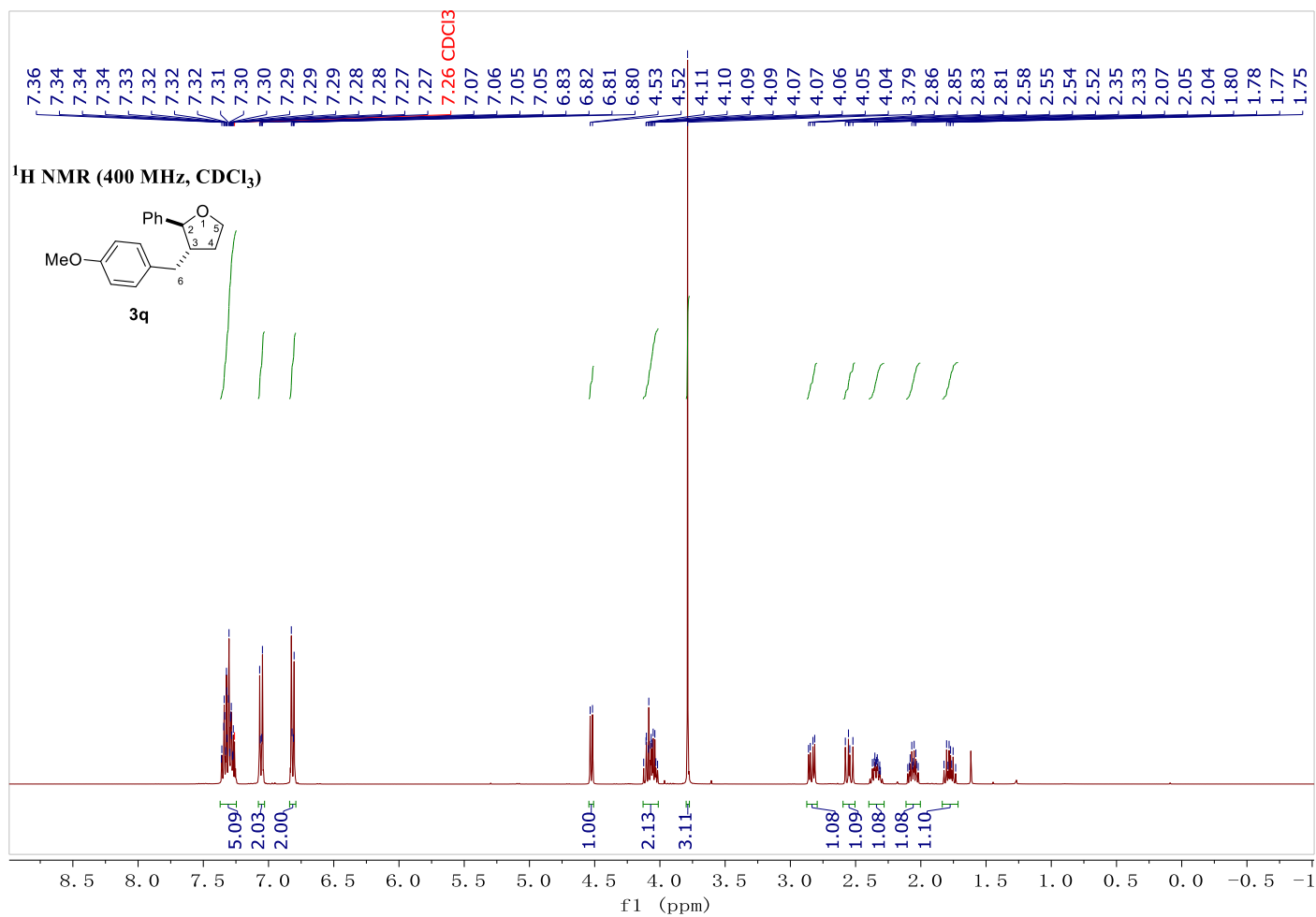
NOESY-2D (500 MHz, CDCl₃)

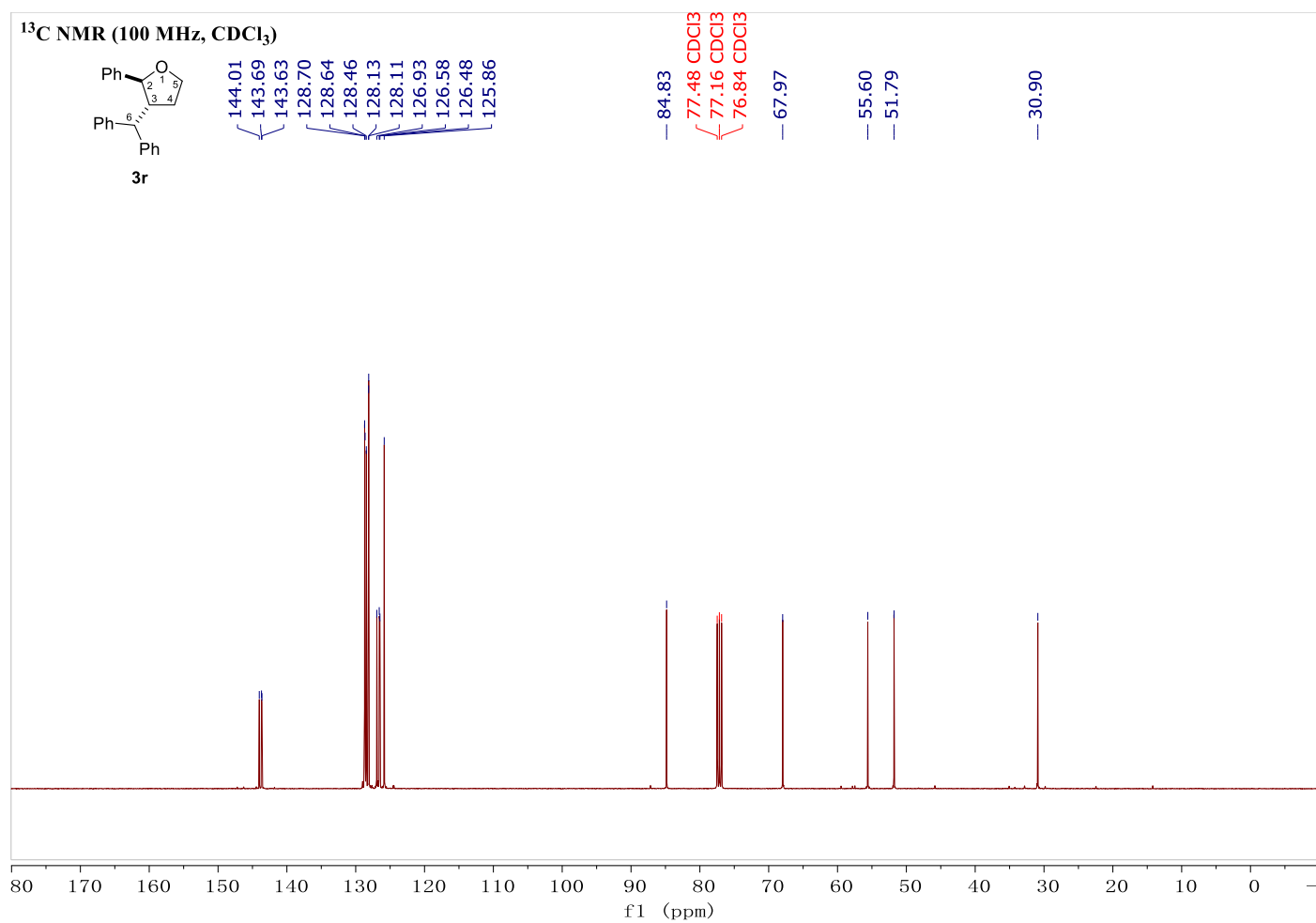
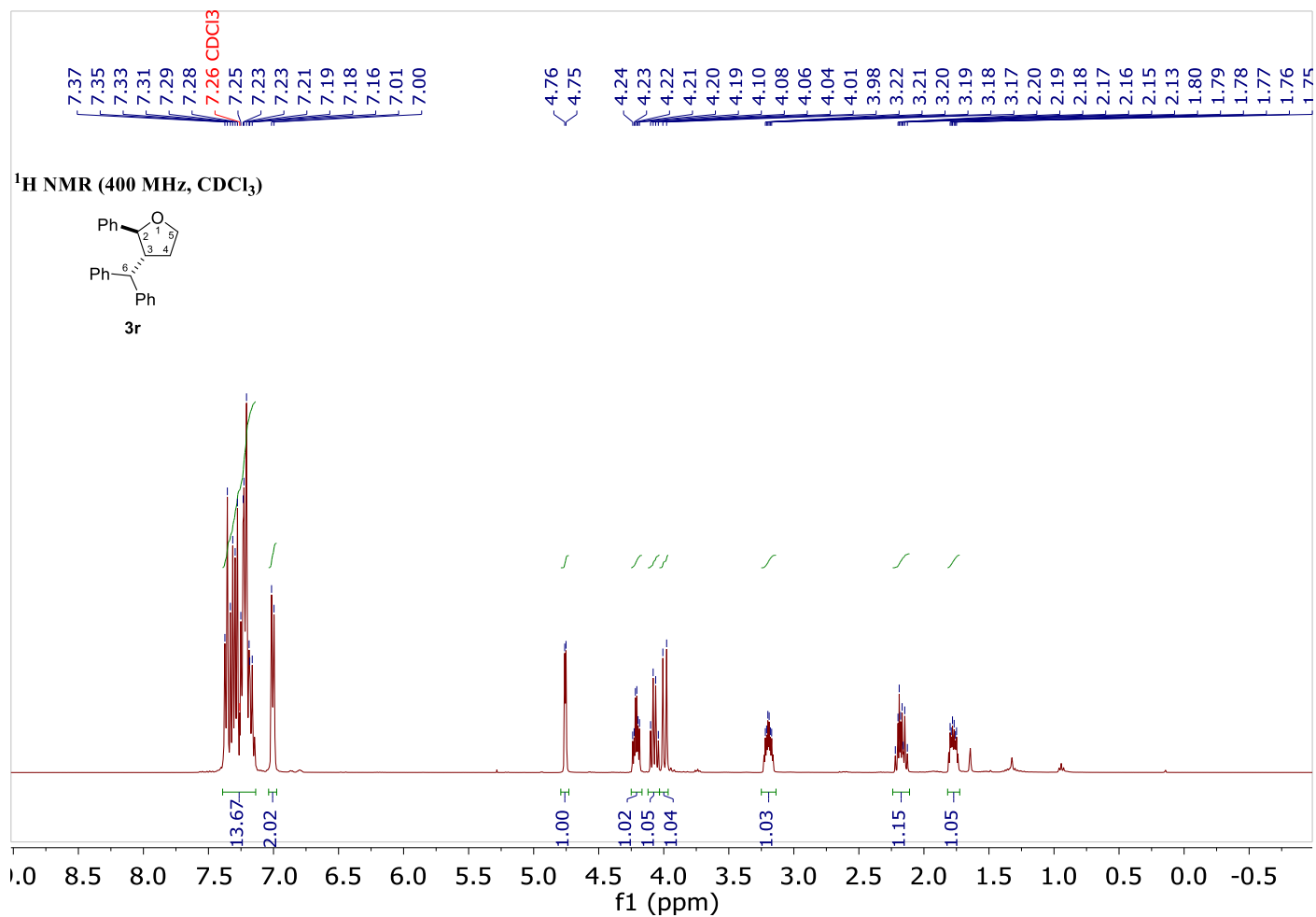


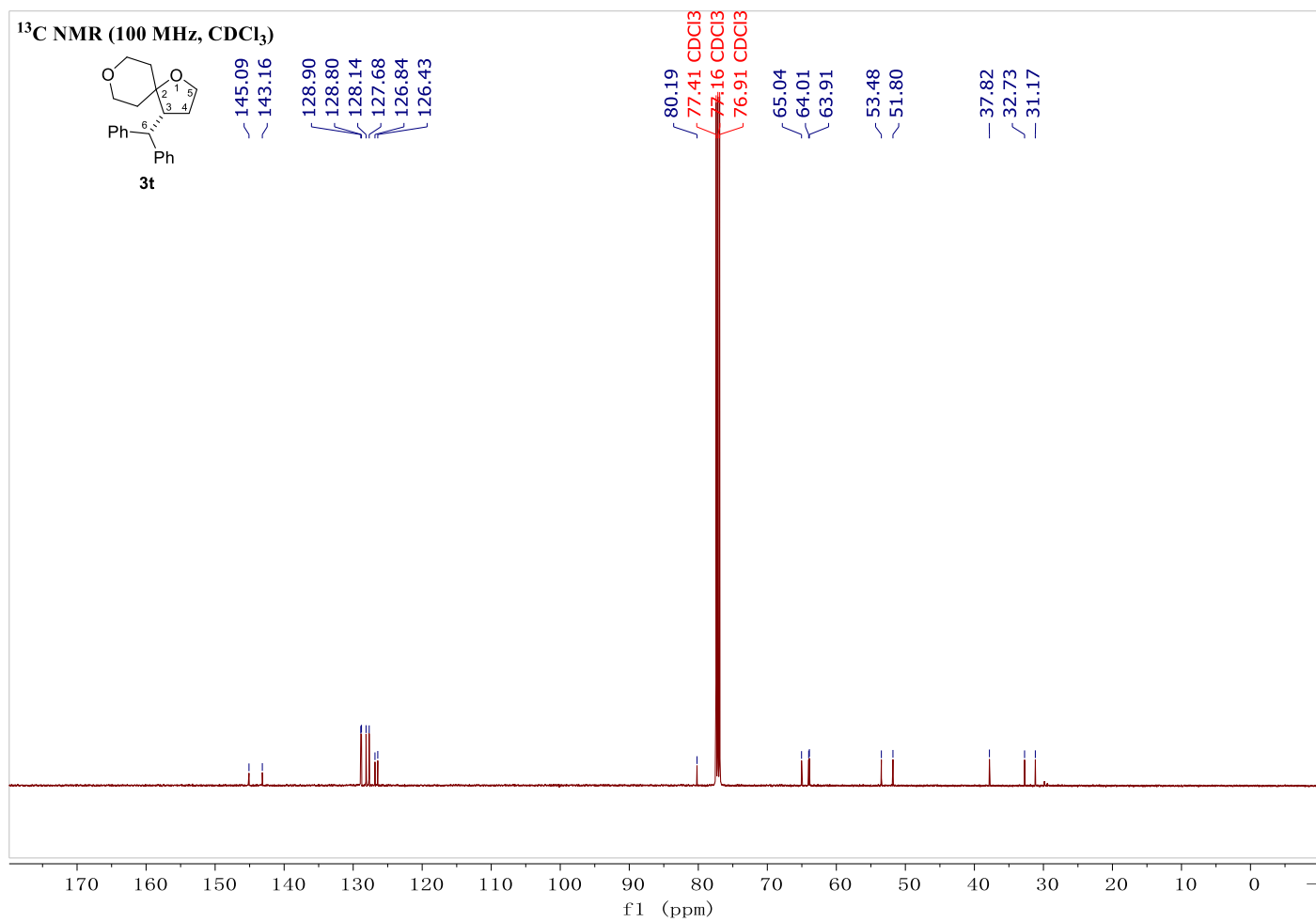
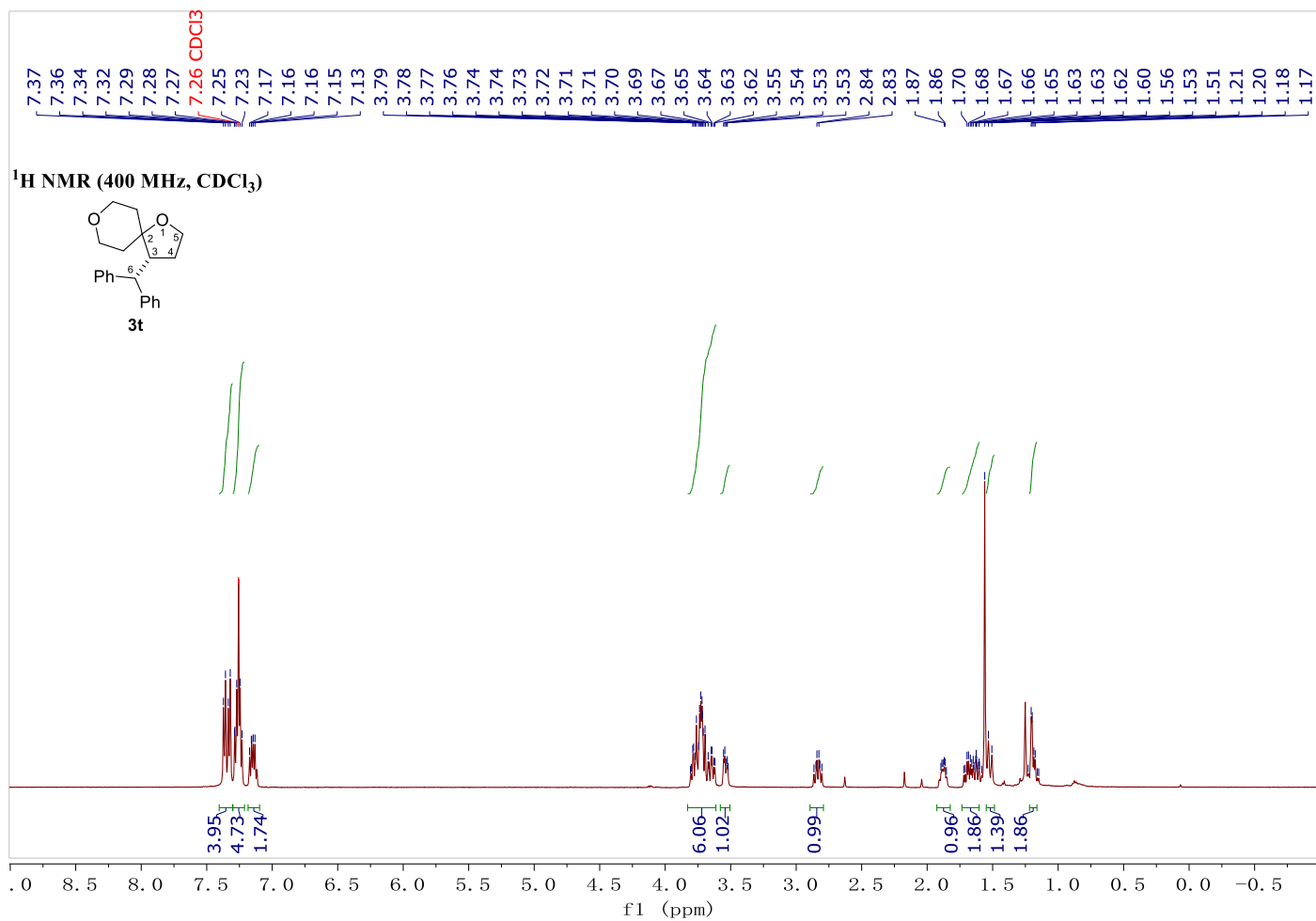


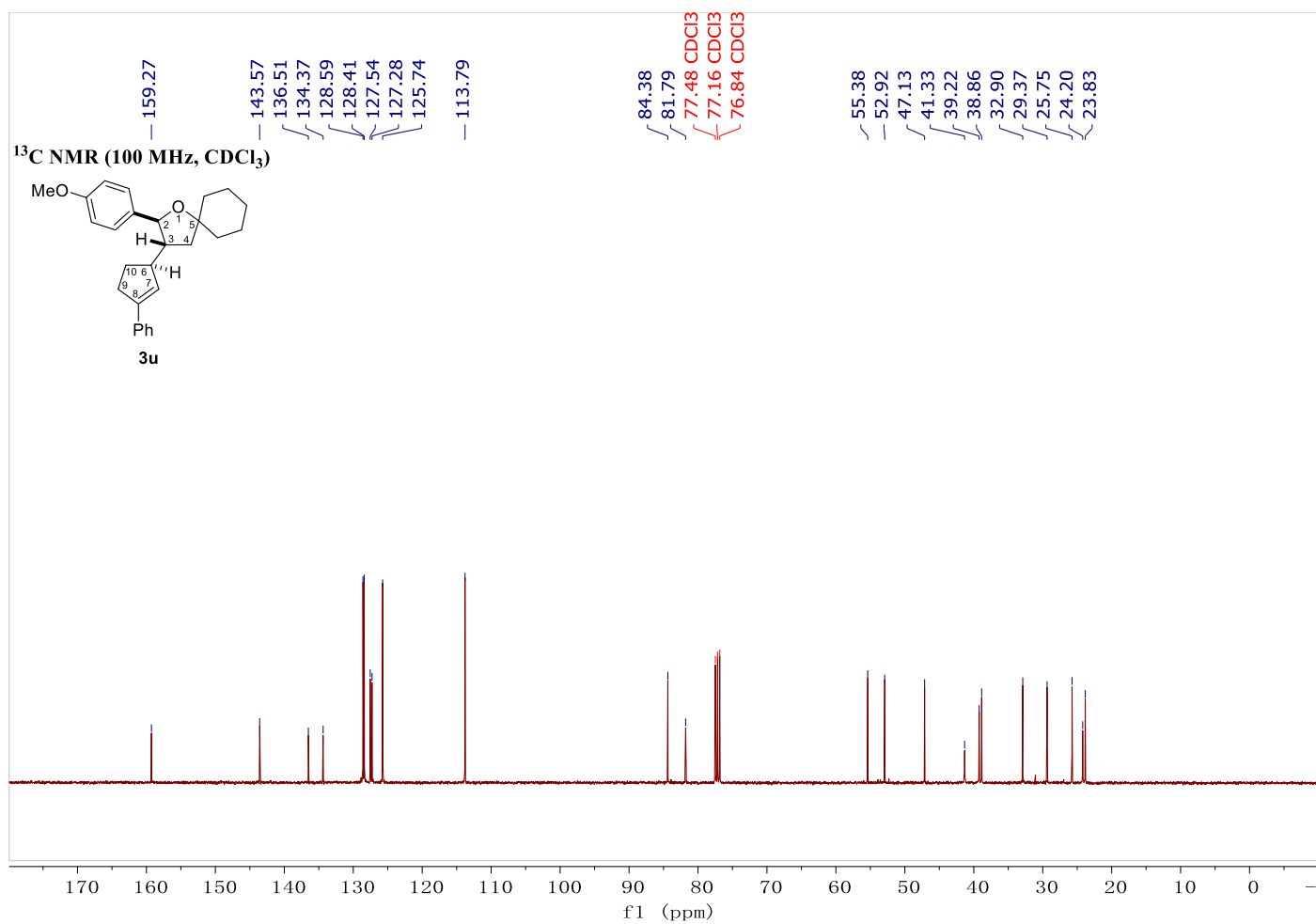
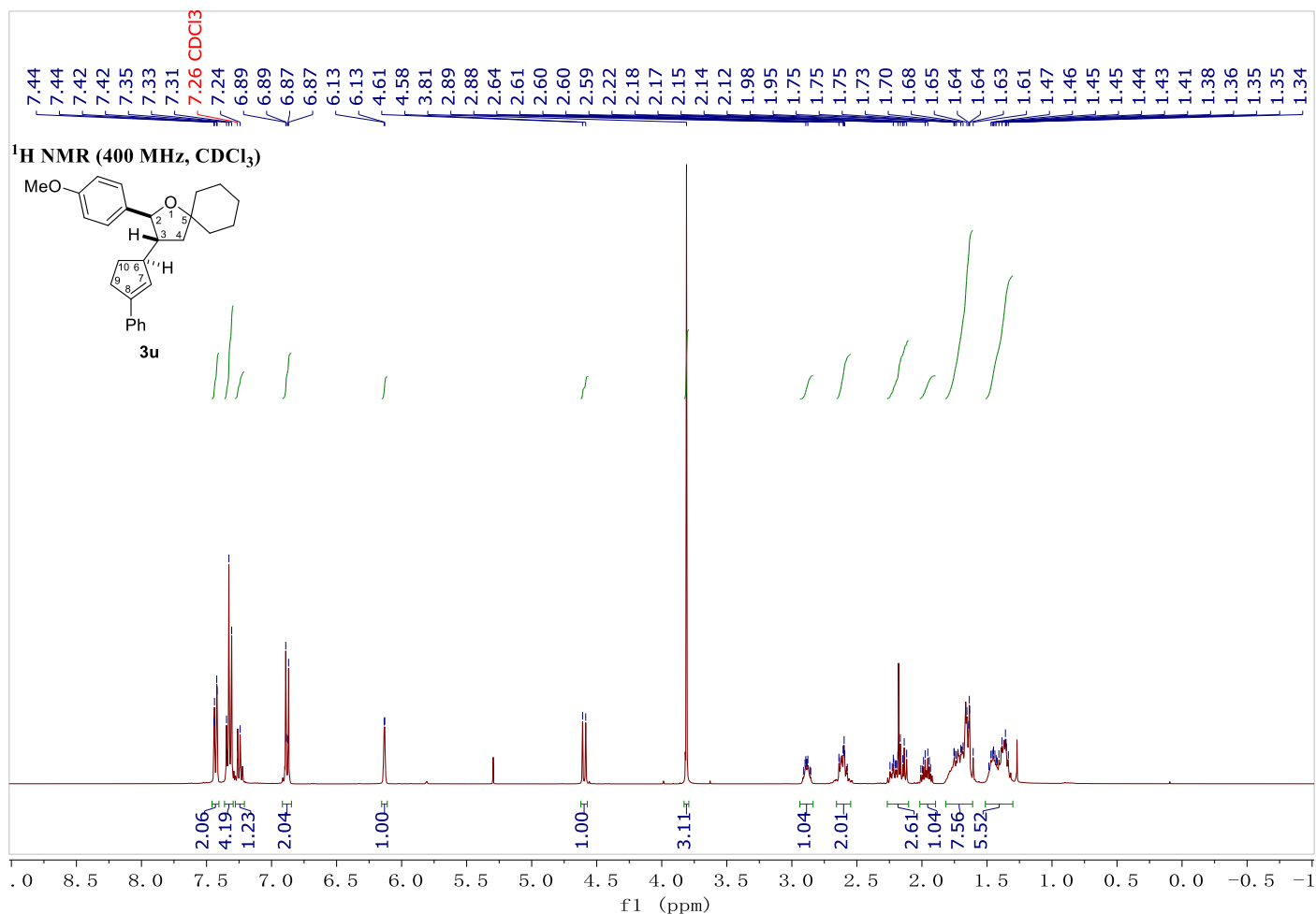


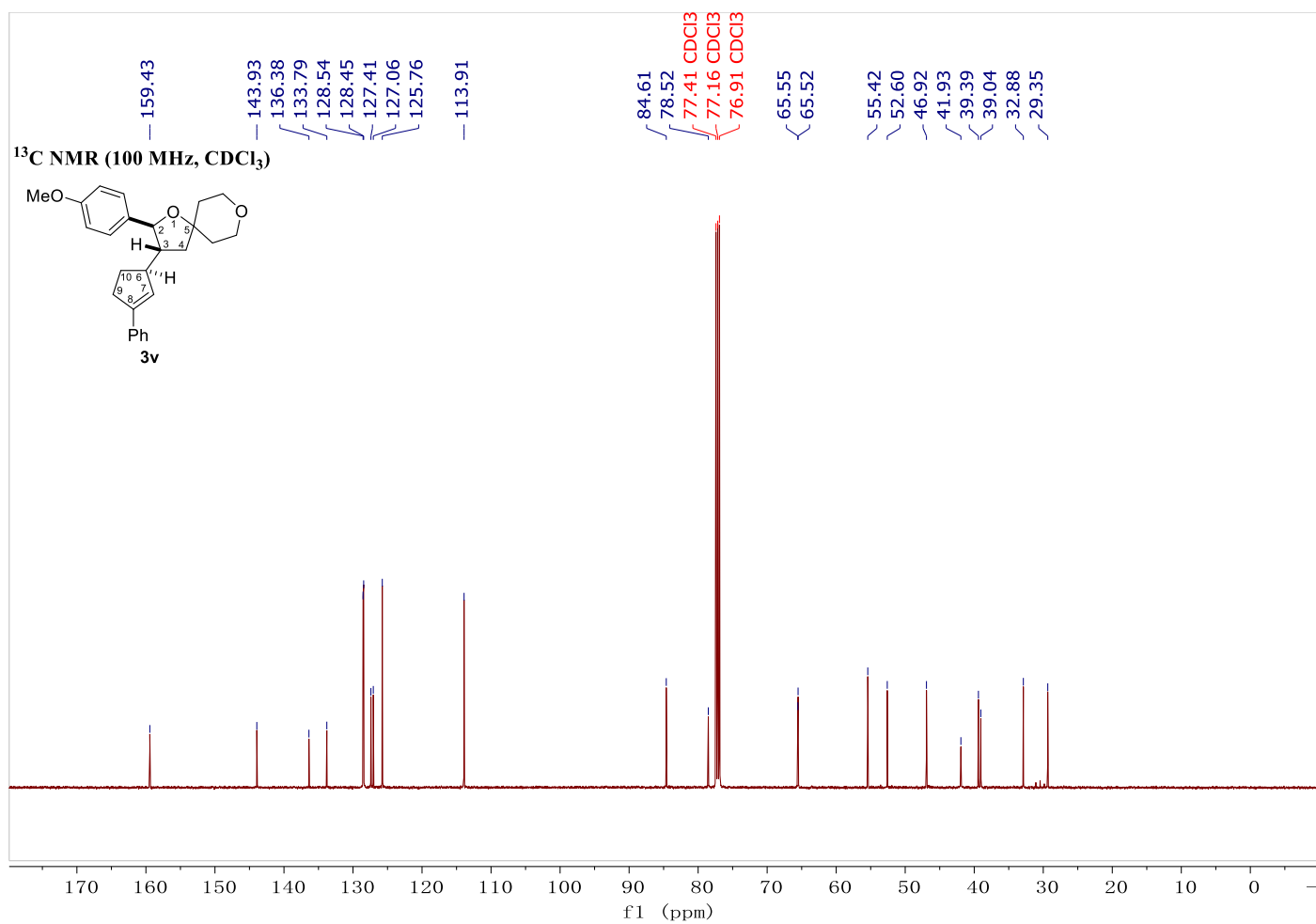
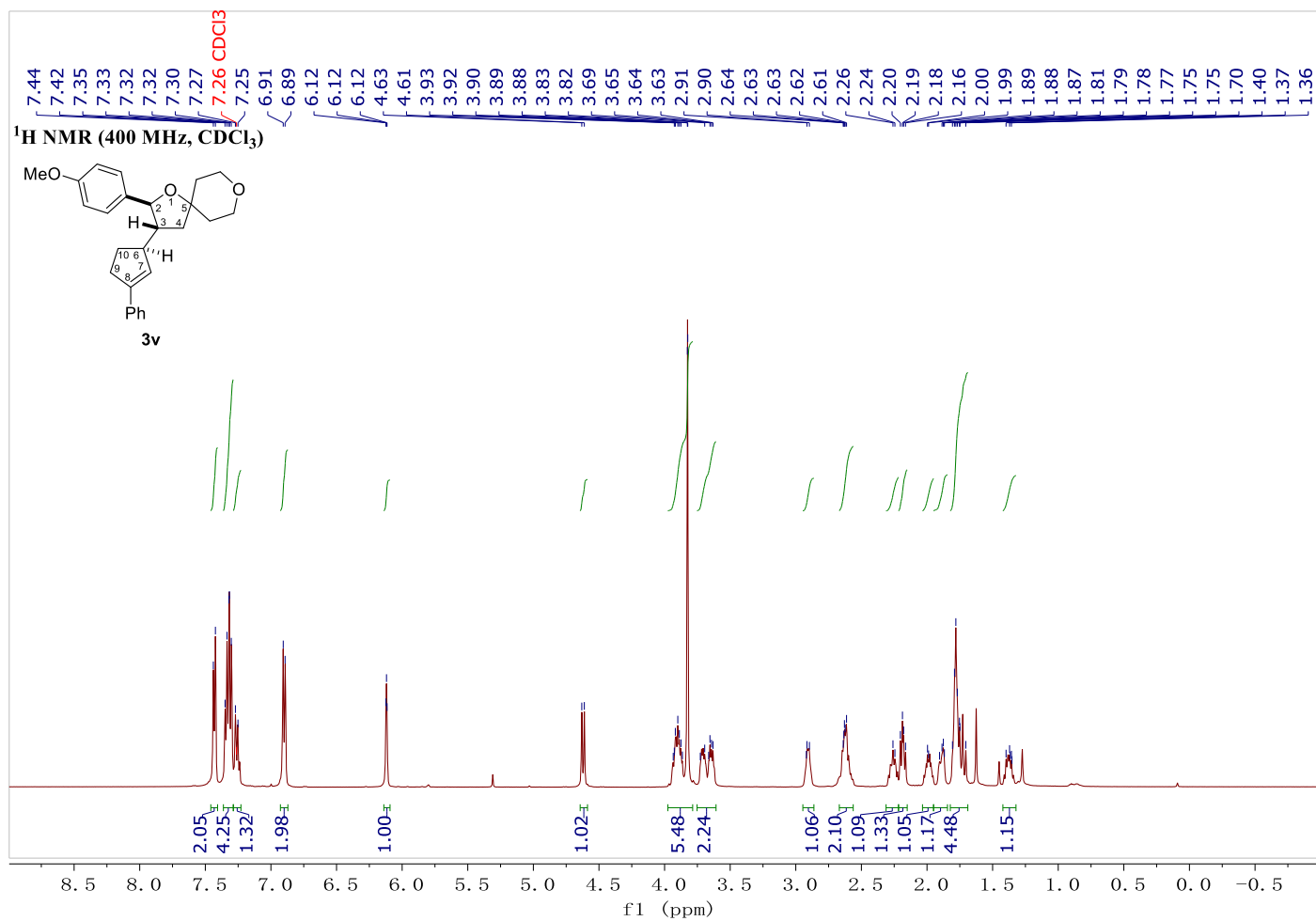


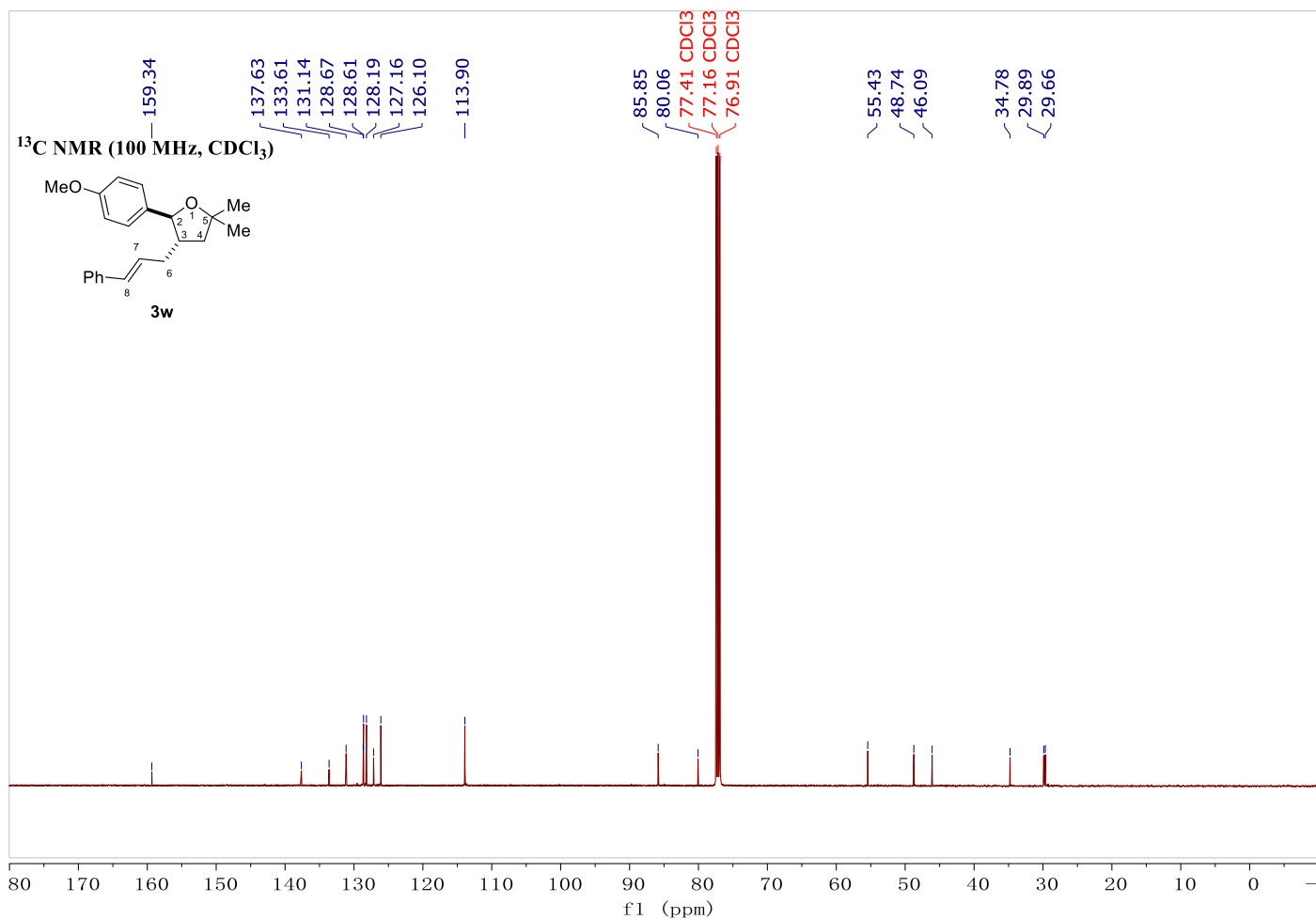
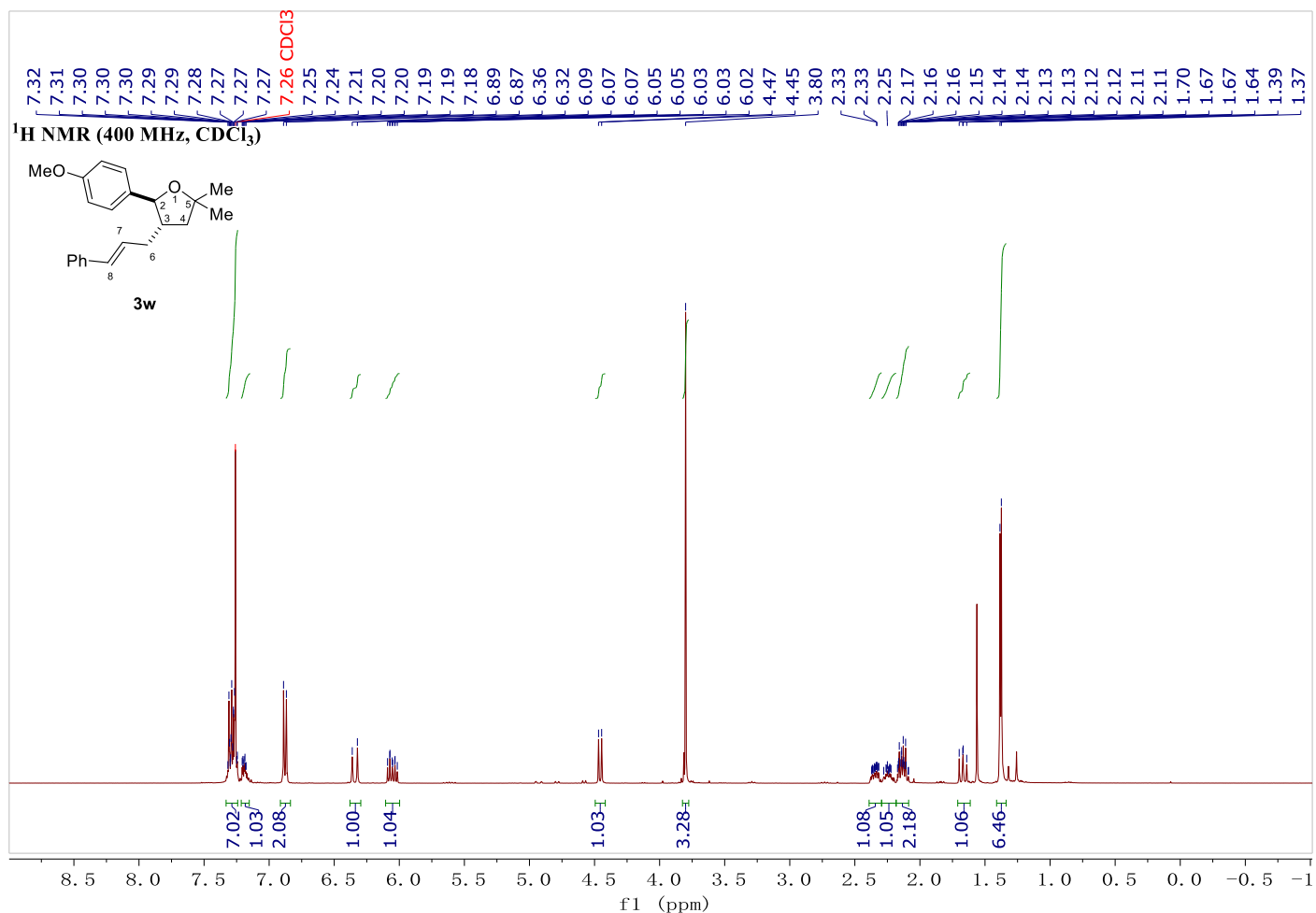


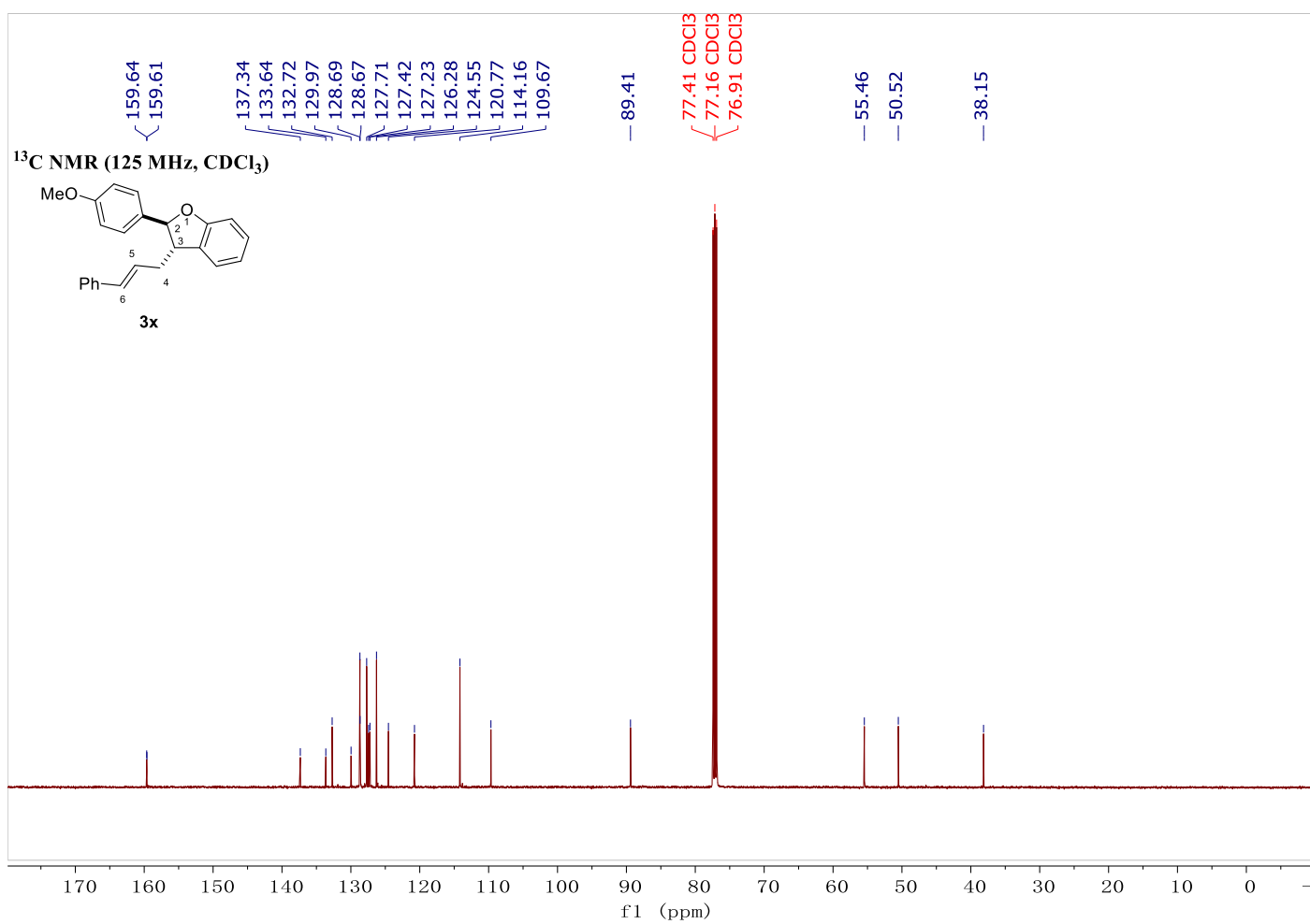
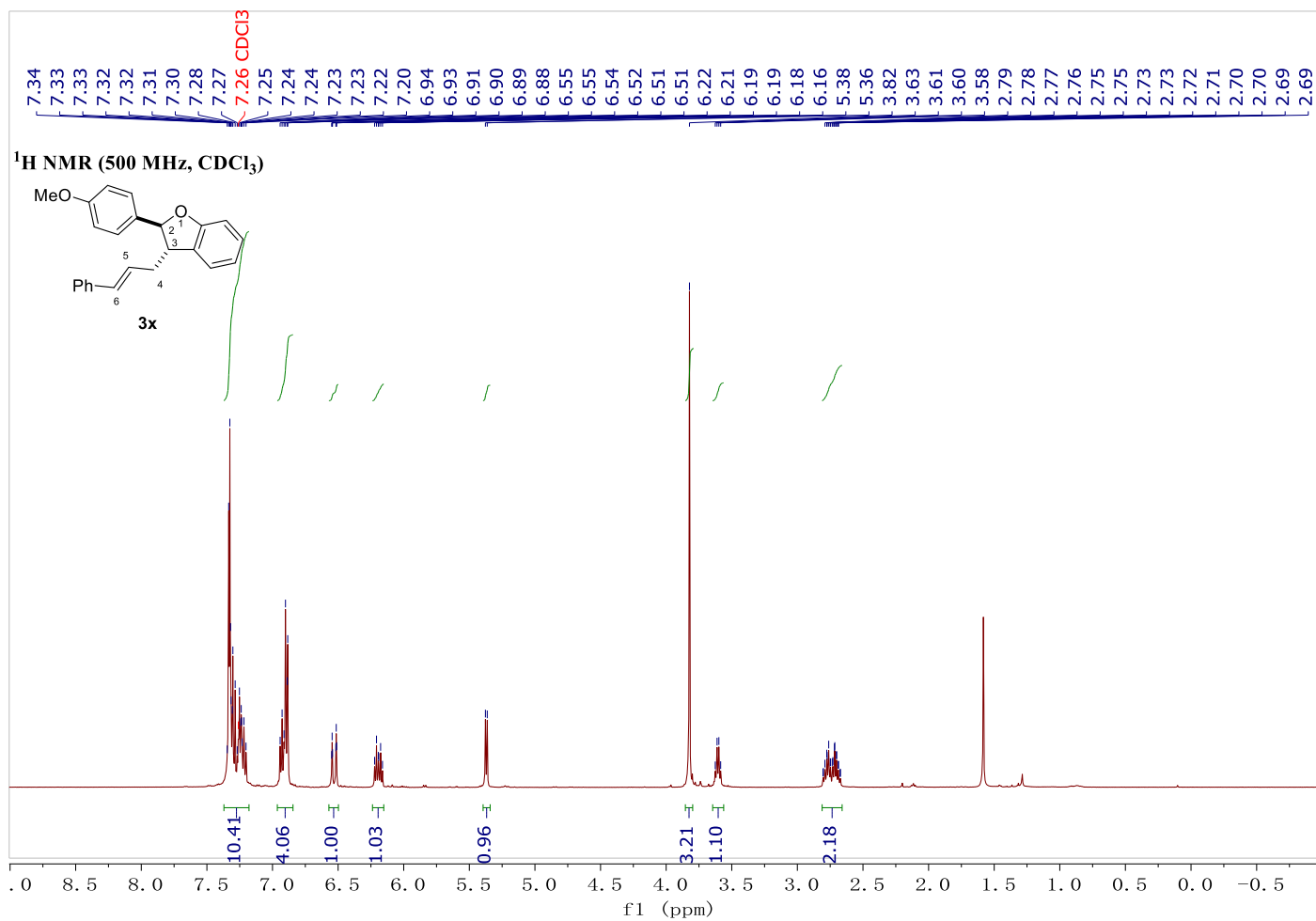




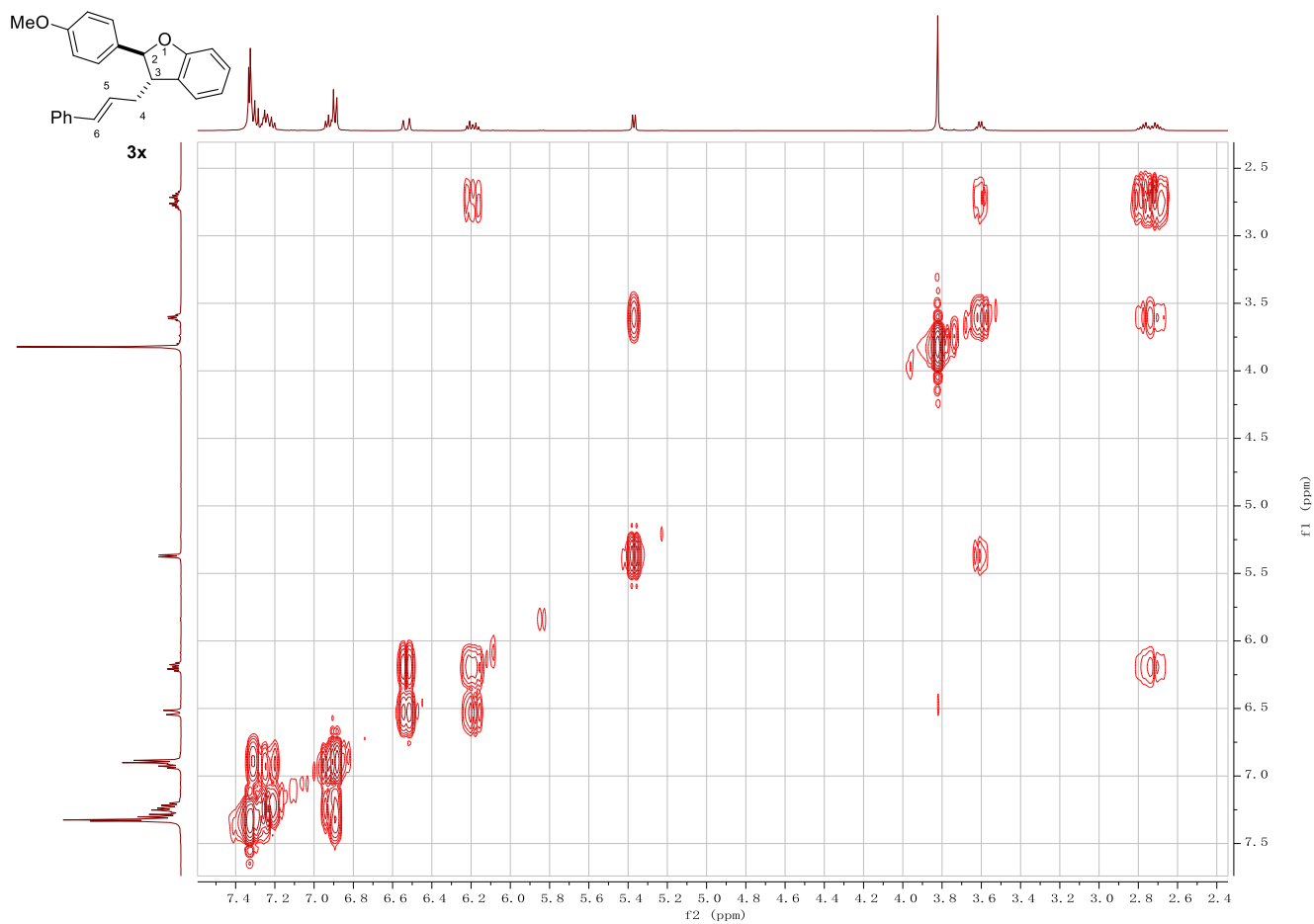




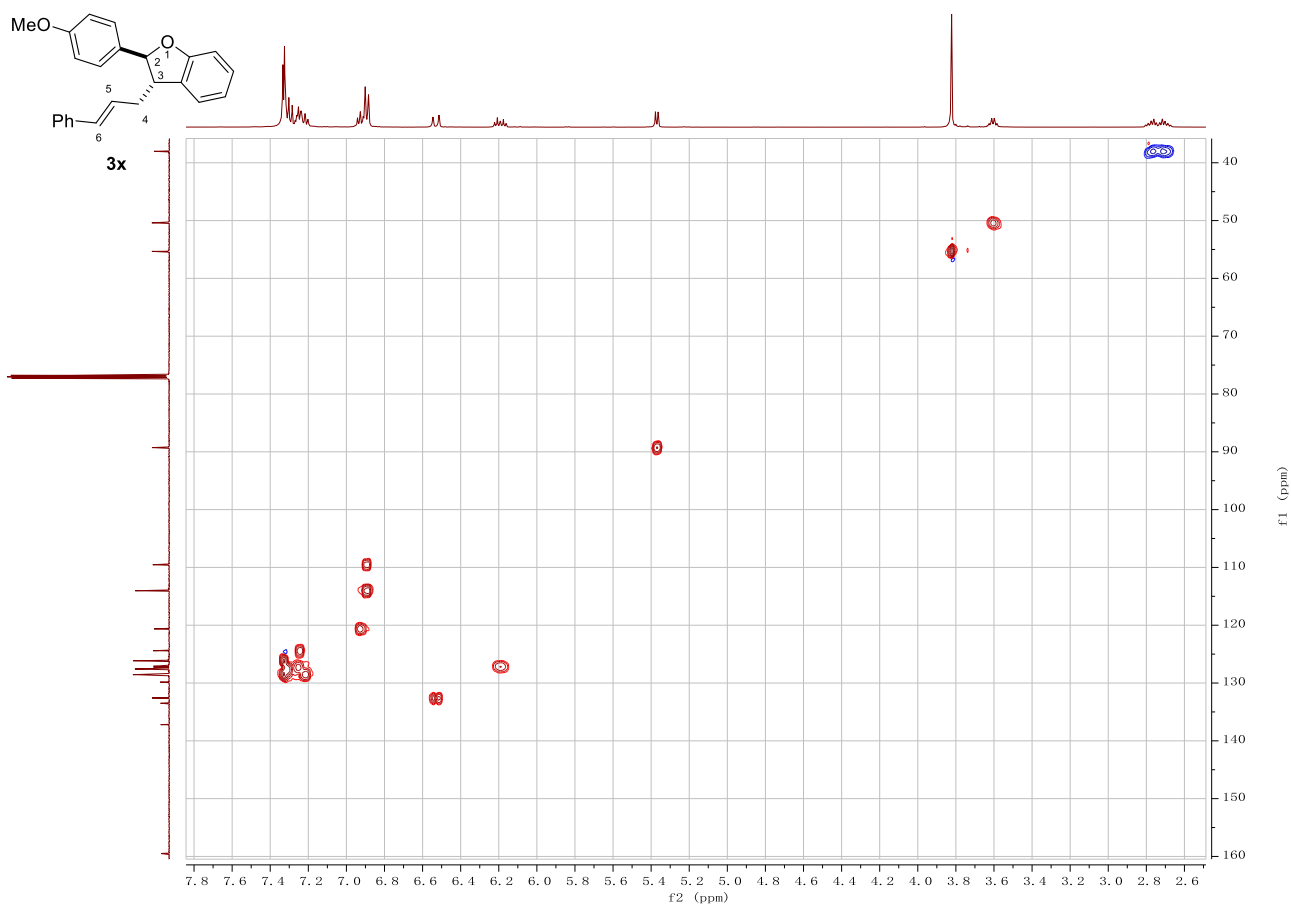




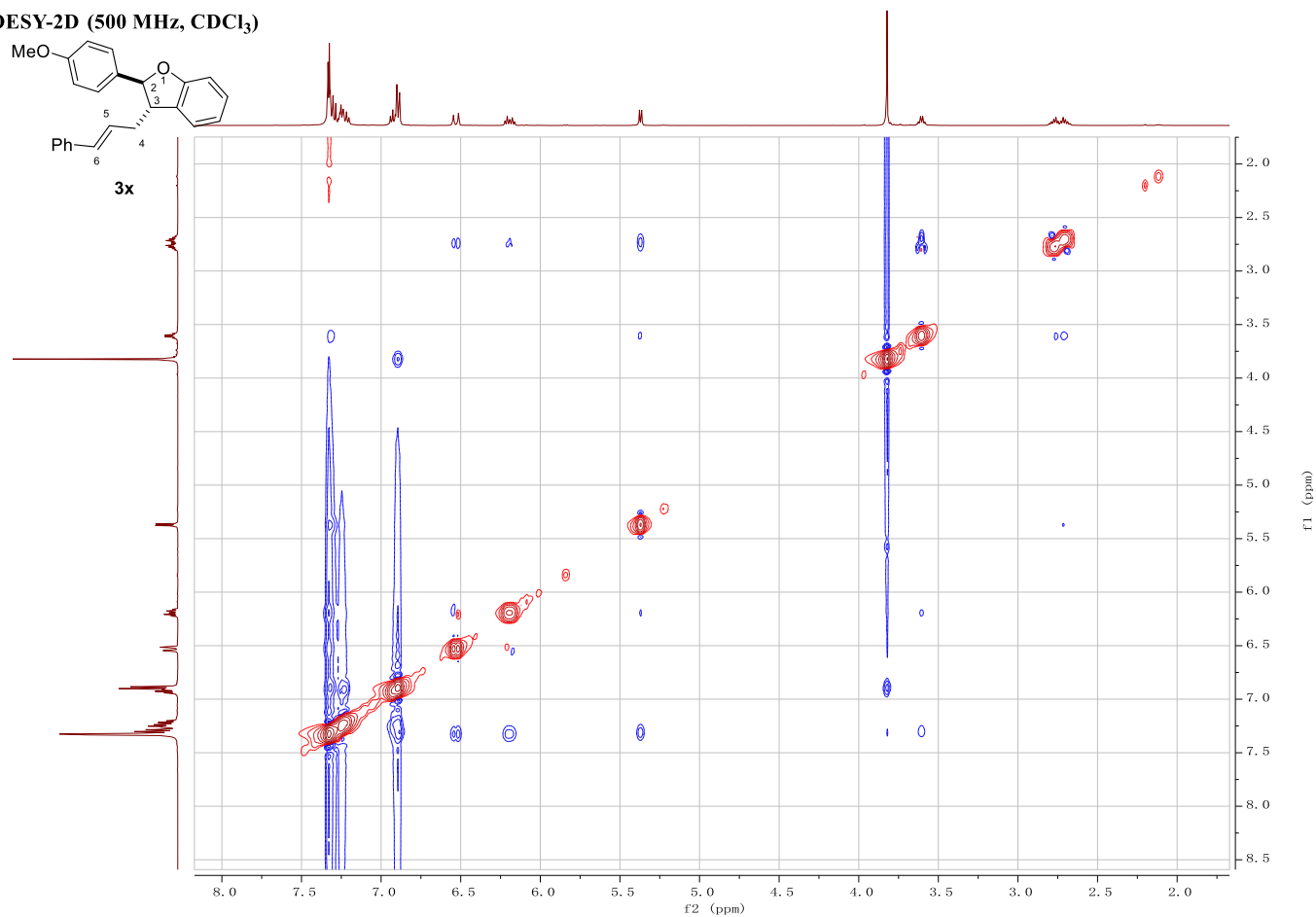
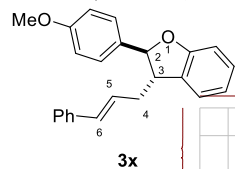
^1H - ^1H COSY - 90 (500 MHz, CDCl_3)

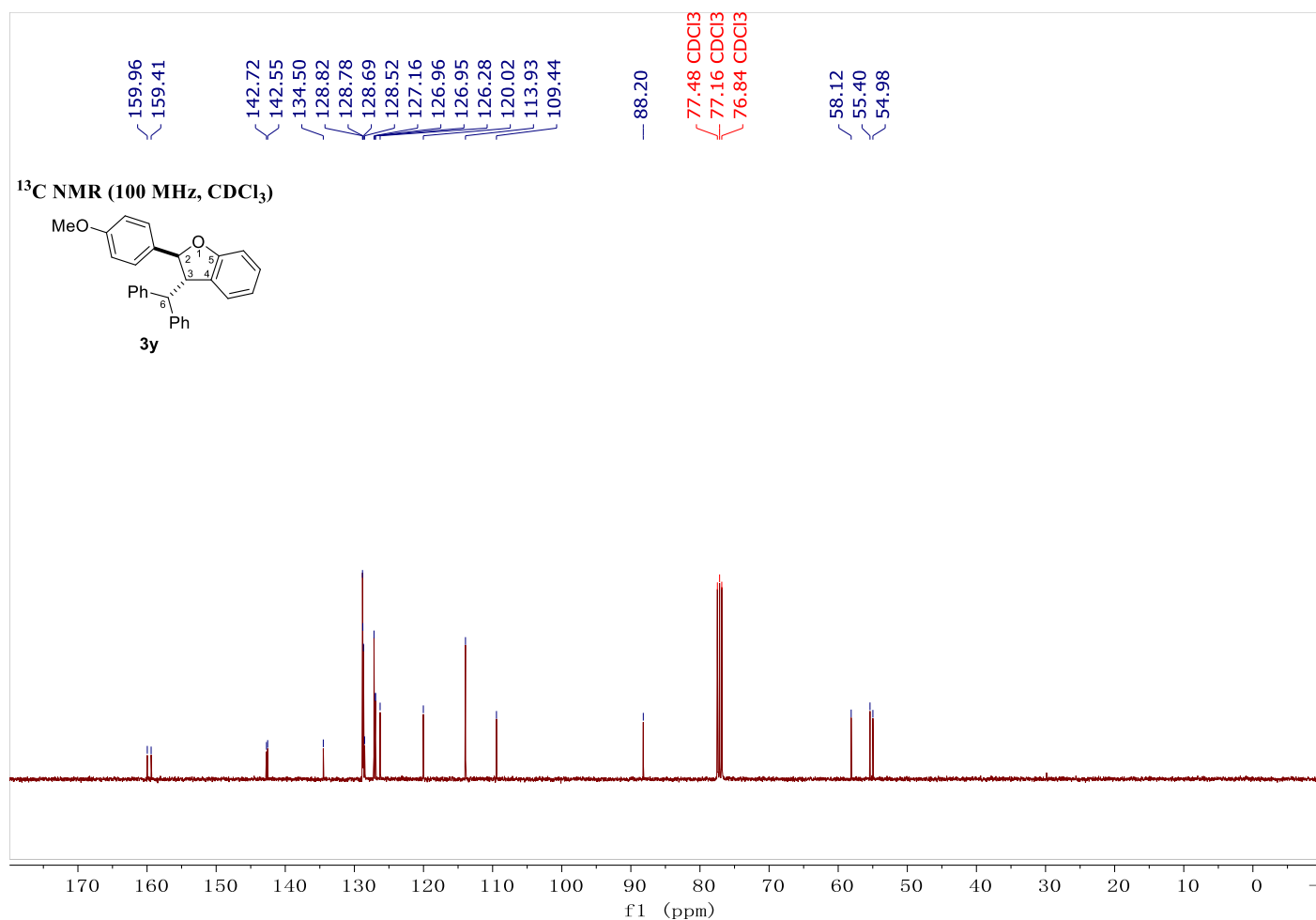
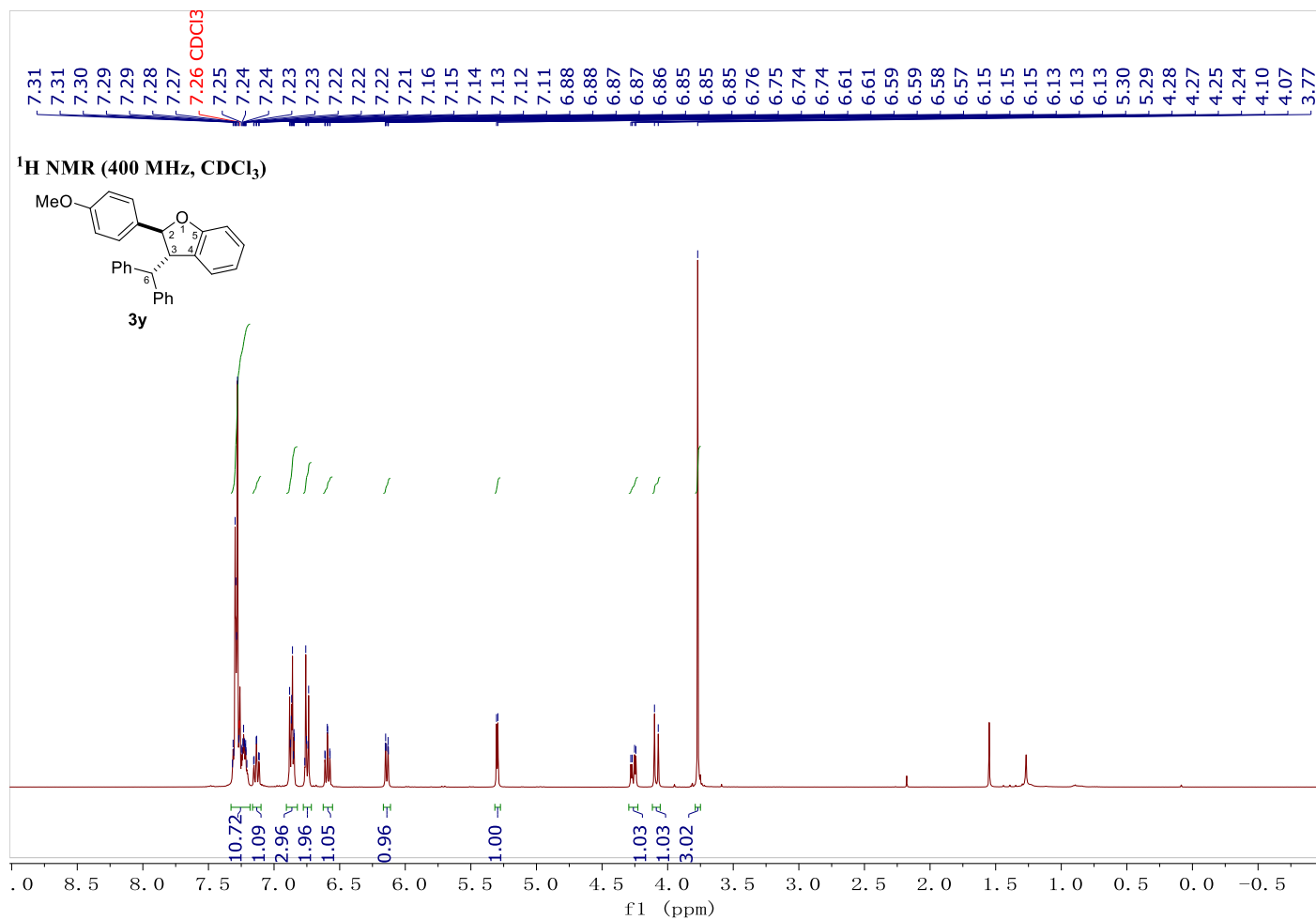


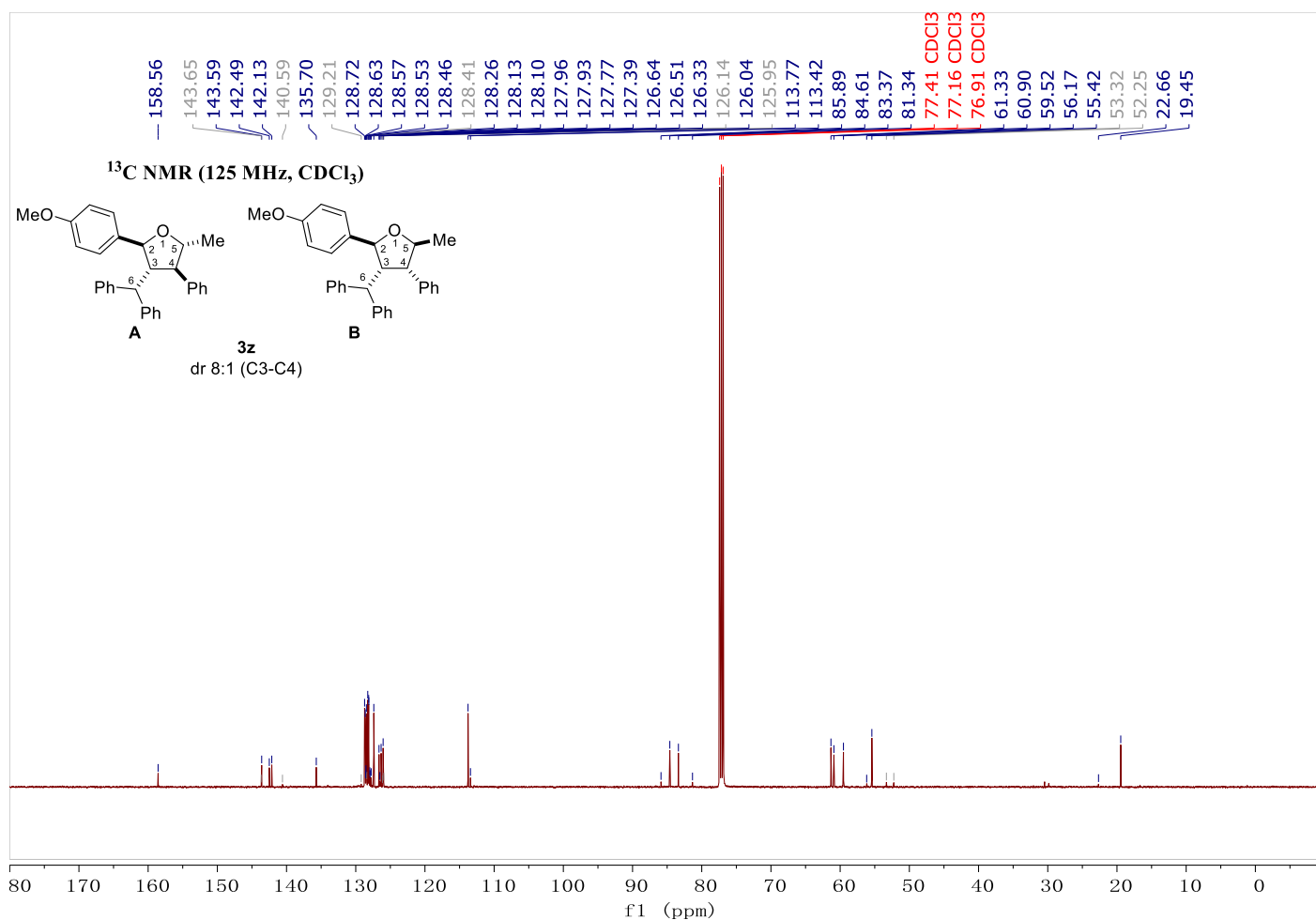
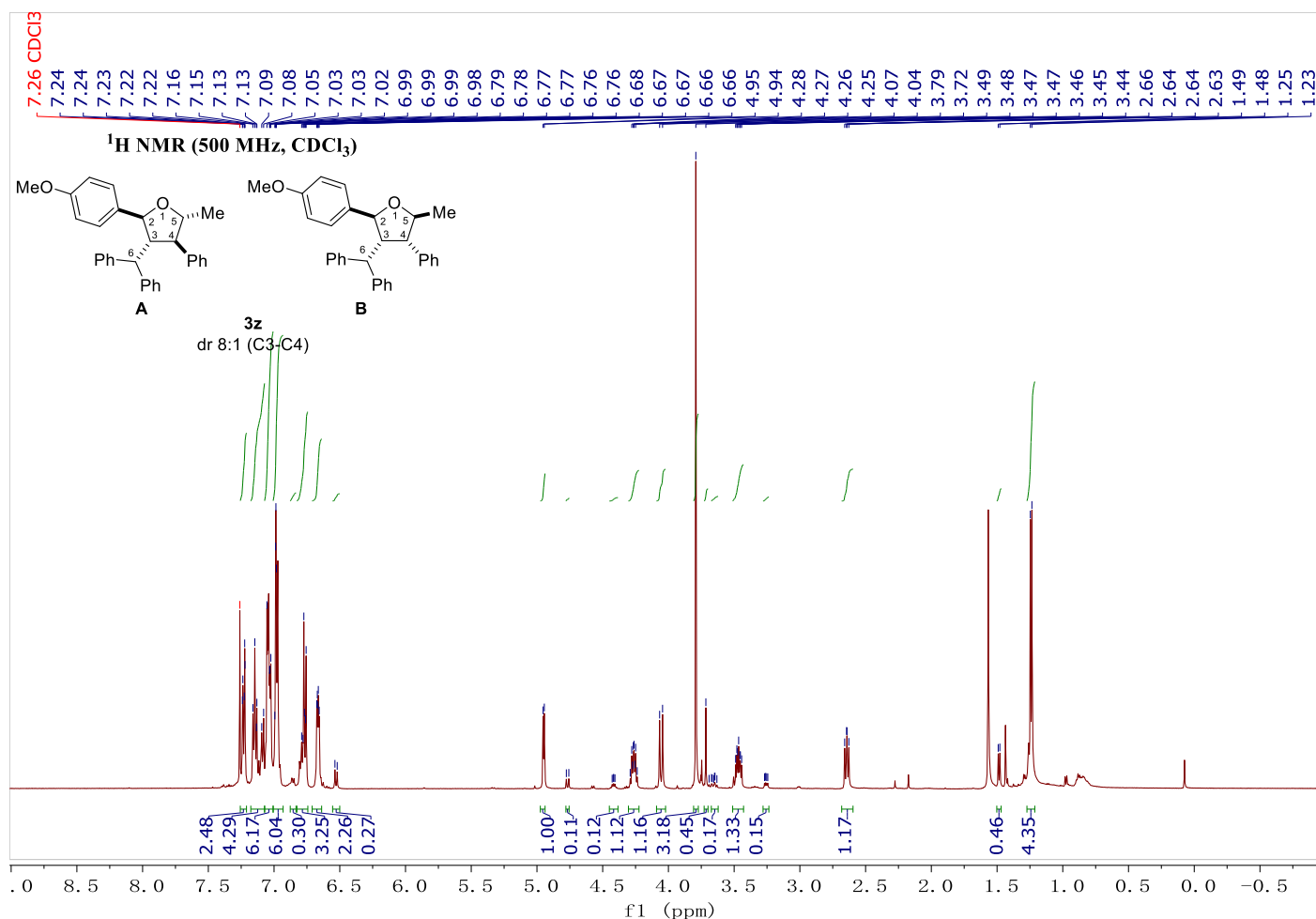
^1H (500 MHz) - ^{13}C (125 MHz) HSQC (CDCl_3)



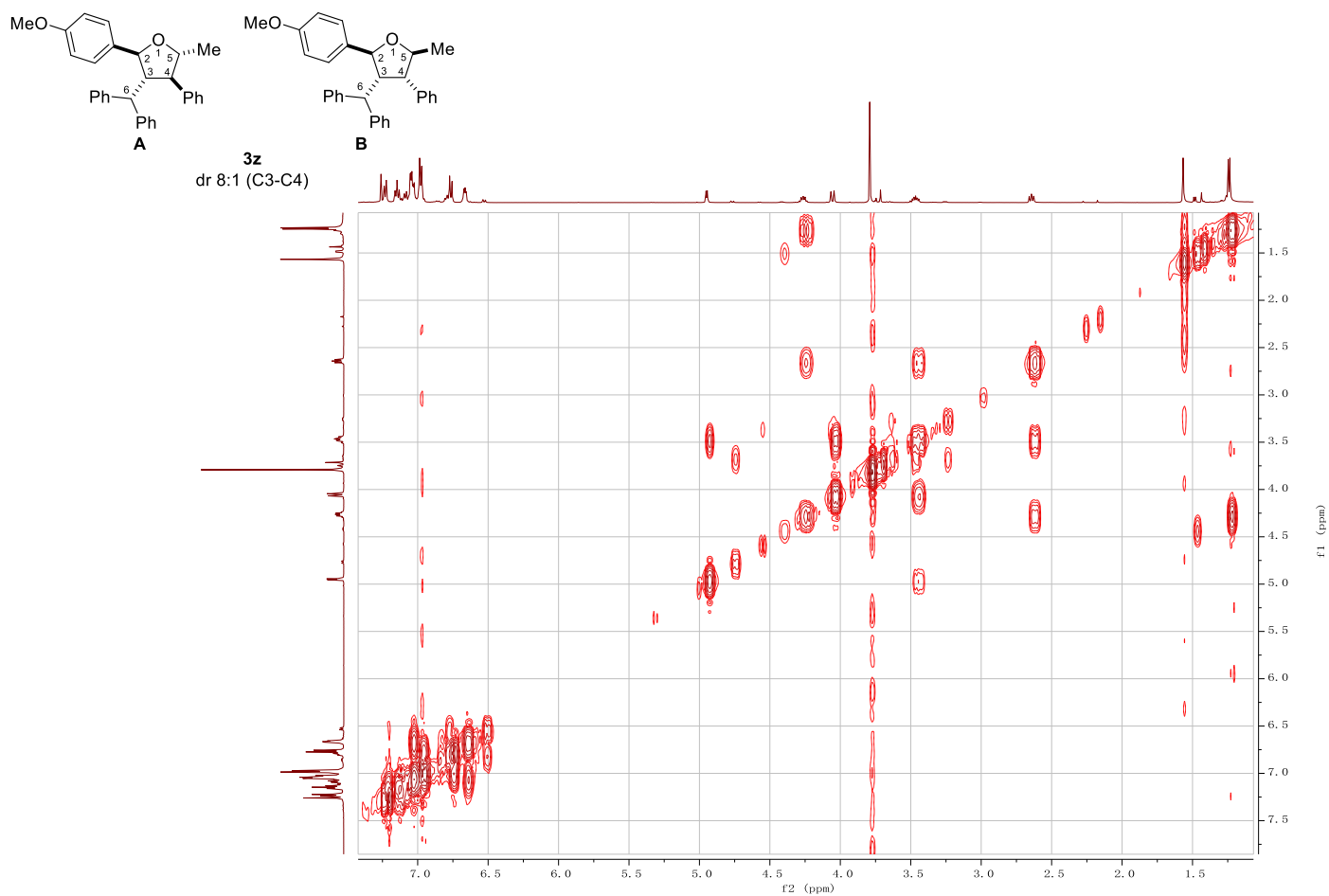
NOESY-2D (500 MHz, CDCl₃)



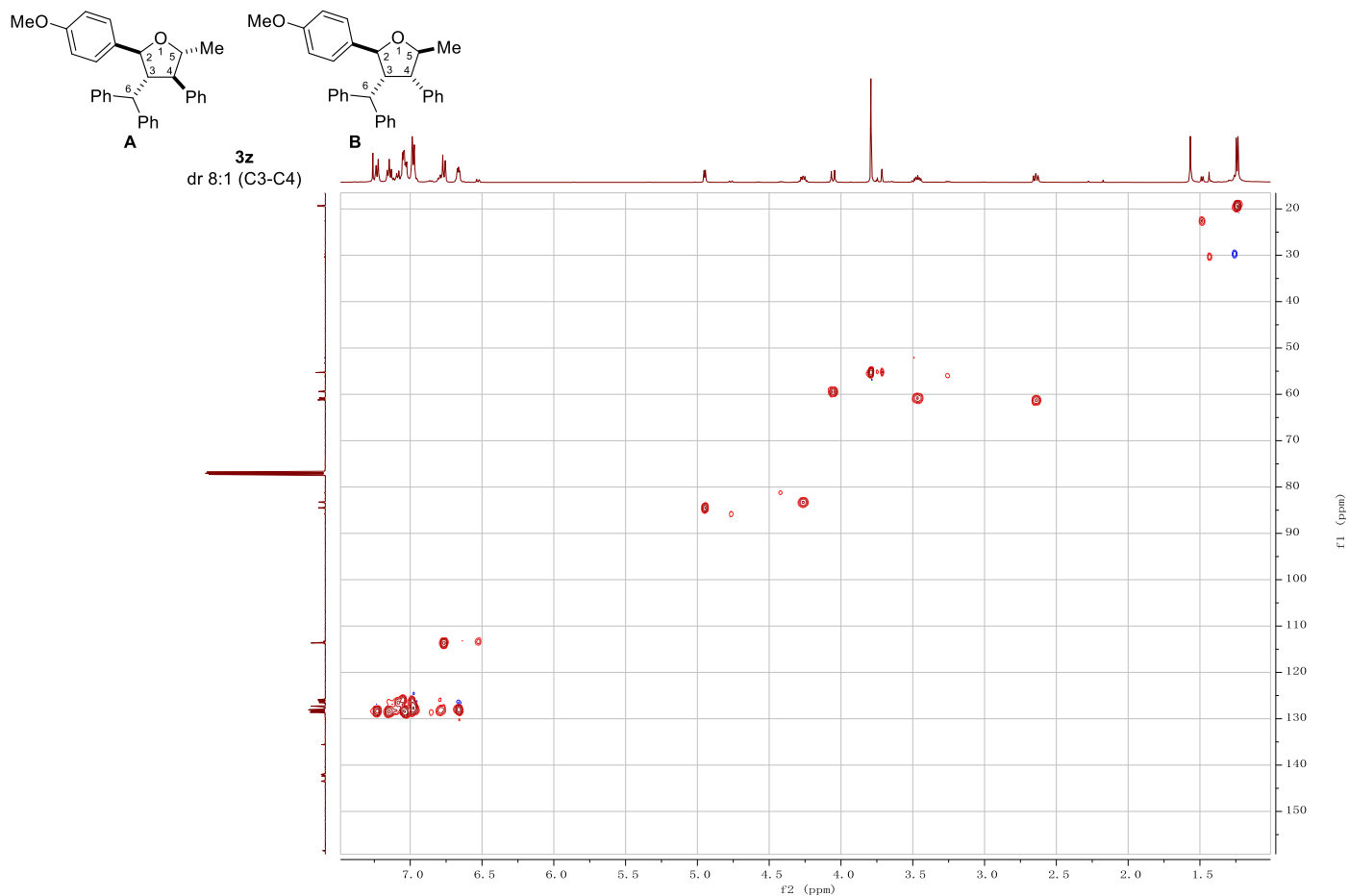




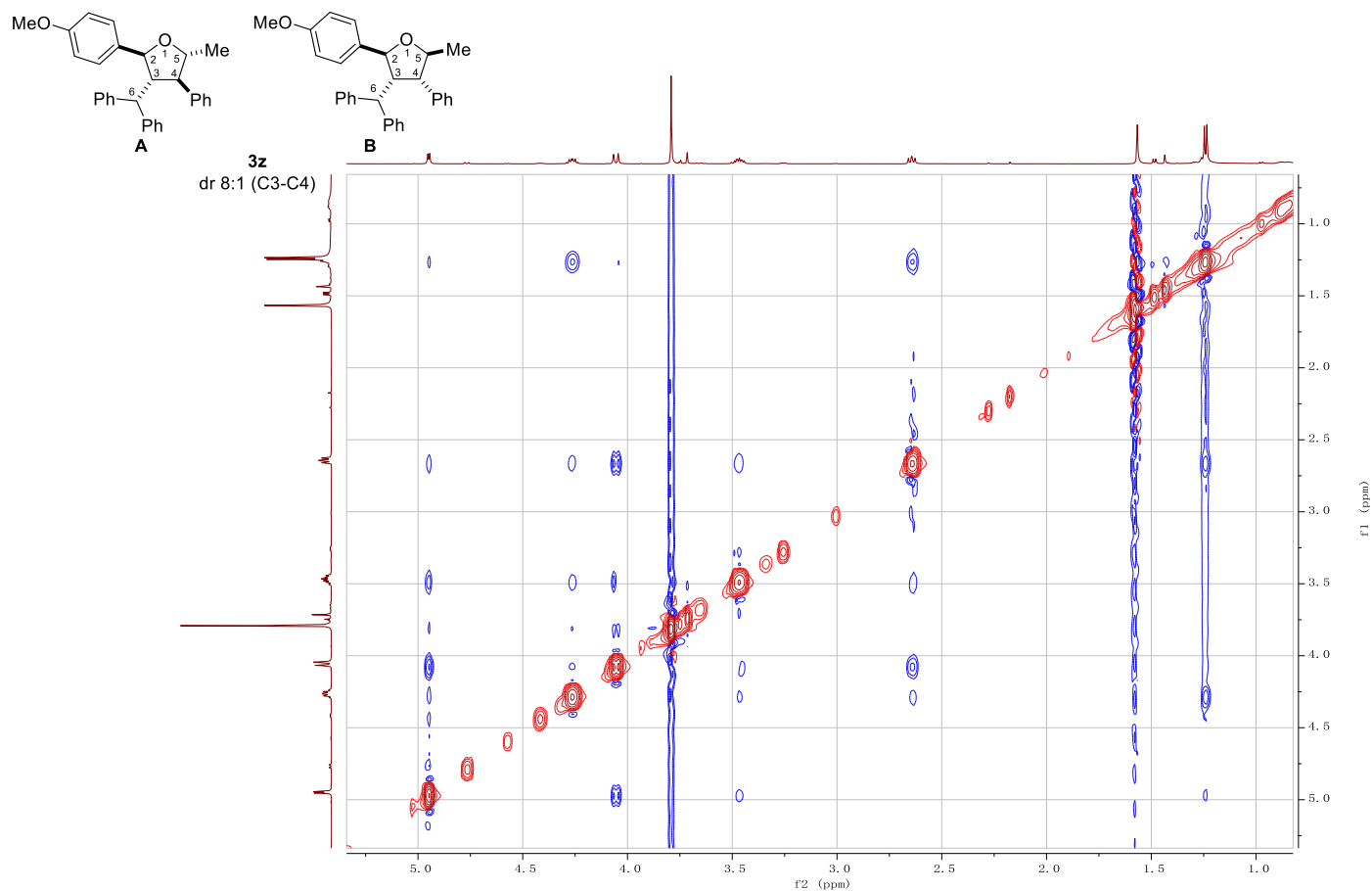
^1H - ^1H COSY - 90 (500 MHz, CDCl_3)

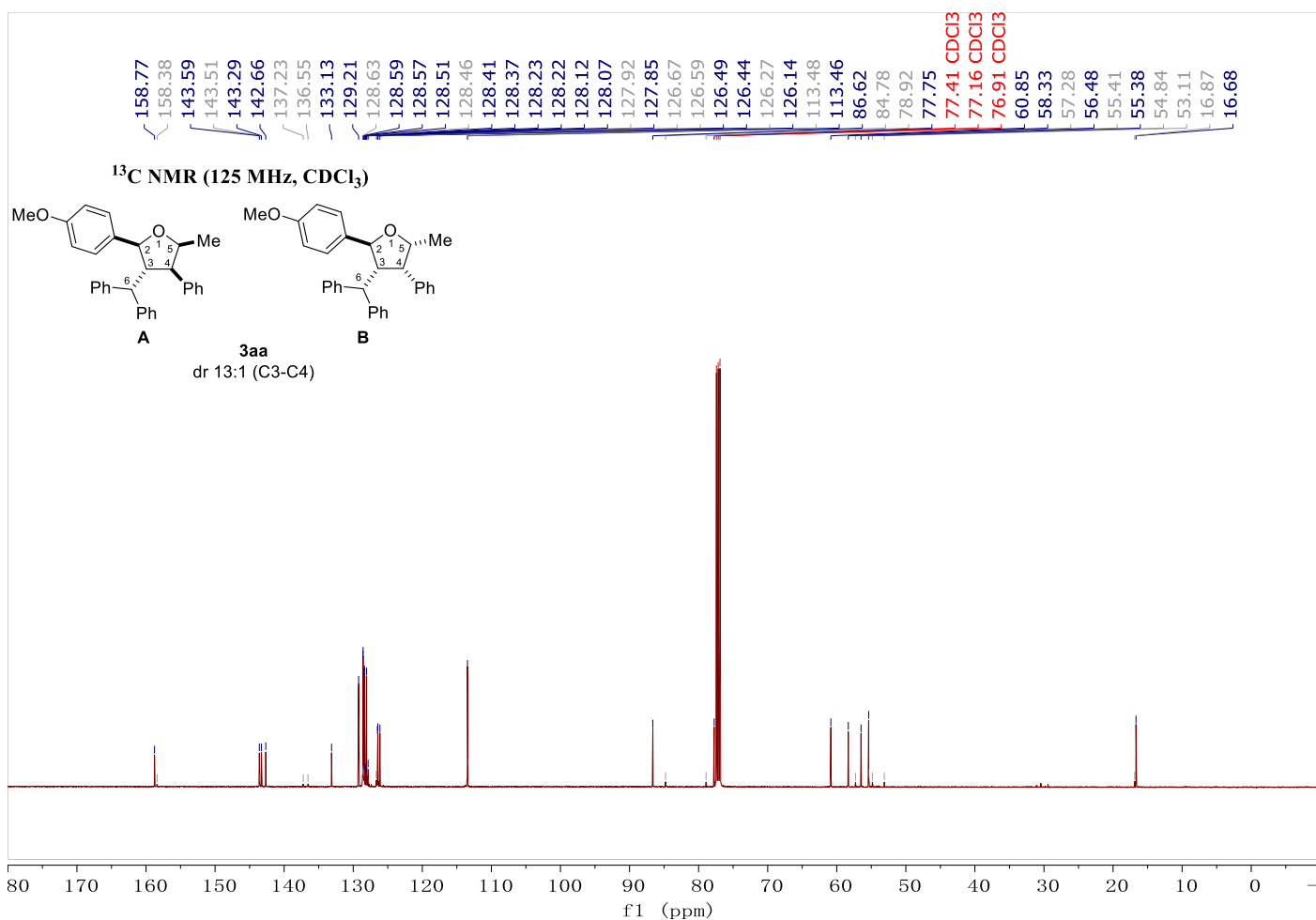
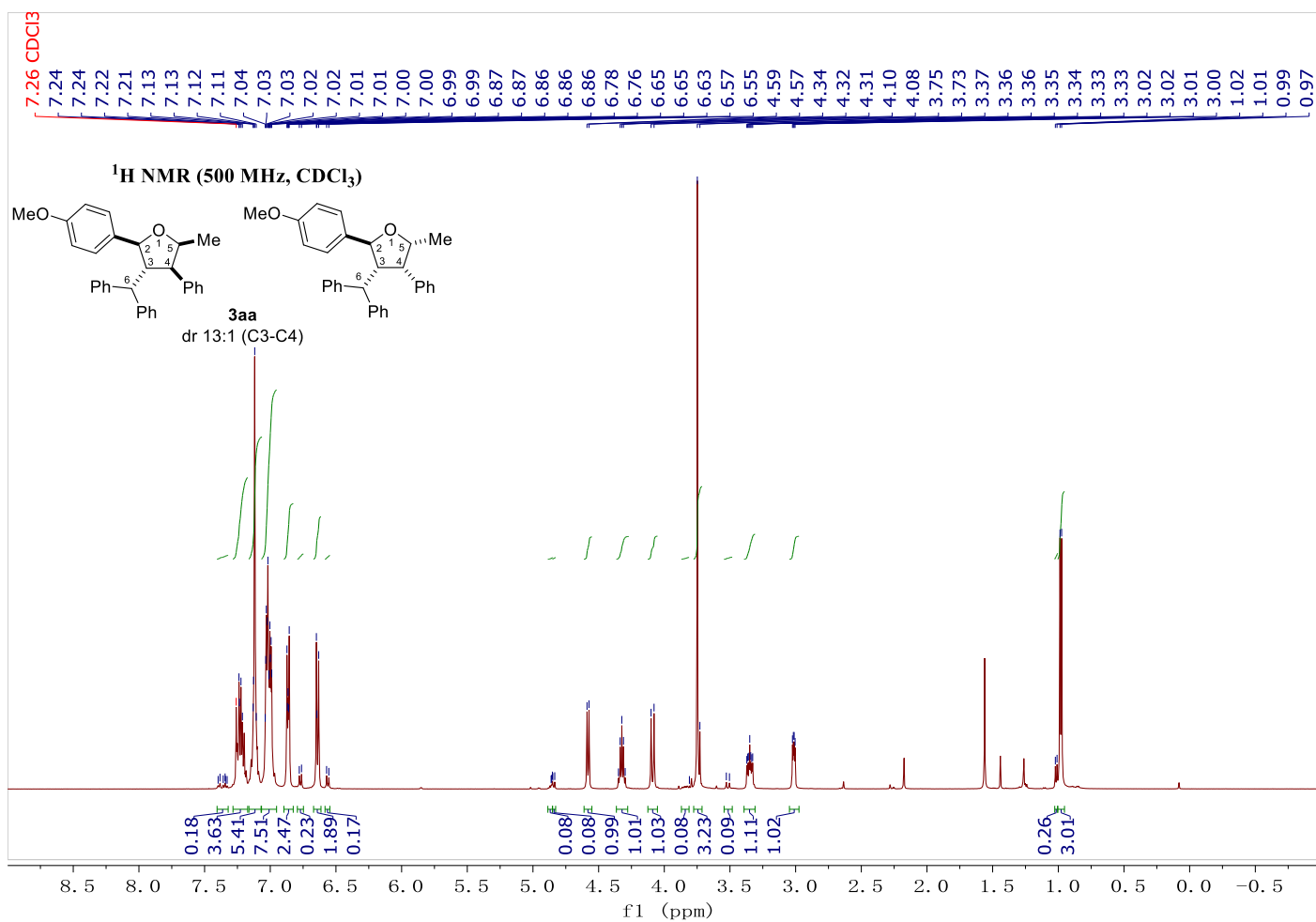


^1H (500 MHz) - ^{13}C (125 MHz) HSQC (CDCl_3)

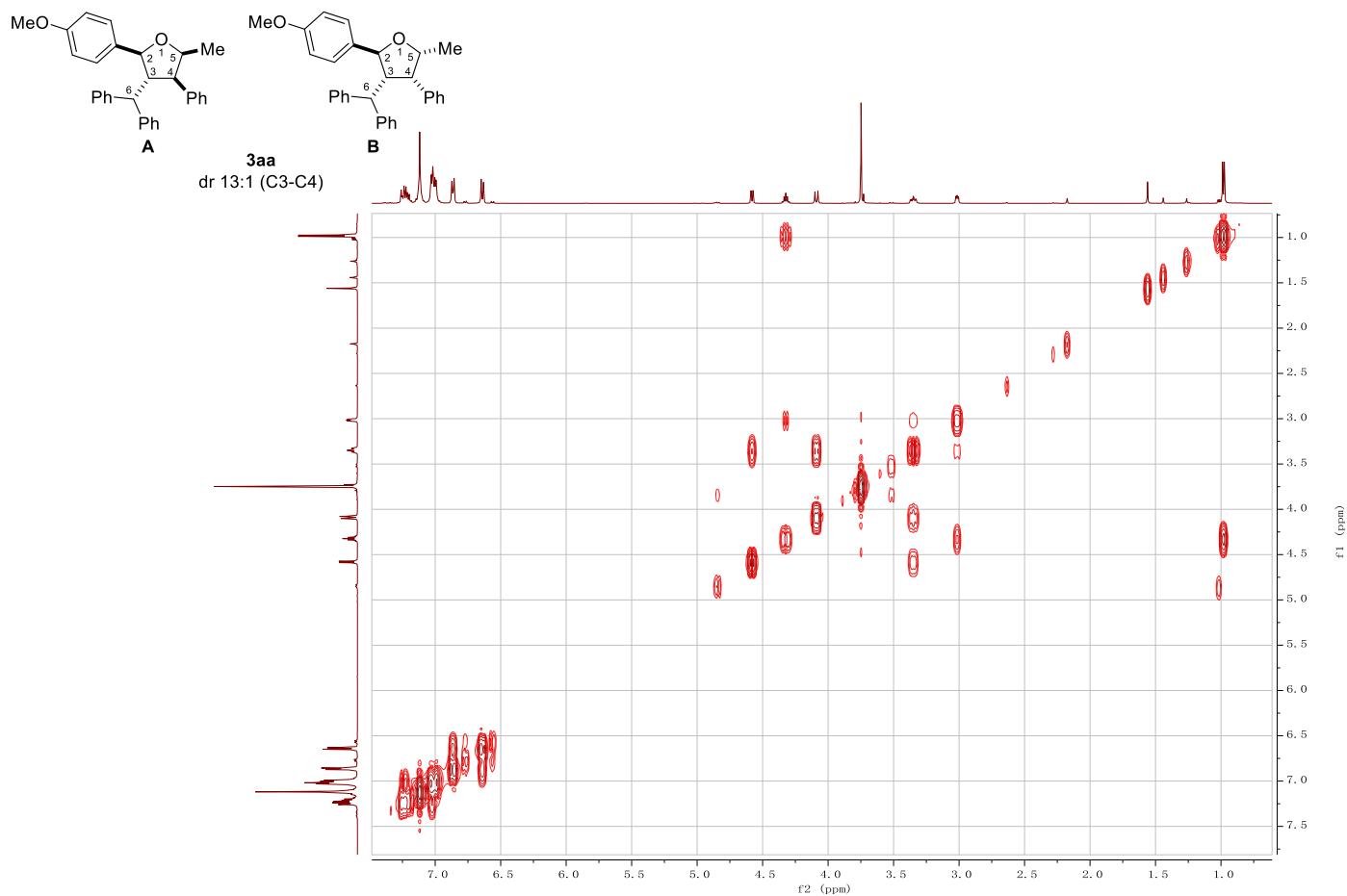


NOESY-2D (500 MHz, CDCl₃)

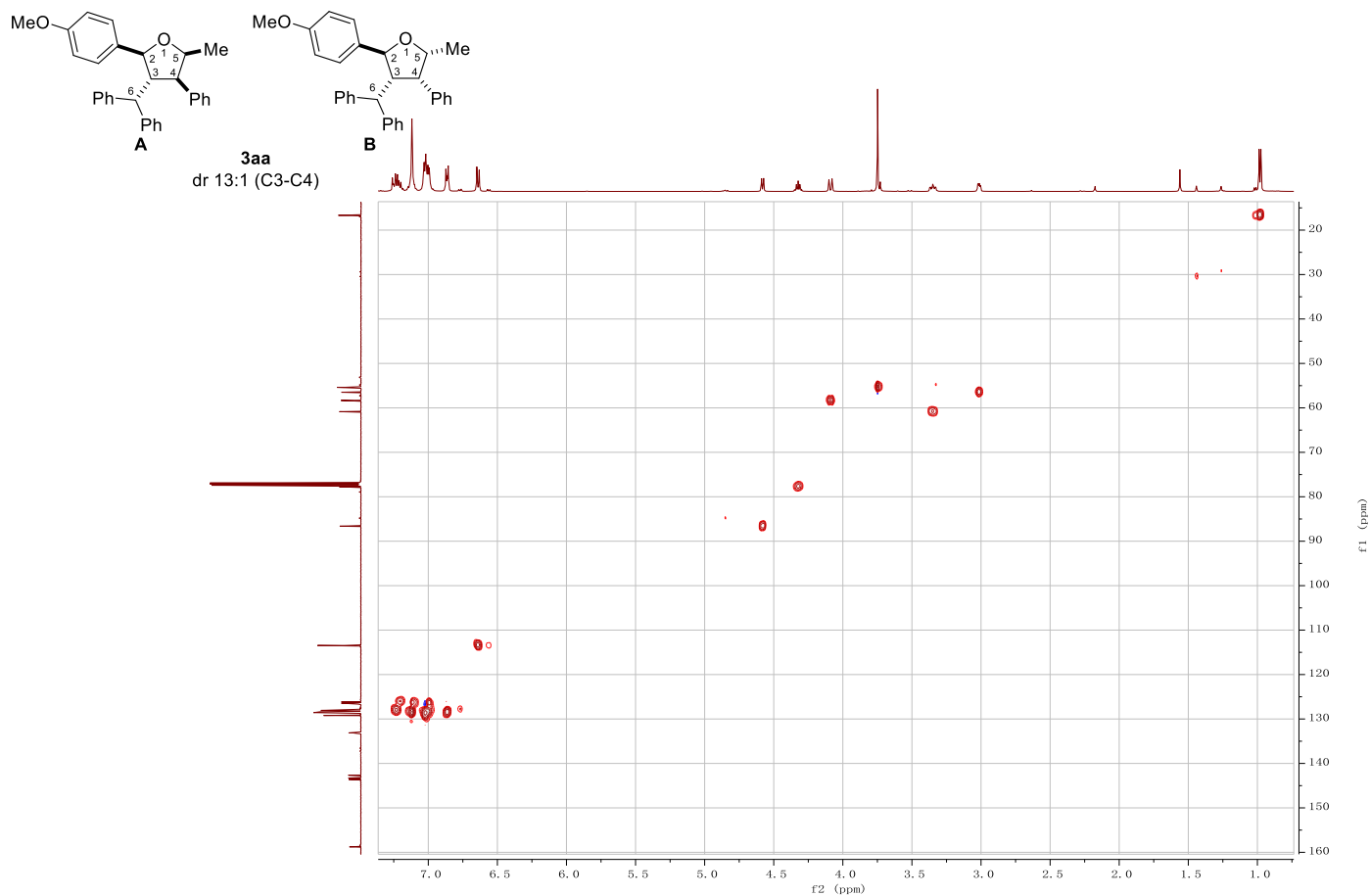




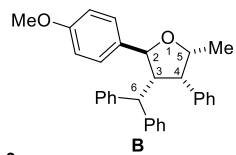
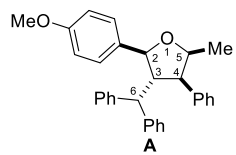
¹H - ¹H COSY - 90 (500 MHz, CDCl₃)



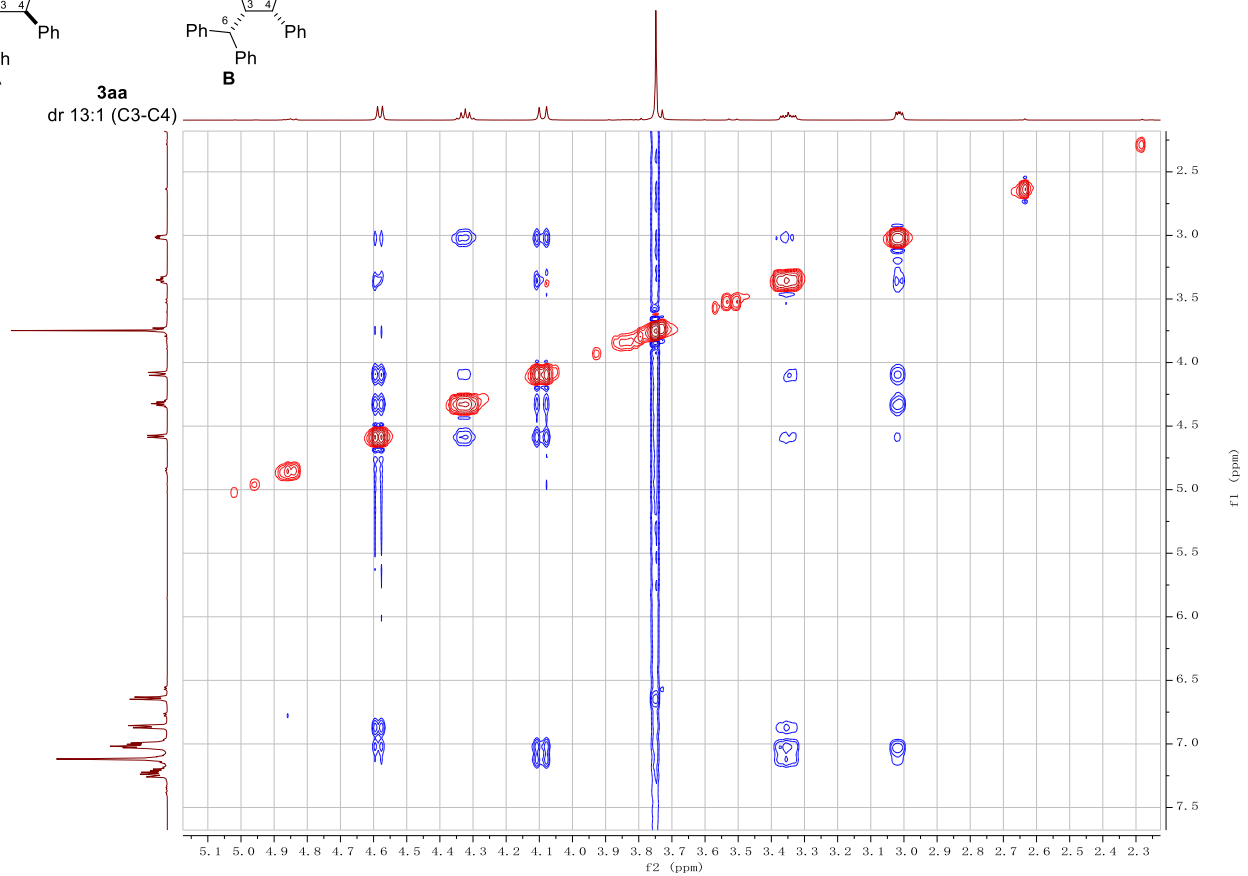
¹H (500 MHz) - ¹³C (125 MHz) HSQC (CDCl₃)

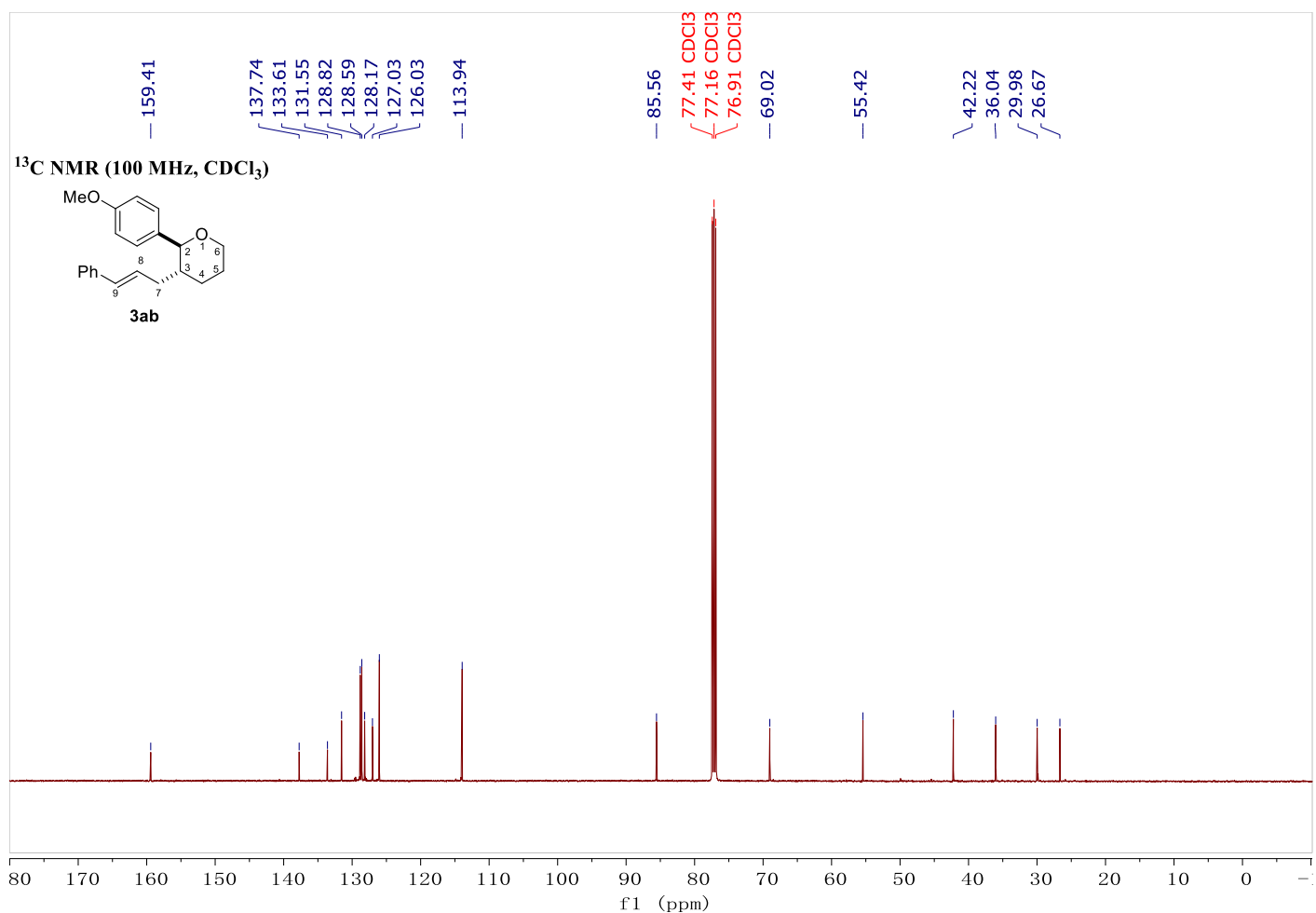
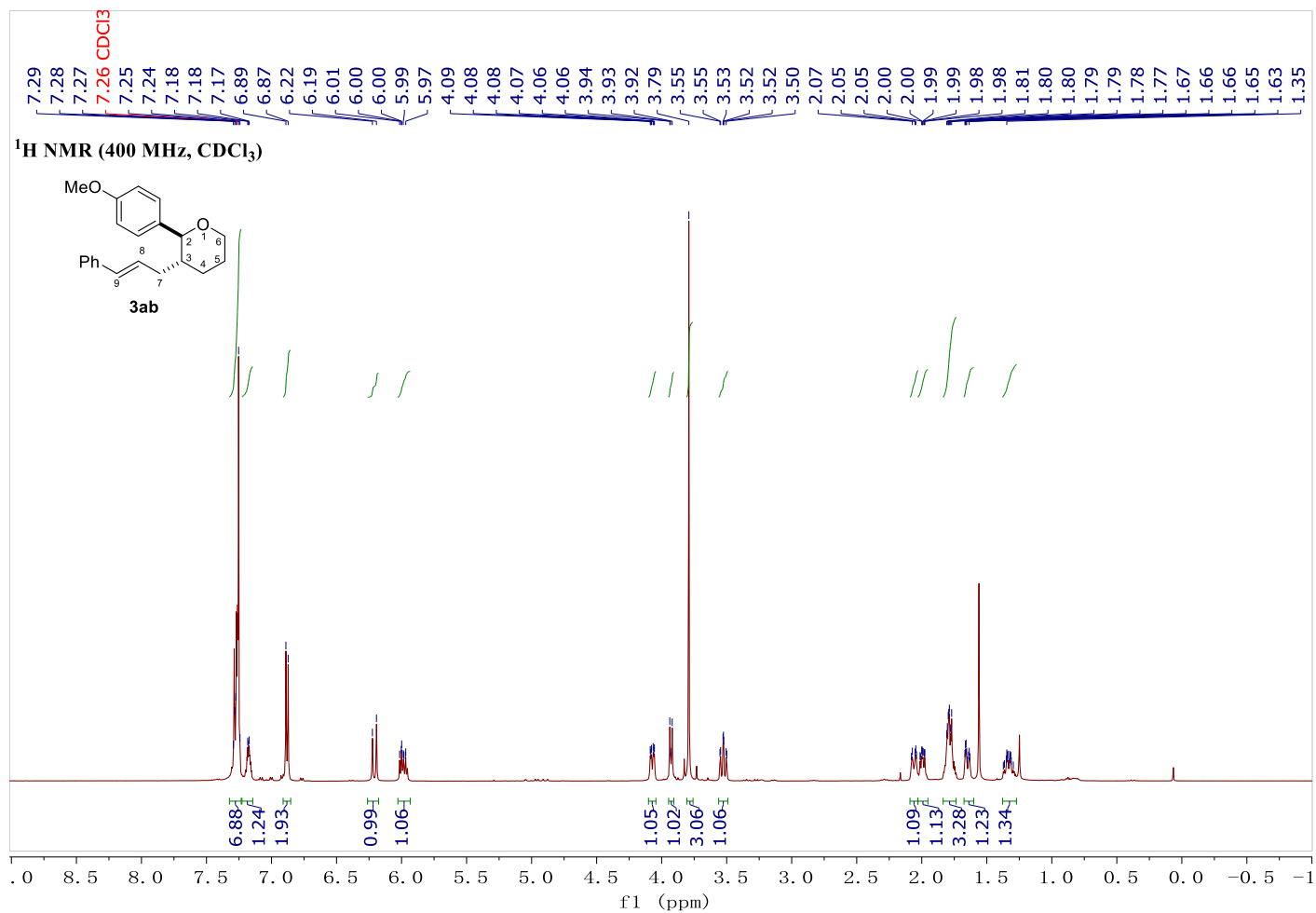


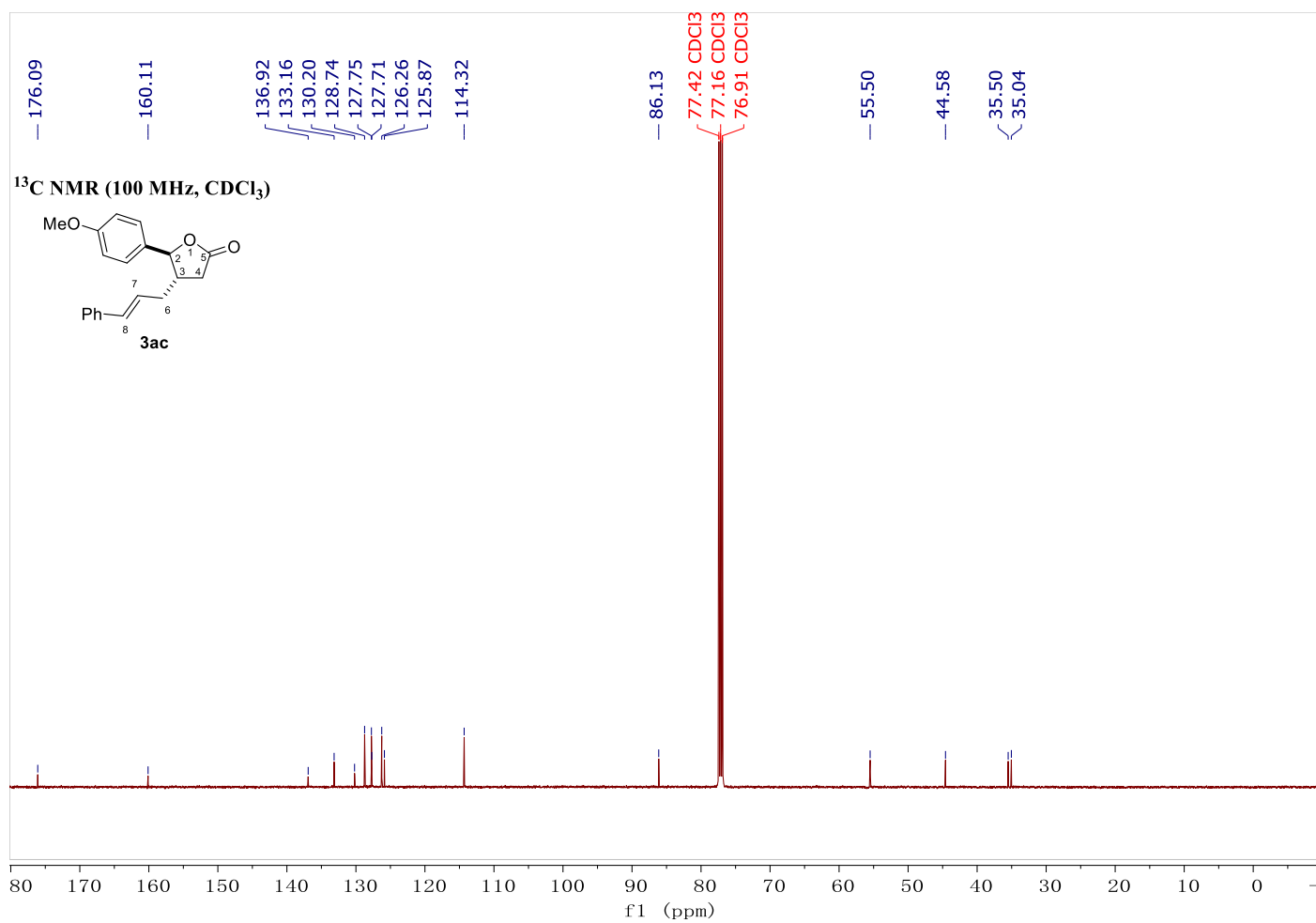
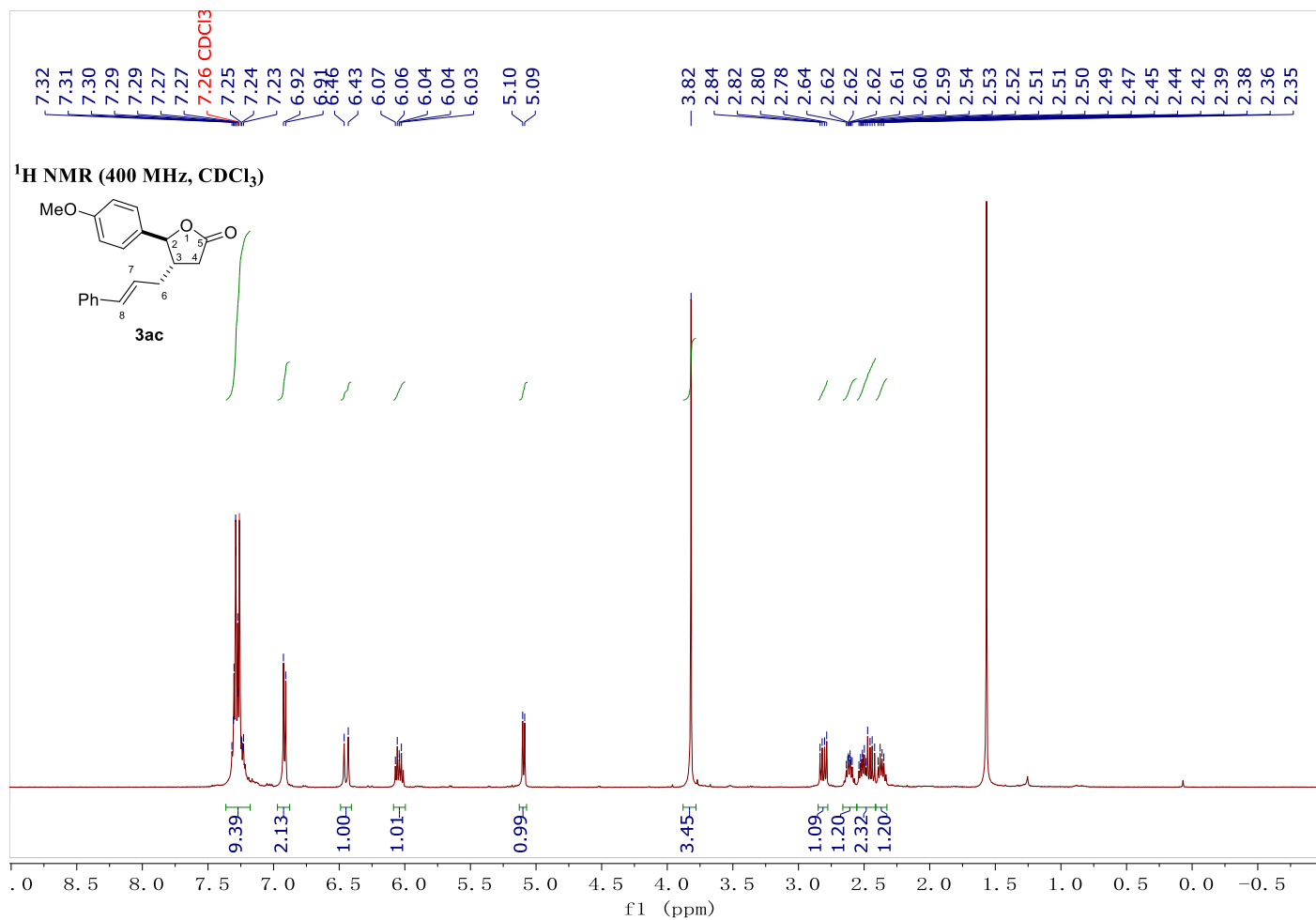
NOESY-2D (500 MHz, CDCl₃)

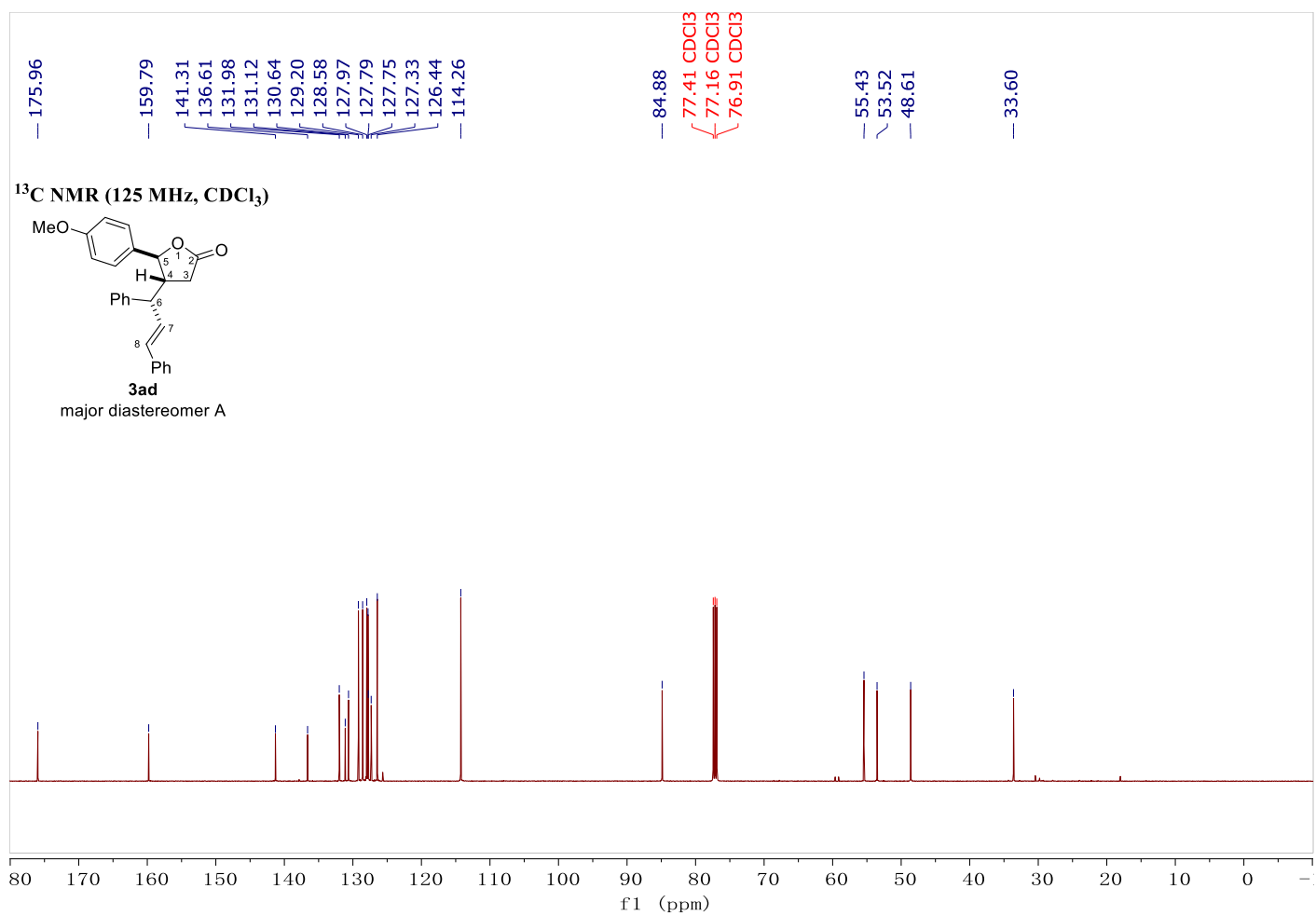
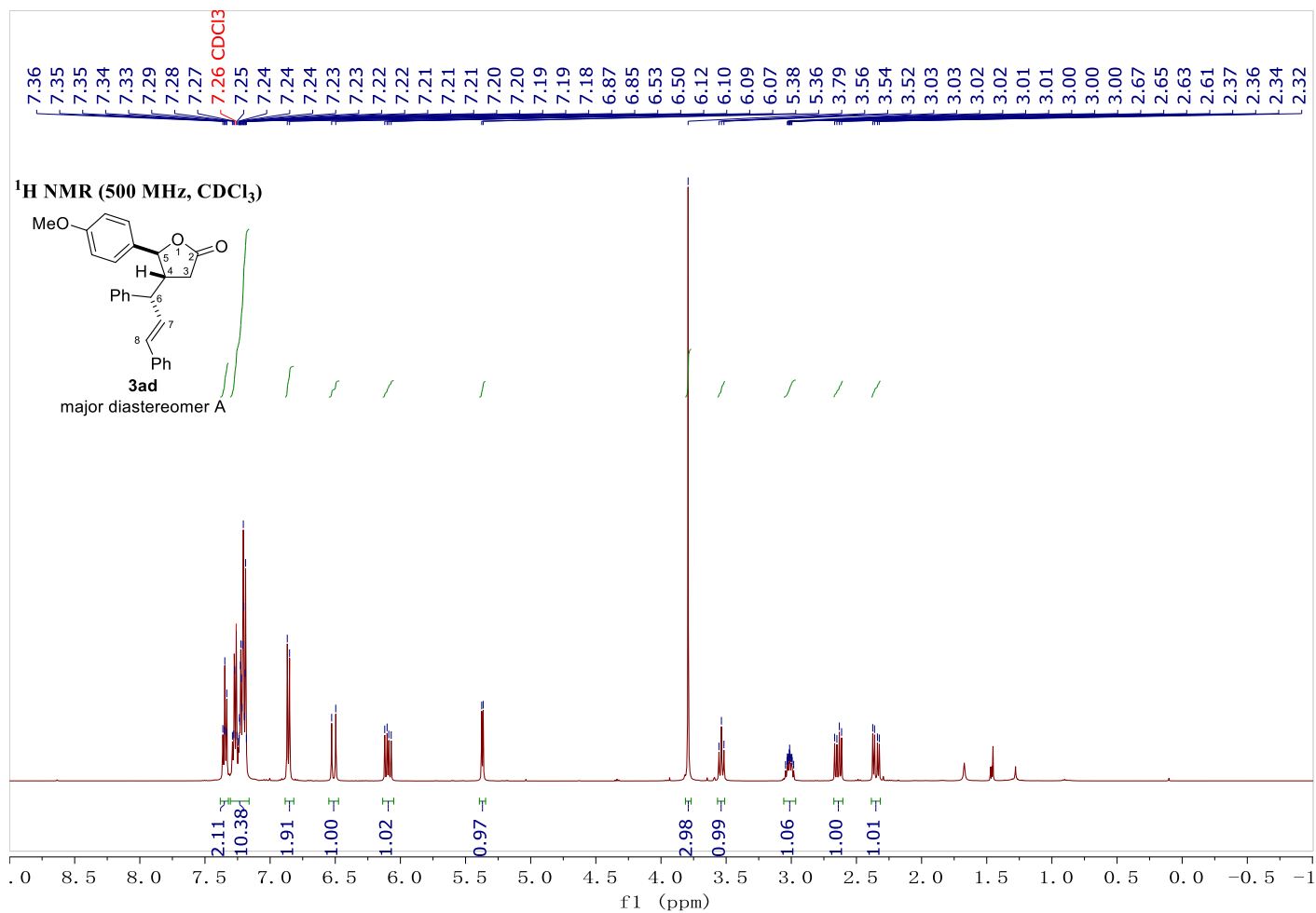


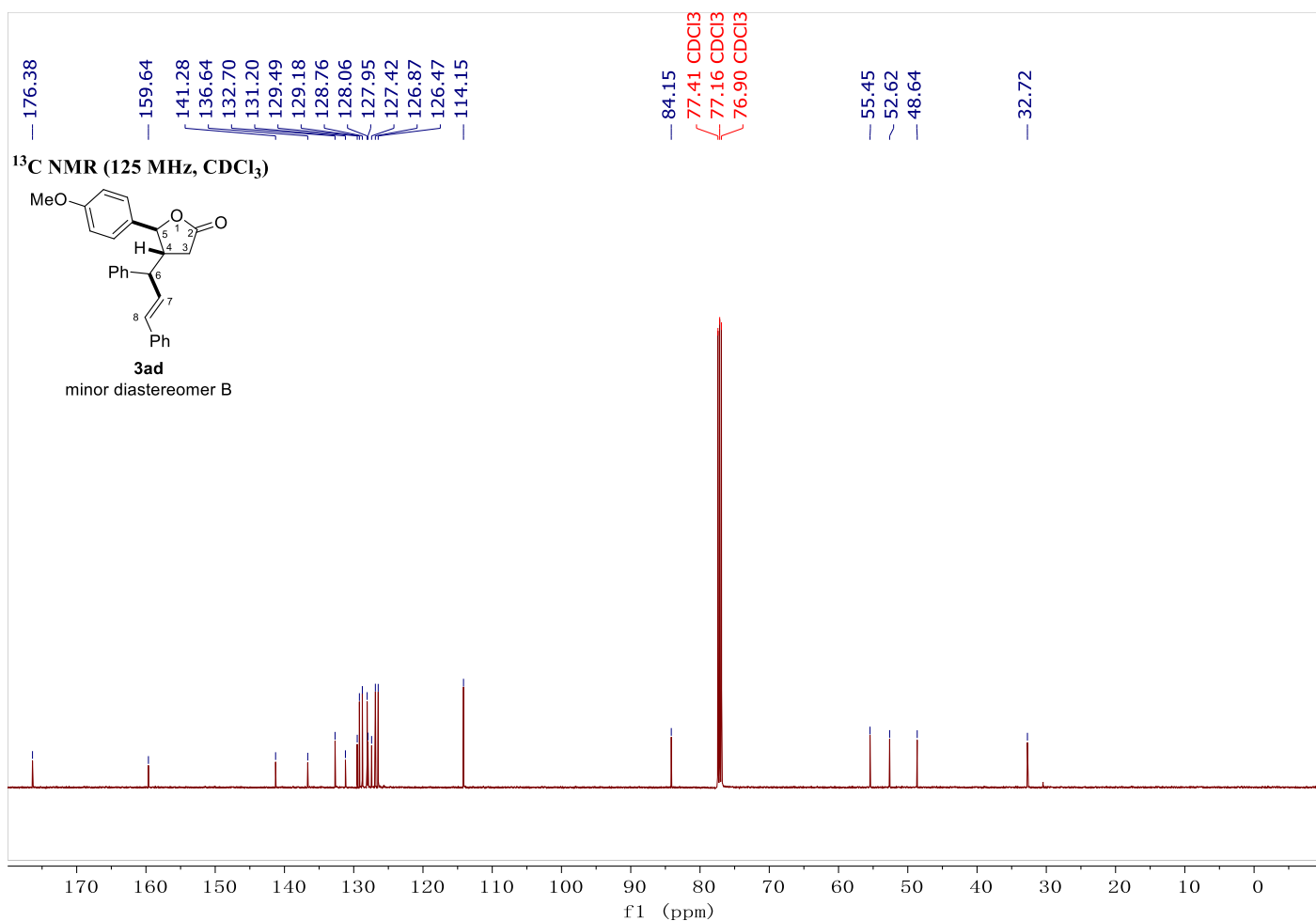
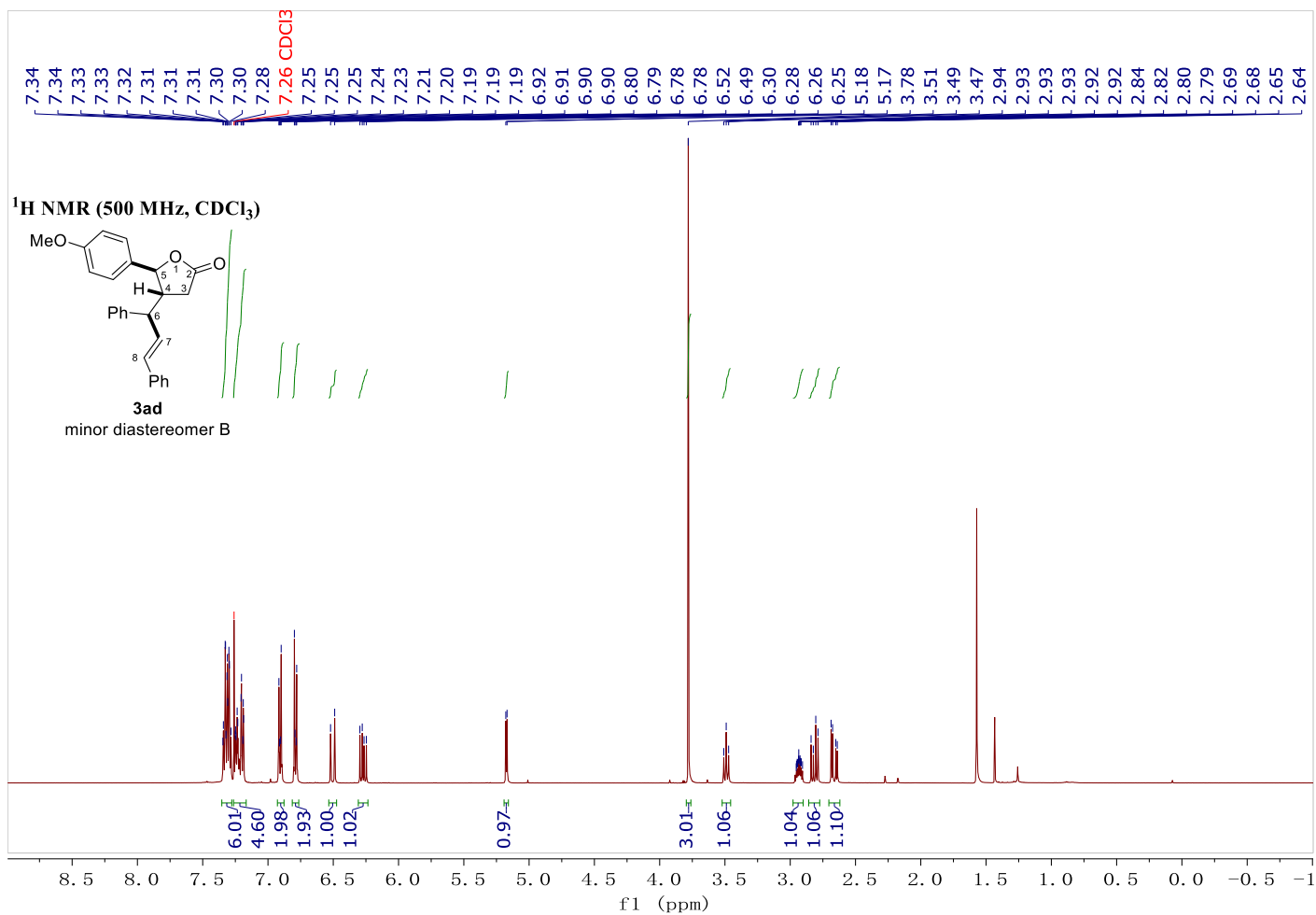
3aa
dr 13:1 (C3-C4)

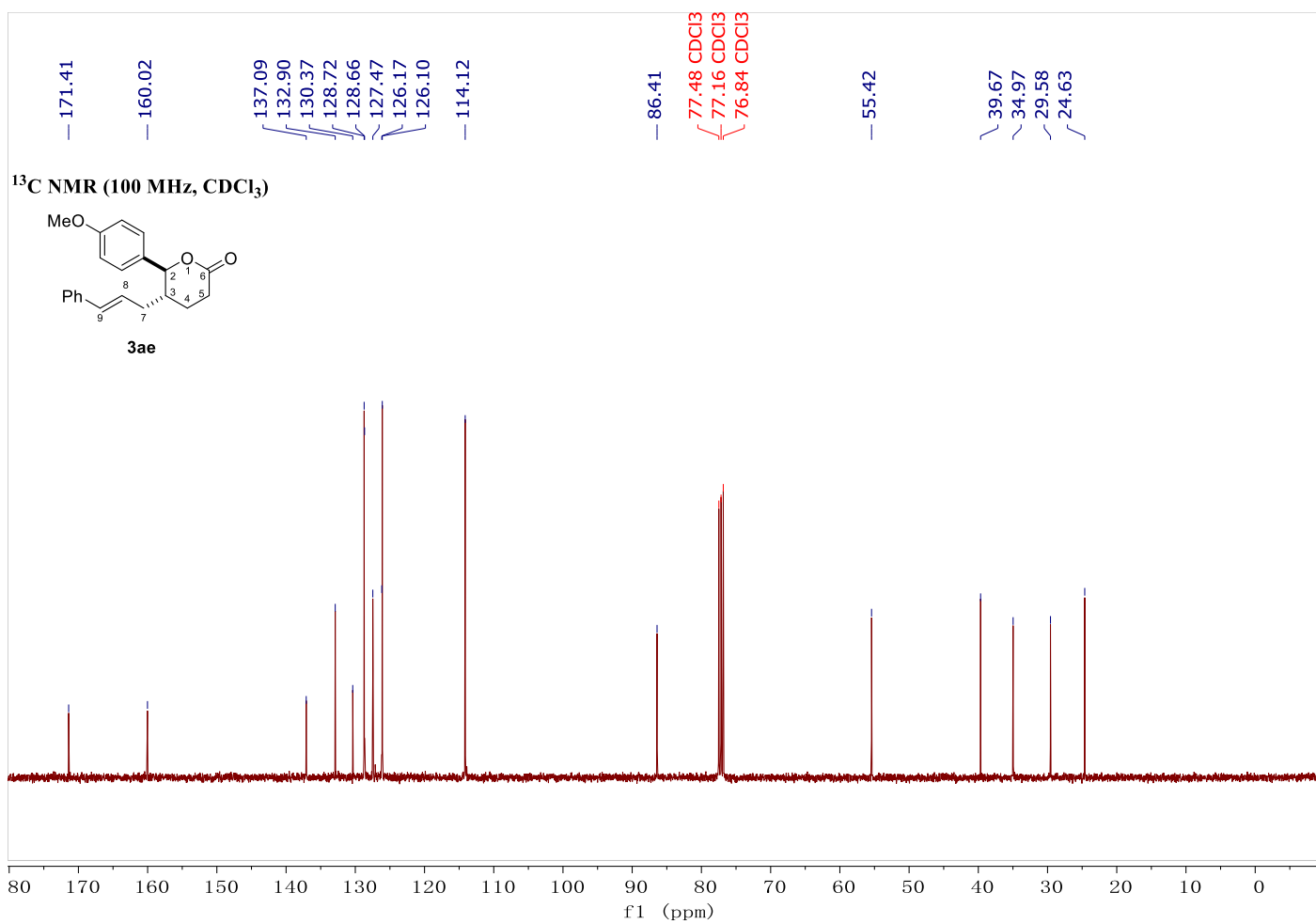
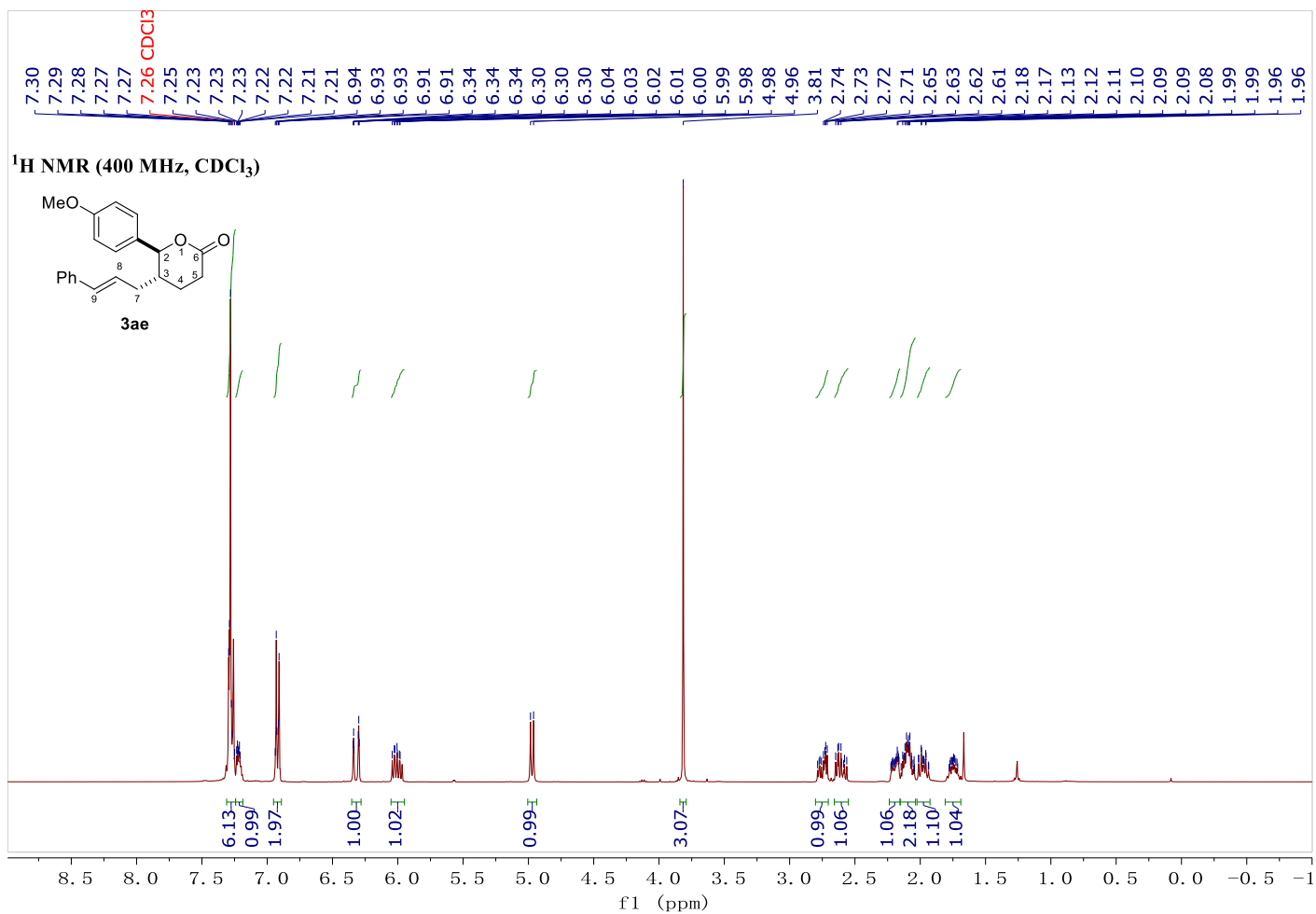


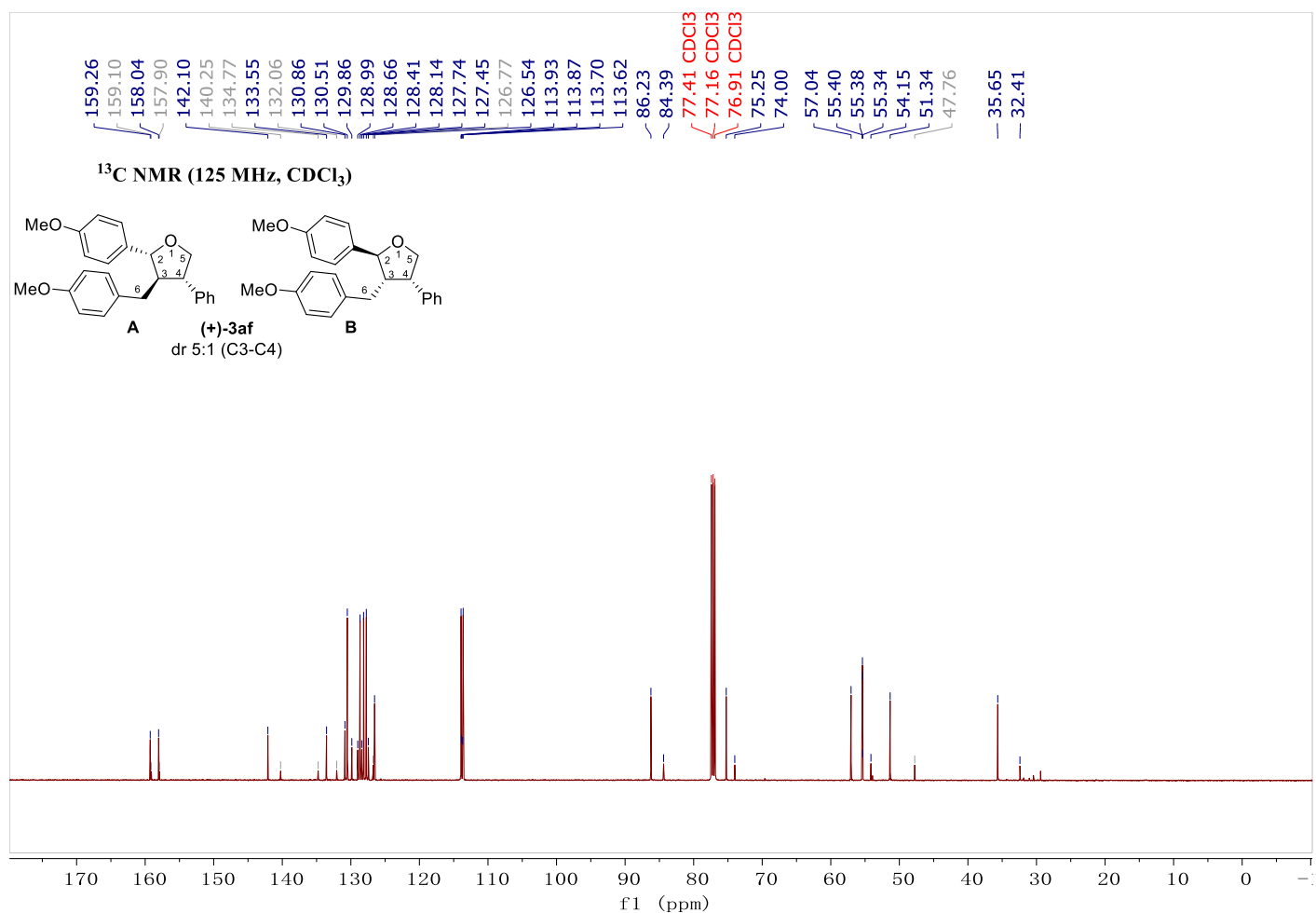
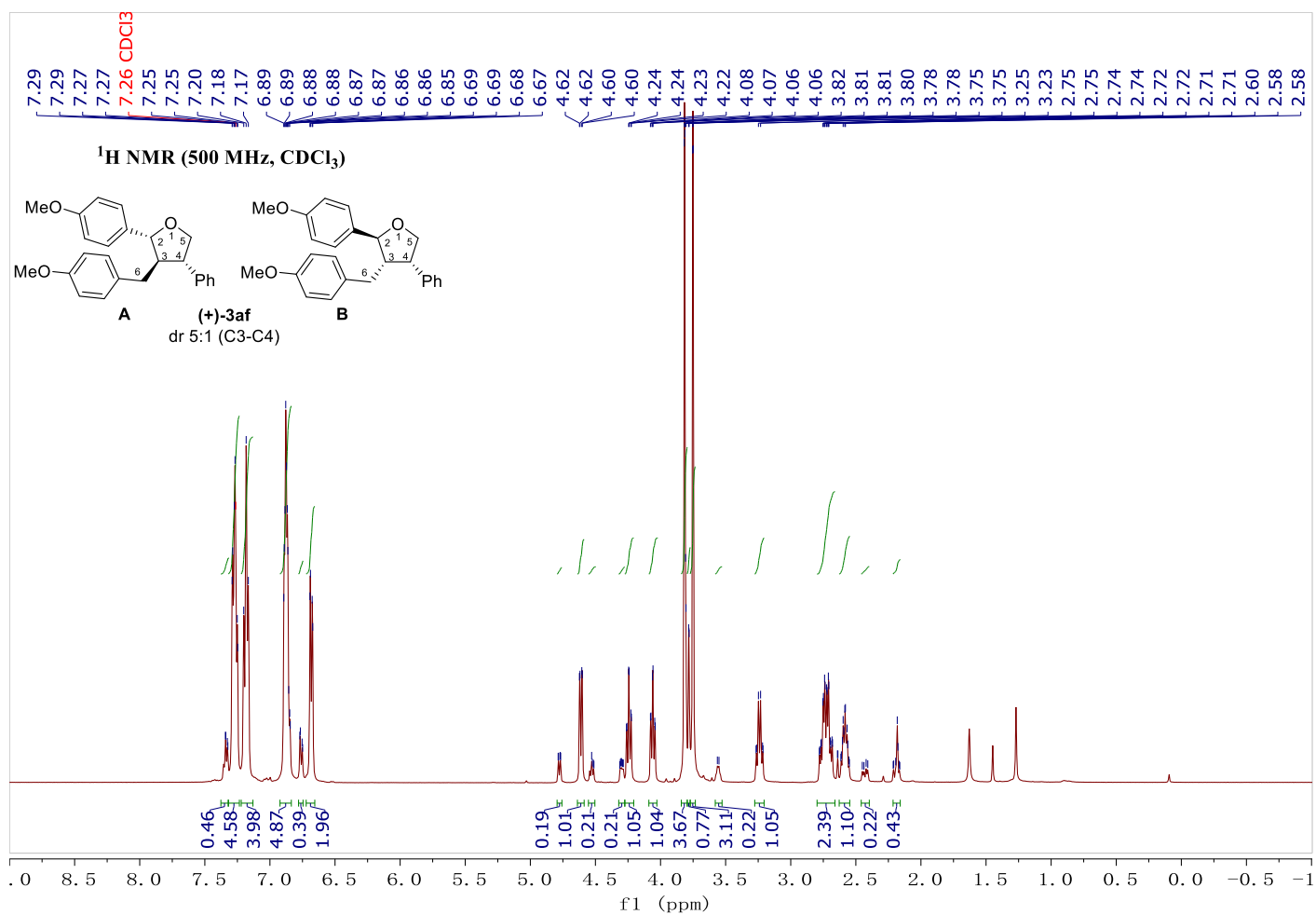


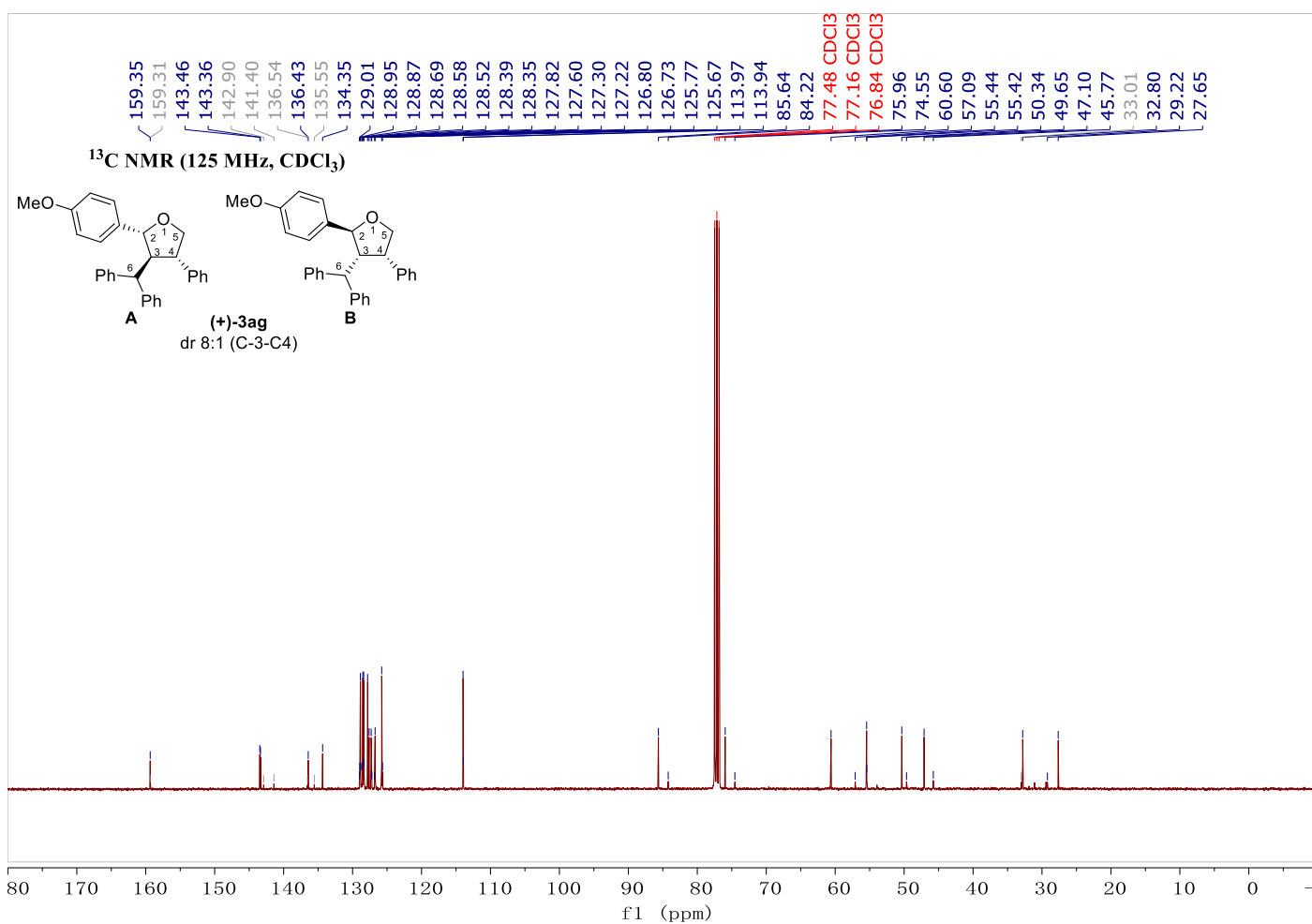
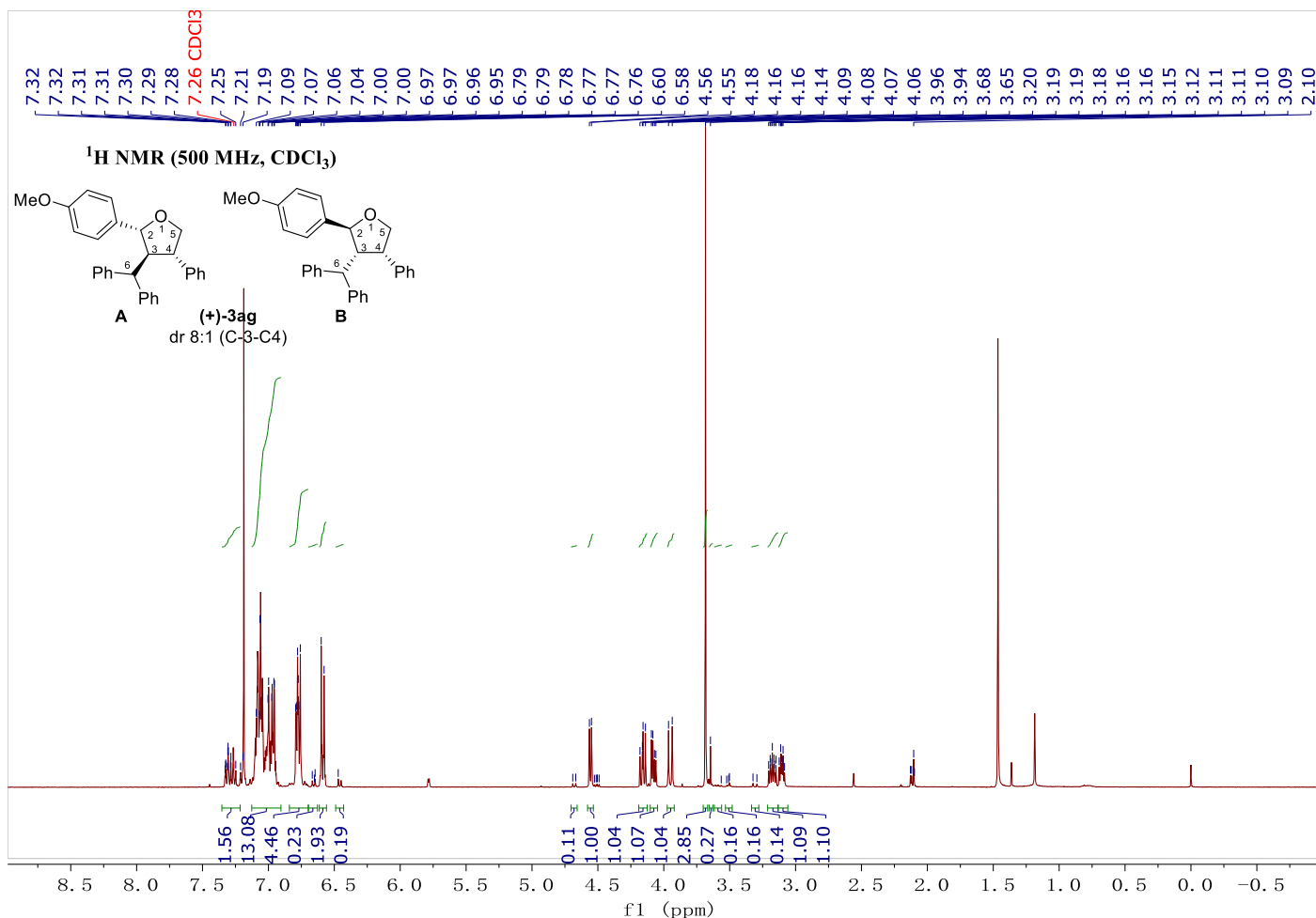




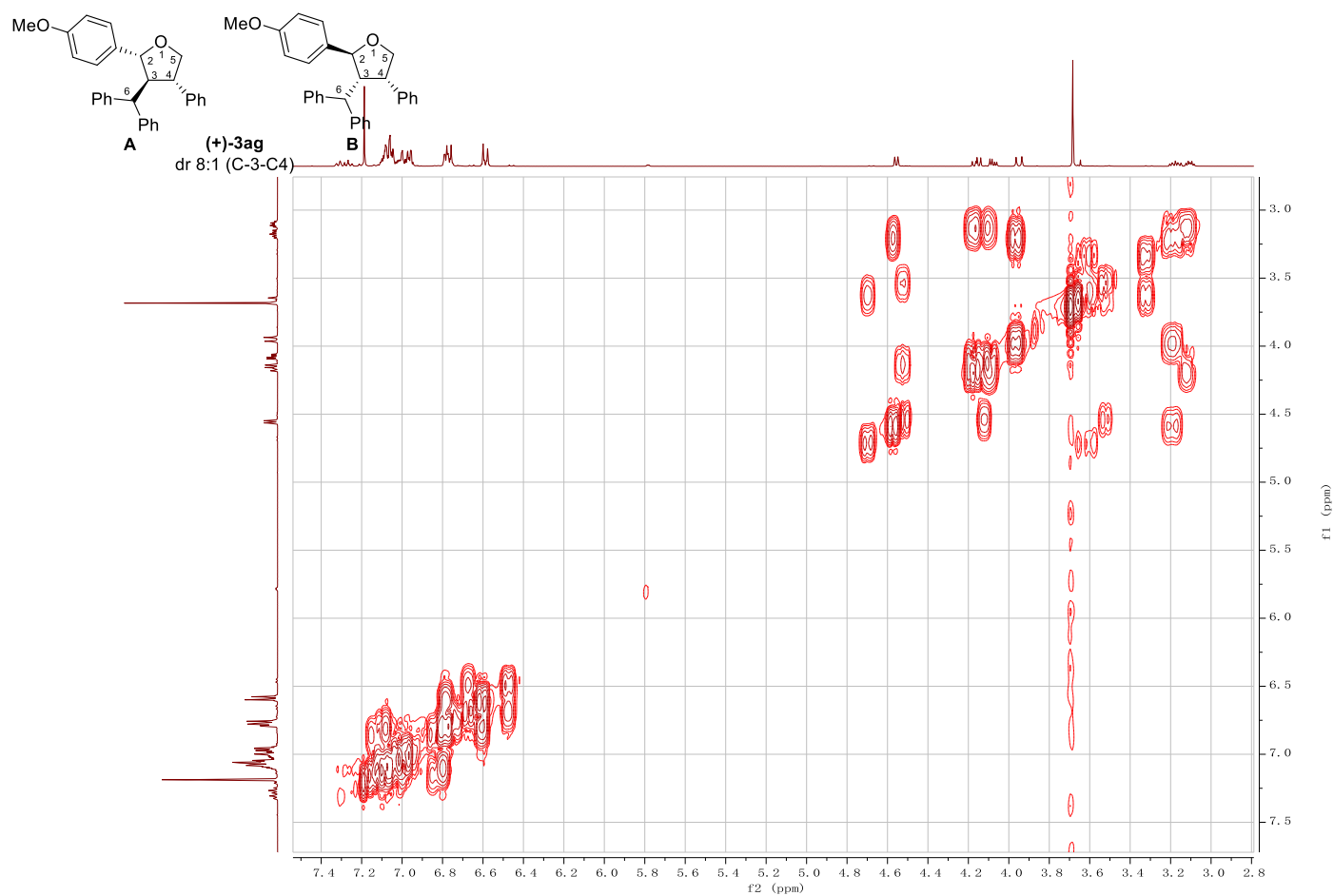




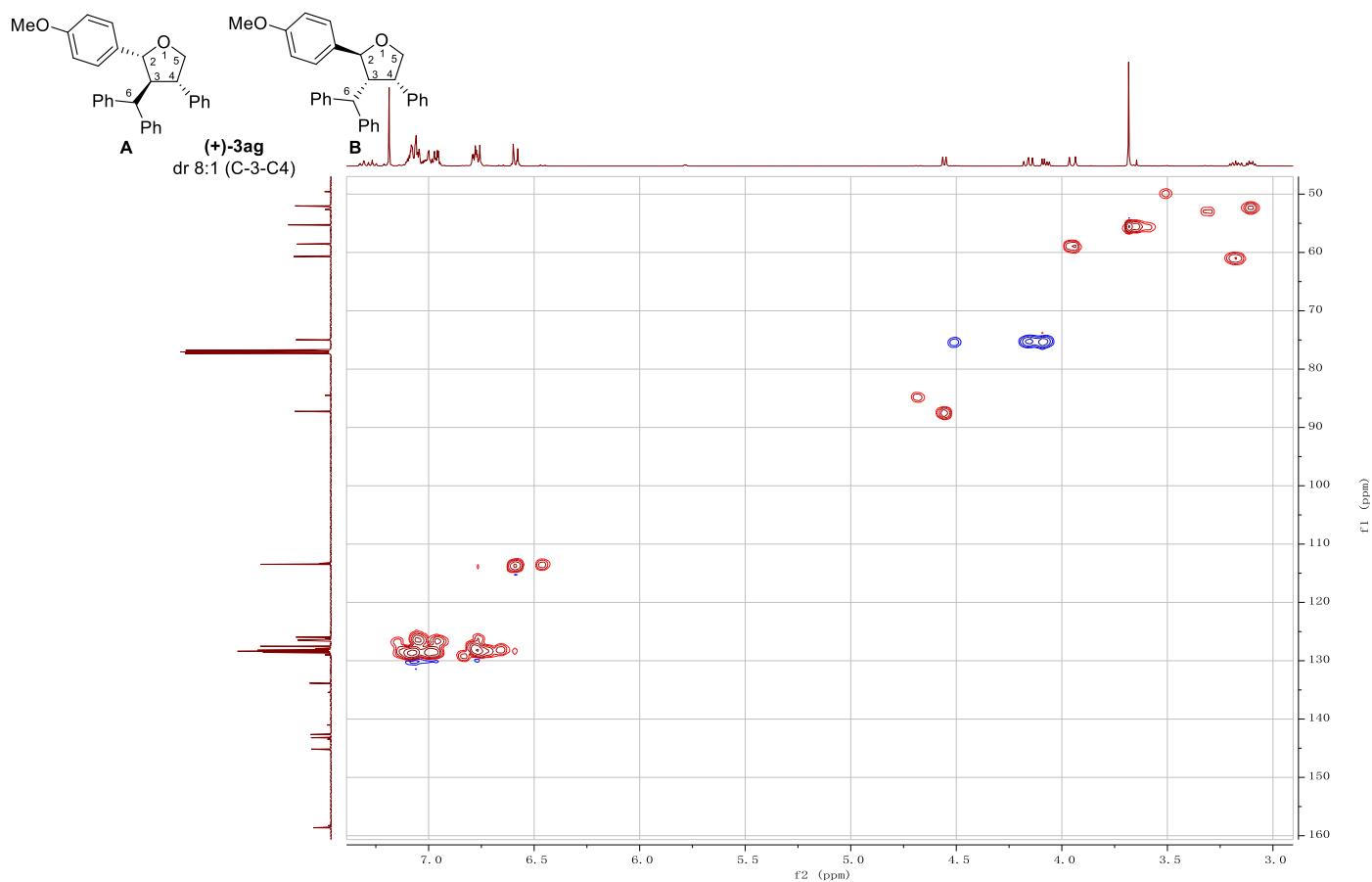




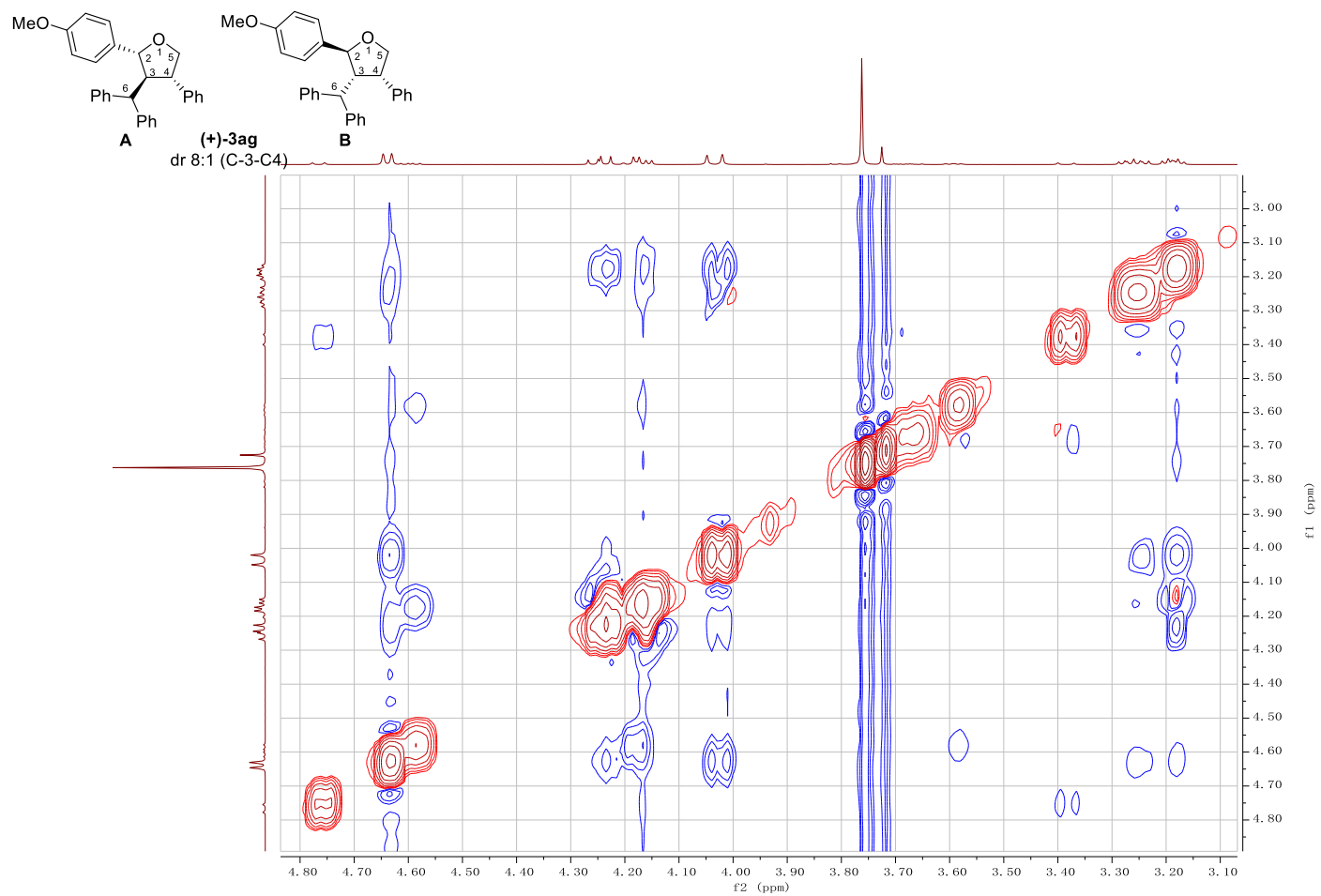
^1H - ^1H COSY - 90 (500 MHz, CDCl_3)

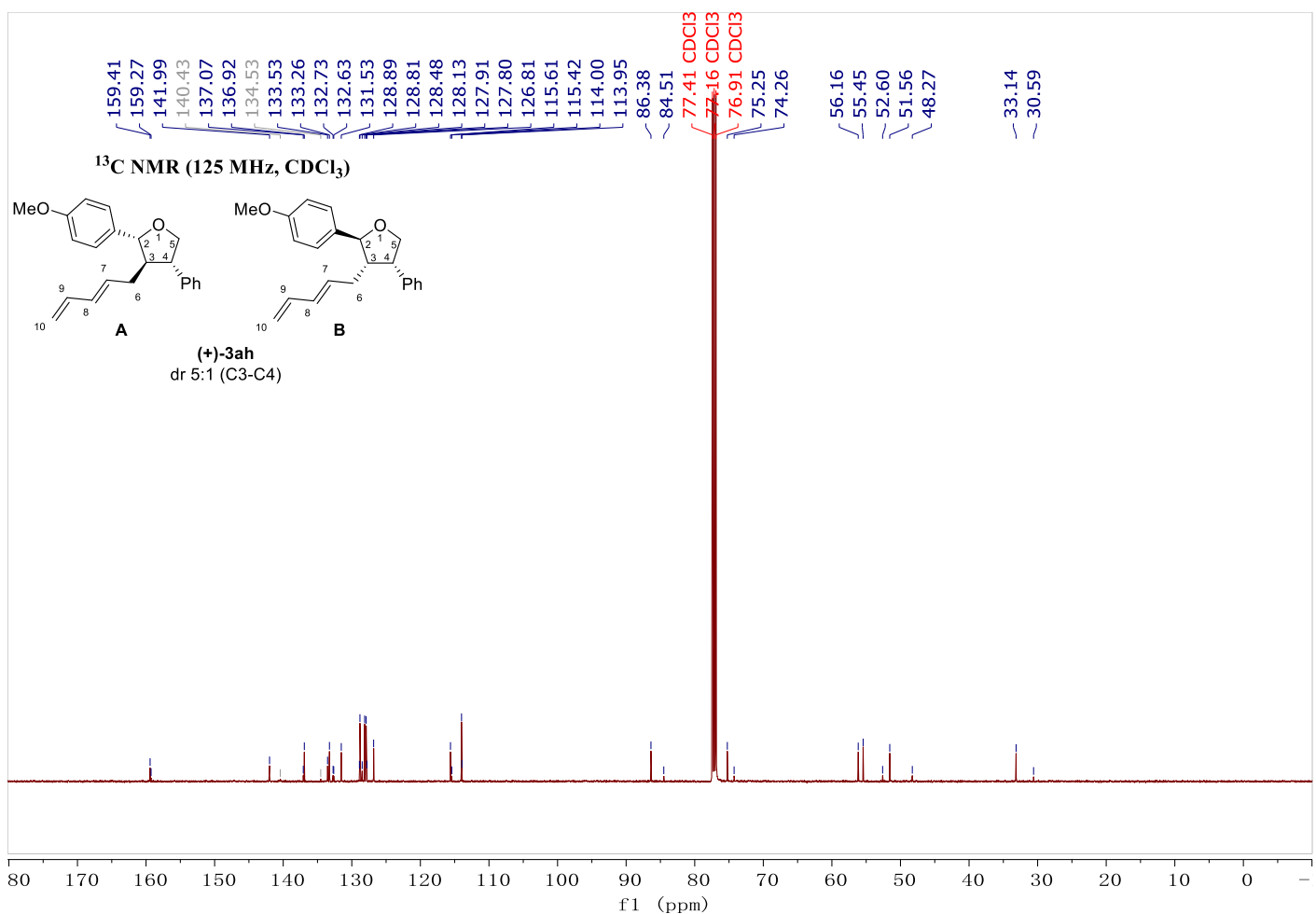
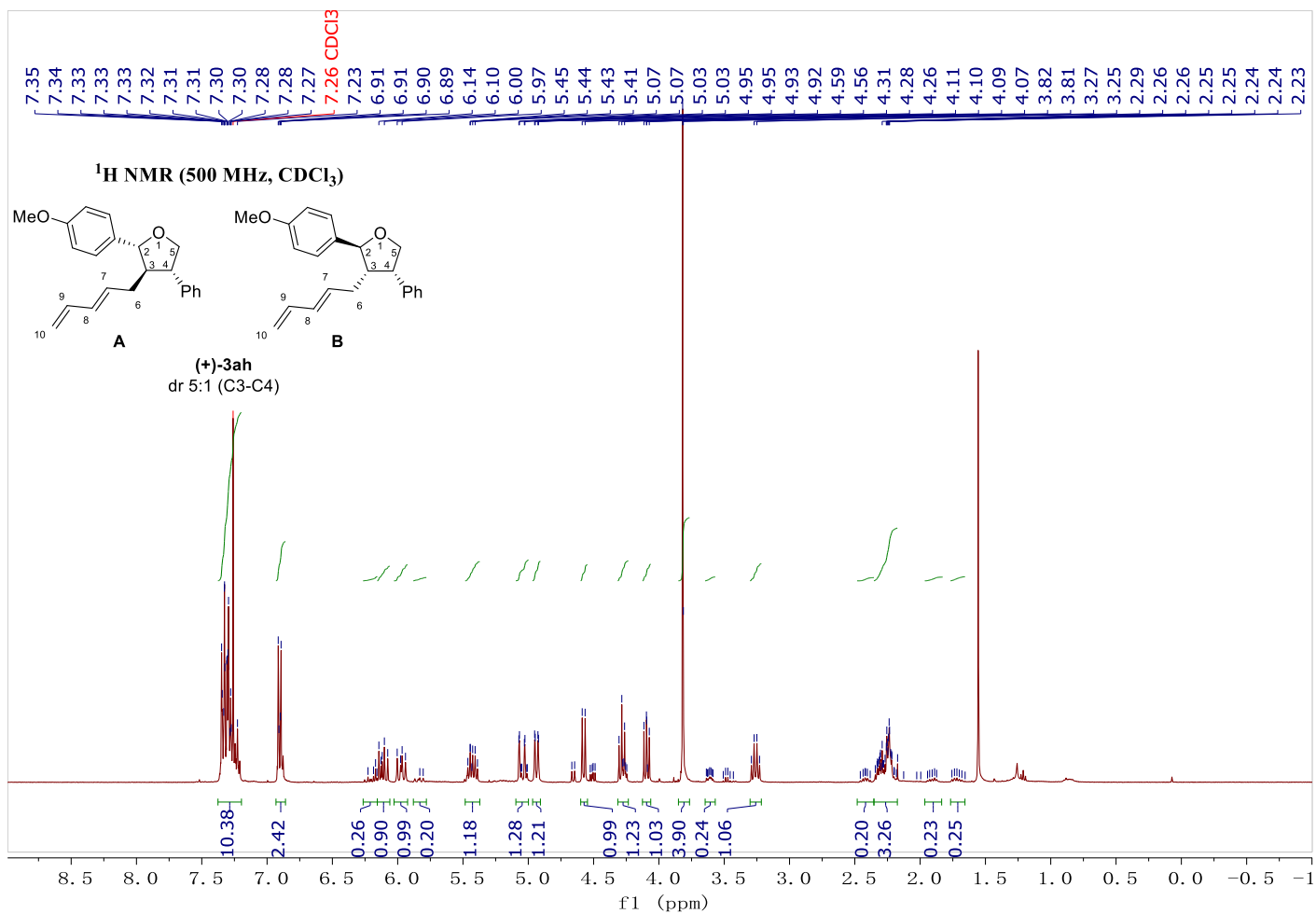


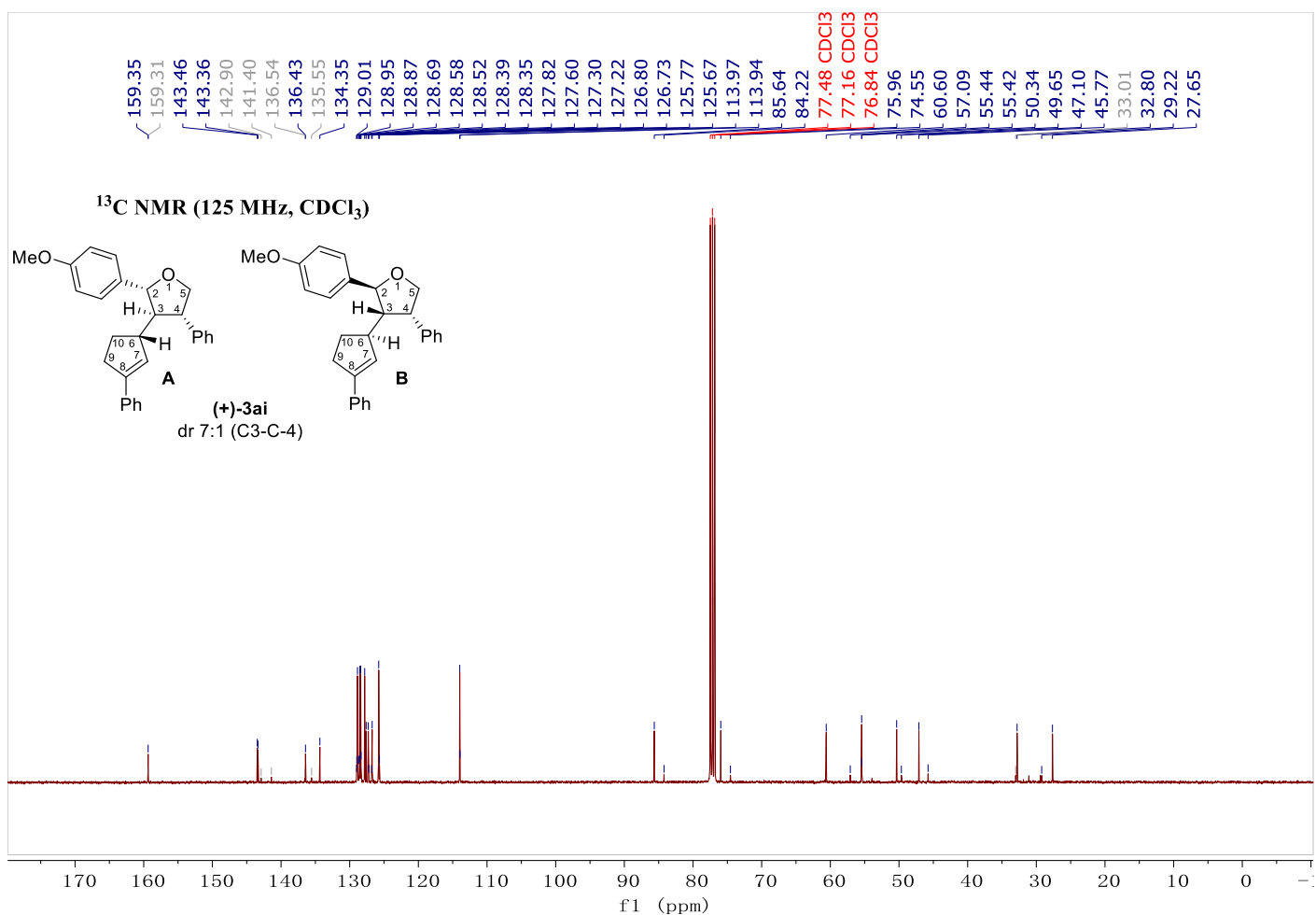
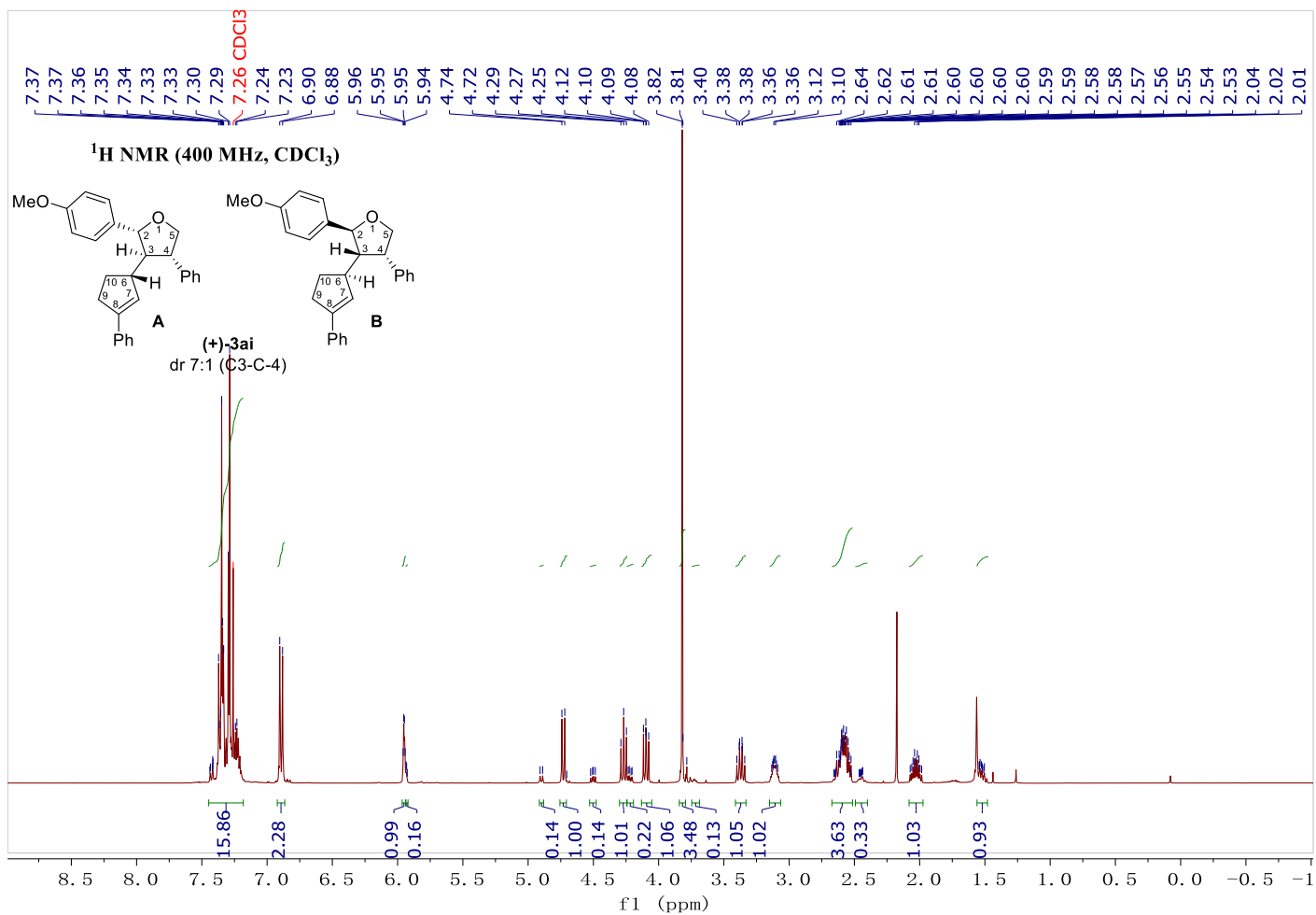
^1H (500 MHz) - ^{13}C (125 MHz) HSQC (CDCl_3)

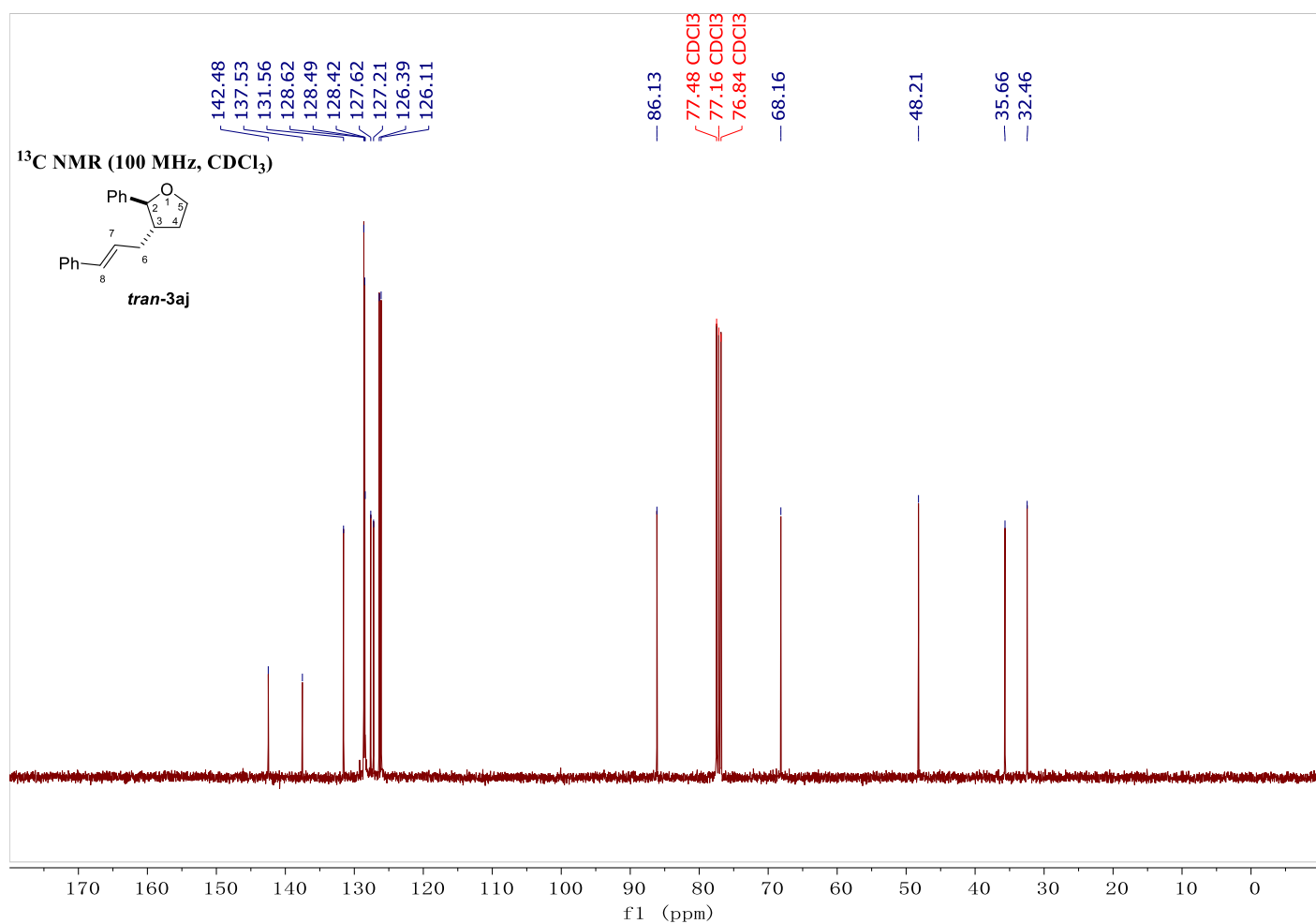
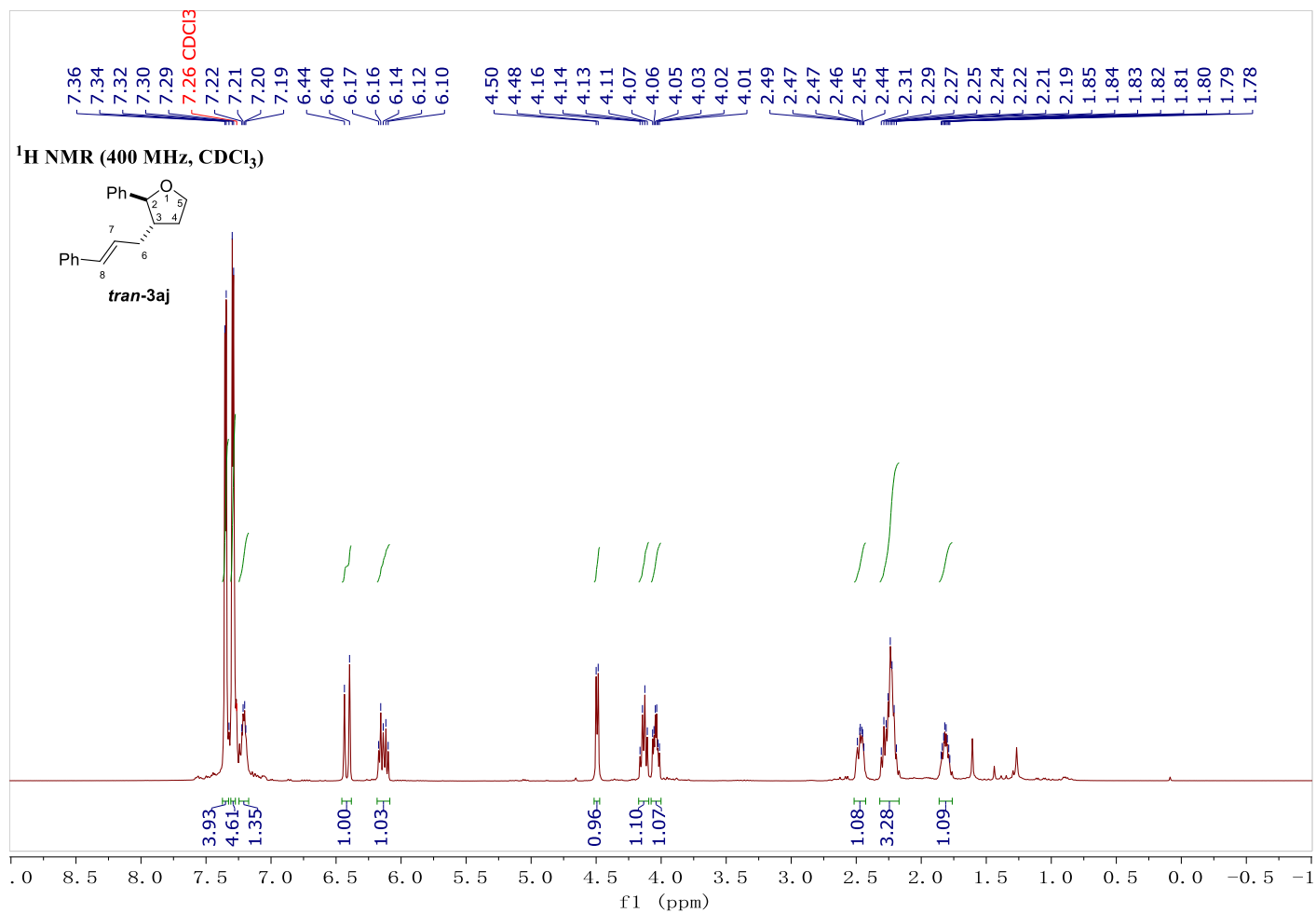


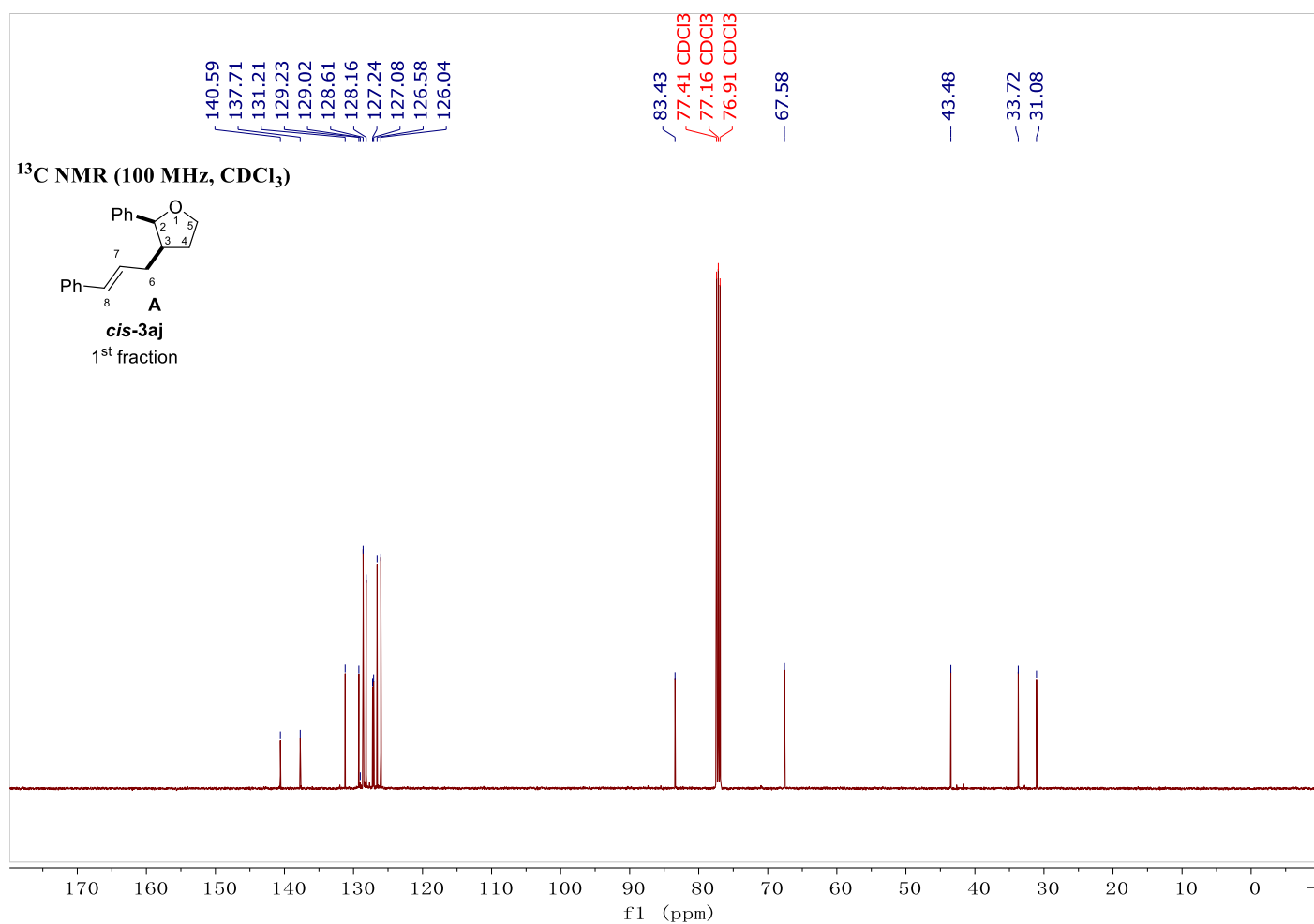
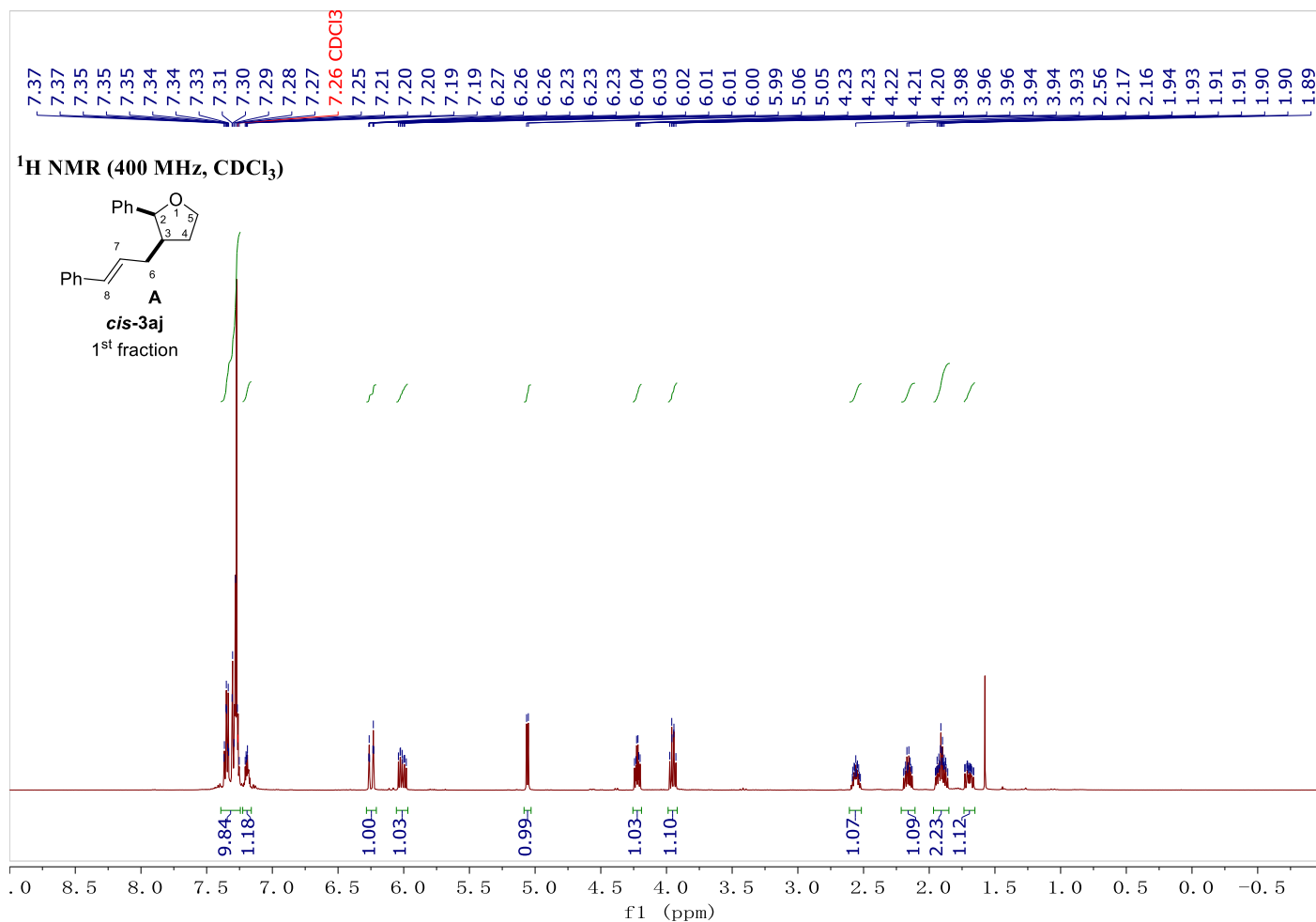
NOESY-2D (500 MHz, CDCl₃)

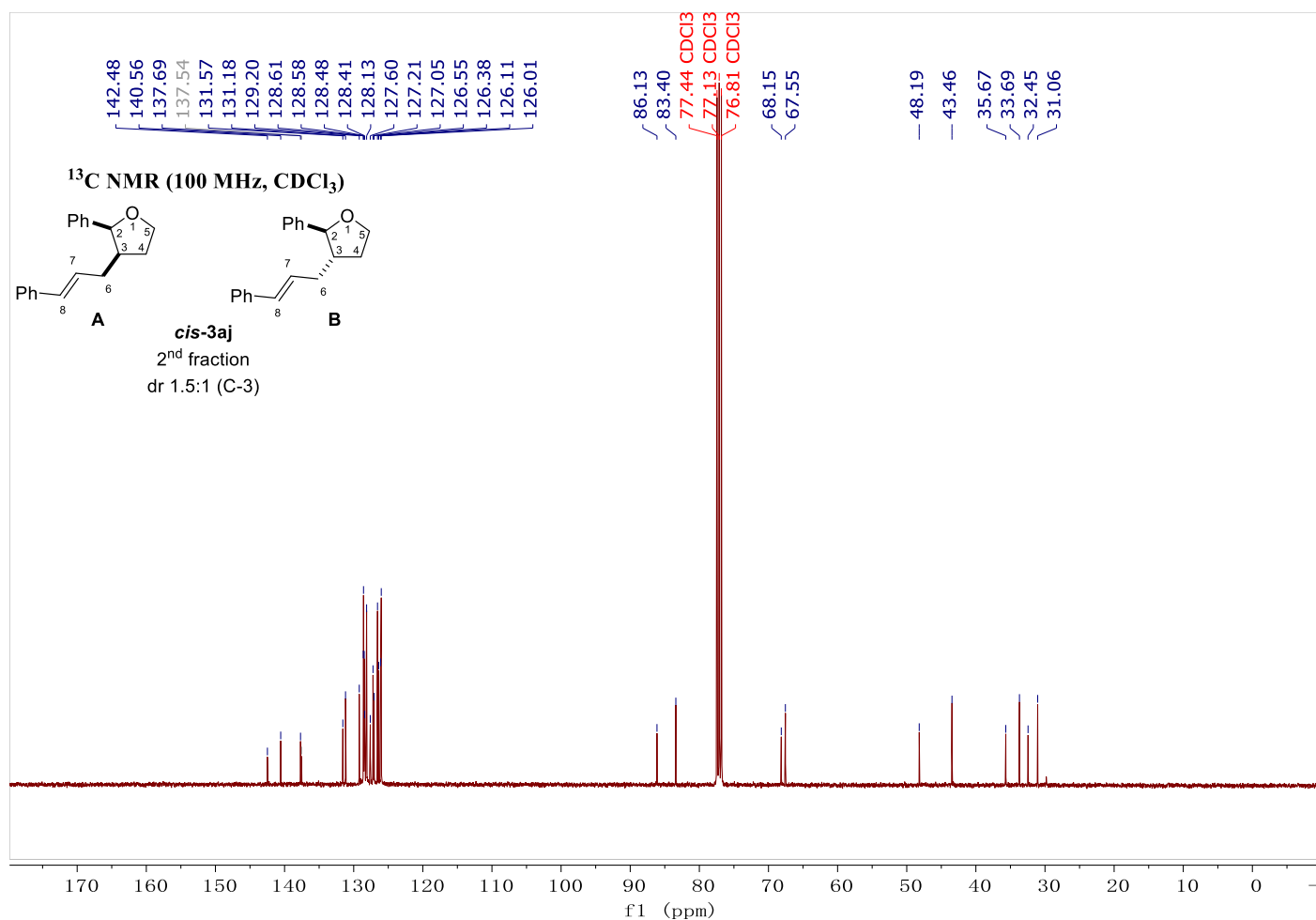
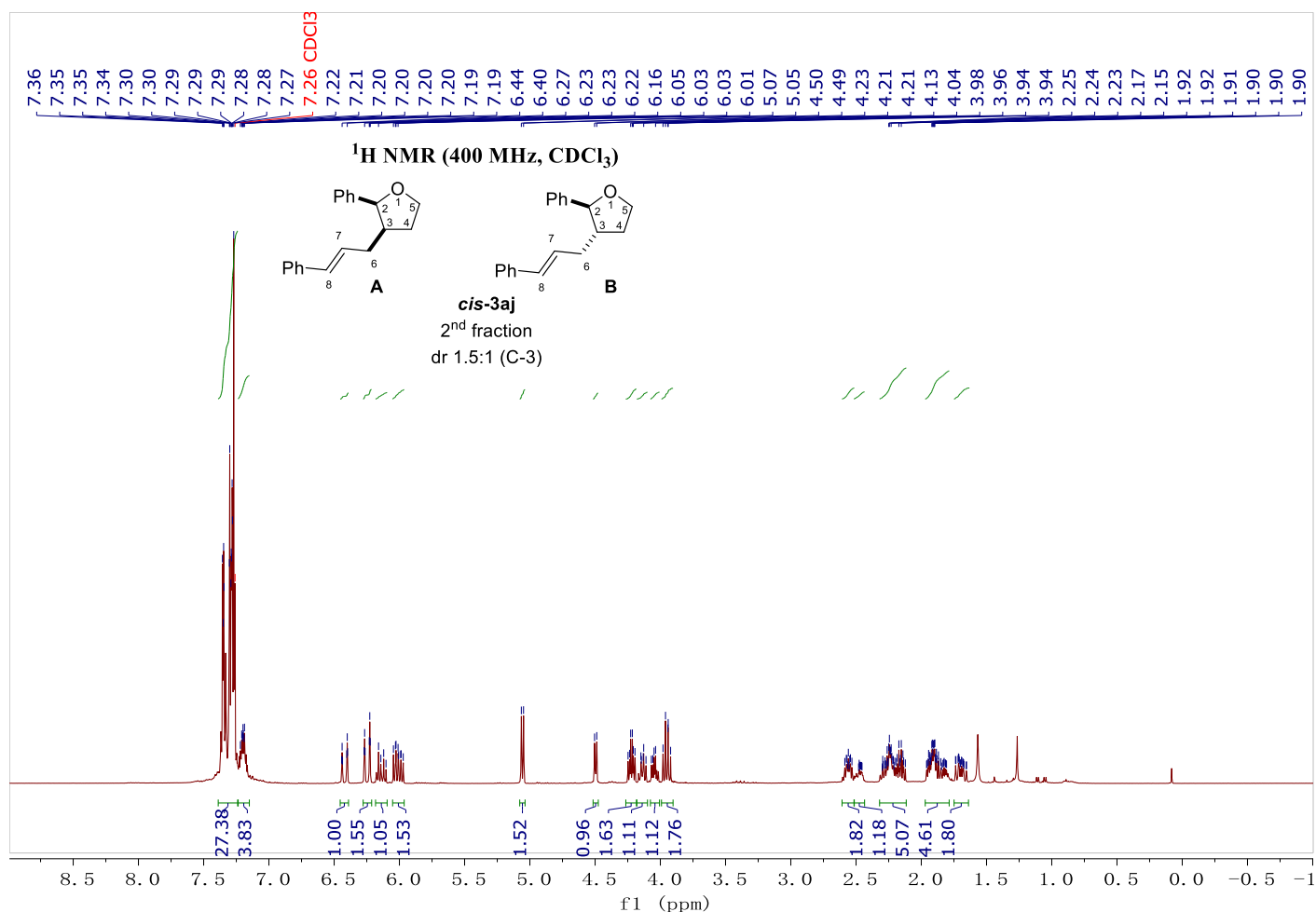




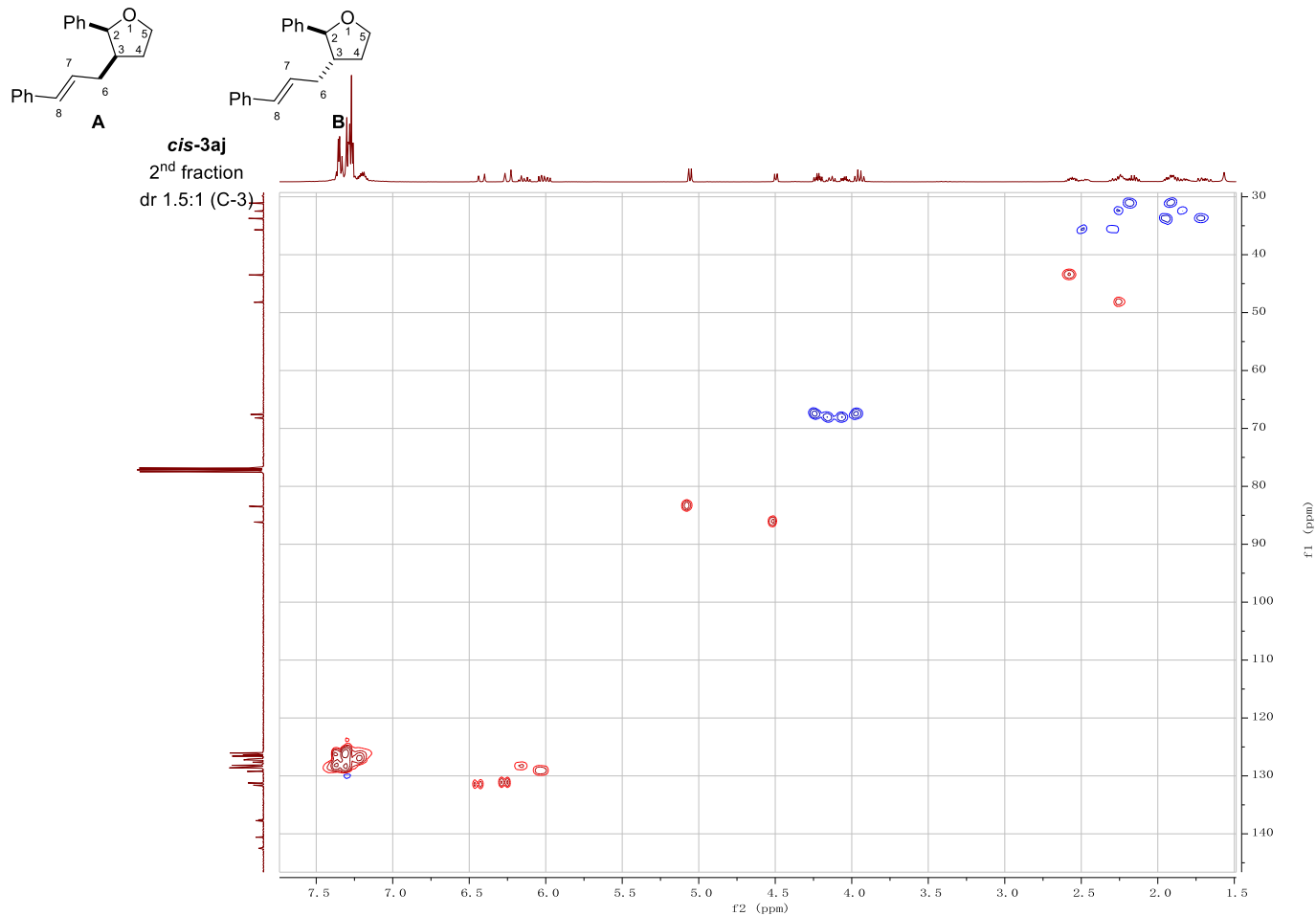
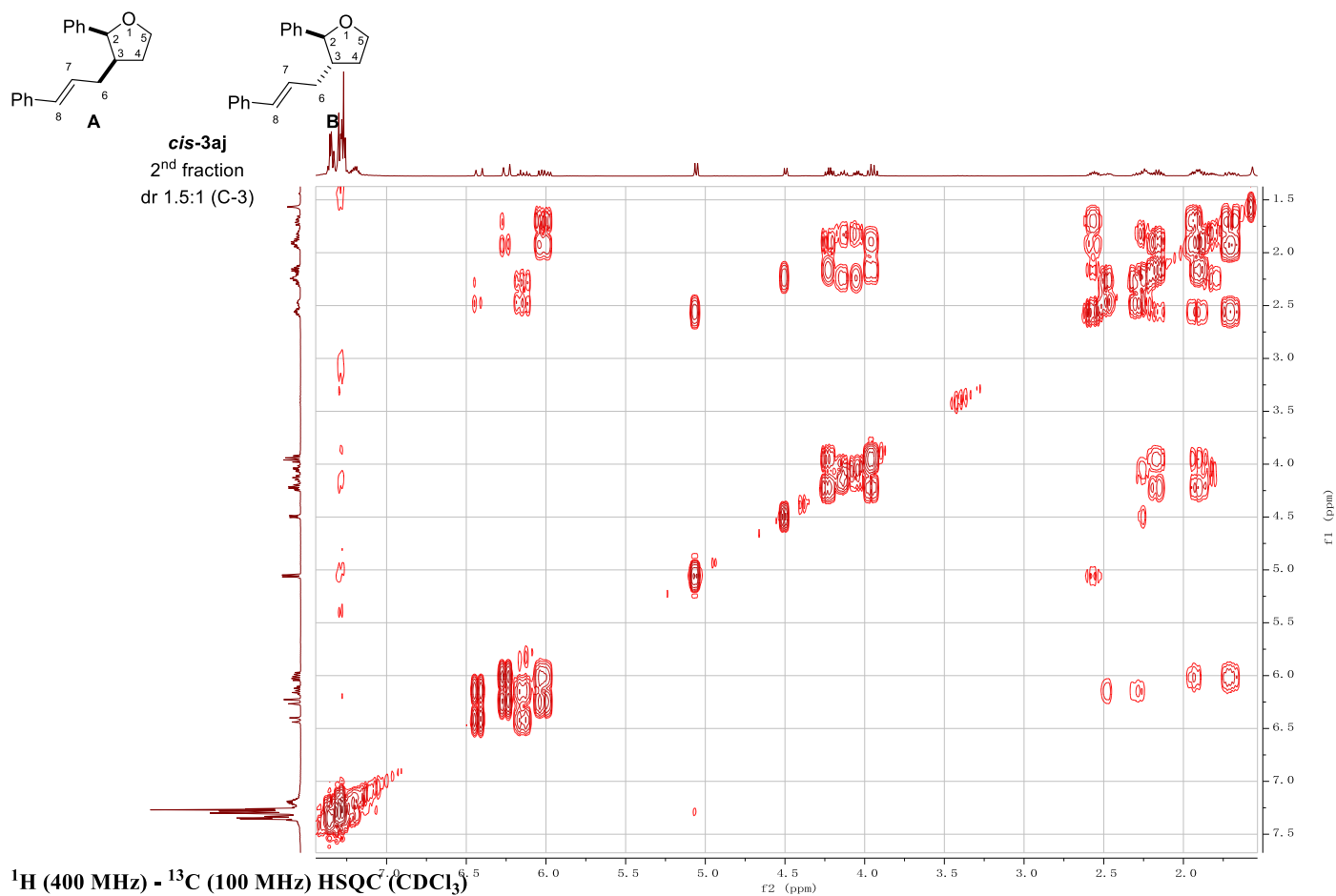




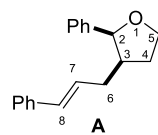




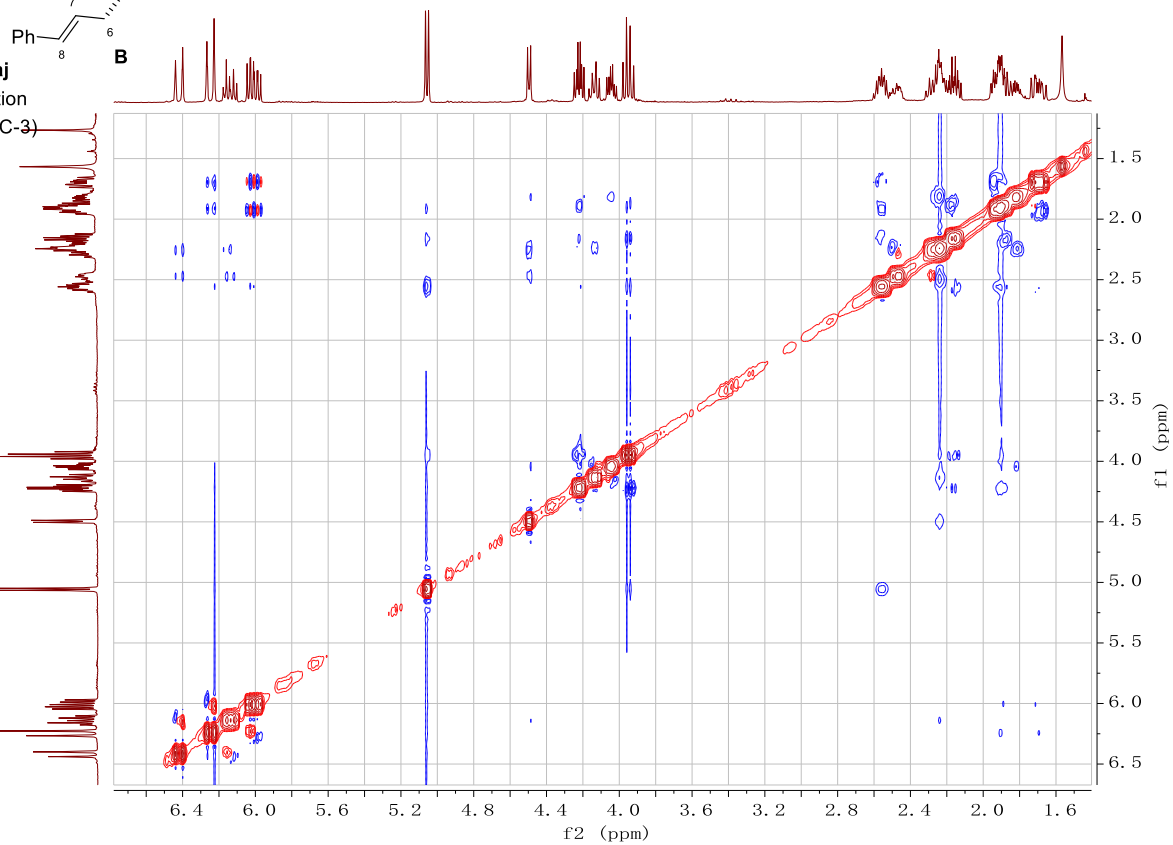
$^1\text{H} - ^1\text{H}$ COSY - 90 (400 MHz, CDCl_3)

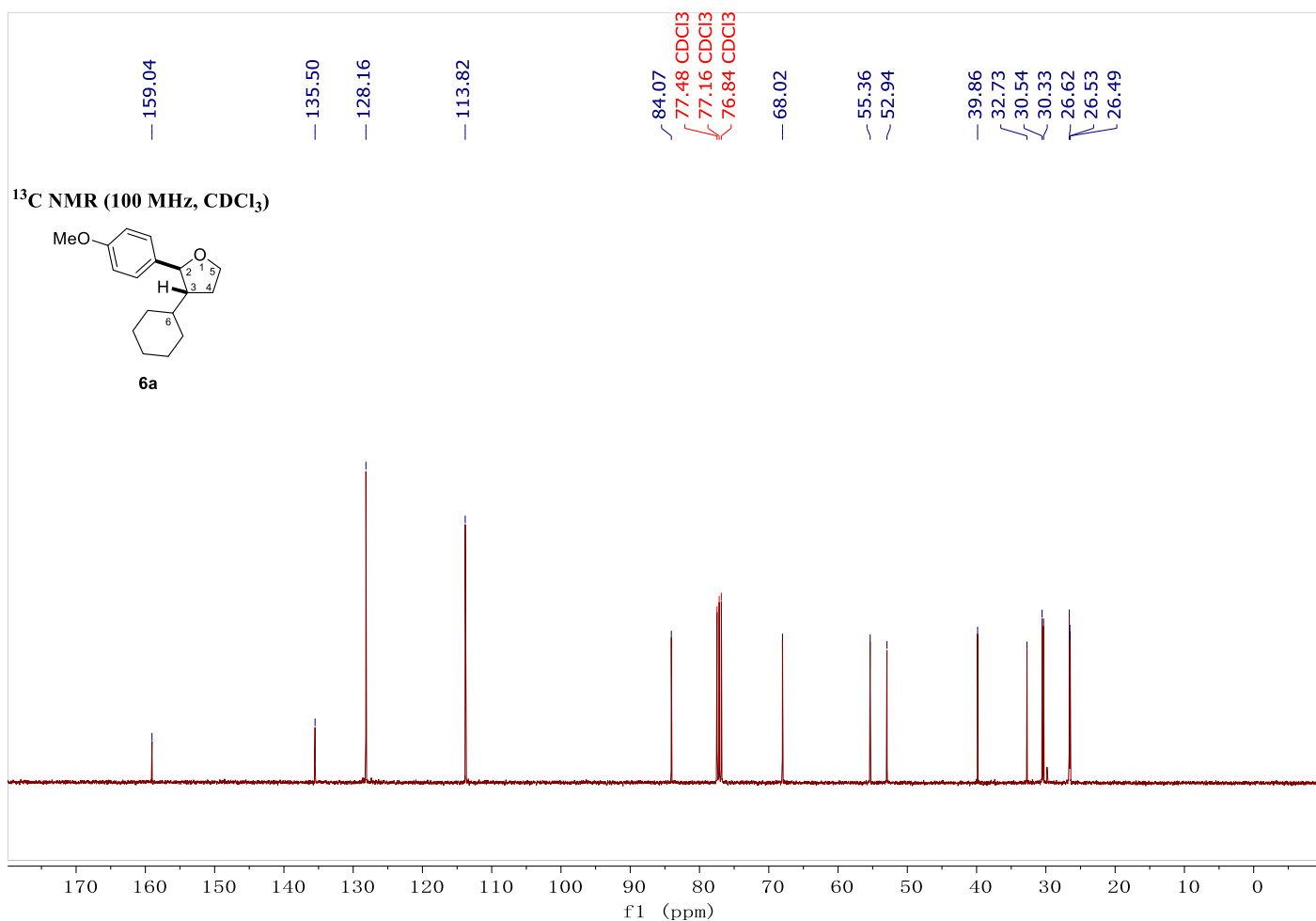
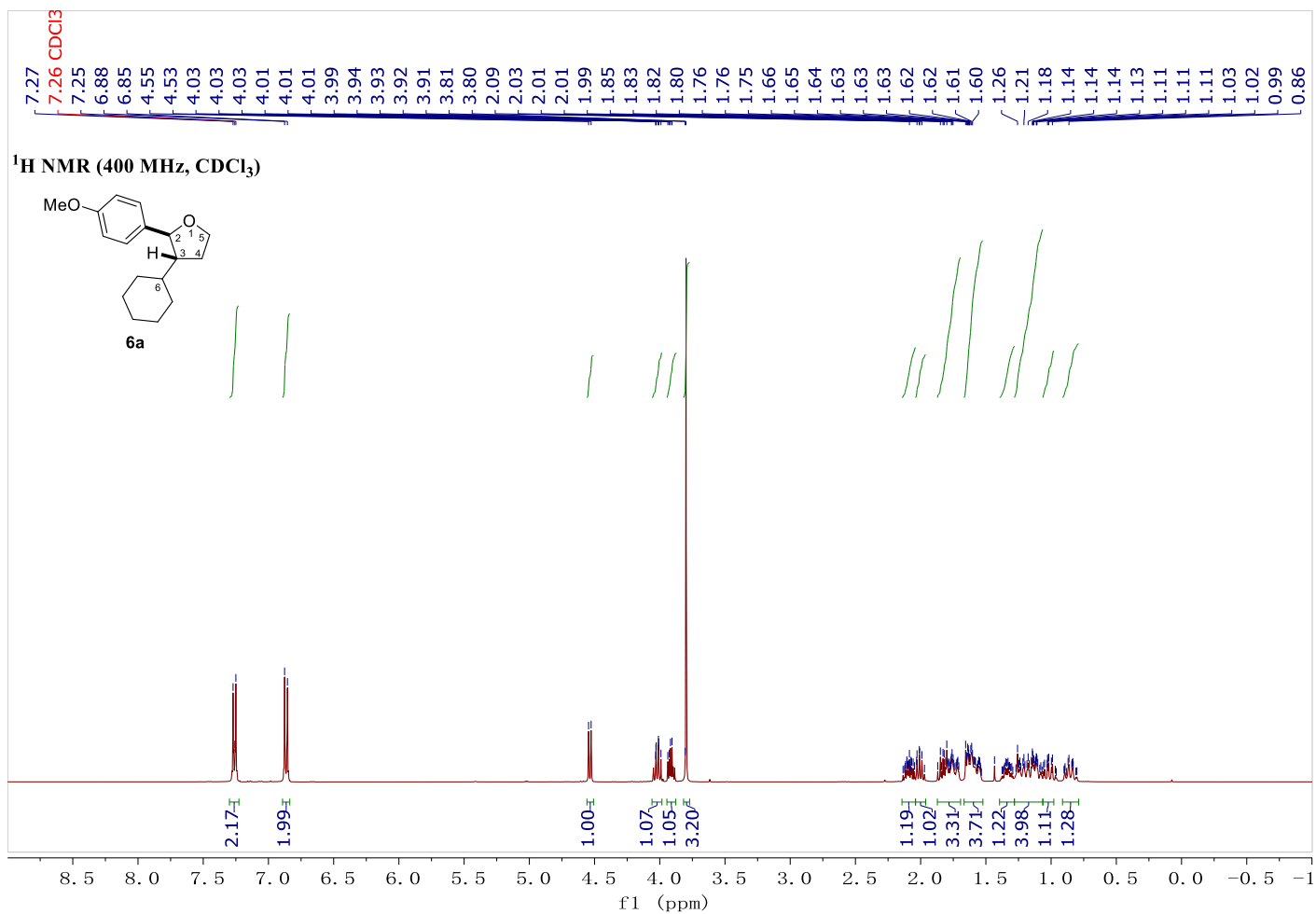


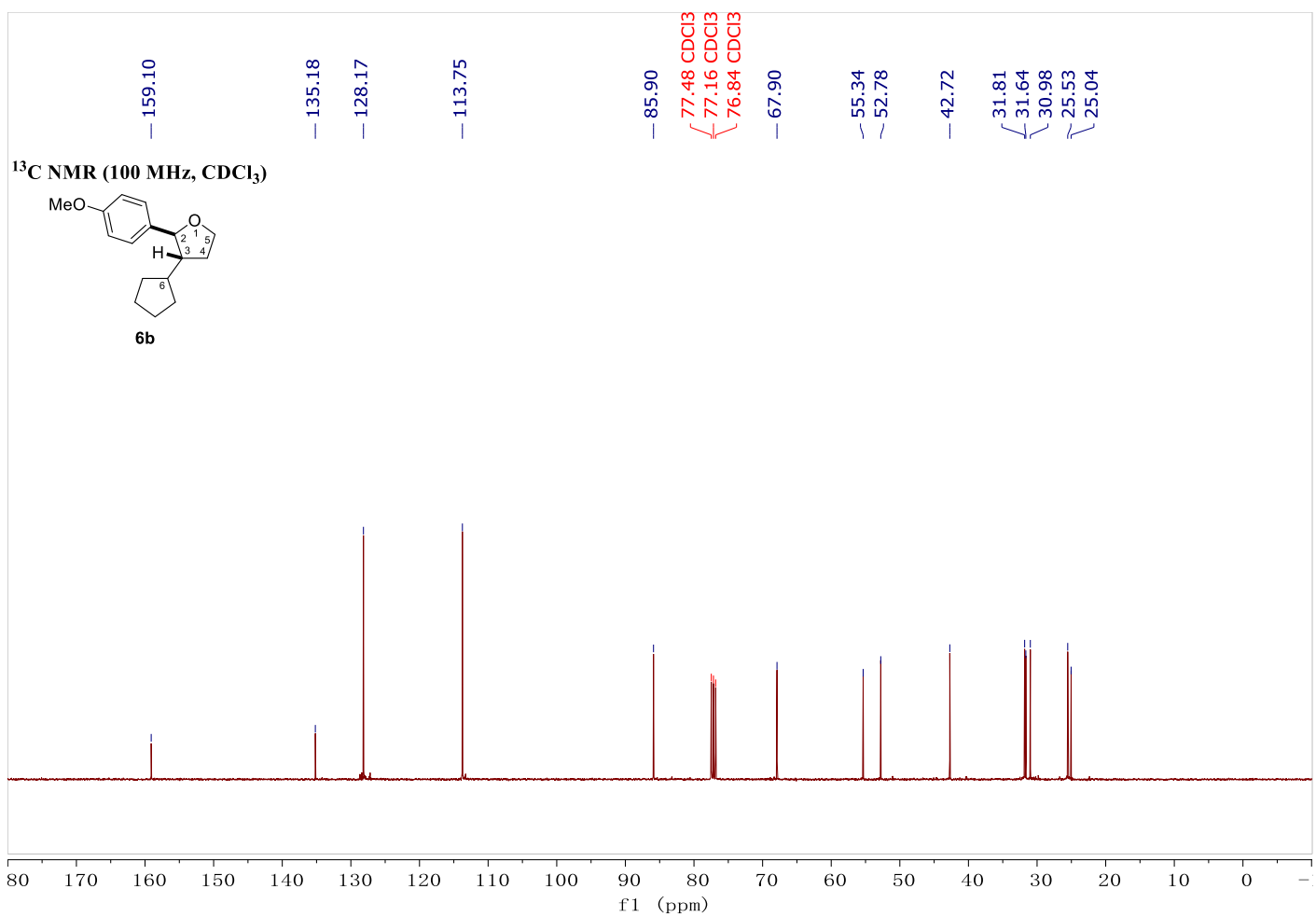
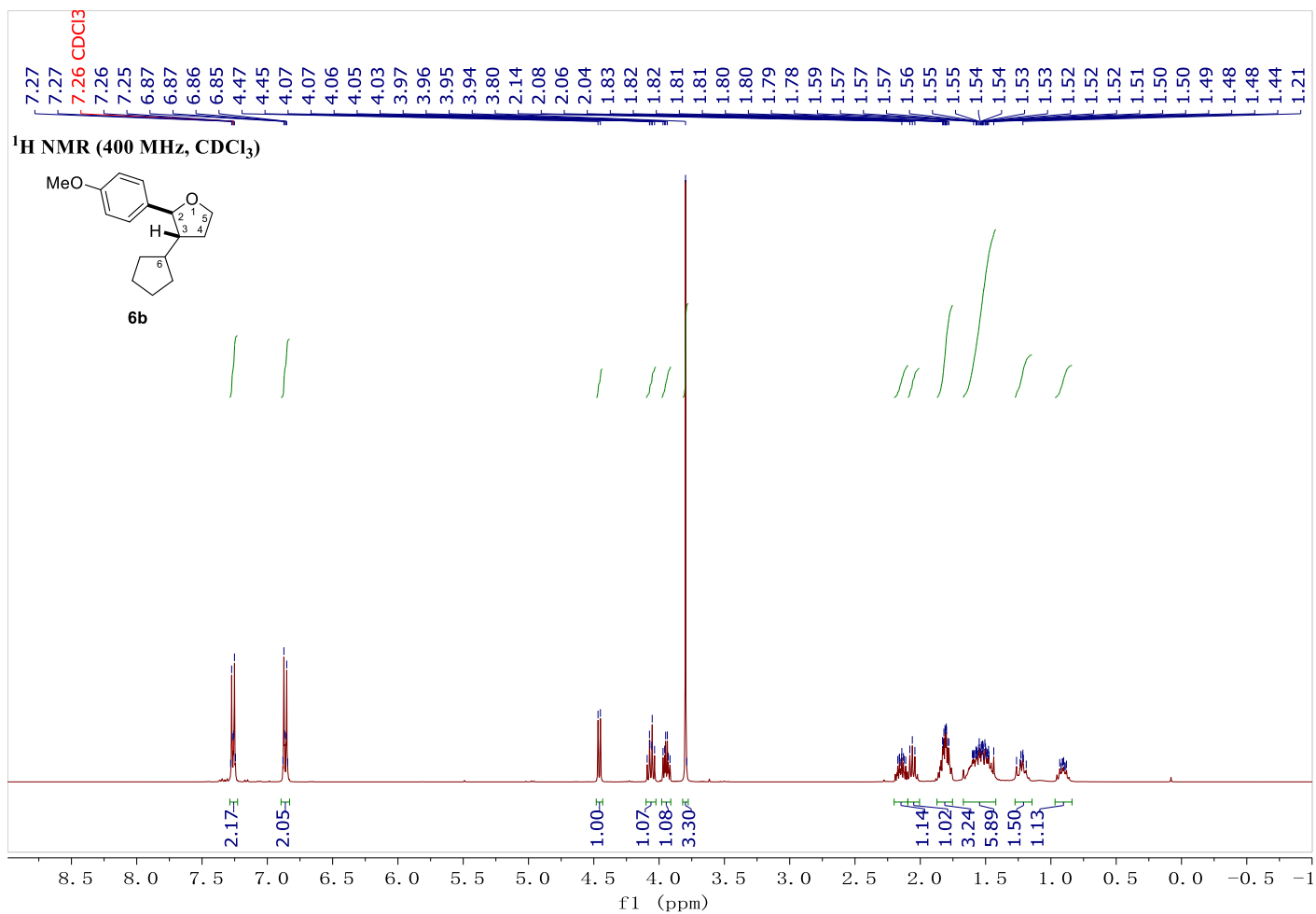
NOESY-2D (400 MHz, CDCl₃)

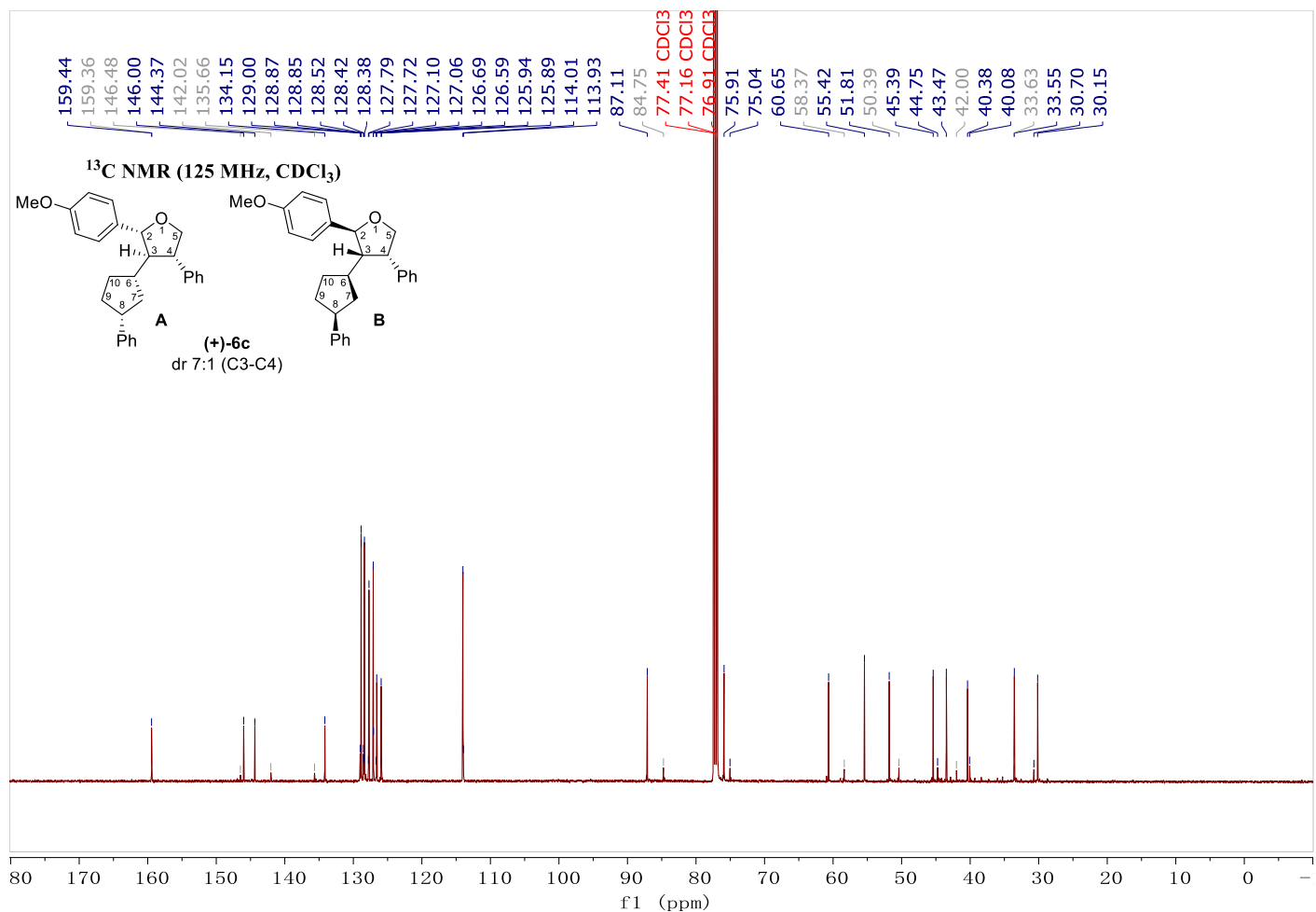
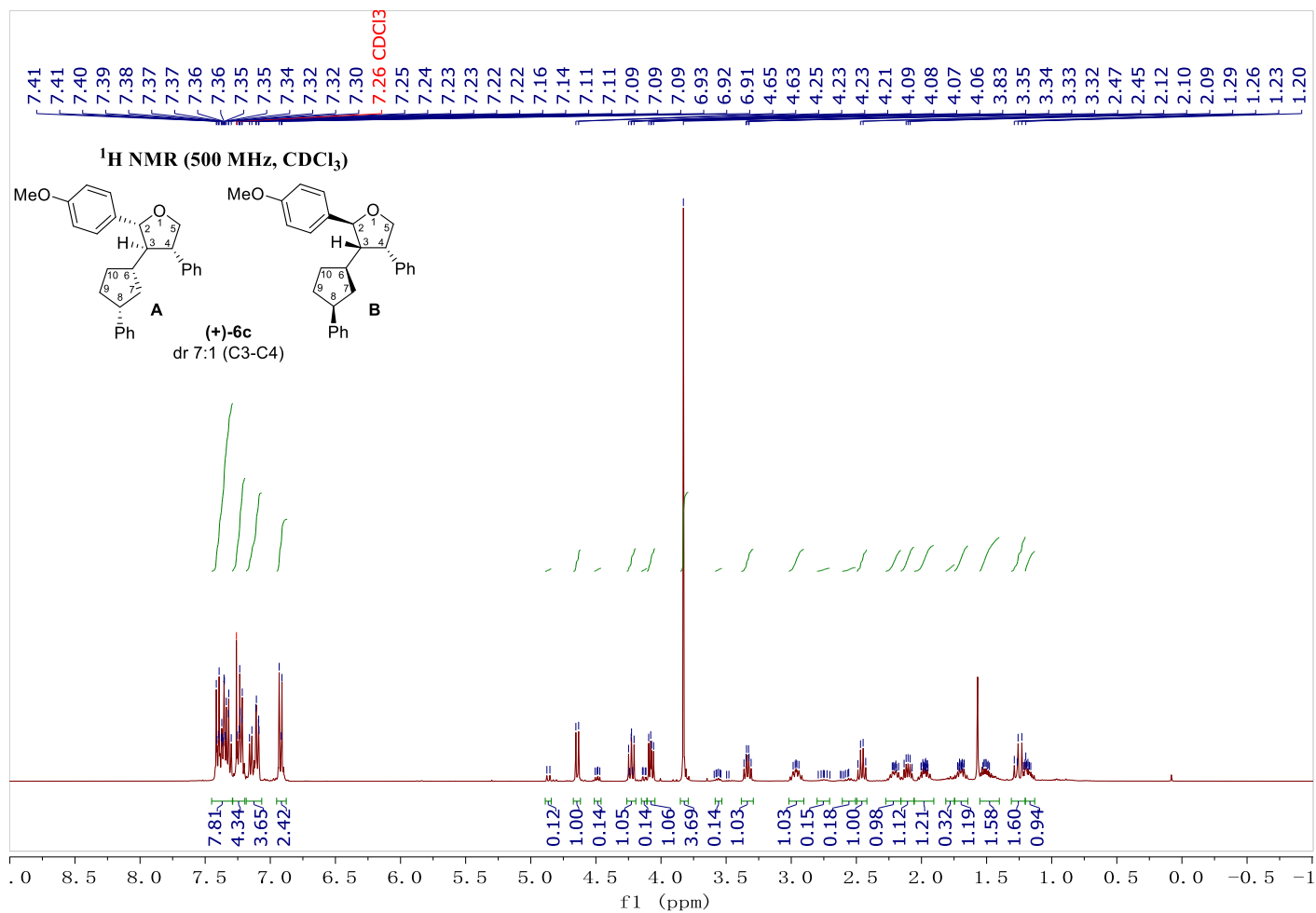


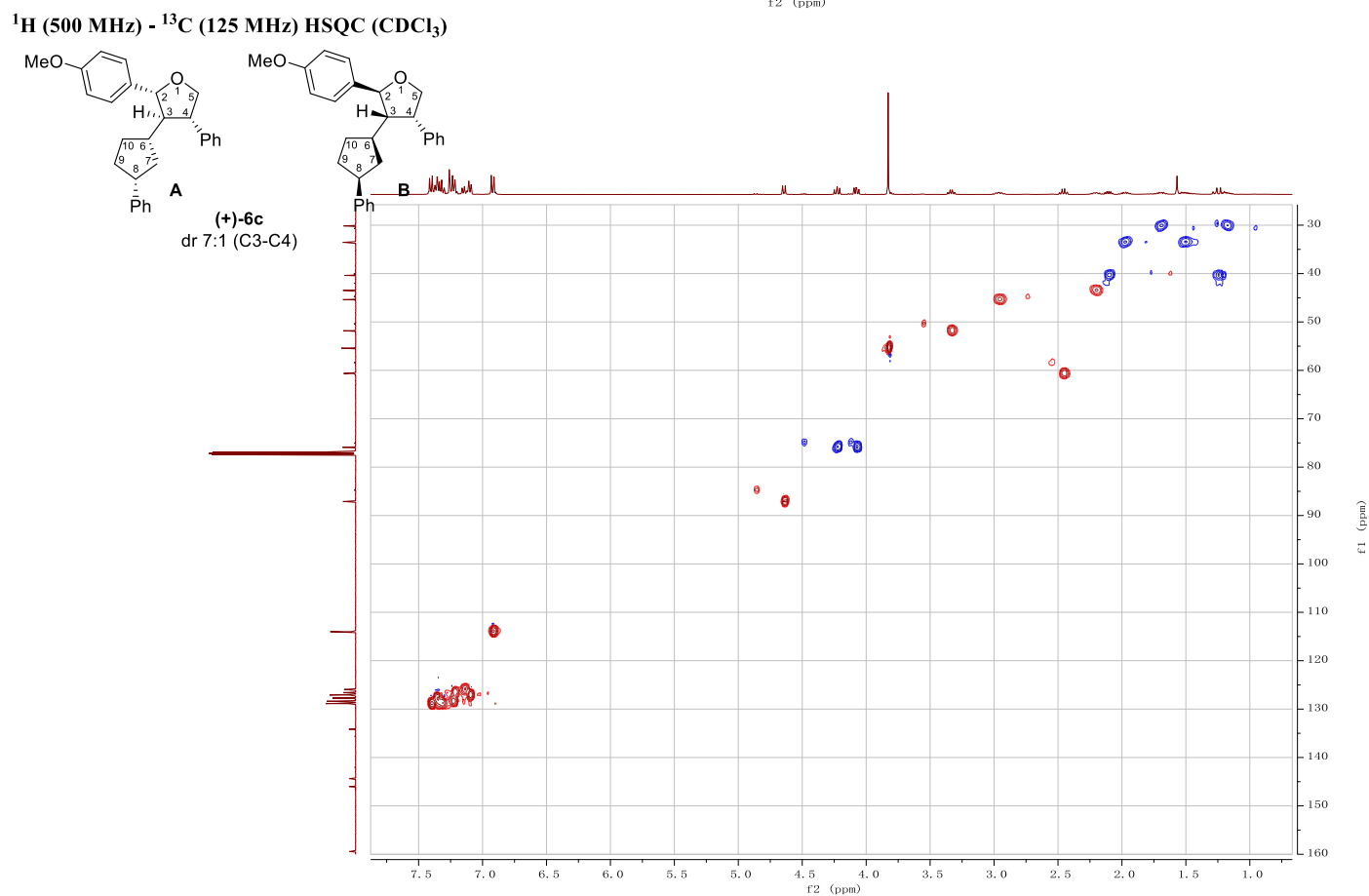
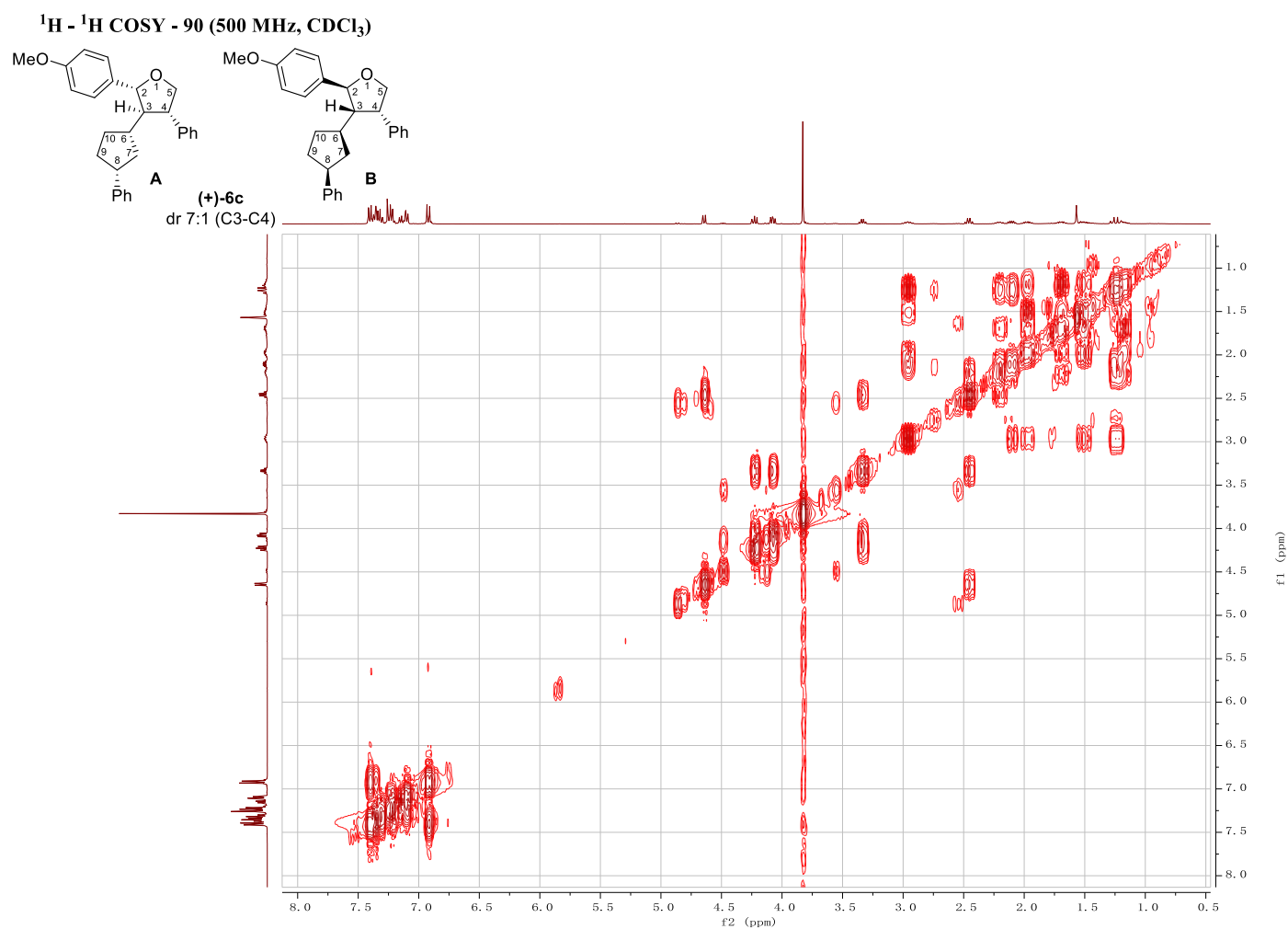
cis-3aj
2nd fraction
dr 1.5:1 (C-3)



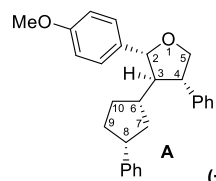




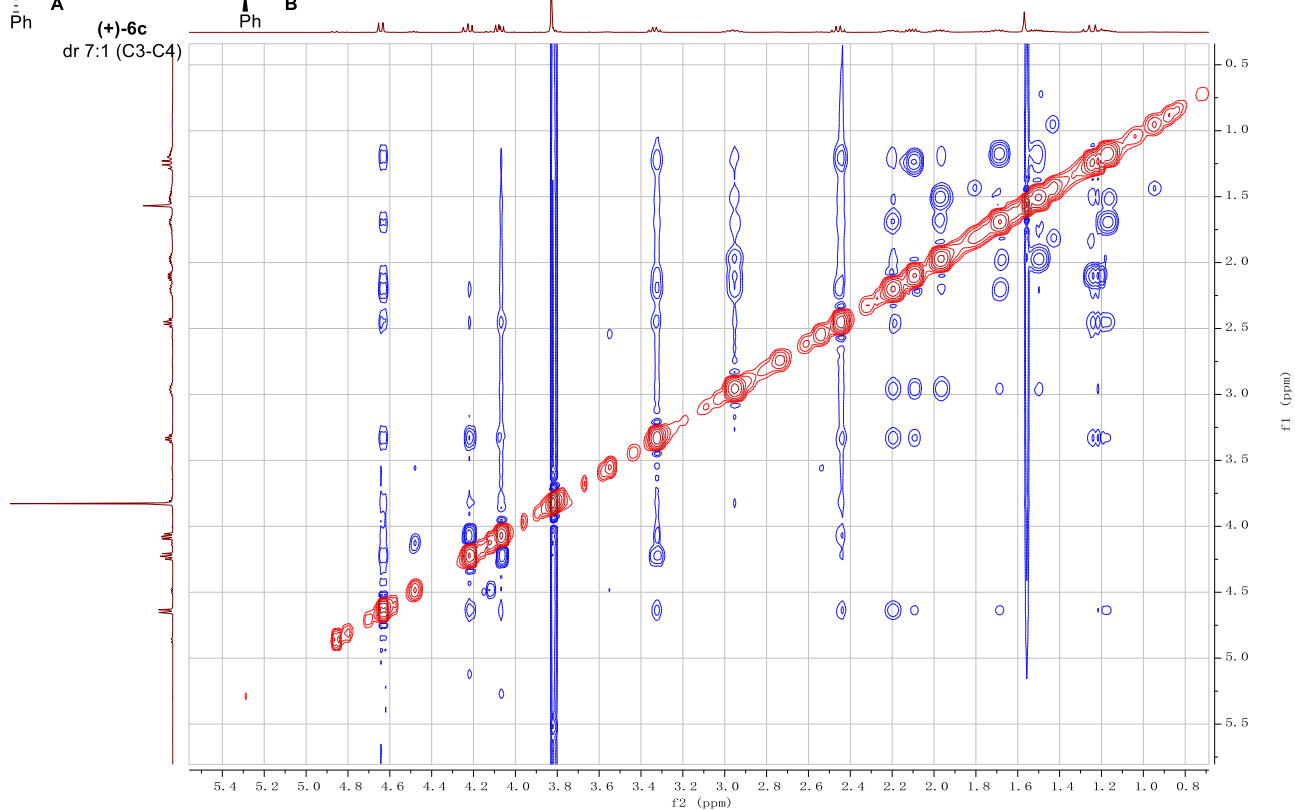
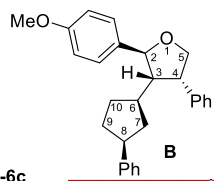


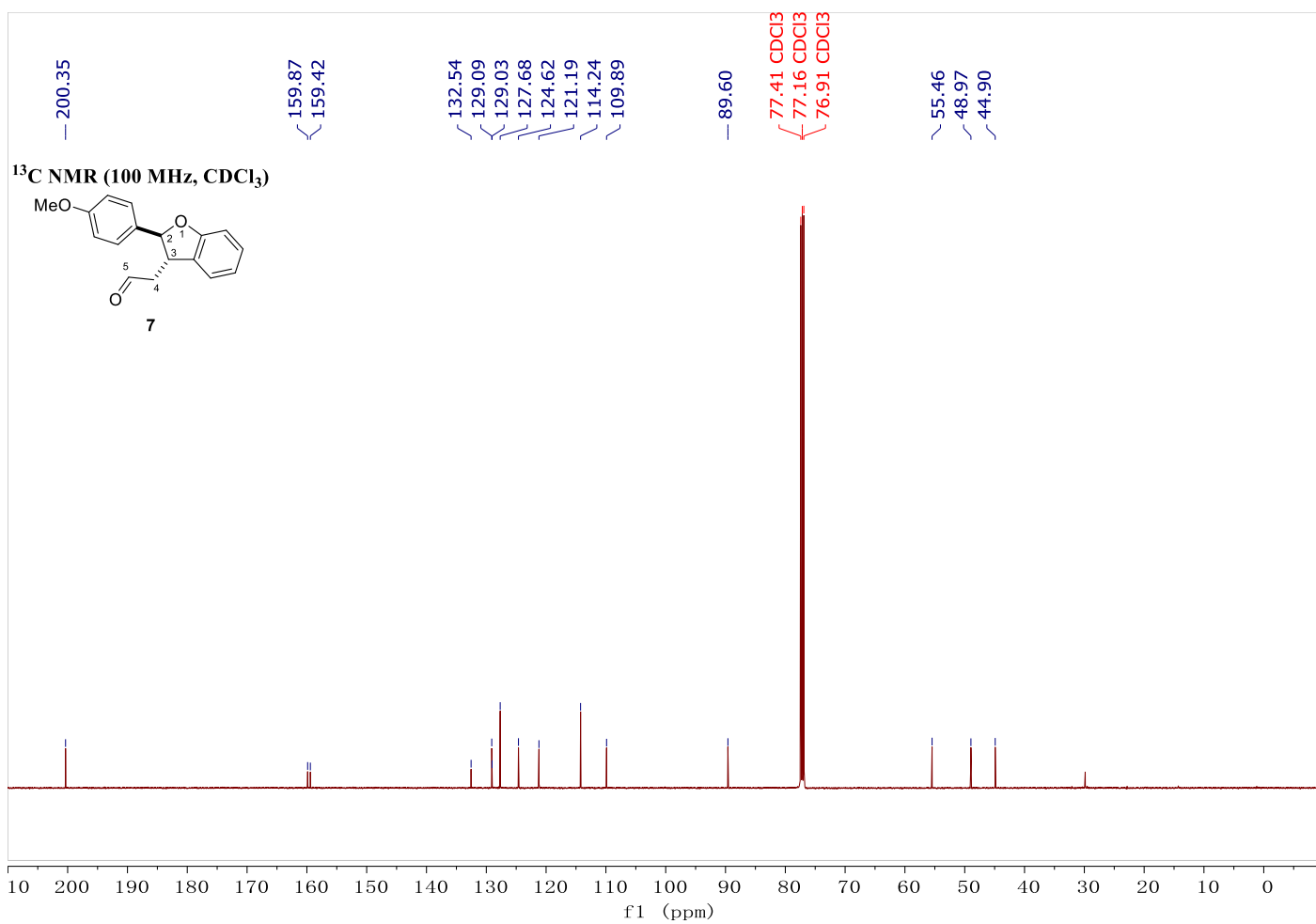
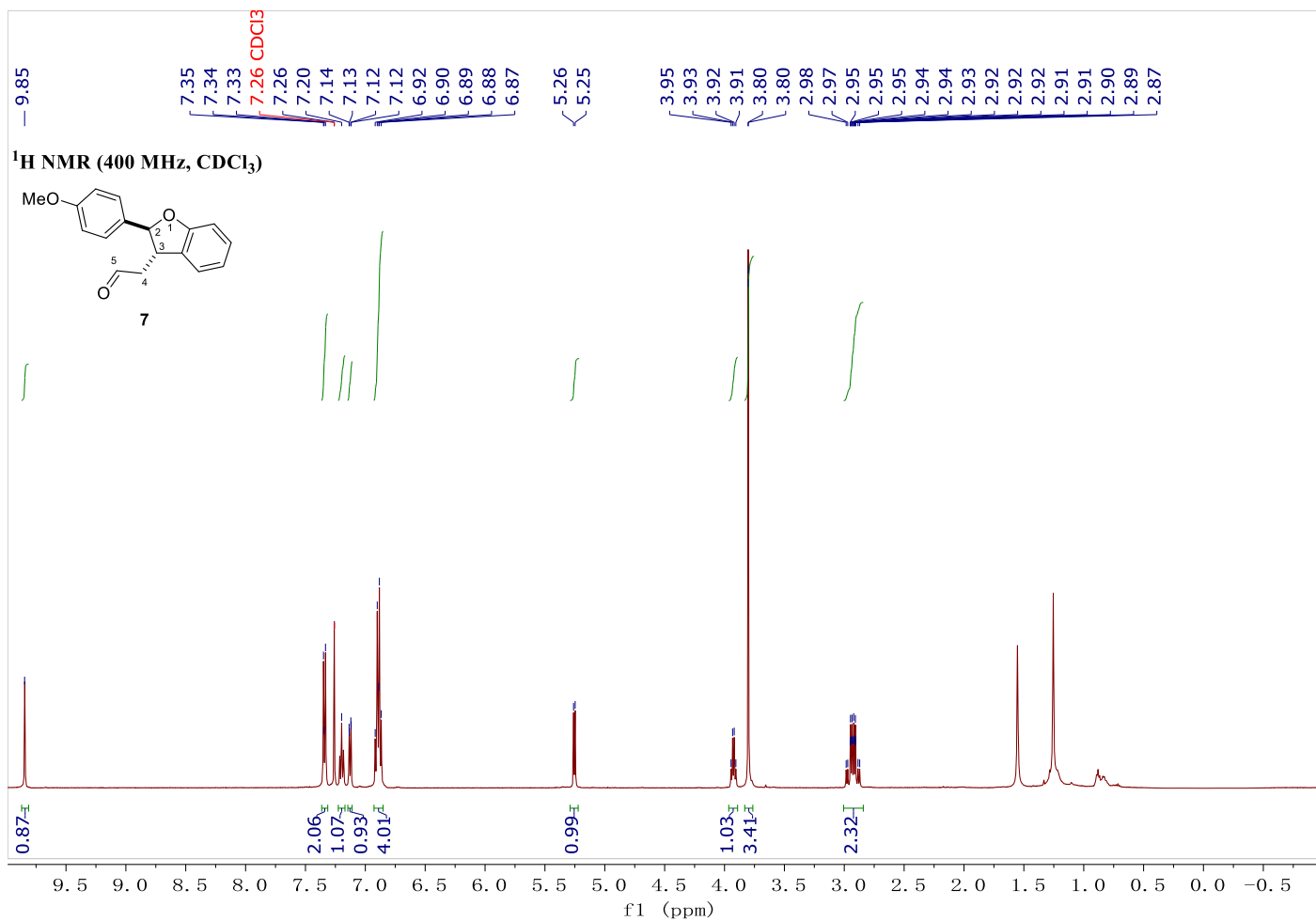


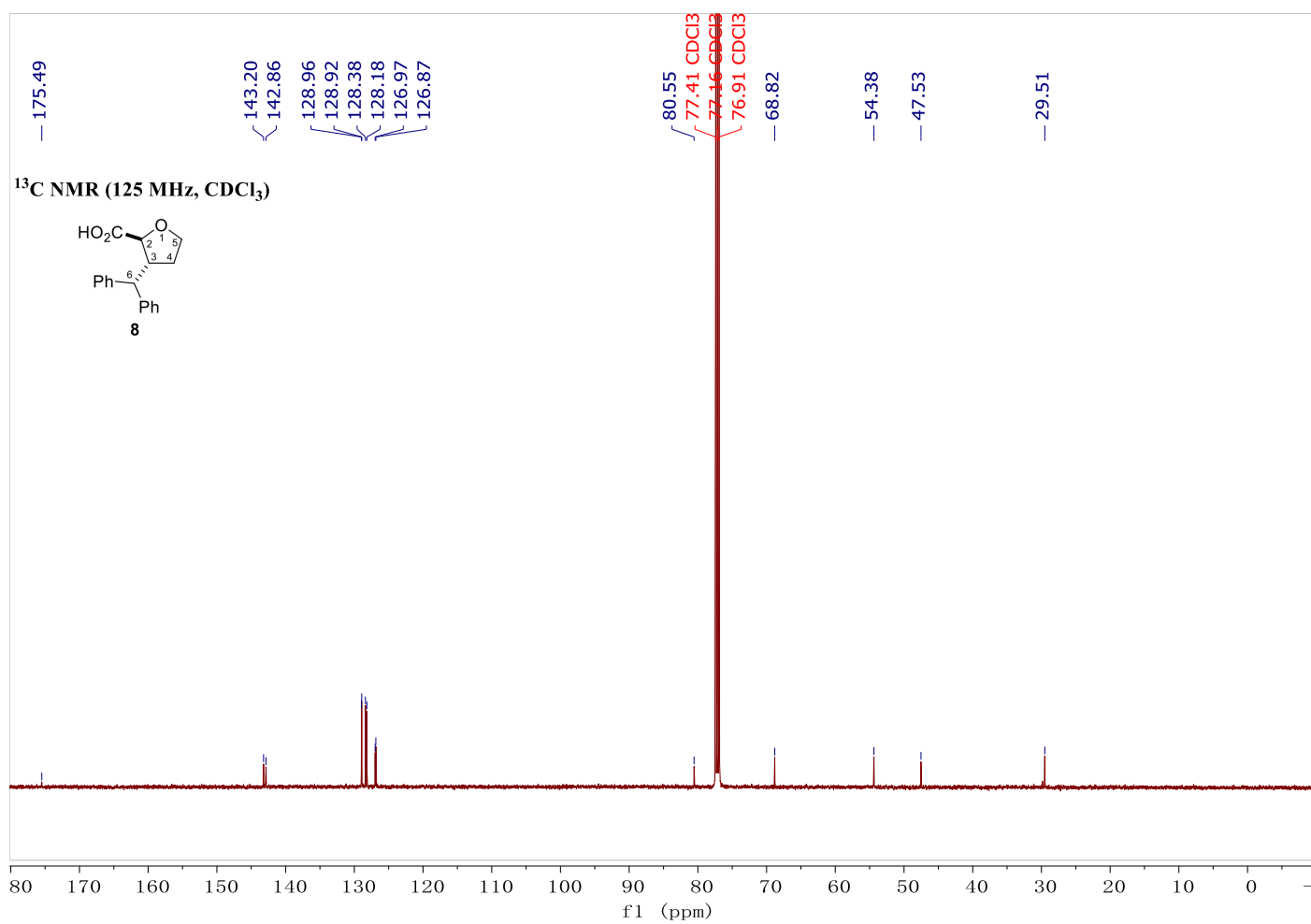
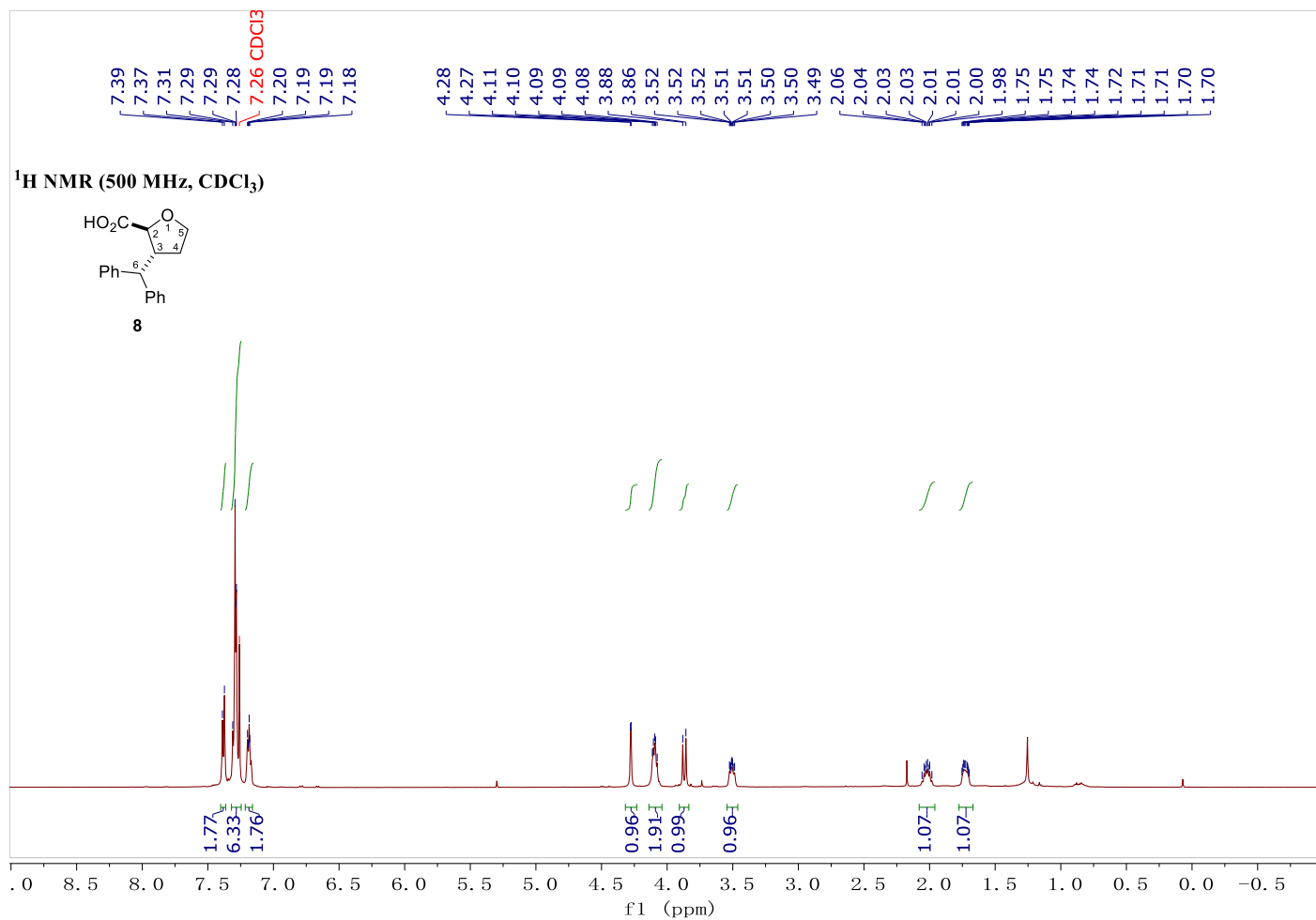
NOESY-2D (500 MHz, CDCl₃)



(+)-6c
dr 7:1 (C3-C4)



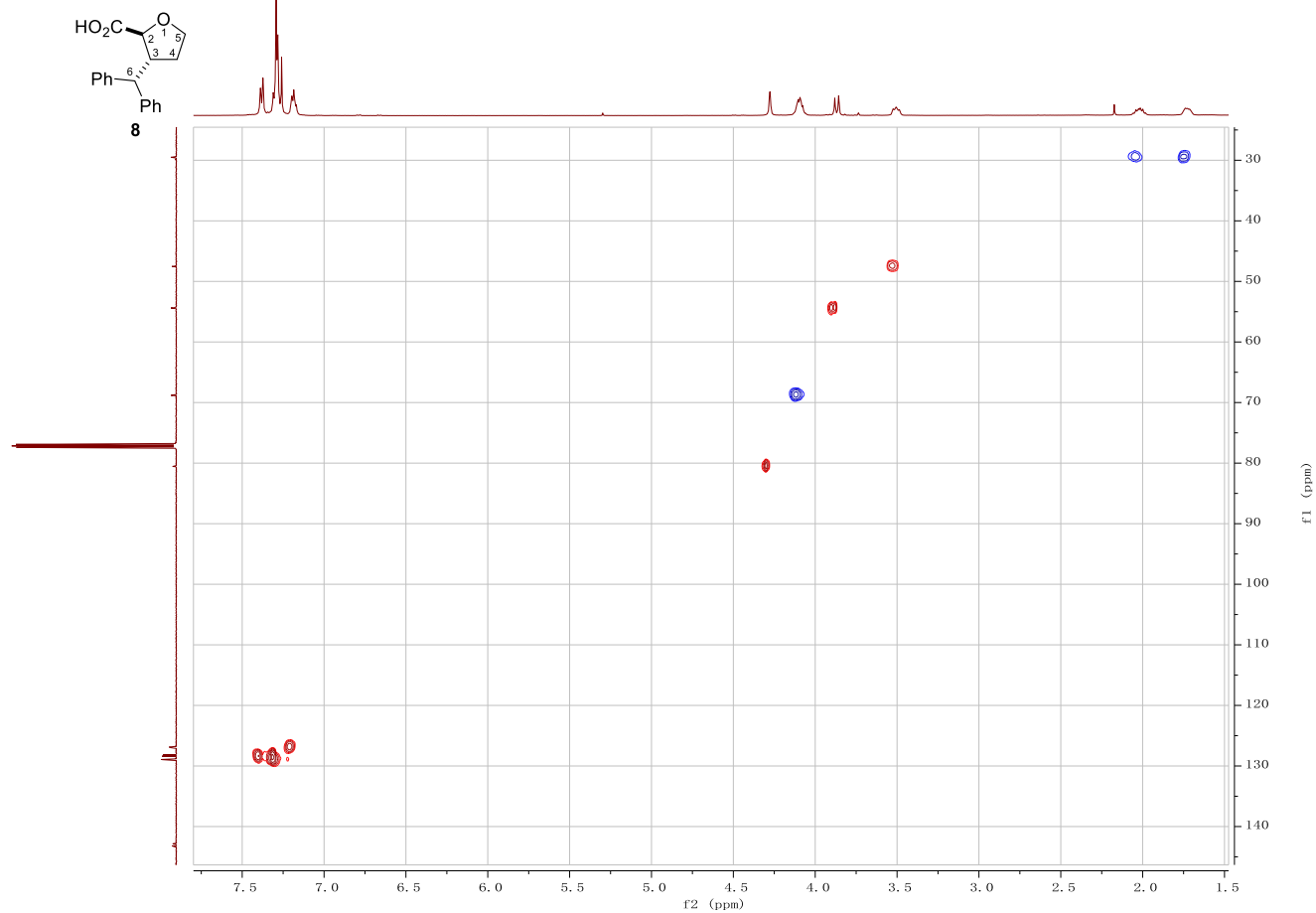




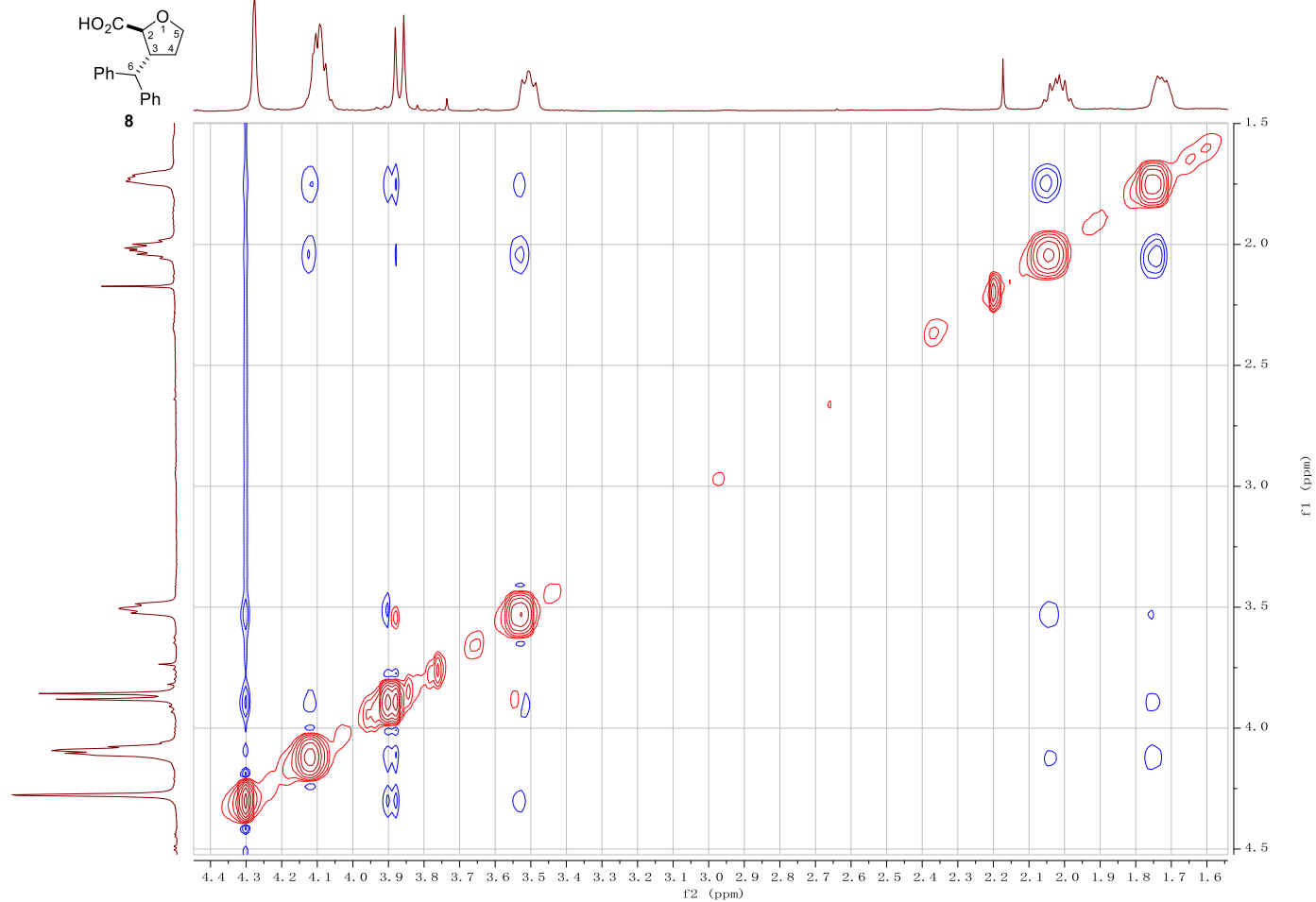
$^1\text{H} - ^1\text{H}$ COSY - 90 (500 MHz, CDCl_3)

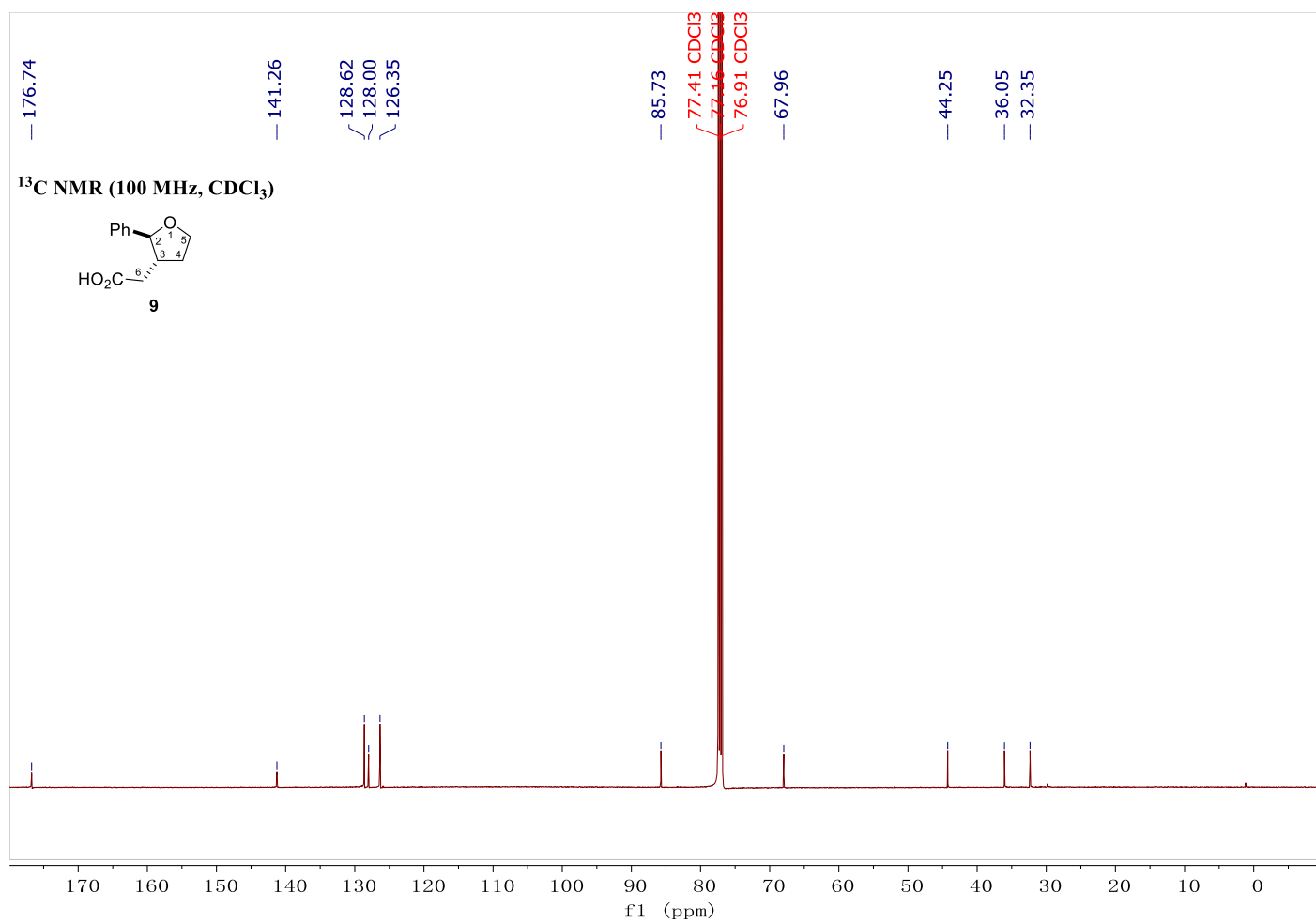
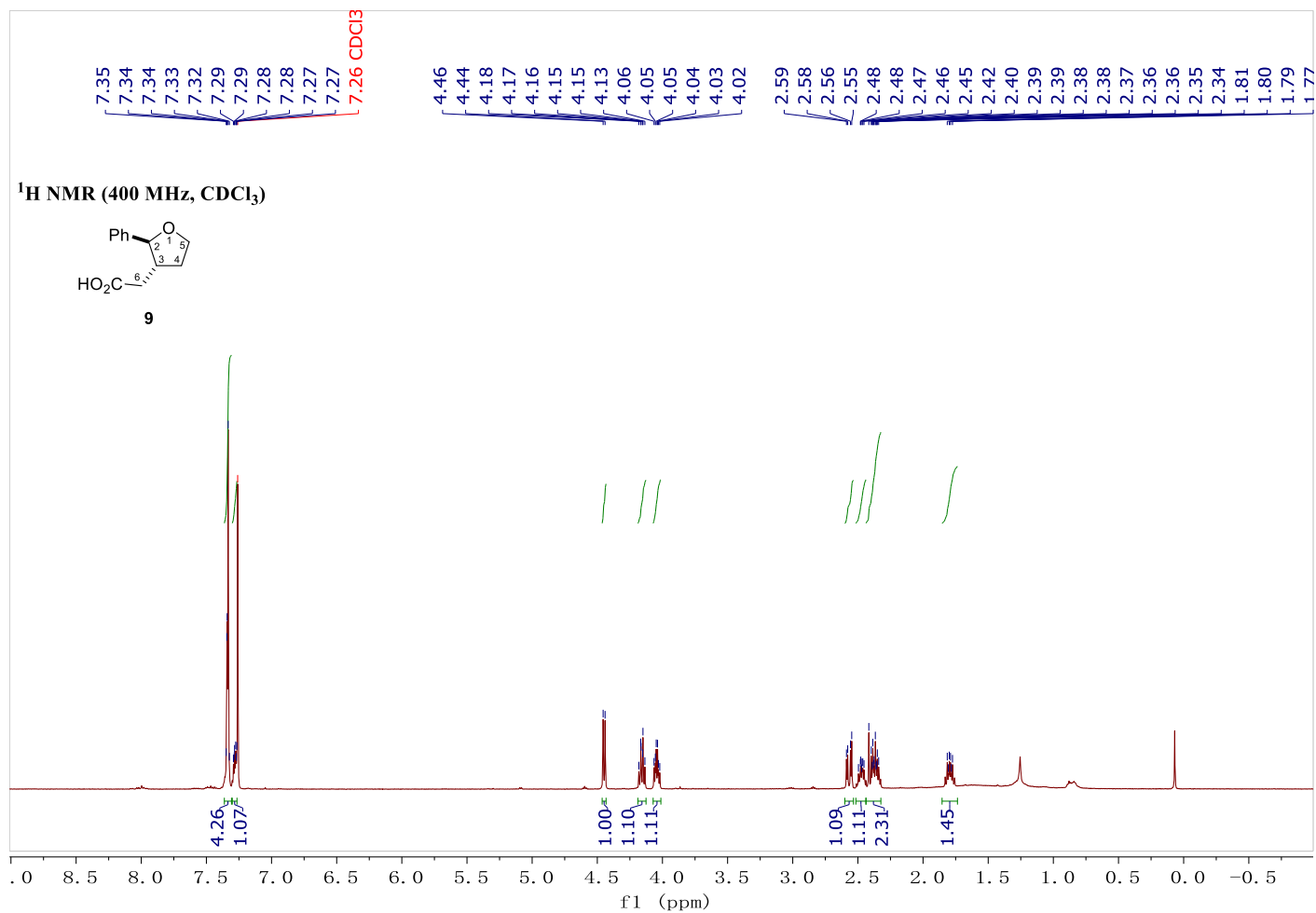


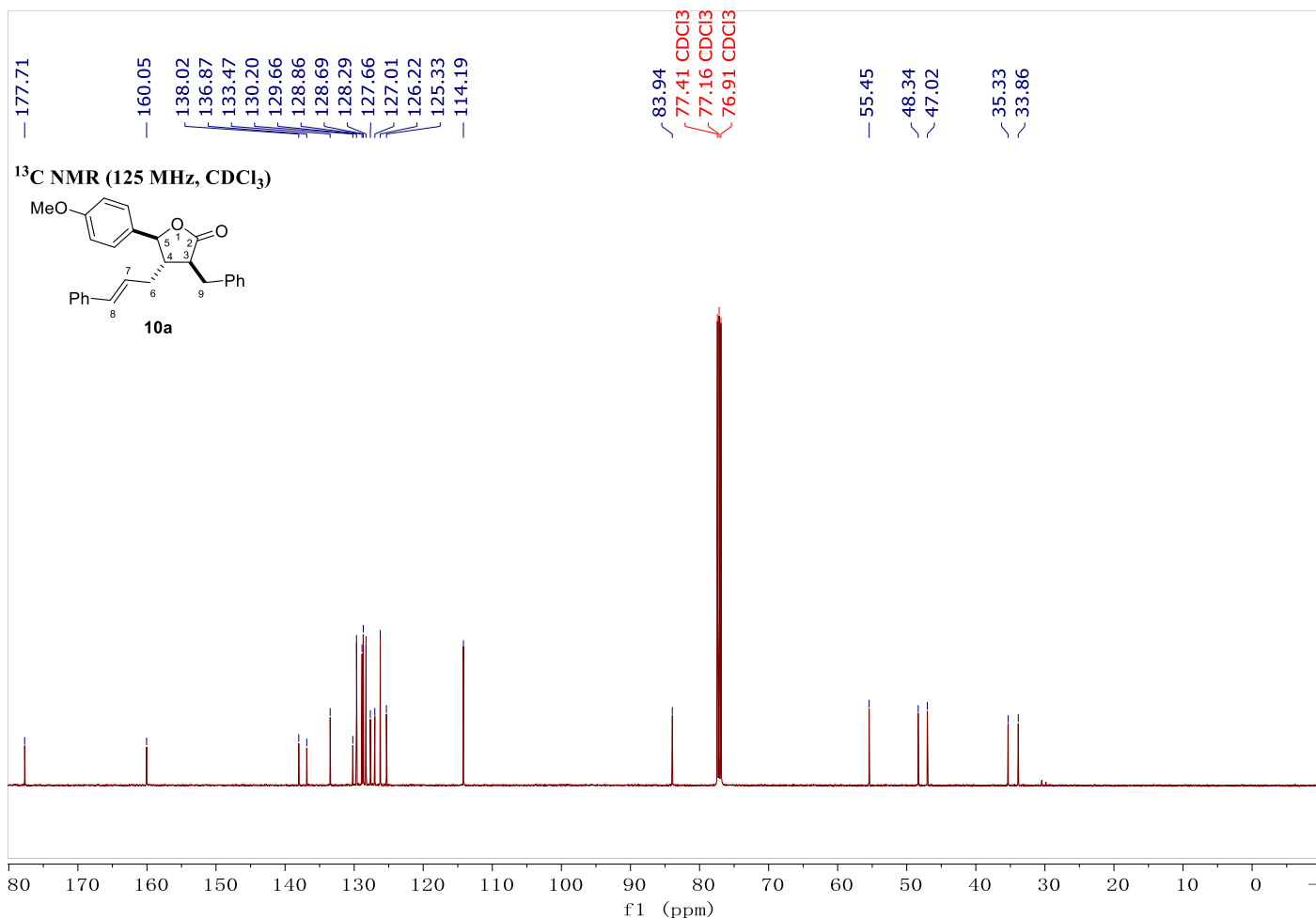
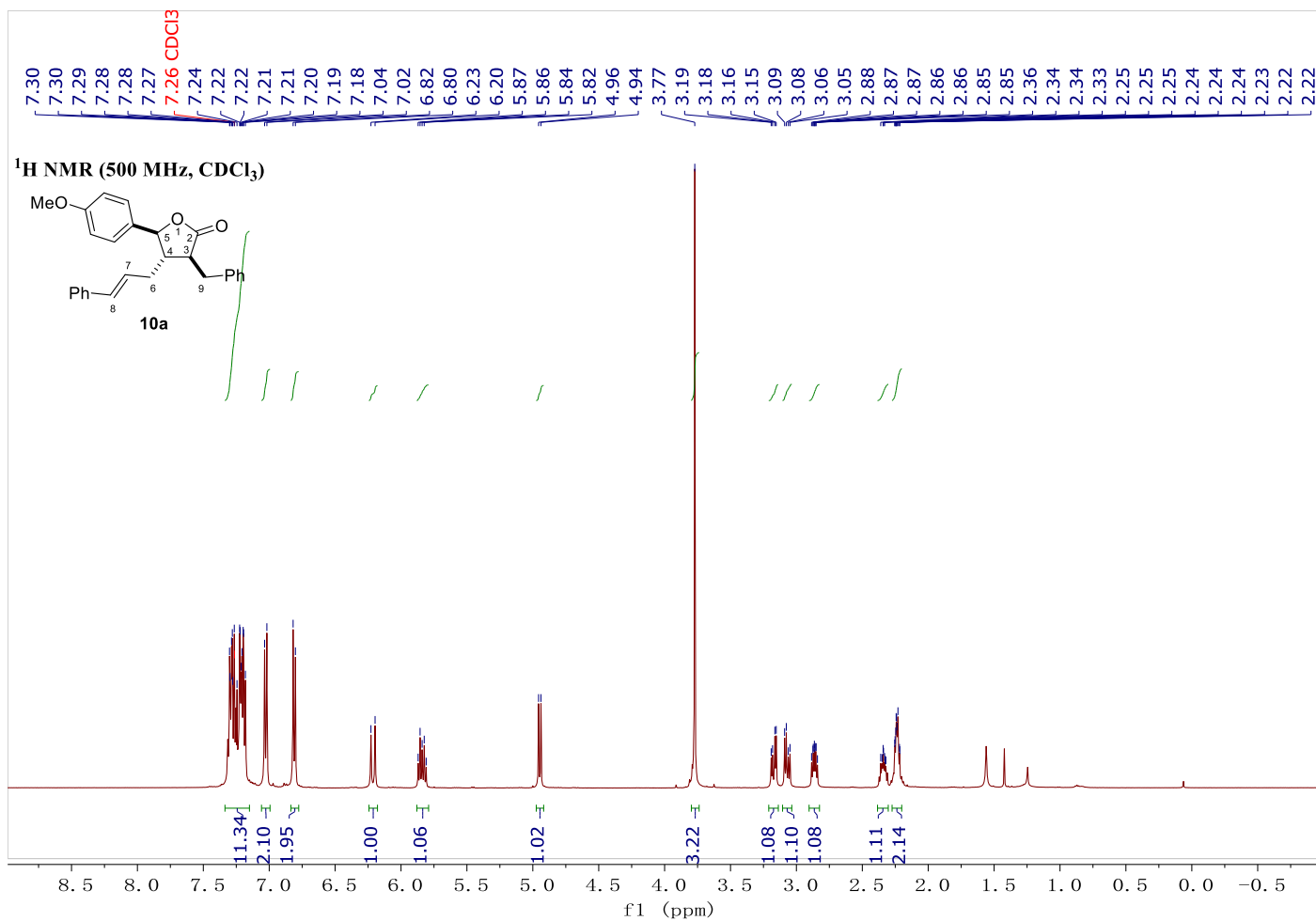
^1H (500 MHz) - ^{13}C (125 MHz) HSQC (CDCl_3)



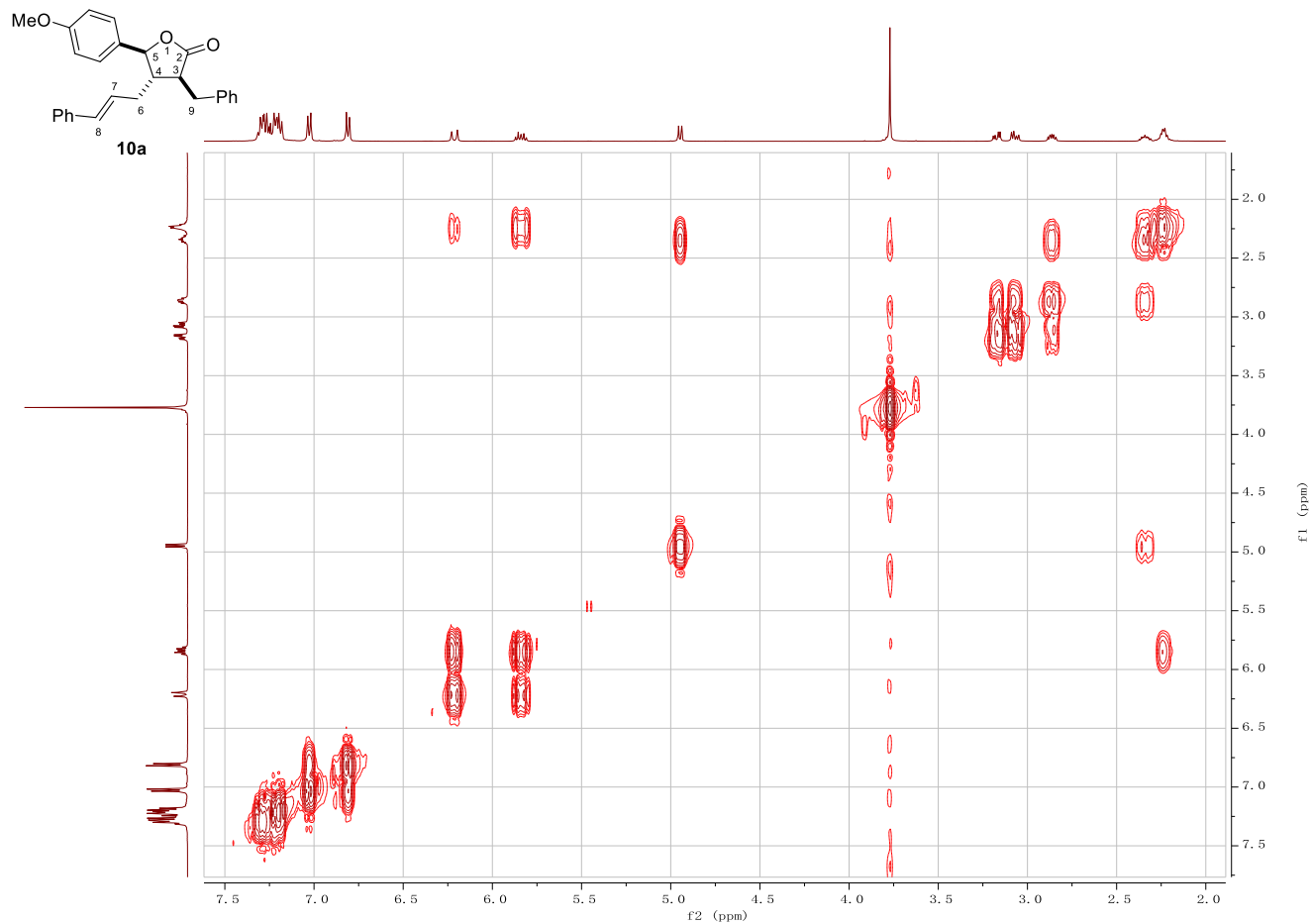
NOESY-2D (500 MHz, CDCl₃)



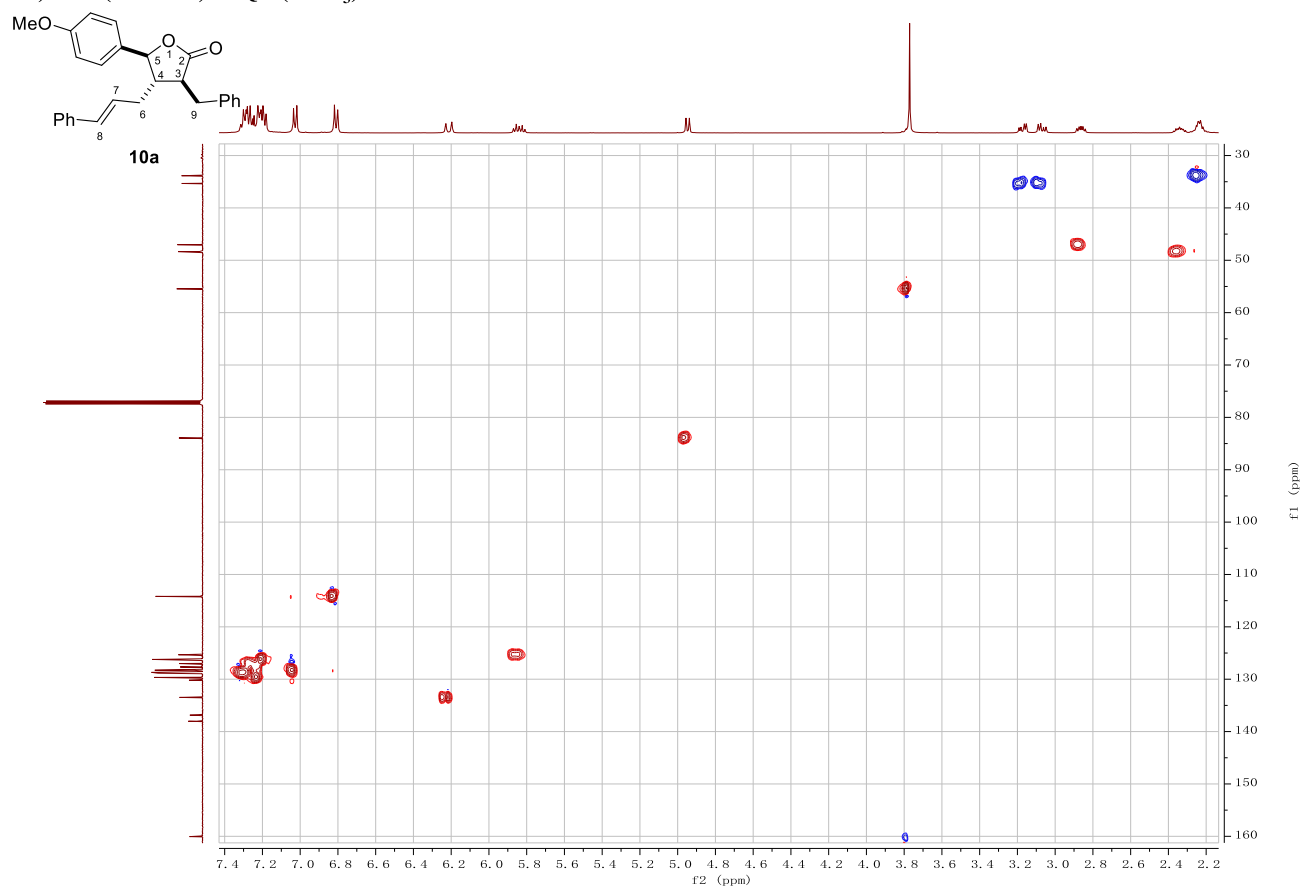




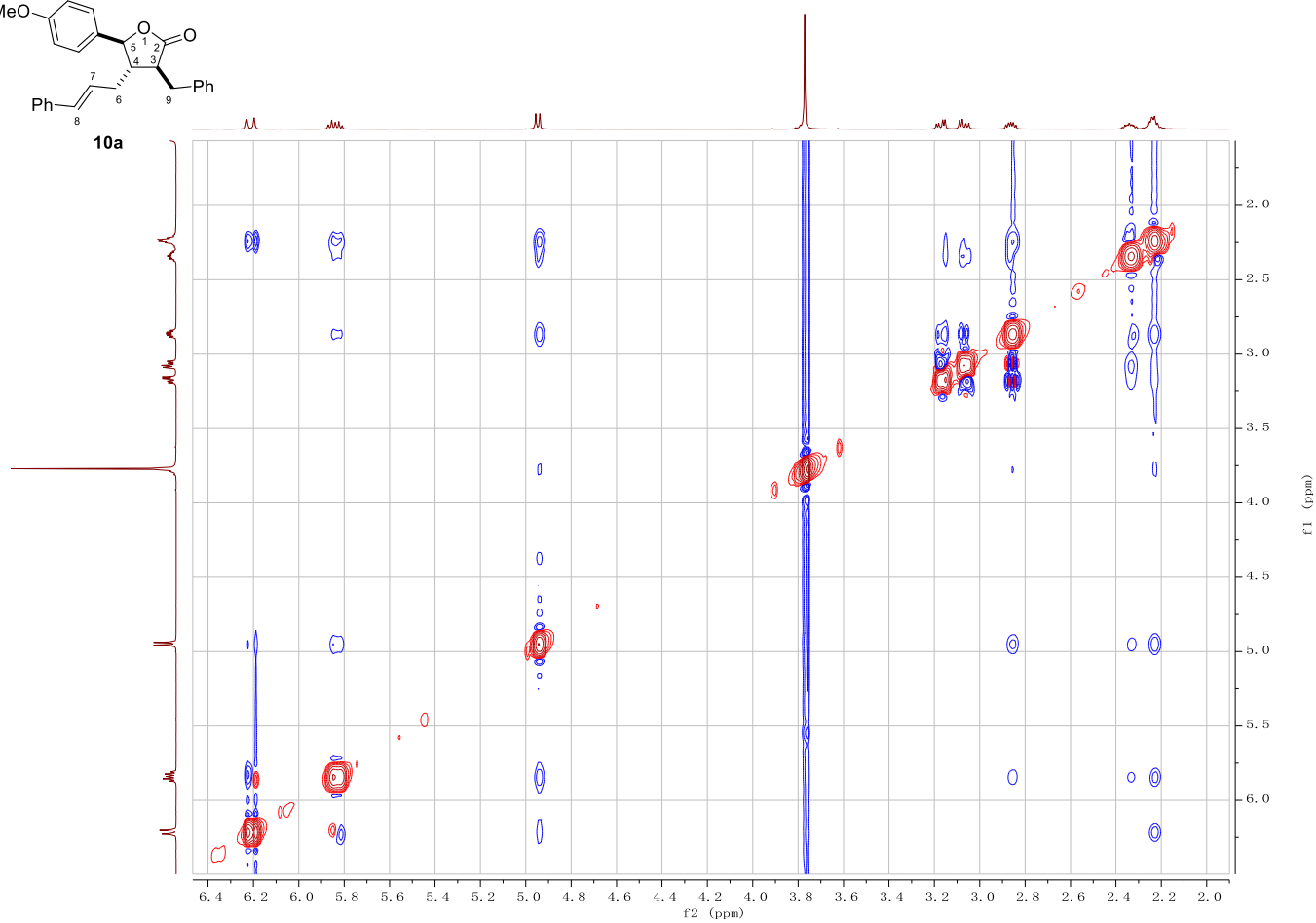
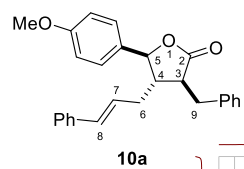
^1H - ^1H COSY - 90 (500 MHz, CDCl_3)

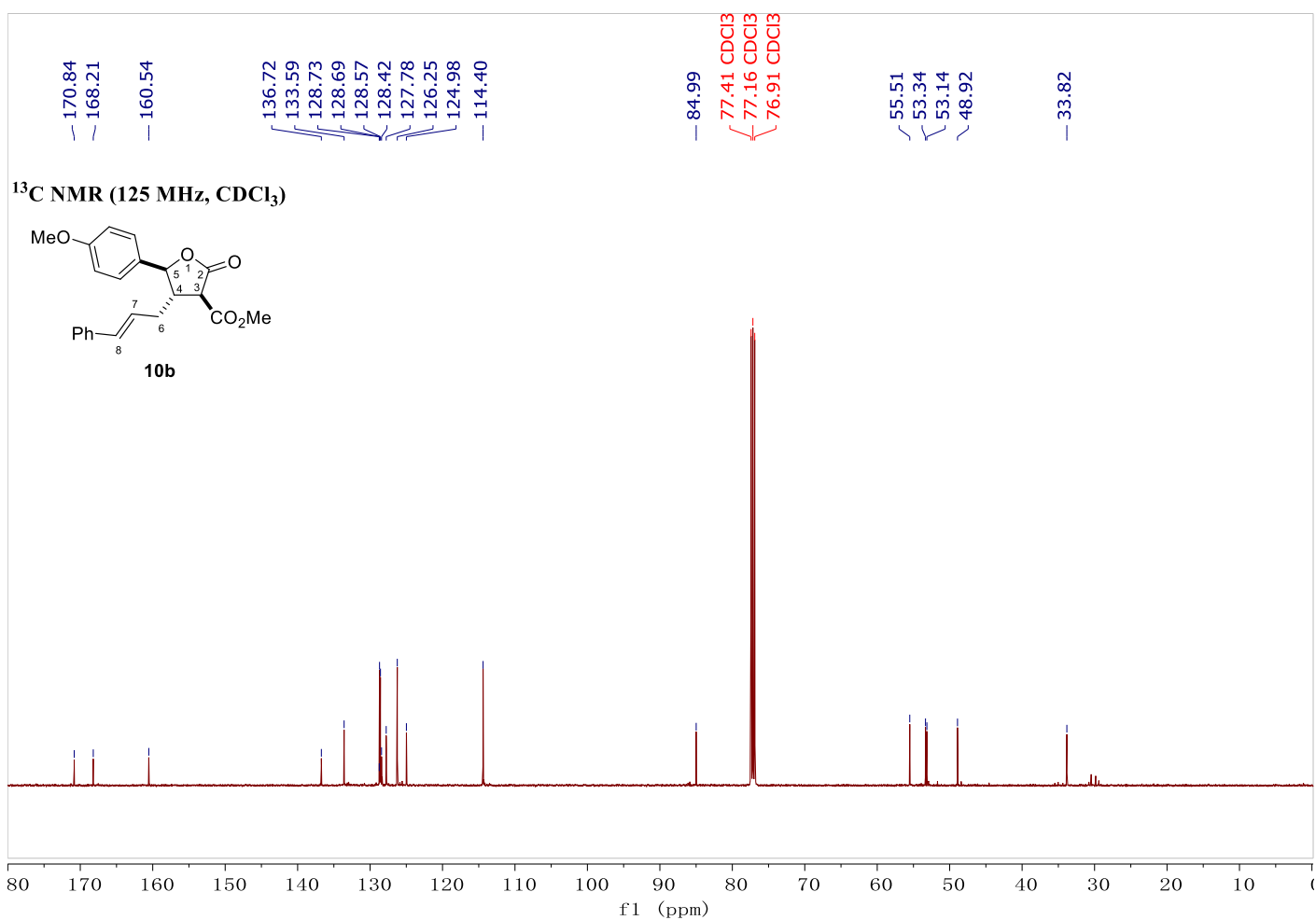
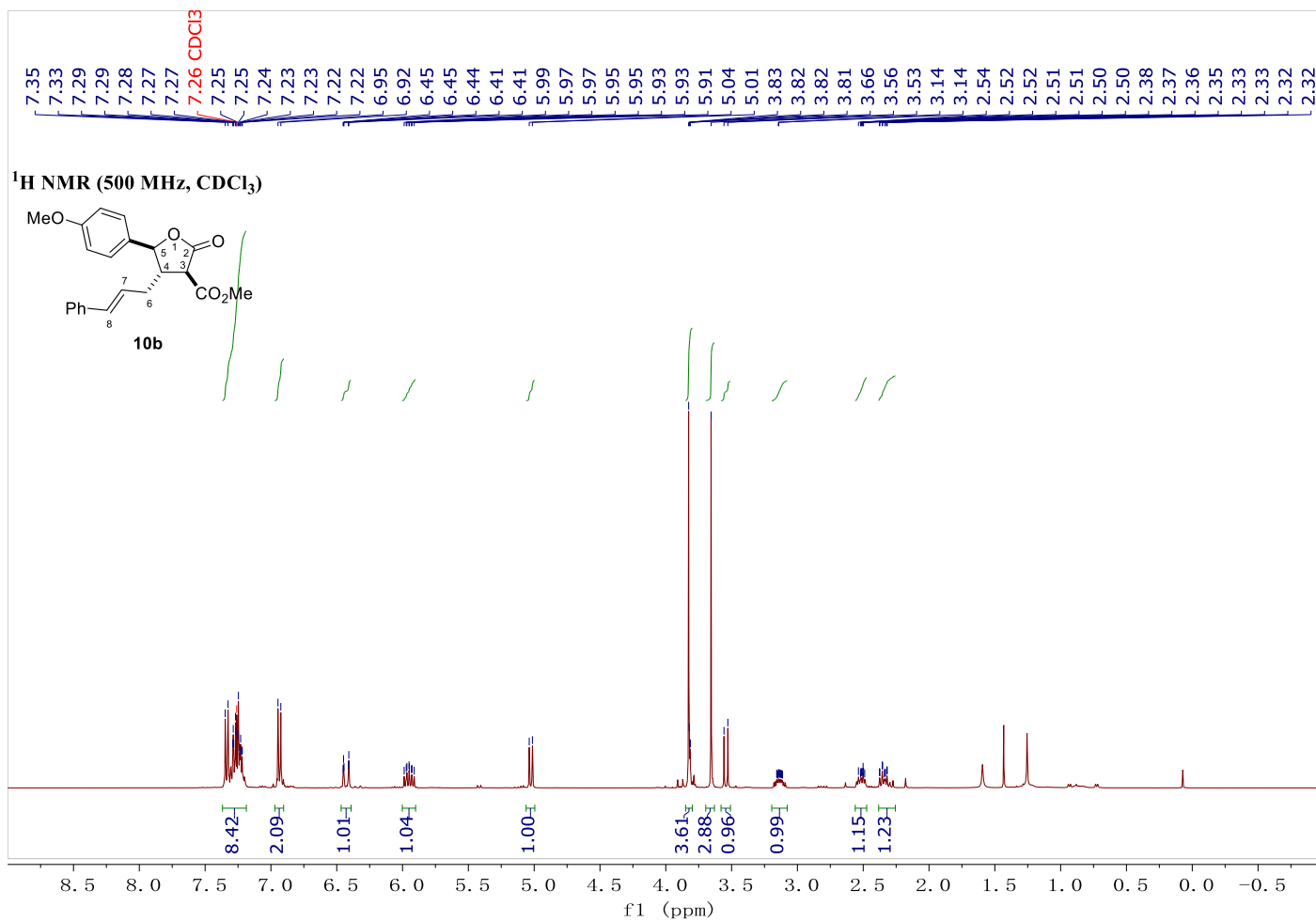


^1H (500 MHz) - ^{13}C (125 MHz) HSQC (CDCl_3)

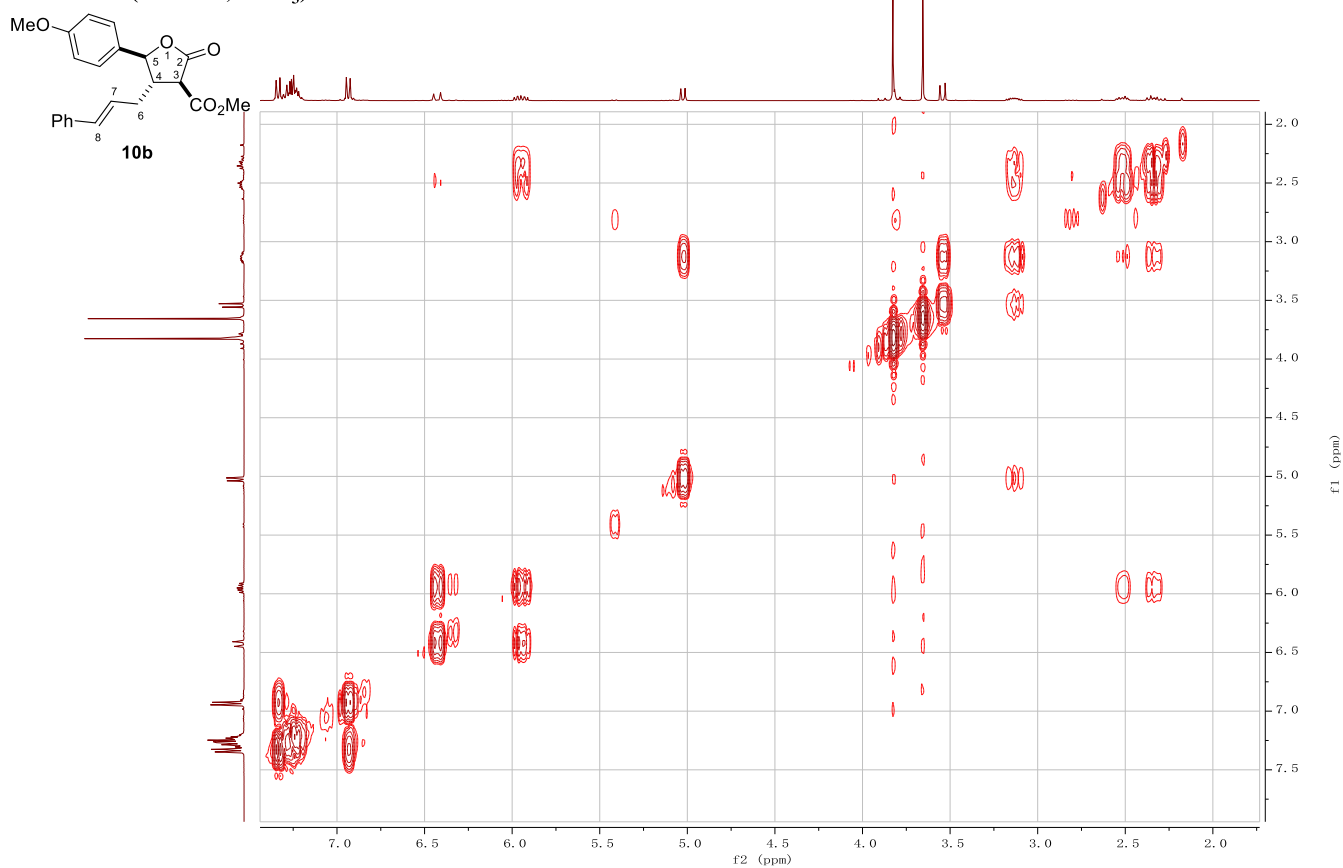


NOESY-2D (500 MHz, CDCl₃)

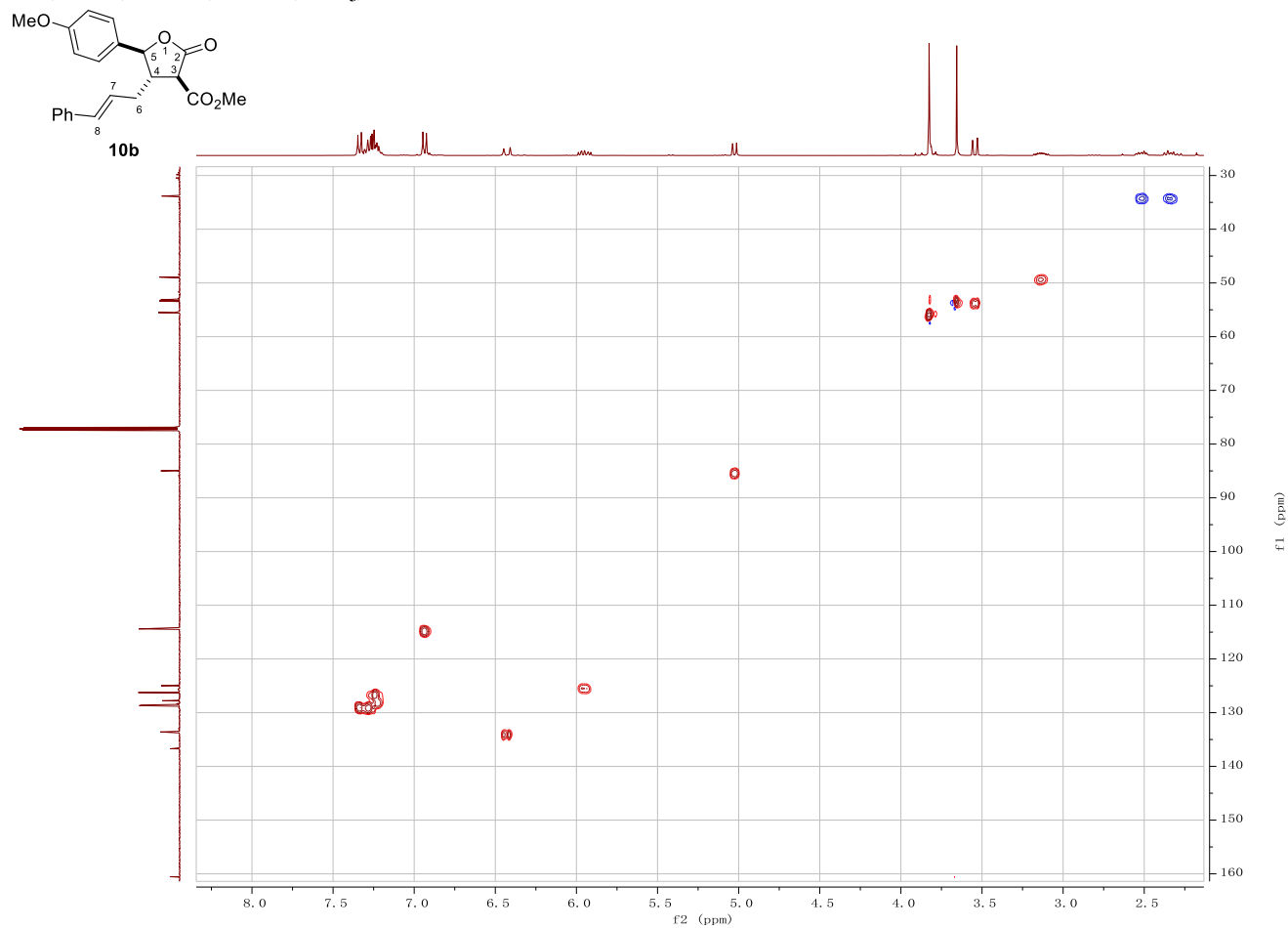




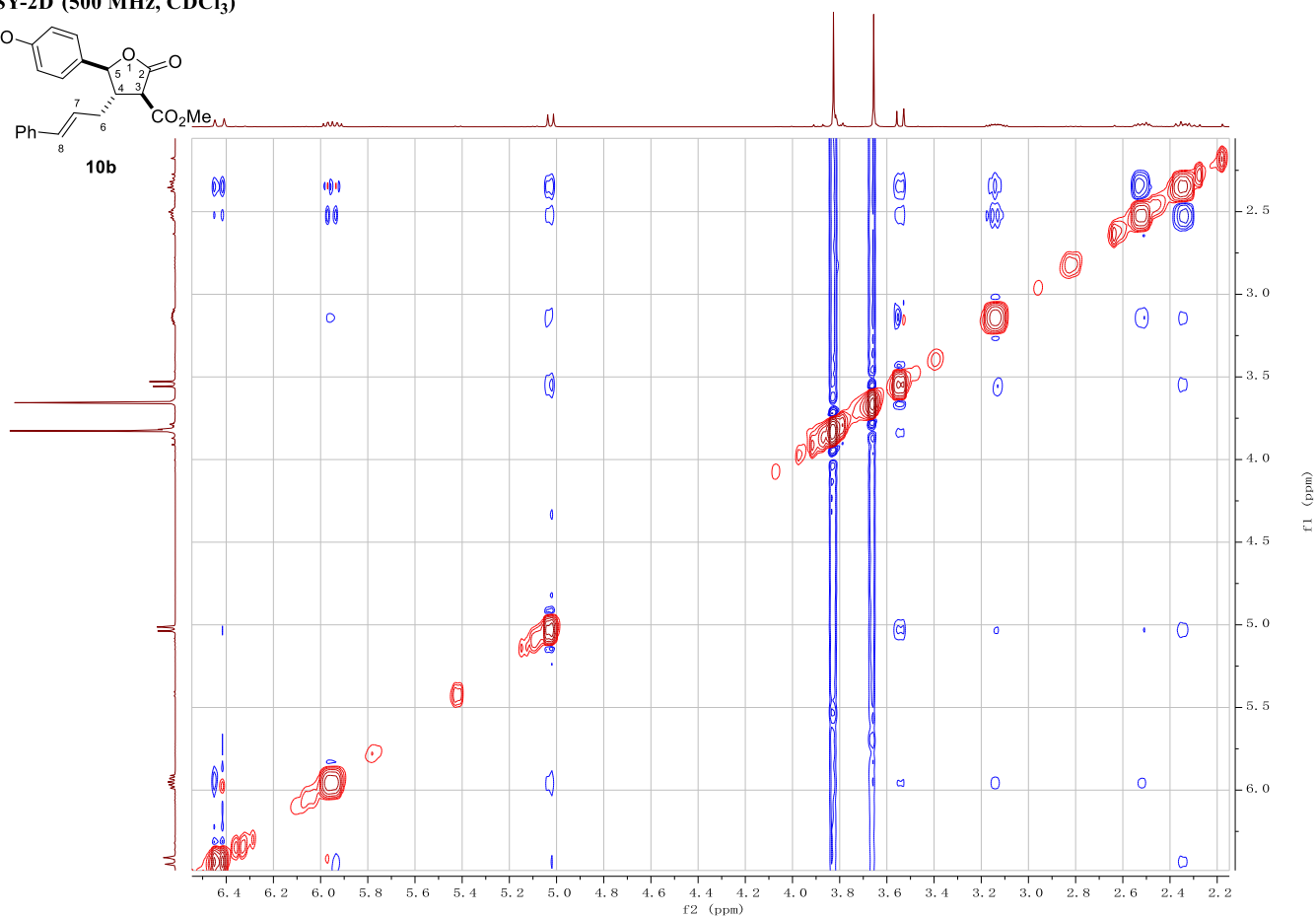
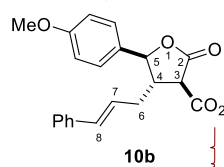
$^1\text{H} - ^1\text{H}$ COSY - 90 (500 MHz, CDCl_3)

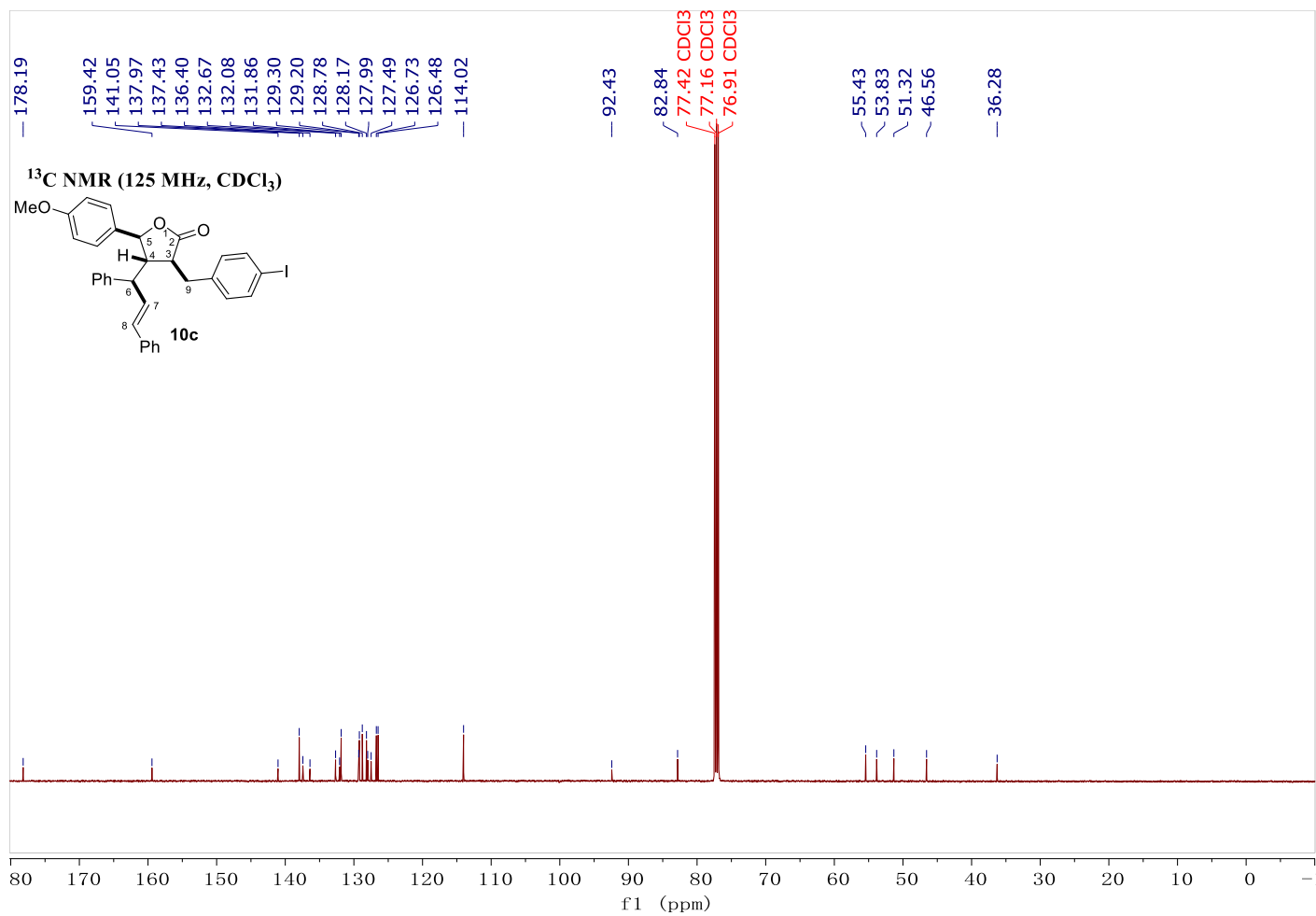
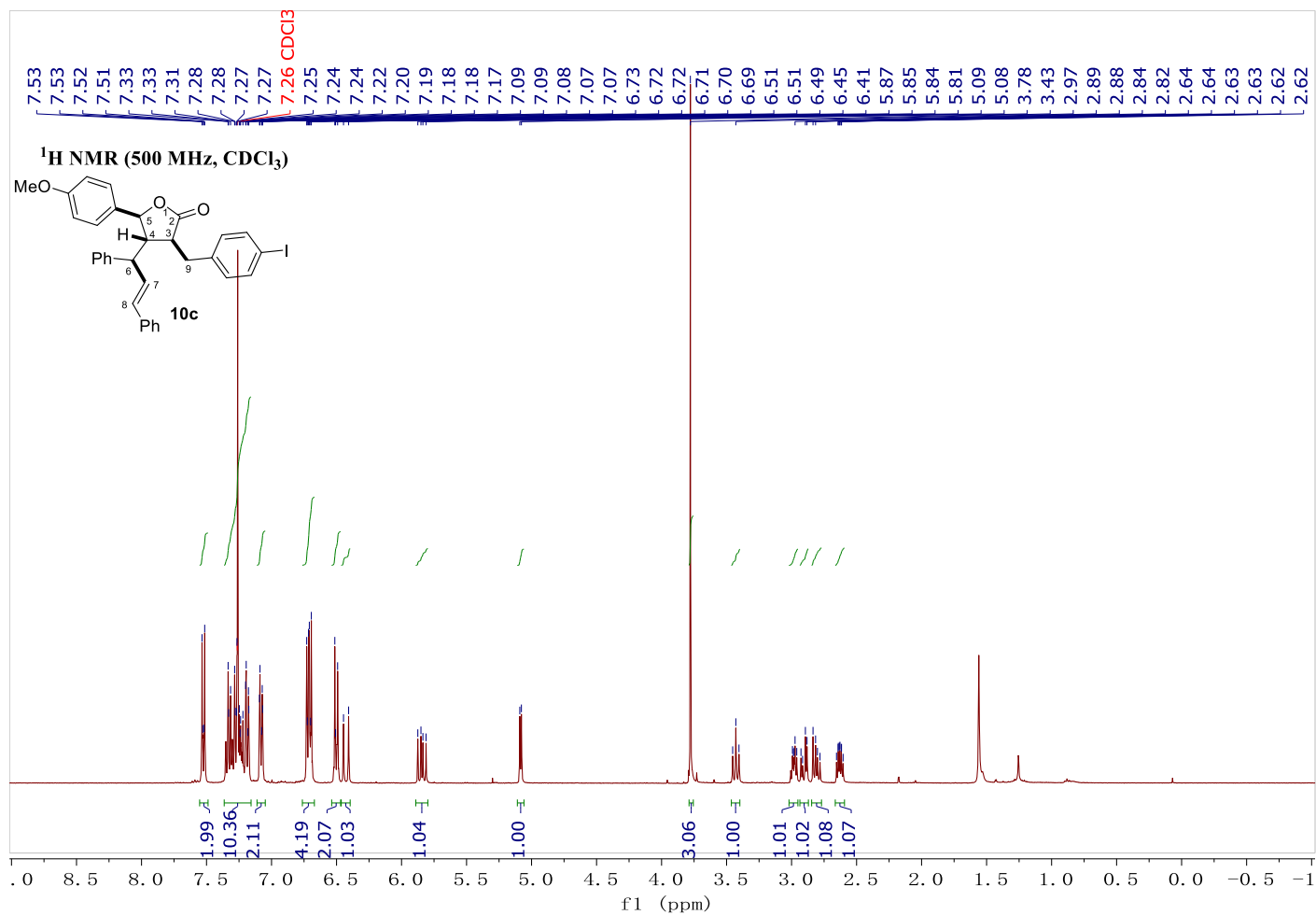


^1H (500 MHz) - ^{13}C (125 MHz) HSQC (CDCl_3)

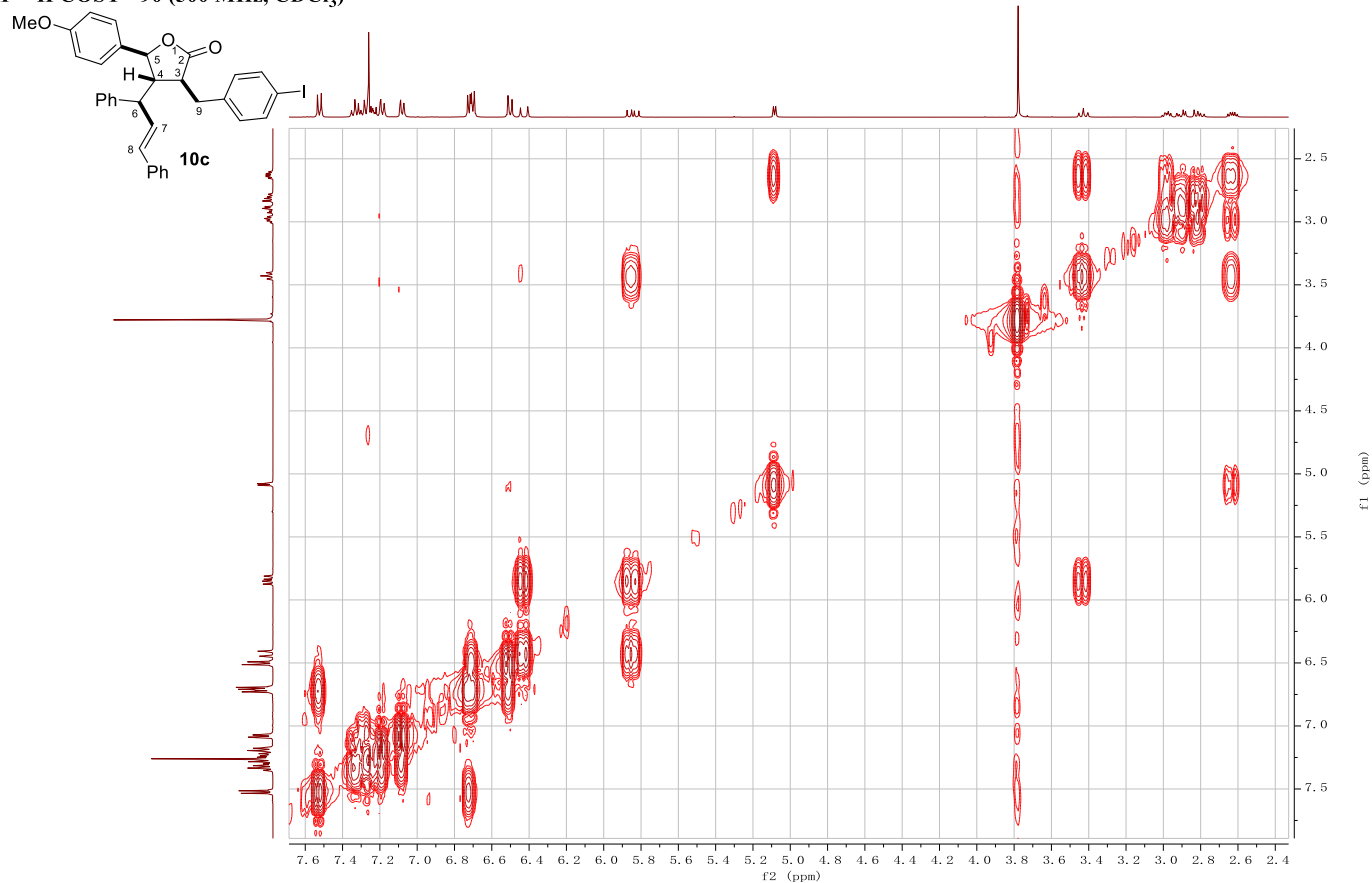


NOESY-2D (500 MHz, CDCl₃)

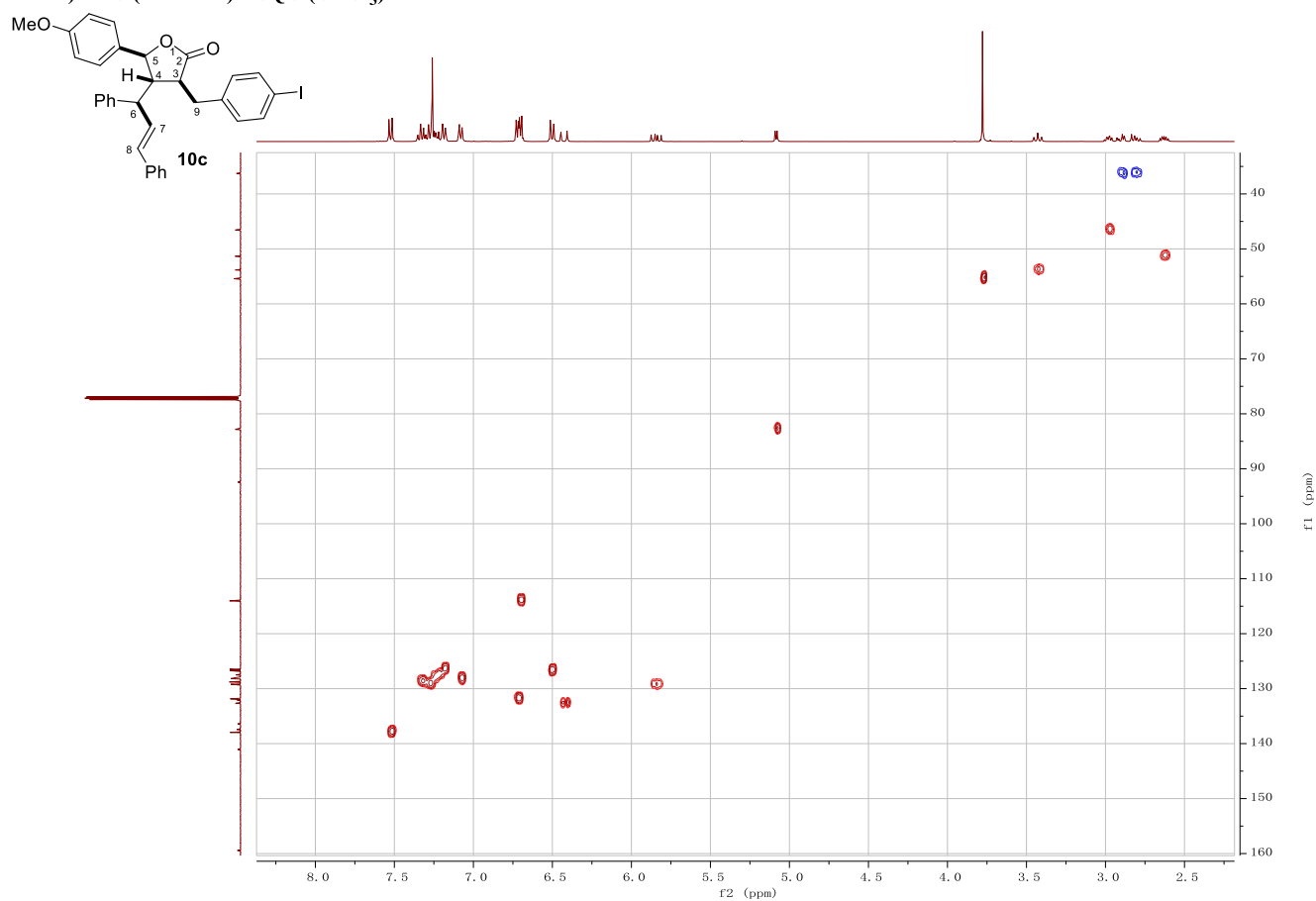




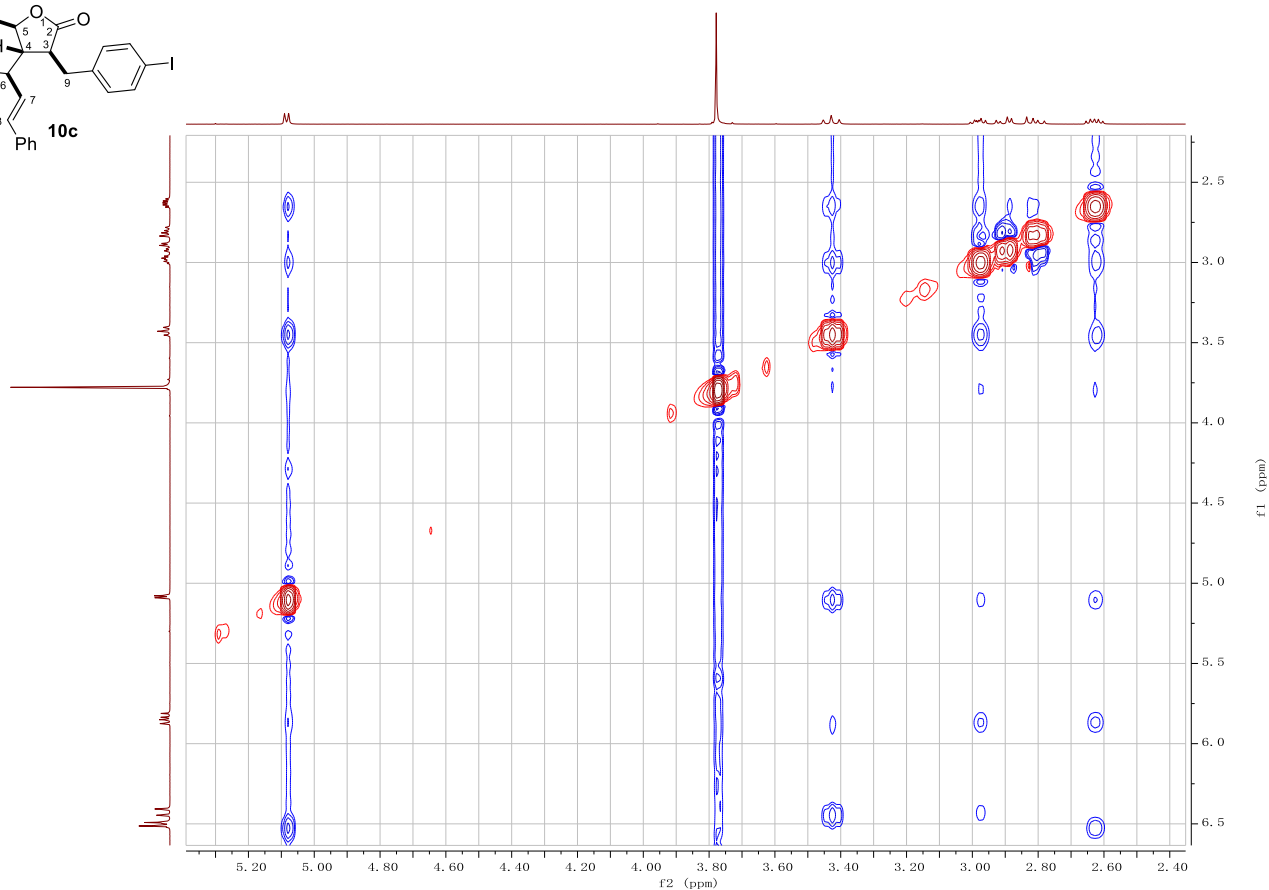
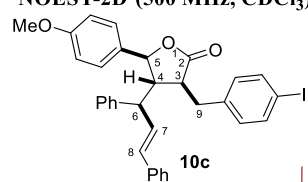
$^1\text{H} - ^1\text{H}$ COSY - 90 (500 MHz, CDCl_3)

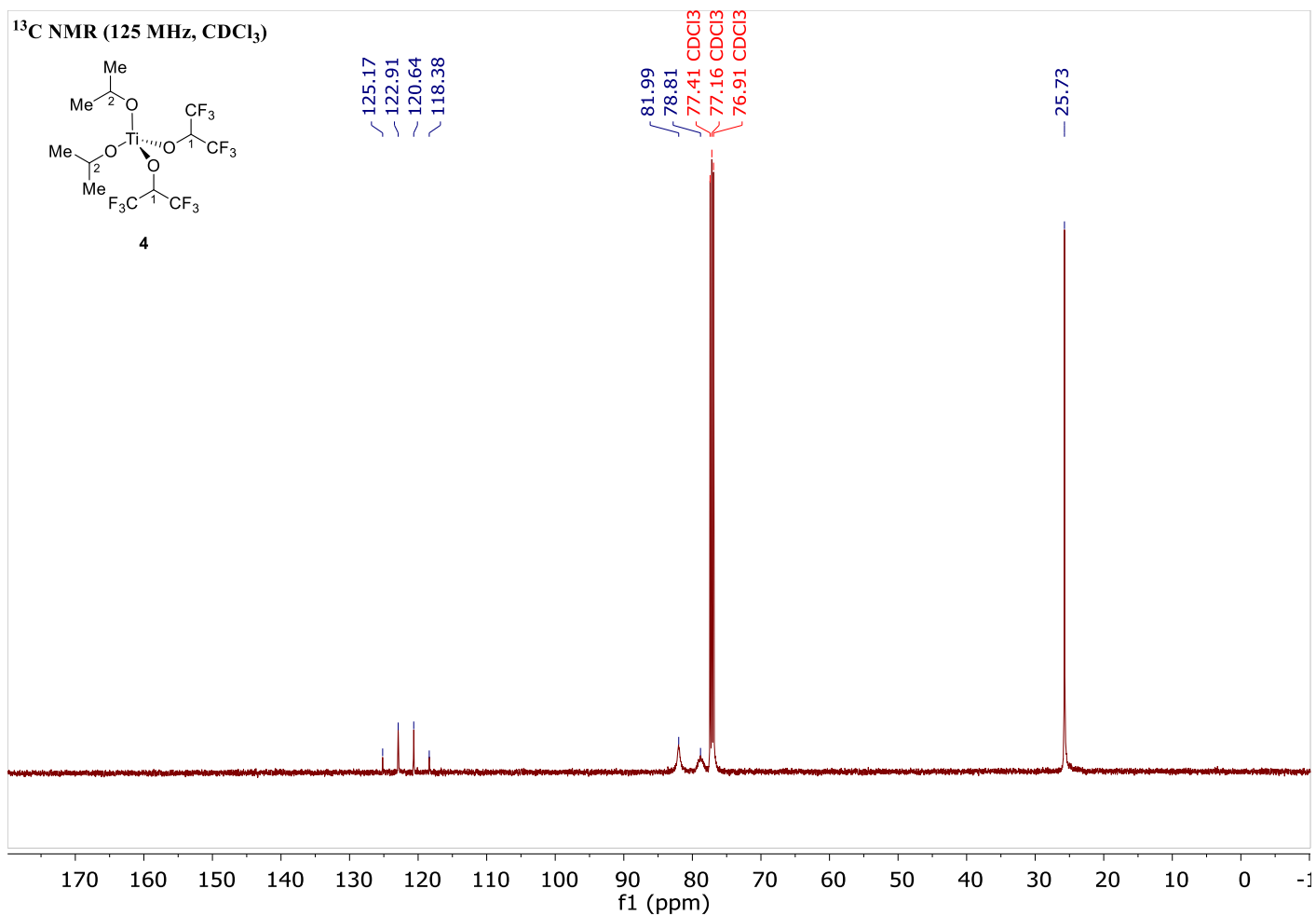
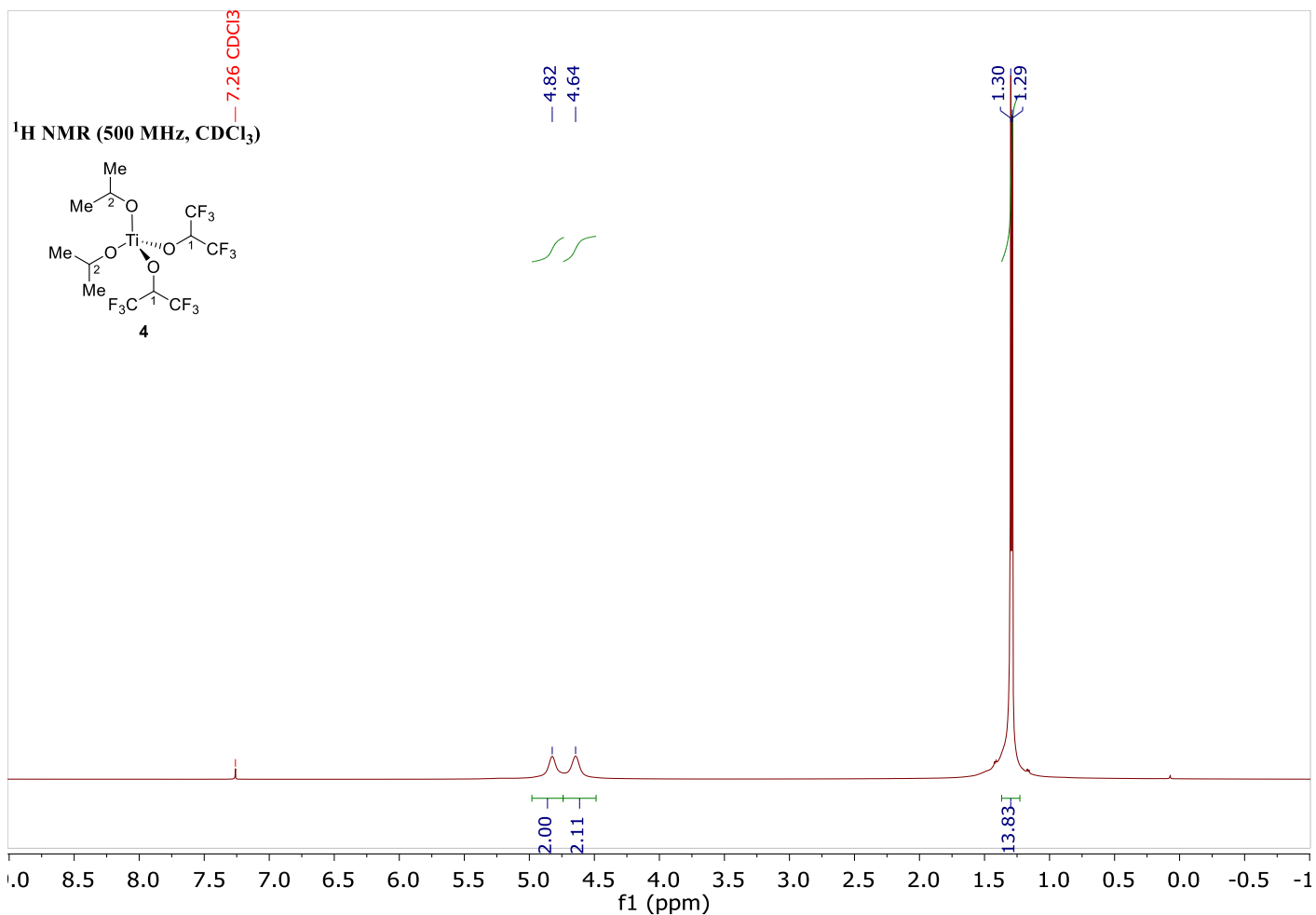


^1H (500 MHz) - ^{13}C (125 MHz) HSQC (CDCl_3)

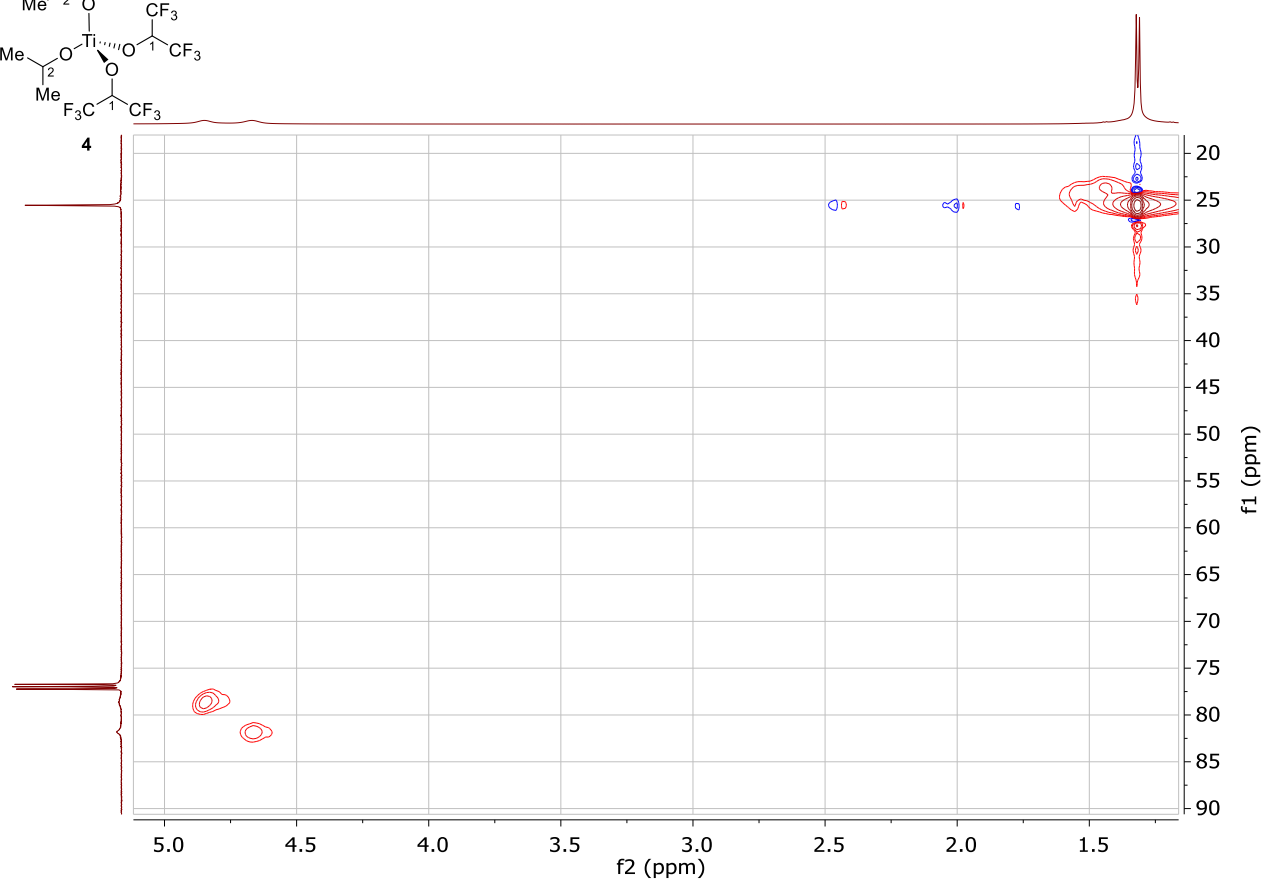
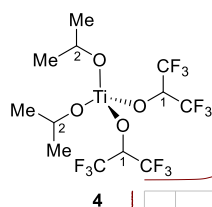
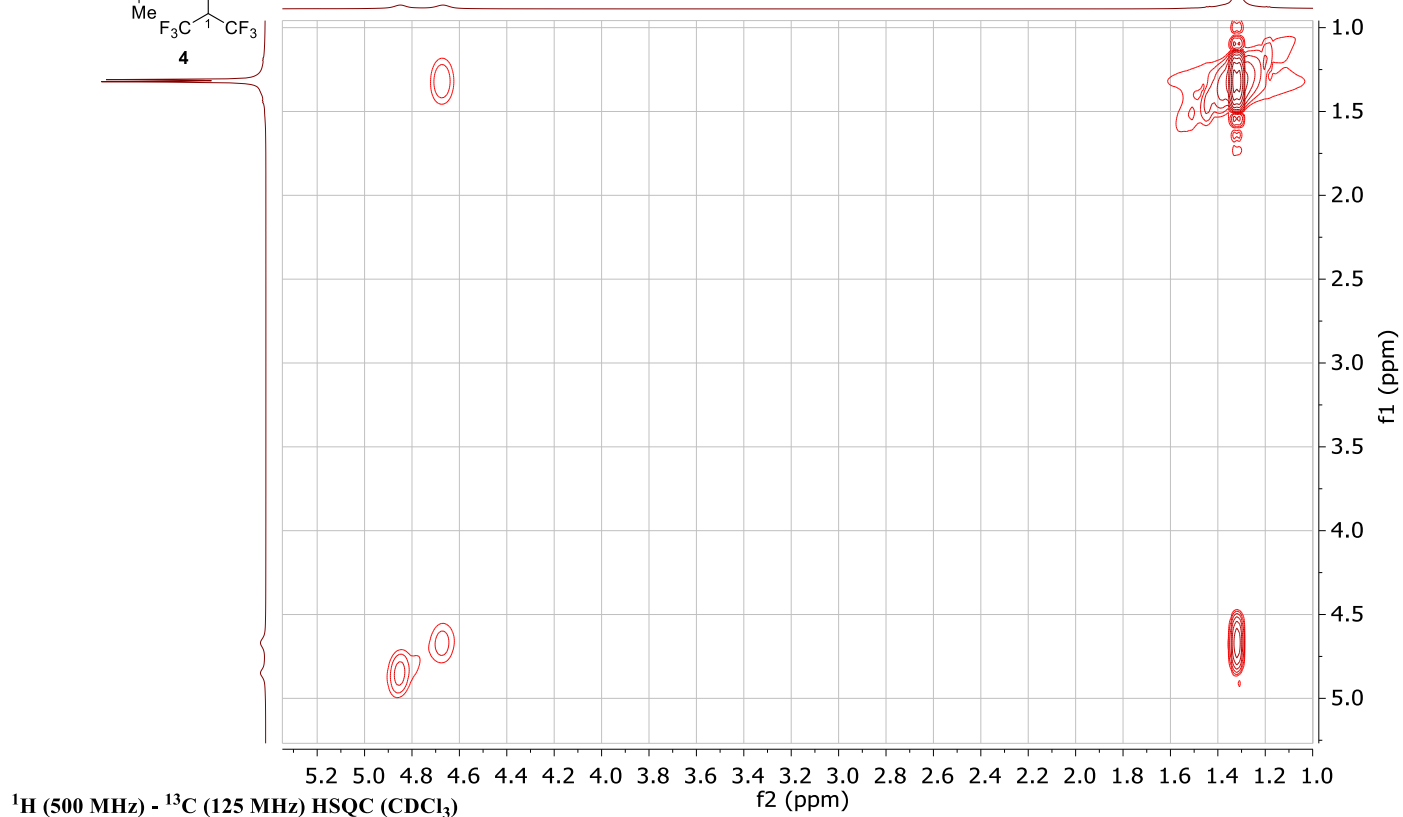
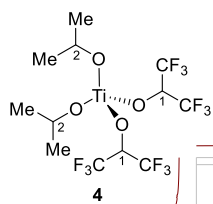


NOESY-2D (500 MHz, CDCl₃)

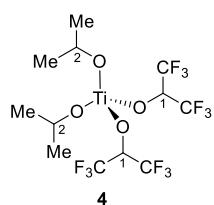




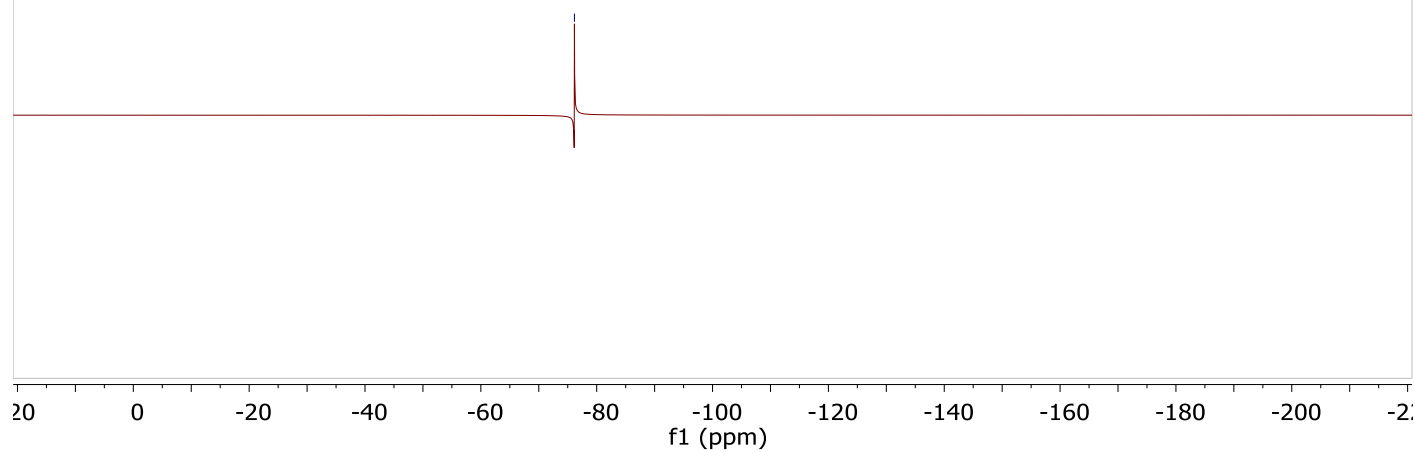
¹H - ¹H COSY - 90 (500 MHz, CDCl₃)



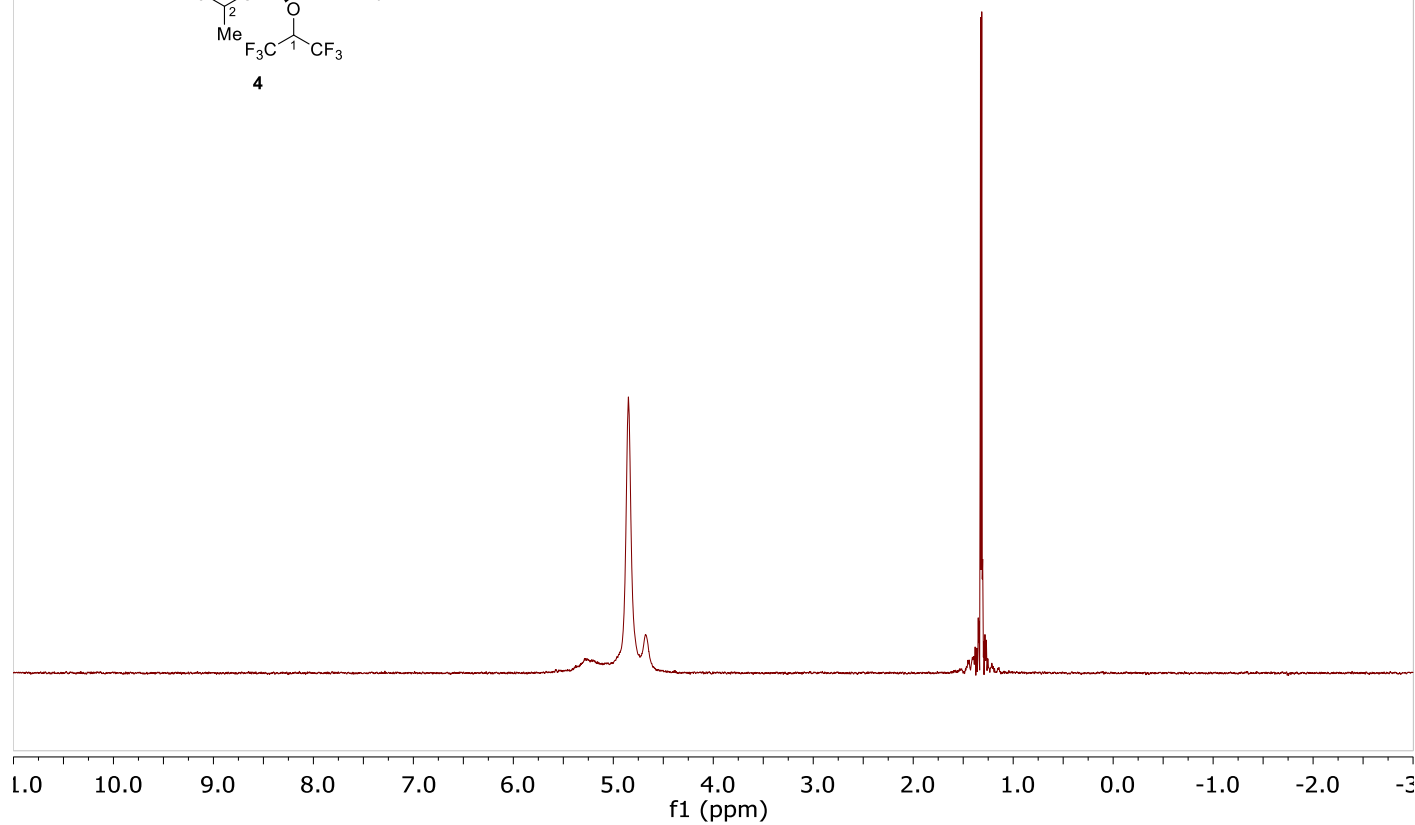
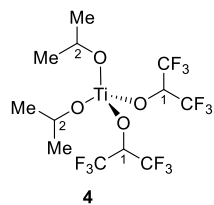
¹⁹F NMR (471 MHz, CDCl₃)

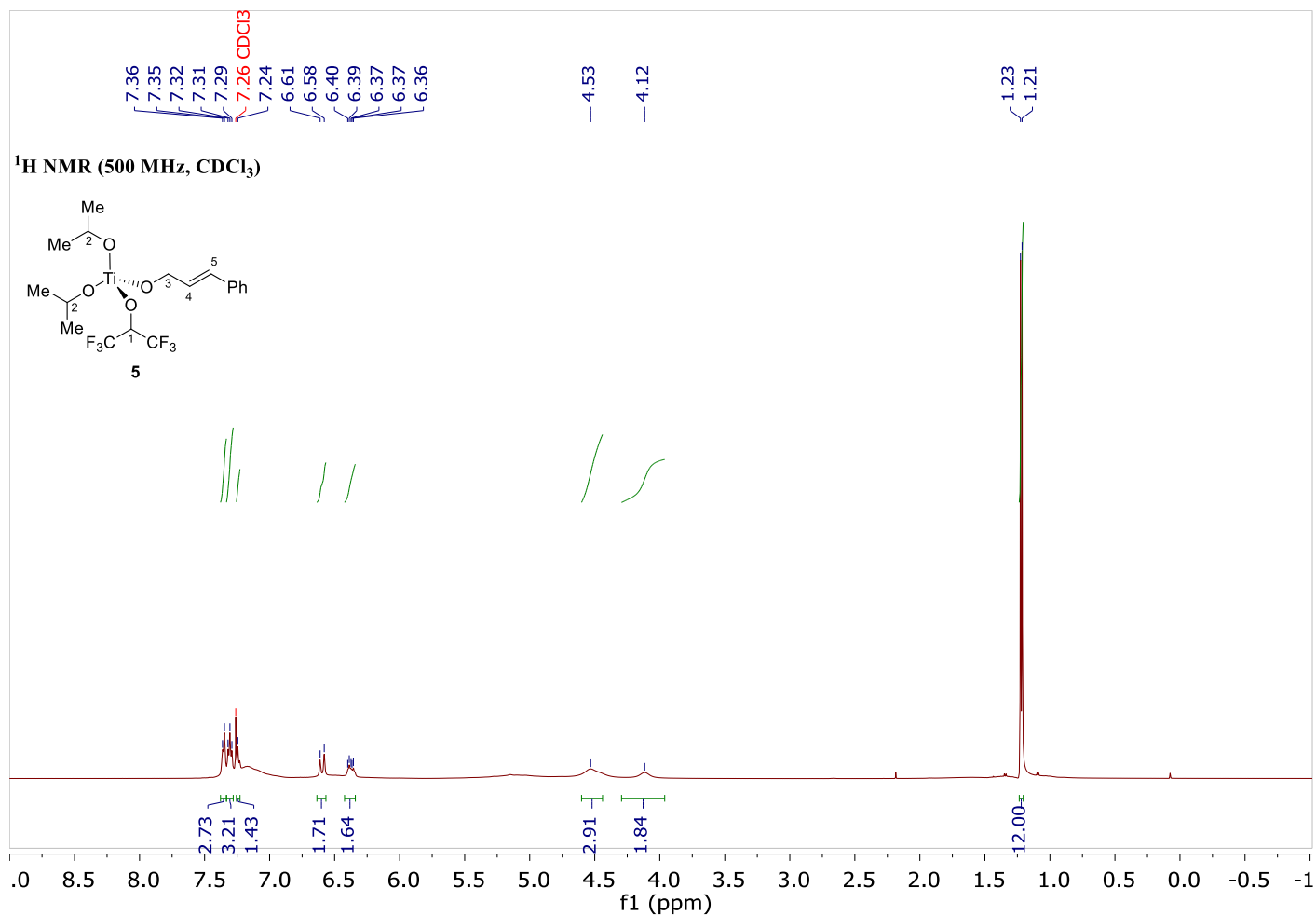


— -76.16

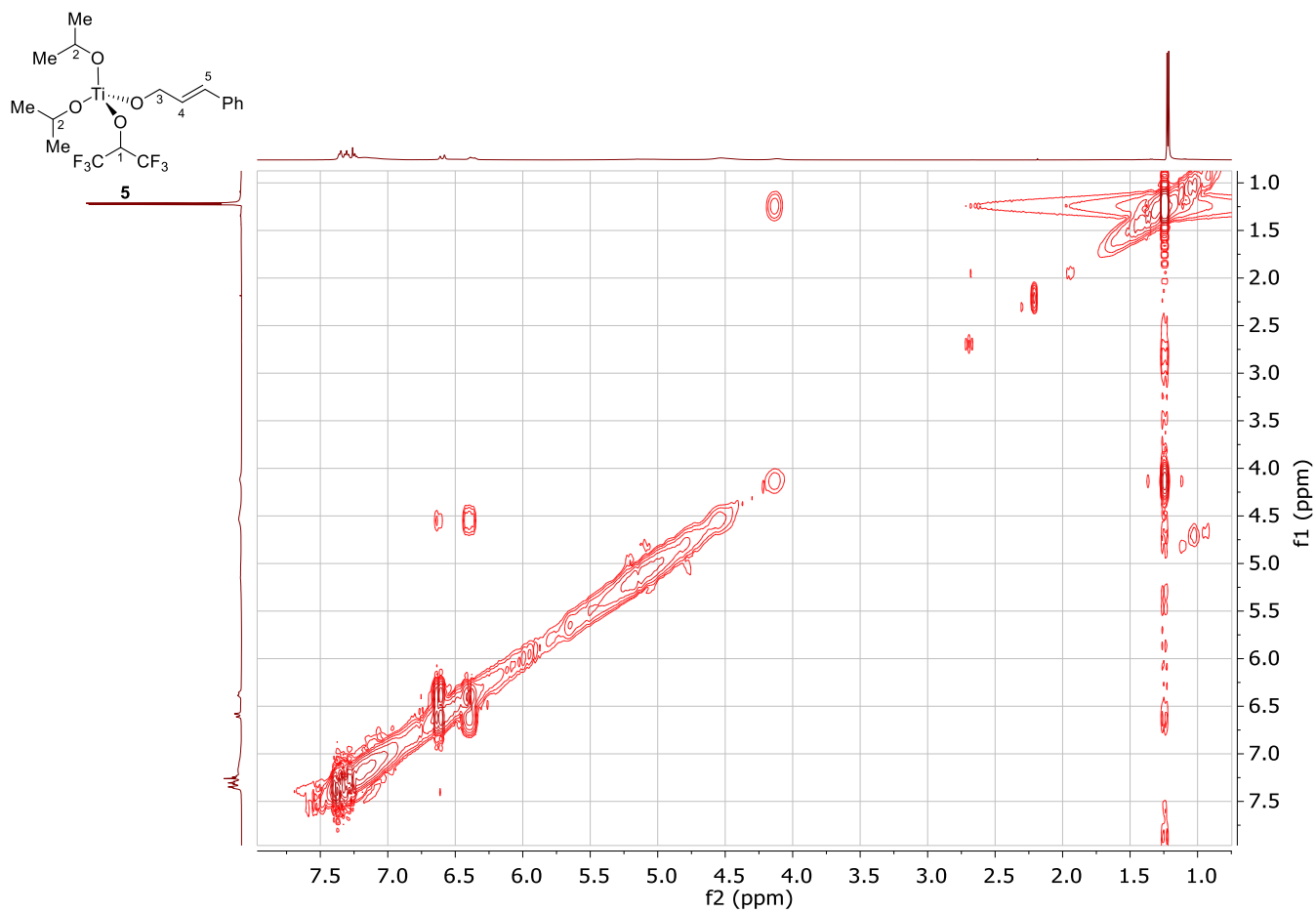


¹⁹F (471 MHz, CDCl₃) - ¹H(500 MHz, CDCl₃) HOESY

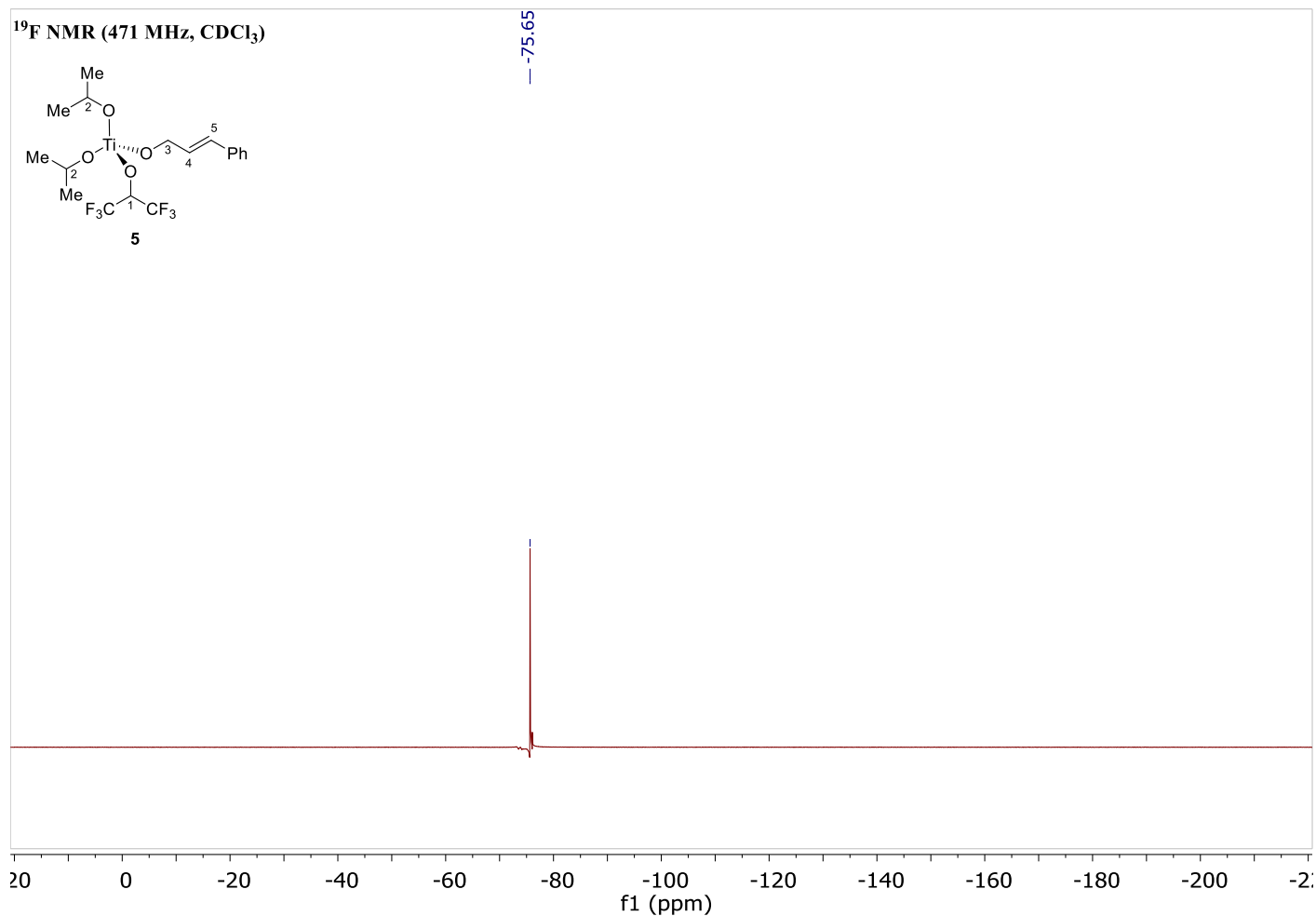
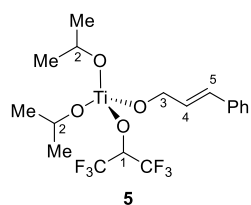




¹H - ¹H COSY - 90 (500 MHz, CDCl₃)



¹⁹F NMR (471 MHz, CDCl₃)



NOESY-2D (500 MHz, CDCl₃)

