

Anexo V:

NMR spectra

Capítulo 2:

Catalytic asymmetric 1,3 dipolar cycloaddition of α -heteroarylsilylimines and activated olefins 2

Capítulo 3:

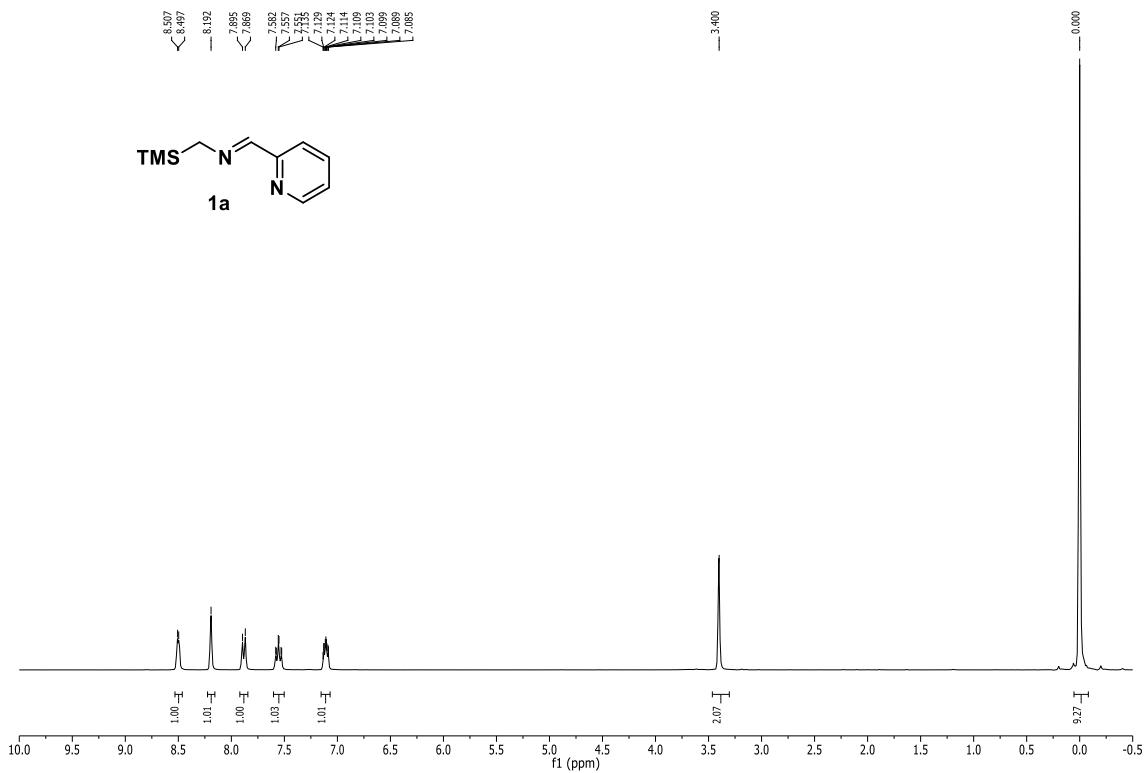
Catalytic asymmetric synthesis of azabicycles by 1,3-dipolar cycloaddition/intramolecular alkylation..... 51

Capítulo 4:

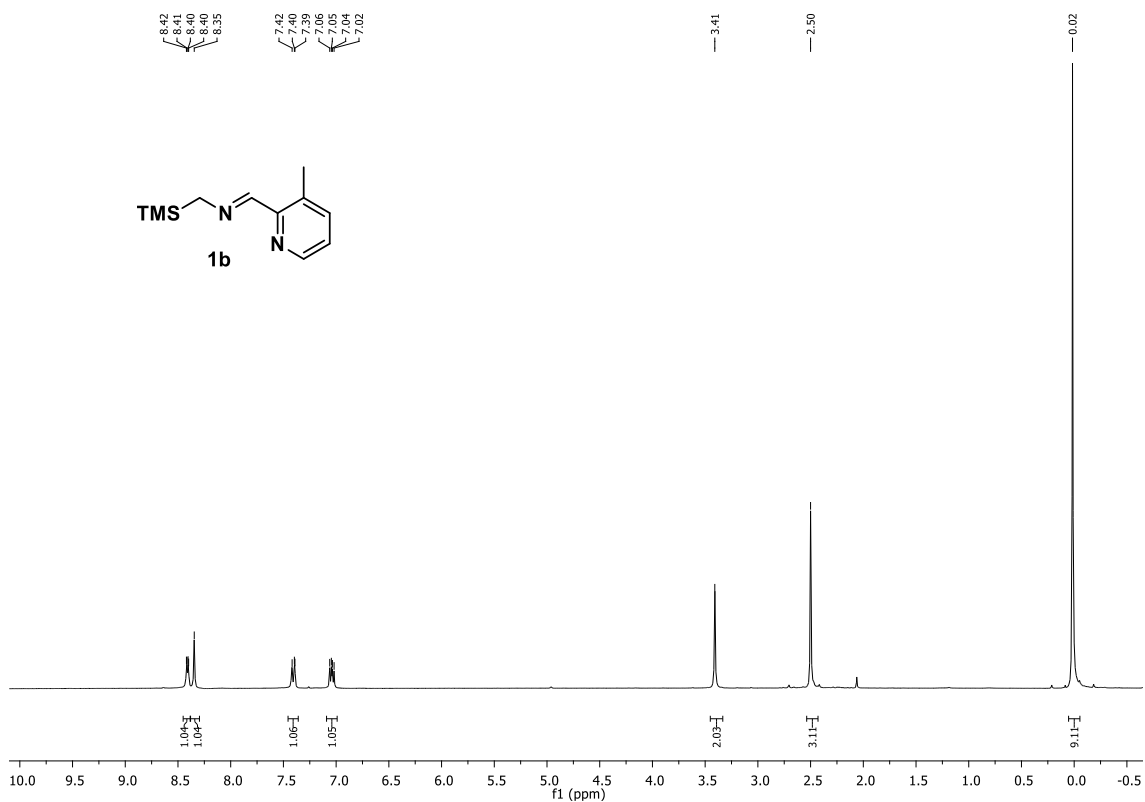
Alkenylarenes as dipolarophiles in catalytic asymmetric 1,3-dipolar cycloadditions of azomethine ylides..... 89

Capítulo 2: Catalytic asymmetric 1,3 dipolar cycloaddition of α -heteroarylsilylimines and activated olefins

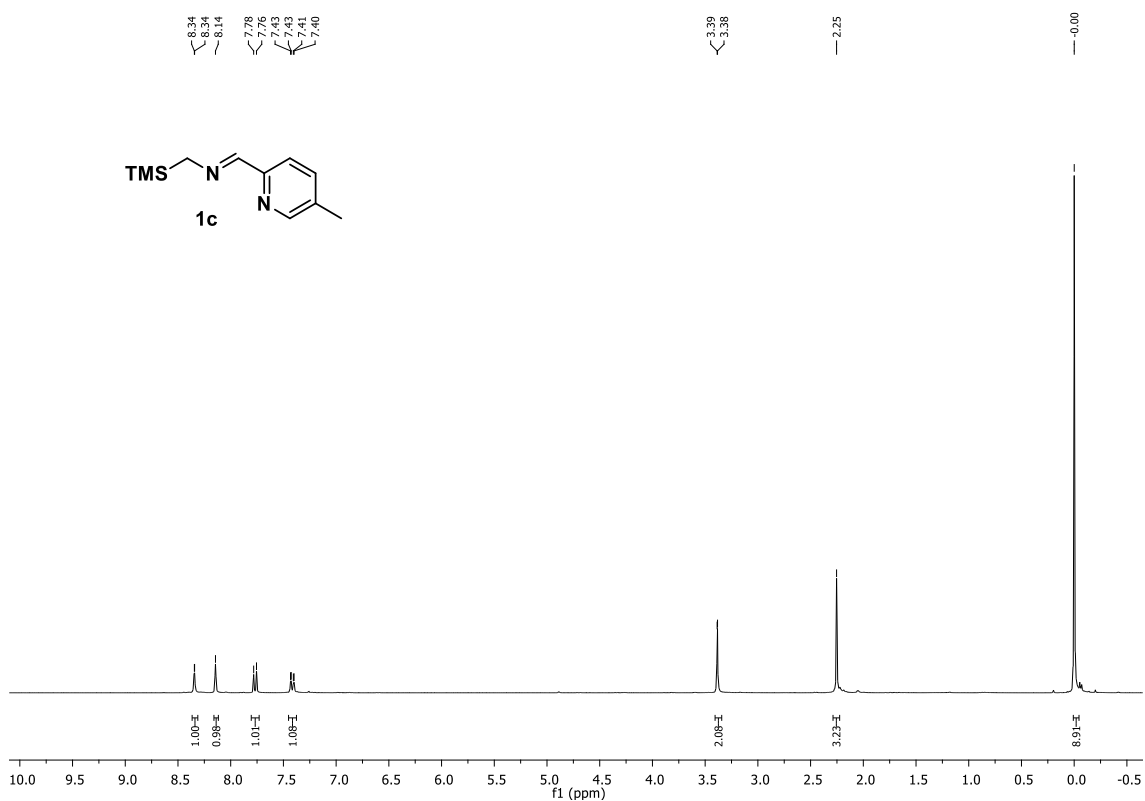
(*E*)-*N*-(2-Pyridinylmethylene)-1-(trimethylsilyl)methylamine (1a)



(*E*)-*N*-((3-Methyl-2-pyridinyl)methylene)-1-(trimethylsilyl)methylamine (1b)



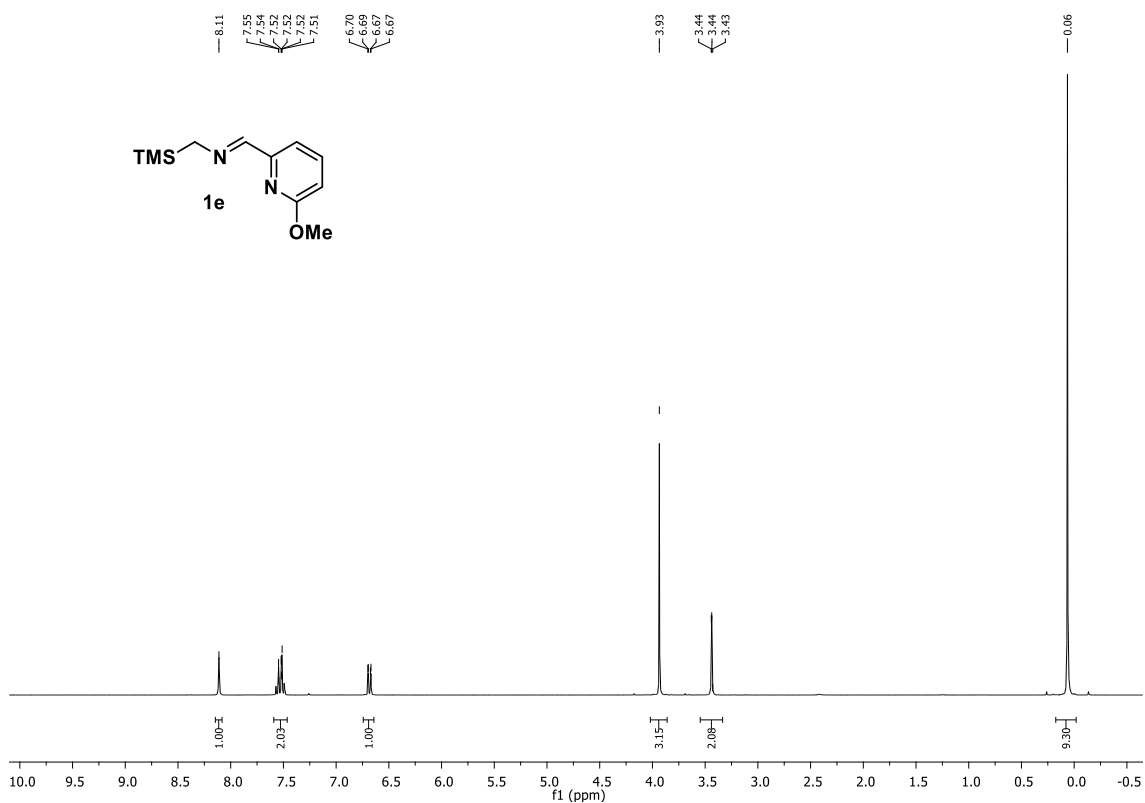
(E)-N-((5-Methyl-2-pyridinyl)methylene)-1-(trimethylsilyl)methylamine (1c)



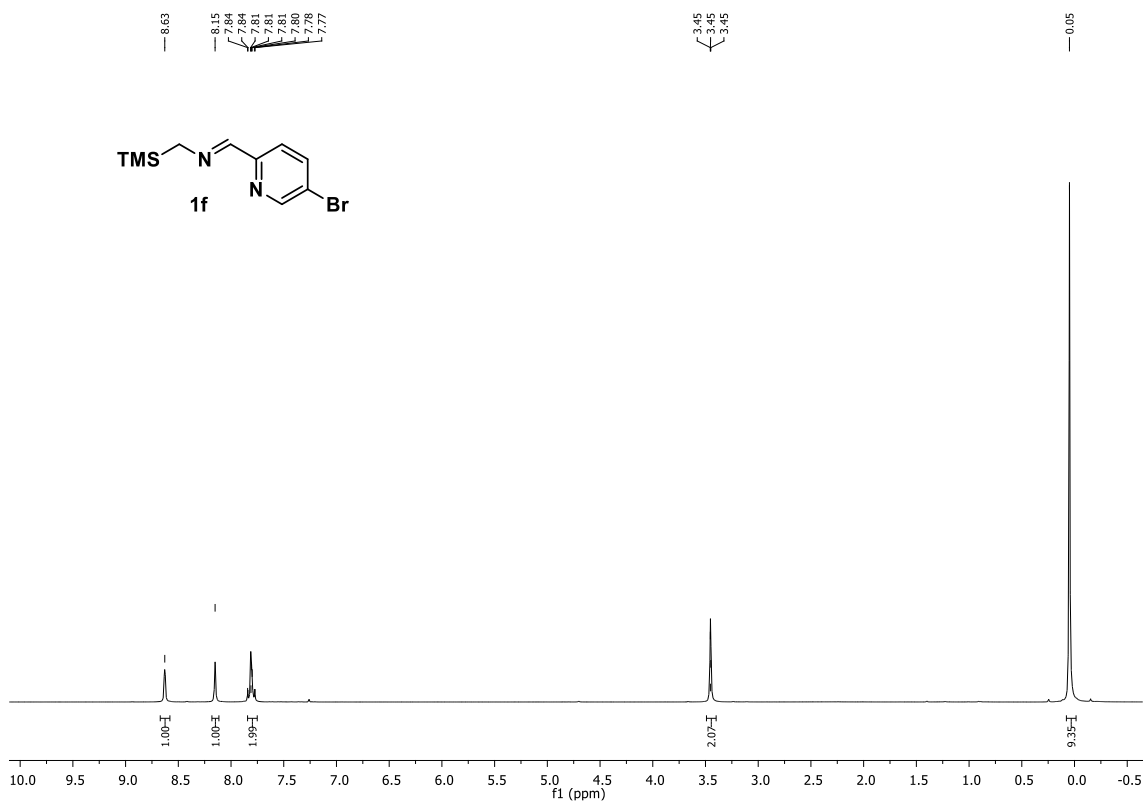
(E)-N-((6-Methyl-2-pyridinyl)methylene)-1-(trimethylsilyl)methylamine (1d)



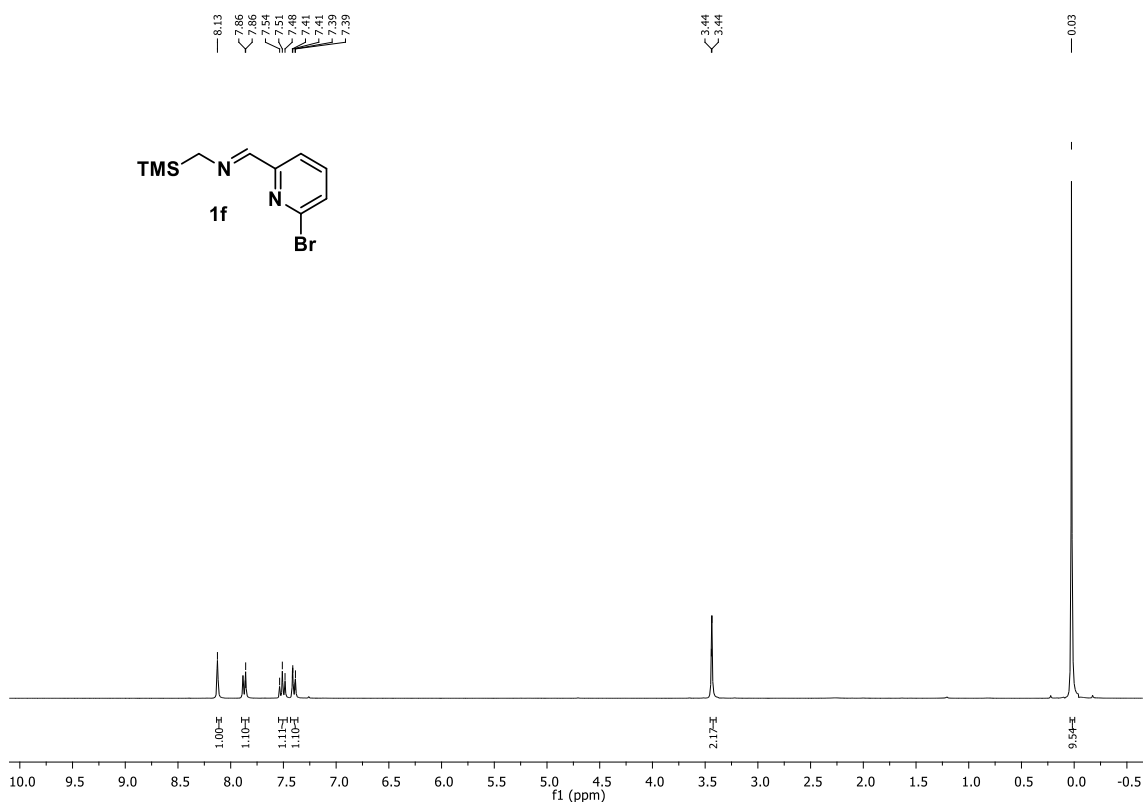
(*E*)-*N*-((6-Methoxy-2-pyridinyl)methylene)-1-(trimethylsilyl)methylamine (1e)



(*E*)-*N*-((5-Bromo-2-pyridinyl)methylene)-1-(trimethylsilyl)methylamine (1f)



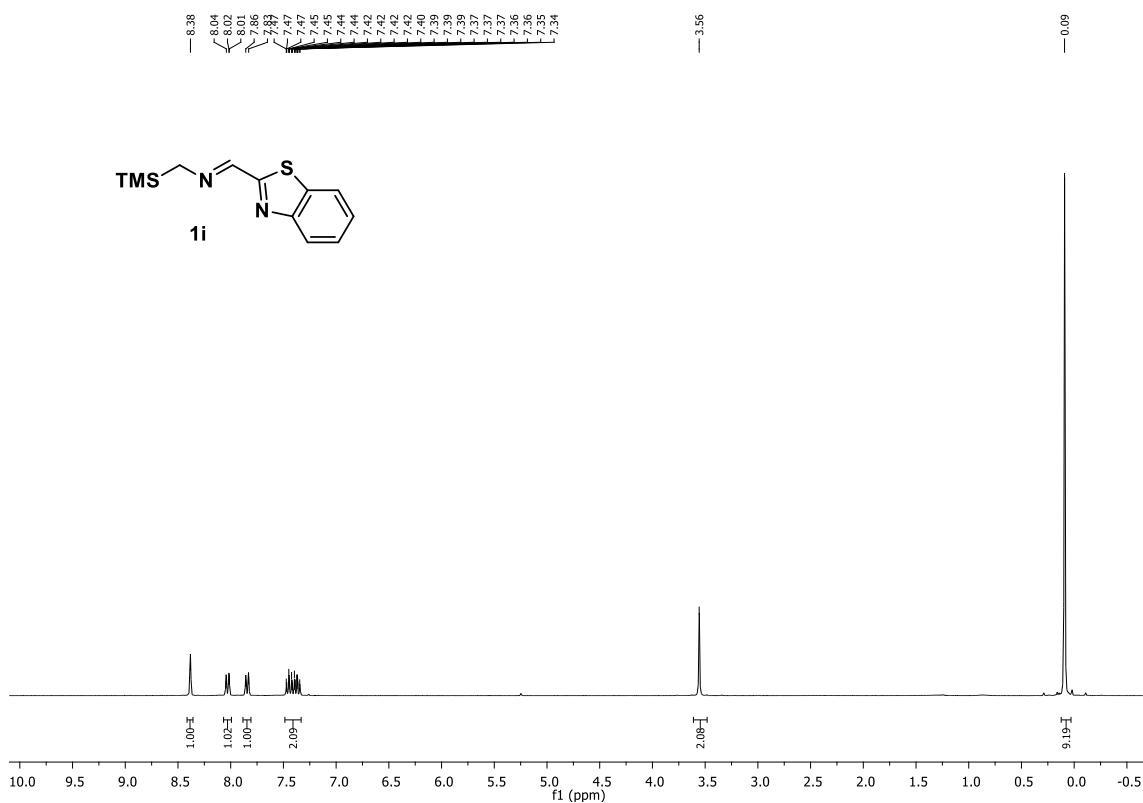
(E)-N-((6-Bromo-2-pyridinyl)methylene)-1-(trimethylsilyl)methylamine (1g)



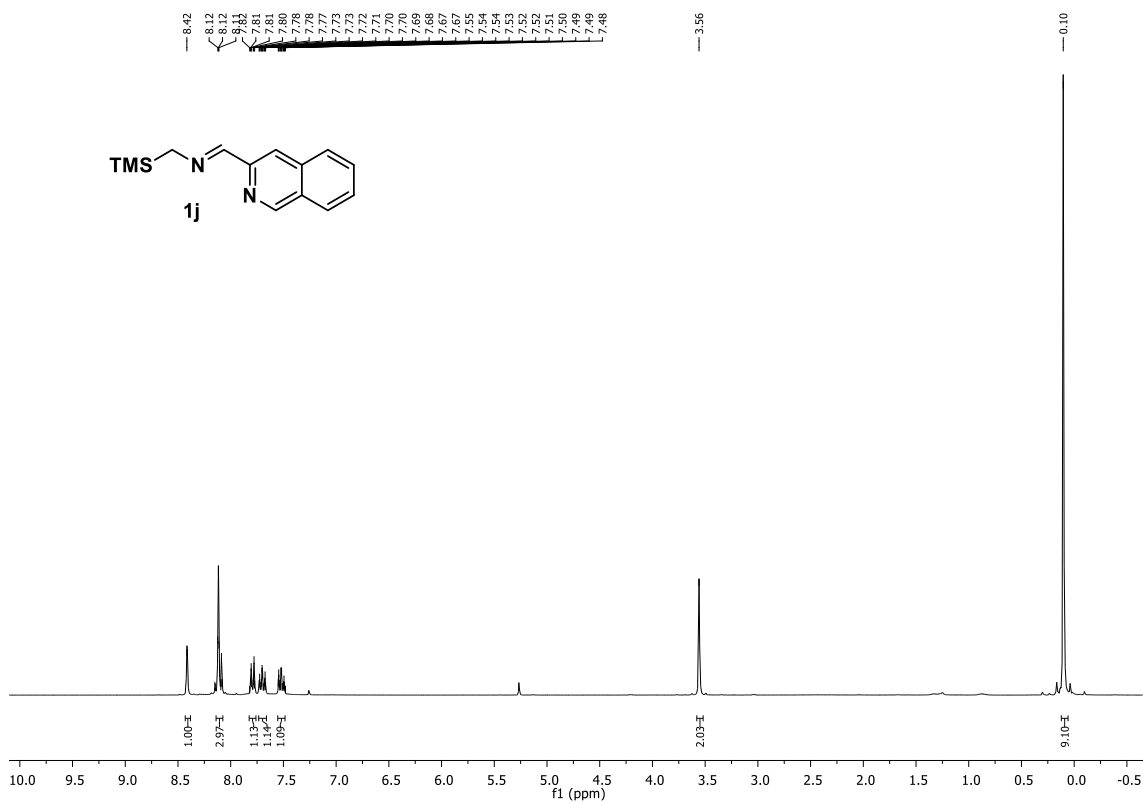
(E)-N-(2-Thiazolylmethylene)-1-(trimethylsilyl)methylamine (1h)



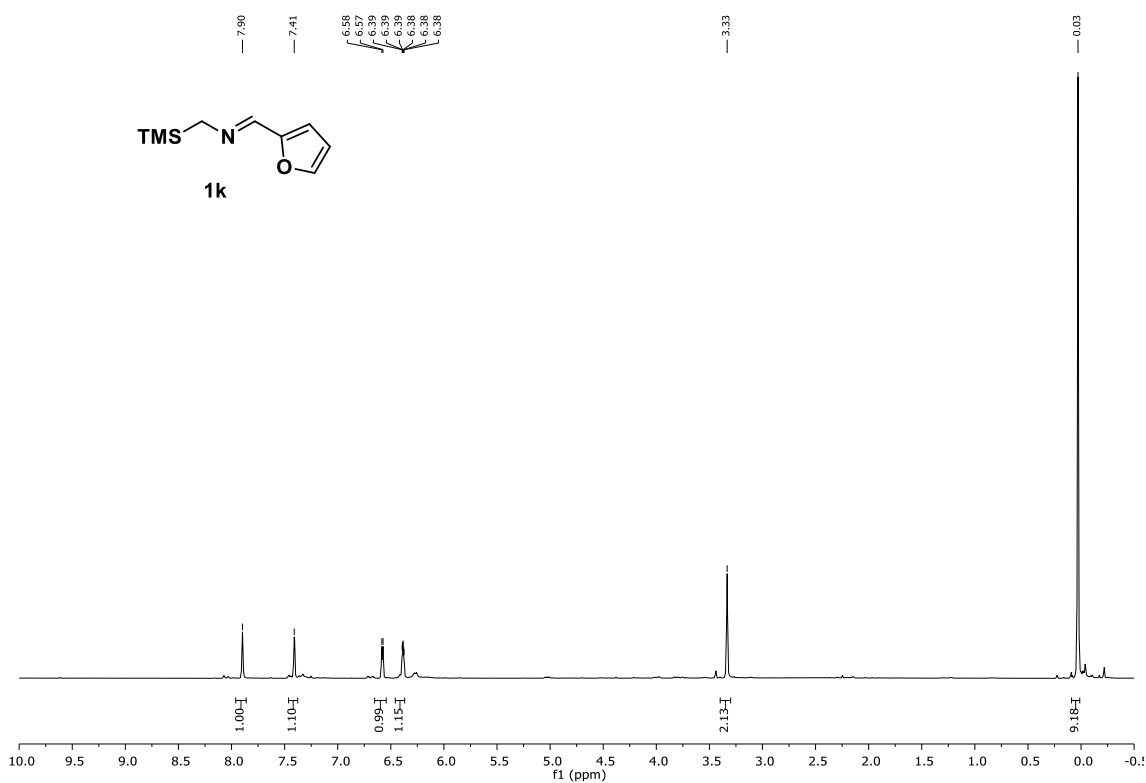
(*E*)-*N*-(2-Benzo[*d*]thiazolylmethylene)-1-(trimethylsilyl)methylamine (1i)



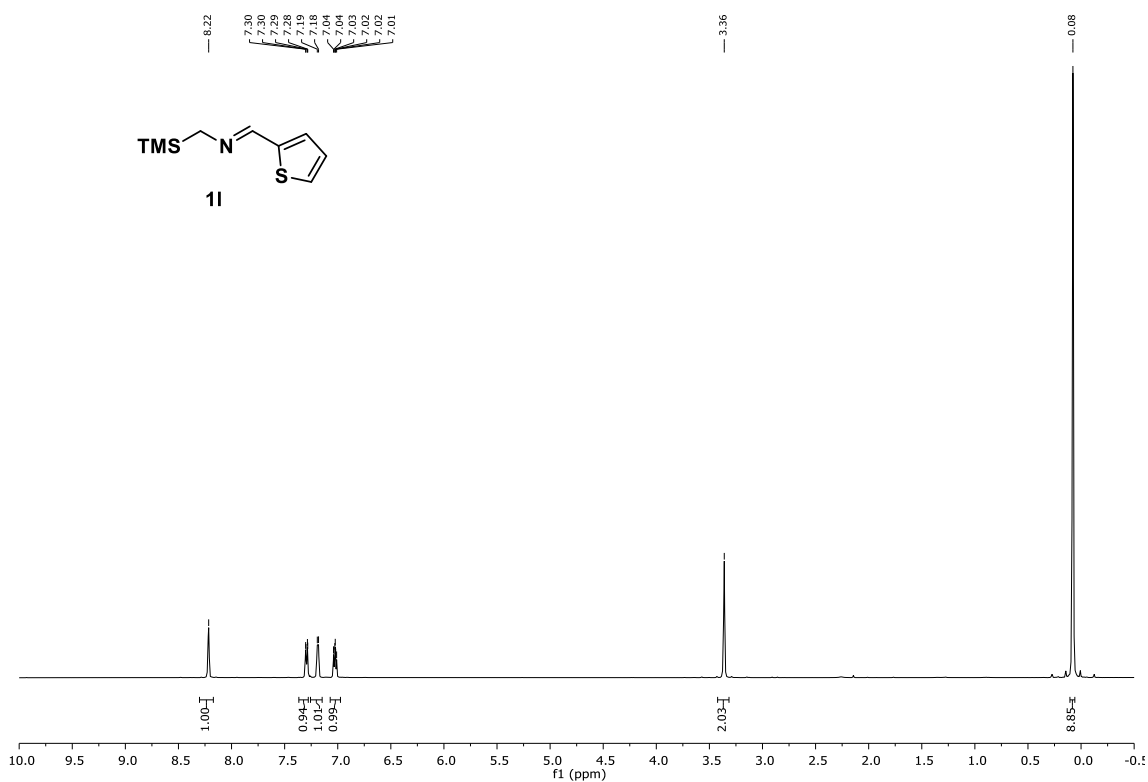
(*E*)-*N*-((3-Isoquinolinyl)methylene)-1-(trimethylsilyl)methylamine (1j)



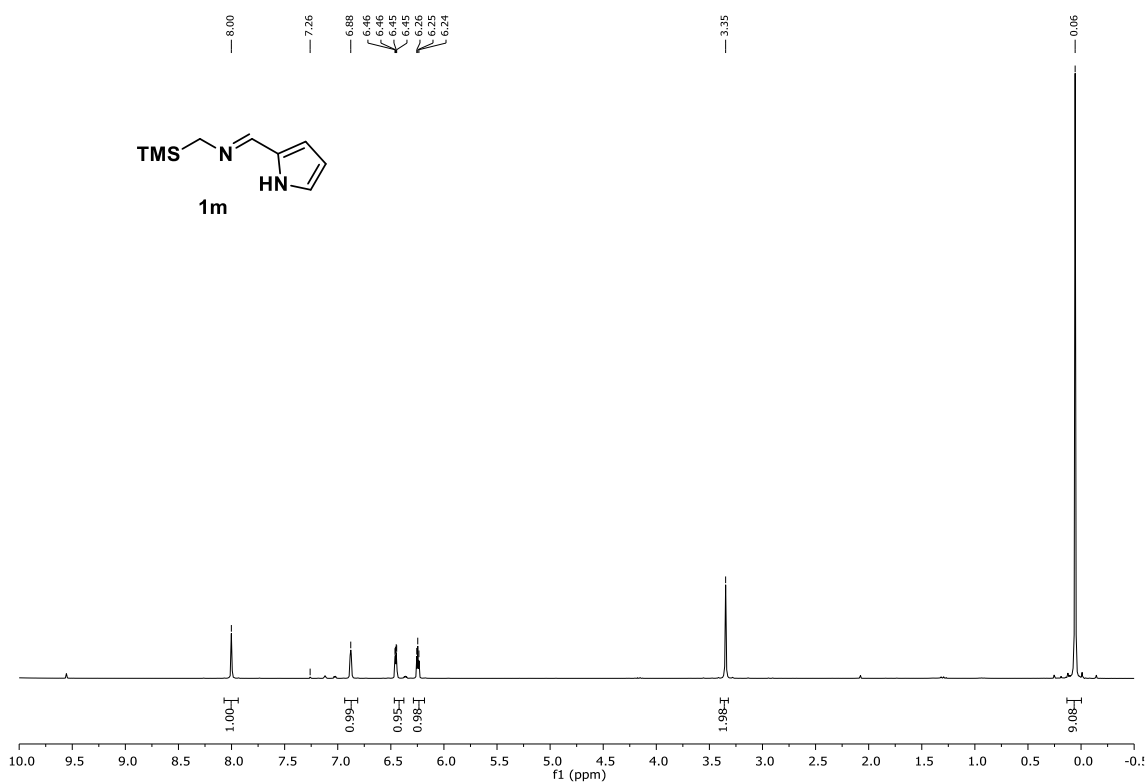
(*E*)-*N*-(2-Furanylmethylene)-1-(trimethylsilyl)methylamine (1k)



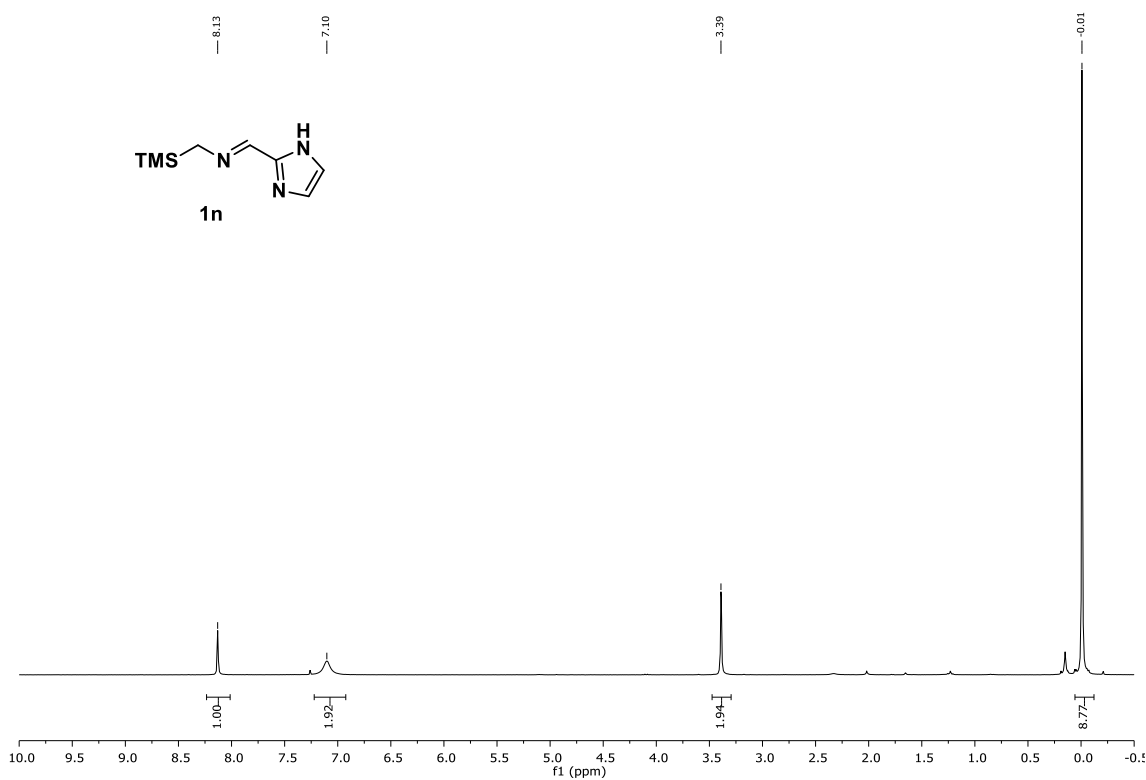
(*E*)-*N*-(2-Thiophenylmethylene)-1-(trimethylsilyl)methylamine (1l)



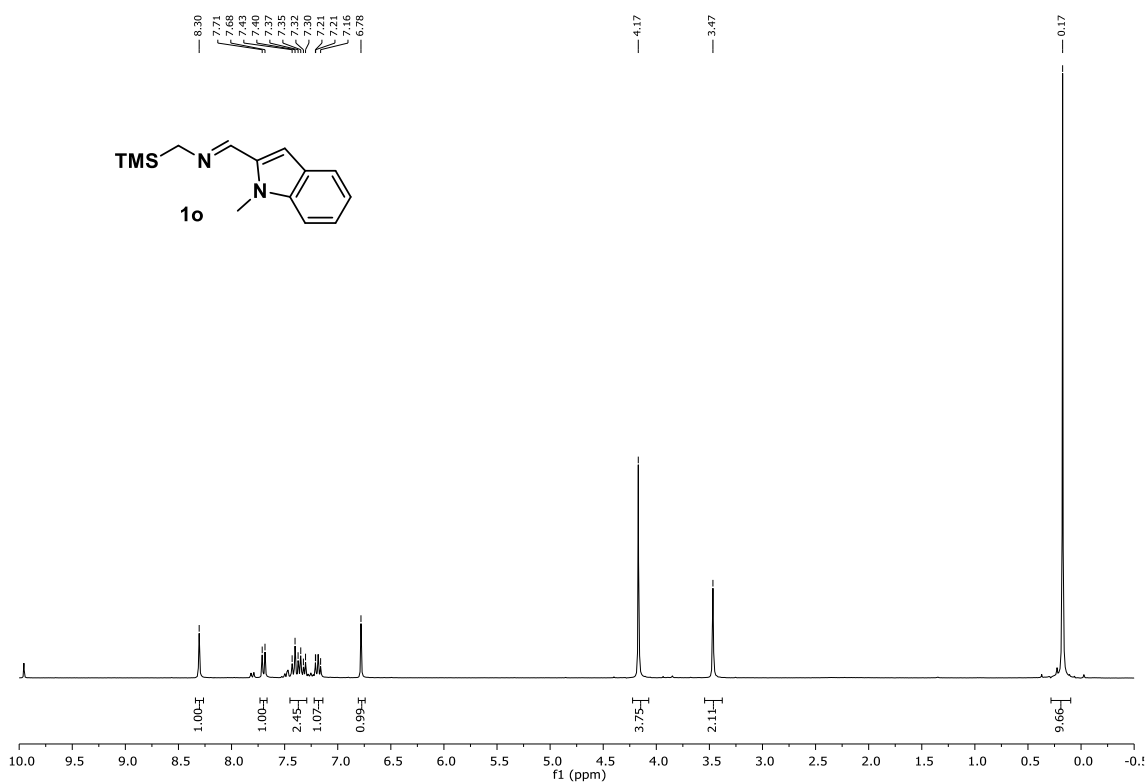
(E)-N-(2-Pyrrolylmethylene)-1-(trimethylsilyl)methylamine (1m)



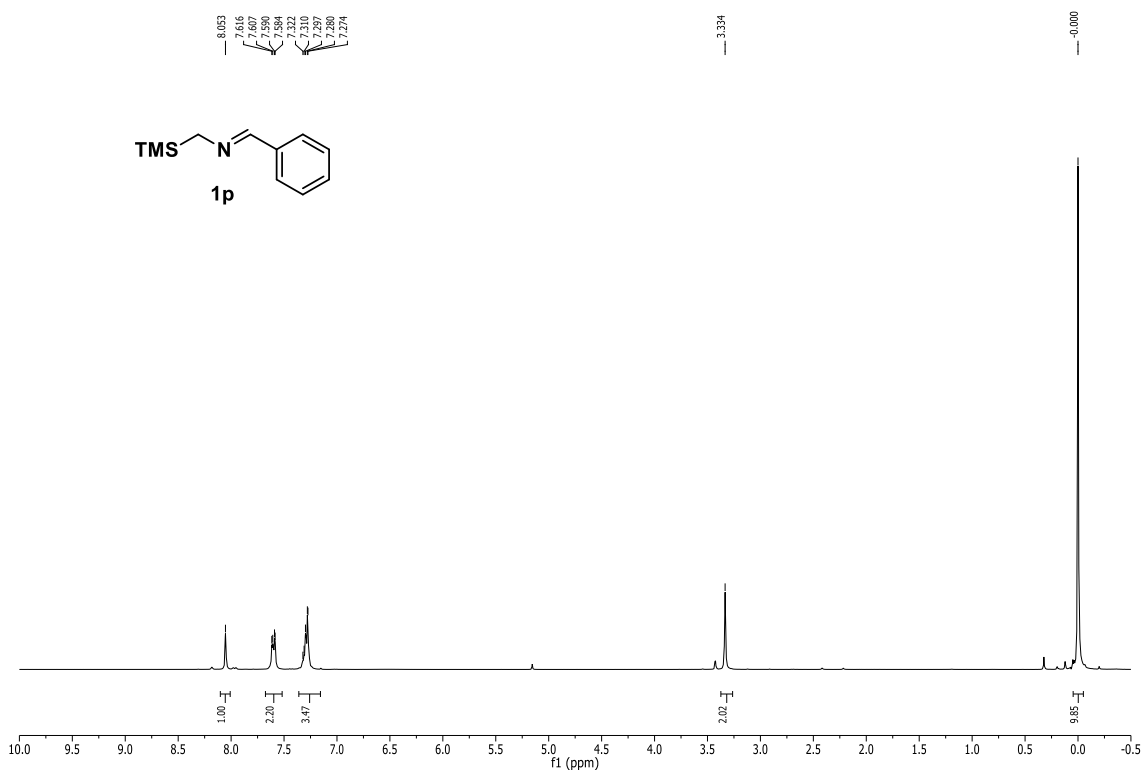
(E)-N-(2-Imidazolylmethylene)-1-(trimethylsilyl)methylamine (1n)



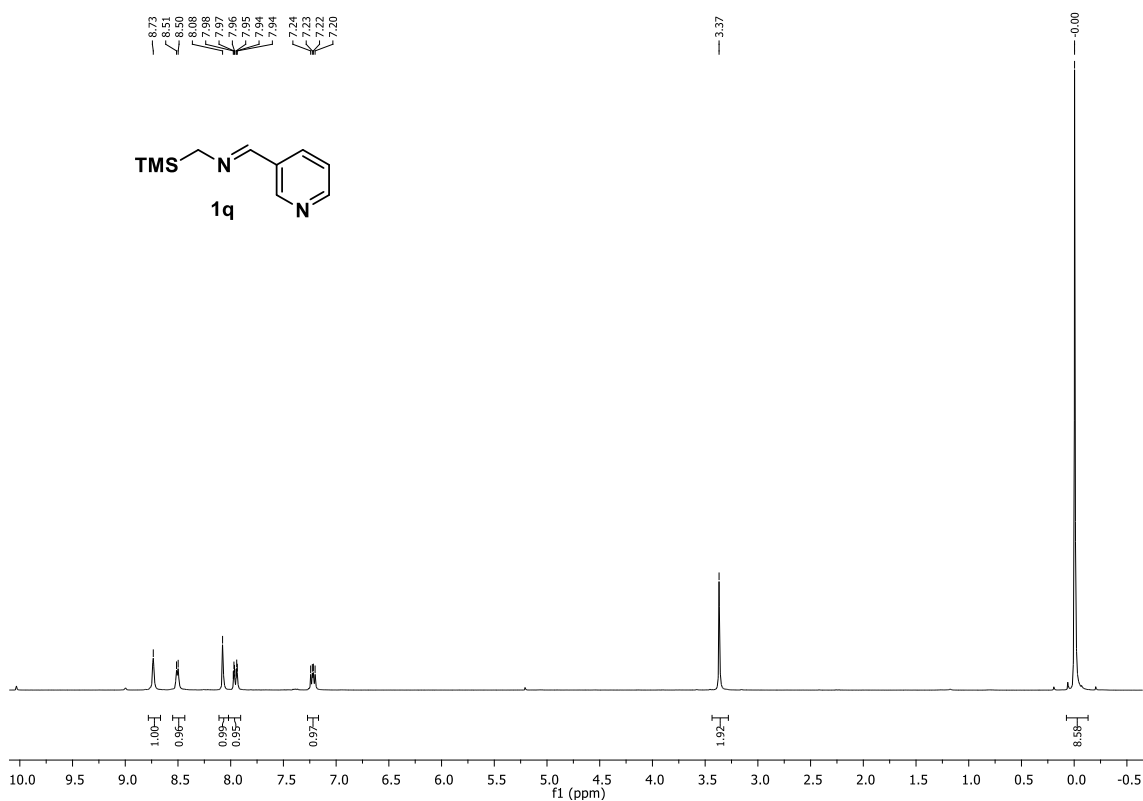
(E)-N-(2-(N-Methylindol)ylmethylene)-1-(trimethylsilyl)methylamine (1o)



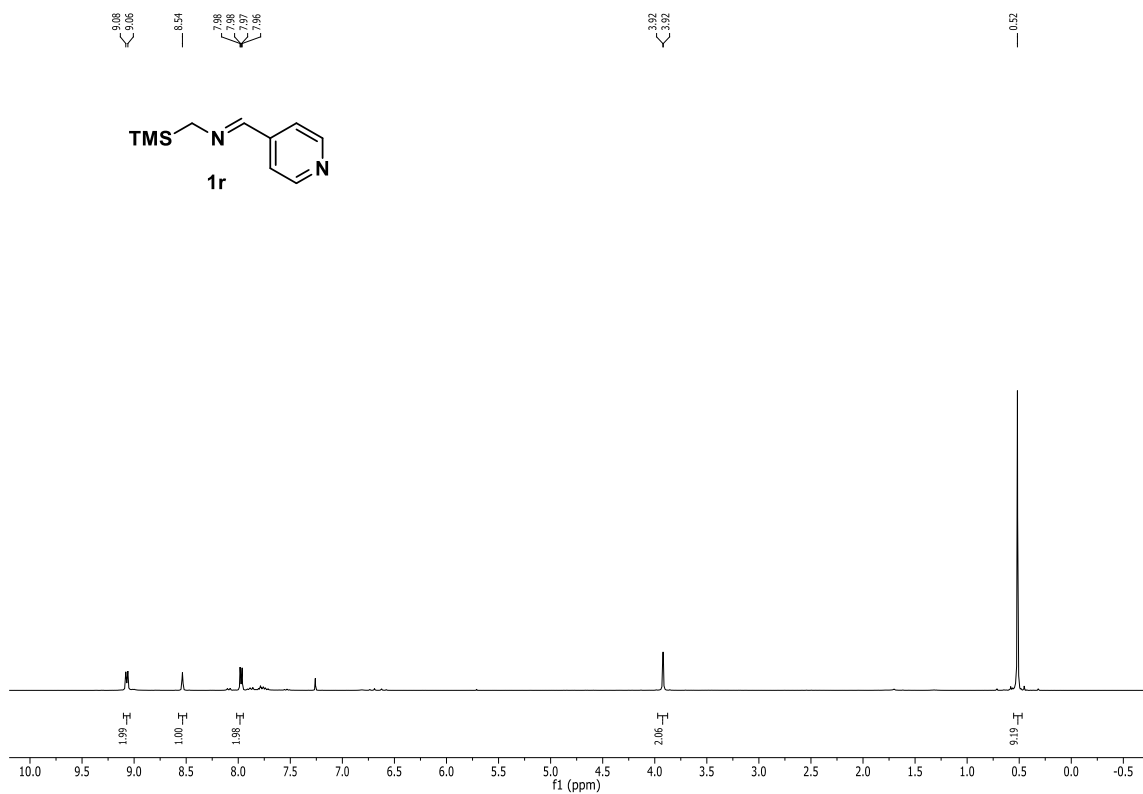
(E)-N-(Phenylmethylene)-1-(trimethylsilyl)methylamine (1p)



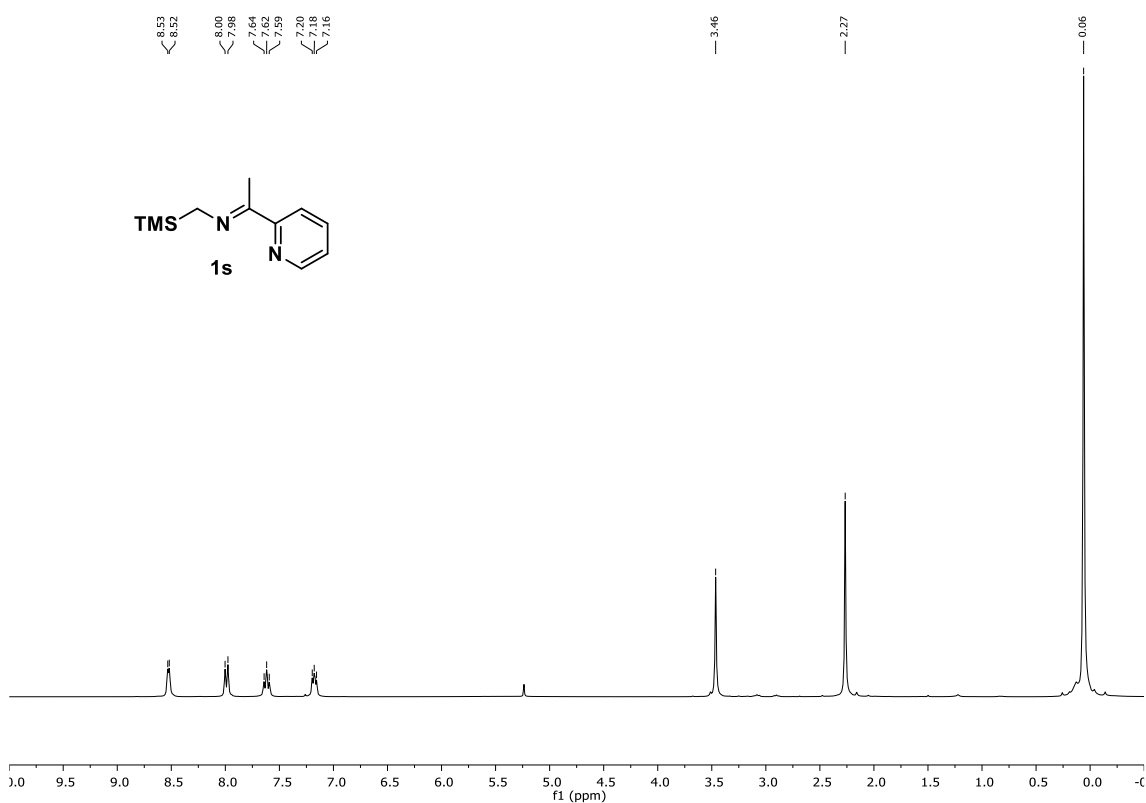
(*E*)-*N*-(3-Pyridinylmethylene)-1-(trimethylsilyl)methylamine (1q)



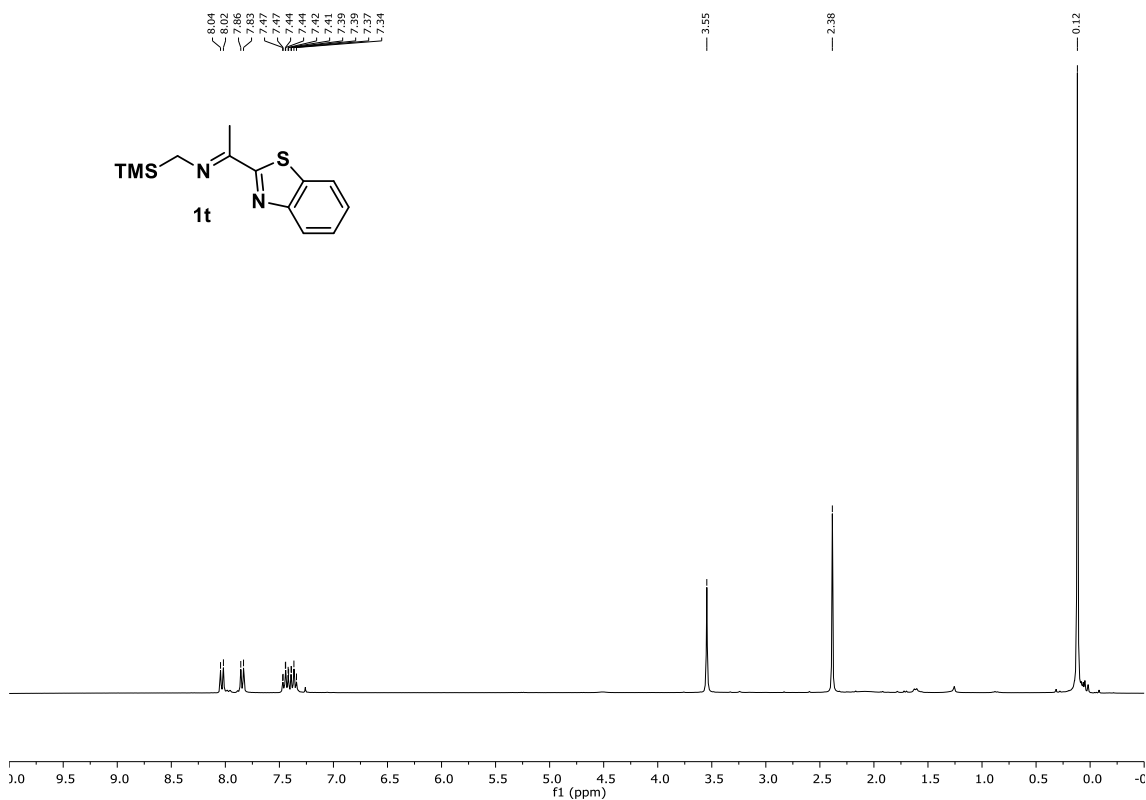
(*E*)-*N*-(4-Pyridinylmethylene)-1-(trimethylsilyl)methylamine (1r)



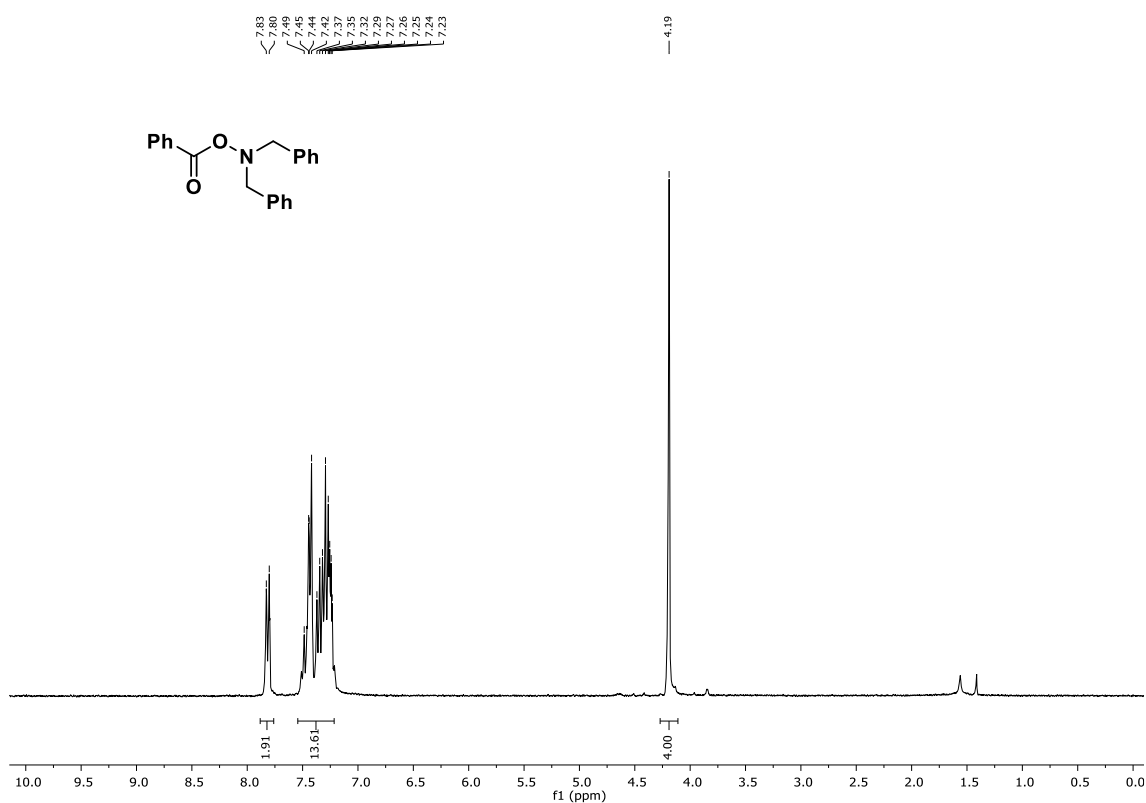
(*E*)-*N*-(1-(2-Pyridinyl)ethylidene)-1-(trimethylsilyl)methylamine (1s)



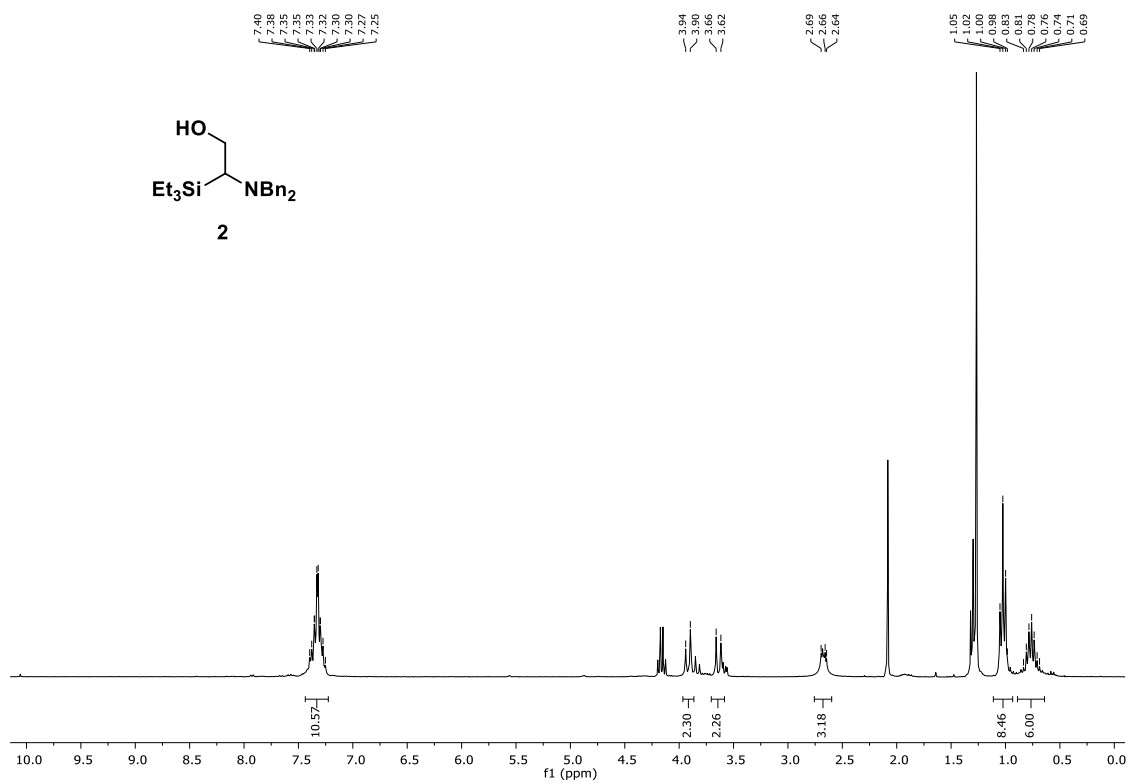
(*E*)-*N*-(1-(2-Benzo[d]thiazolyl)ethylidene)-1-(trimethylsilyl)methylamine (1t)



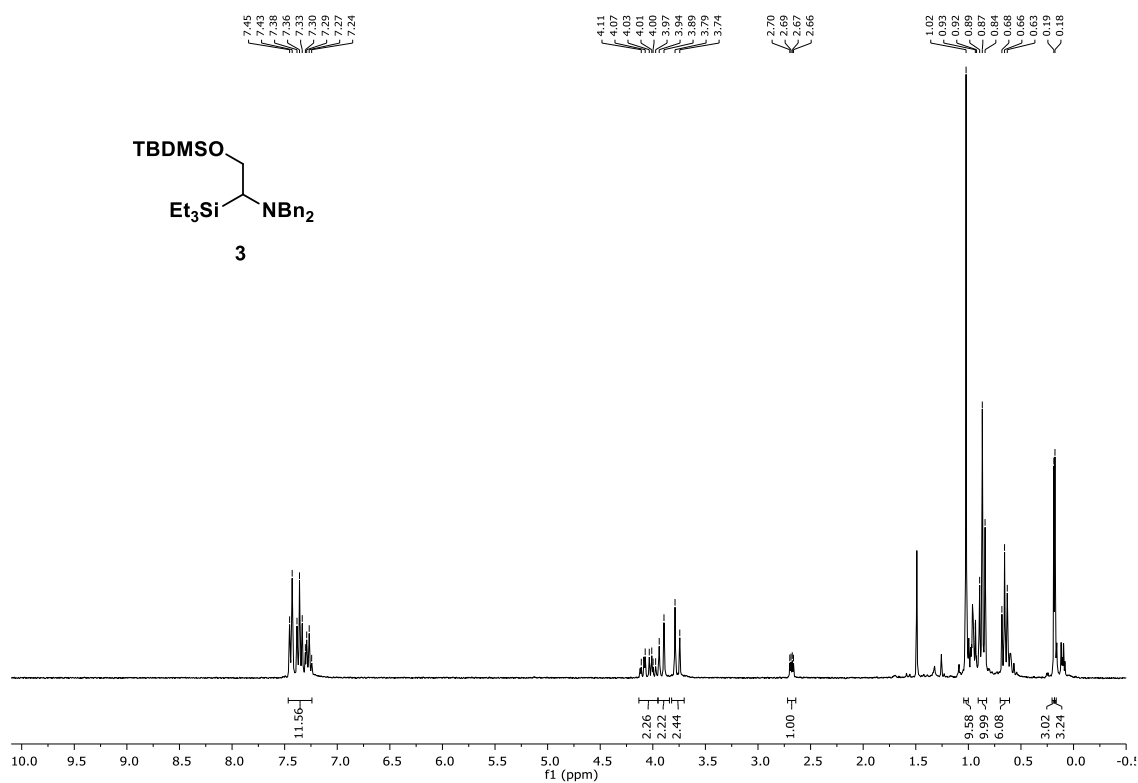
O-Benzoyl-N,N-dibenzylhydroxylamine



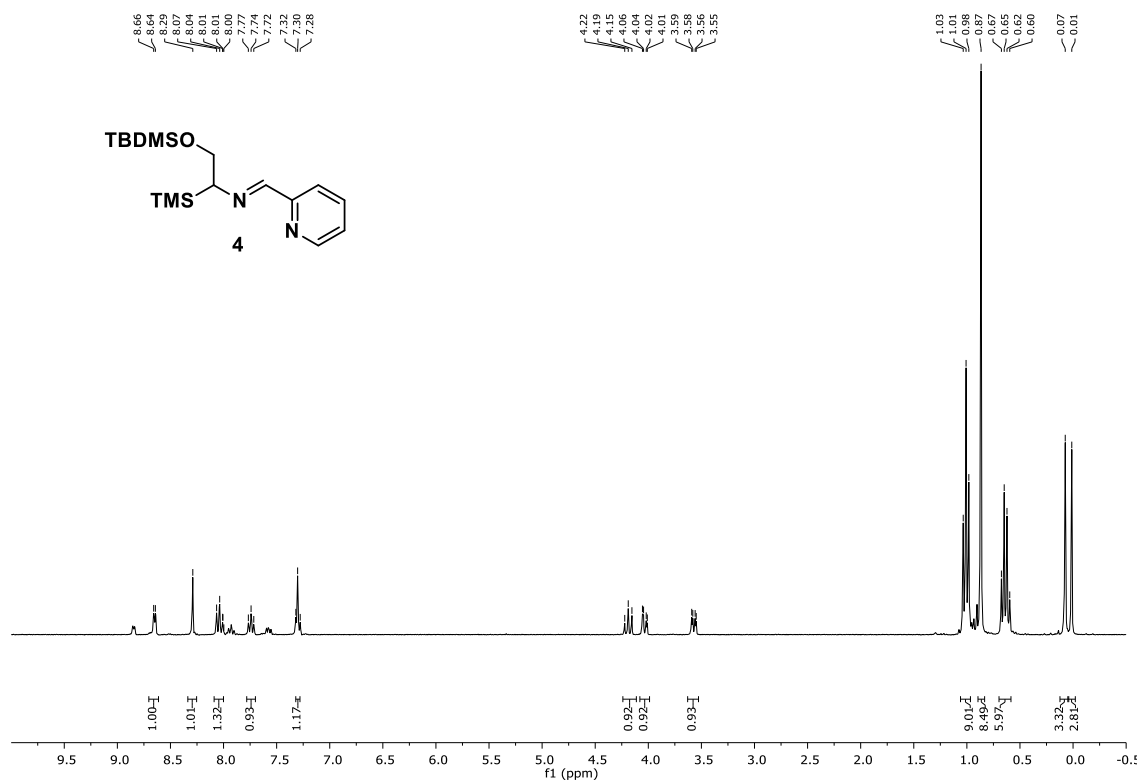
2-(Dibenzylamino)-2-(triethylsilyl)ethan-1-ol (2)



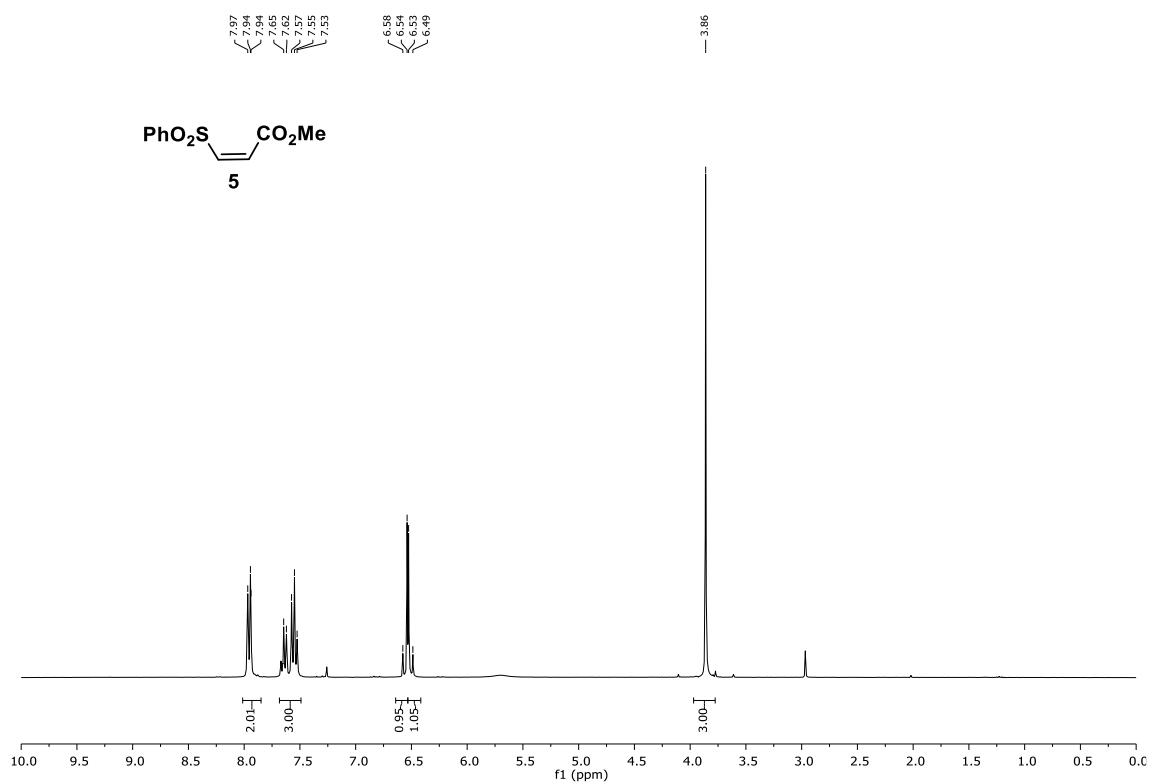
***N,N*-Dibenzyl-2-((*tert*-butyldimethylsilyl)oxi)-1-(triethylsilyl)ethan-1-amine (3)**



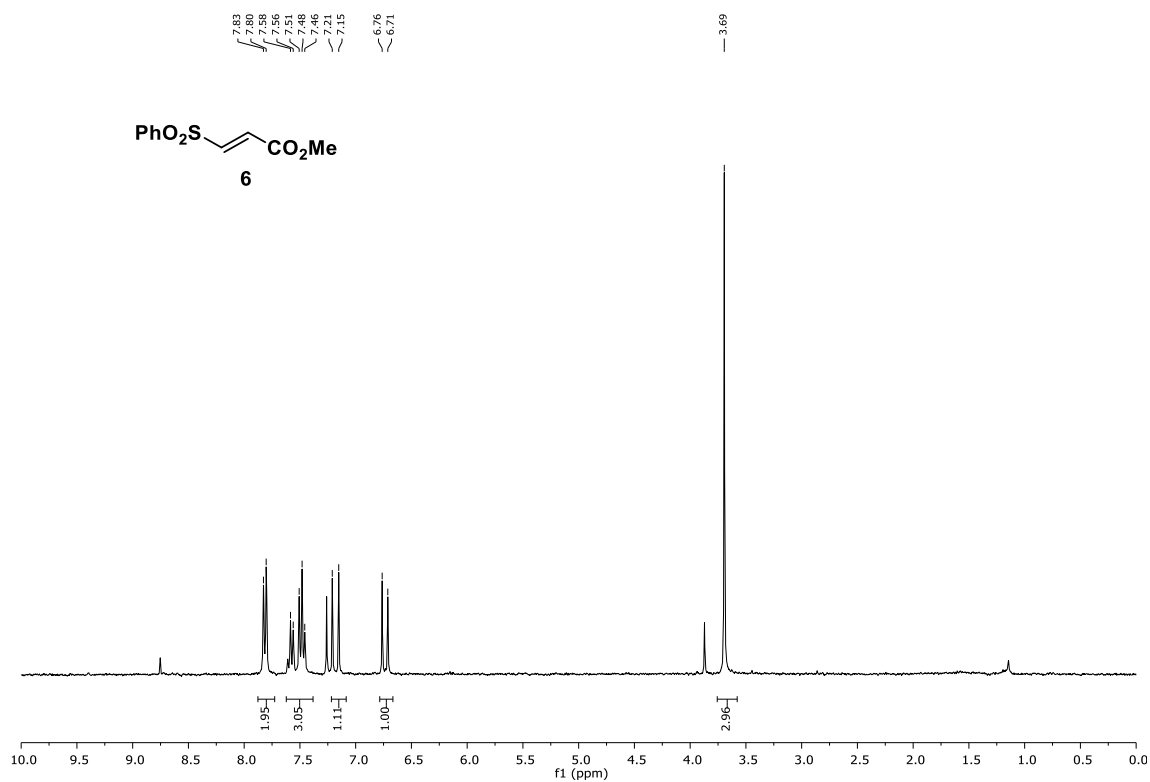
***(E)*-N-(2-Pyridinylmetylen)-2-((*tert*-butyldimethylsilyl)oxi)-1-(trimethylsilyl)methylamine (4)**



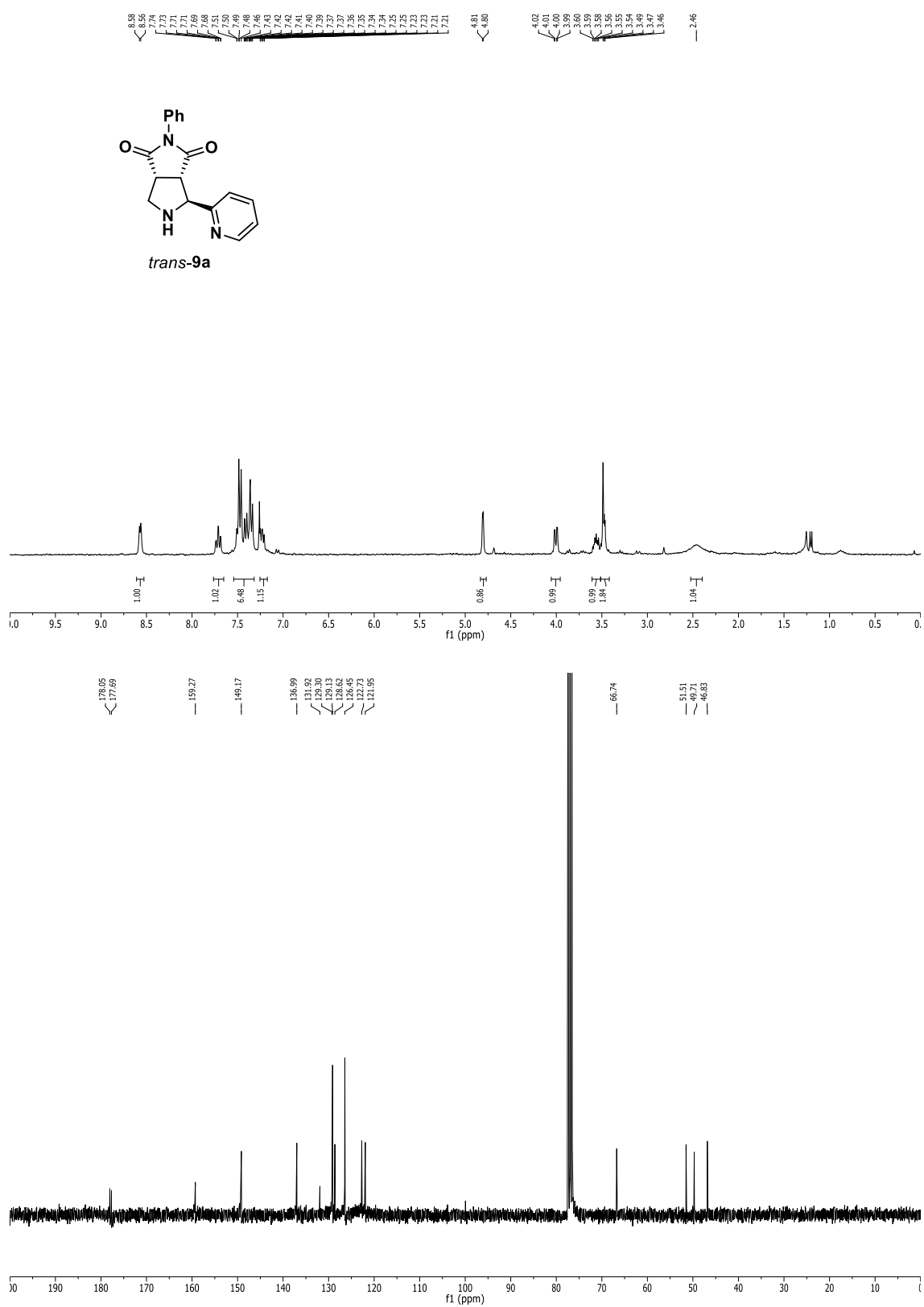
***cis*-Bis(phenylsulfonyl)ethylene (5)**



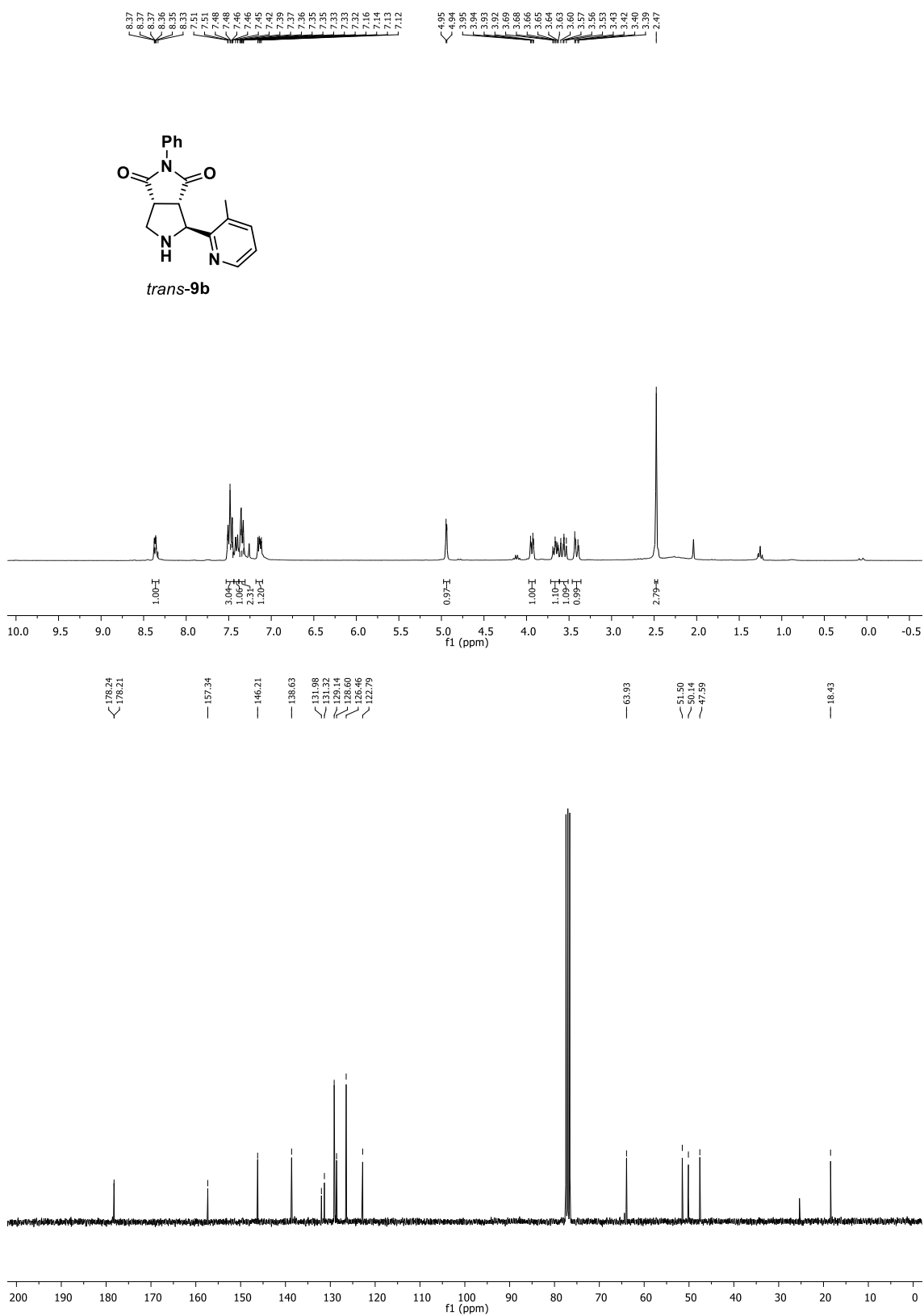
***trans*-Bis(phenylsulfonyl)ethylene (6)**



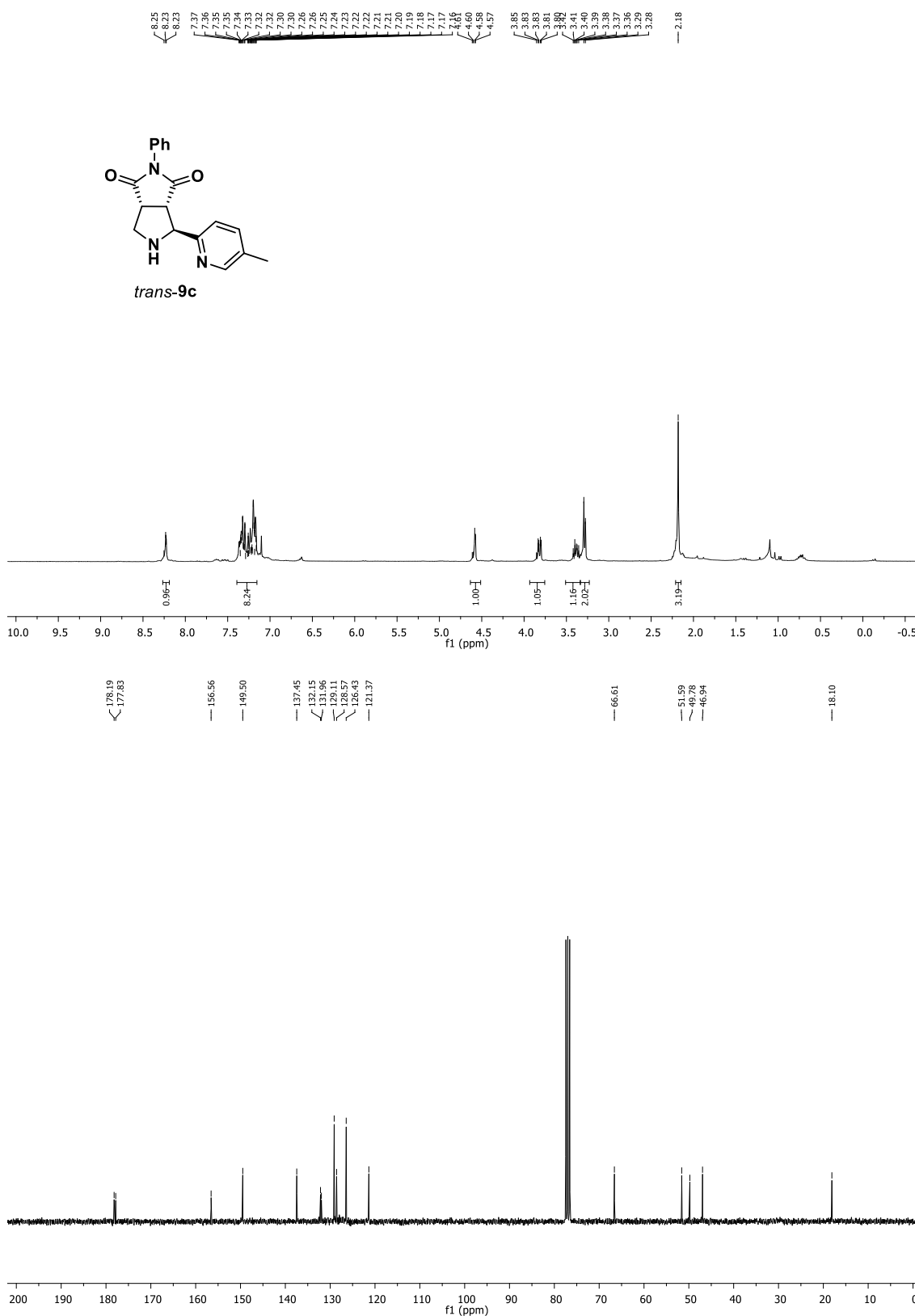
(3a*S*,4*S*,6a*R*)-2-Phenyl-4-(2-pyridinyl)tetrahydropyrrolo[3,4-*c*]pyrrole-1,3(2*H*,3a*H*)-dione
(*trans*-9a)



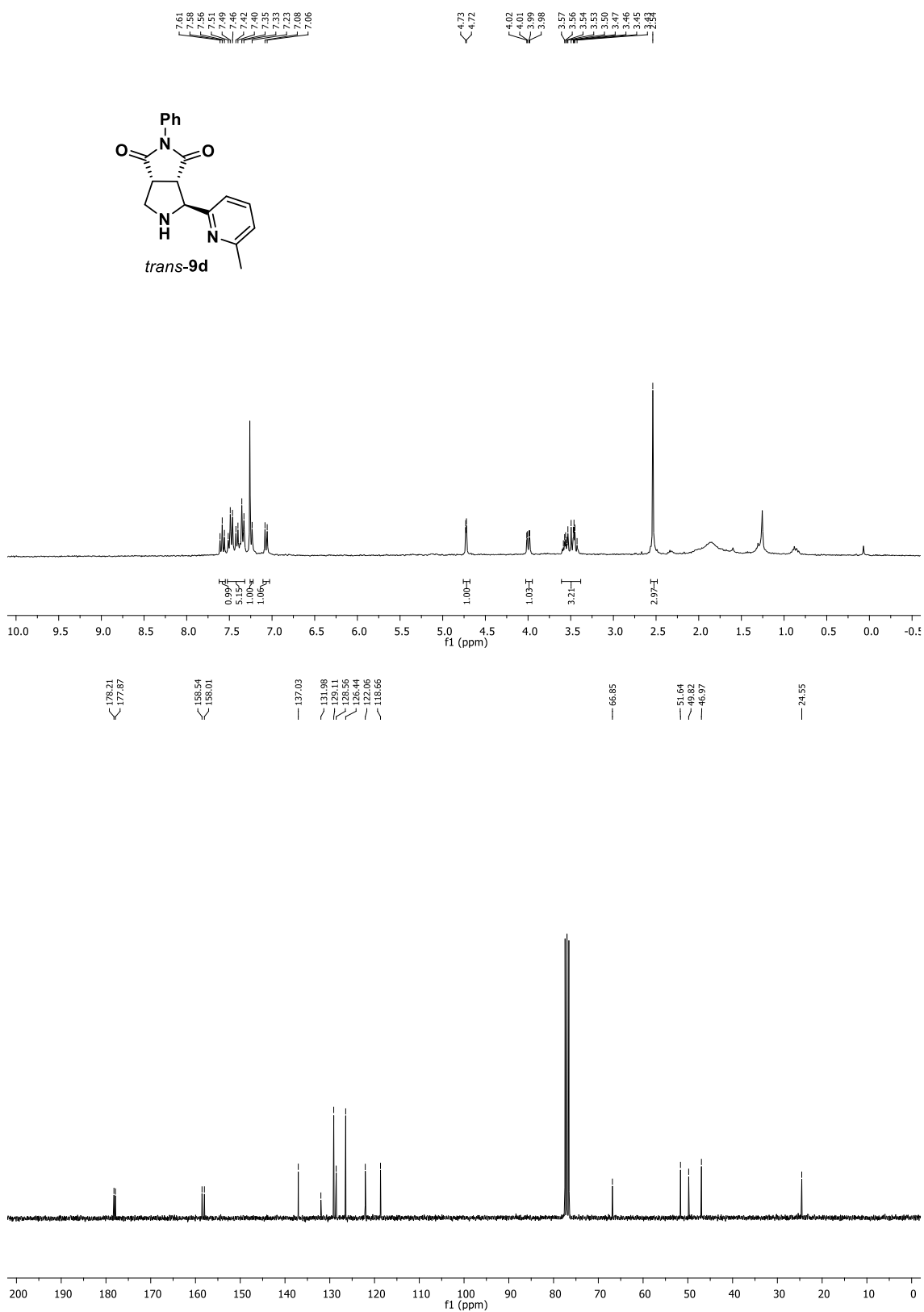
(3a*S*,4*S*,6a*R*)-4-(3-Methyl-2-pyridinyl)-2-phenyltetrahydropyrrolo[3,4-*c*]pyrrole-1,3(2*H*,3a*H*)-dione (*trans*-9b)



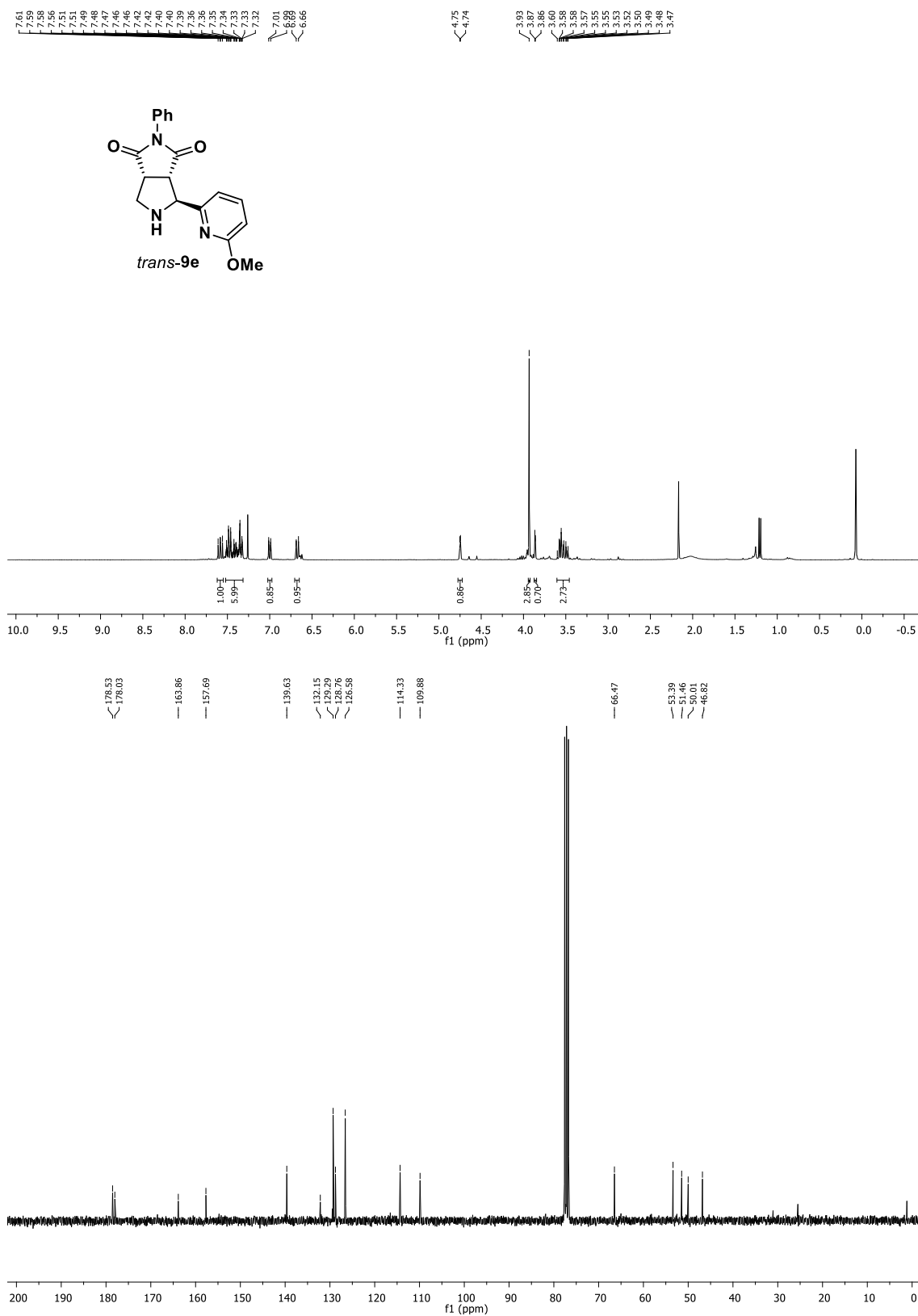
(3*aS*,4*S*,6*aR*)-4-(5-Methyl-2-pyridinyl)-2-phenyltetrahydropyrrolo[3,4-*c*]pyrrole-1,3(2*H*,3*aH*)-dione (*trans*-9c)



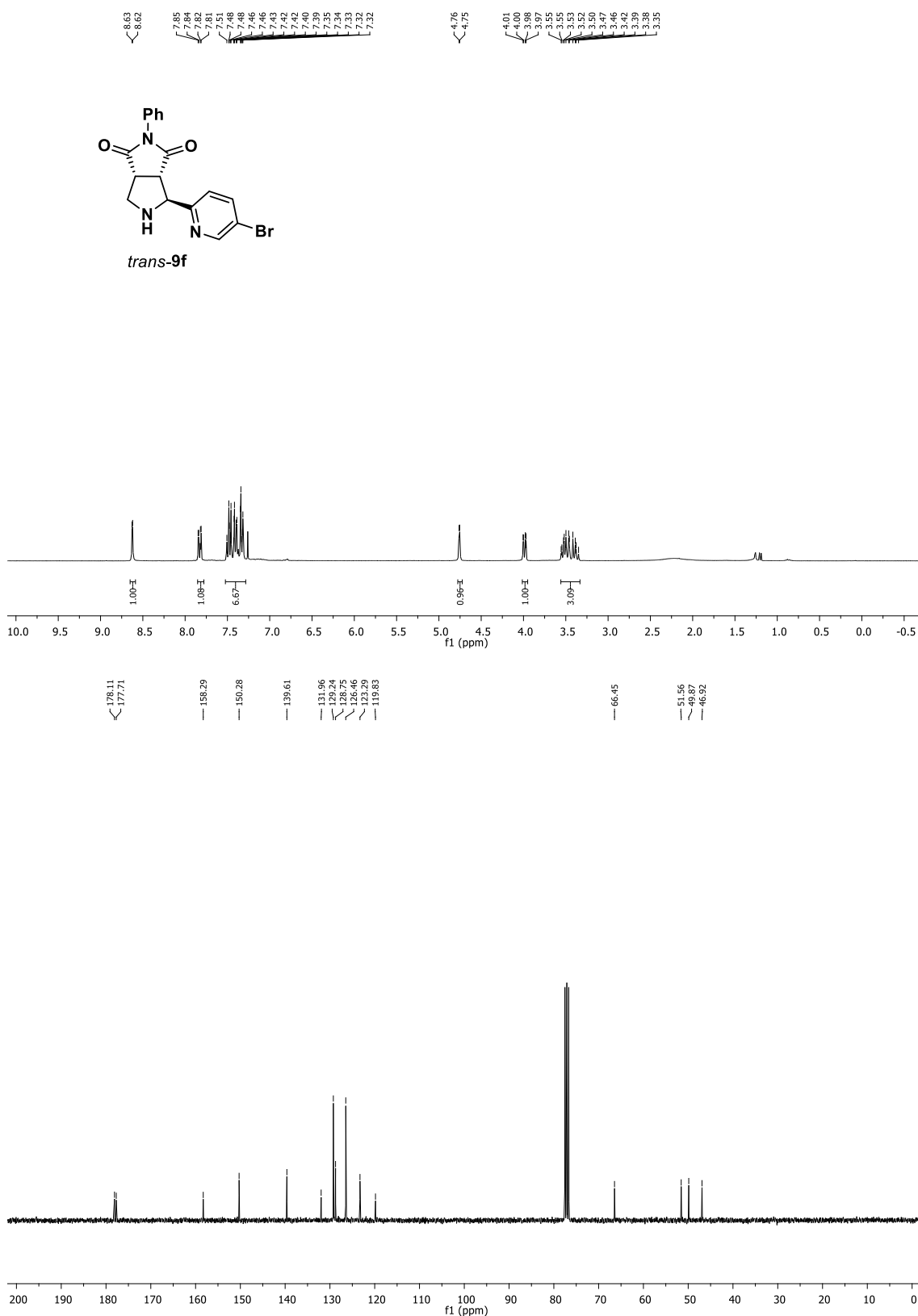
(3a*S*,4*S*,6a*R*)-4-(6-Methyl-2-pyridinyl)-2-phenyltetrahydropyrrolo[3,4-*c*]pyrrole-1,3(2*H*,3a*H*)-dione (*trans*-9d)



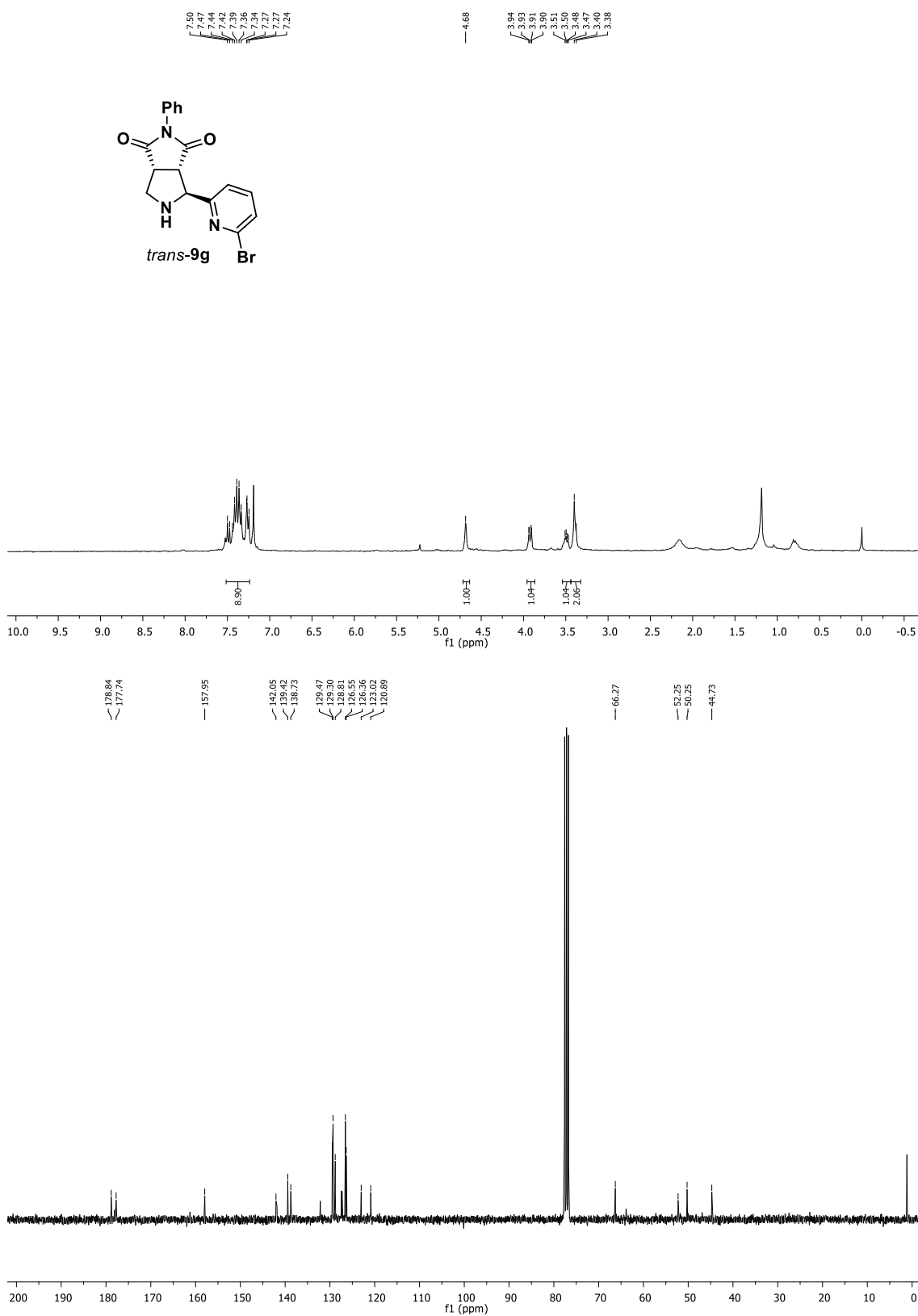
(3a*S*,4*S*,6a*R*)-4-(6-Methoxy-2-pyridinyl)-2-phenyltetrahydropyrrolo[3,4-*c*]pyrrole-1,3(2*H*,3a*H*)-dione (*trans*-9e)



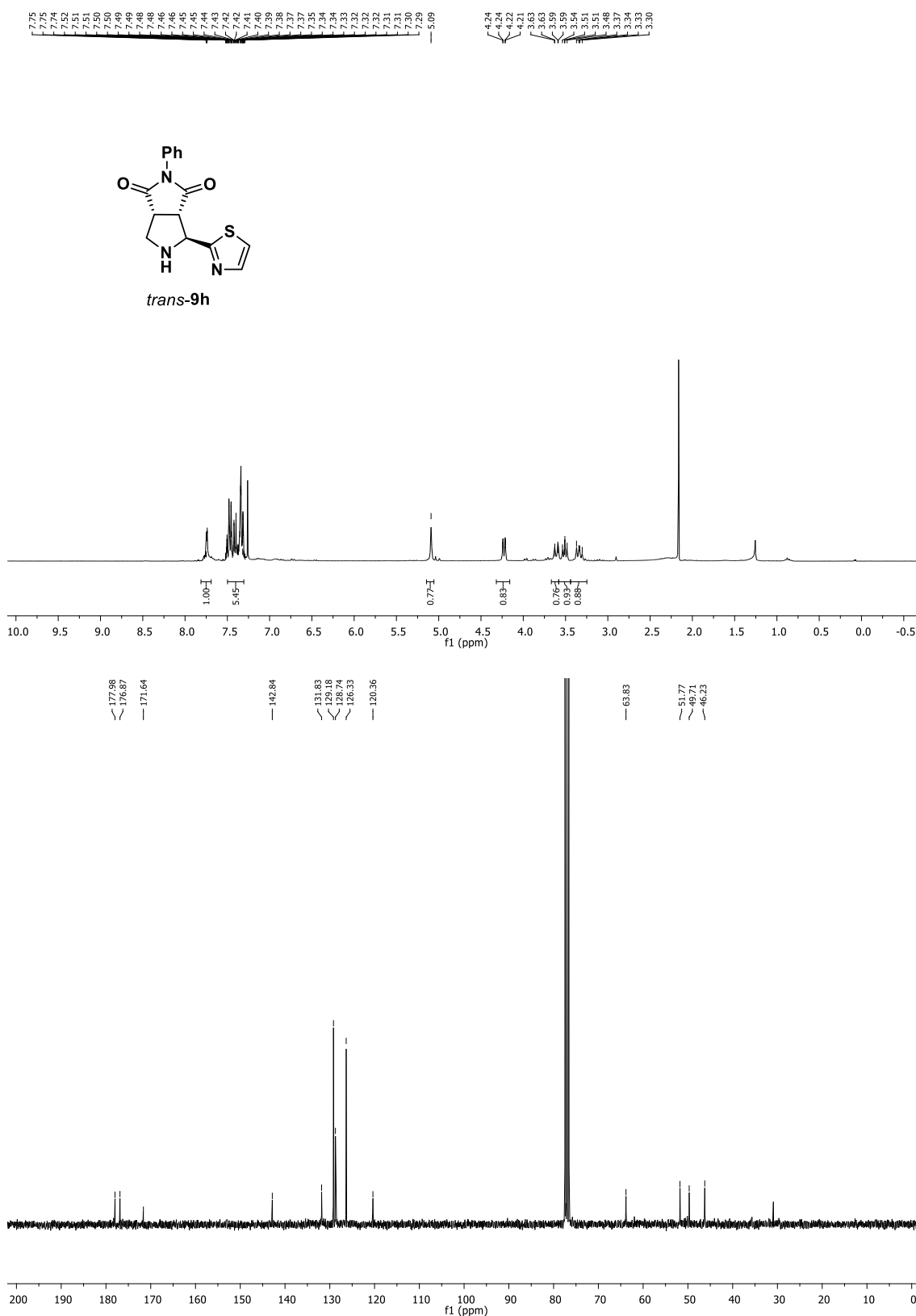
(3*S*,4*S*,6*aR*)-4-(5-Bromo-2-pyridinyl)-2-phenyltetrahydropyrrolo[3,4-*c*]pyrrole-1,3(2*H*,3*aH*)-dione (*trans*-9f)



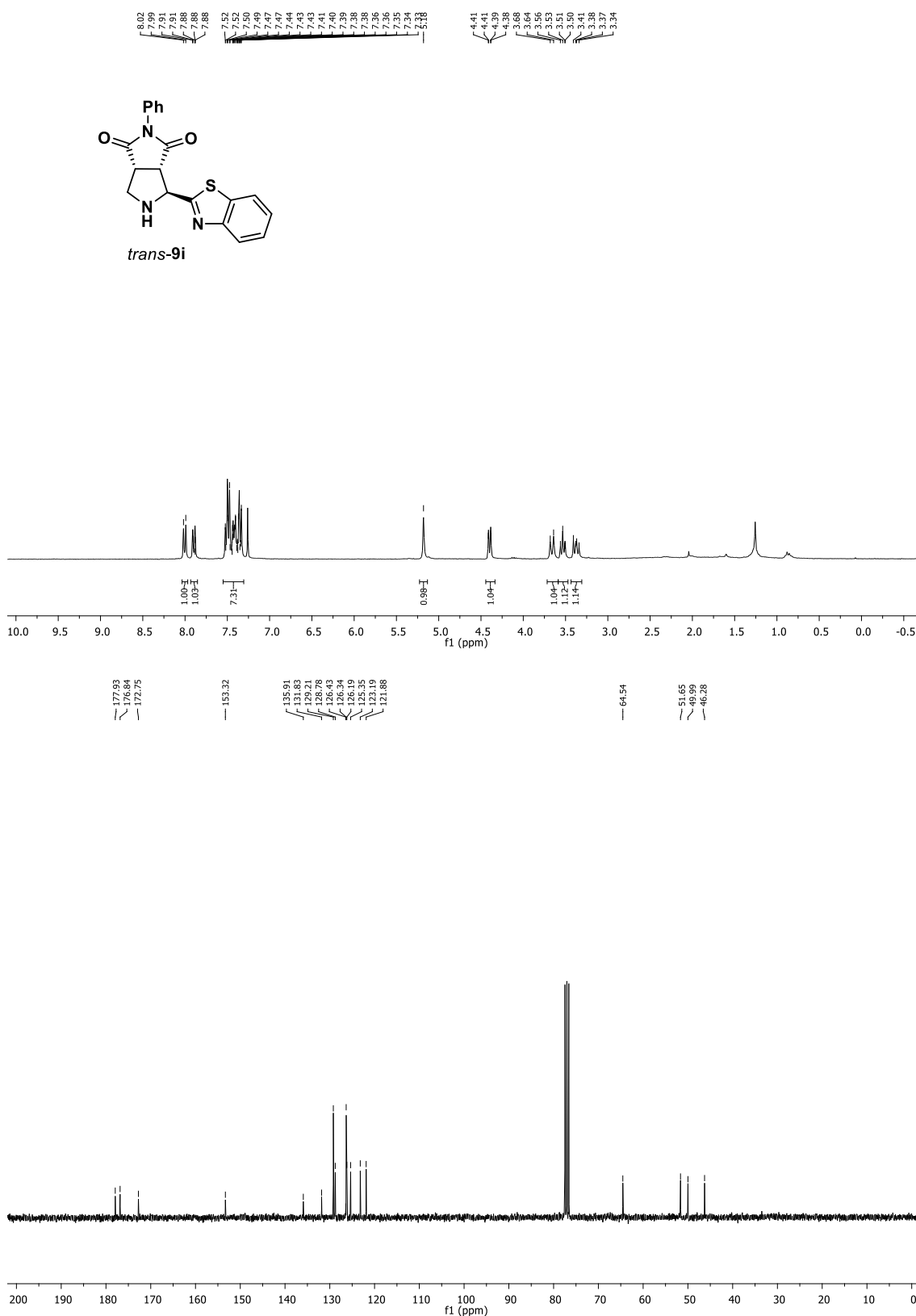
(3a*S*,4*S*,6a*R*)-4-(6-Bromo-2-pyridinyl)-2-phenyltetrahydropyrrolo[3,4-*c*]pyrrole-1,3(2*H*,3a*H*)-dione (*trans*-9g)



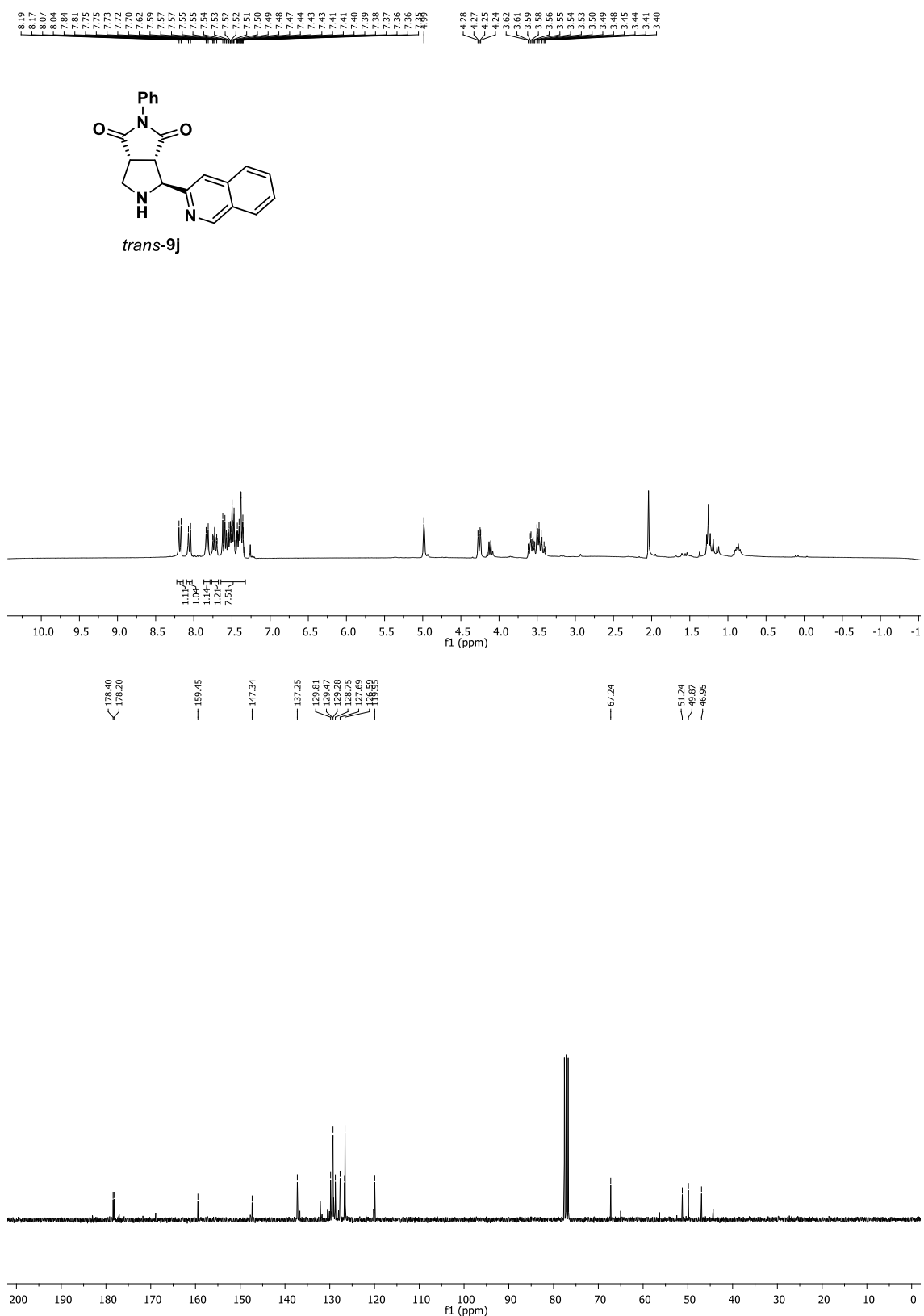
(3a*S*,4*S*,6a*R*)-4-(2-Thiazolyl)-2-phenyltetrahydropyrrolo[3,4-*c*]pyrrole-1,3(2*H*,3a*H*)-dione
(*trans*-9h)



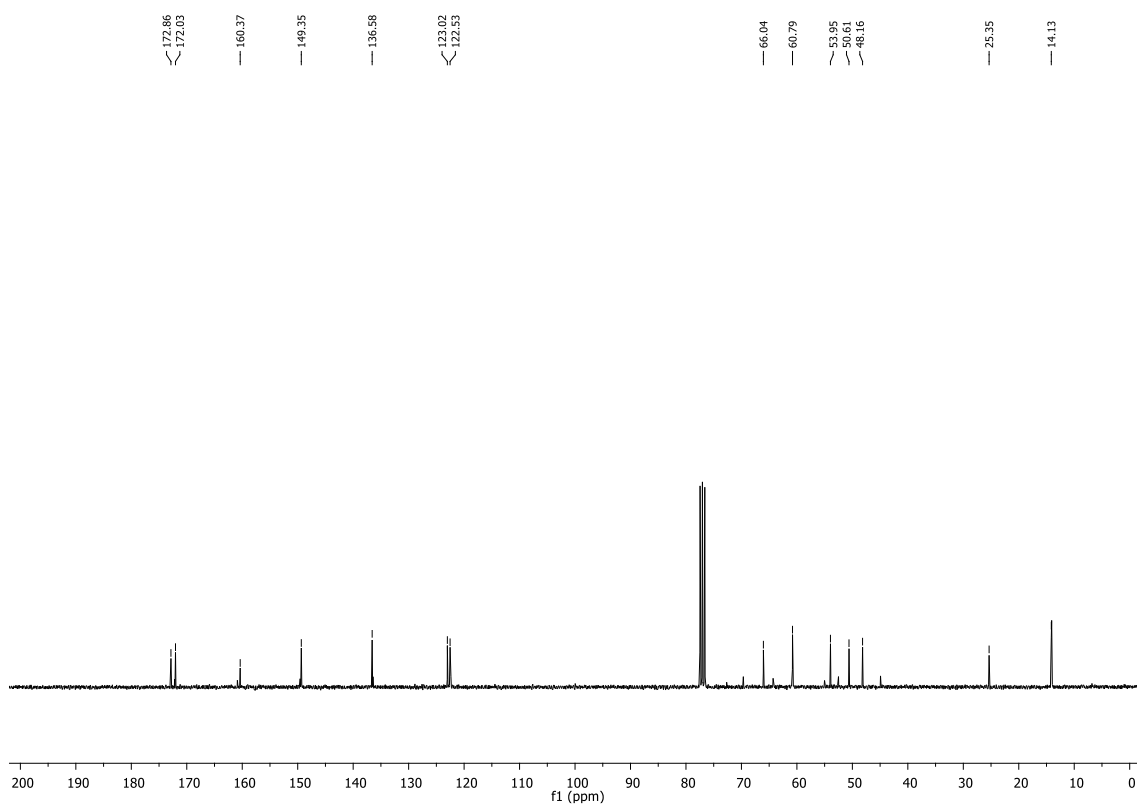
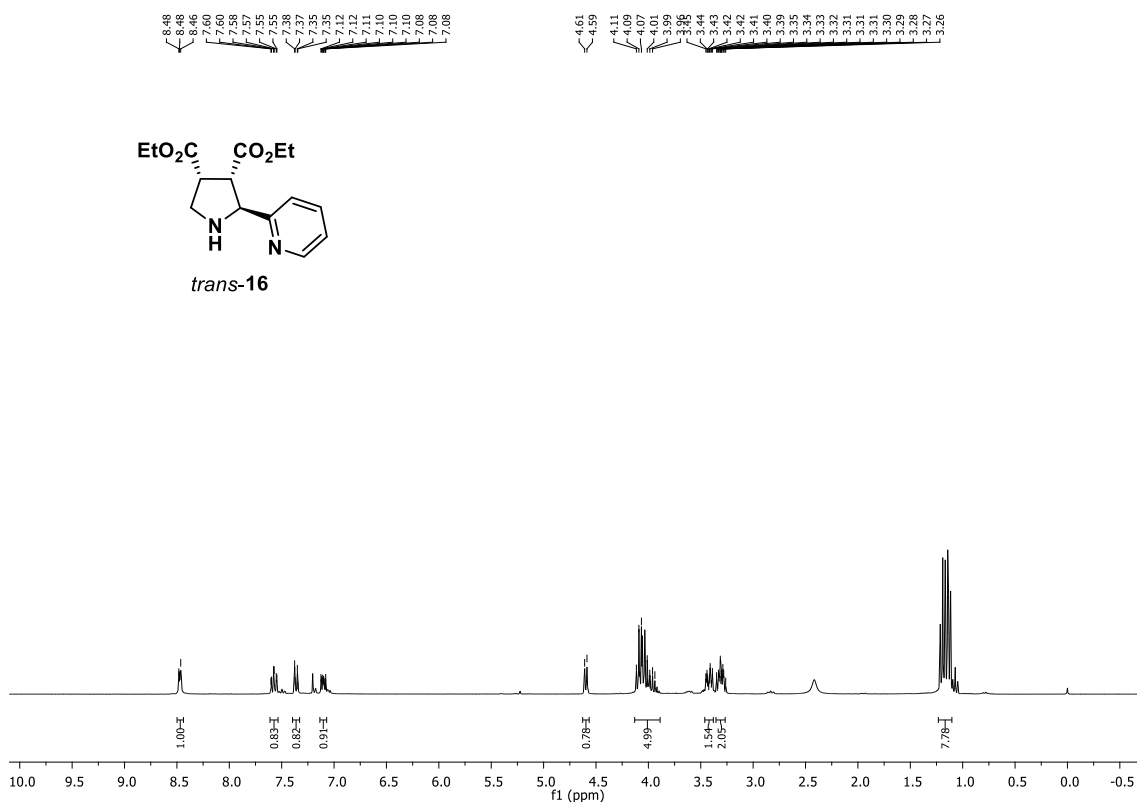
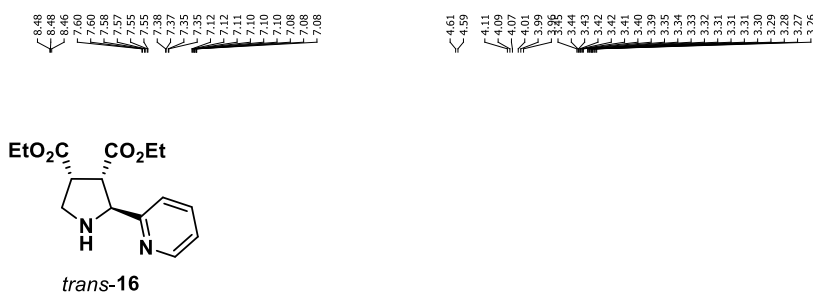
(3a*S*,4*S*,6a*R*)-4-(Benzo[*d*]thiazol-2-yl)-2-phenyltetrahydropyrrolo[3,4-*c*]pyrrole-1,3(2*H*,3a*H*)-dione (*trans*-9i)



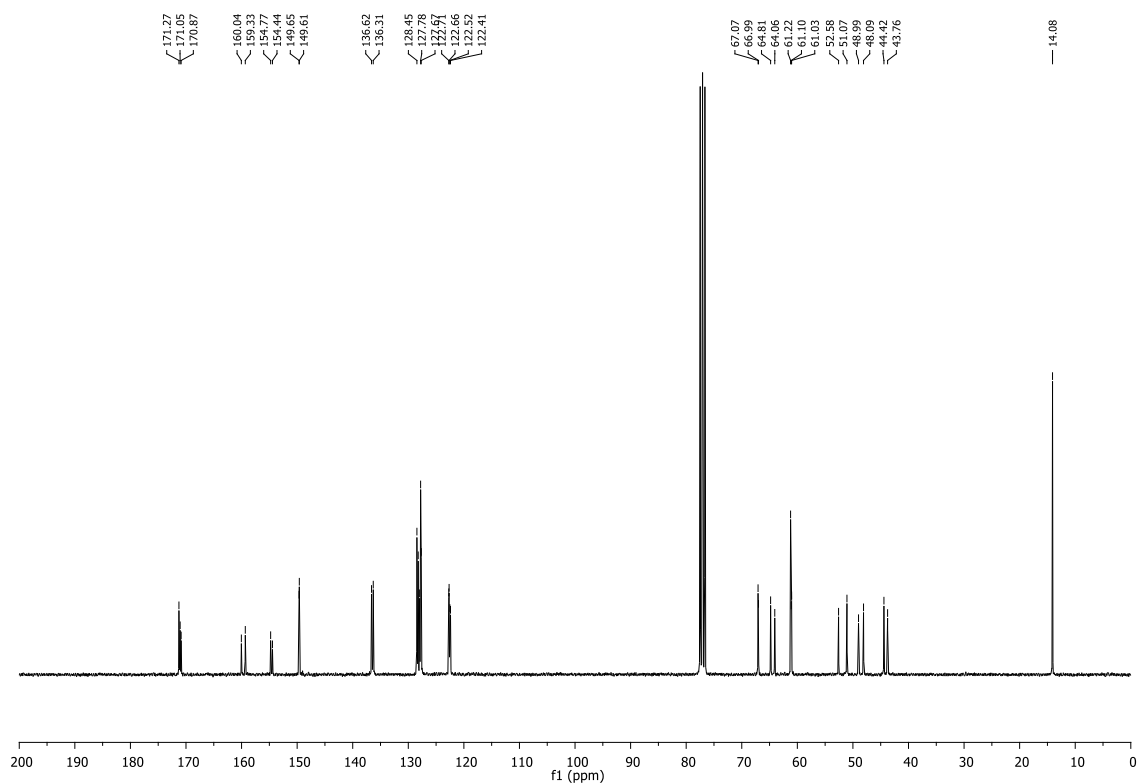
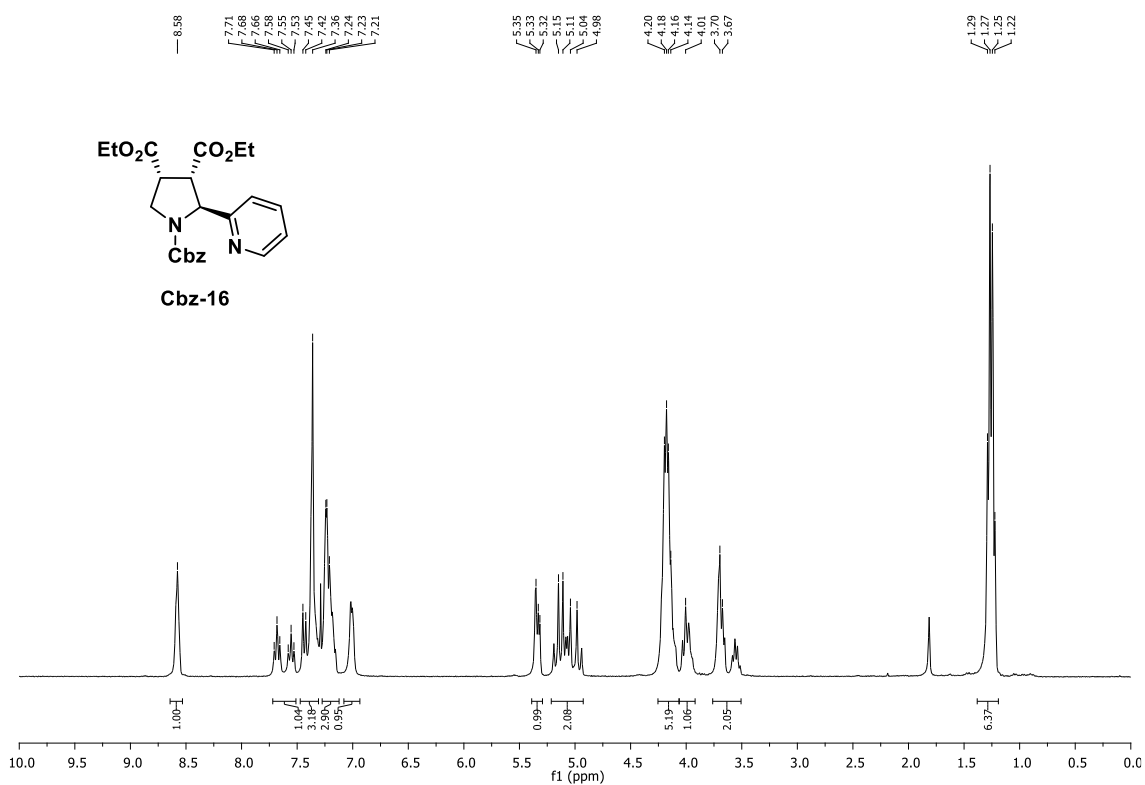
(3*aS*,4*S*,6*aR*)-4-(3-Isoquinoliny)-2-phenyltetrahydropyrrolo[3,4-*c*]pyrrole-1,3(2*H*,3*aH*)-dione
(*trans*-9j)



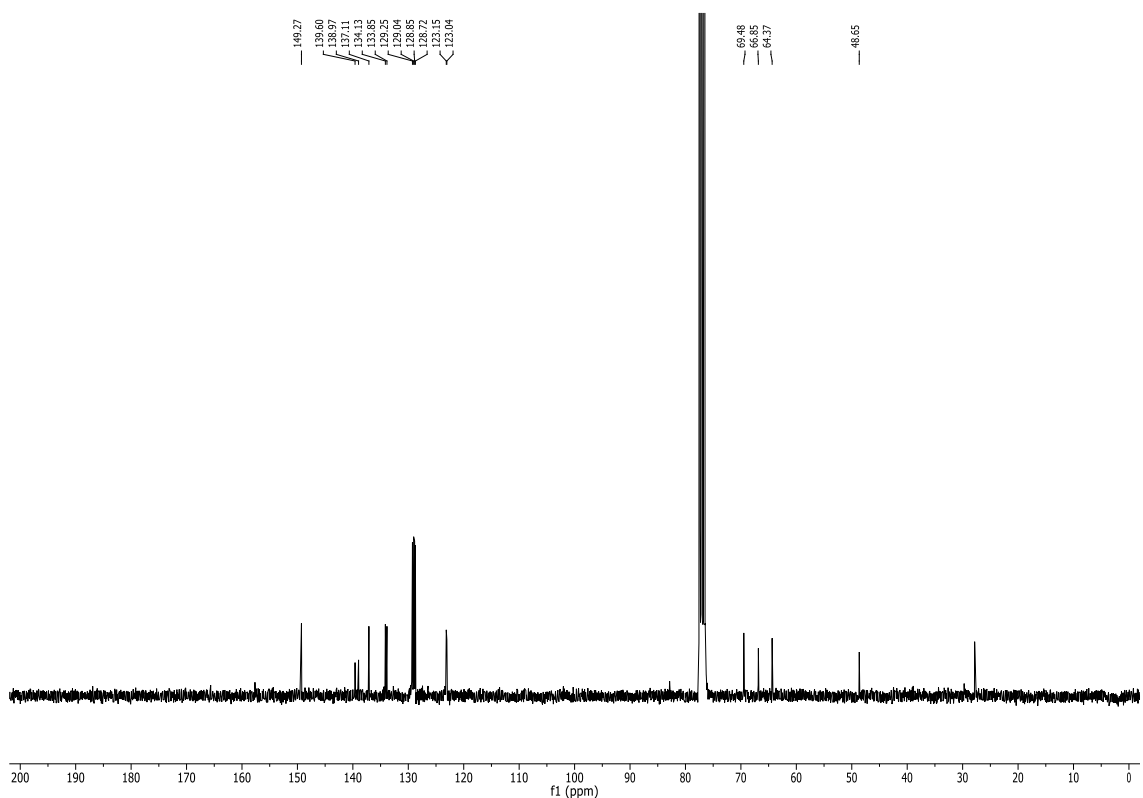
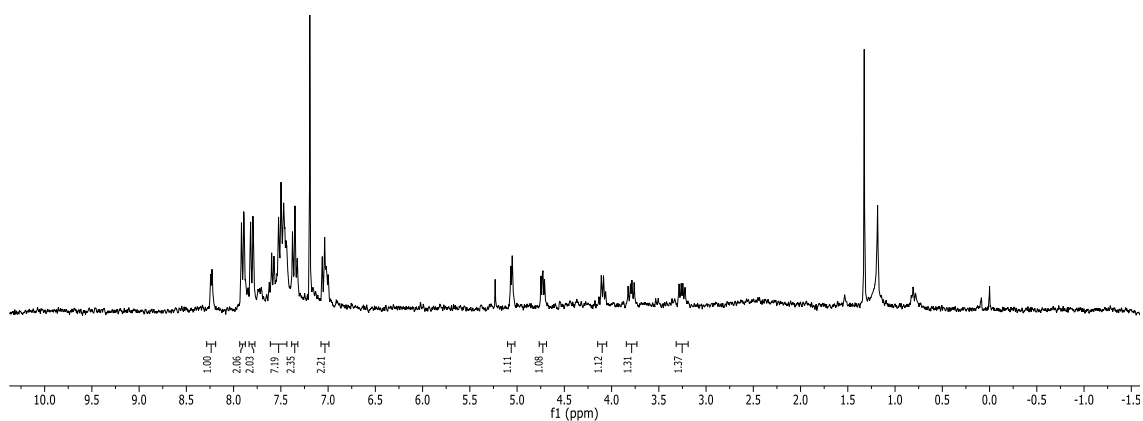
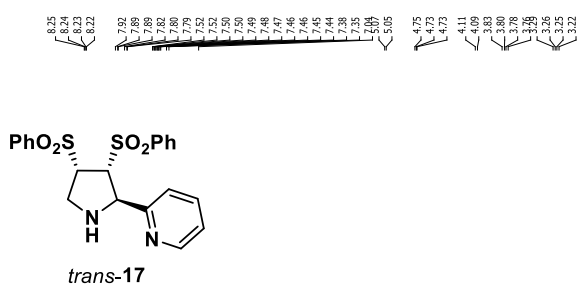
Diethyl (2*S*,3*S*,4*R*)-2-(2-pyridinyl)pyrrolidine-3,4-dicarboxylate (*trans*-16)

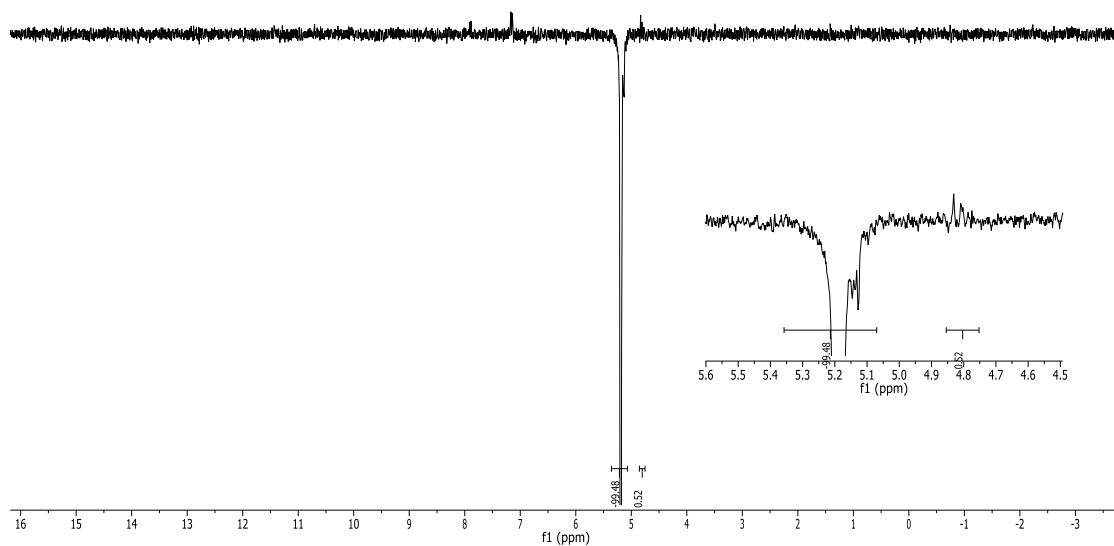
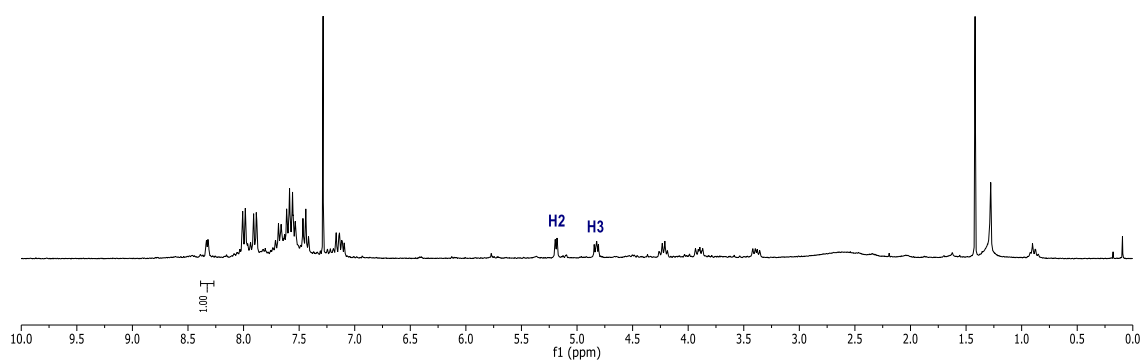
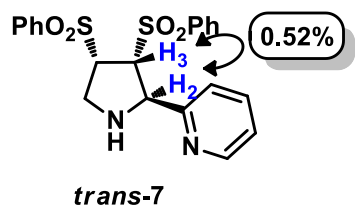


(2*S*,3*S*,4*R*)-Diethyl *N*-carboxybenzyl-2-(2-pyridinyl)pyrrolidine-3,4-dicarboxylate (Cbz-16)

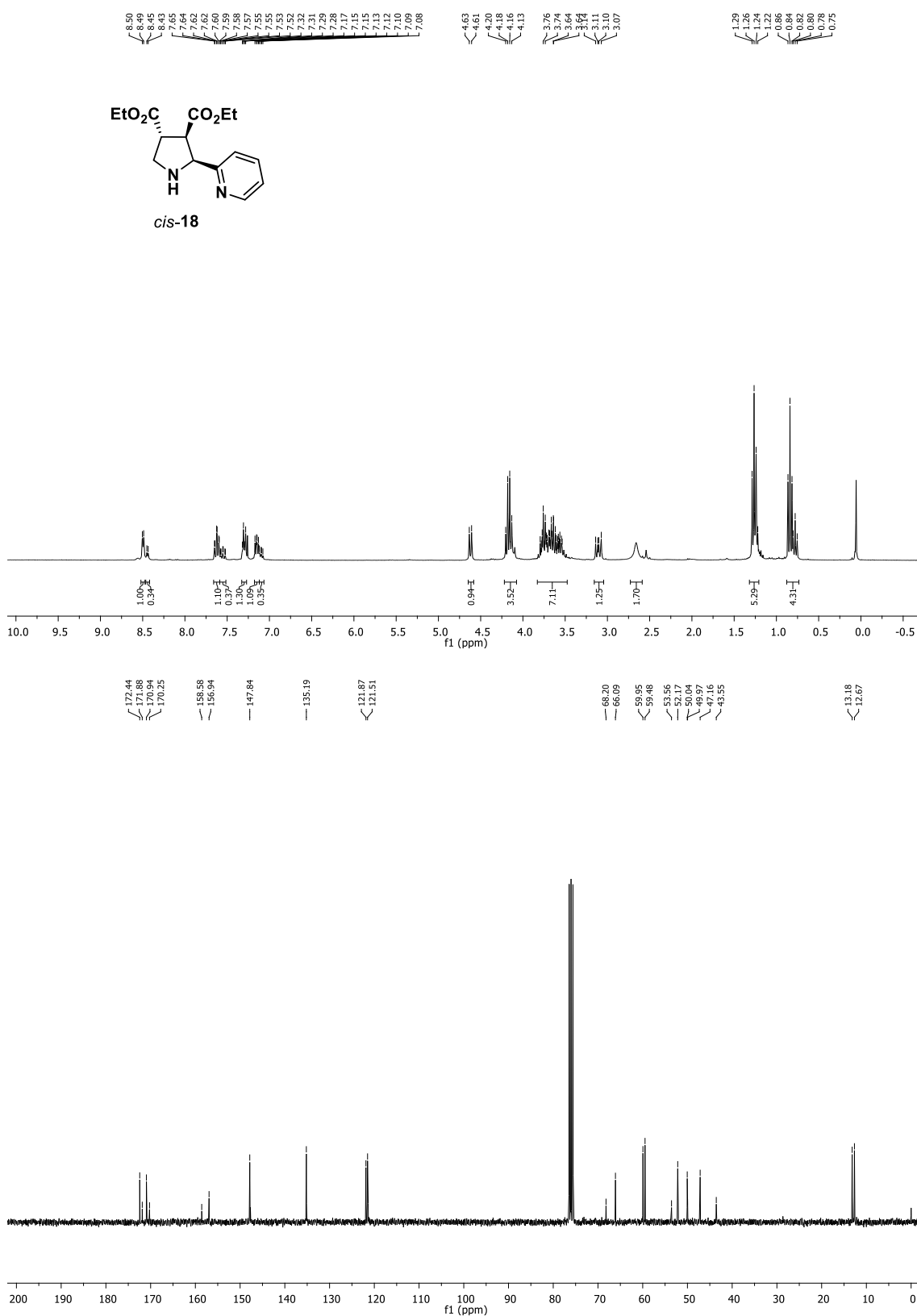


(2*R*,3*R*,4*S*)-3,4-Bis(phenylsulfonyl)-2-(2-pyridinyl)pyrrolidine (*trans*-17)

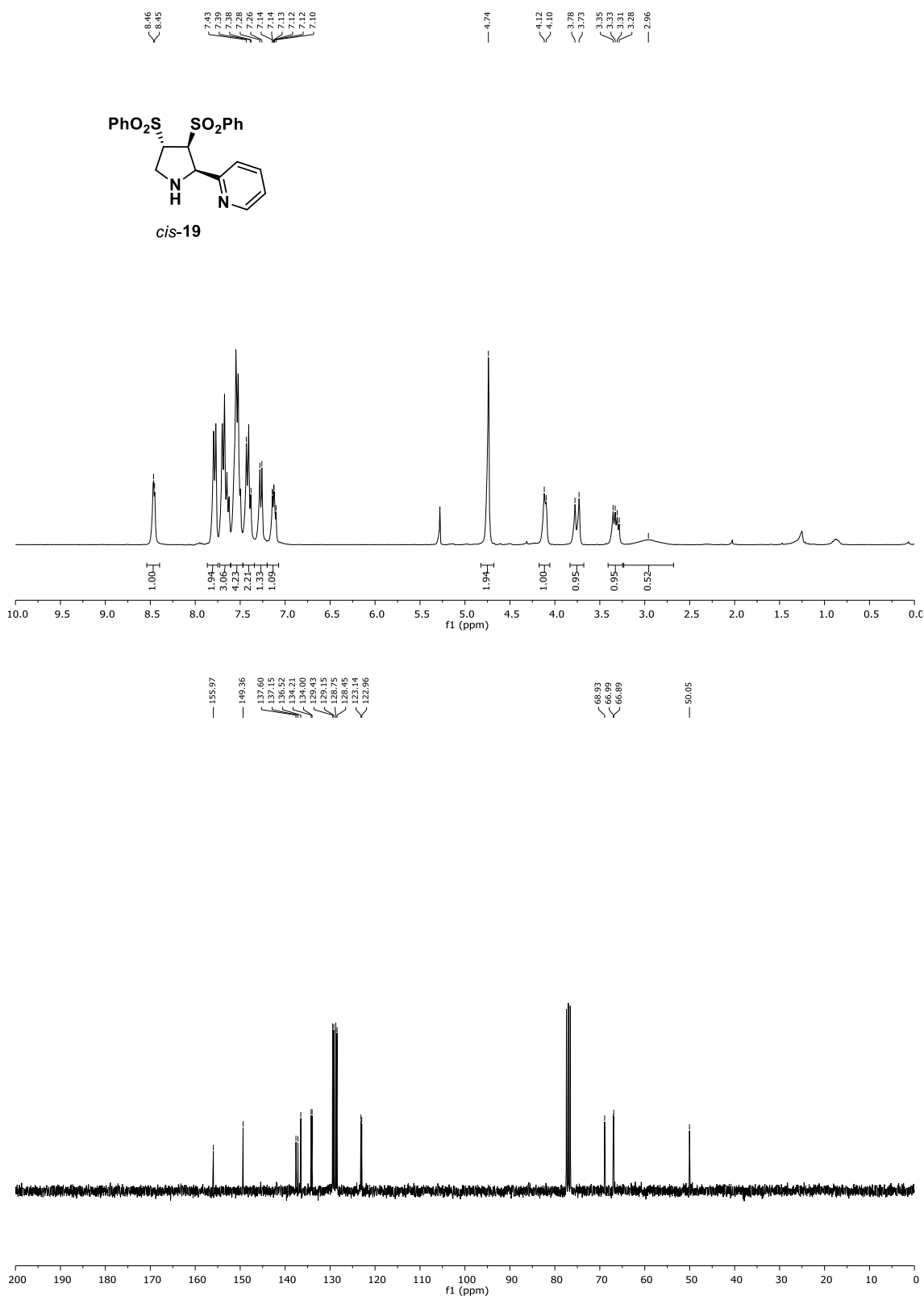




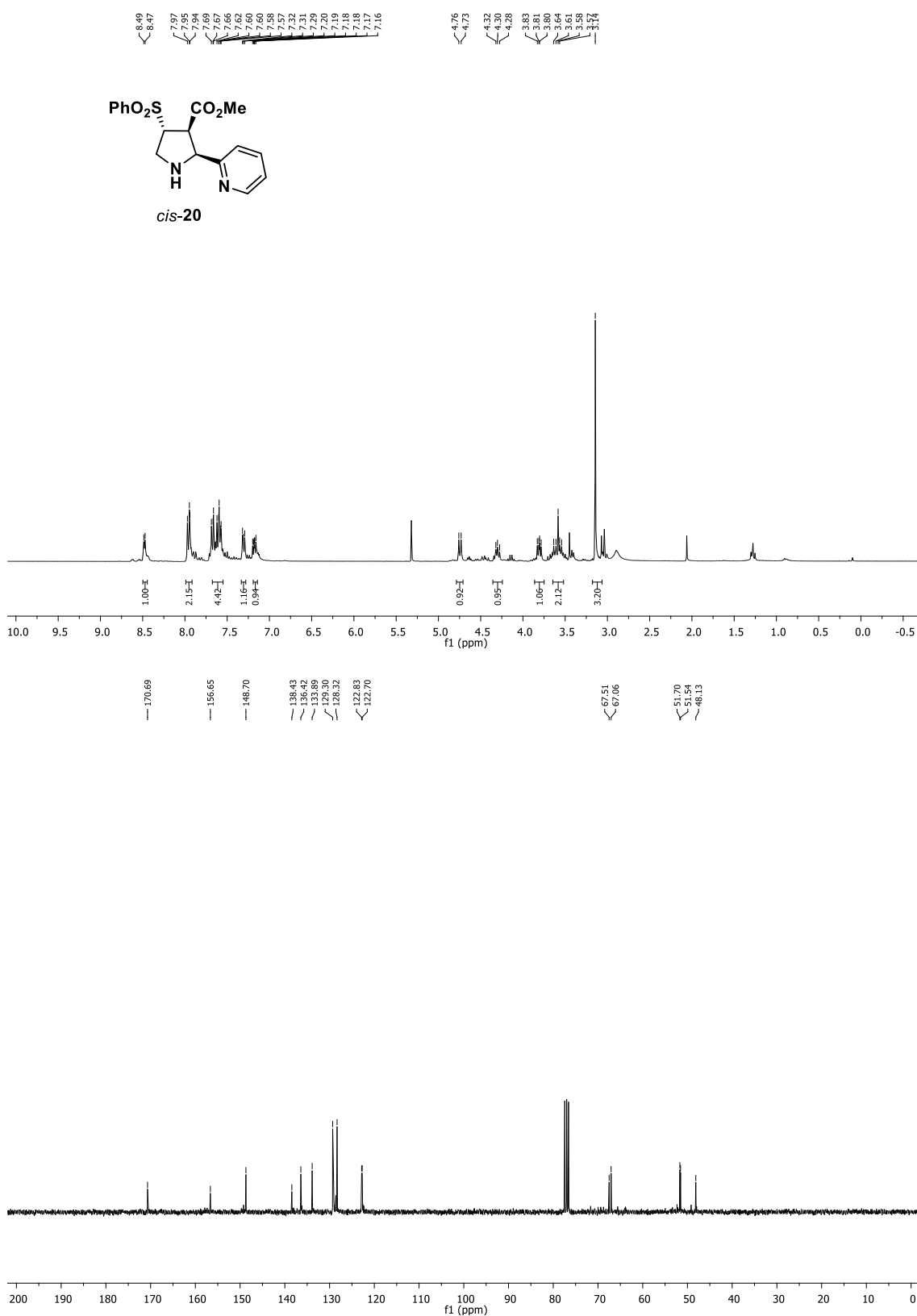
Diethyl (2*S*,3*R*,4*R*)-2-(2-pyridinyl)pyrrolidine-3,4-dicarboxylate (*cis*-18)



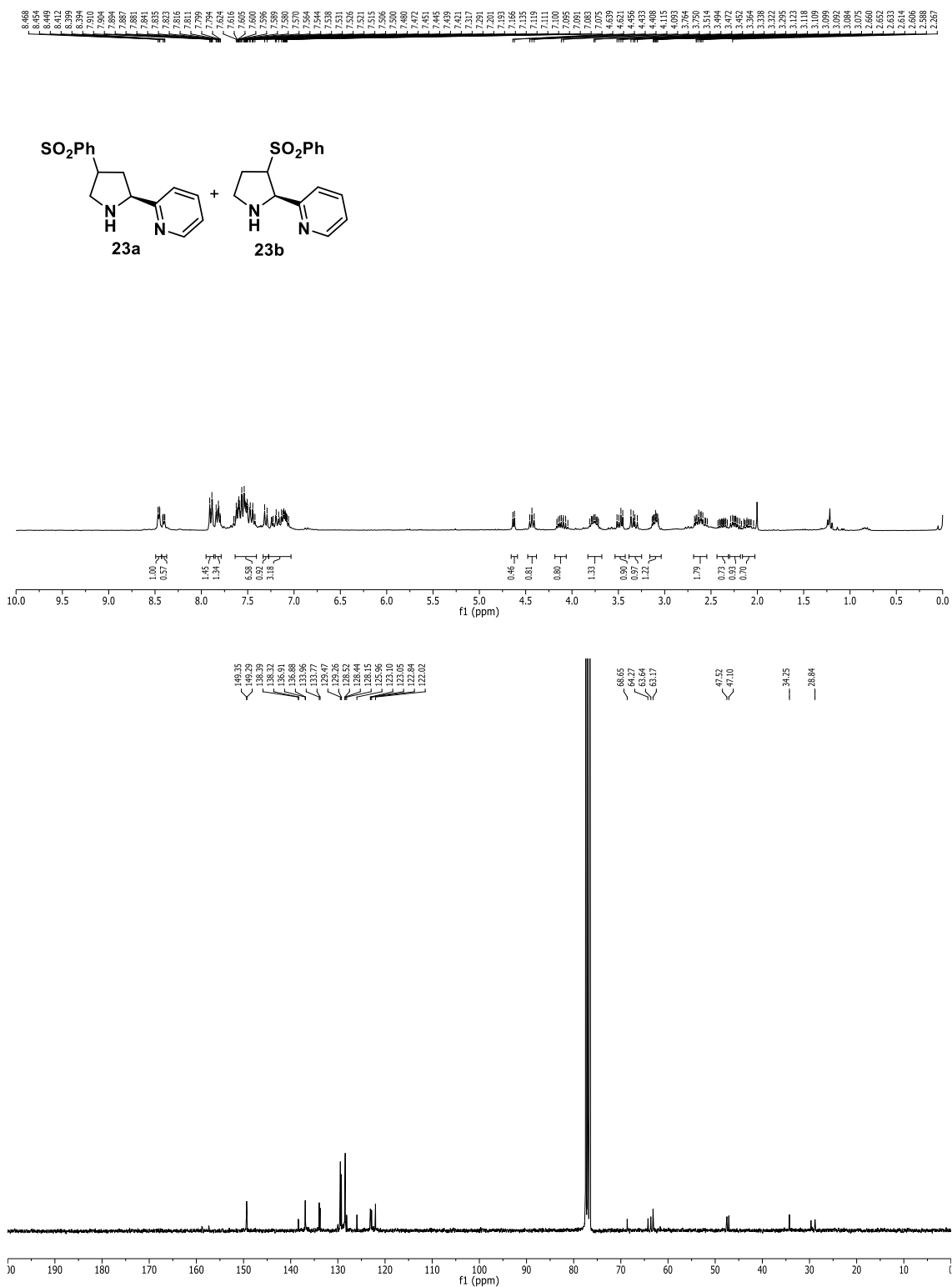
(2*R*,3*S*,4*S*)-3,4-Bis(phenylsulfonyl)-2-(2-pyridinyl)pyrrolidine (*cis*-19)



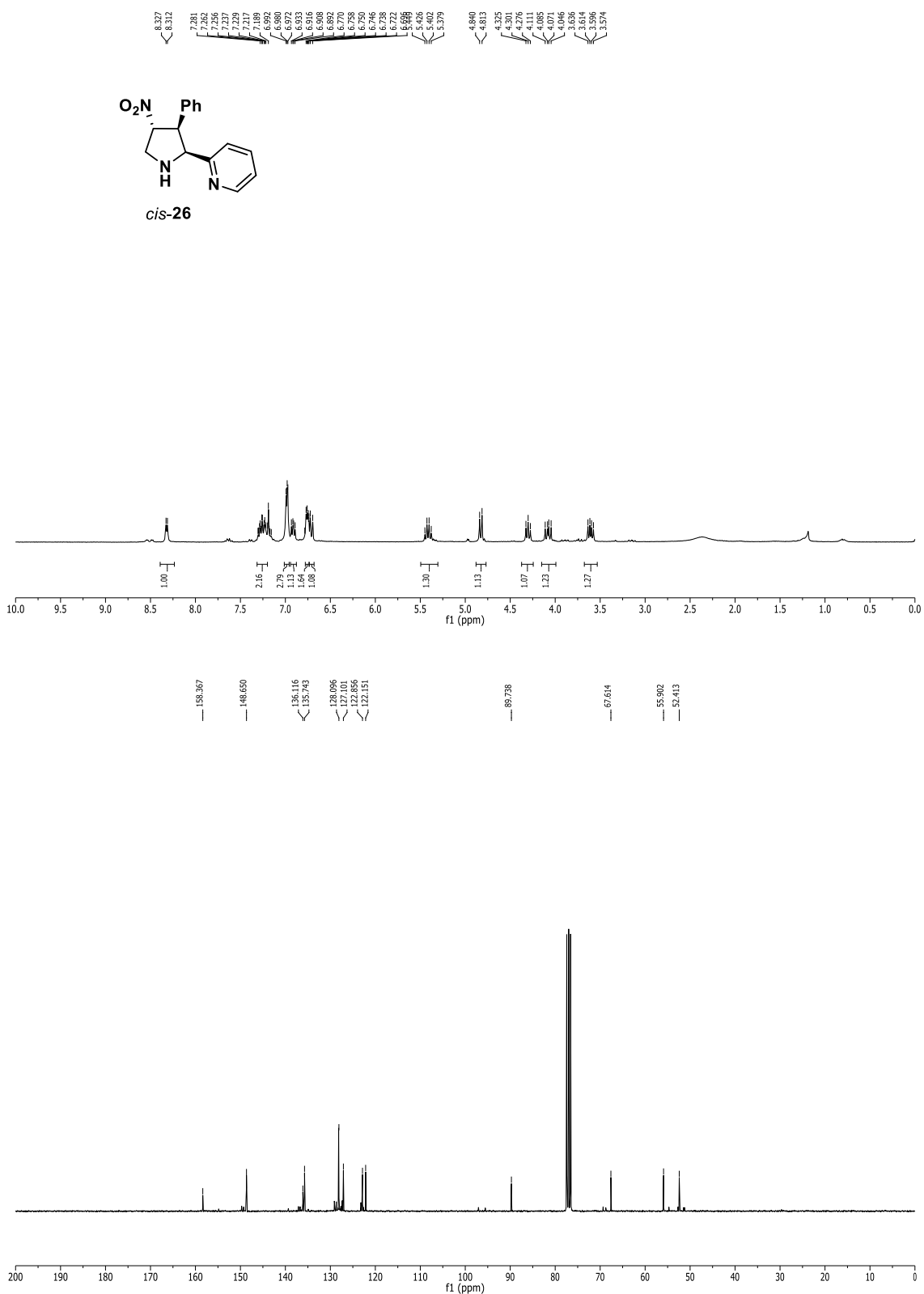
Methyl (2*S*,3*R*,4*R*)-4-(phenylsulfonyl)-2-(2-pyridinyl)pyrrolidine-3-carboxylate (*cis*-20)

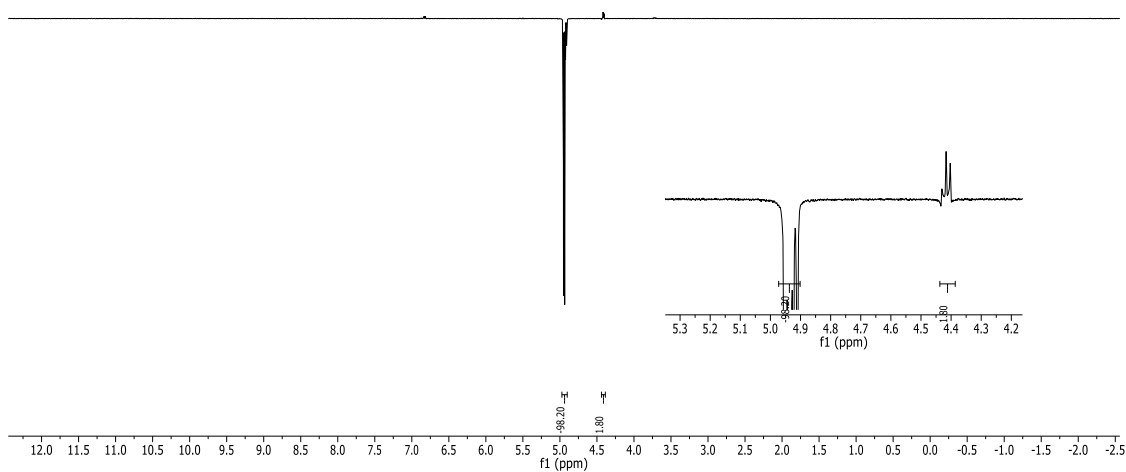
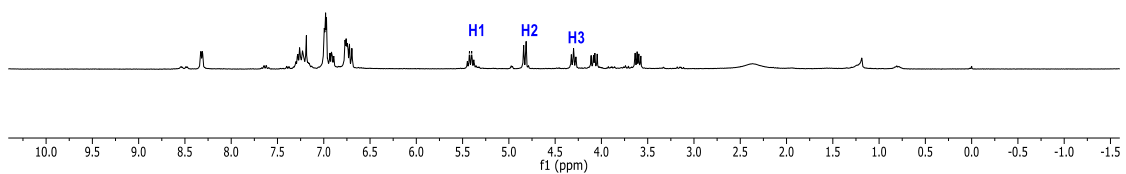
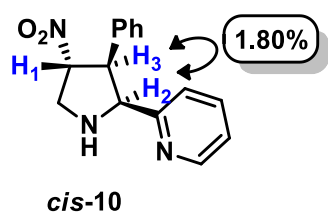


(2*R*)-4-(Phenylsulfonyl)-2-(2-pyridinyl)pyrrolidine and 2-((2*R*)-3-(phenylsulfonyl)-2-(2-pyridinyl)pyrrolidine (23a + 23b)

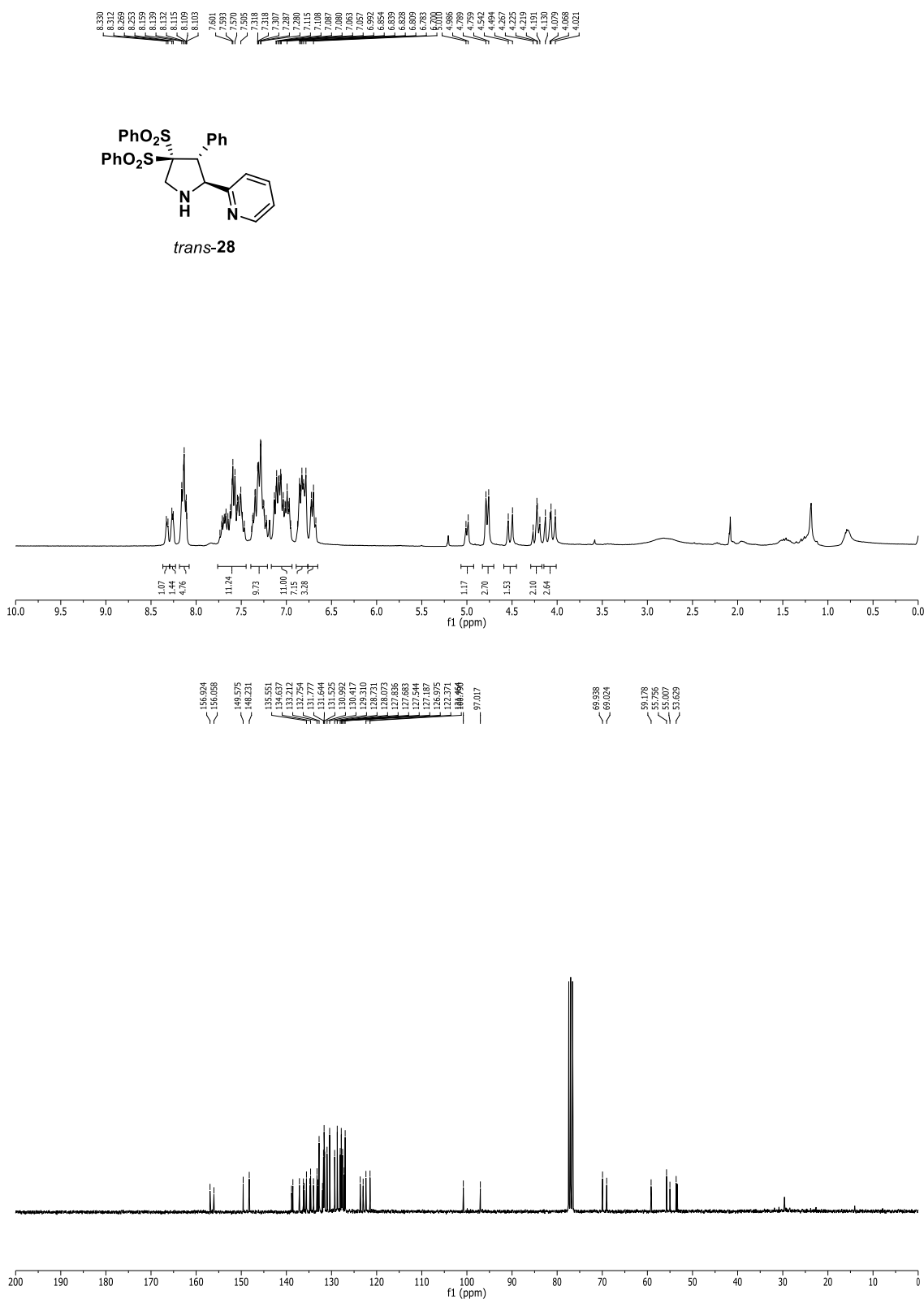


(2*S*,3*S*,4*R*)-4-Nitro-3-phenyl-2-(2-pyridinyl)pyrrolidine (*cis*-26)

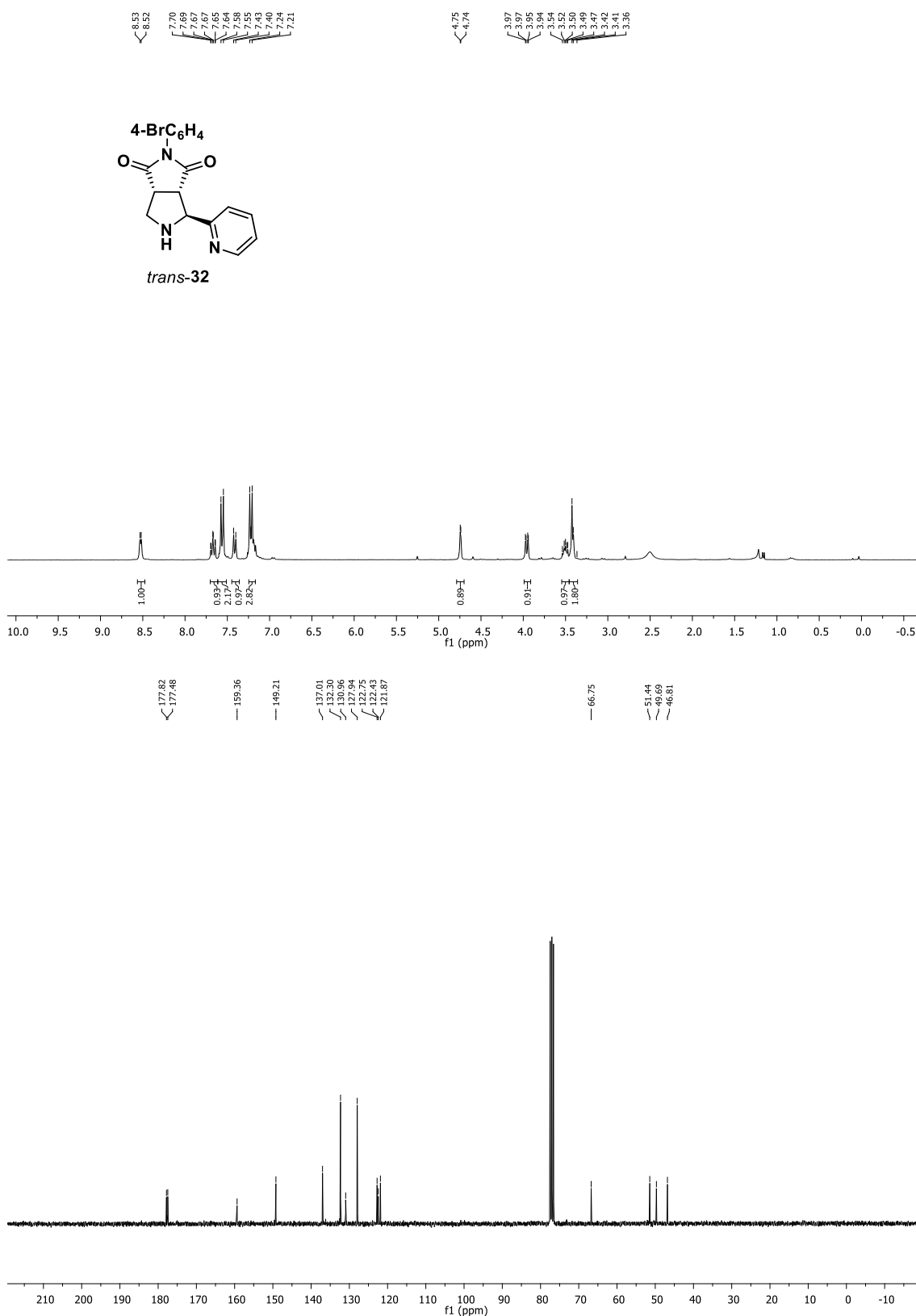




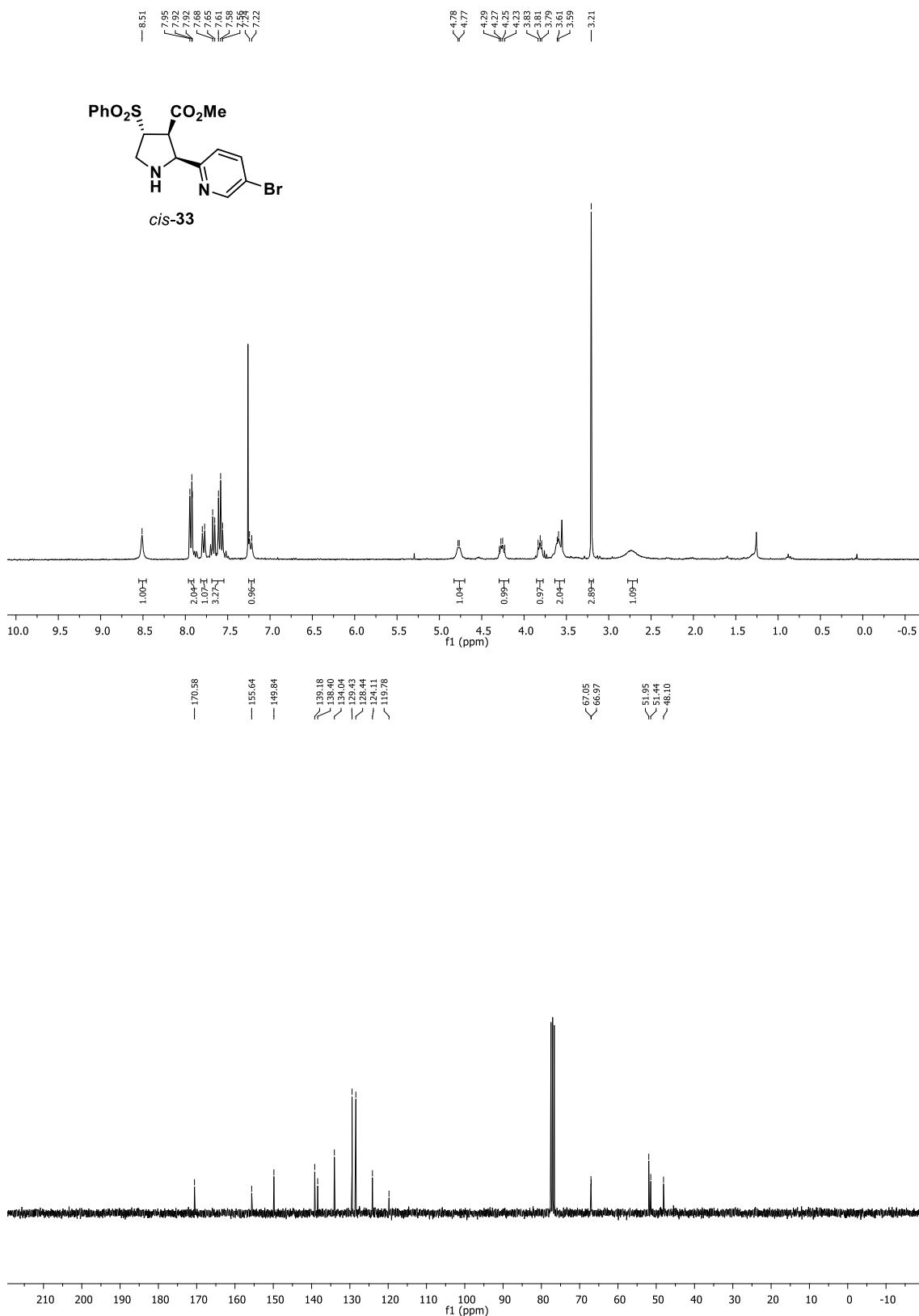
(2*S*, 3*S*)-3-Phenyl-4,4-bis(phenylsulfonyl)-2-(2-pyridinyl)pyrrolidine (*trans*-28)



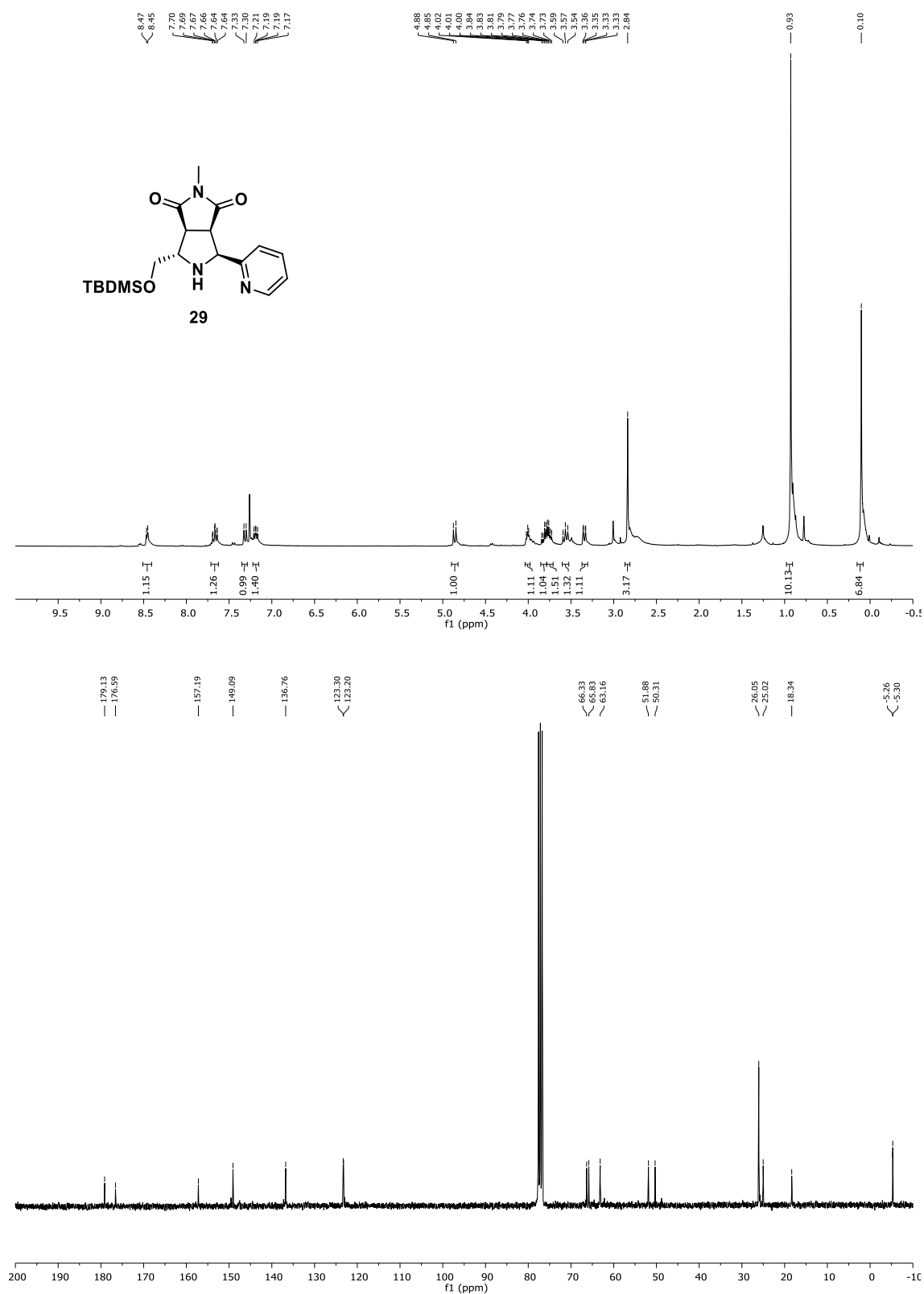
(3a*S*,4*S*,6a*R*)-2-(4-Bromophenyl)-4-(2-pyridinyl)tetrahydropyrrolo[3,4-*c*]pyrrole-1,3(2*H*,3a*H*)-dione (*trans*-32)

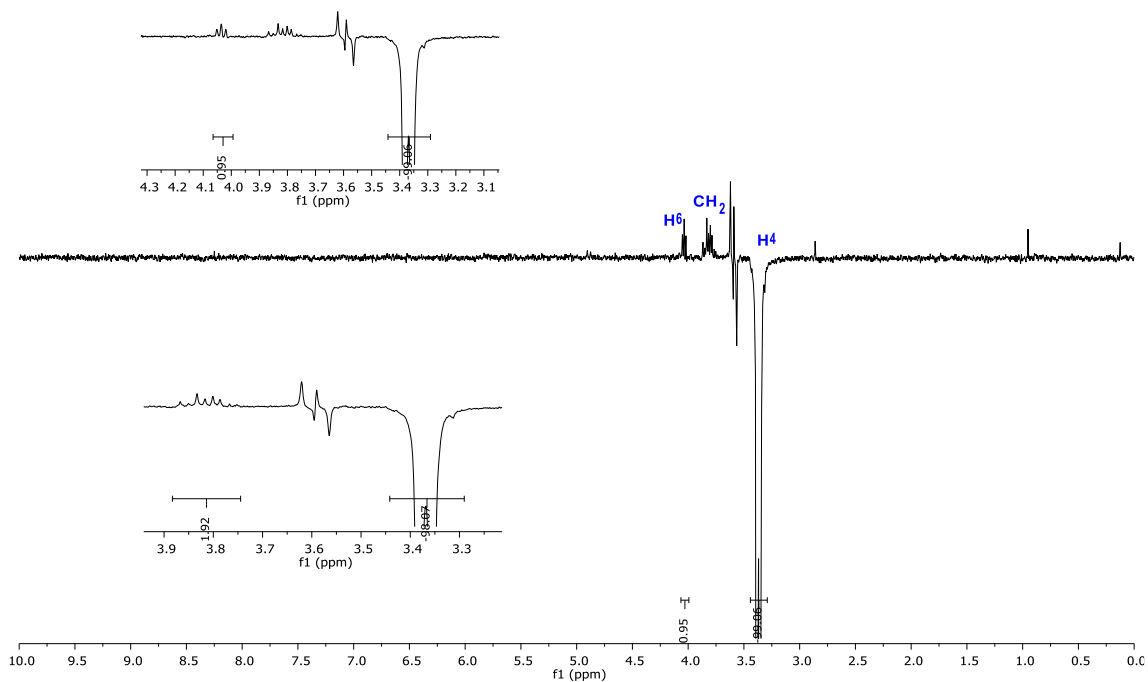
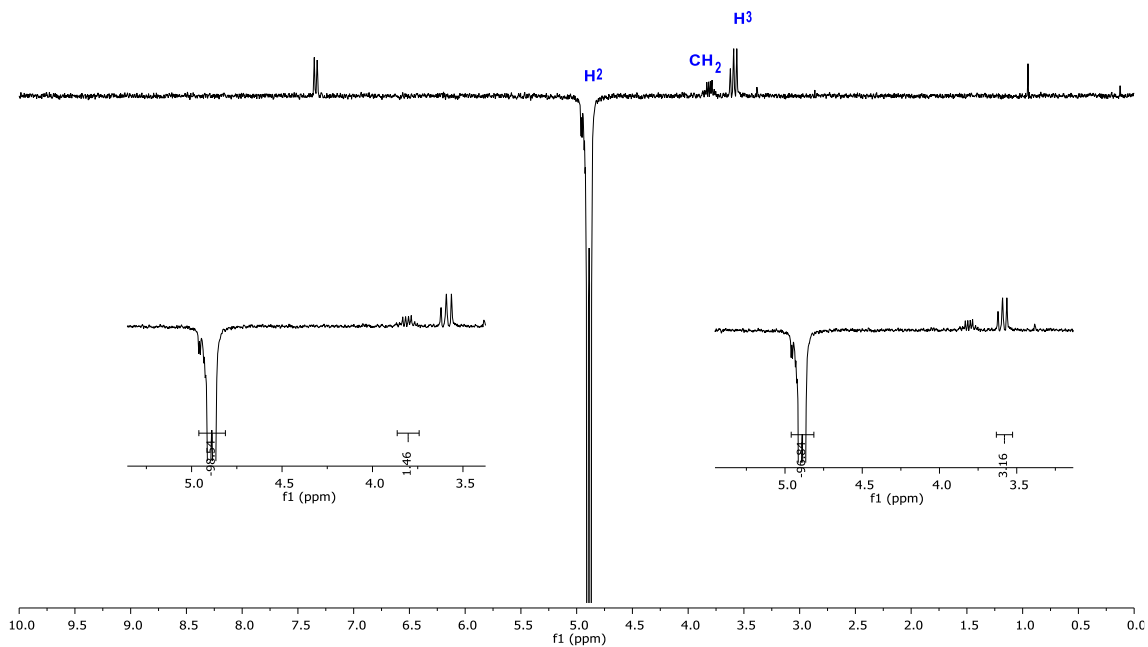
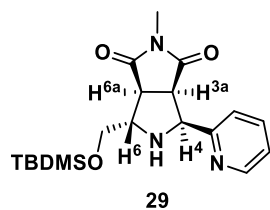


Methyl (2*S*,3*R*,4*R*)-2-(5-bromopyridin-2-yl)-4-(phenylsulfonyl)pyrrolidine-3-carboxylate
(*cis*-33)

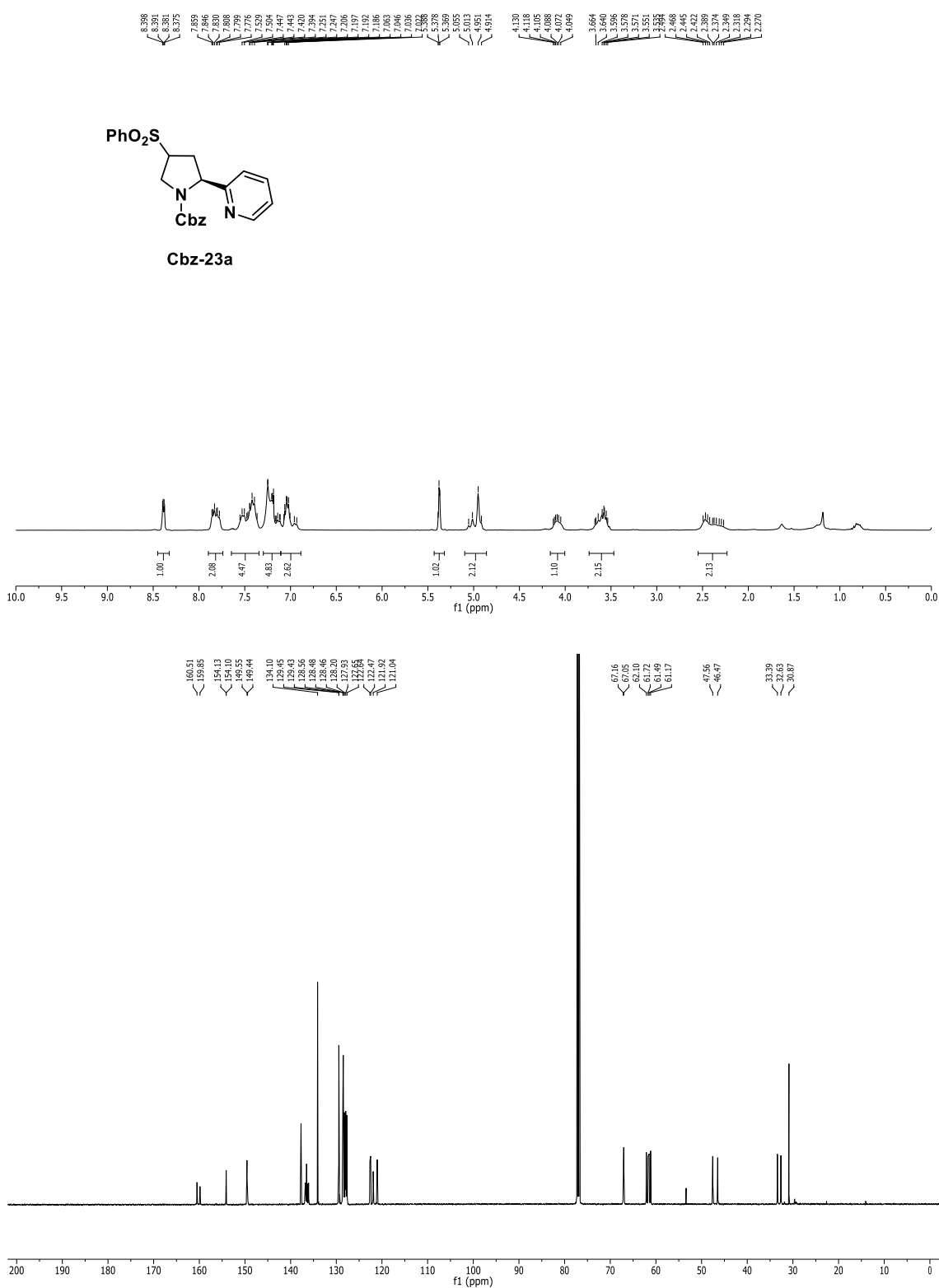


**(3a*S*,4*S*,6*S*,6a*R*)-4-(((*tert*-Butyldimethylsilyl)oxi)methyl)-2-methyl-6-(pyridin-2-yl)pyrrolidin
[3,4-*c*]pyrrol-1,3(2*H*,3a*H*)-dione (29)**

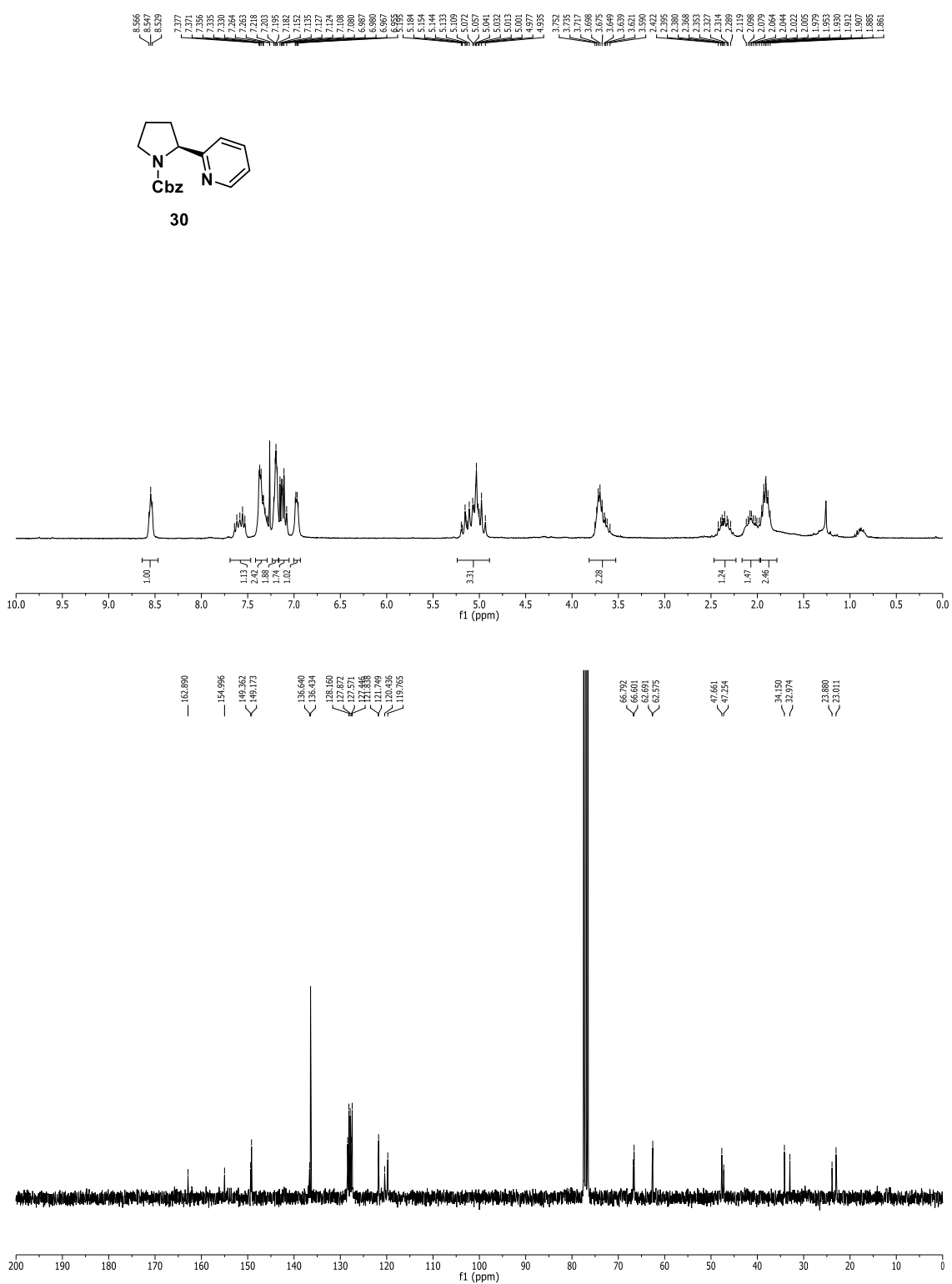




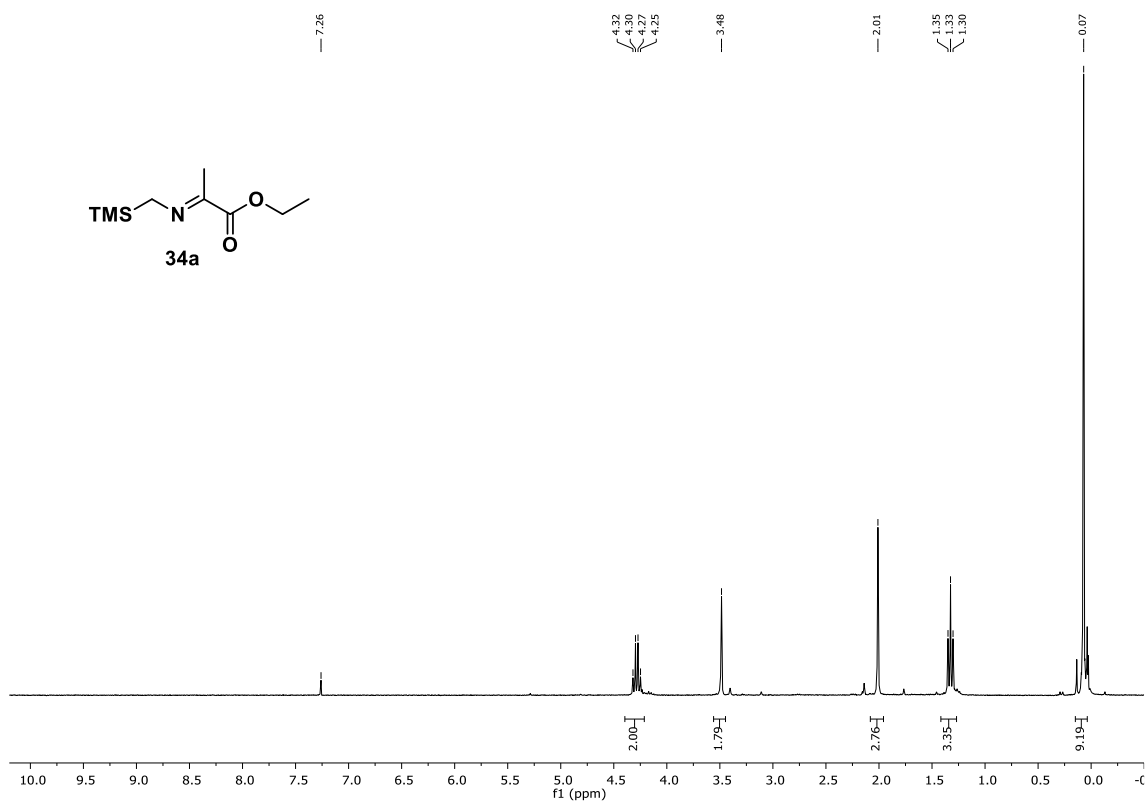
(2S)-Benzyl 4-(phenylsulfonyl)-2-(2-pyridinyl)pyrrolidine-1-carboxylate (Cbz-23a)



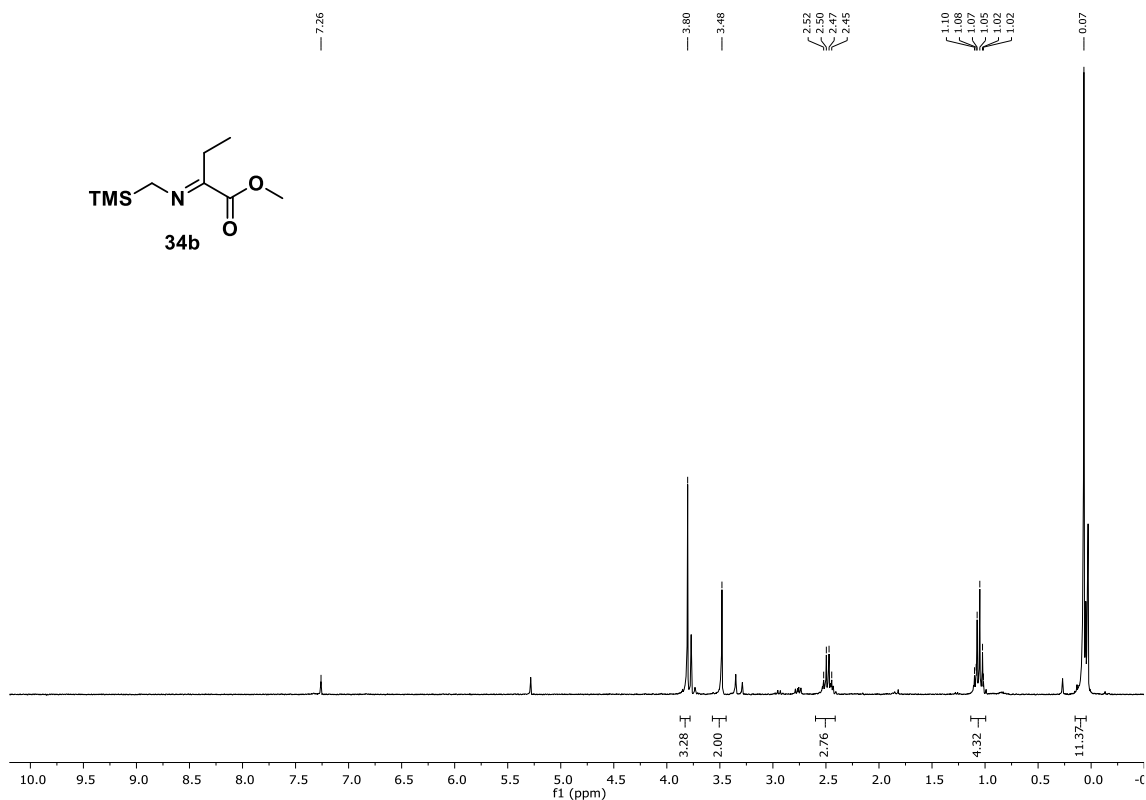
(S)-Benzyl 2-(2-pyridinyl)pyrrolidine-1-carboxylate (30)



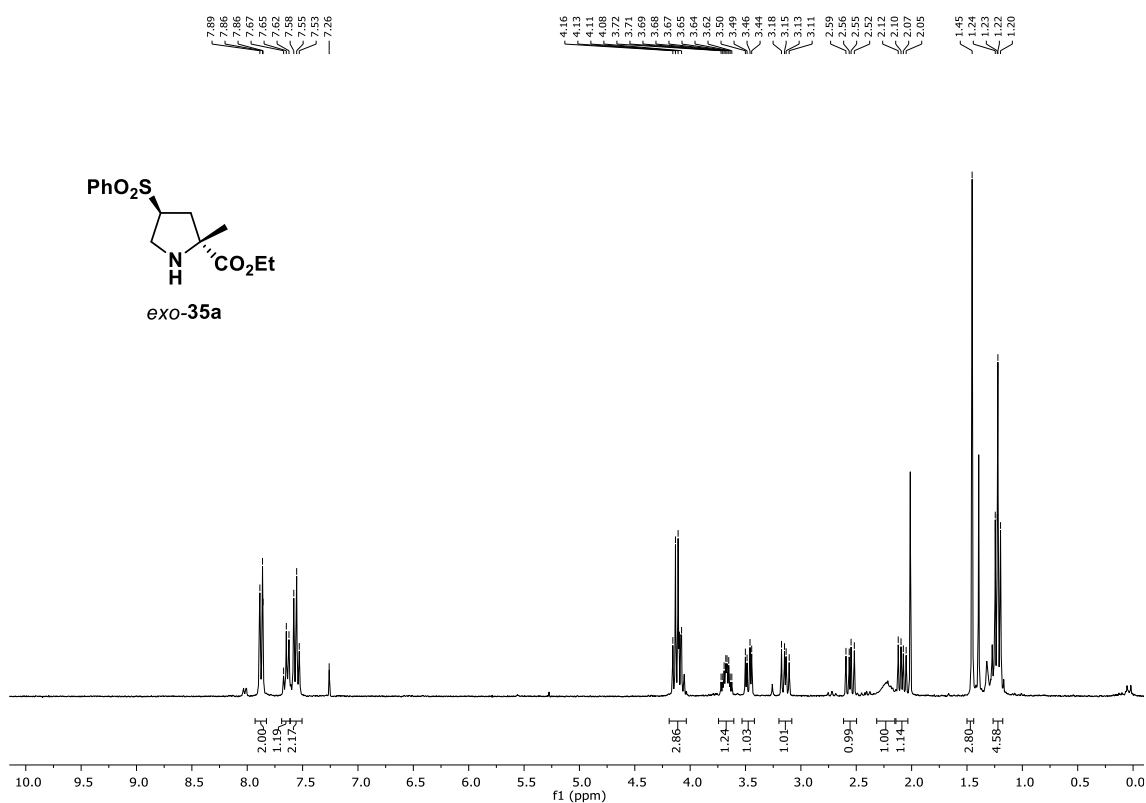
(E)-Ethyl 2-(((trimethylsilyl)methyl)imino)propanoate (34a)



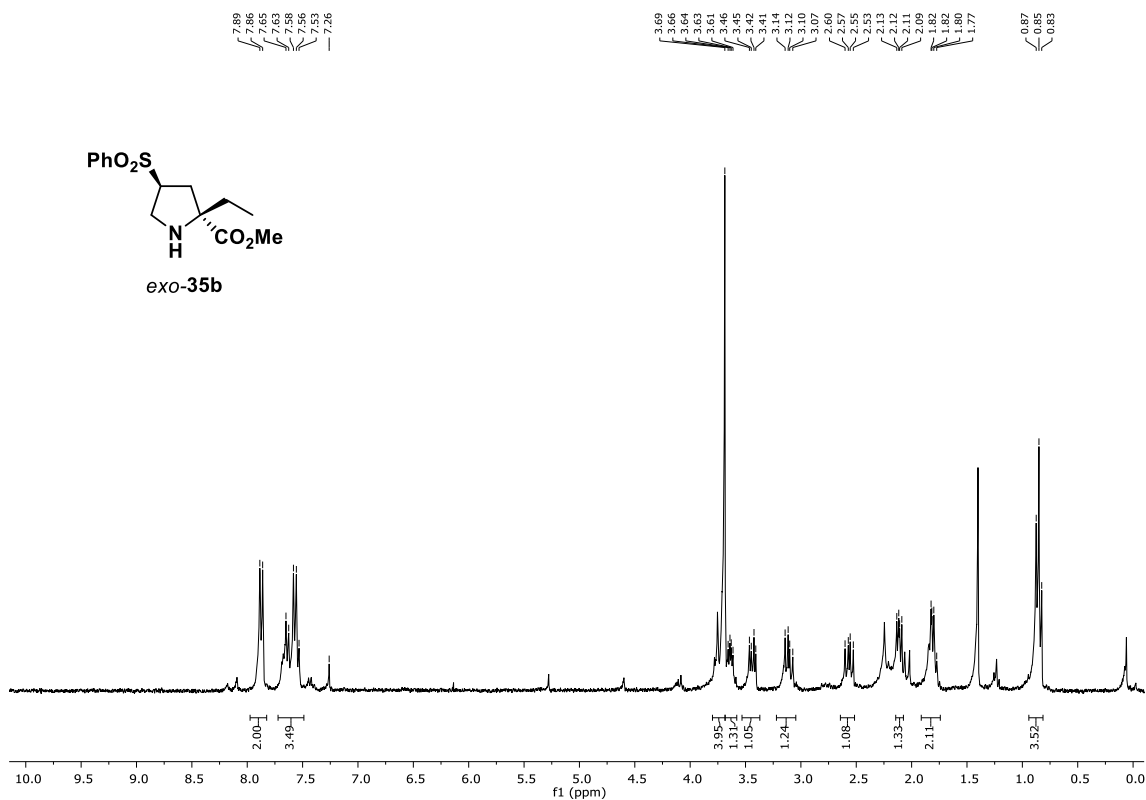
(E)-Methyl 2-(((trimethylsilyl)methyl)imino)butanoate (34b)



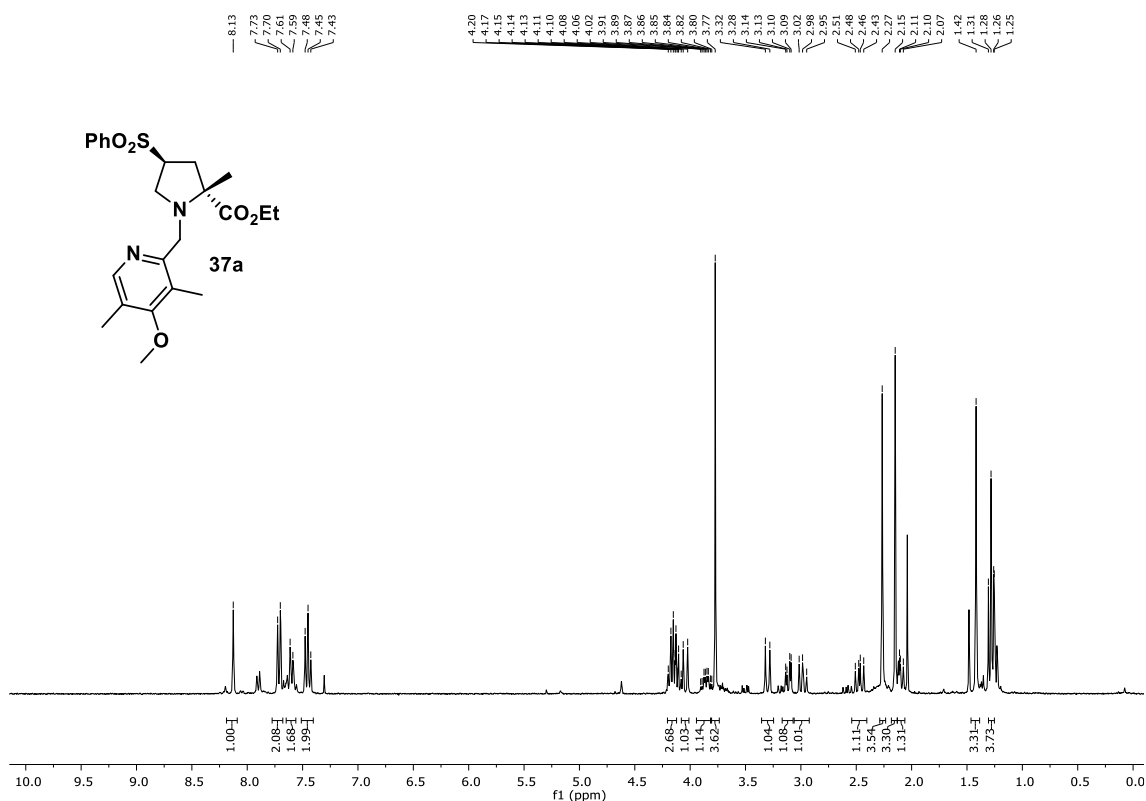
(2*R*,4*S*)-Ethyl 2-methyl-4-(phenylsulfonyl)pyrrolidine-2-carboxylate (*exo*-35a)



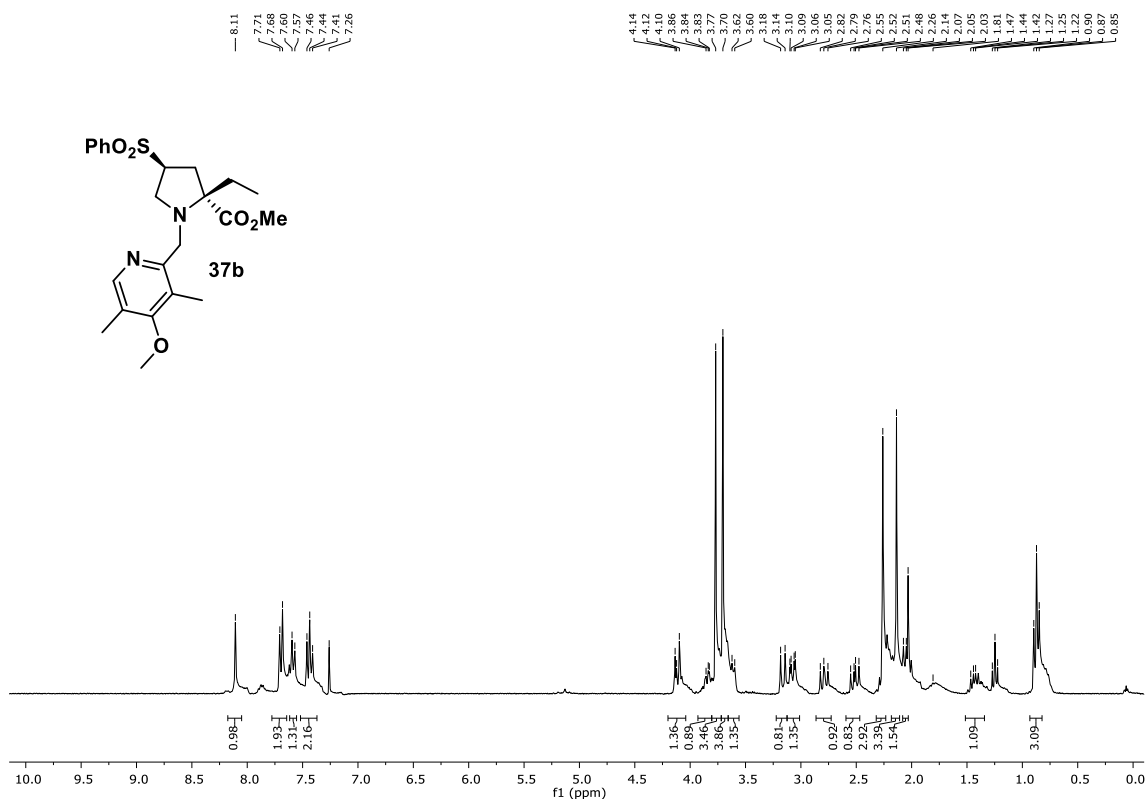
(2*R*,4*S*)-Methyl 2-ethyl-4-(phenylsulfonyl)pyrrolidine-2-carboxylate (*exo*-35b)



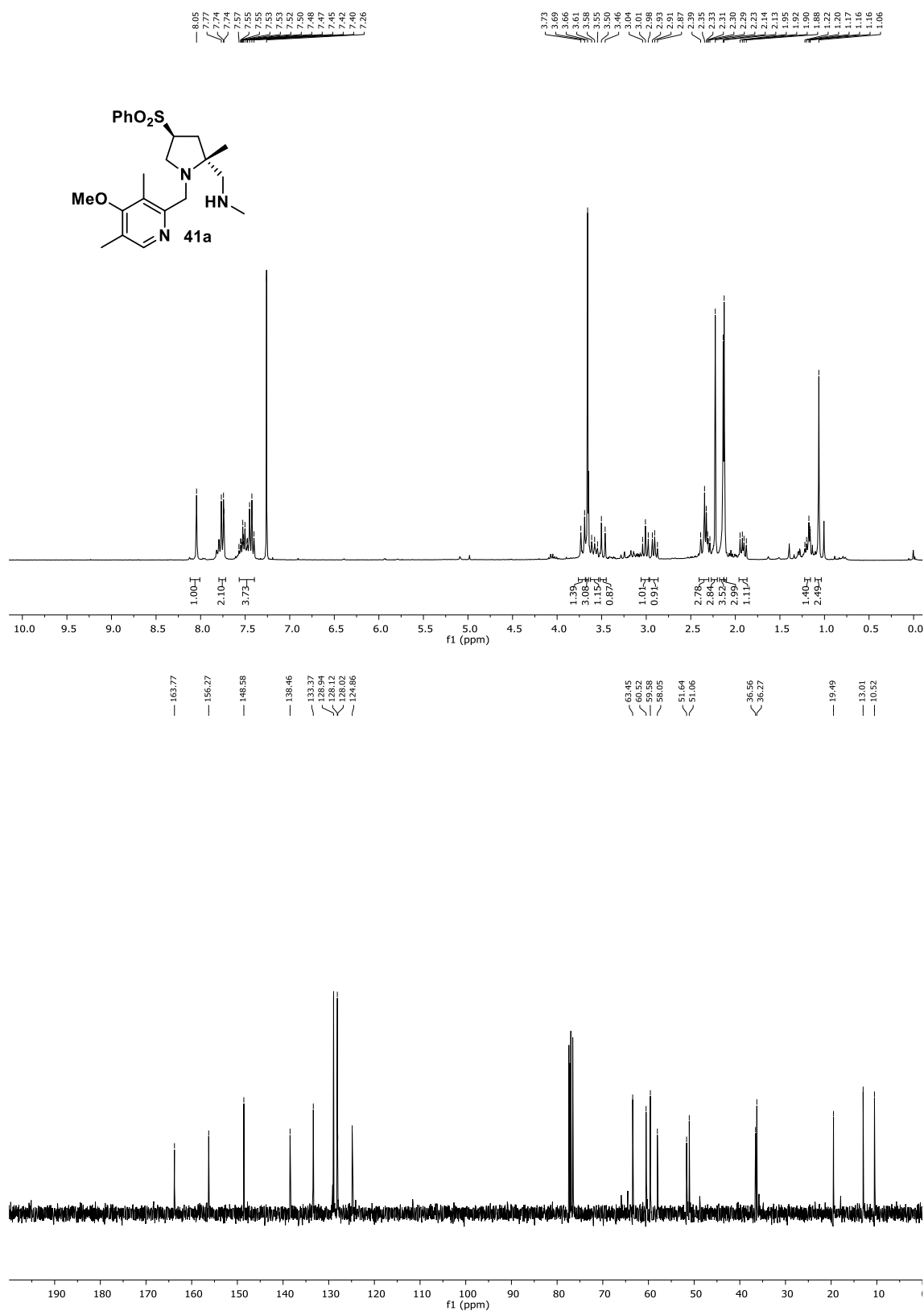
(2*R*,4*S*)-Ethyl 1-((4-methoxy-3,5-dimethylpyridin-2-yl)methyl)-2-methyl-4-(phenylsulfonyl)pyrrolidine-2-carboxylate (37a)



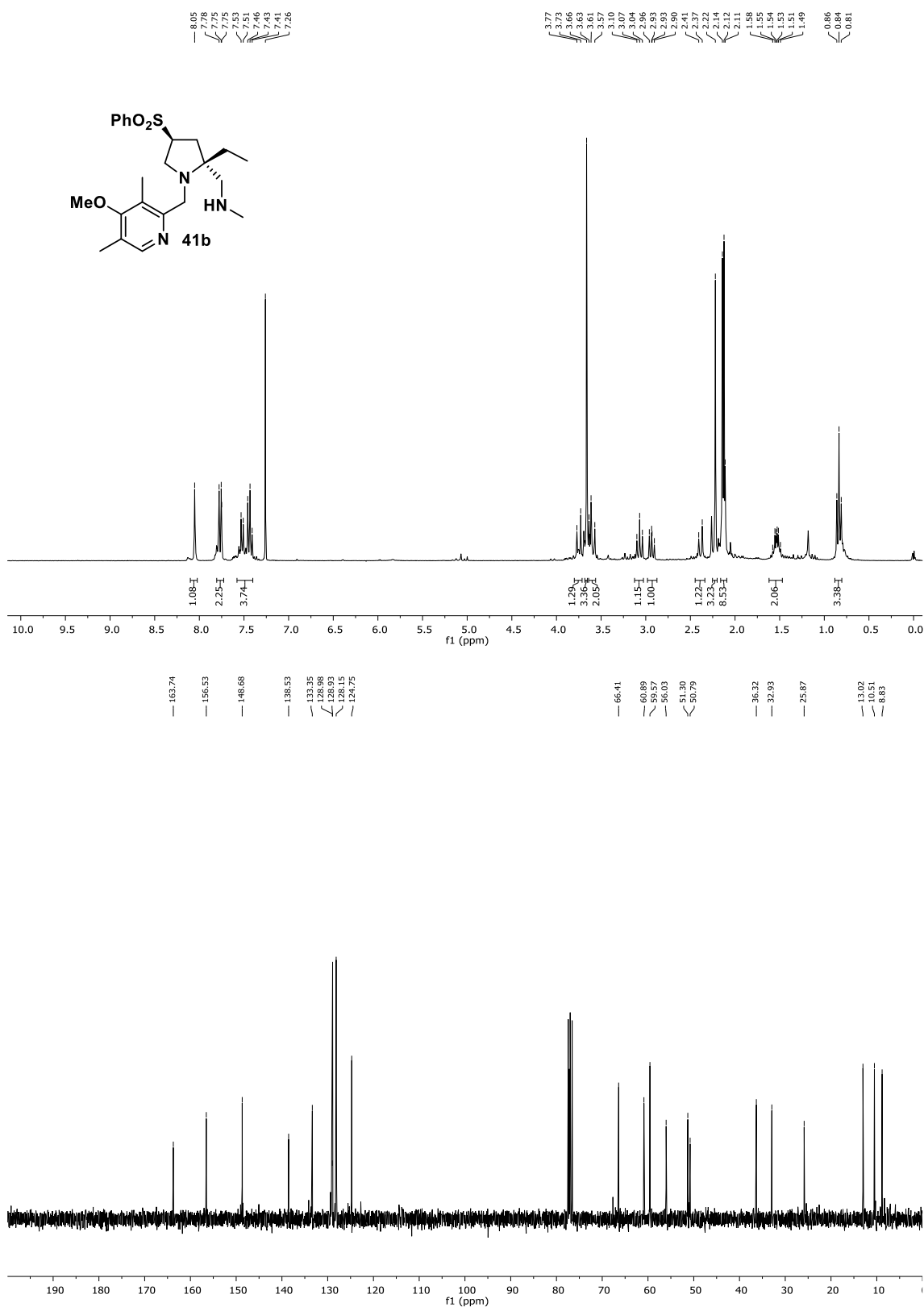
(2*R*,4*S*)-Methyl 1-((4-methoxy-3,5-dimethylpyridin-2-yl)methyl)-2-ethyl-4-(phenylsulfonyl)pyrrolidine-2-carboxylate (37b)



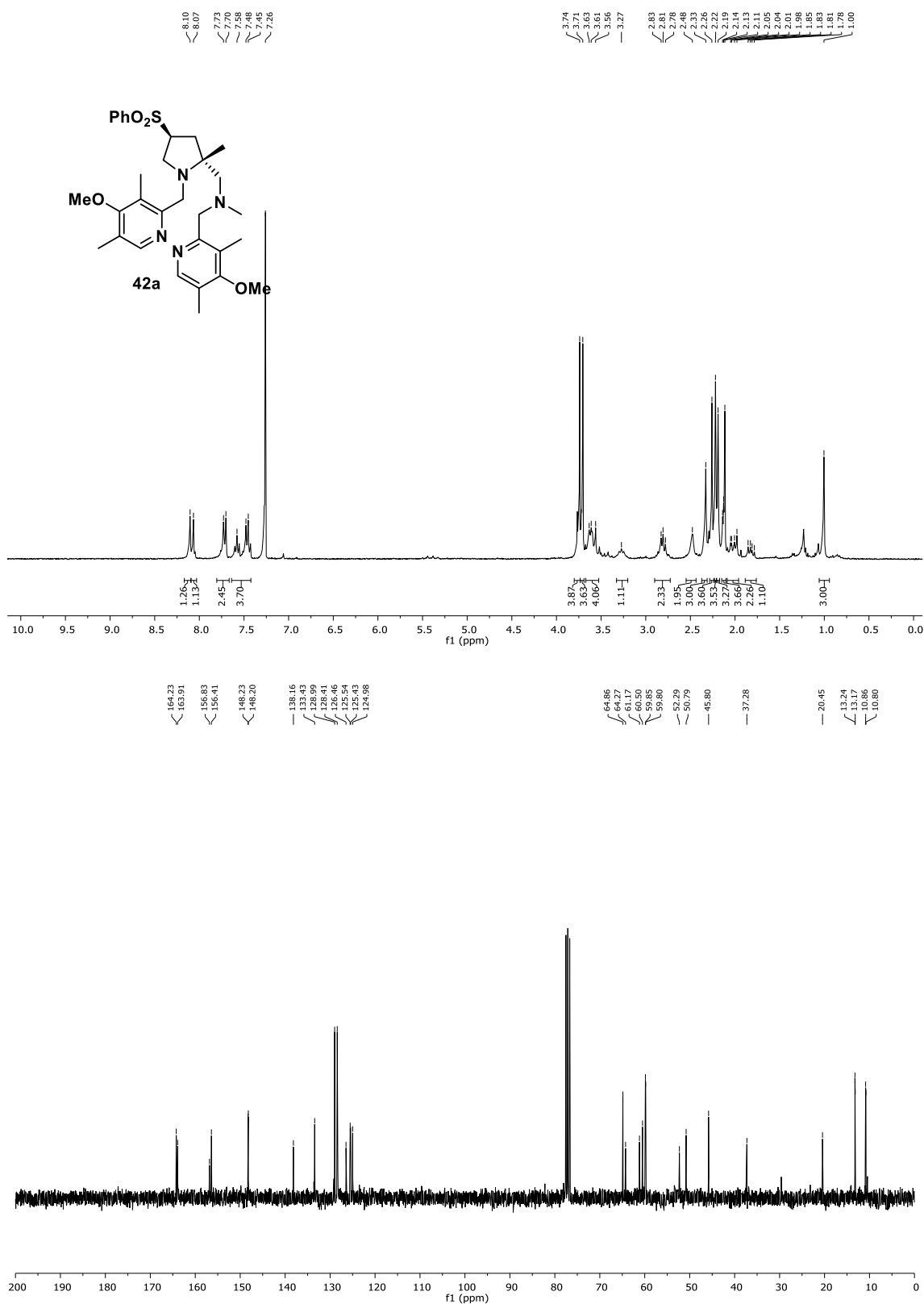
(2*R*,4*S*) 1-(((4-methoxy-3,5-dimethylpyridin-2-yl)methyl)-2-methyl-4-(4-phenylsulfonyl)pyrrolidin-2-yl)-*N*-methylmethanamine (41a)



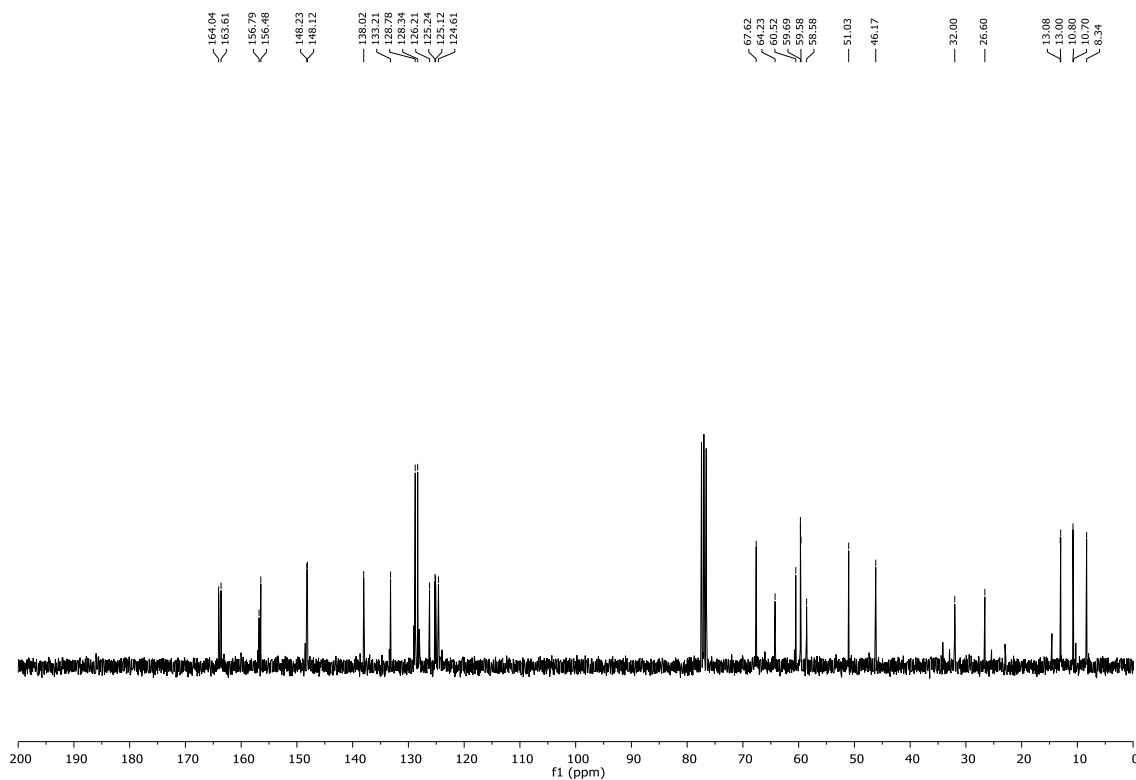
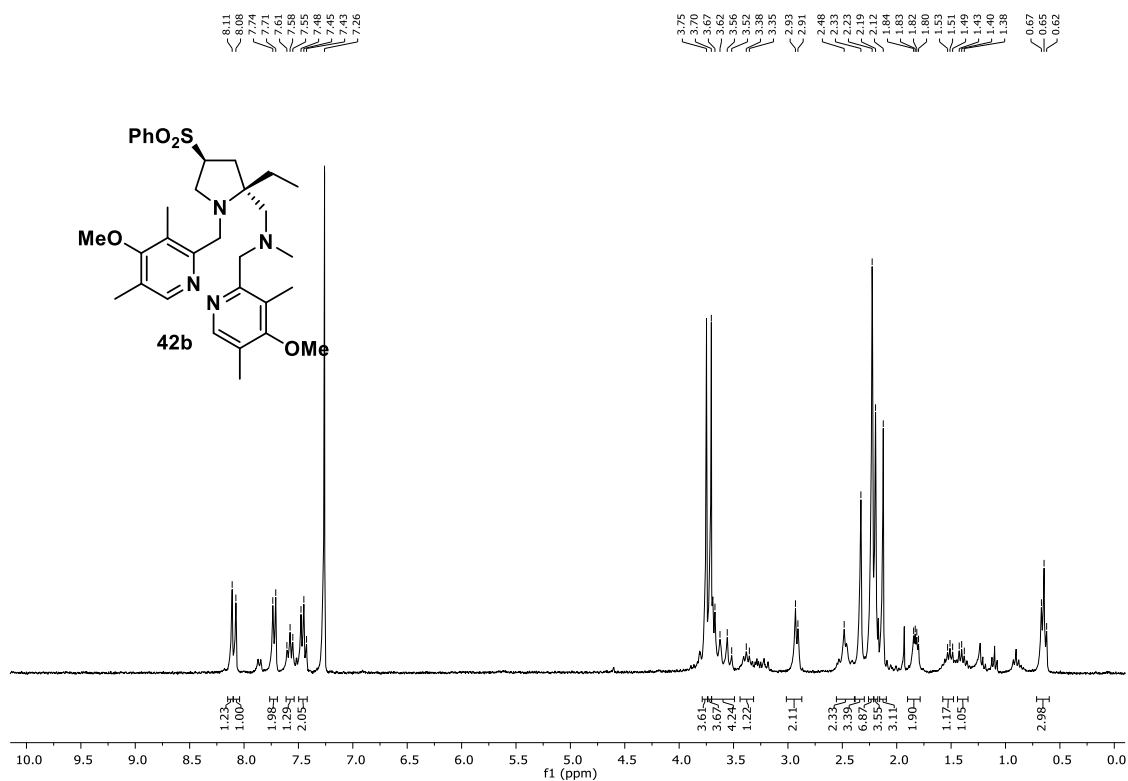
(2*R*,4*S*) 1-(((4-methoxy-3,5-dimethylpyridin-2-yl)methyl)-2-ethyl-4-(4-phenylsulfonyl)pyrrolidin-2-yl)-*N*-methylmethanamine (41b)



(2*R*,4*S*)-1-(4-Methoxy-3,5-dimethylpyridin-2-yl)-*N*-((1-((4-methoxy-3,5-dimethylpyridin-2-yl)methyl)-2-methyl-4-(4-phenylsulfonyl)pyrrolidin-2-yl)methyl)-*N*-methylmethanamine (42a)

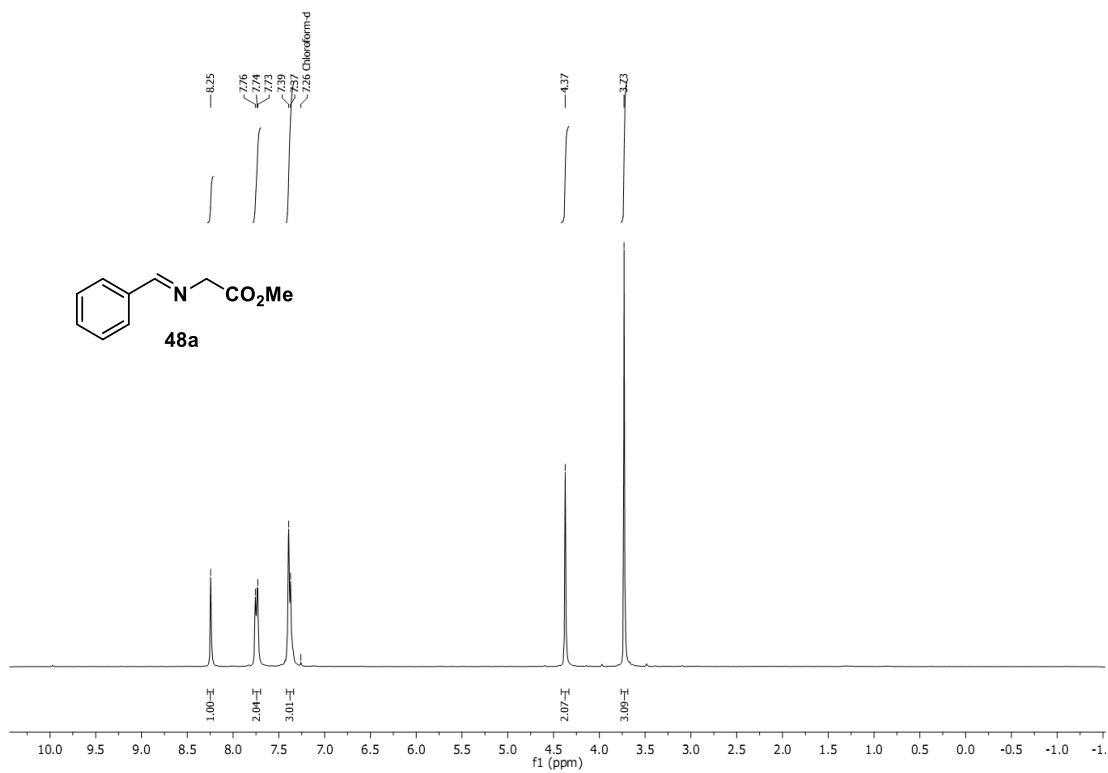


(2*R*,4*S*)-1-(4-Methoxy-3,5-dimethylpyridin-2-yl)-*N*-((1-((4-methoxy-3,5-dimethylpyridin-2-yl)methyl)-2-ethyl-4-(4-phenylsulfonyl)pyrrolidin-2-yl)methyl)-*N*-methyl methanamine (42b)

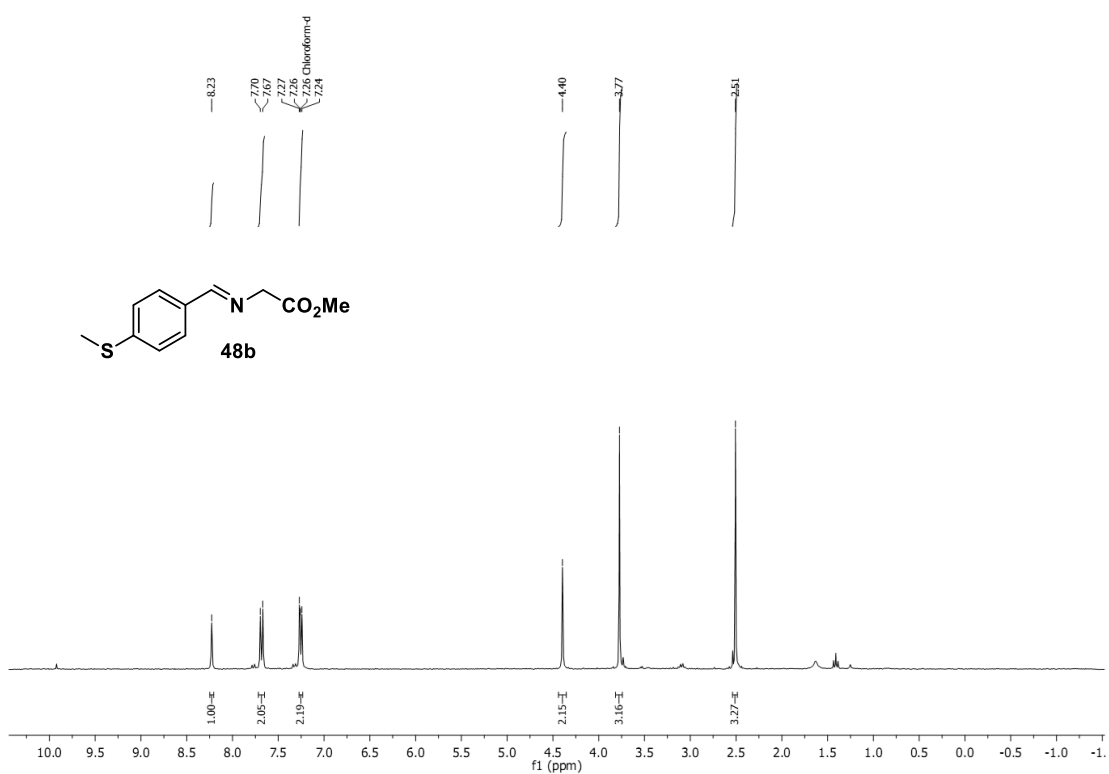


Capítulo 3: Catalytic asymmetric synthesis of azabicycles by 1,3-dipolar cycloaddition/intramolecular alkylation

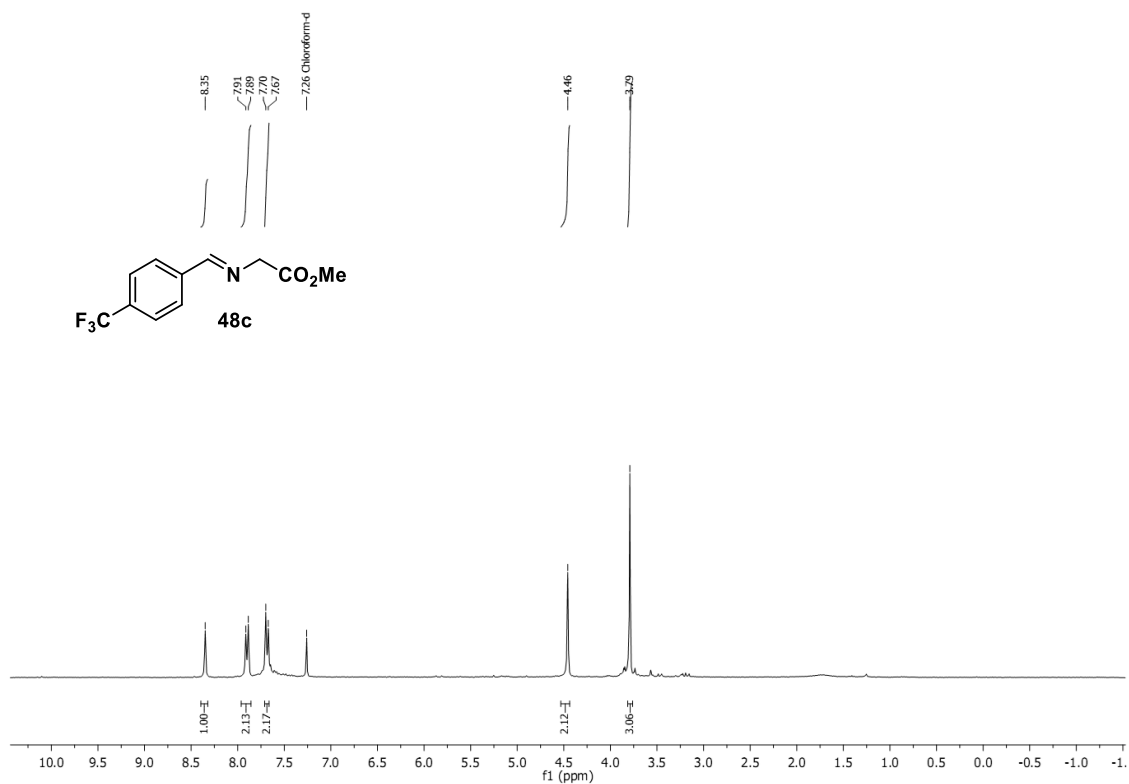
(*E*)-Methyl 2-(benzylideneamino)acetate (48a)



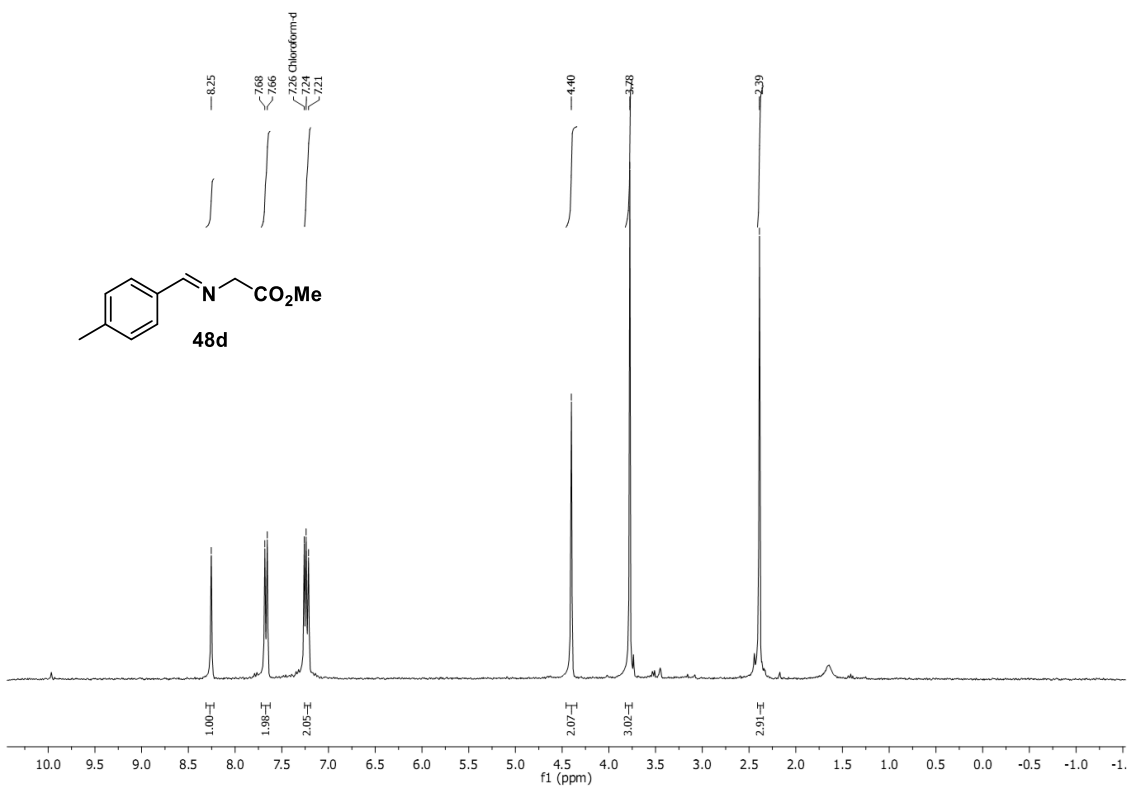
(*E*)-Methyl 2-((4-(methylthio)benzylidene)amino)acetate (48b)



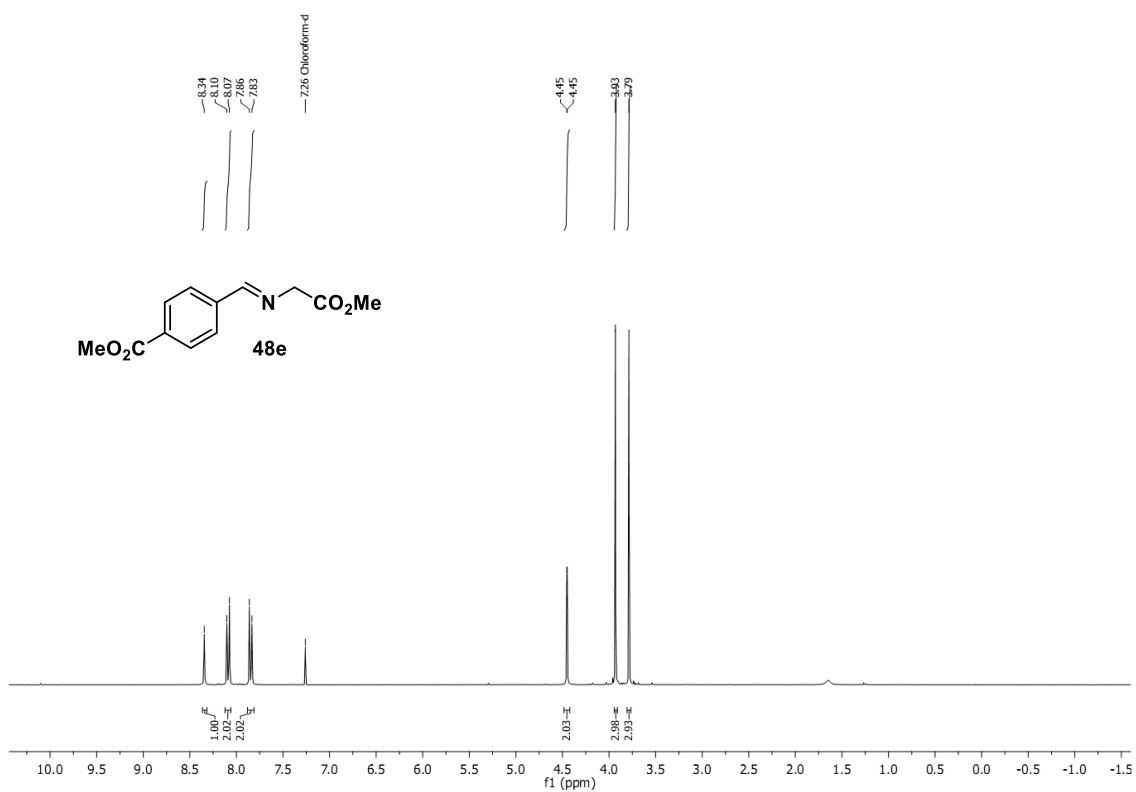
(E)-Methyl 2-((4-(trifluoromethyl)benzylidene)amino)acetate (48c)



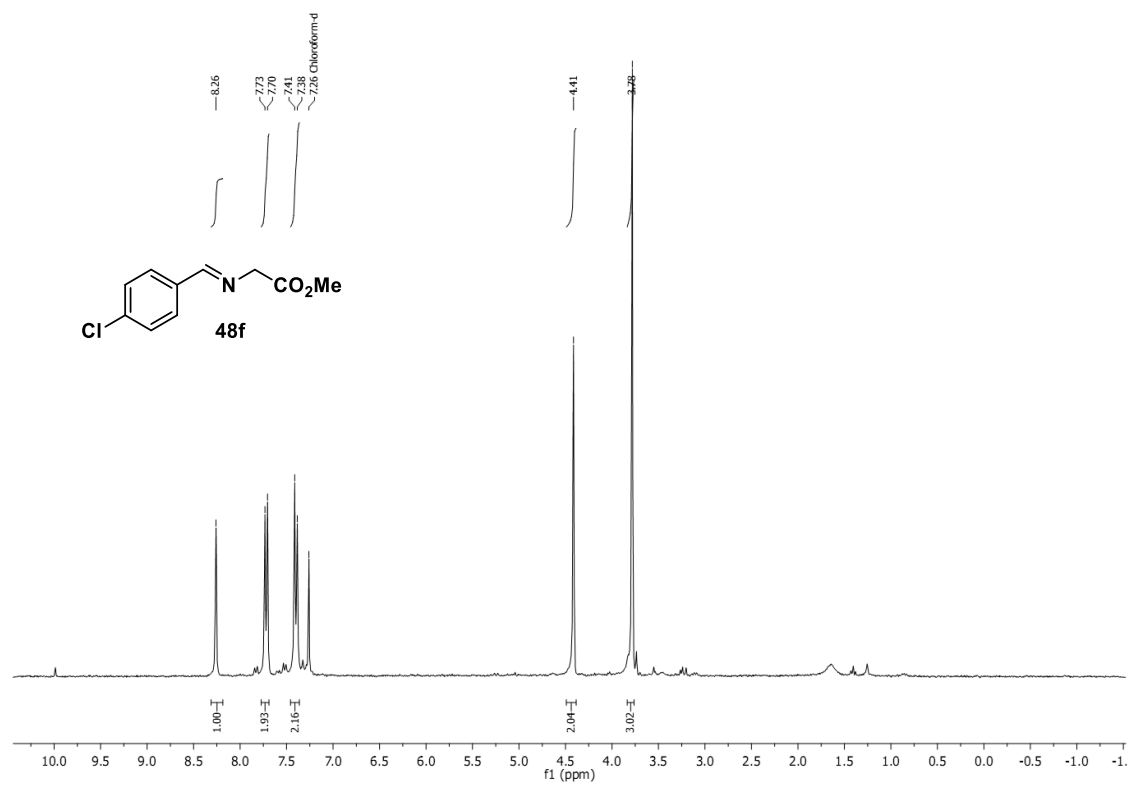
(E)-Methyl 2-((4-methylbenzylidene)amino)acetate (48d)



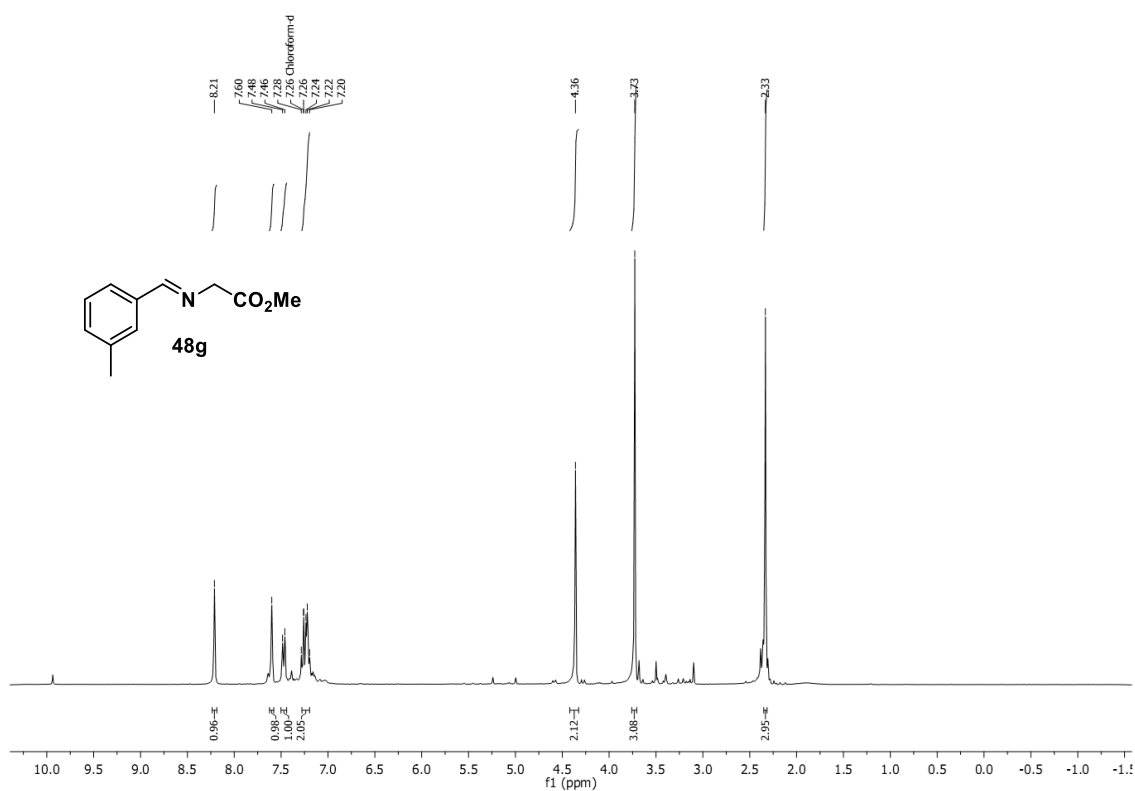
(E)-Methyl 2-((4-(methoxycarbonyl)benzylidene)amino)acetate (48e)



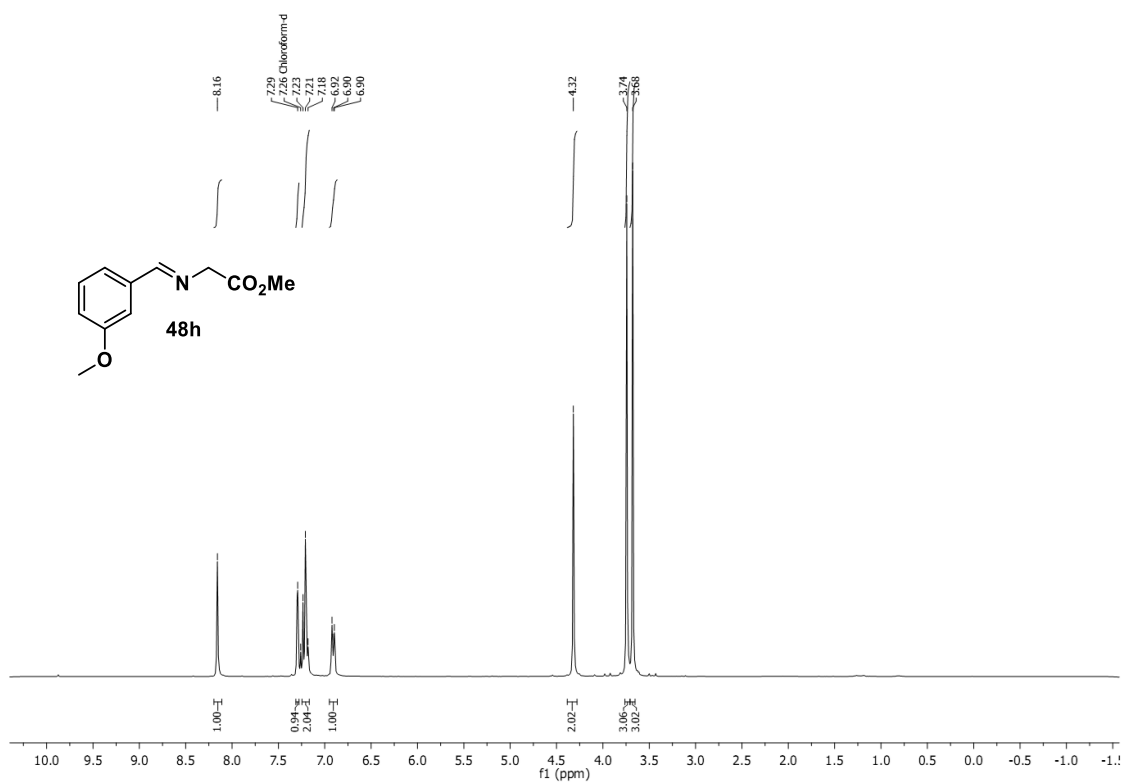
(E)-Methyl 2-((4-chlorobenzylidene)amino)acetate (48f)



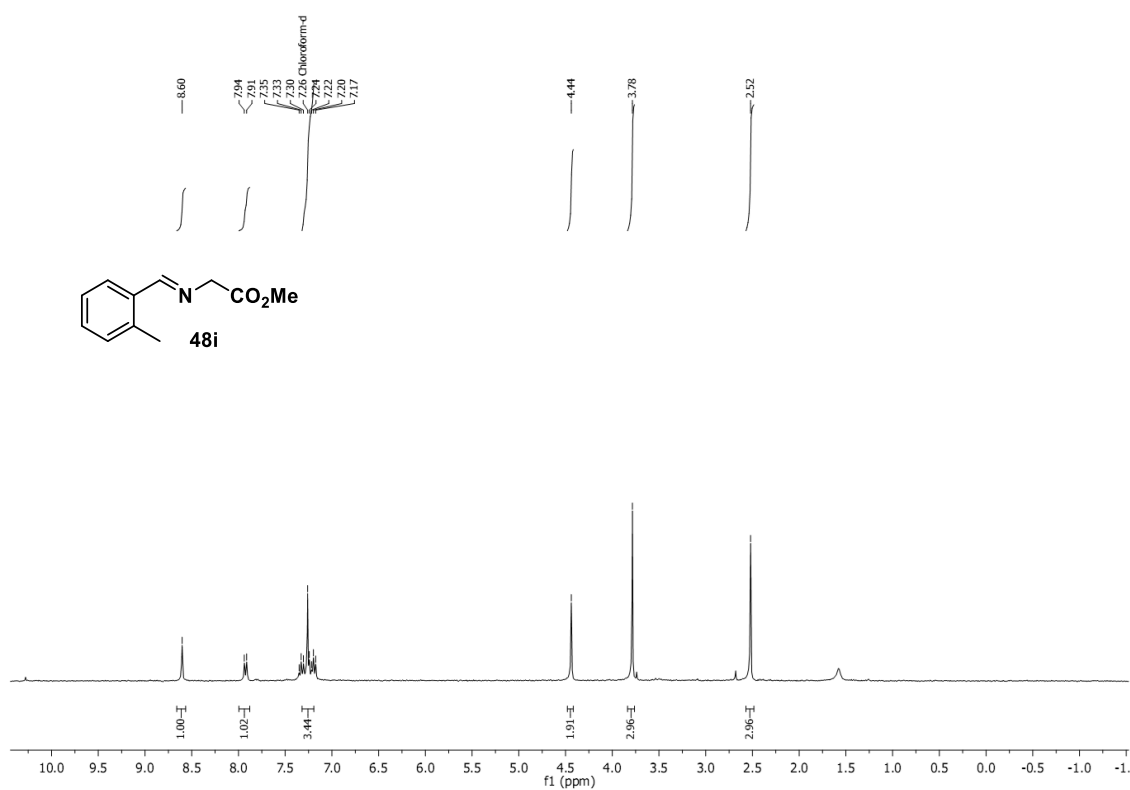
(E)-Methyl 2-((3-methylbenzylidene)amino)acetate (48g)



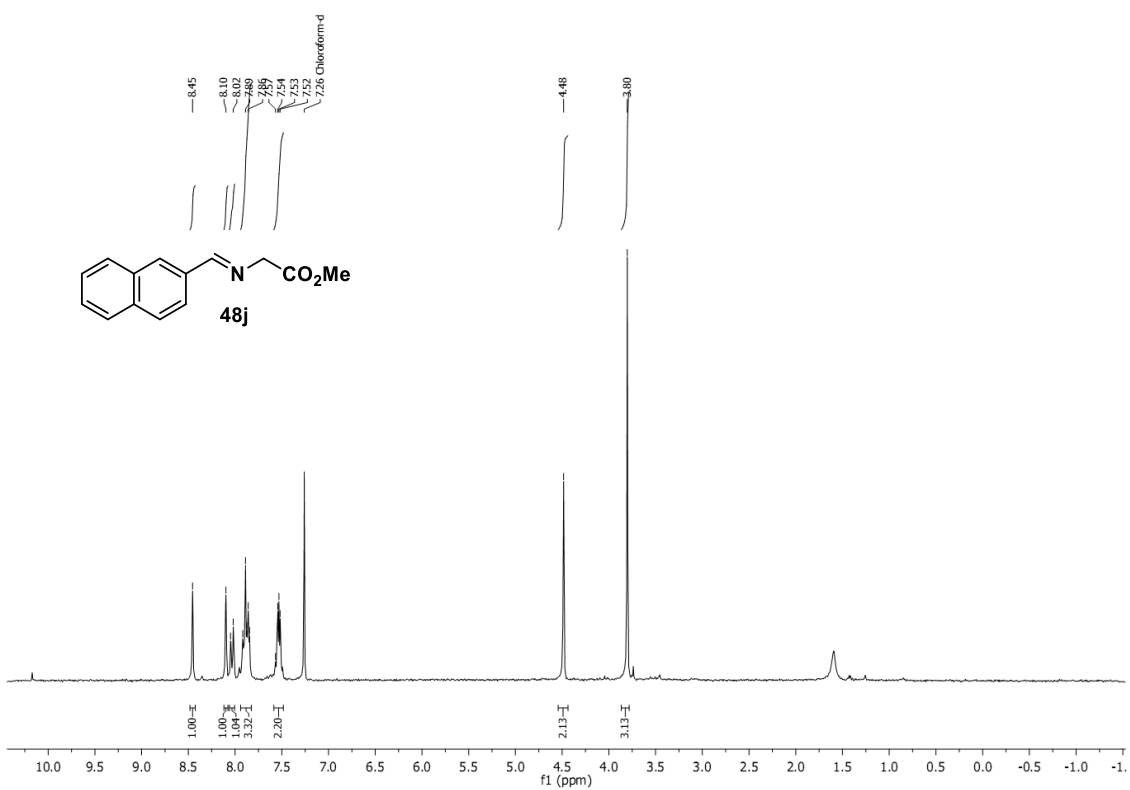
(E)-Methyl 2-((3-methoxybenzylidene)amino)acetate (48h)



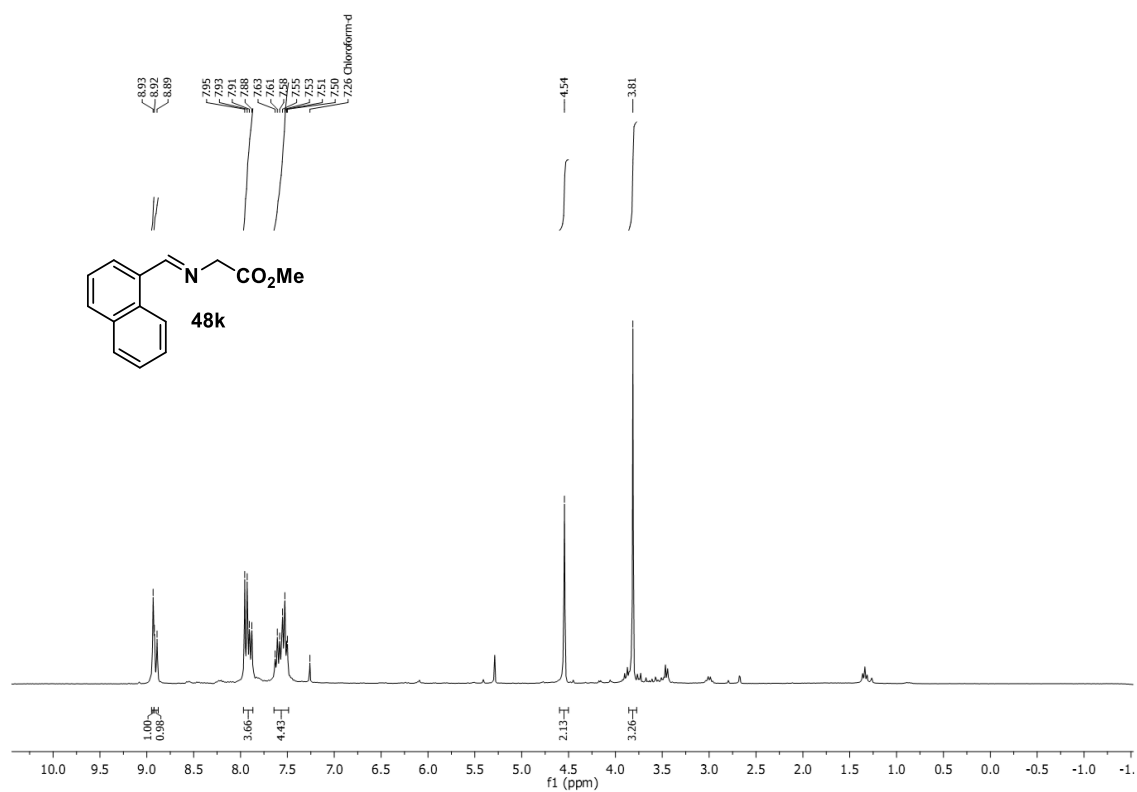
(E)-Methyl 2-((2-methylbenzylidene)amino)acetate (48i)



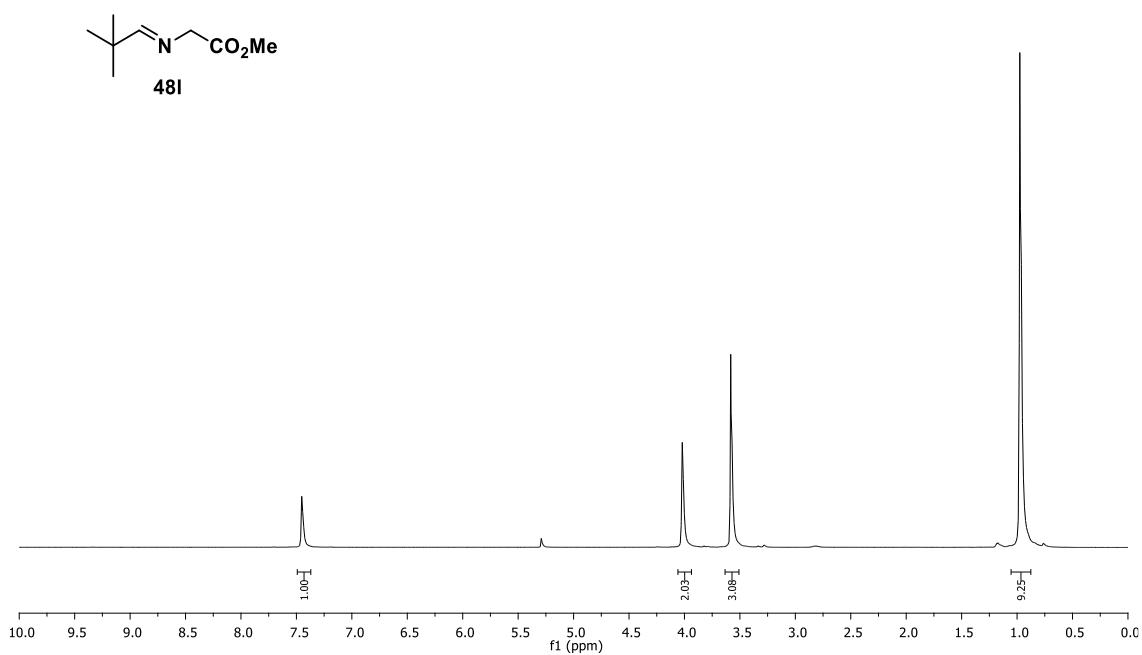
(E)-Methyl 2-((naphthalen-2-ylmethylene)amino)acetate (48j)



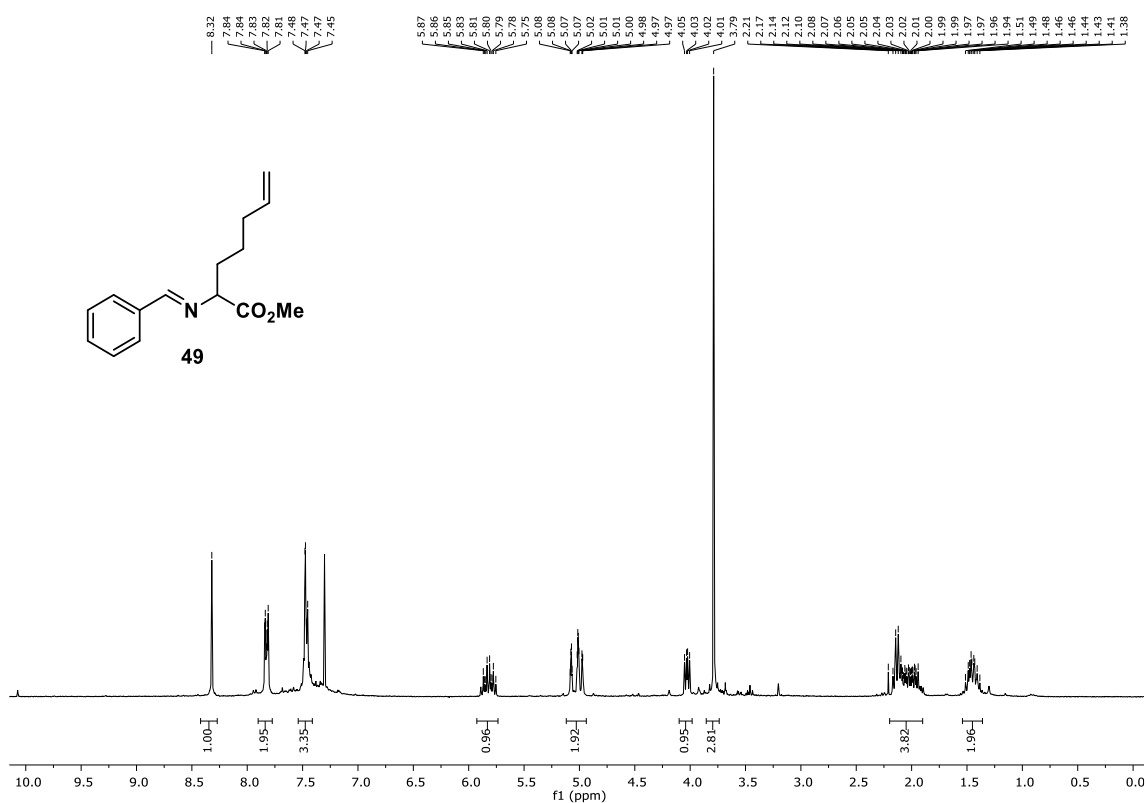
(E)-Methyl 2-((naphthalen-1-ylmethylene)amino)acetate (48k)



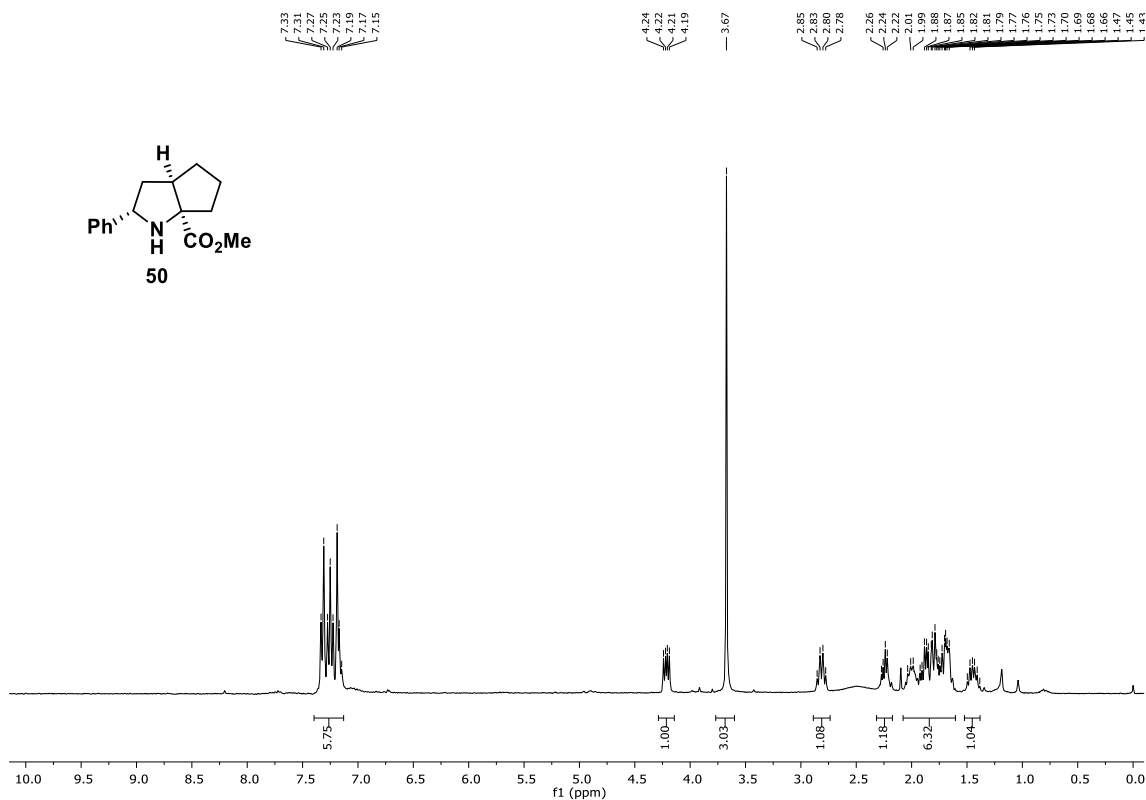
(E)-Methyl 2-((2,2-dimethylpropylidene)amino)acetate (48l)

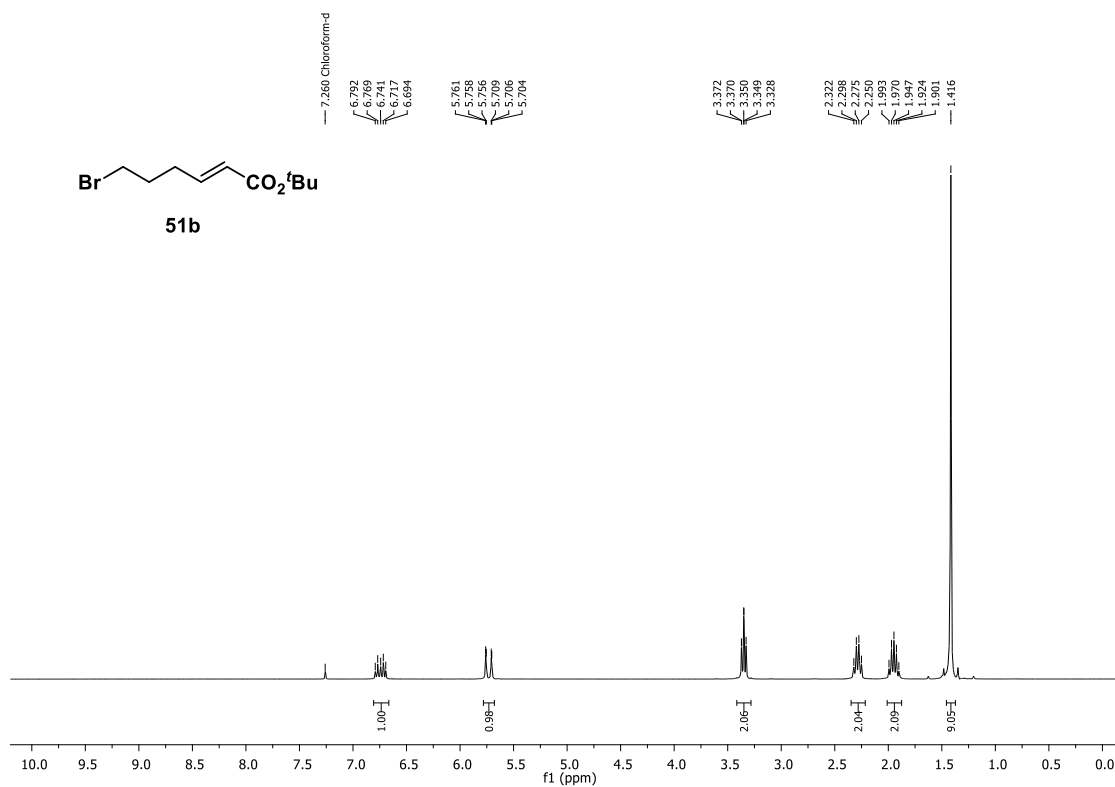
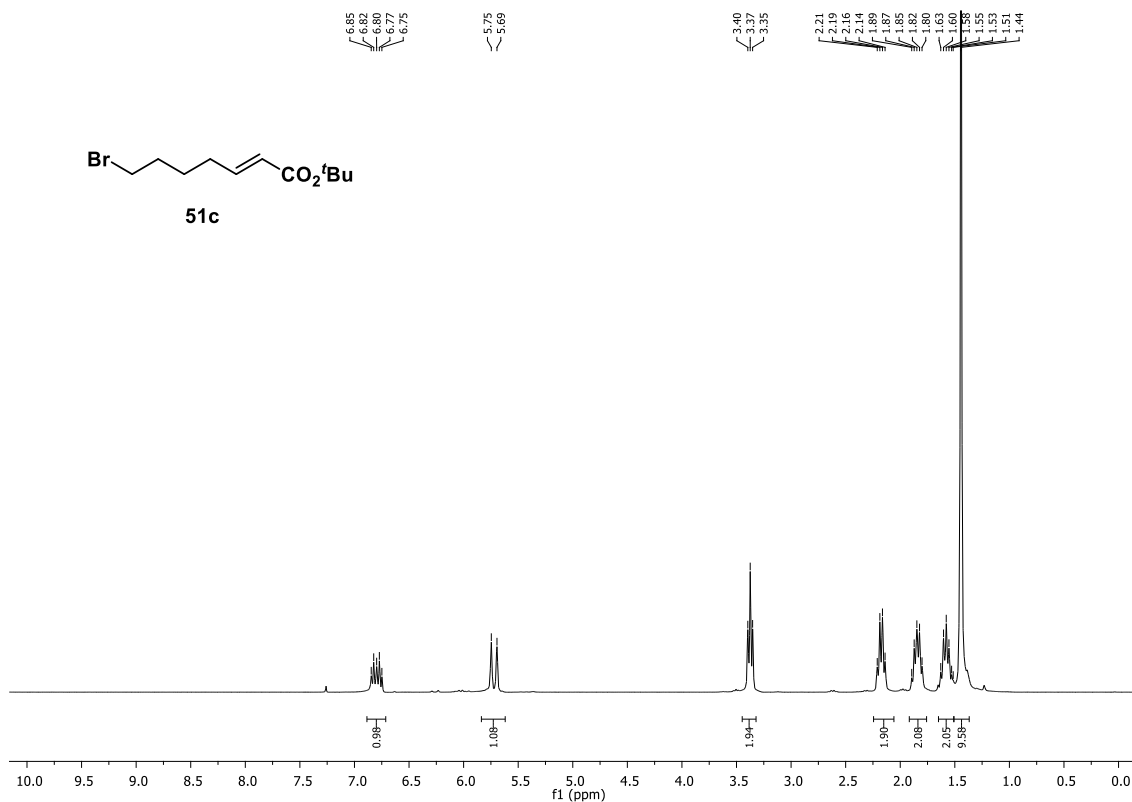


(E)-Methyl 2-(benzylideneamino)hept-6-enoate (49)

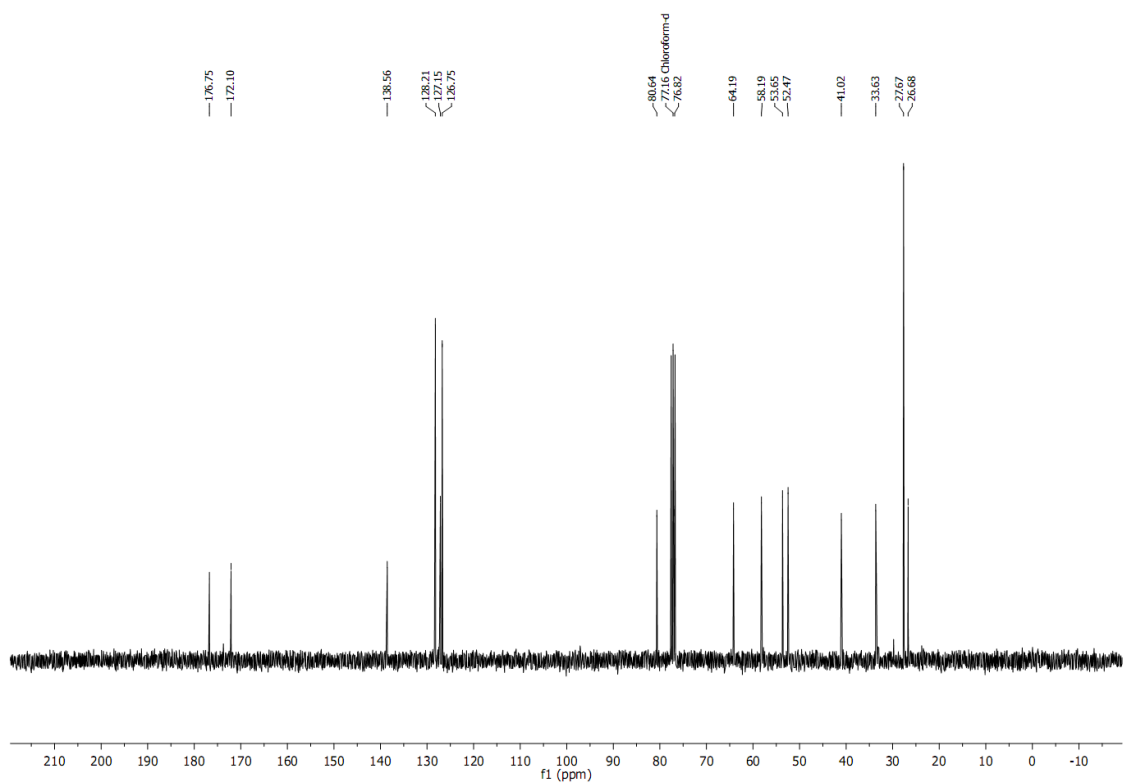
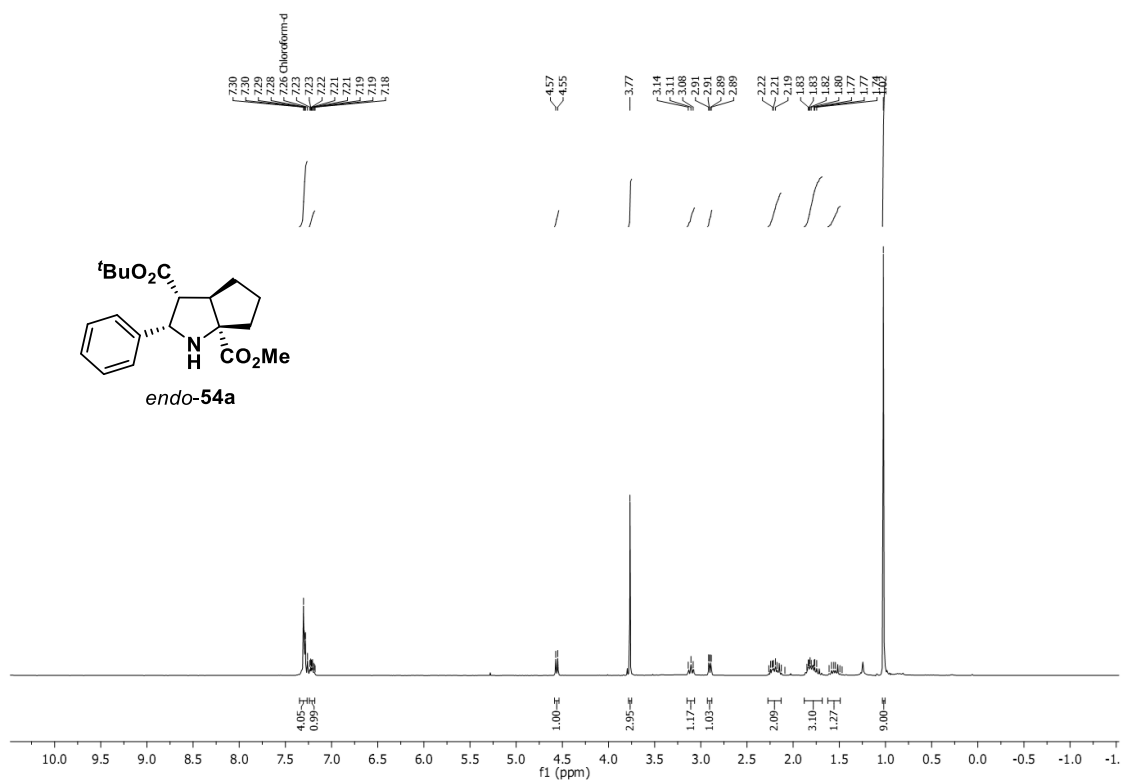


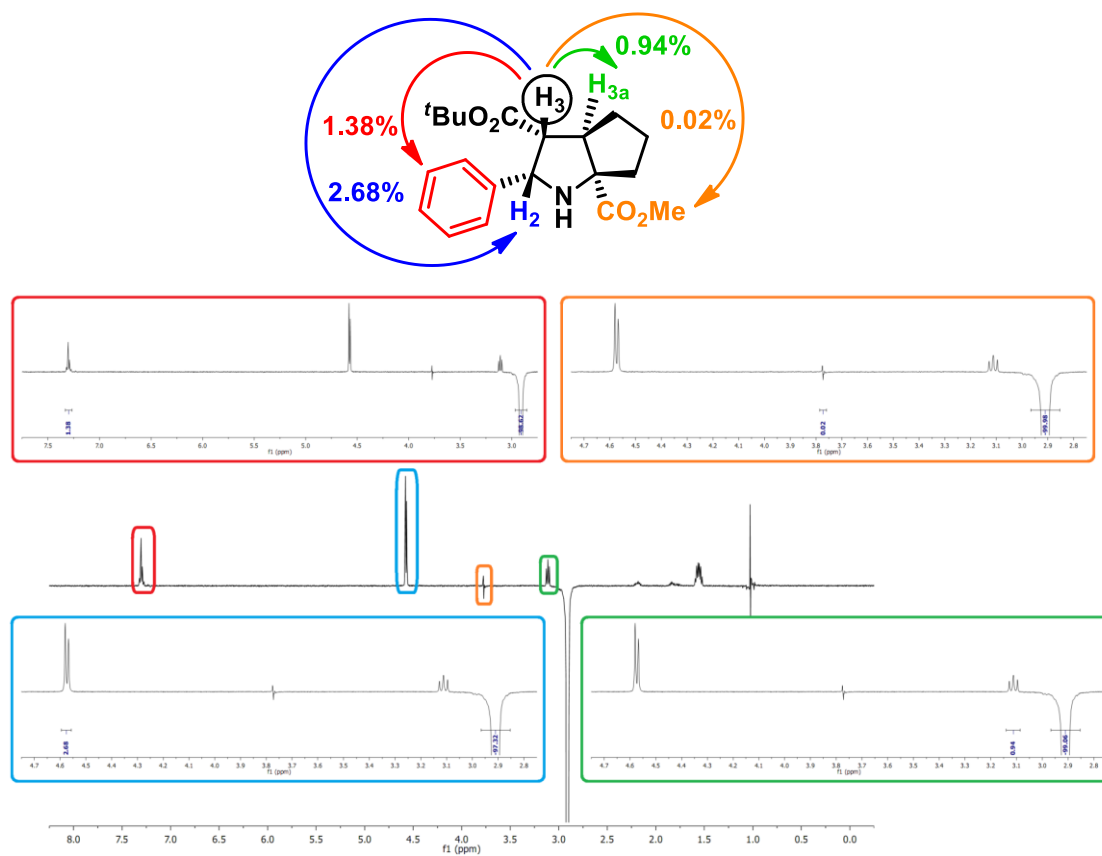
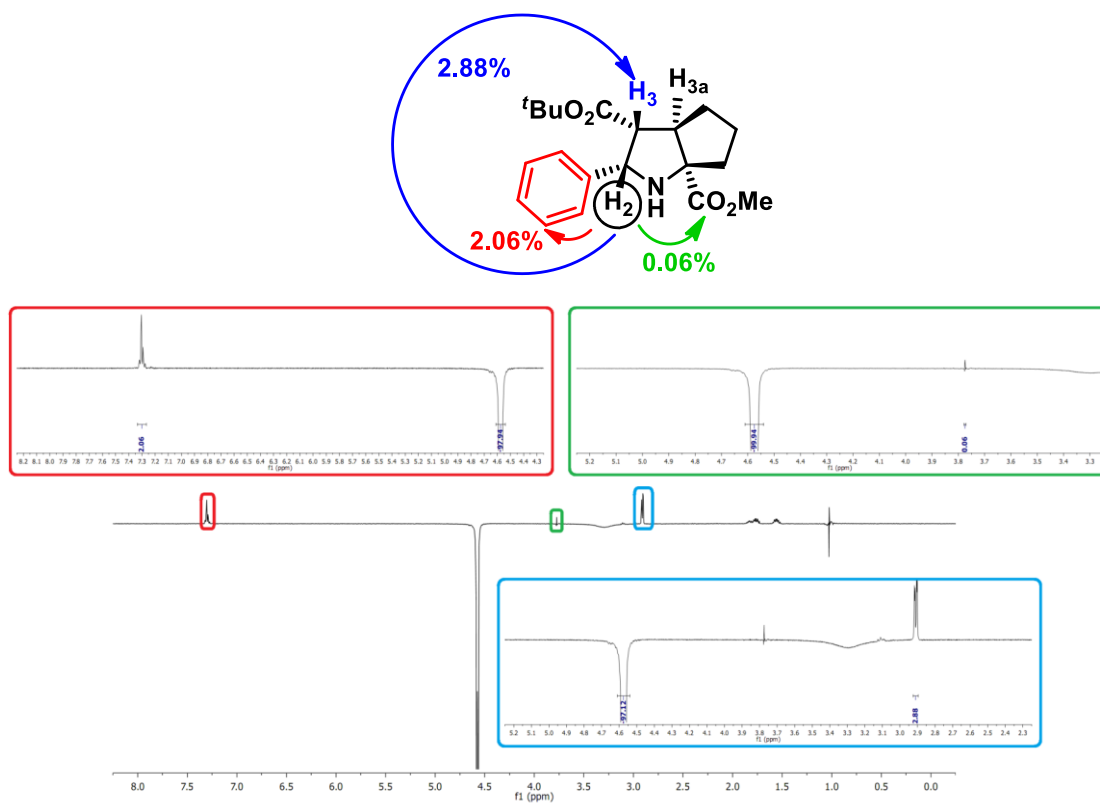
(2S,3aR,6aR)-Methyl 2-phenylhexahydrocyclopenta[b]pyrrole-6a(1H)-carboxylate (50)

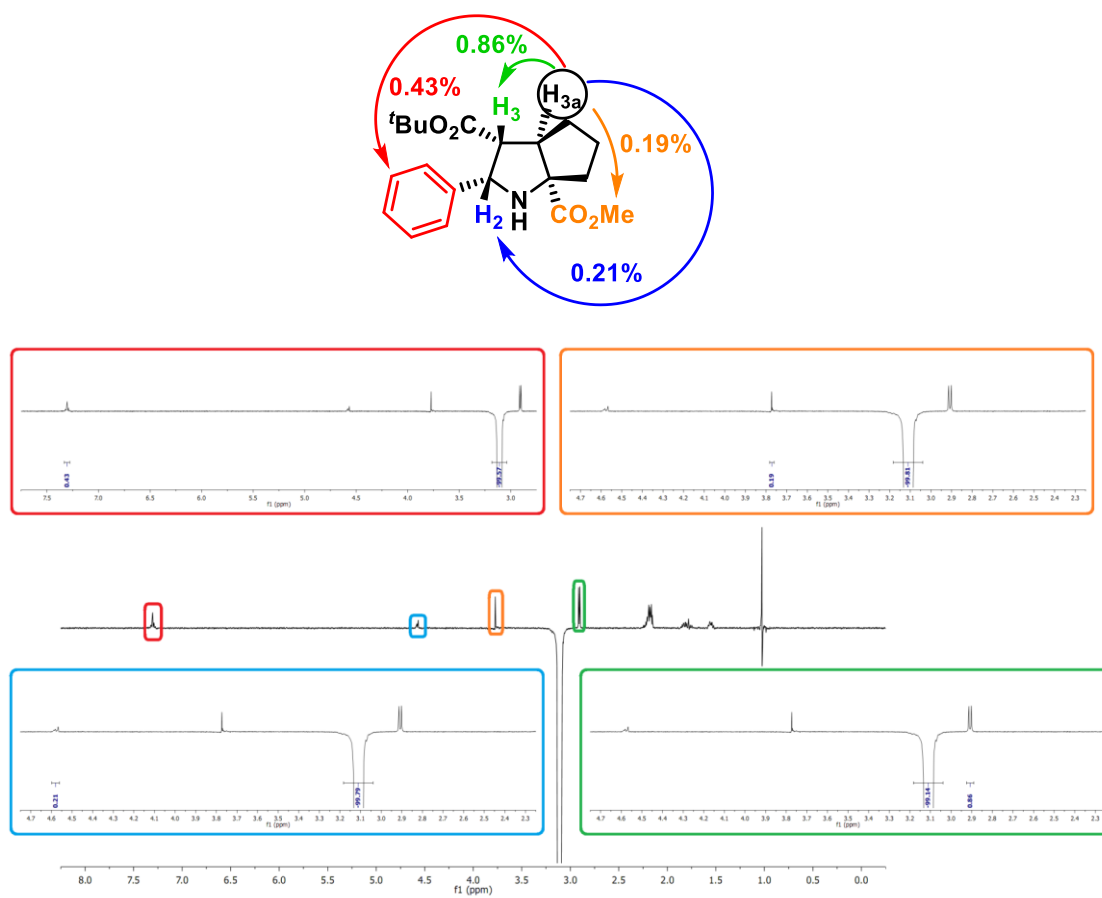


(E)-Methyl 6-bromo-2-hexenoate (51a)**(E)-tert-Butyl 6-bromo-2-hexenoate (51b)****(E)-tert-Butyl 6-bromo-2-heptenoate (51c)**

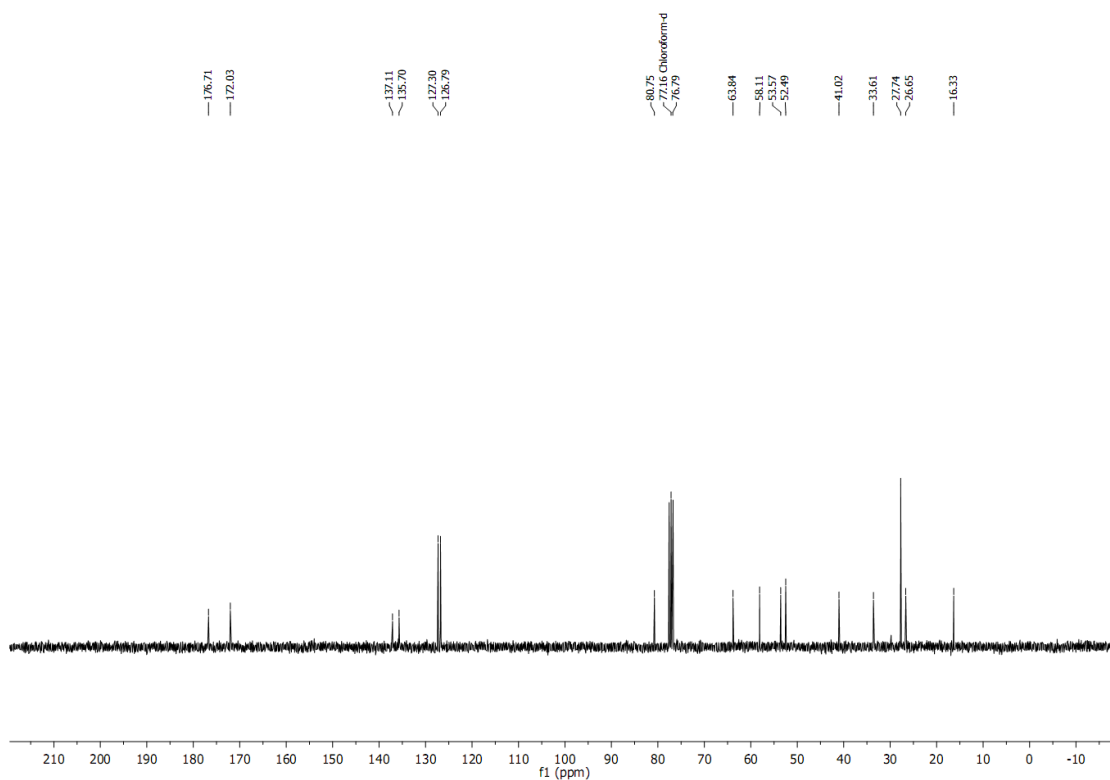
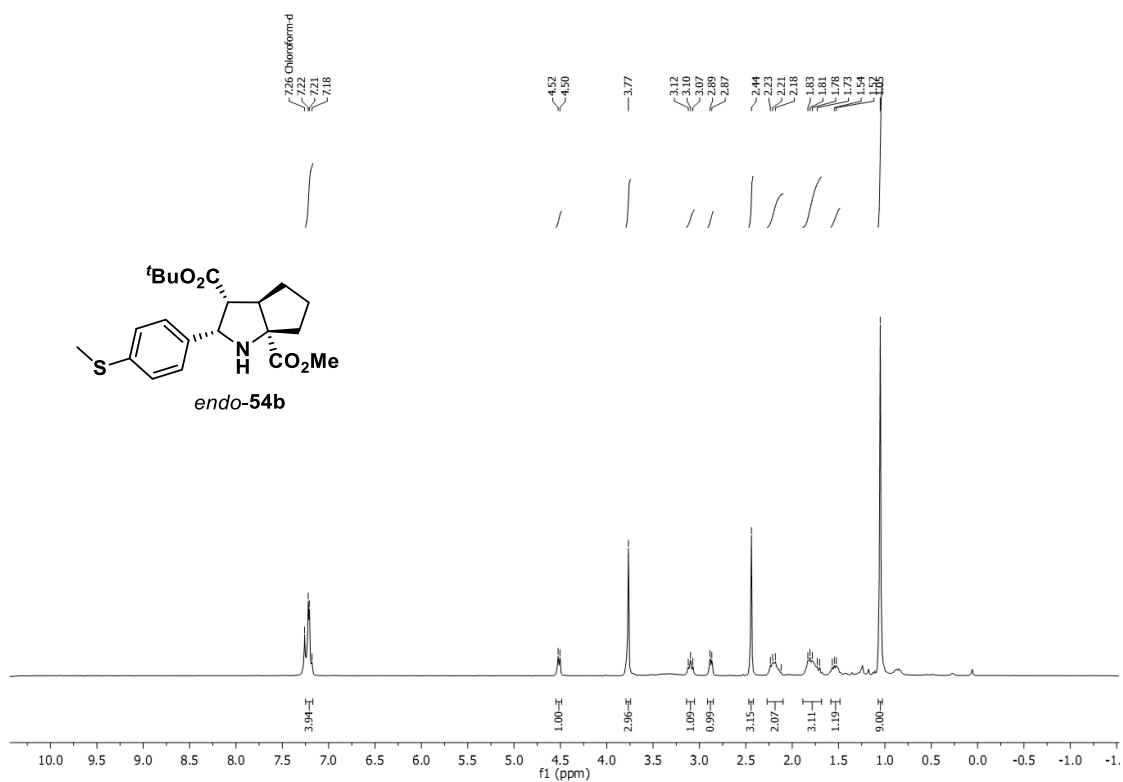
(2*S, 3*R**, 3*aR**, 6*aR**)-3-*tert*-Butyl 6*a*-methyl 2-phenyloctahydrocyclopenta[*b*] pyrrole-3,6*a*-dicarboxylate (*endo*-54*a*)**



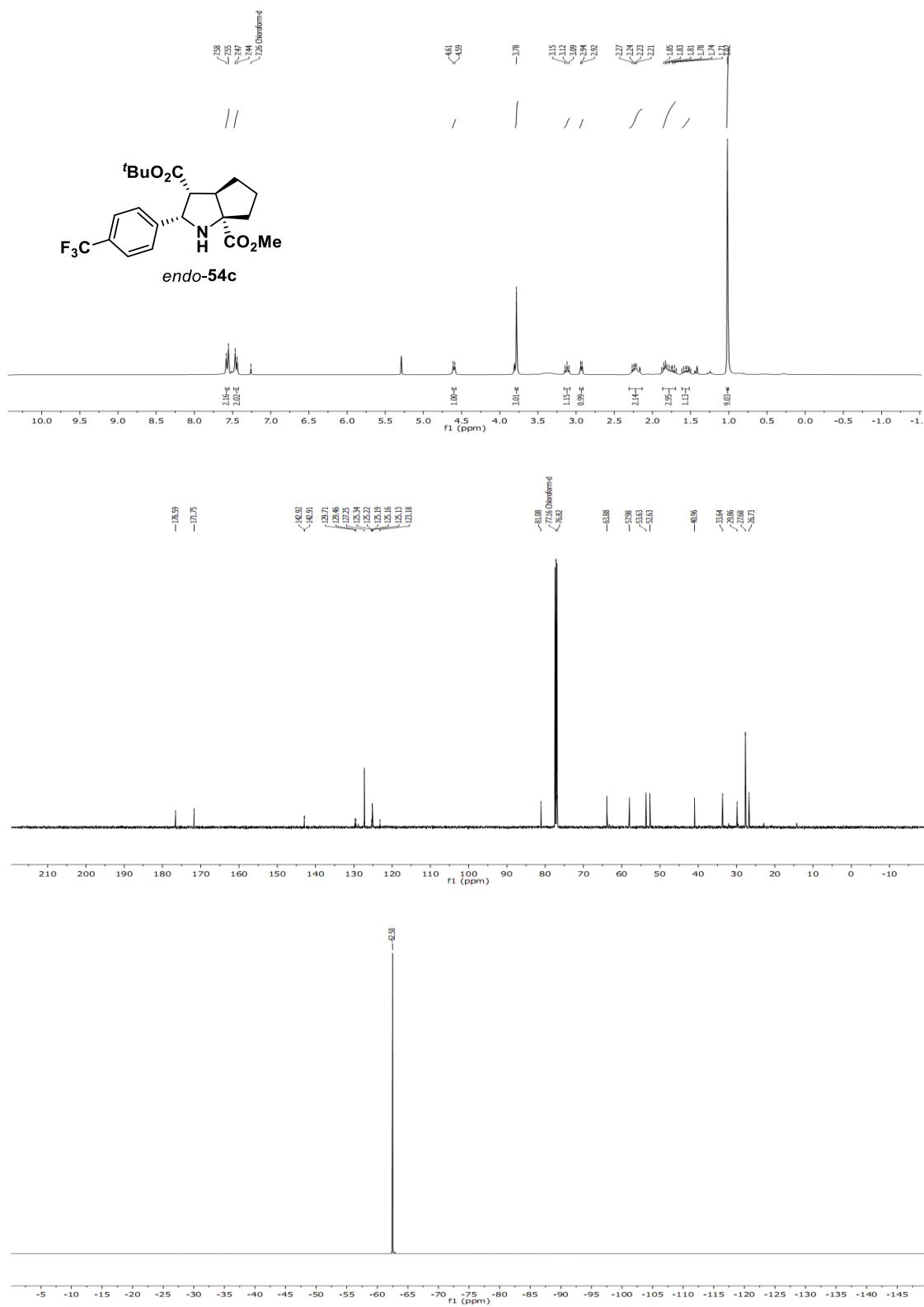




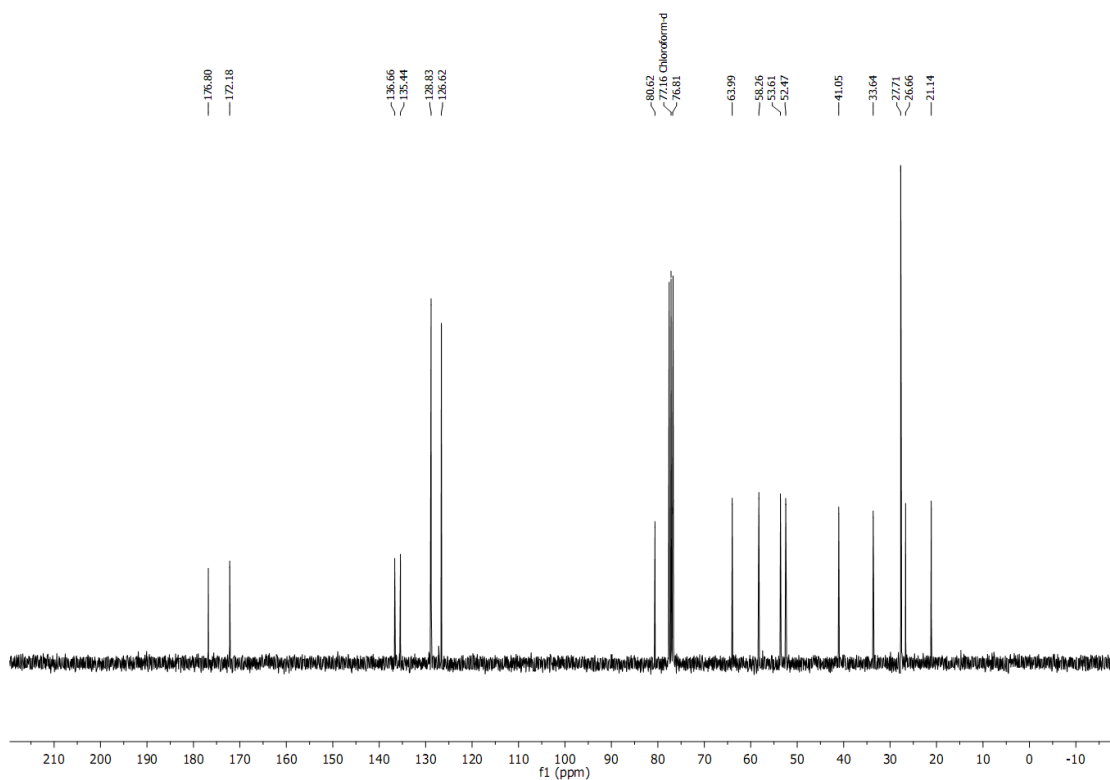
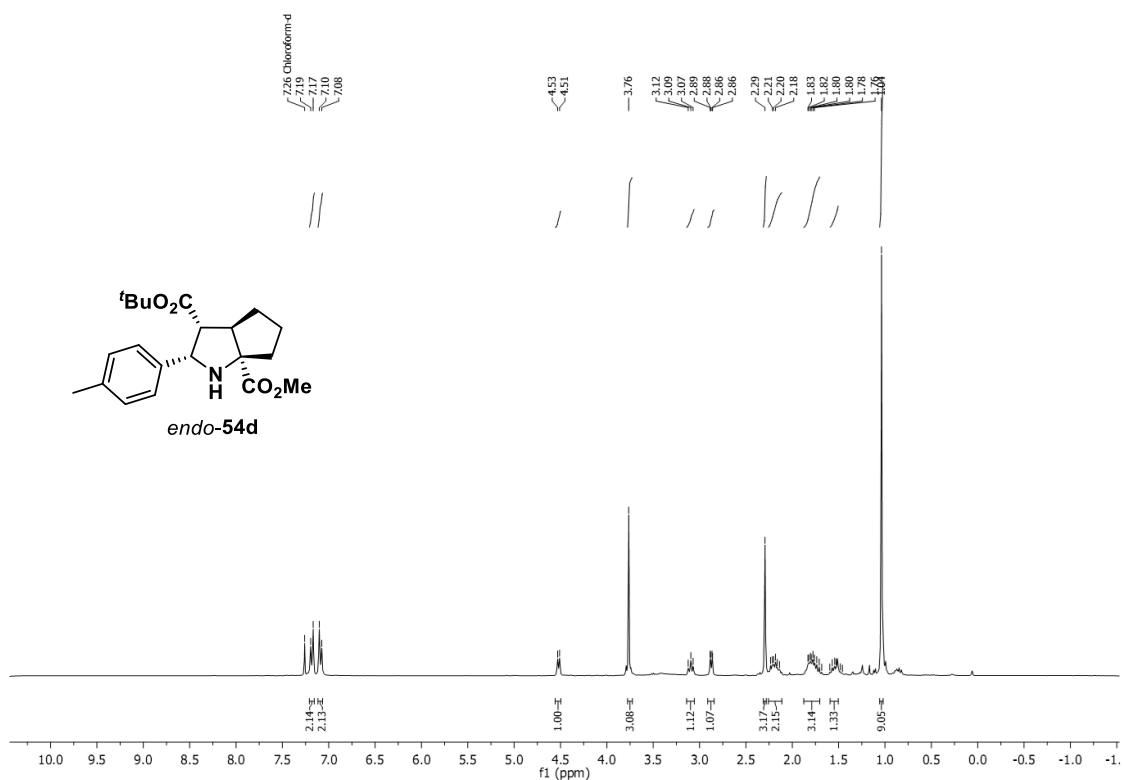
(2*S, 3*R**, 3*aR**, 6*aR**)-3-*tert*-Butyl 6*a*-methyl 2-(4-(methylthio)phenyl)octahydrocyclopenta [b]pyrrole-3,6*a*-dicarboxylate (*endo*-54b)**



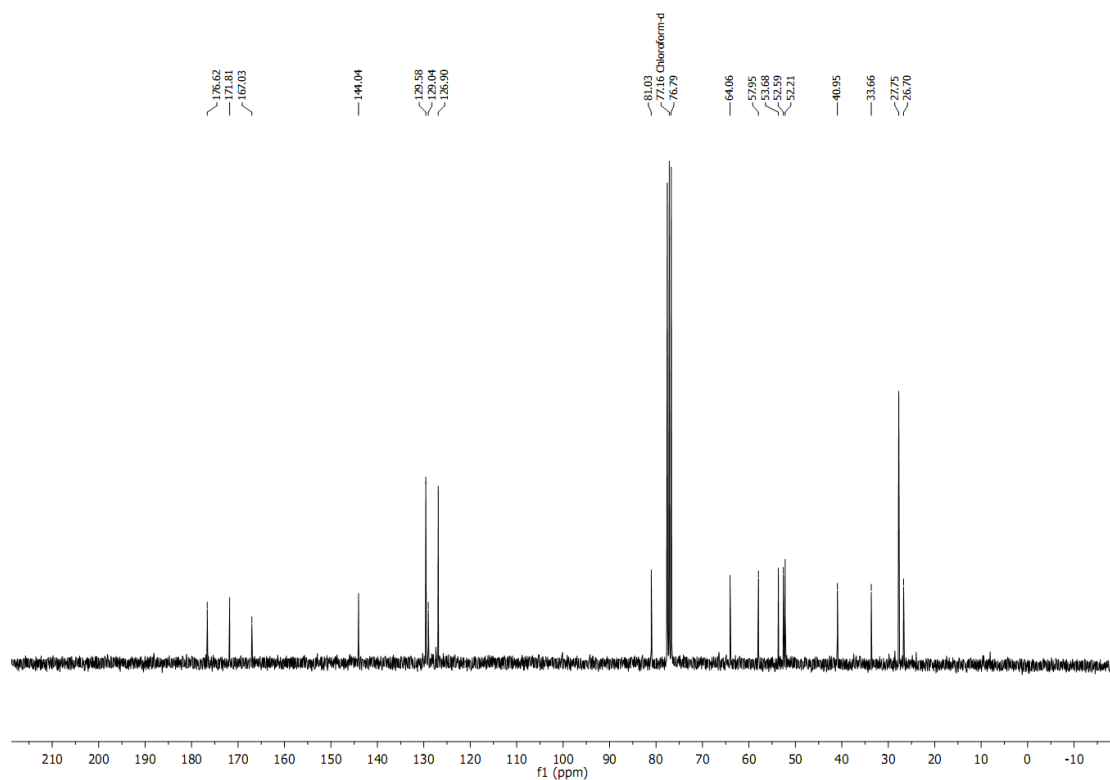
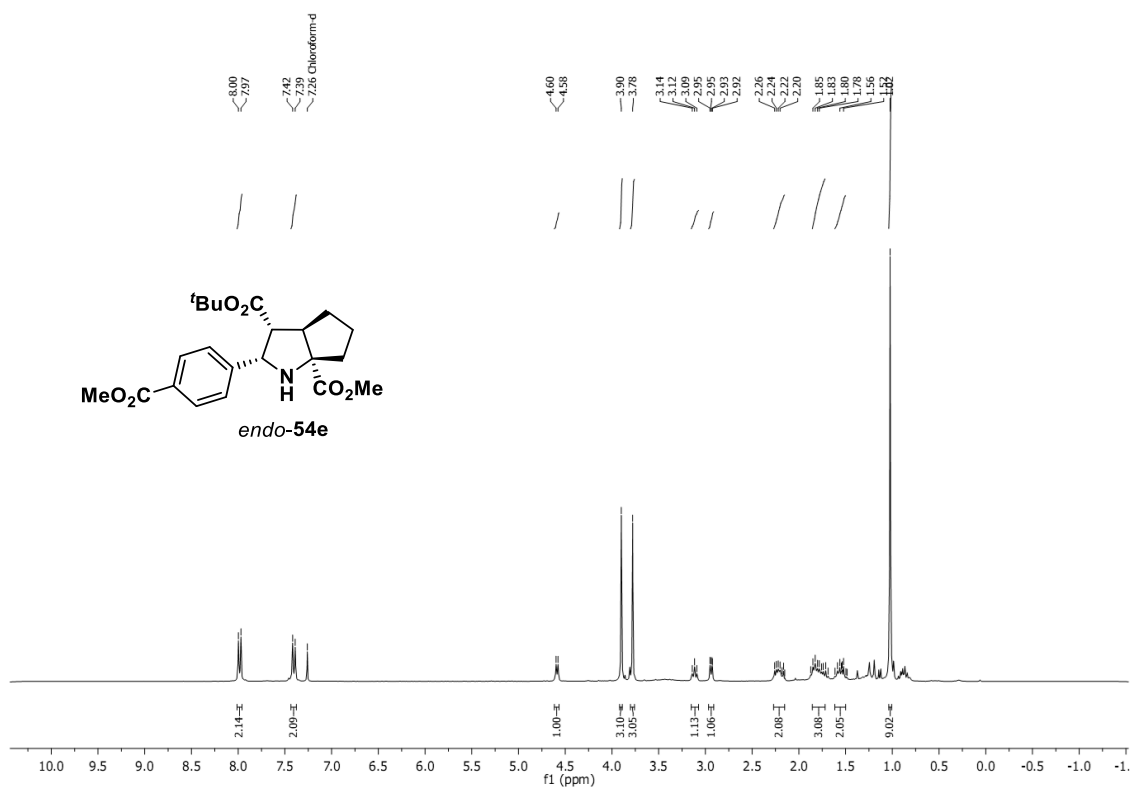
(2*S, 3*R**, 3*aR**, 6*aR**)-3-*tert*-Butyl 6a-methyl 2-(4-(trifluoromethyl)phenyl)octahydrocyclopenta[*b*]pyrrole-3,6a-dicarboxylate (*endo*-54c)**



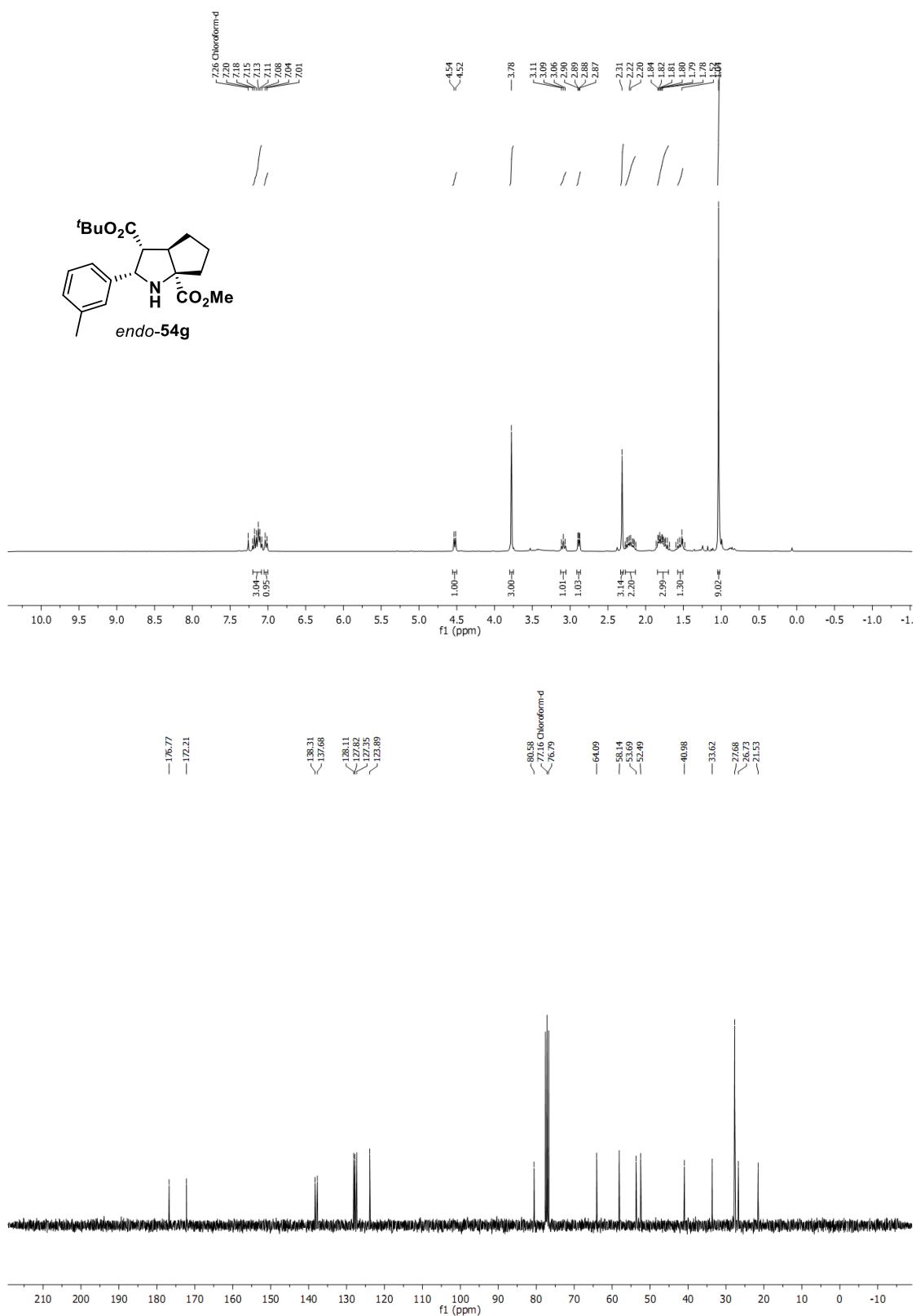
(2*S, 3*R**, 3*aR**, 6*aR**)-3-*tert*-Butyl 6*a*-methyl 2-(*p*-tolyl)octahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*endo*-54d)**



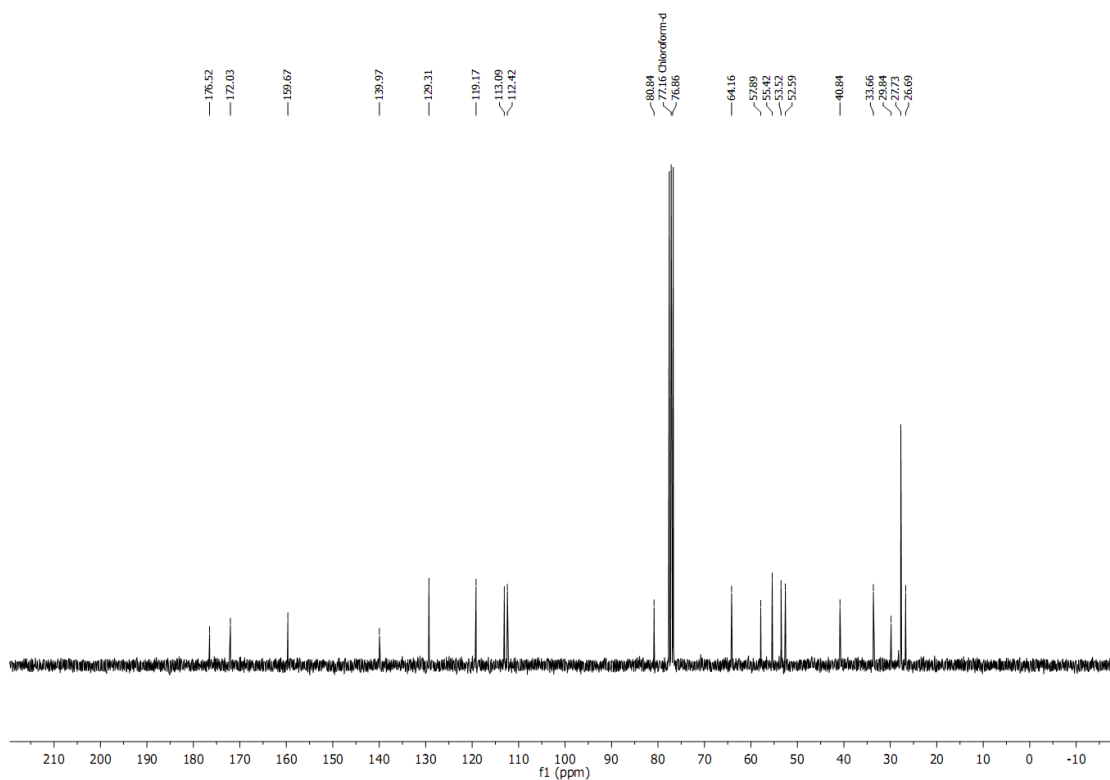
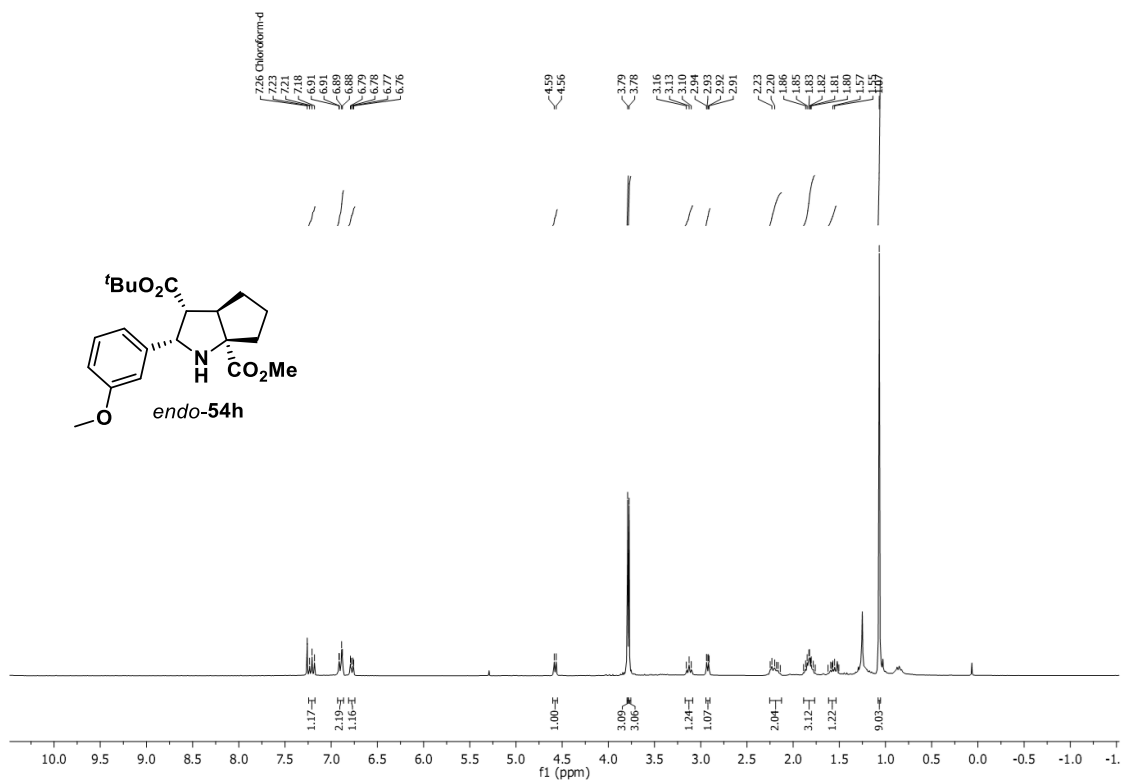
(2*S, 3*R**, 3*aR**, 6*aR**)-3-*tert*-Butyl 6*a*-methyl 2-(4-(methoxycarbonyl)phenyl)octahydro cyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*endo*-54e)**



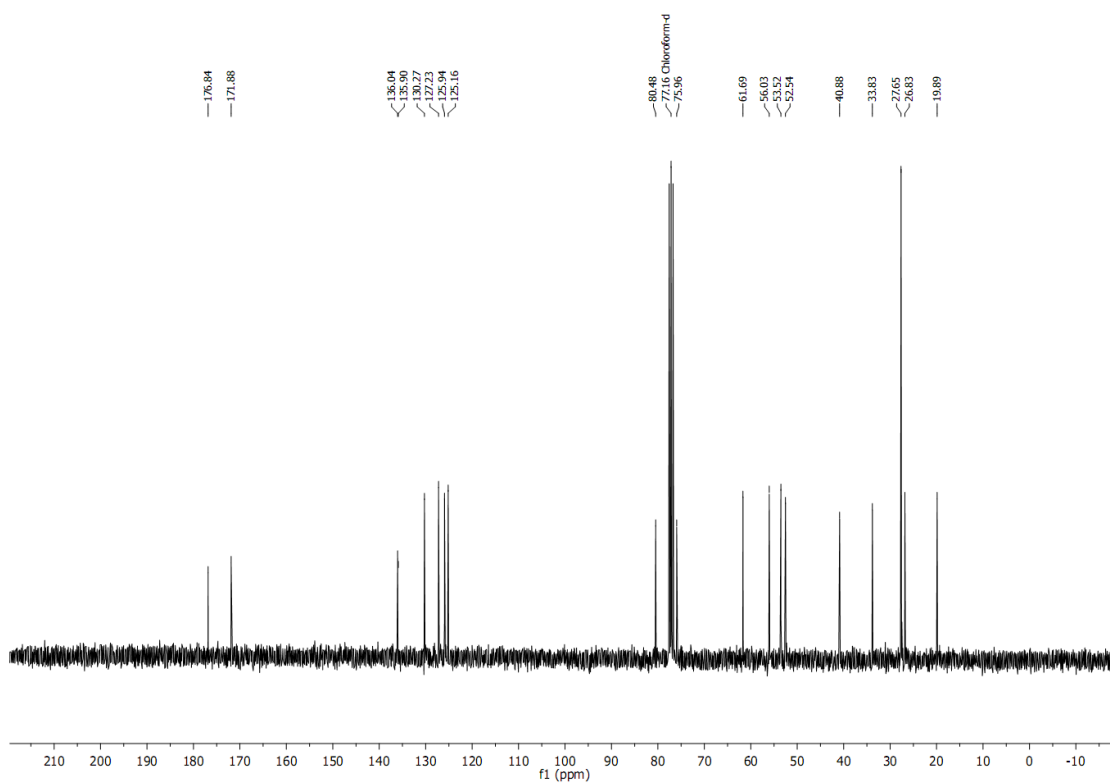
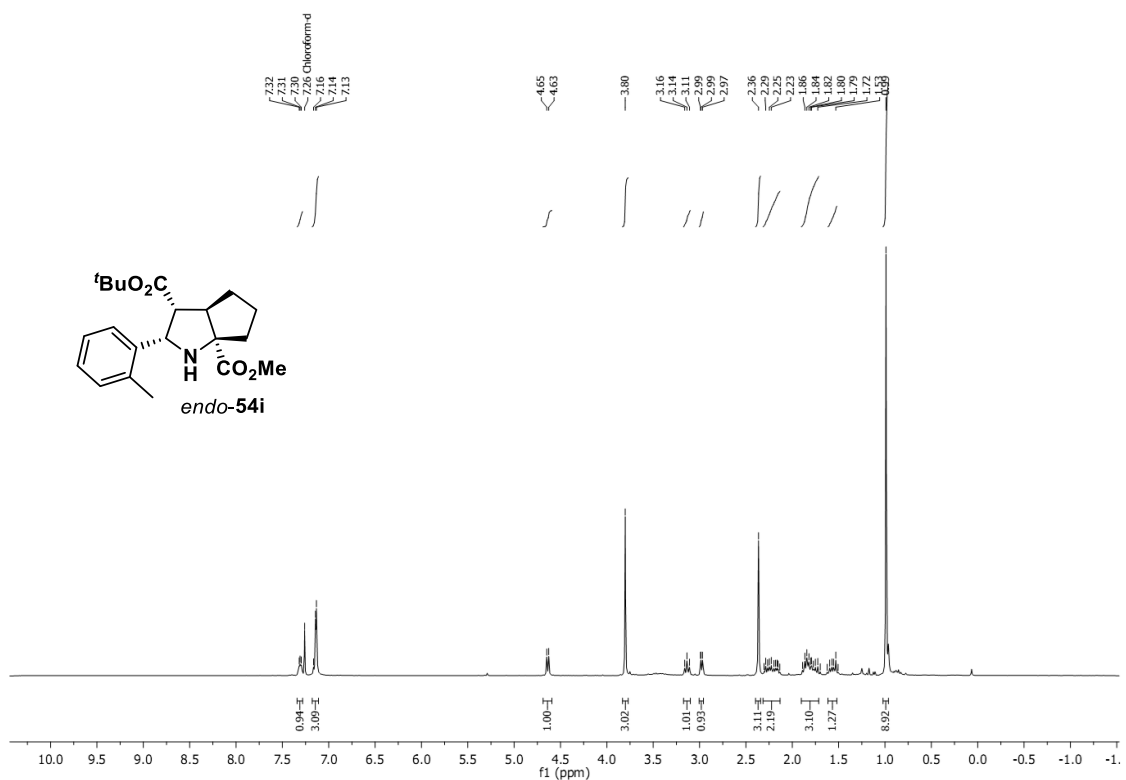
(2*S, 3*R**, 3*aR**, 6*aR**)-3-*tert*-Butyl 6*a*-methyl 2-(3-*tolyl*)octahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*endo*-54g)**



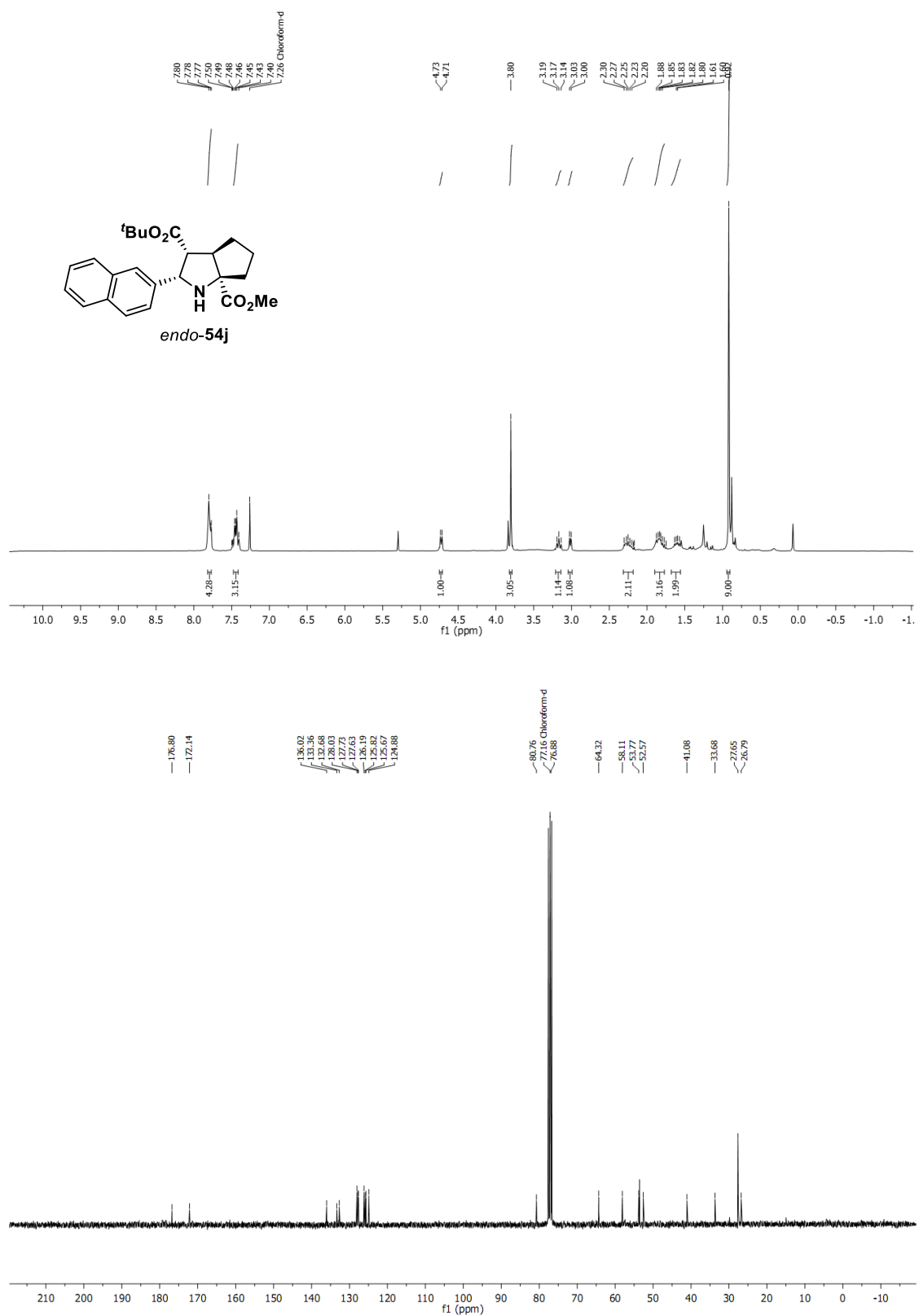
(2*S, 3*R**, 3*aR**, 6*aR**)-3-*tert*-Butyl 6*a*-methyl 2-(3-methoxyphenyl)octahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*endo*-54h)**



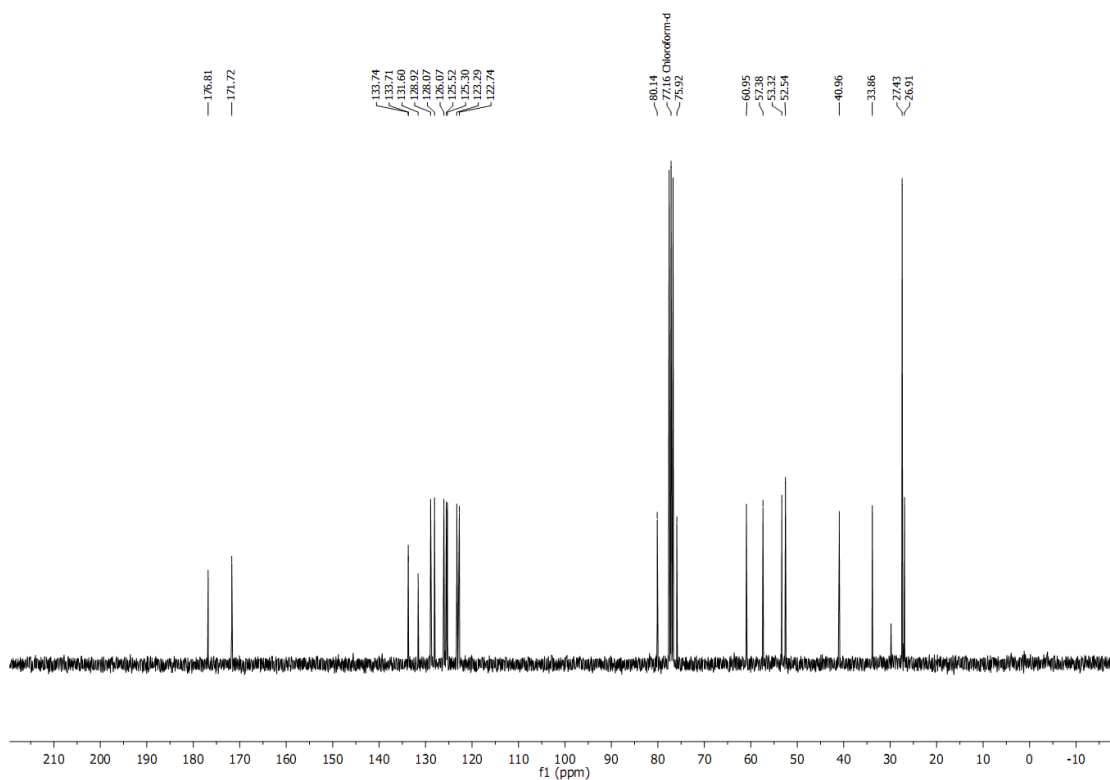
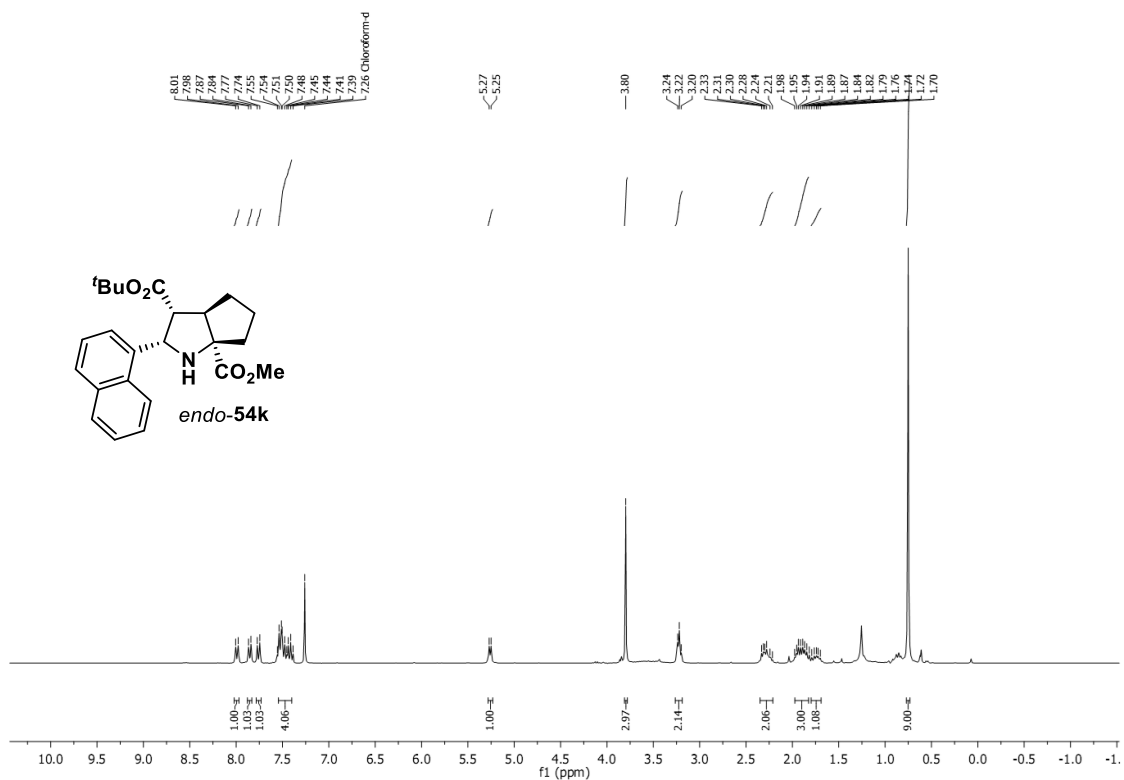
(2*S, 3*R**, 3*aR**, 6*aR**)-3-*tert*-Butyl 6*a*-methyl 2-(2-*tolyl*)octahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*endo*-54i)**



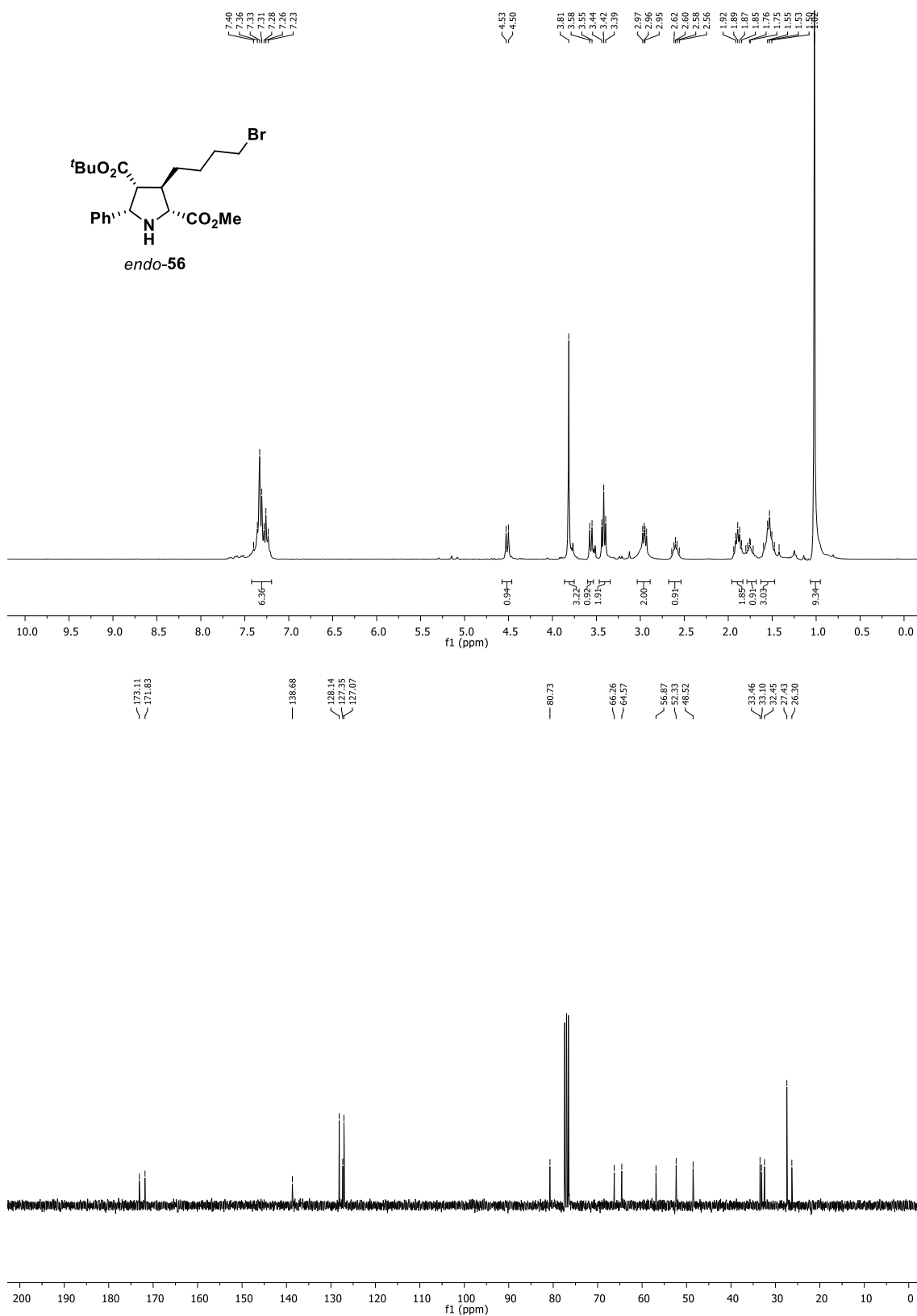
(2*S, 3*R**, 3*aR**, 6*aR**)-3-*tert*-Butyl 6*a*-methyl 2-(naphthalen-2-yl)octahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*endo*-54j)**



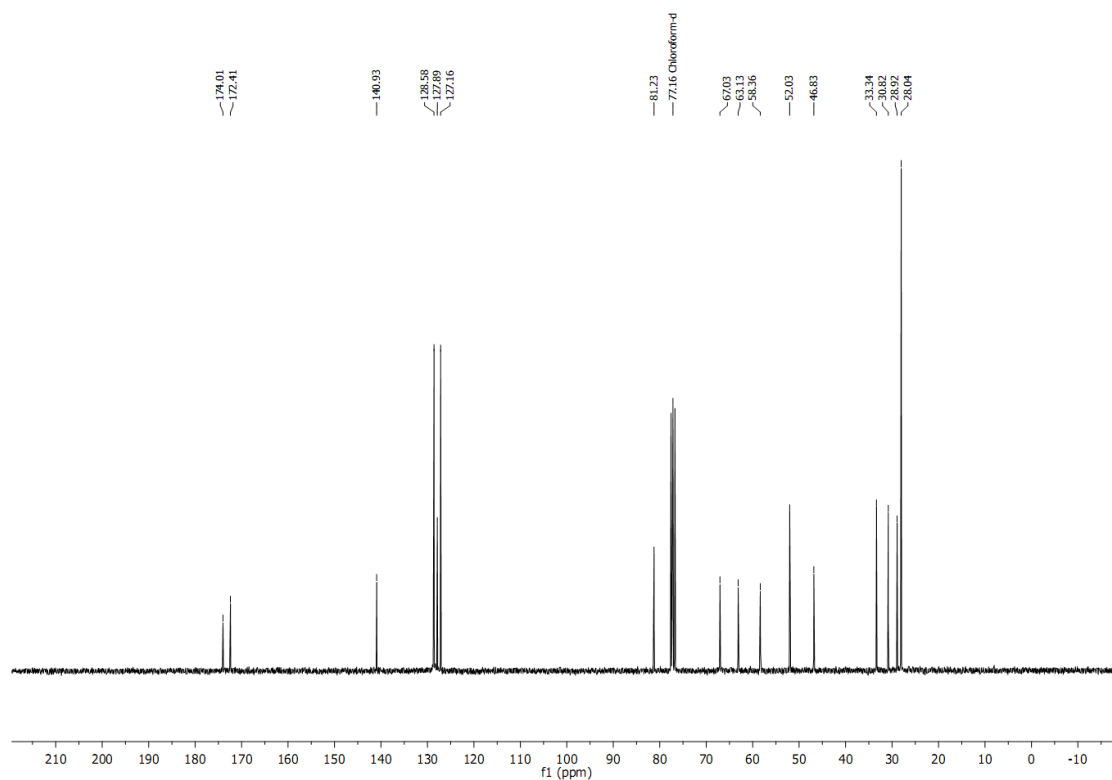
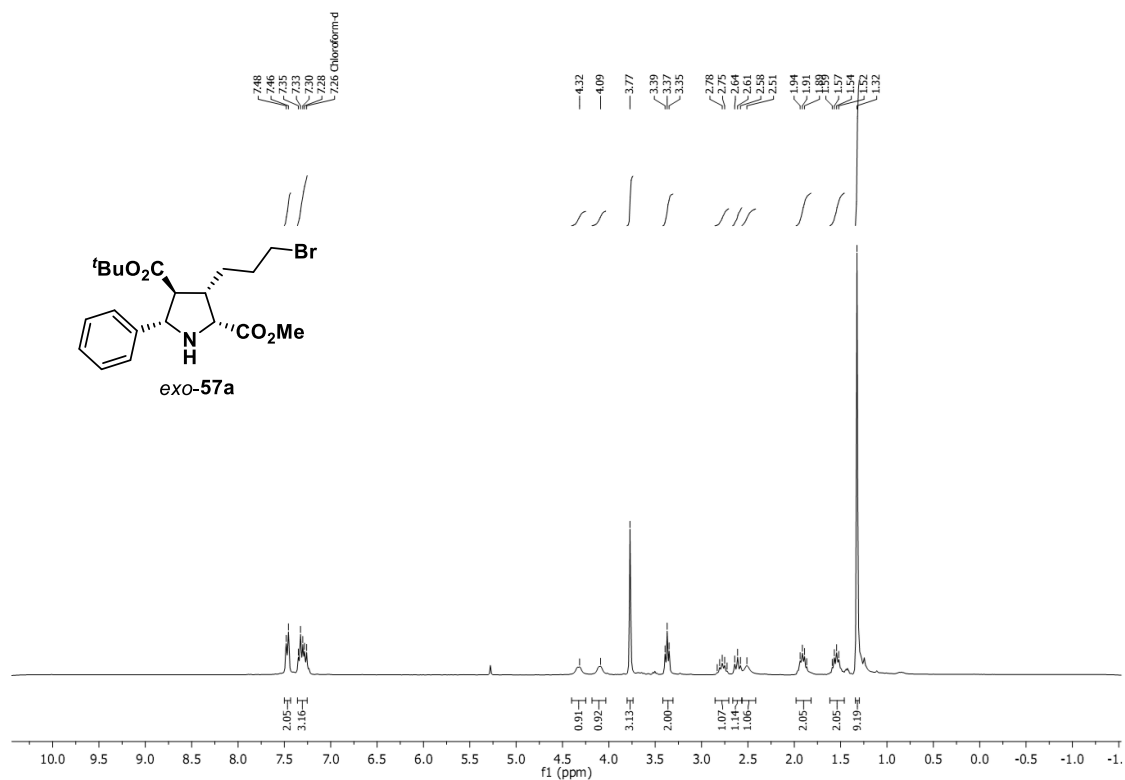
(2*S, 3*R**, 3*aR**, 6*aR**)-3-*tert*-Butyl 6*a*-methyl 2-(naphthalen-1-yl)octahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*endo*-54k)**

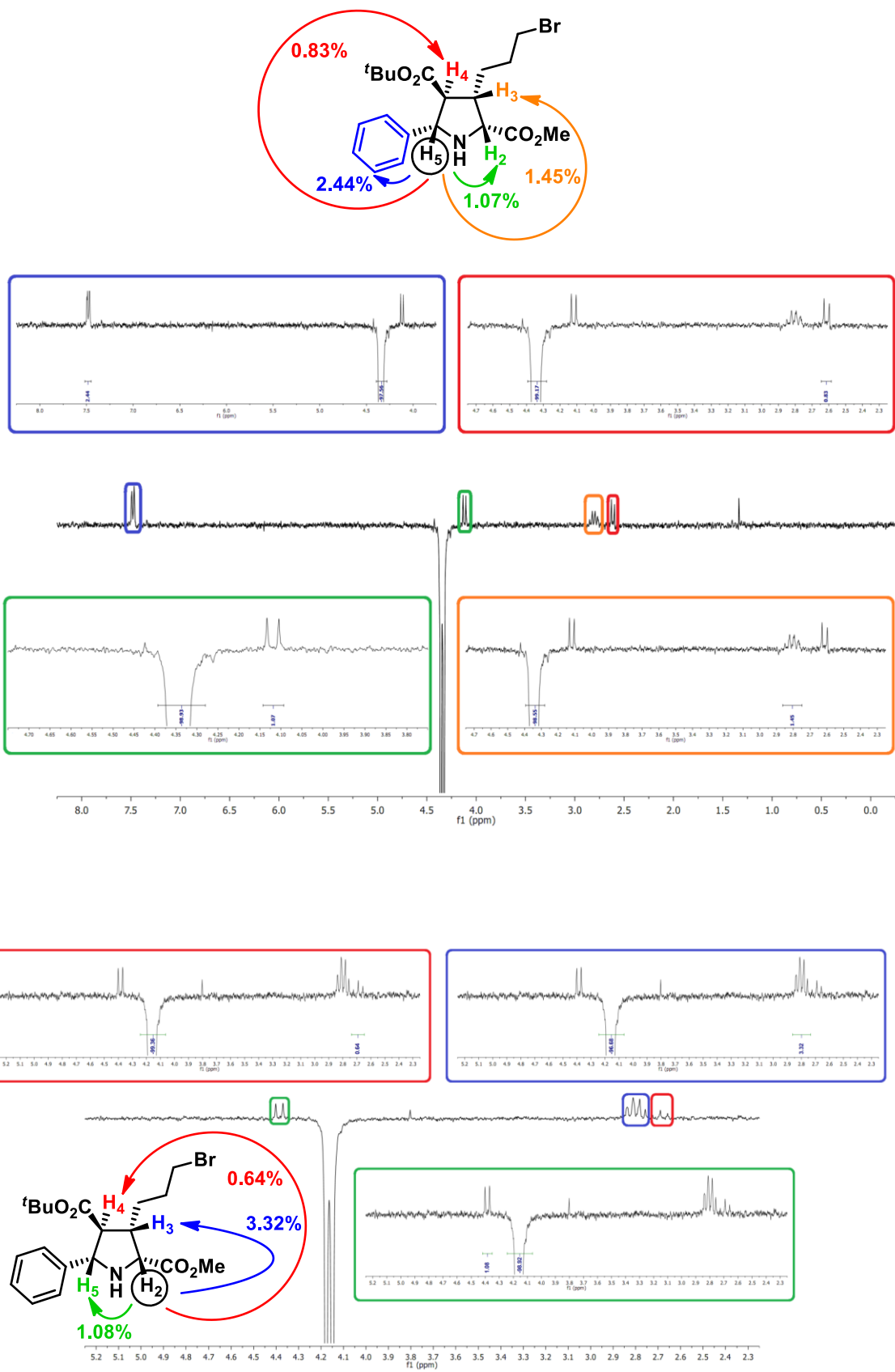


(2*S, 3*R**, 4*R**, 5*S**)-4-*tert*-Butyl 2-methyl 3-(4-bromobutyl)-5-phenylpyrrolidine-2,4-dicarboxylate (*endo*-56)**

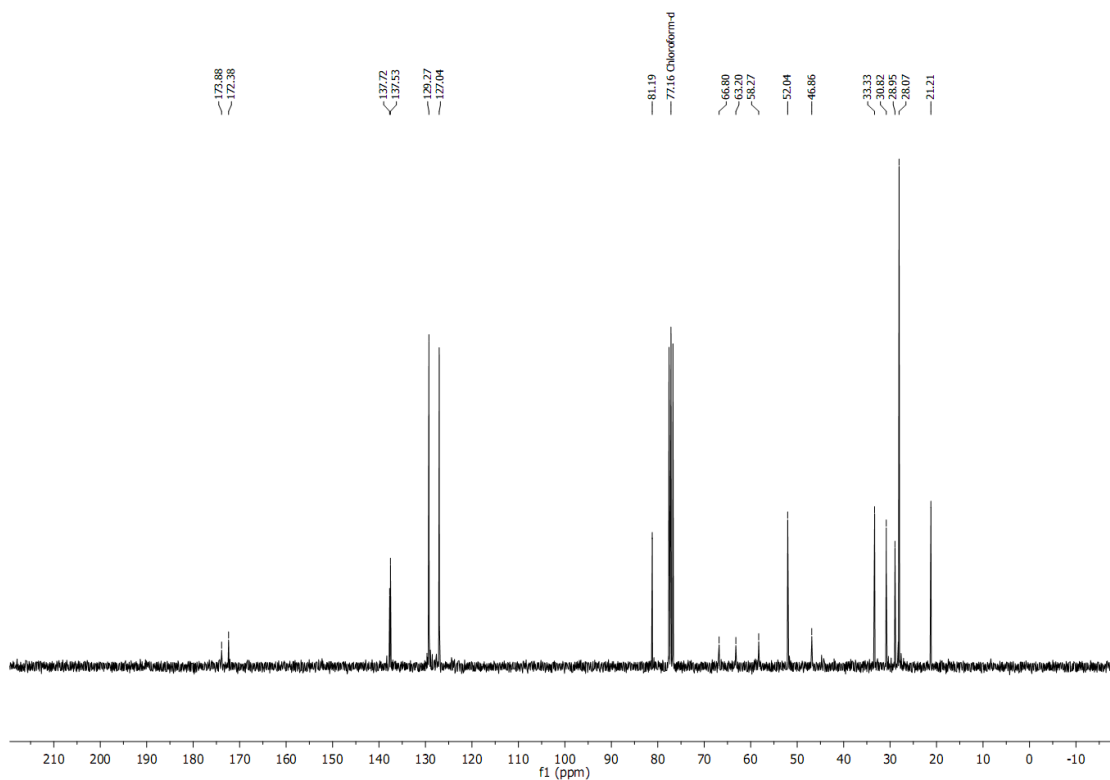
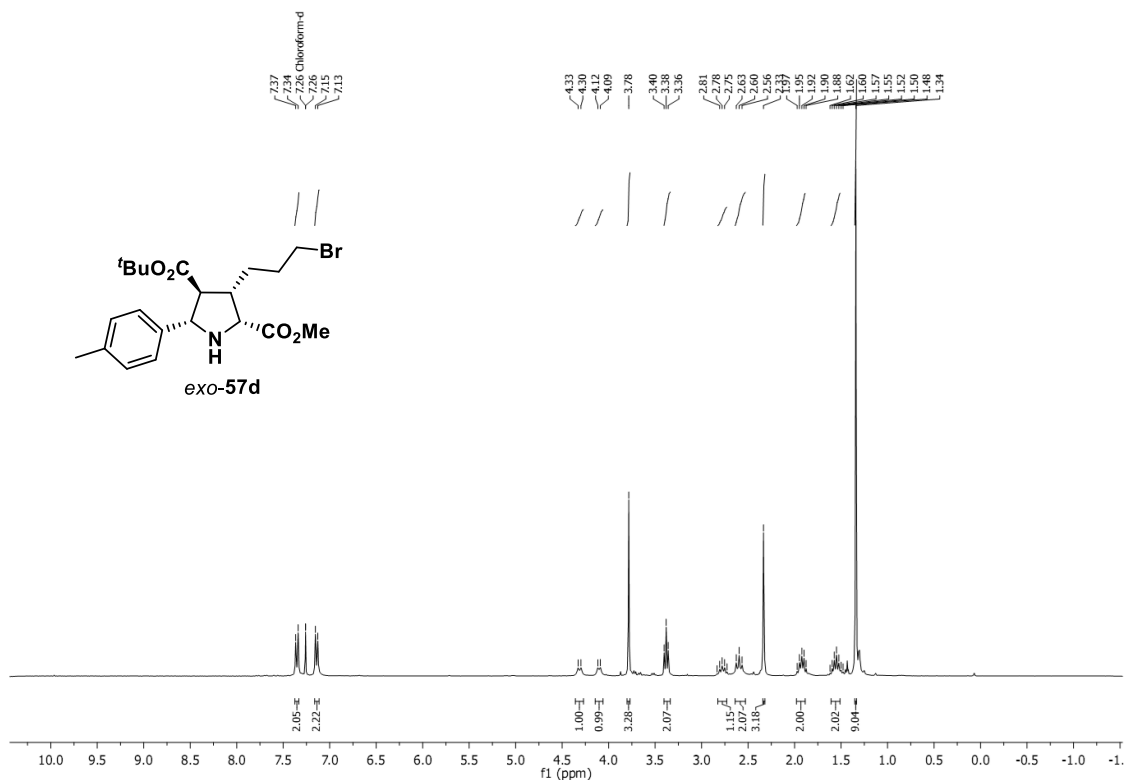


(2*R*, 3*S*, 4*S*, 5*S*)-4-*tert*-Butyl 2-methyl 3-(3-bromopropyl)-5-phenylpyrrolidine-2,4-dicarboxylate (*exo*-57a)

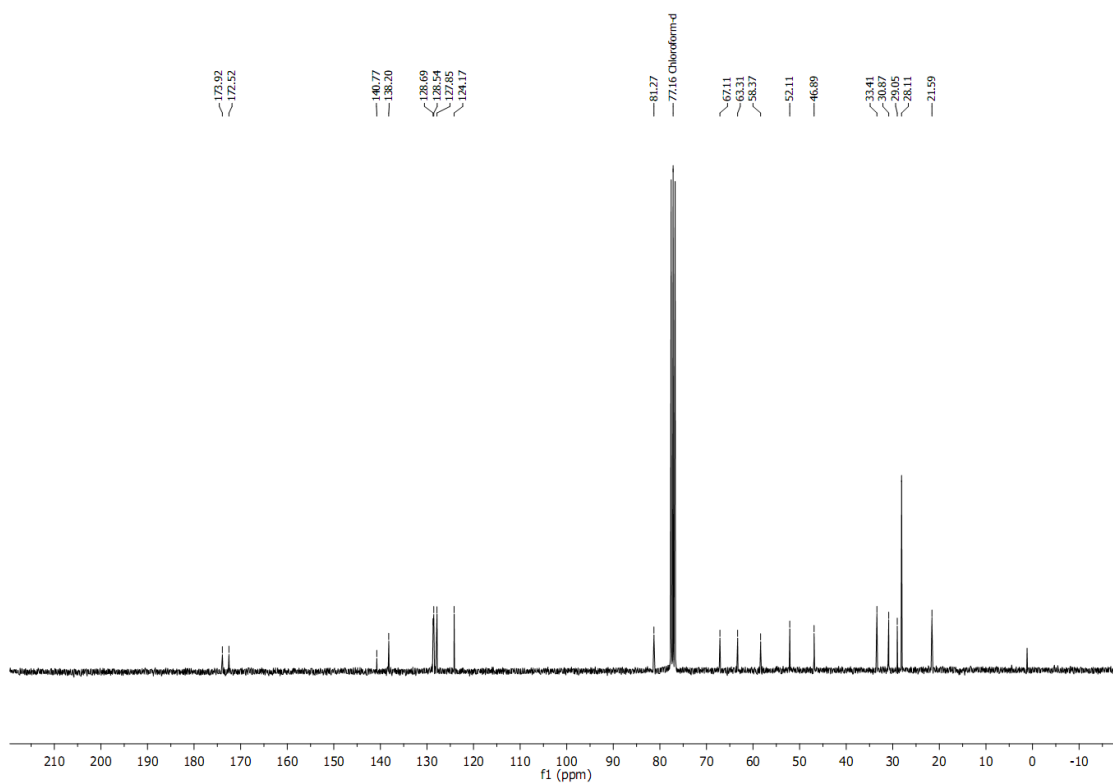
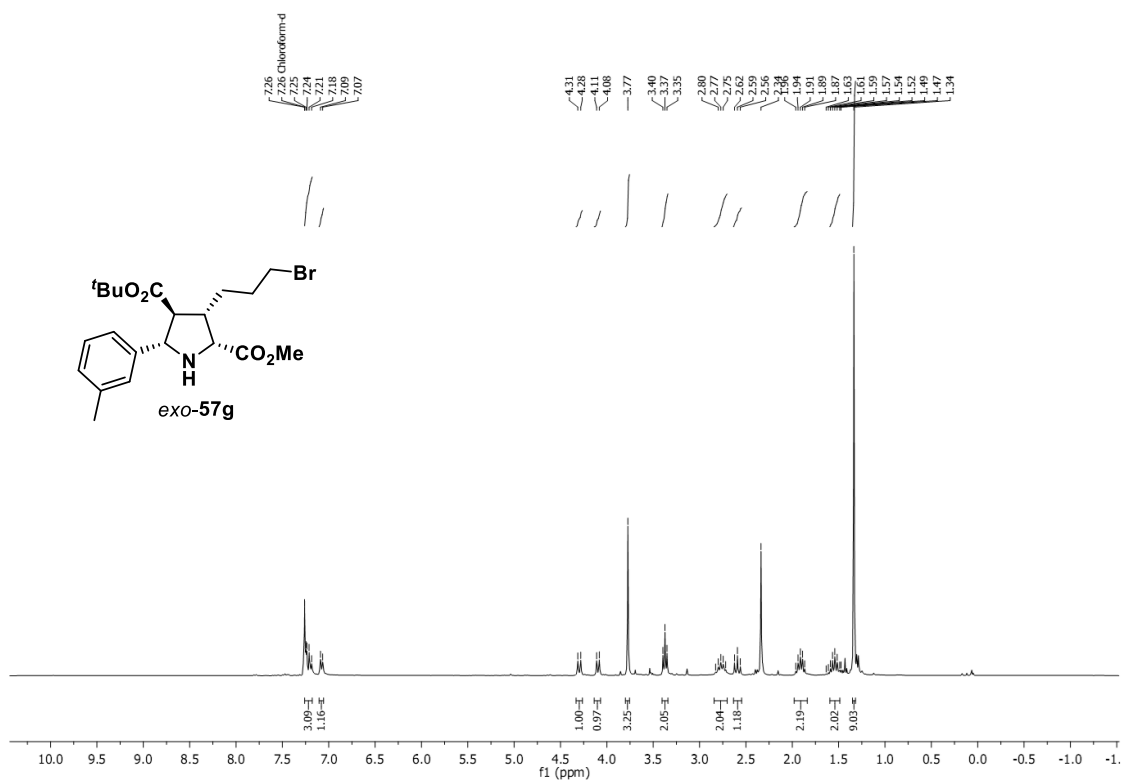




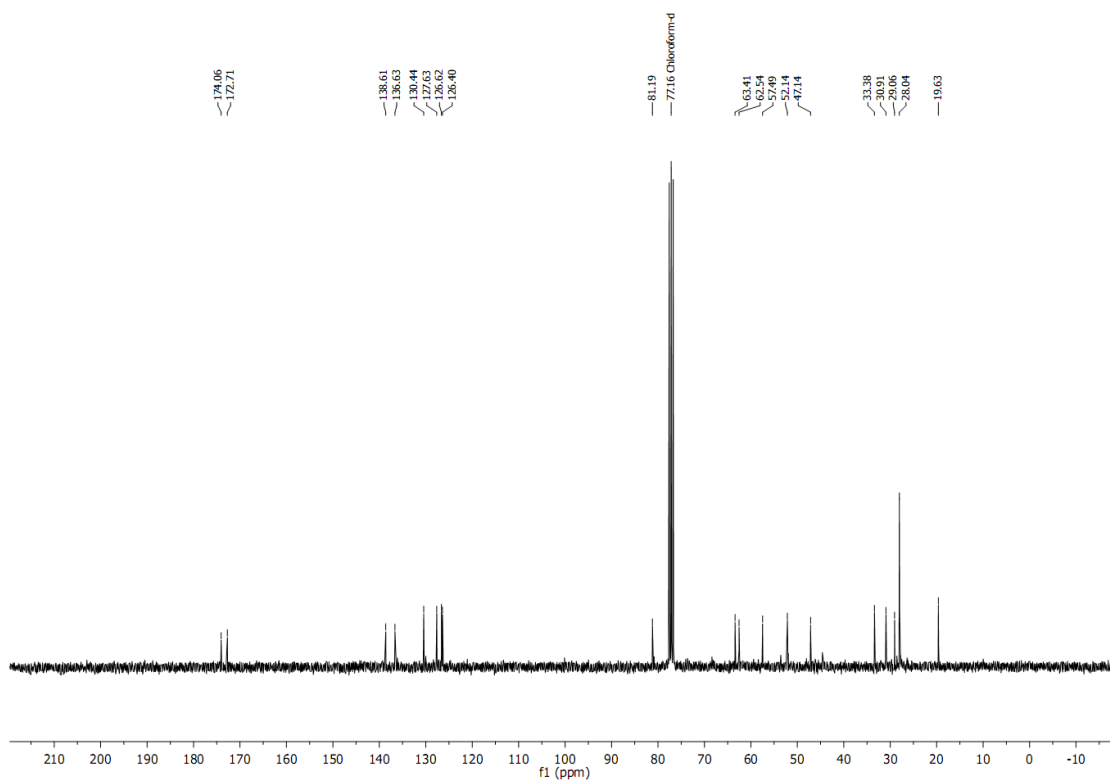
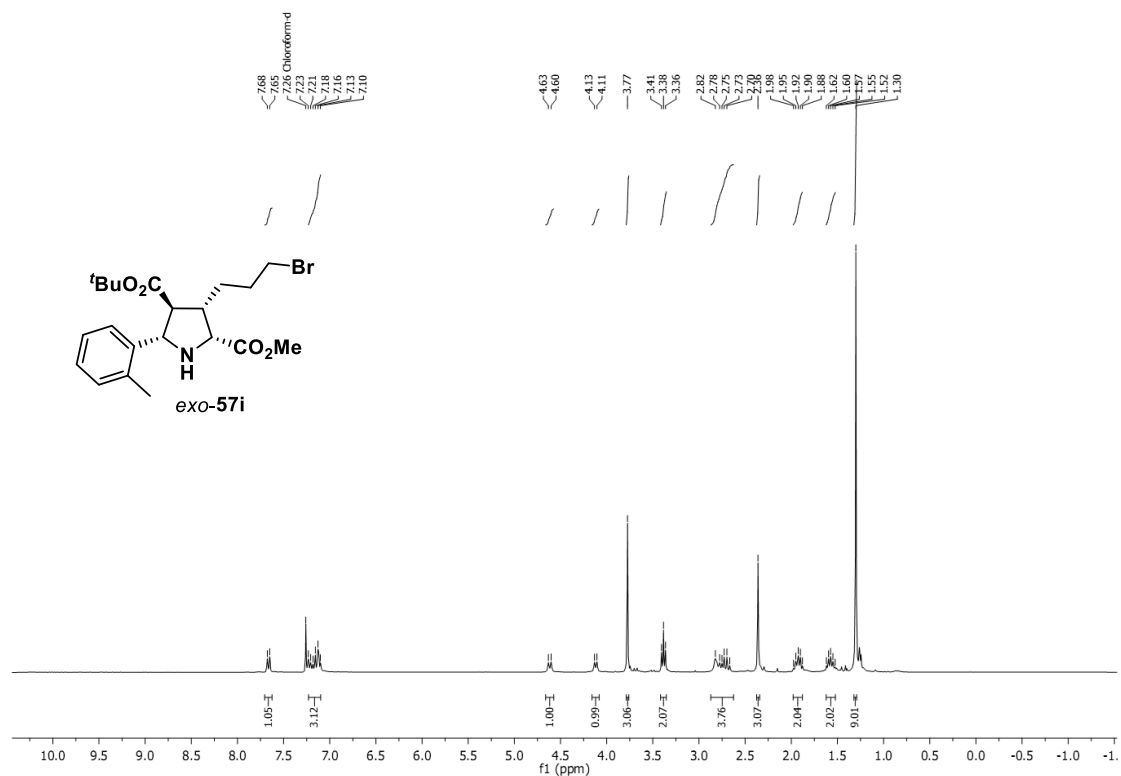
(2*R*, 3*S*, 4*S*, 5*S*)-4-*tert*-Butyl 2-methyl 3-(3-bromopropyl)-5-(4-methylphenyl)pyrrolidine-2,4-dicarboxylate (*exo*-57d)



(2*R*, 3*S*, 4*S*, 5*S*)-4-*tert*-Butyl 2-methyl 3-(3-bromopropyl)-5-(3-methylphenyl)pyrrolidine-2,4-dicarboxylate (*exo*-57g)



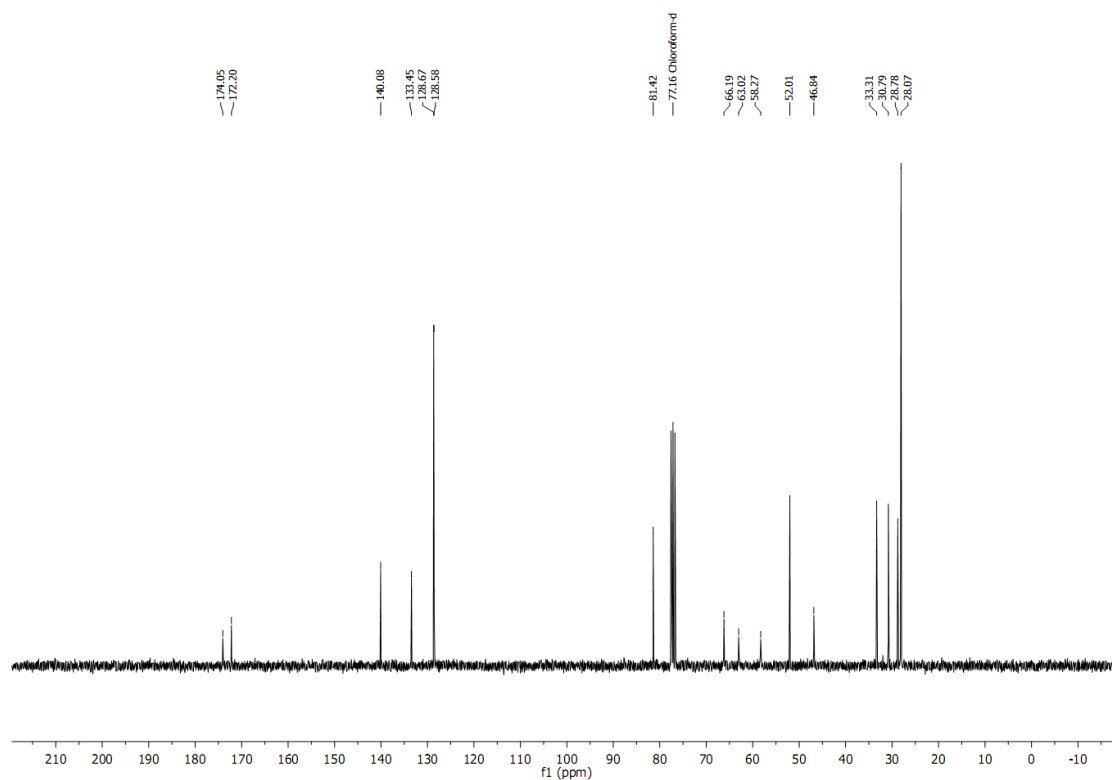
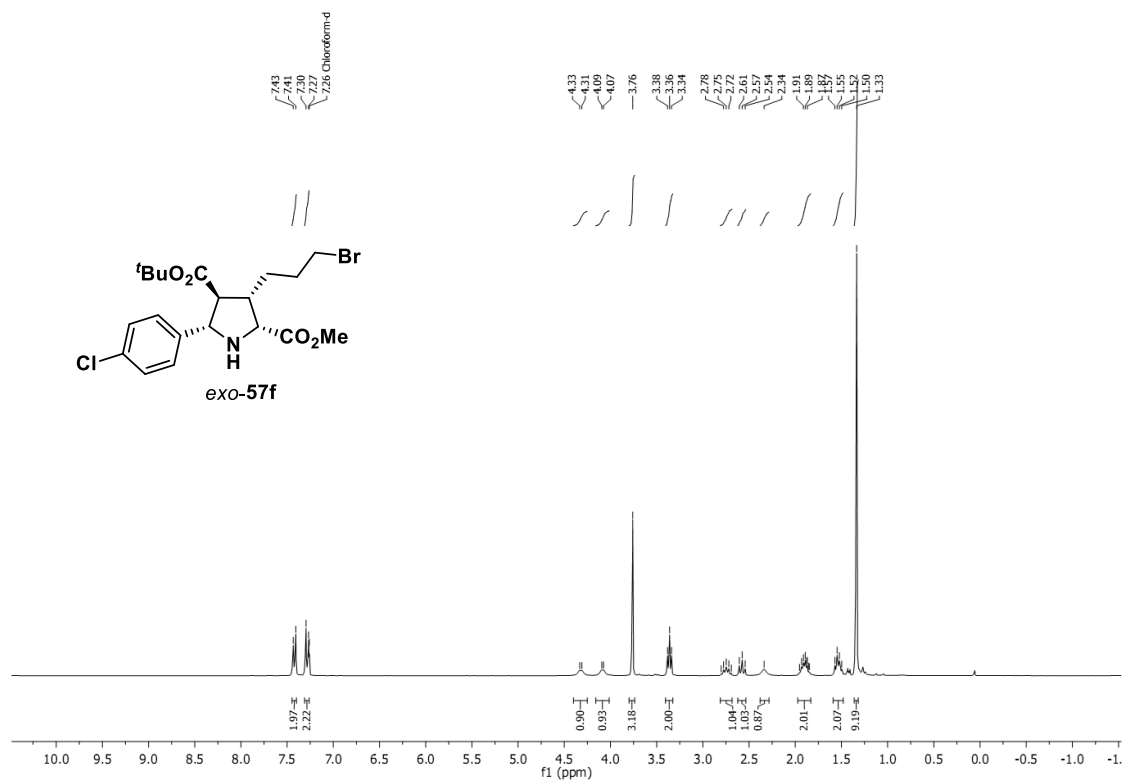
(2*R*, 3*S*, 4*S*, 5*S*)-4-*tert*-Butyl 2-methyl 3-(3-bromopropyl)-5-(2-methylphenyl)pyrrolidine-2,4-dicarboxylate (*exo*-57i)



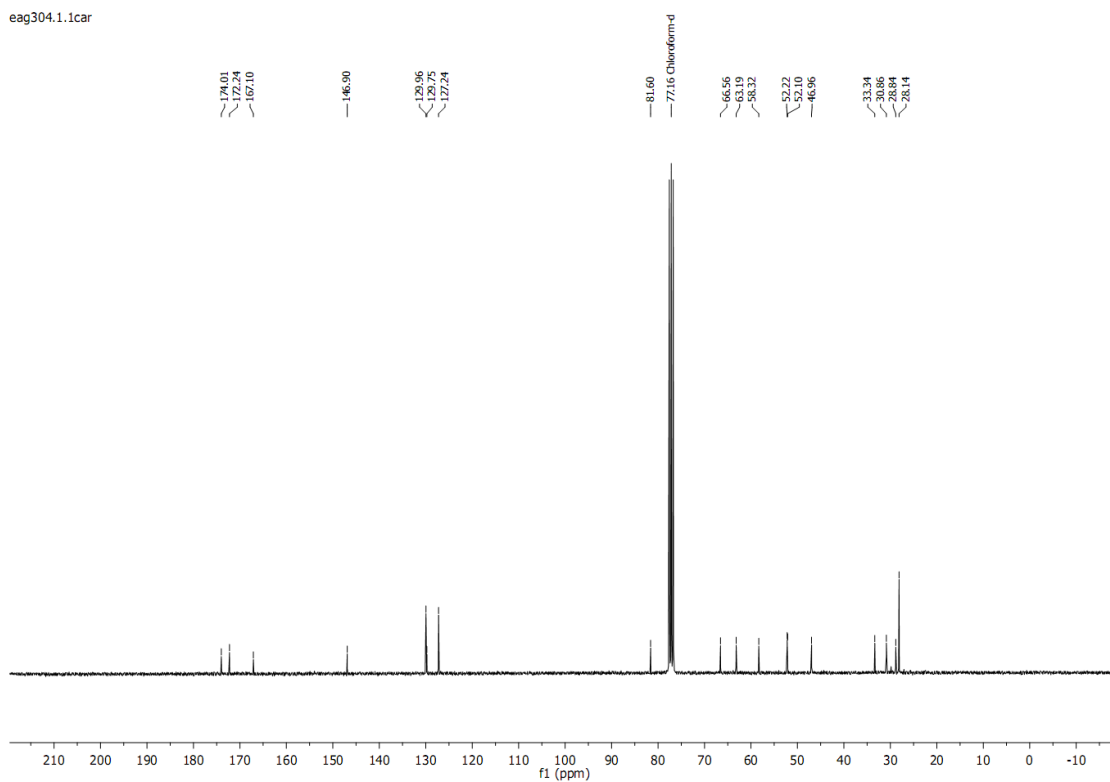
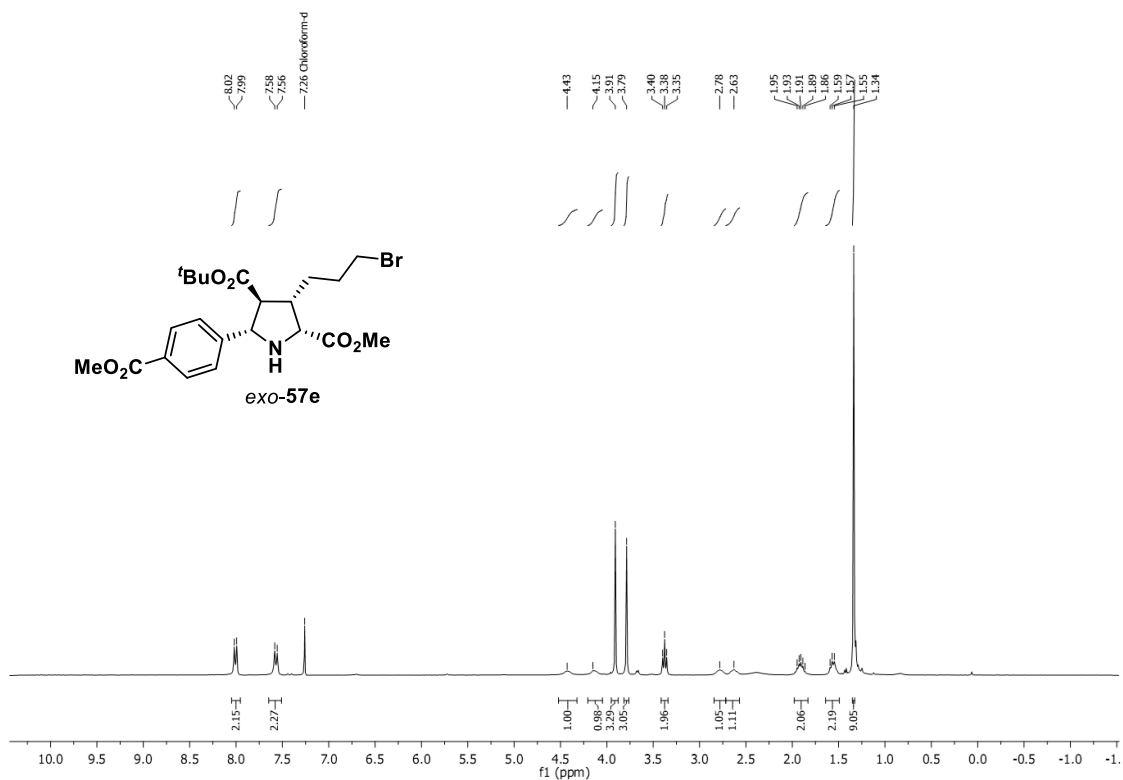
(2*R*, 3*S*, 4*S*, 5*S*)-4-*tert*-Butyl 2-methyl 3-(3-bromopropyl)-5-(4-(methylthio)phenyl)pyrrolidine-2,4-dicarboxylate (*exo*-57b)



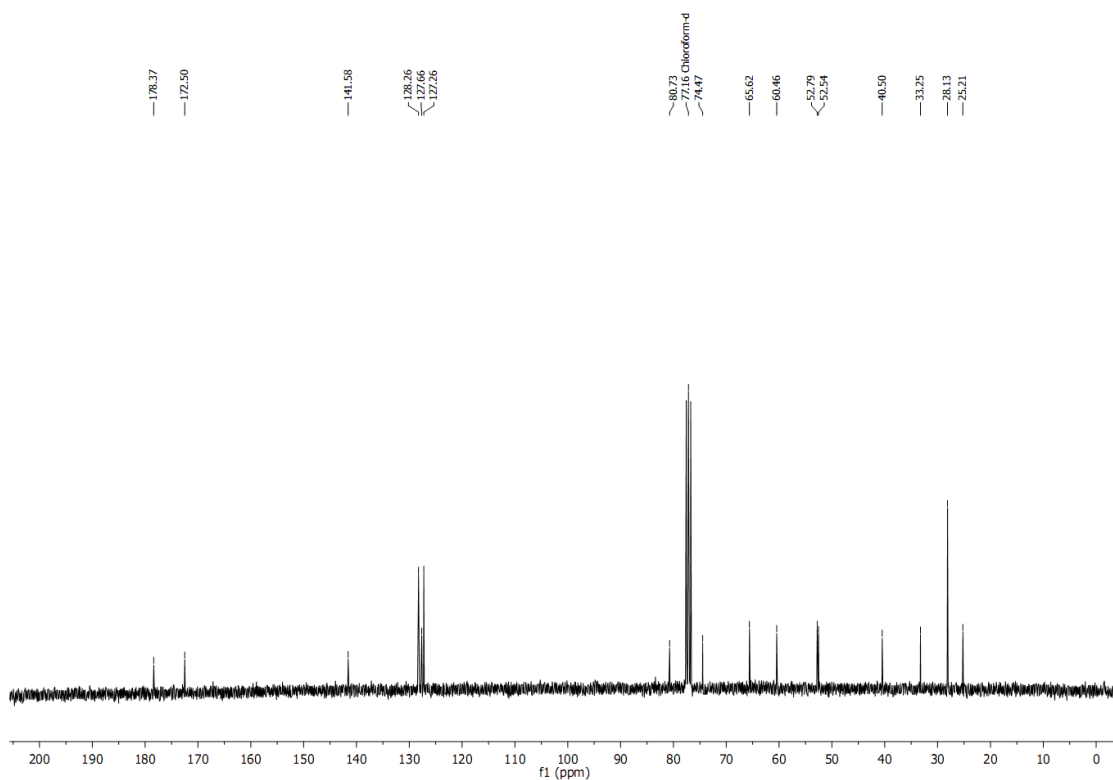
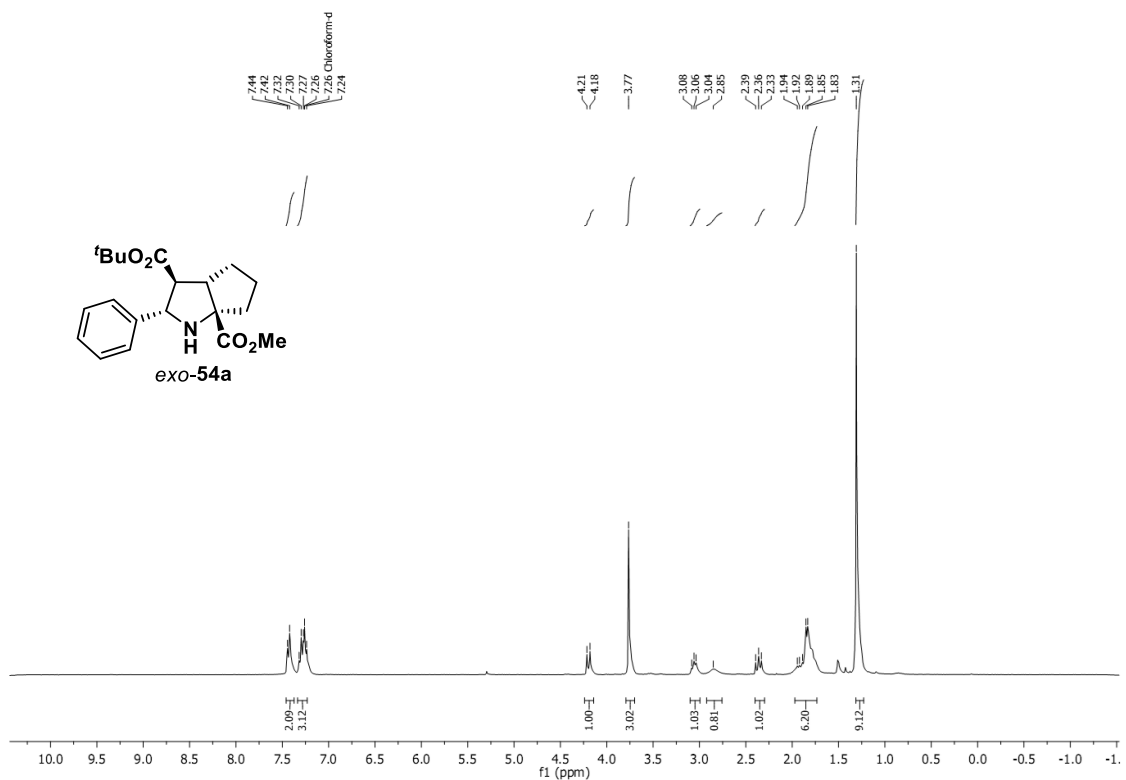
(2*R*, 3*S*, 4*S*, 5*S*)-4-*tert*-Butyl 2-methyl 3-(3-bromopropyl)-5-(4-chlorophenyl)pyrrolidine-2,4-dicarboxylate (*exo*-57f)

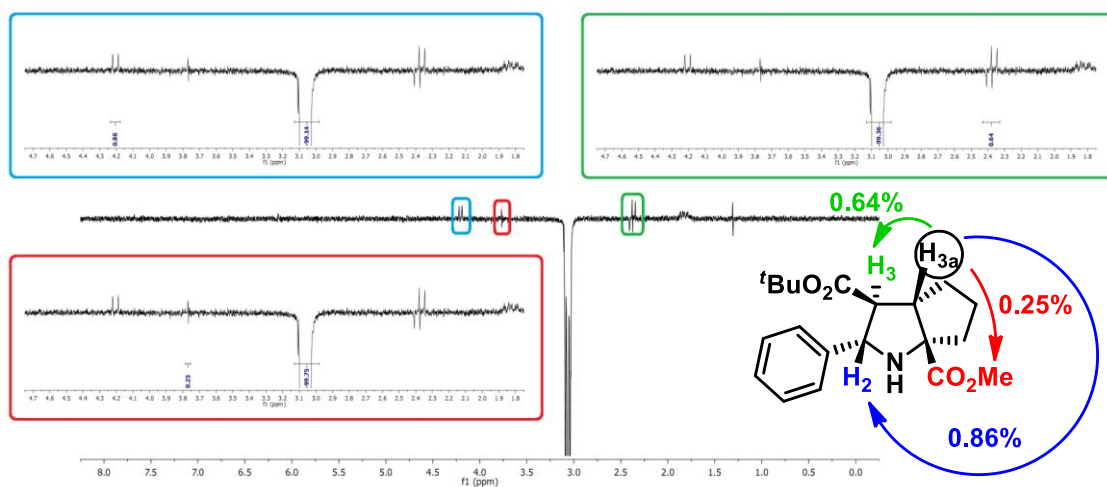
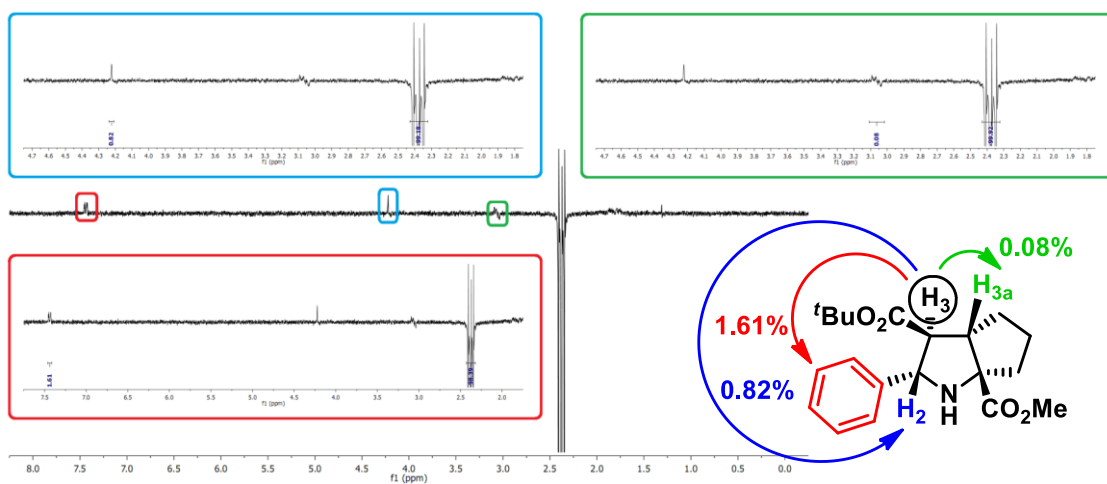
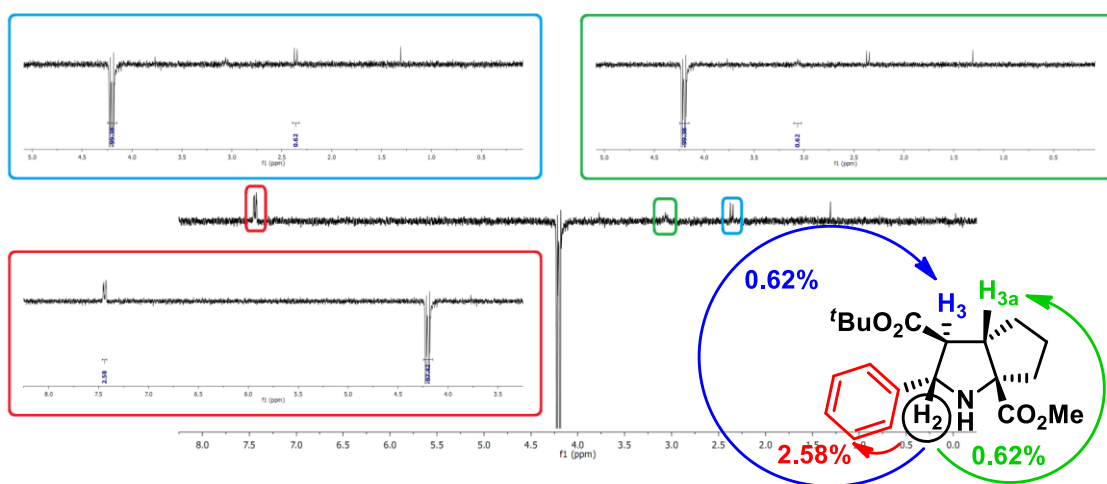


(2*R*, 3*S*, 4*S*, 5*S*)-4-*tert*-Butyl 2-methyl 3-(3-bromopropyl)-5-(4-(methoxycarbonyl)phenyl)pyrrolidine-2,4-dicarboxylate (*exo*-57e)

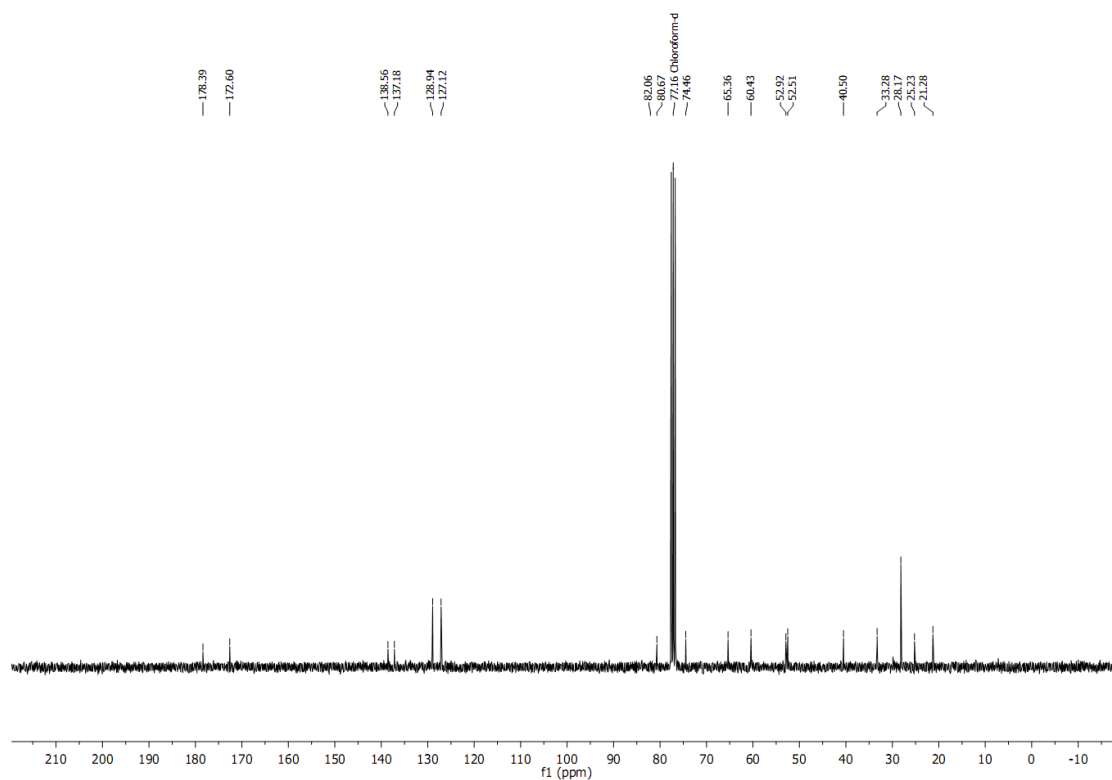
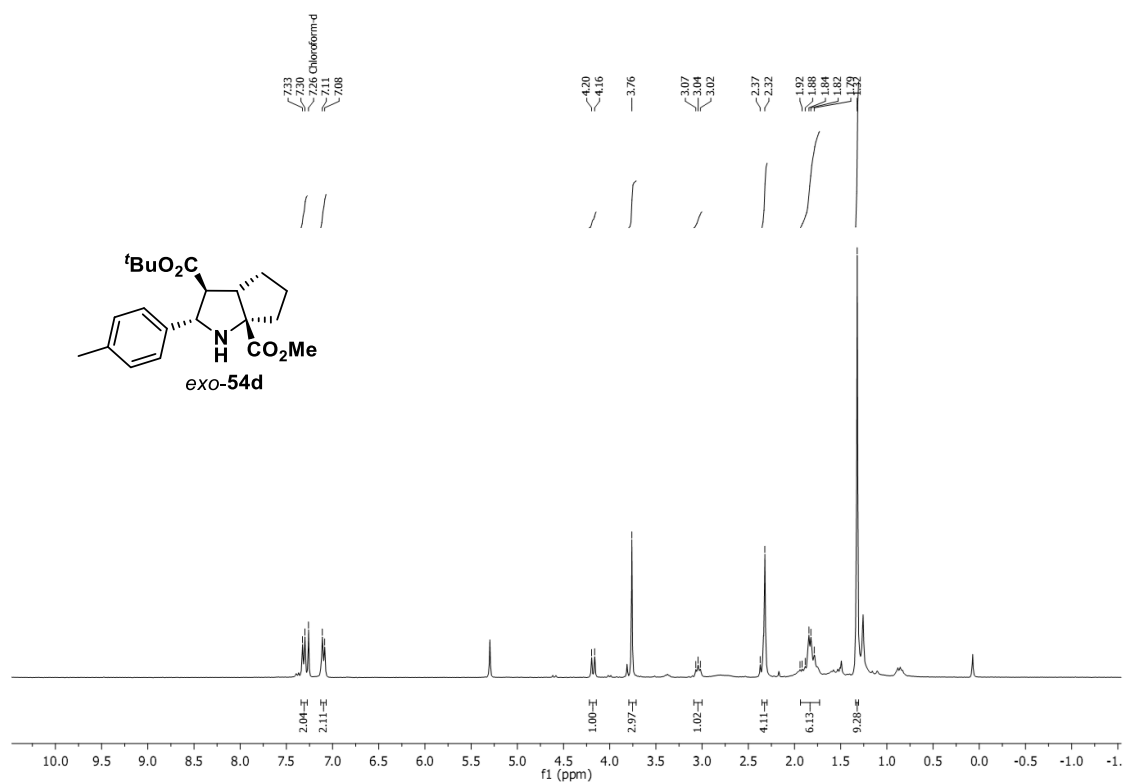


(2*S*, 3*S*, 3*aS*, 6*aS*)-3-*tert*-Butyl 6*a*-methyl 2-phenyloctahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*exo*-54*a*)

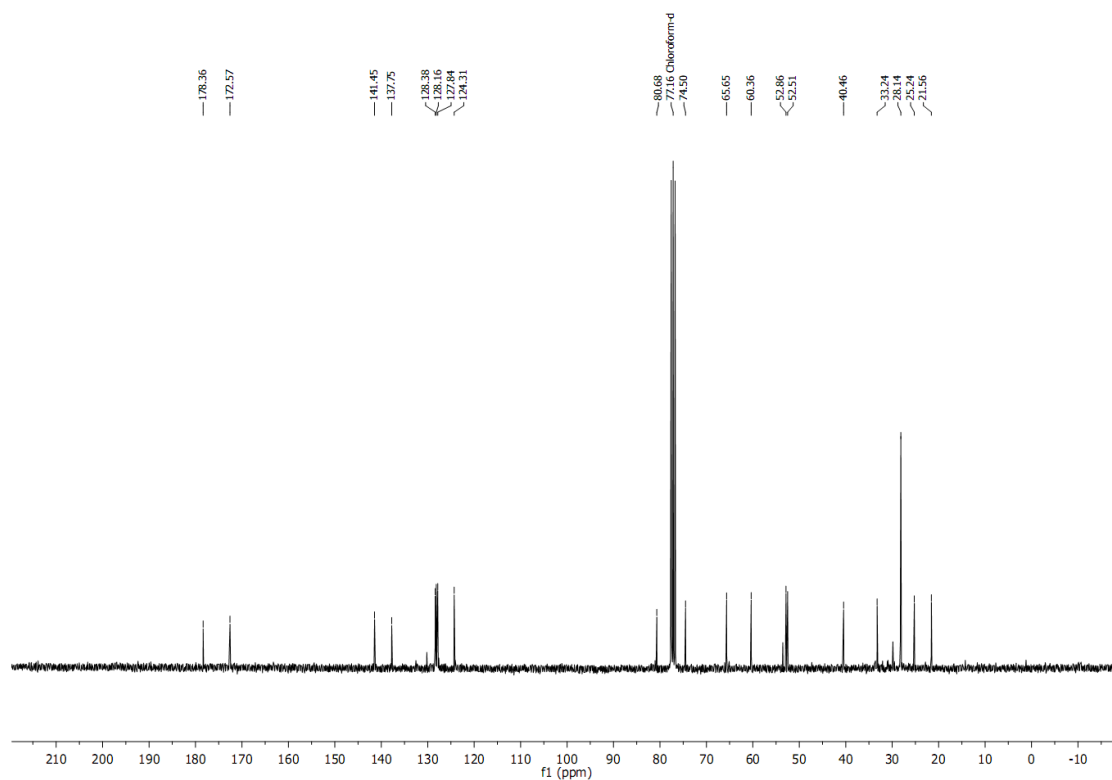
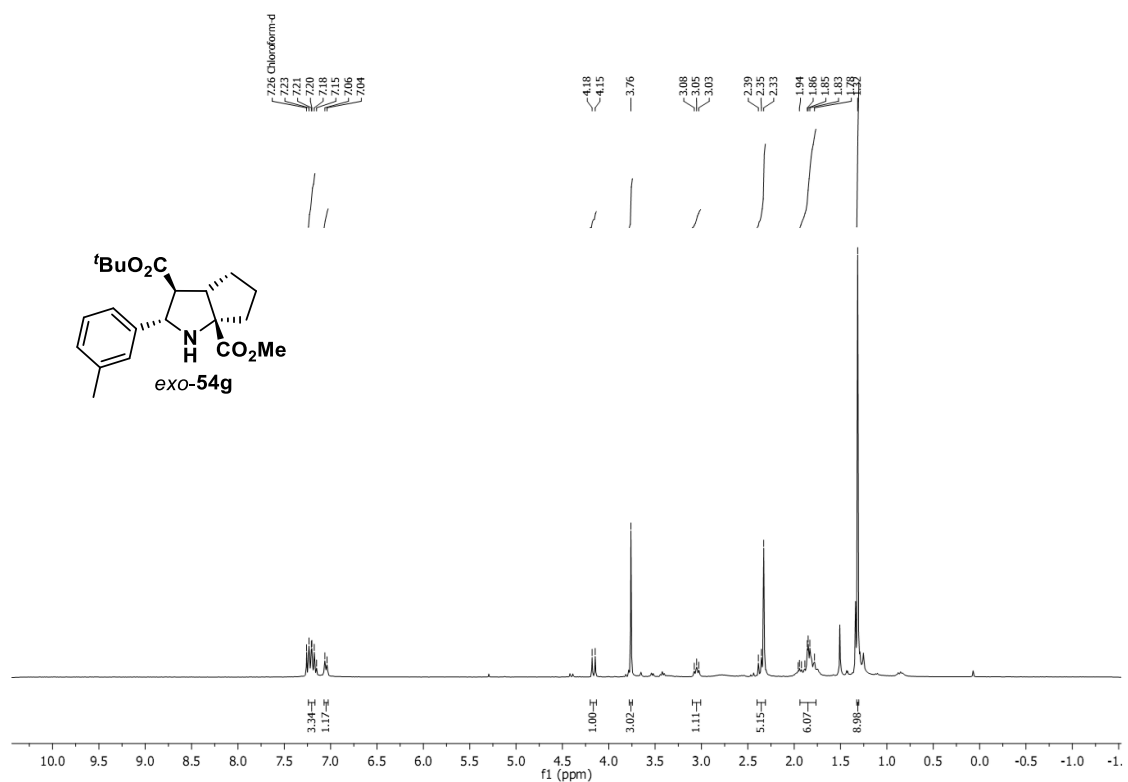




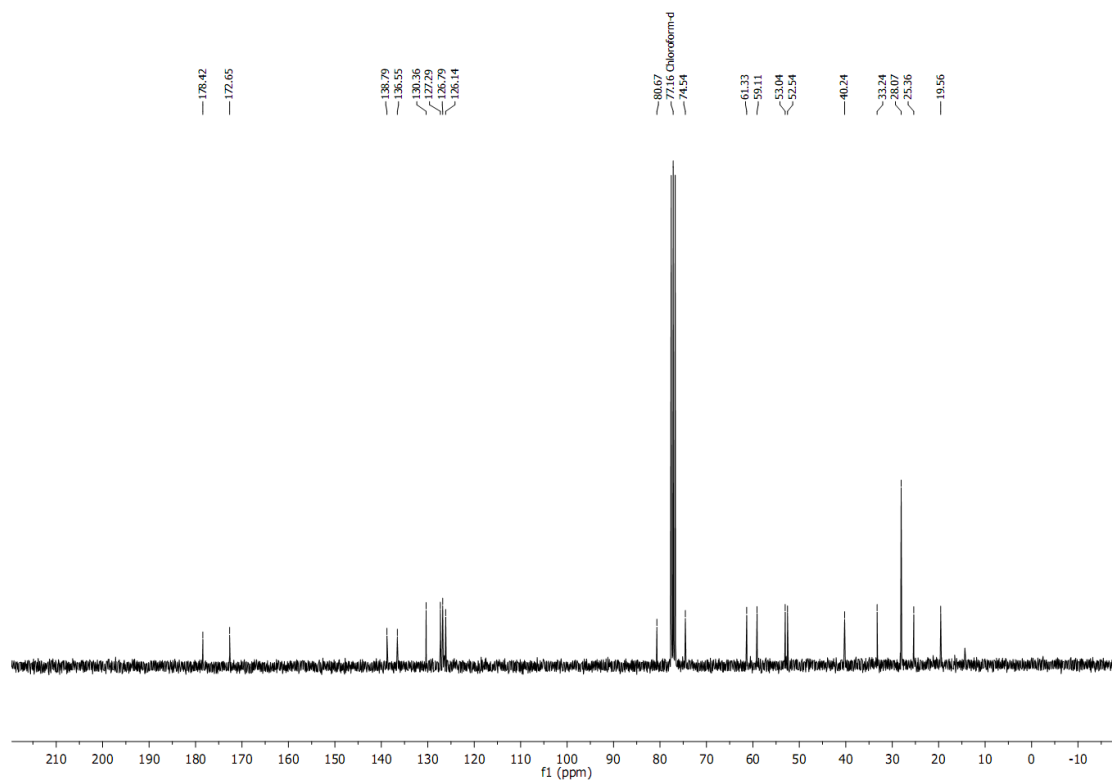
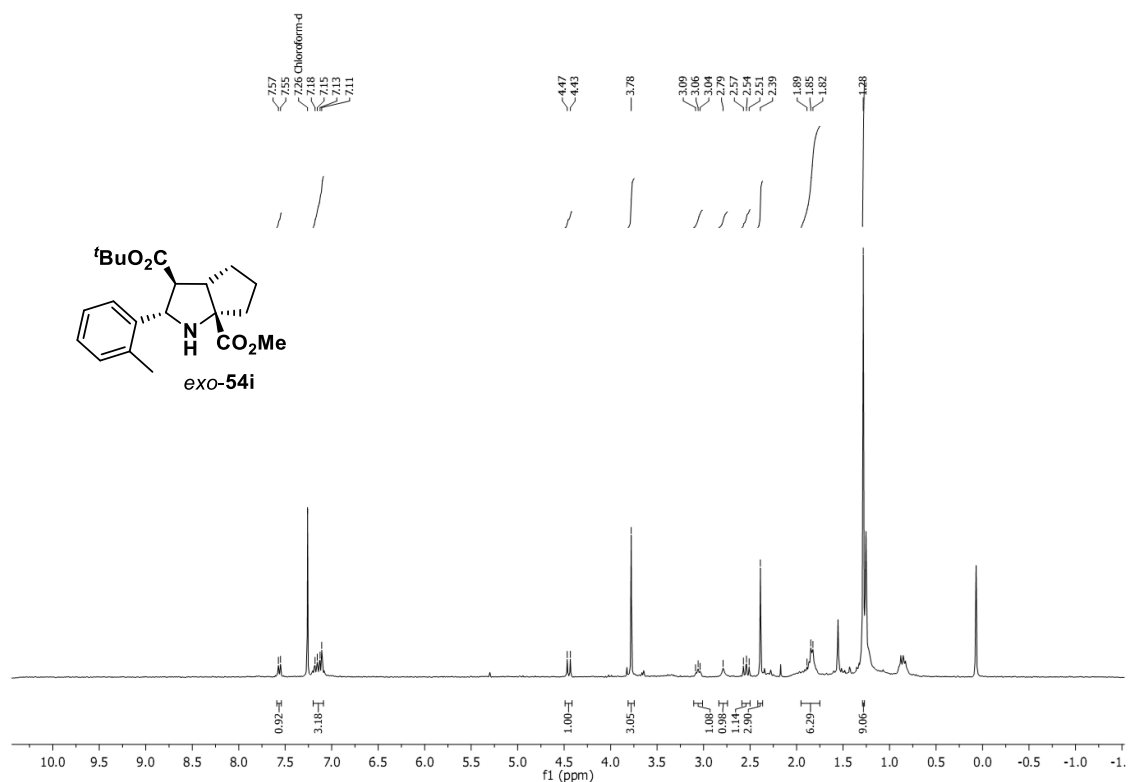
(2*S*, 3*S*, 3*aS*, 6*aS*)-3-*tert*-Butyl 6*a*-methyl 2-(4-methylphenyl)octahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*exo*-54d)



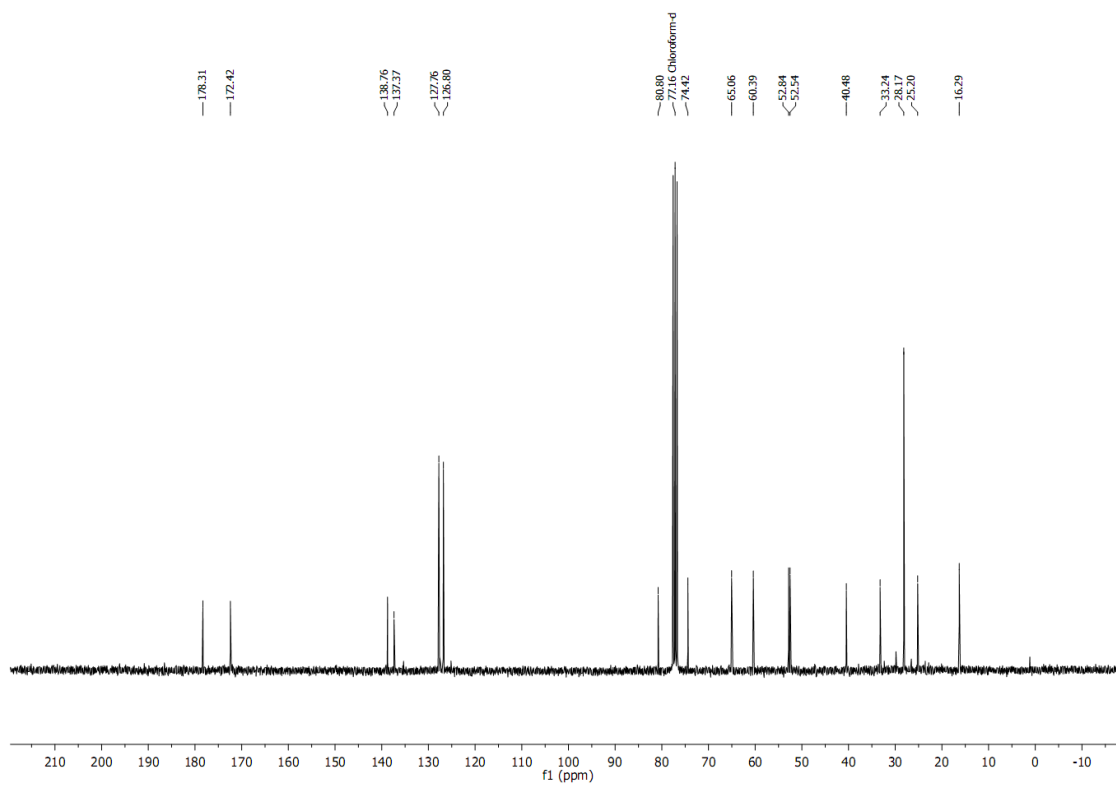
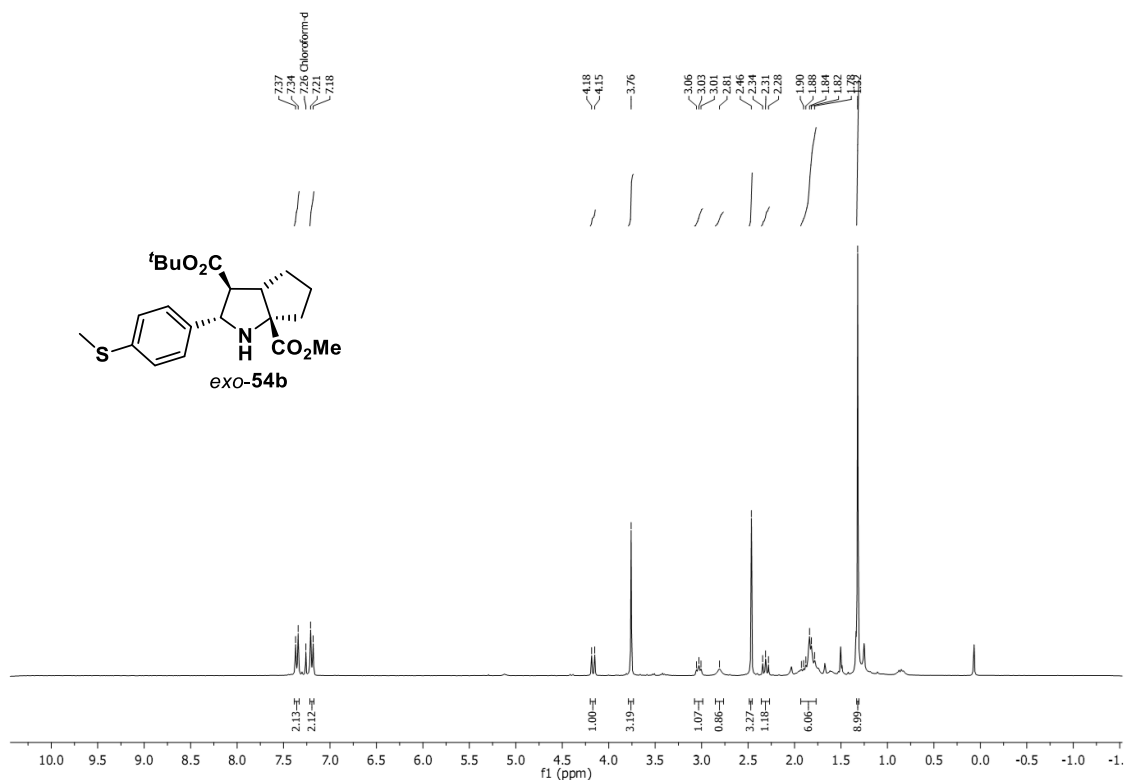
(2*S*, 3*S*, 3*aS*, 6*aS*)-3-*tert*-Butyl 6*a*-methyl 2-(3-methylphenyl)octahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*exo*-54*g*)



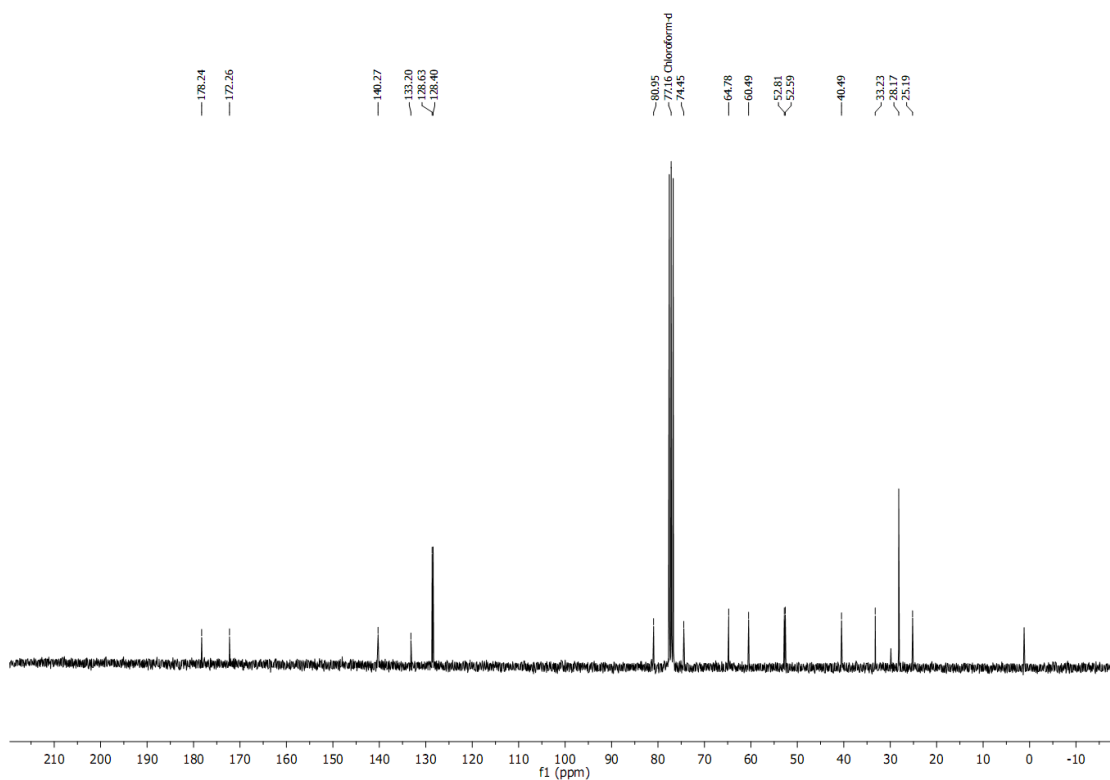
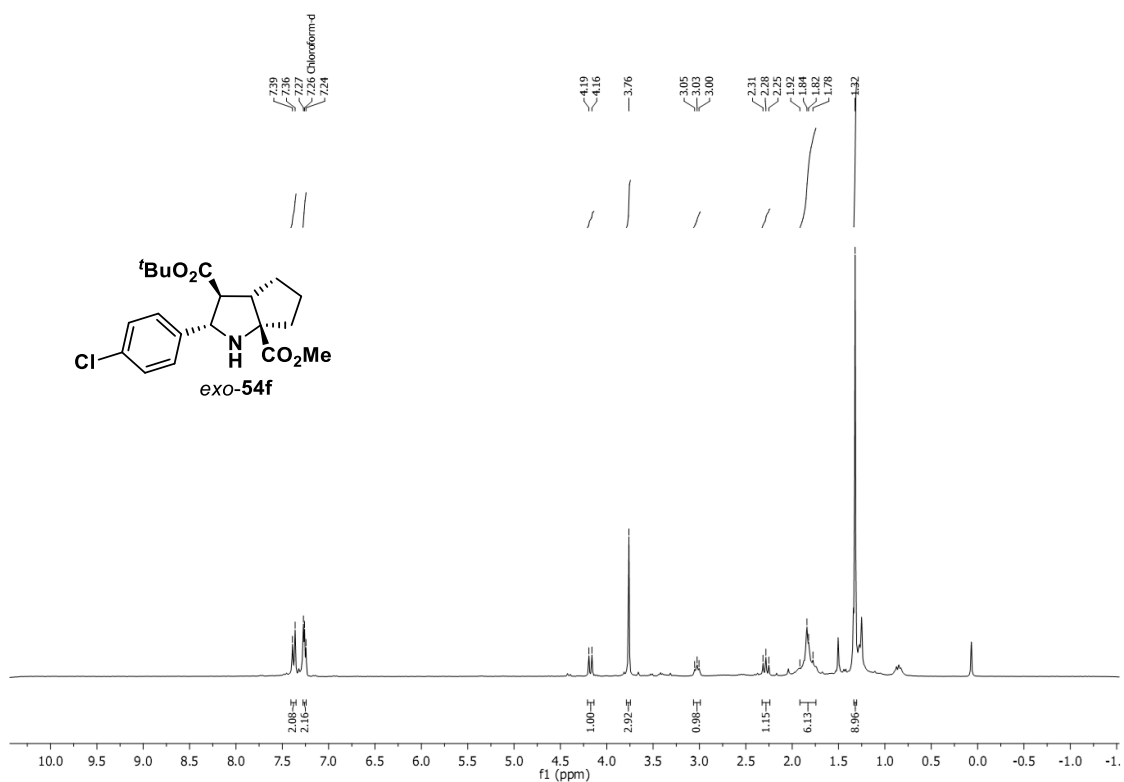
(2*S*, 3*S*, 3*aS*, 6*aS*)-3-*tert*-Butyl 6*a*-methyl 2-(2-methylphenyl)octahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*exo*-54i)



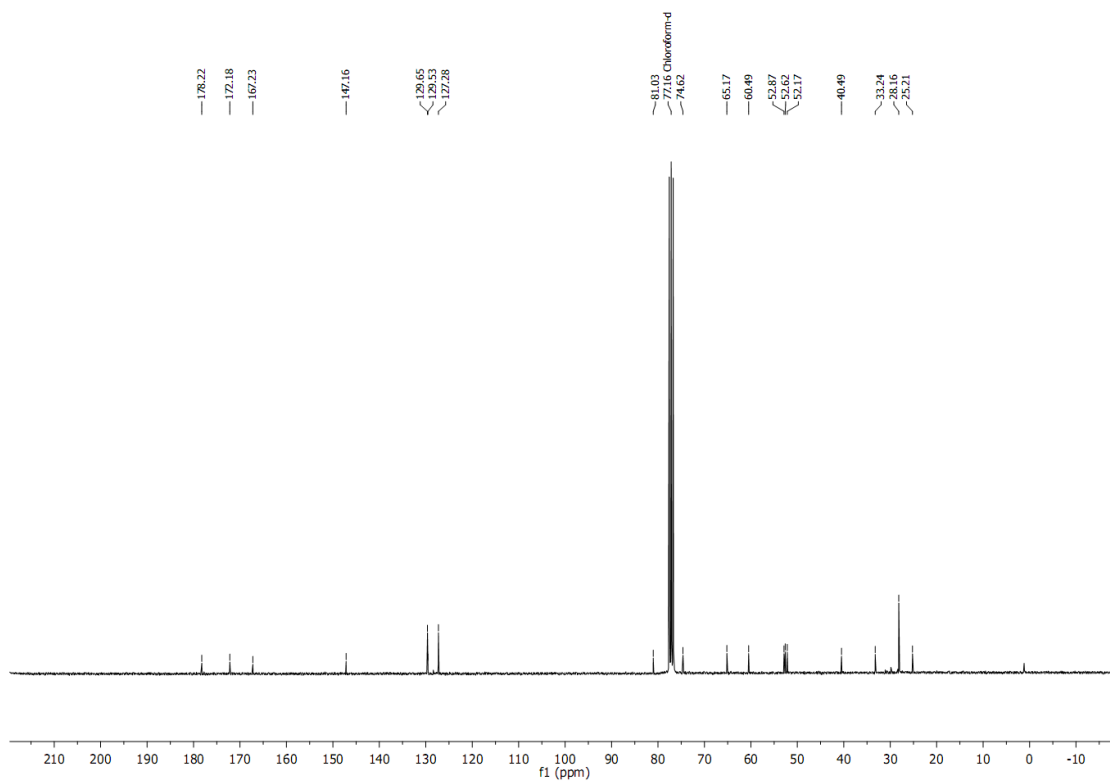
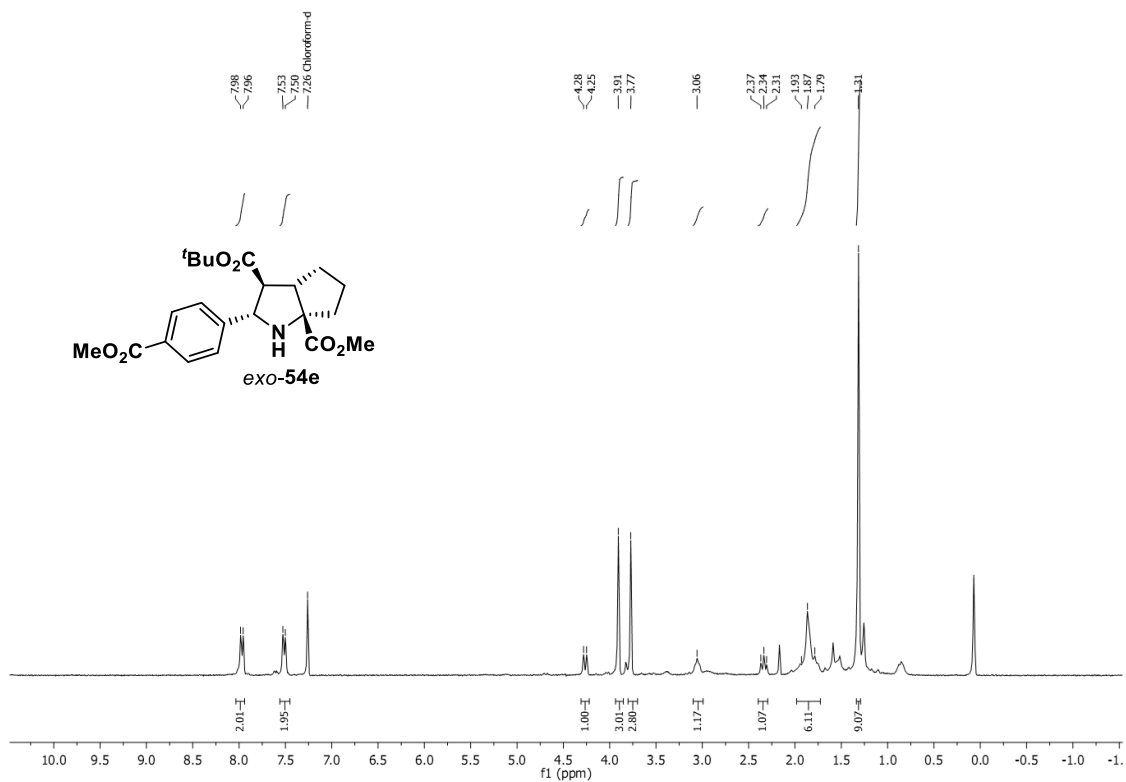
(2*S*, 3*S*, 3*aS*, 6*aS*)-3-*tert*-Butyl 6*a*-methyl 2-(4-(methylthio)phenyl)octahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*exo*-54b)



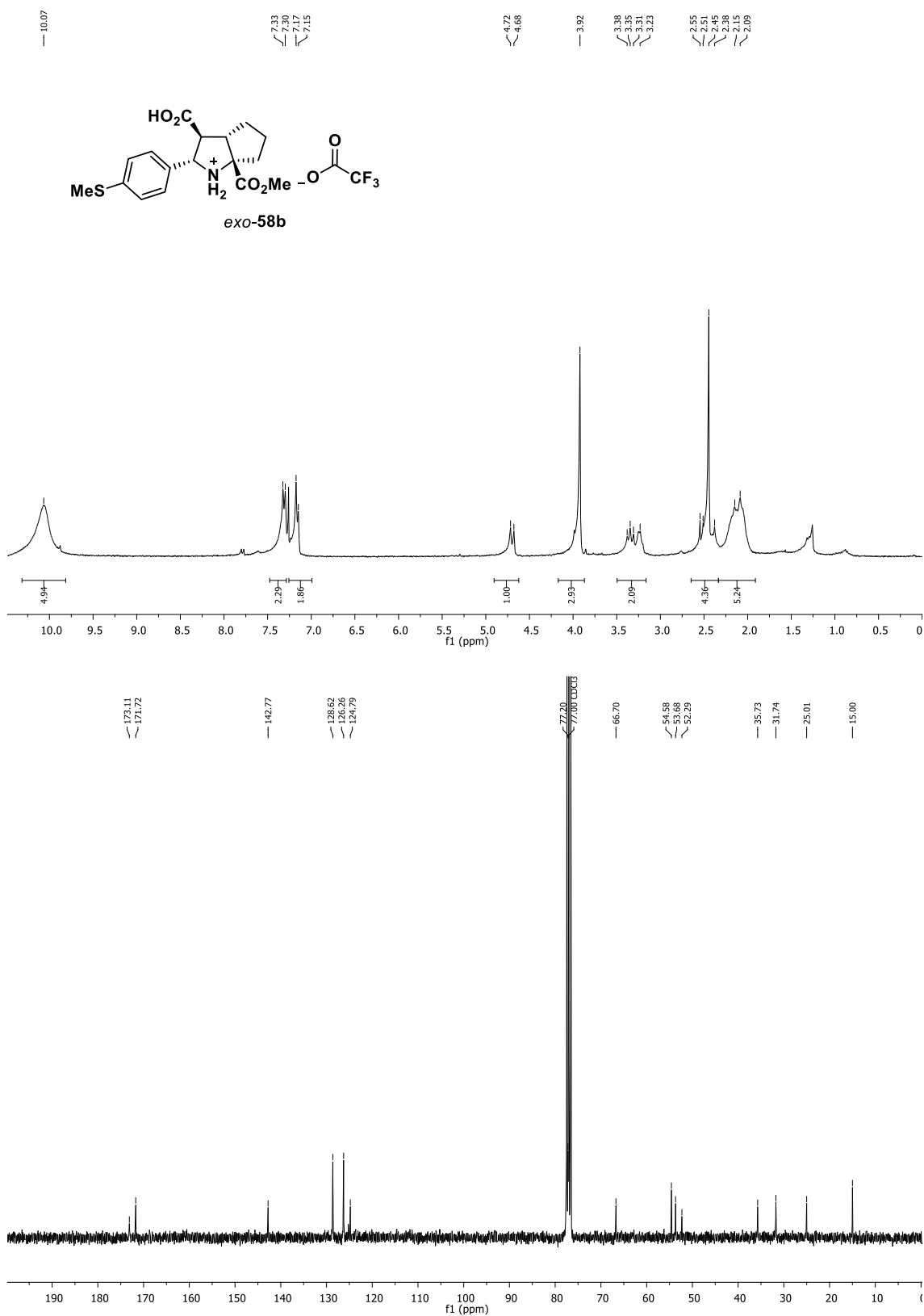
(2*S*, 3*S*, 3*aS*, 6*aS*)-3-*tert*-Butyl 6*a*-methyl 2-(4-chlorophenyl)octahydrocyclopenta[*b*]pyrrole-3,6*a*-dicarboxylate (*exo*-54f)



(2*S*, 3*S*, 3*aS*, 6*aS*)-3-*tert*-Butyl 6*a*-methyl 2-(4-(methoxycarbonyl)phenyl)octahydrocyclopenta [*b*]pyrrole-3,6*a*-dicarboxylate (*exo*-54e)

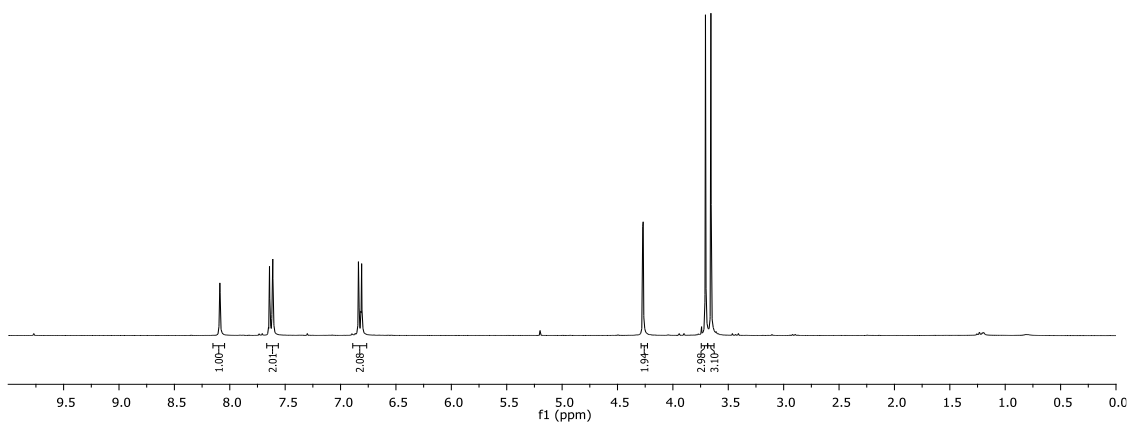
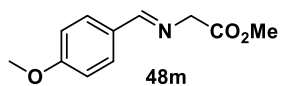


(2*S*,3*S*,3*aS*,6*aS*)-6a-(Methoxycarbonyl)-2-(4-(methylthio)phenyl)octahydrocyclopenta[*b*]pyrrole-3-carboxylic trifluoroacetate (*exo*-58b)

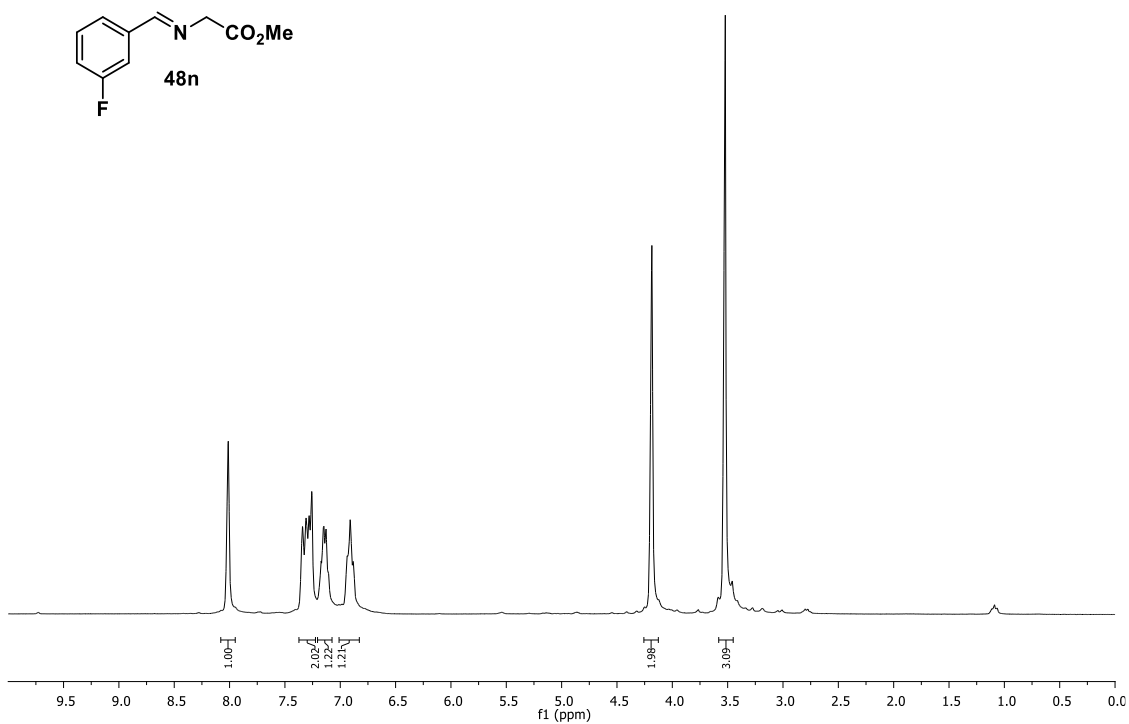
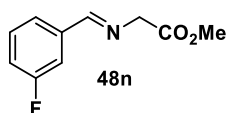


Capítulo 4: Alkenylarenes as dipolarophiles in catalytic asymmetric 1,3-dipolar cycloadditions of azomethine ylides

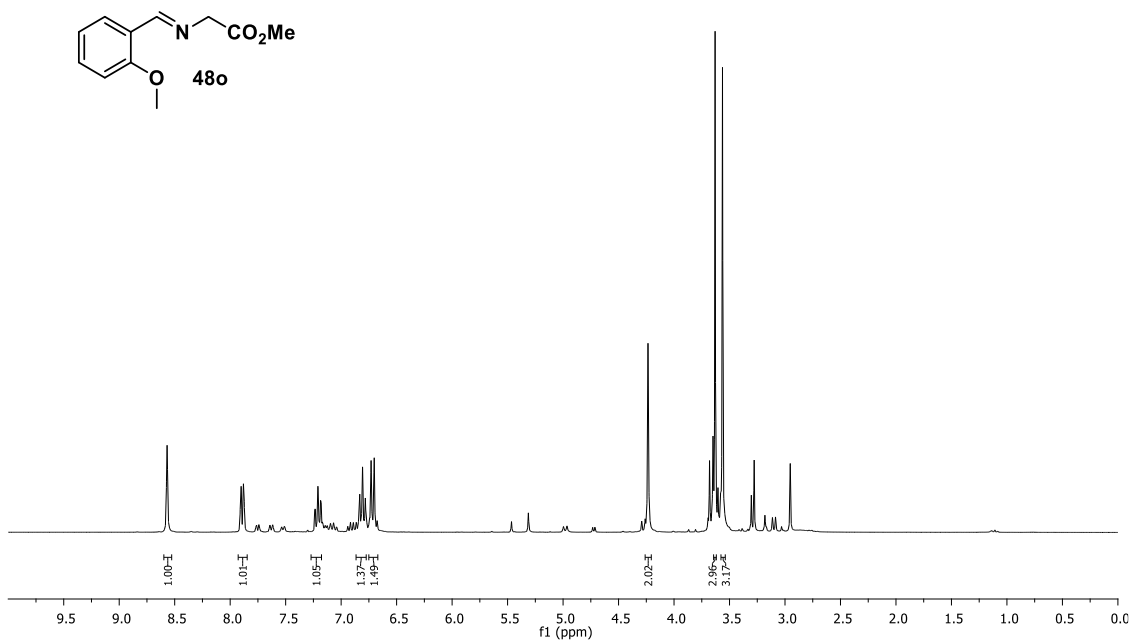
(*E*)-Methyl 2-((4-(methoxy)benzylidene)amino)acetate (48m)



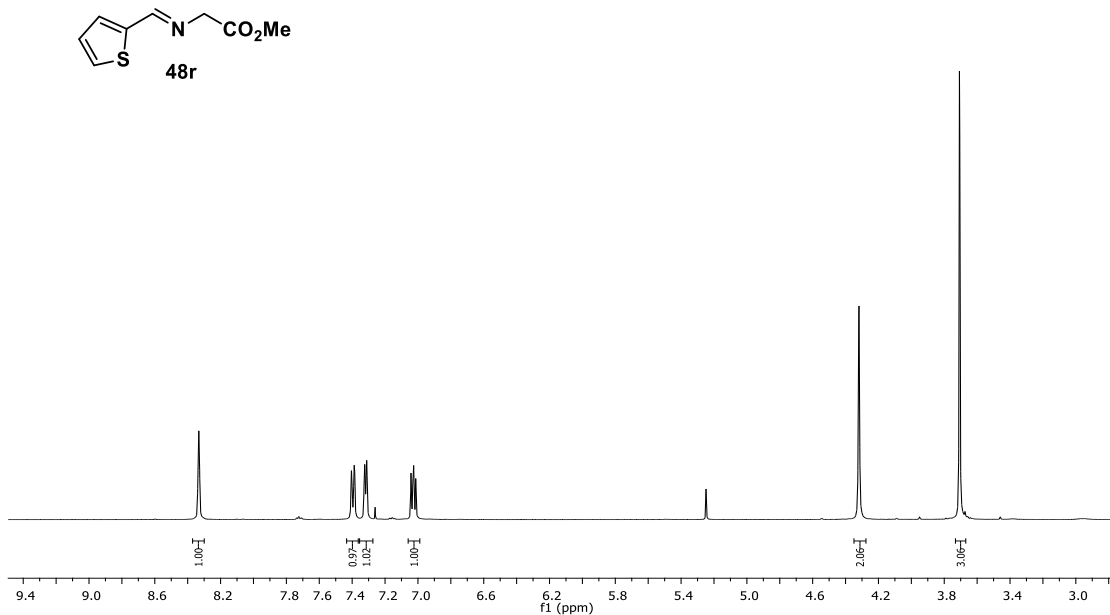
(*E*)-Methyl 2-((3-fluorobenzylidene)amino)acetate (48n)

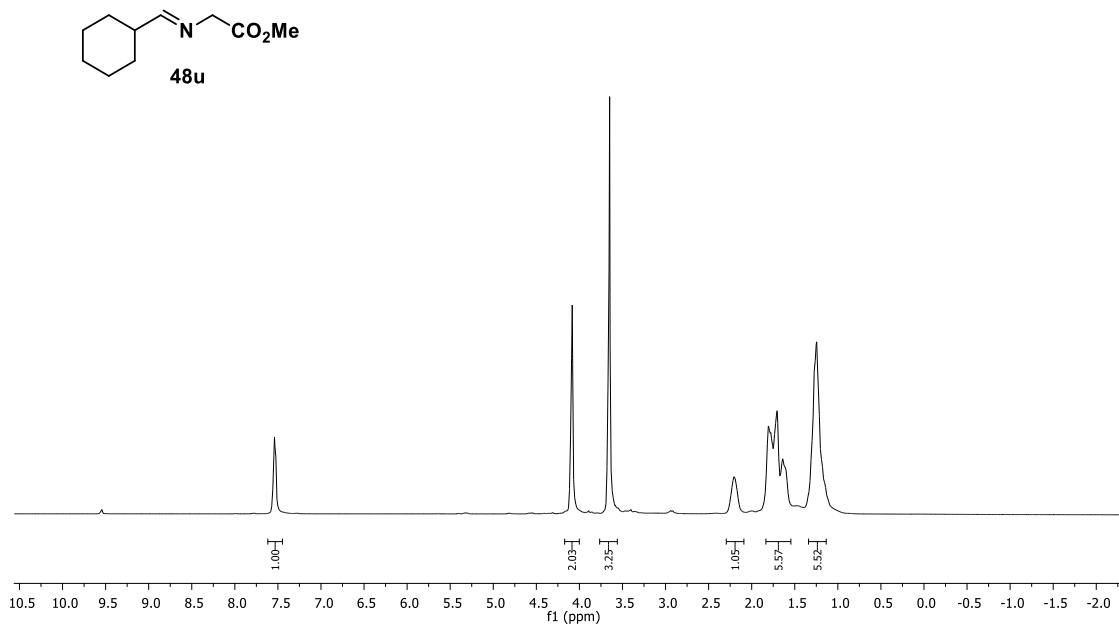
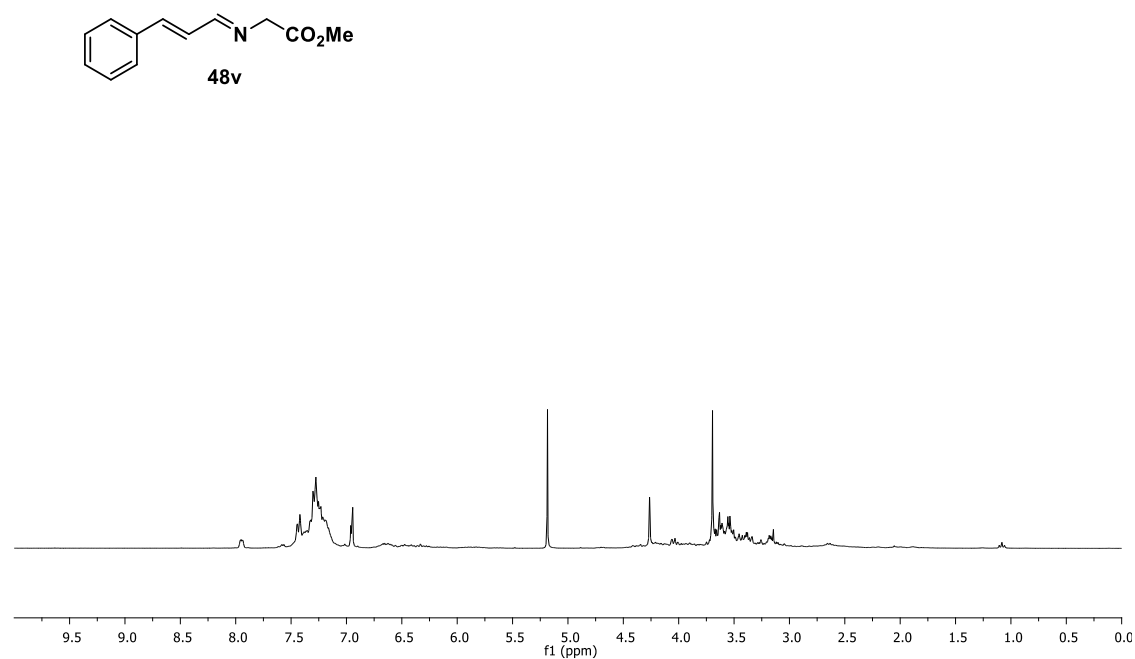


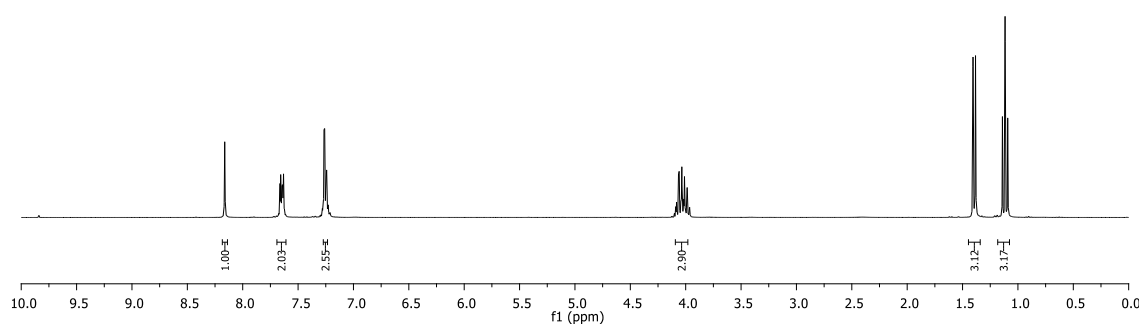
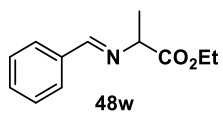
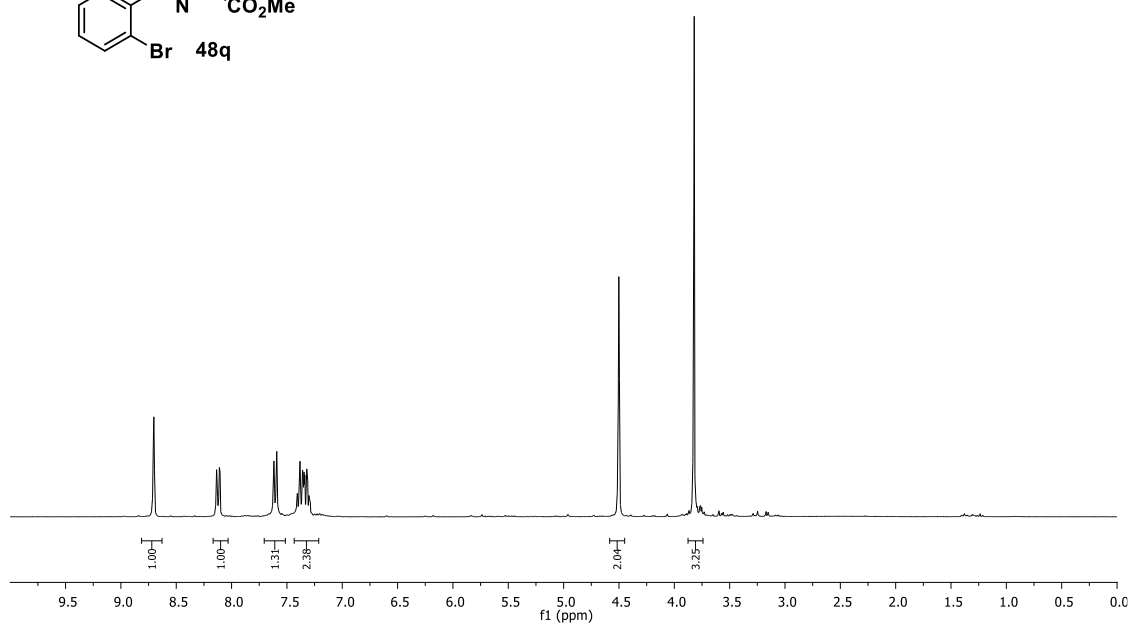
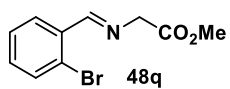
(E)-Methyl 2-((2-(methoxy)benzylidene)amino)acetate (48o)

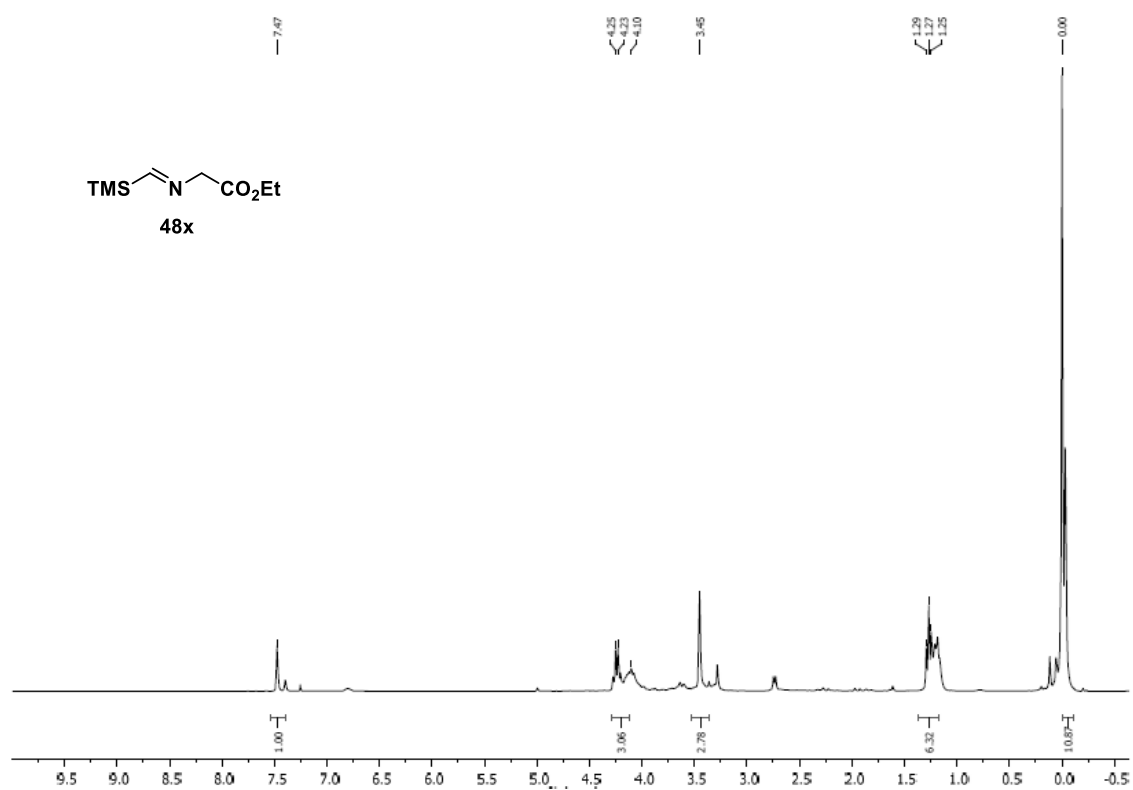
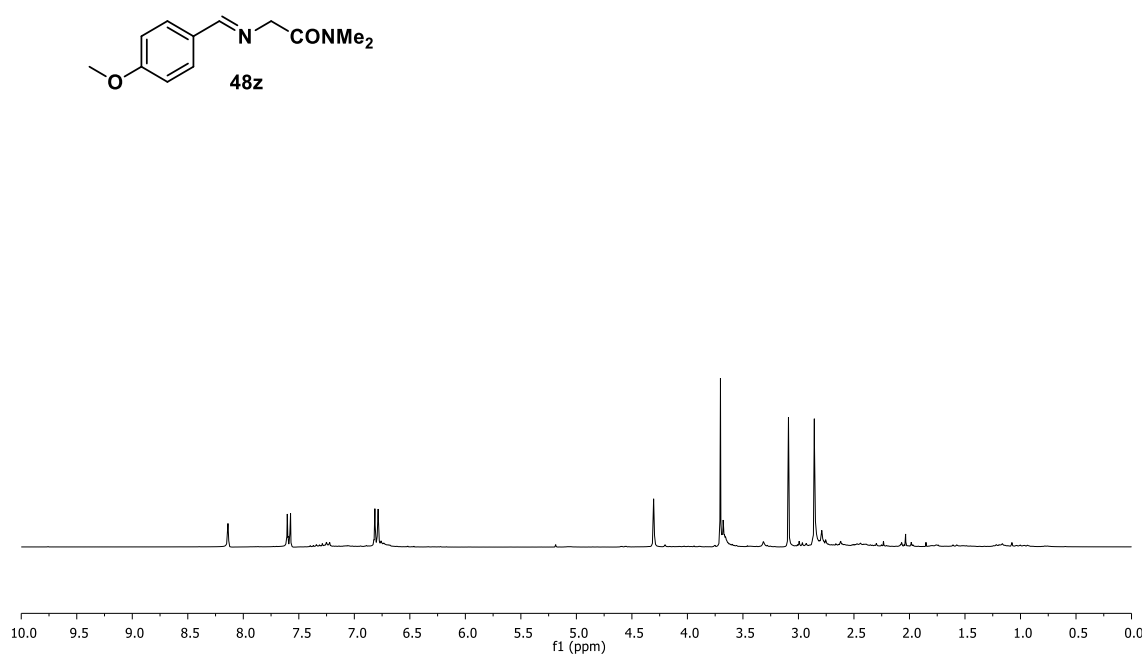


(E)-Methyl 2-((thiophen-2-ylmethylene)amino)acetate (48r)

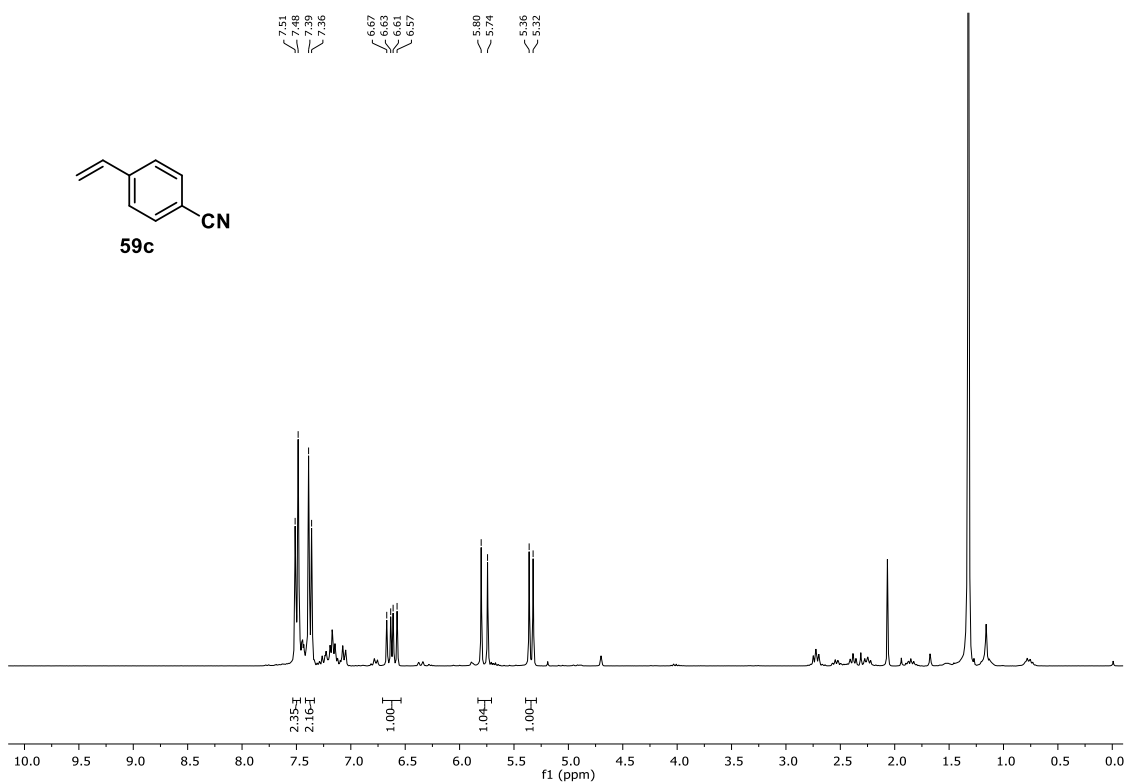


(E)-Methyl 2-((cyclohexylmethylene)amino)acetate (48u)**(1E,2E)-Methyl 2-((3-phenylallylidene)amino)acetate (48v)**

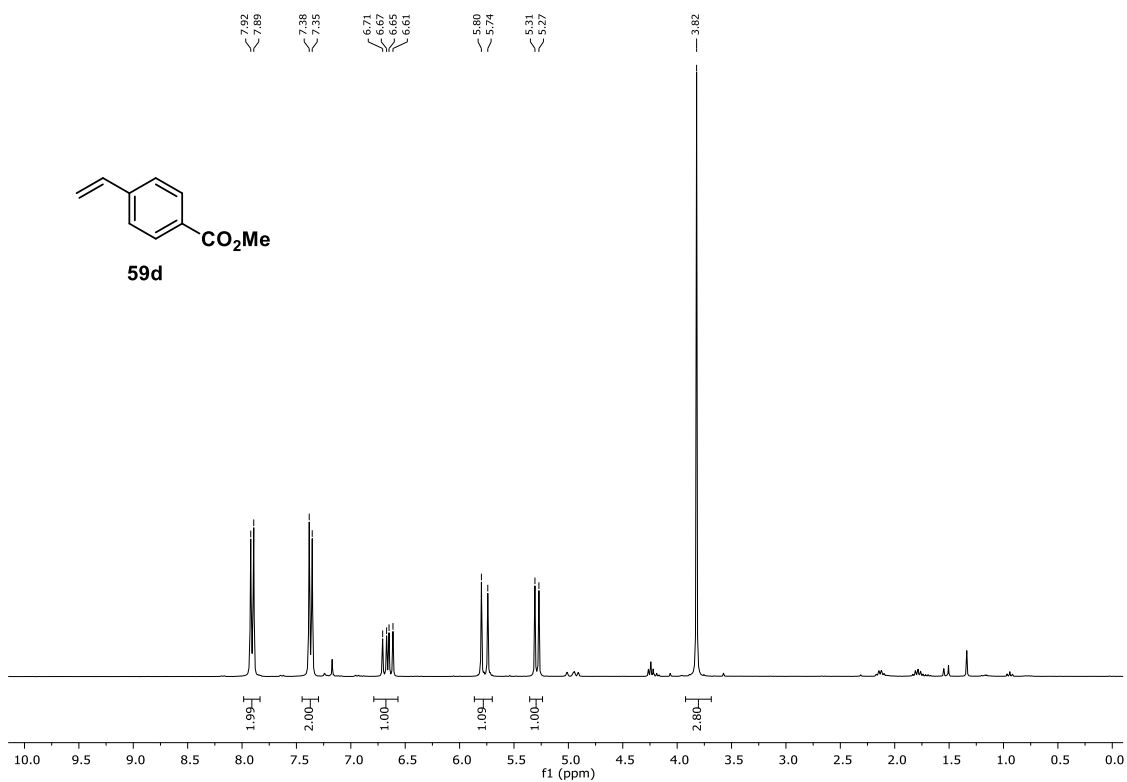
(E)-Ethyl 2-(benzylideneamino)propanoate (48w)**(E)-Methyl 2-((2-bromobenzylidene)amino)acetate (48q)**

(E)-Ethyl 2-((trimethylsilyl)methylene)amino)acetate (48x)**(E)-2-((4-Methoxybenzylidene)amino)-N,N-dimethylacetamide (48z)**

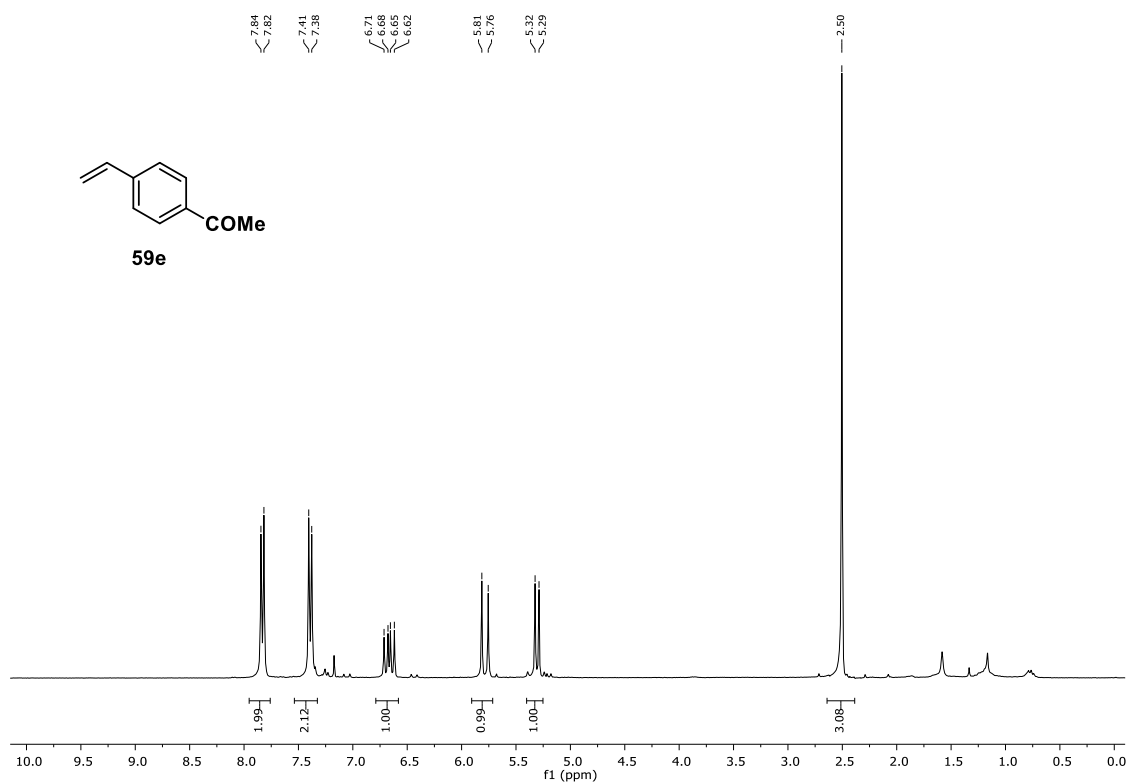
4-Cyanostyrene (59c)



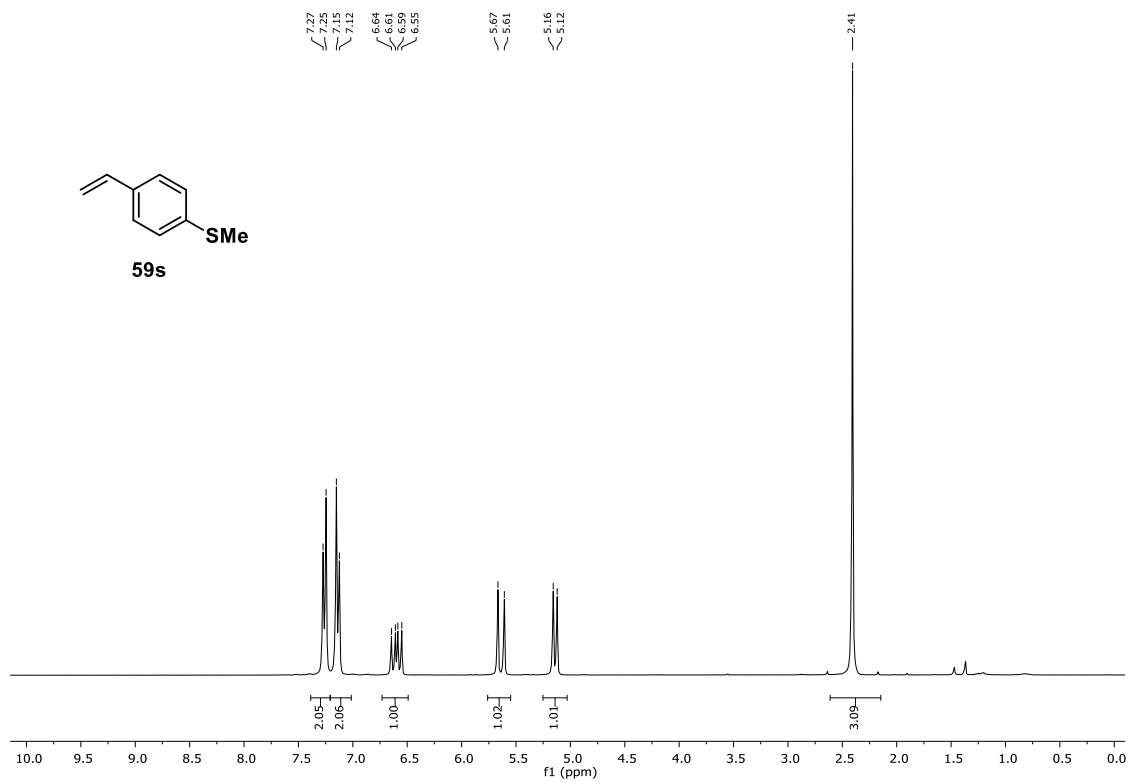
Methyl 4-Vinylbenzoate (59d)



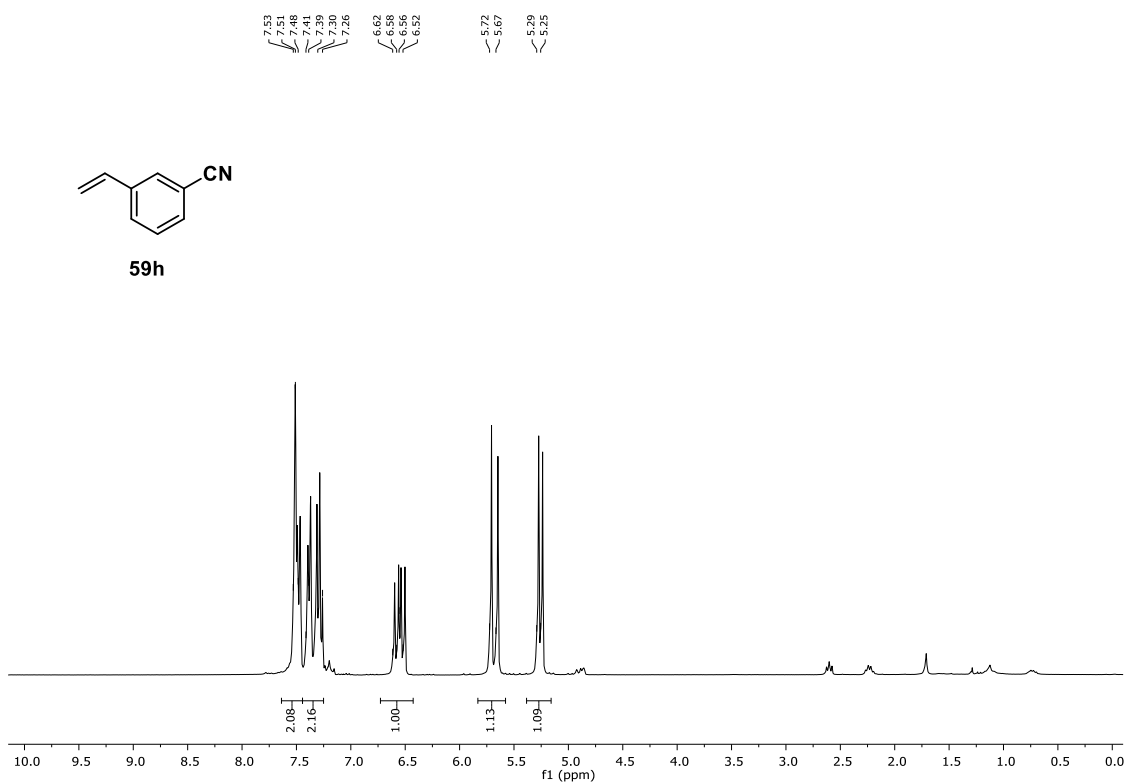
1-(4-Vinylphenyl)ethan-1-one (59e)



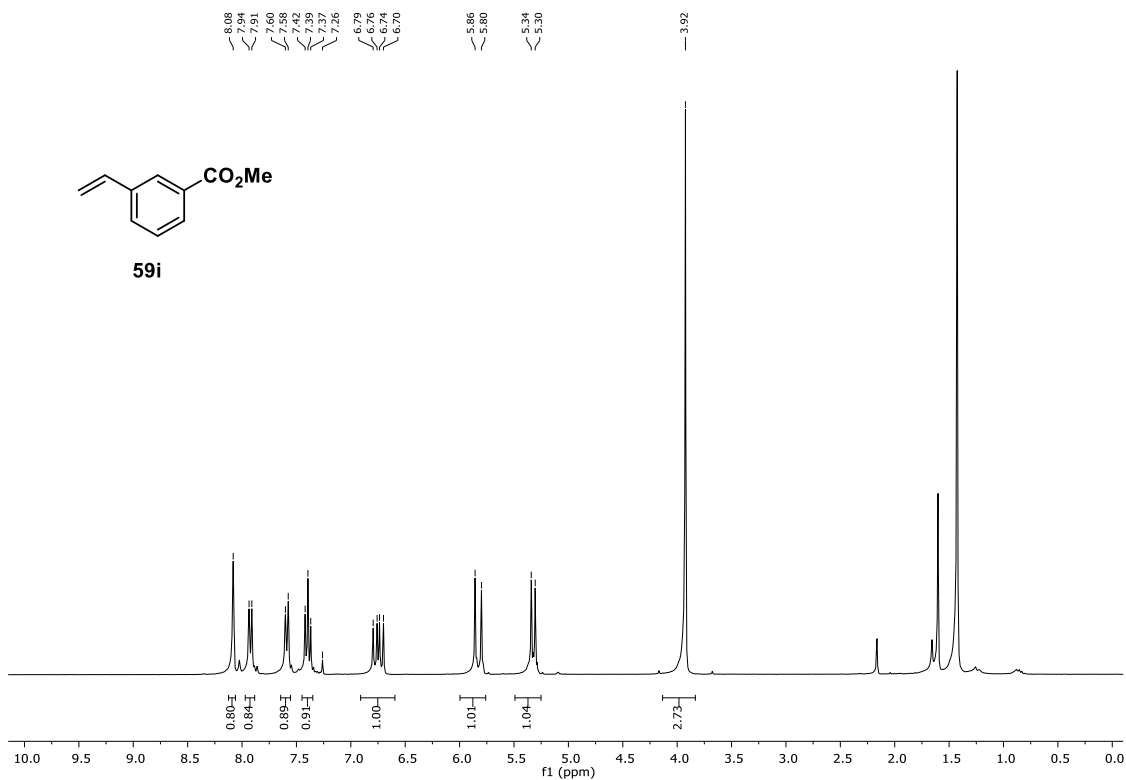
Methyl 4-vinylphenyl thioether (59s)



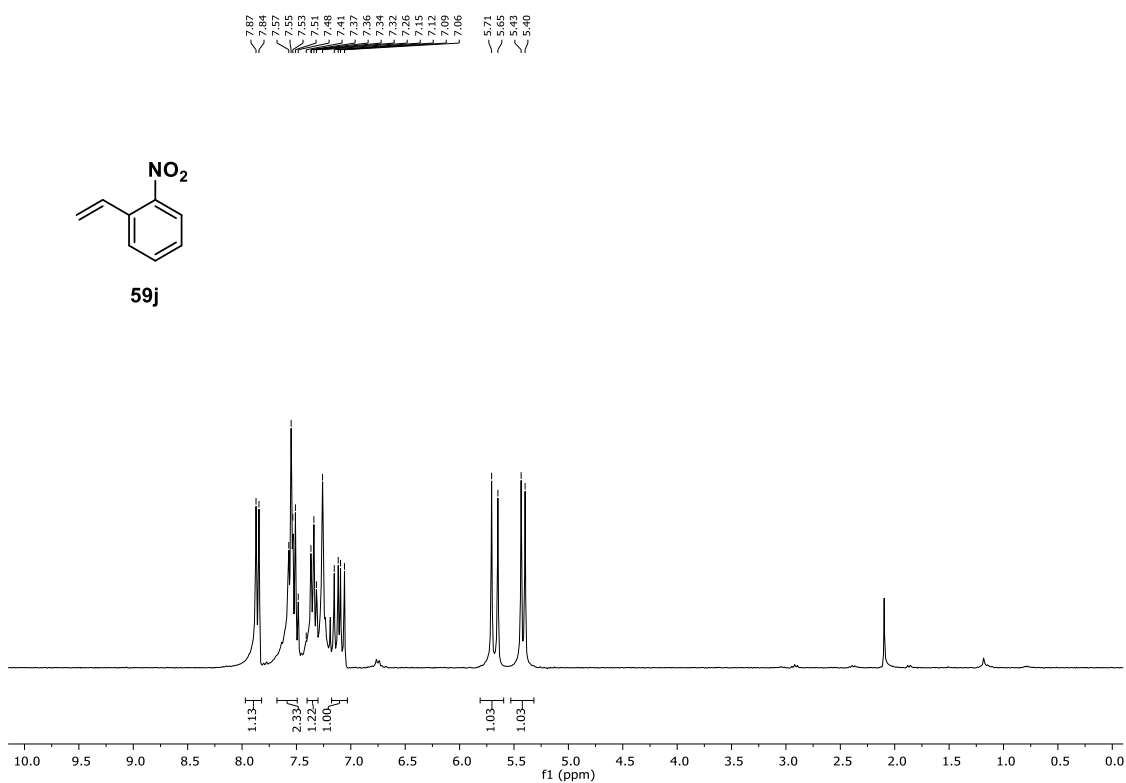
3-Cyanostyrene (59h)



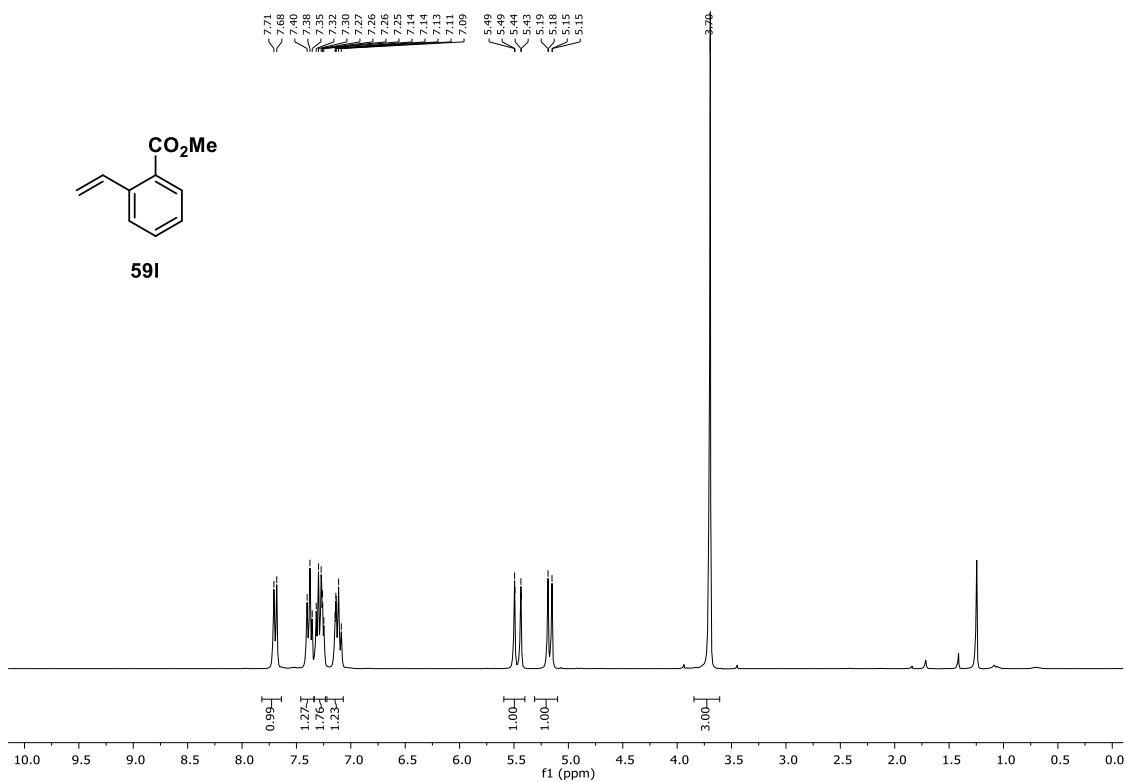
Methyl 3-Vinylbenzoate (59i)



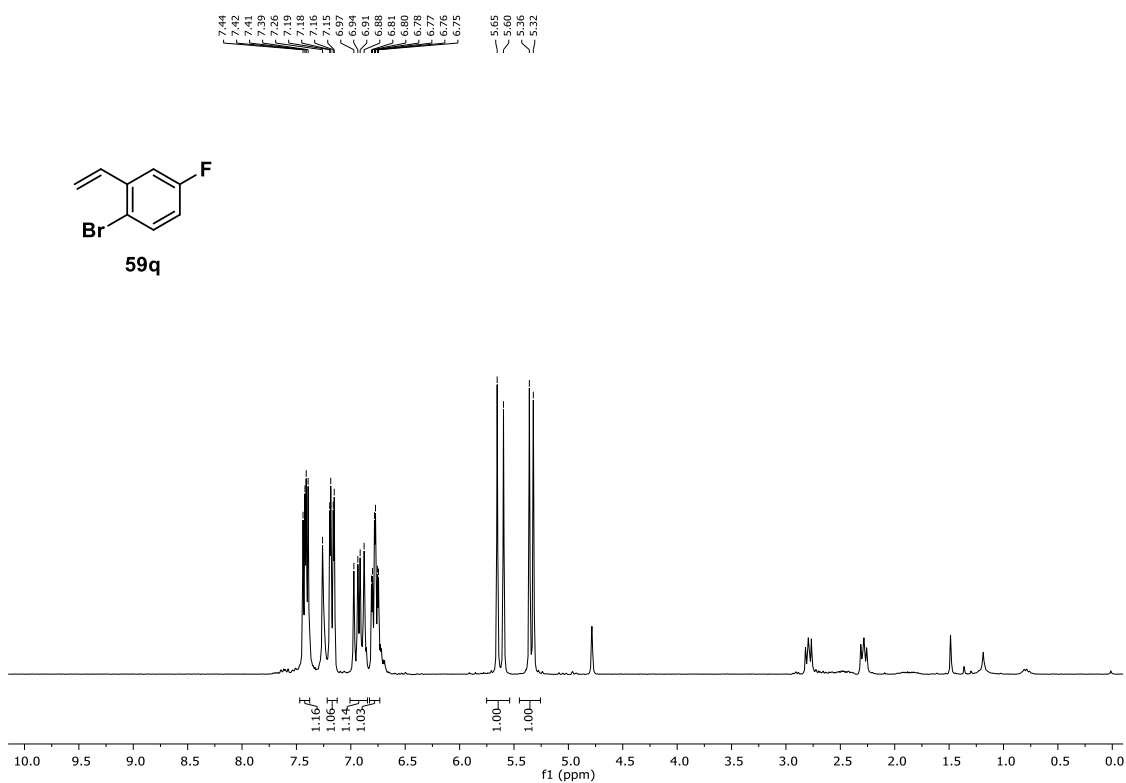
2-Nitrostyrene (59j)



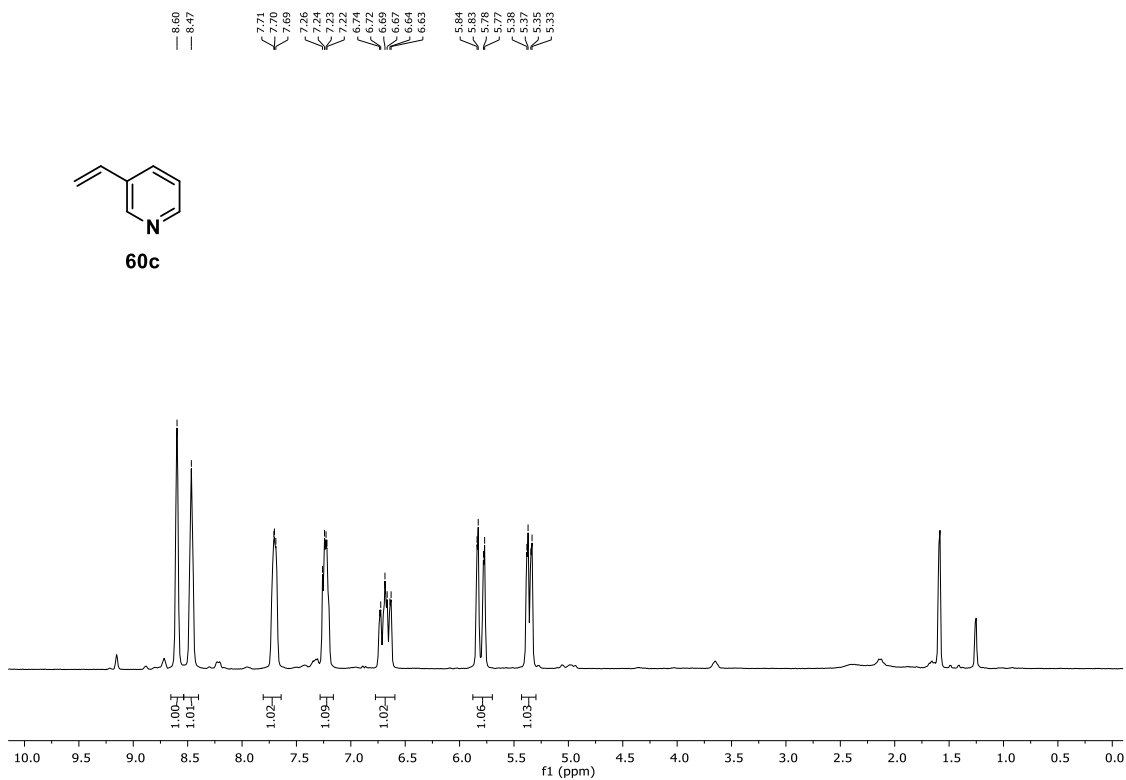
Methyl 2-vinylbenzoate (59l)



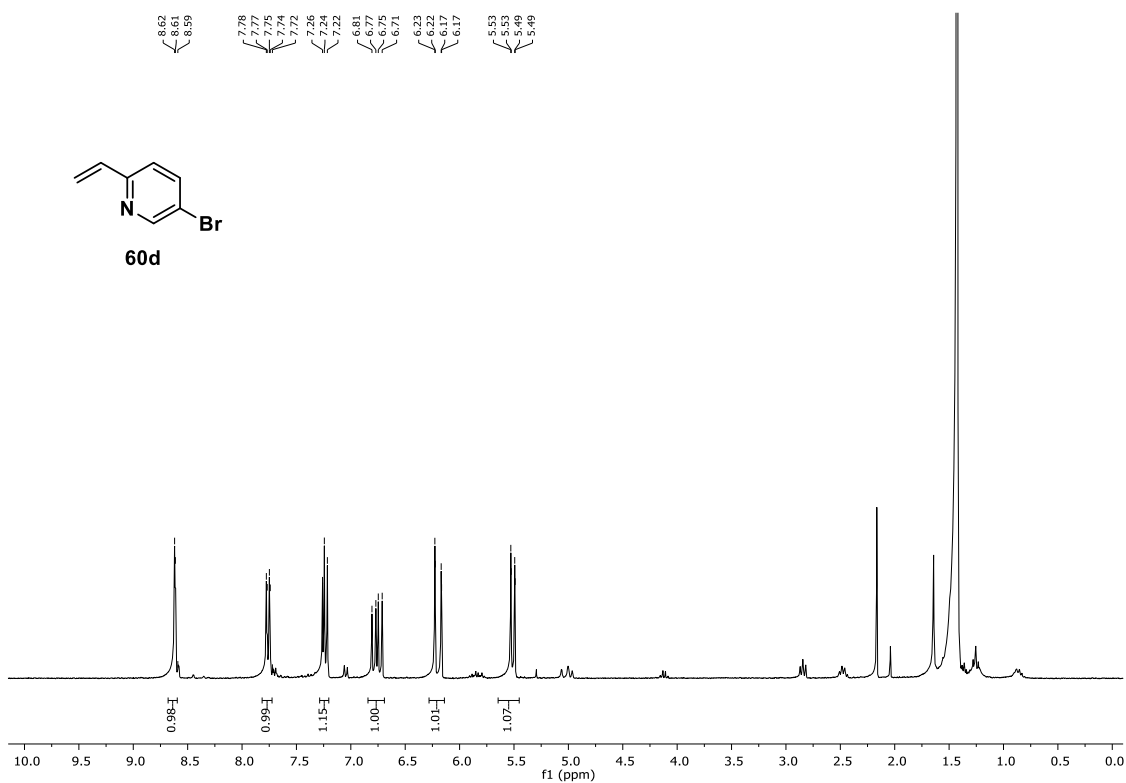
2-Bromo-5-fluorostyrene (59q)



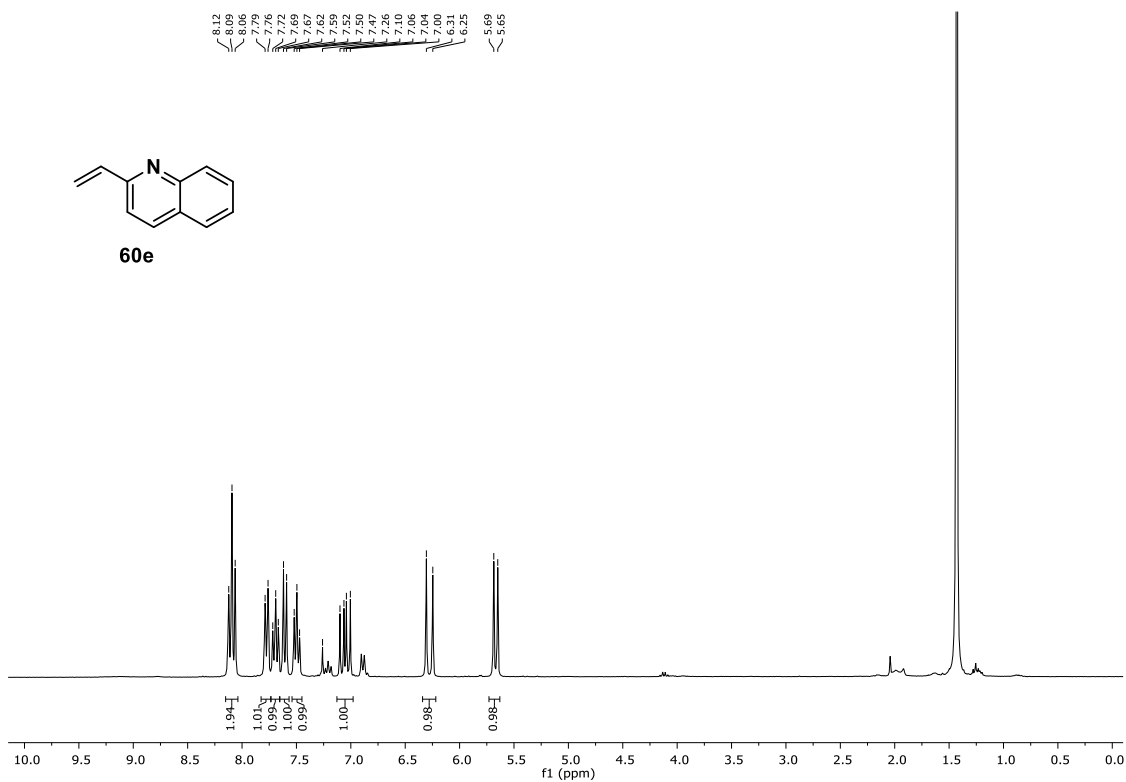
3-Vinylpyridine (60c)



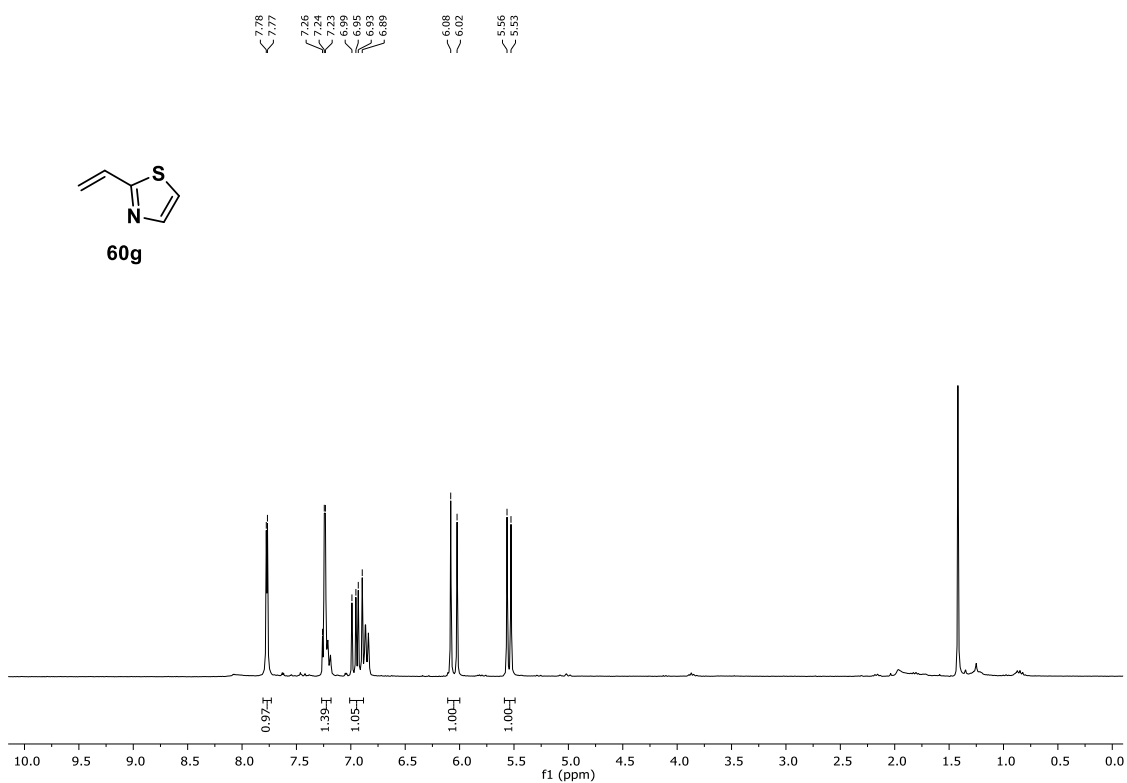
5-Bromo-2-vinylpyridine (60d)



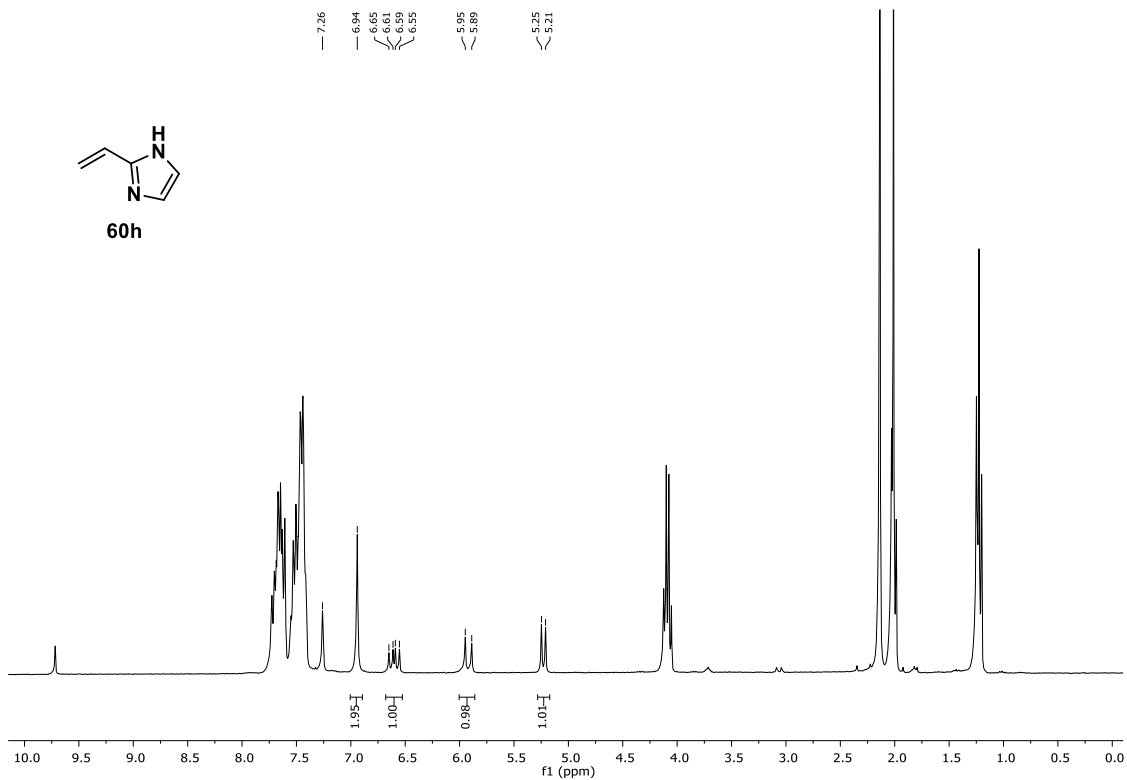
2-Vinylquinoline (60e)



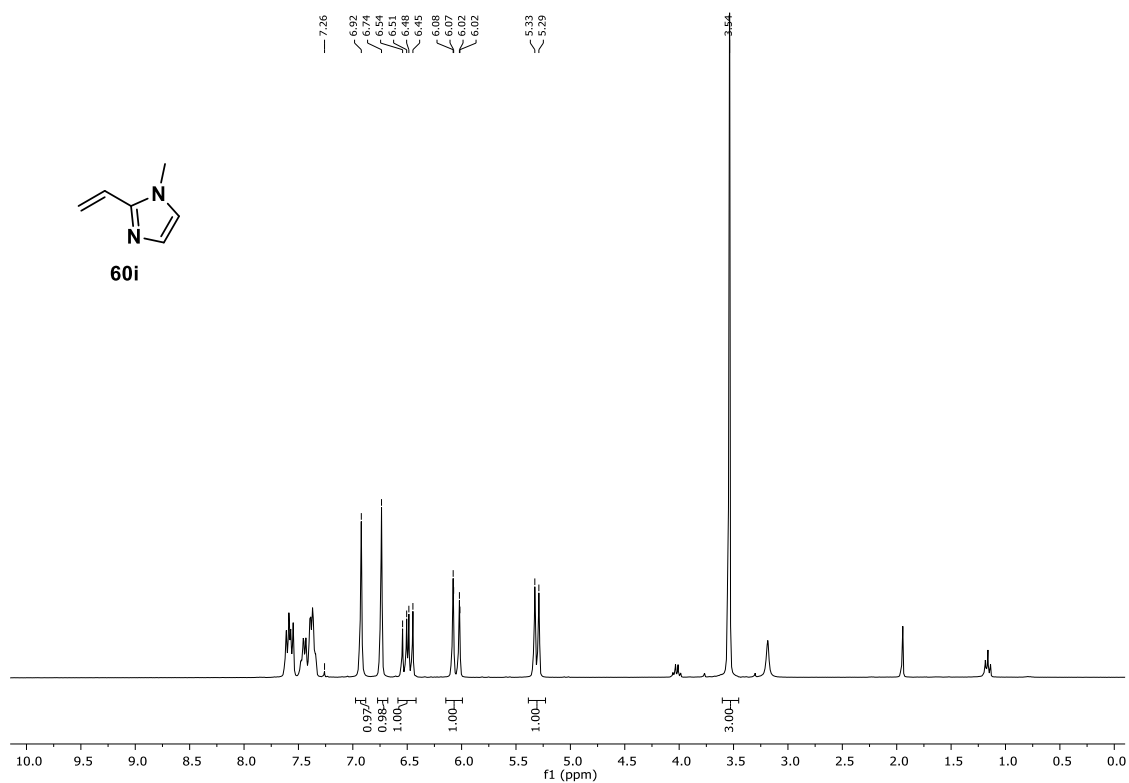
2-Vinylthiazole (60g)



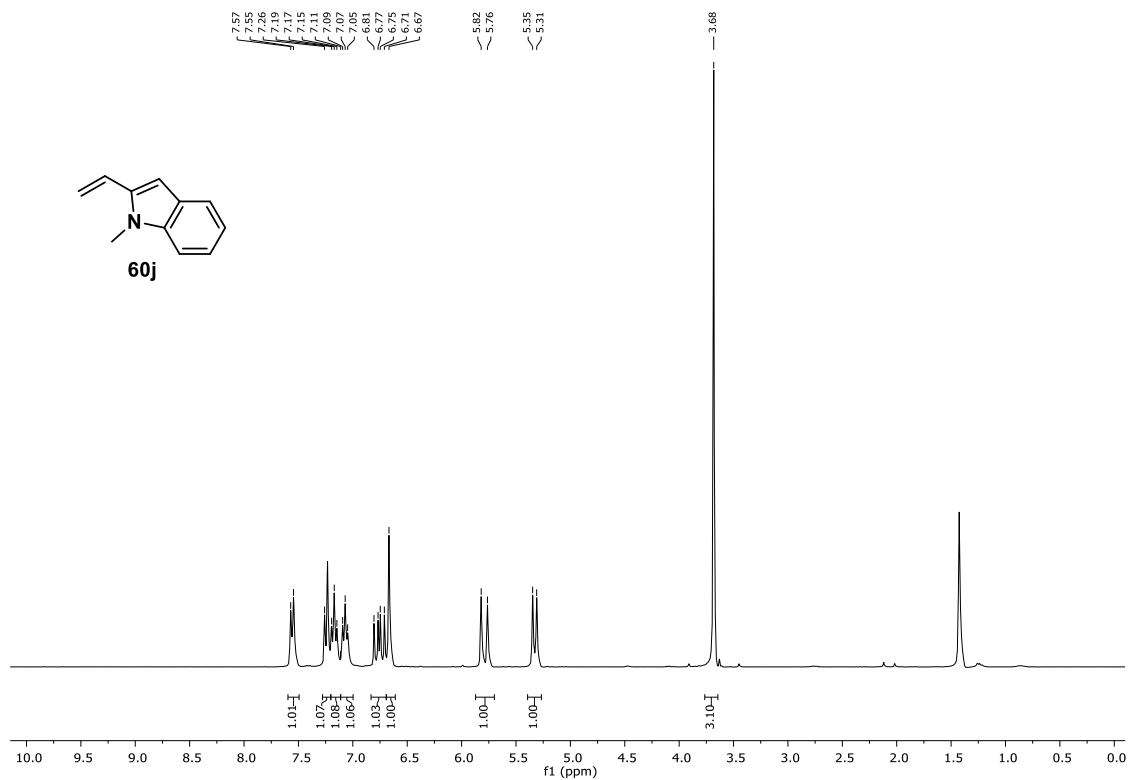
2-Vinylimidazole (60h)



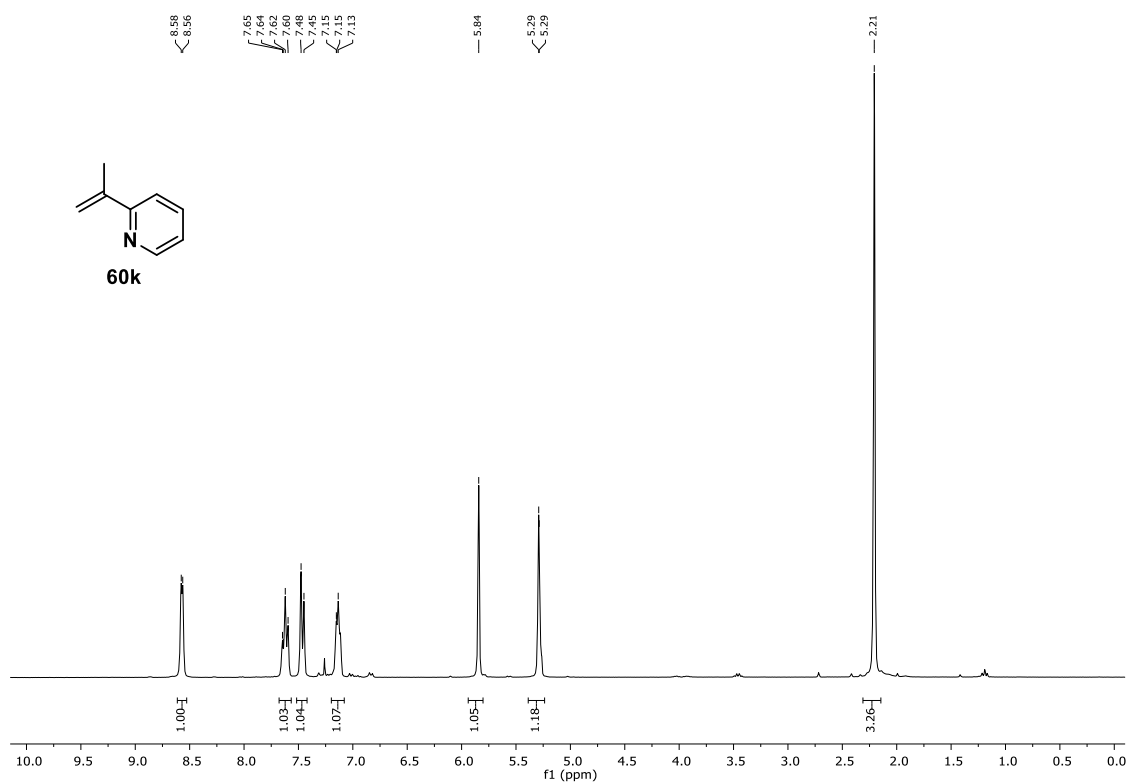
1-Methyl-2-vinylimidazole (60i)



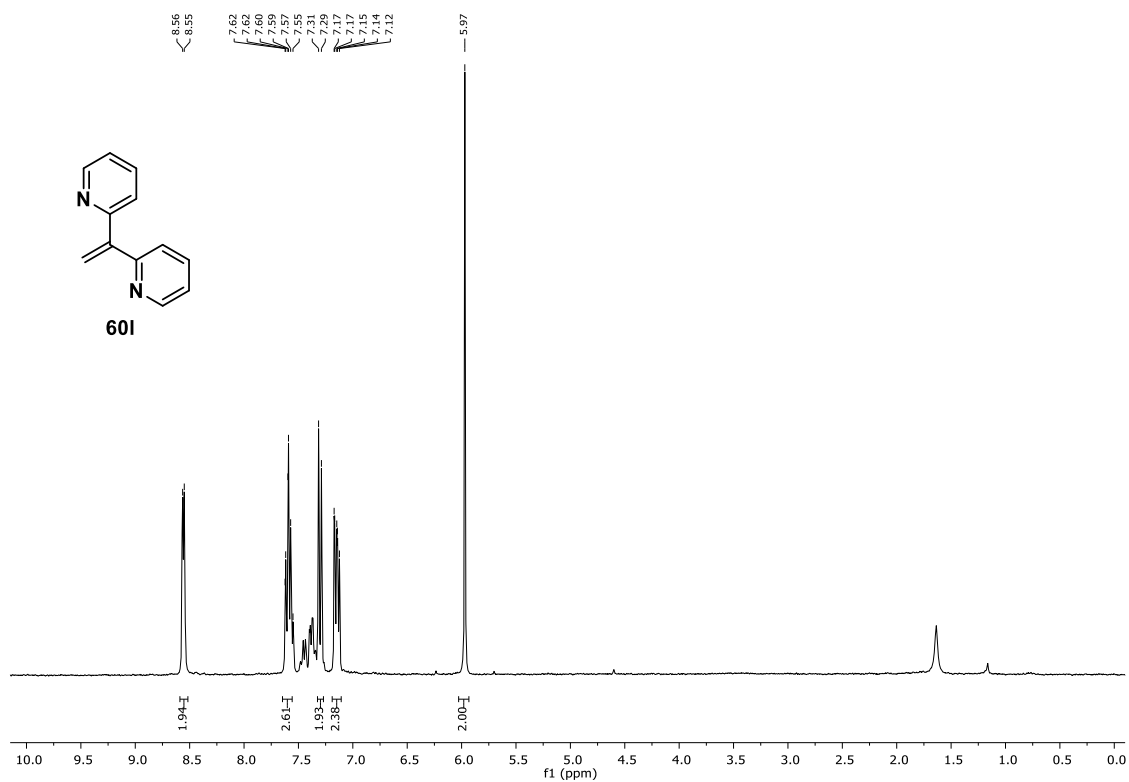
1-Methyl-2-vinylindole (60j)



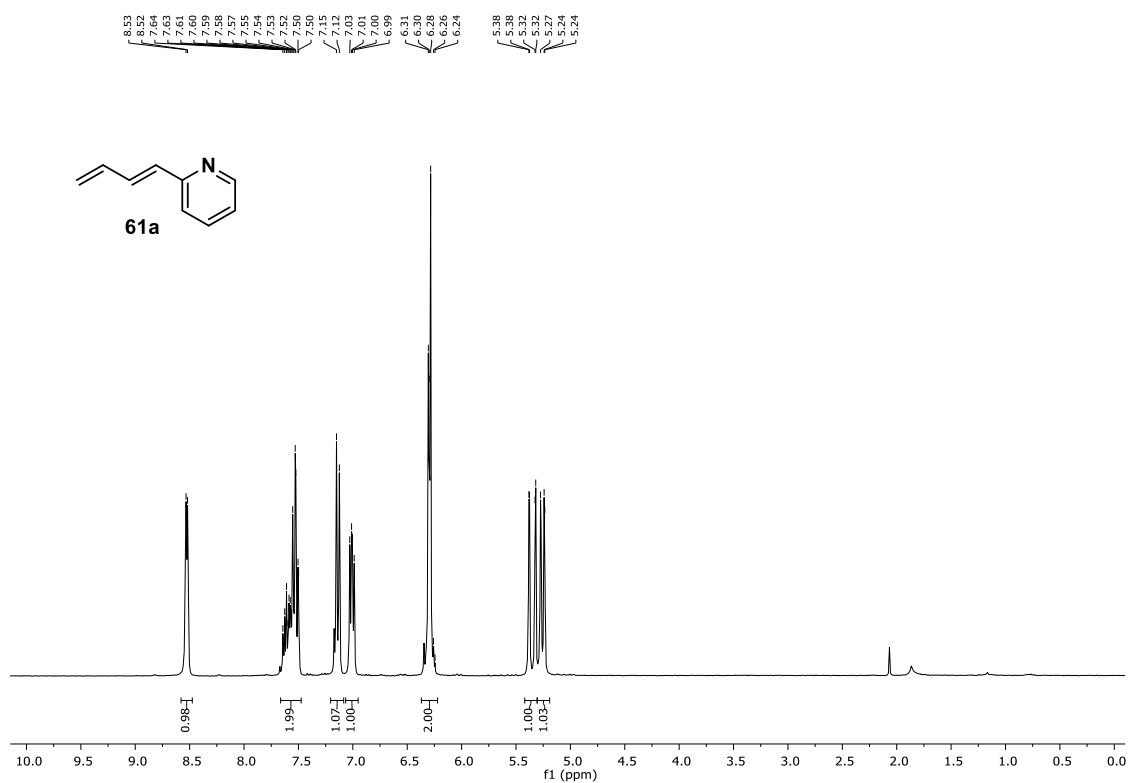
2-(1-Propen-2-yl)pyridine (60k)



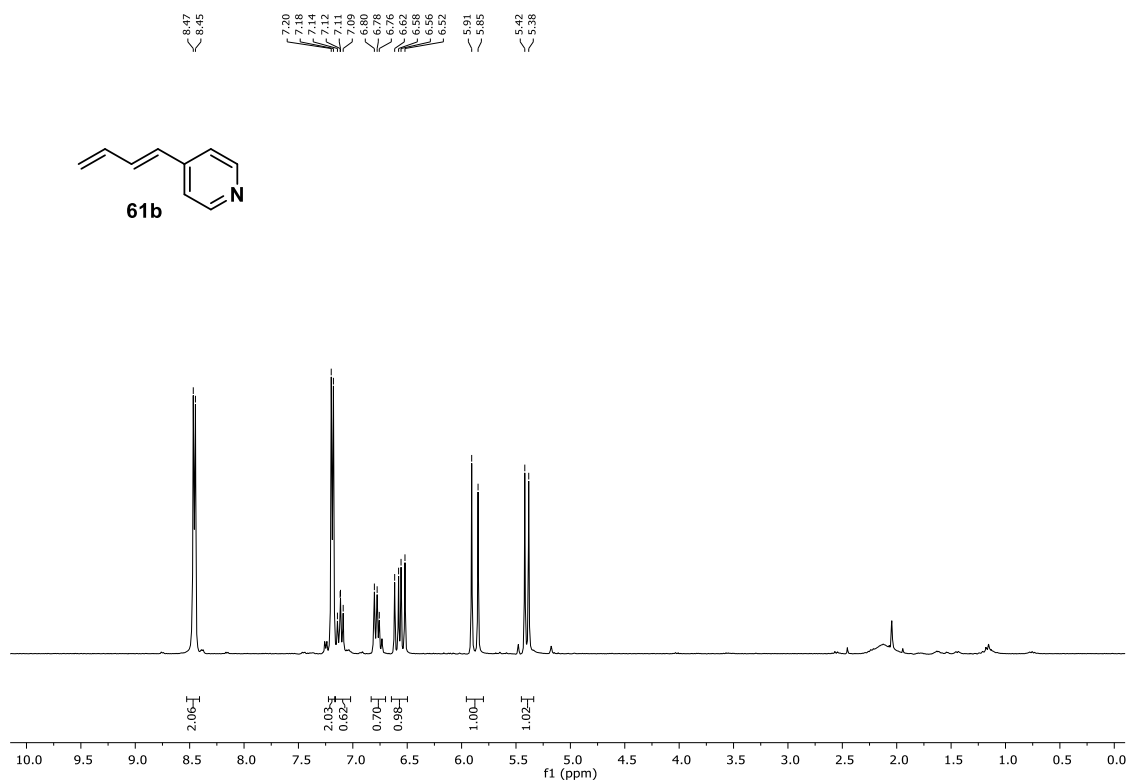
1,1-Bis(2-pyridyl)ethylene (60l)



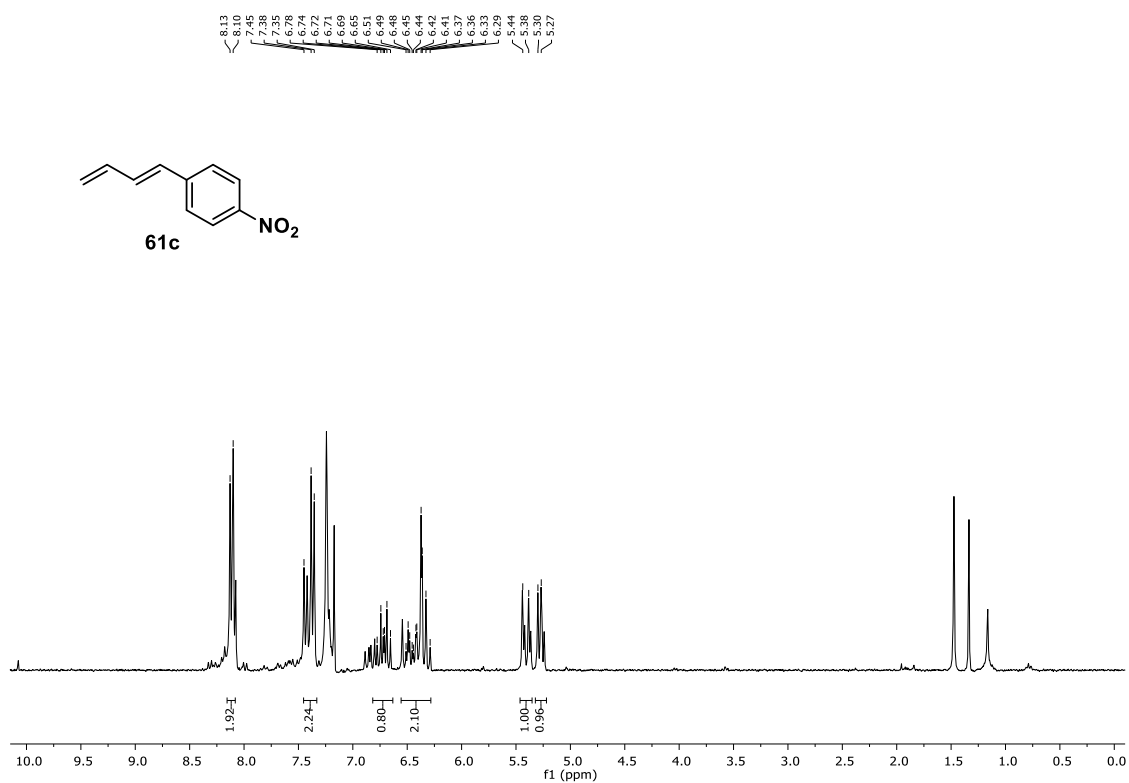
(E)-1-(2-Pyridyl)butadiene (61a)



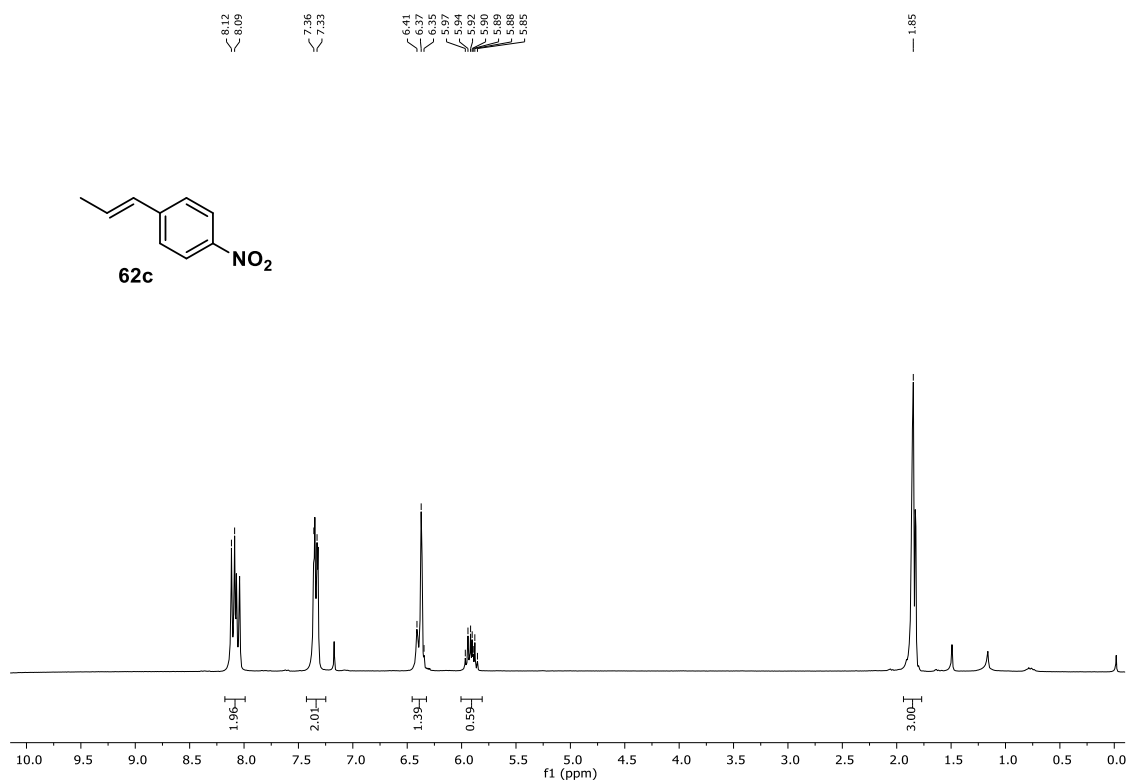
(E)-1-(4-Pyridyl)butadiene (61b)



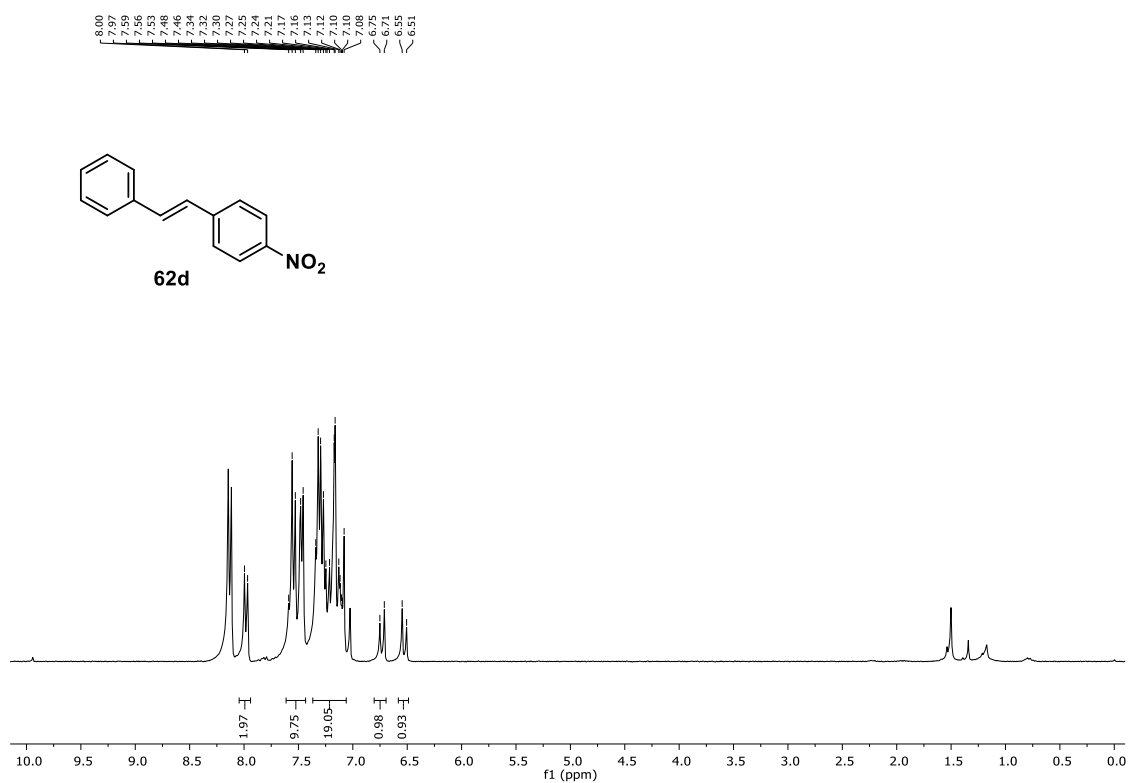
(E)-1-(4-Nitrophenyl)butadiene (61c)



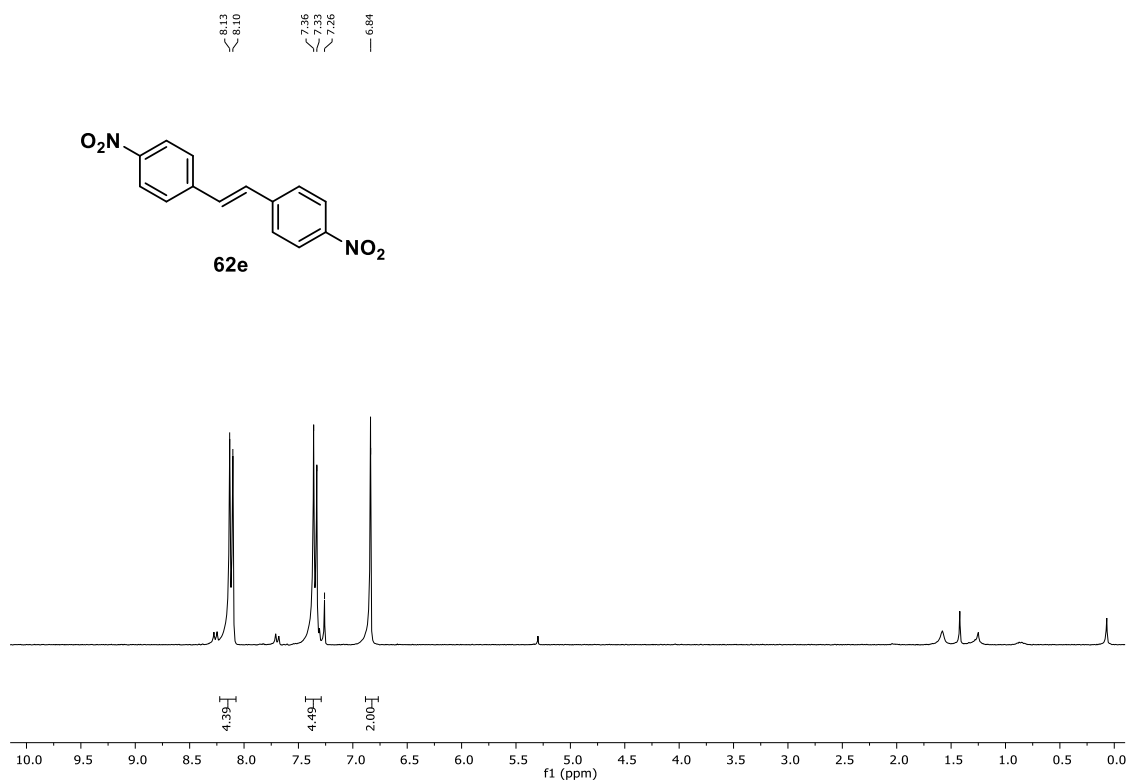
(E)-1-(4-Nitrophenyl)propene (62c)



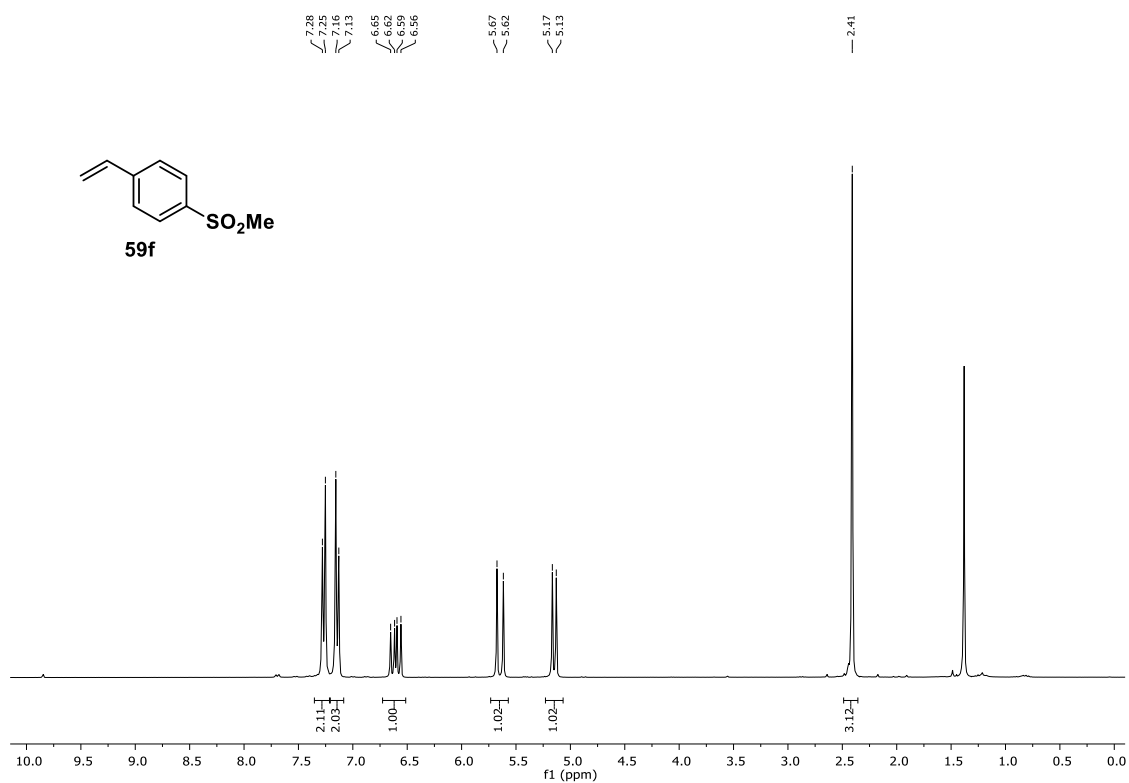
(E)-1-Nitro-4-styrylbenzene (62d)



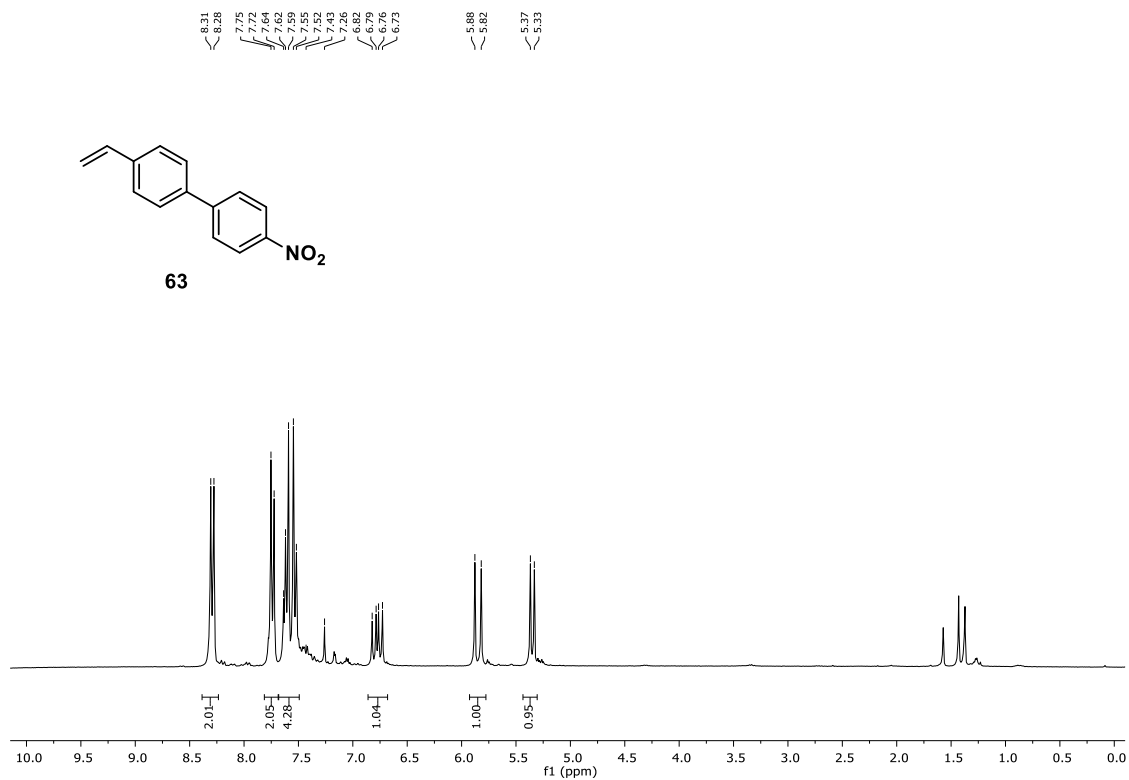
(E)-1,2-Bis(4-nitrophenyl)ethylene (62e)



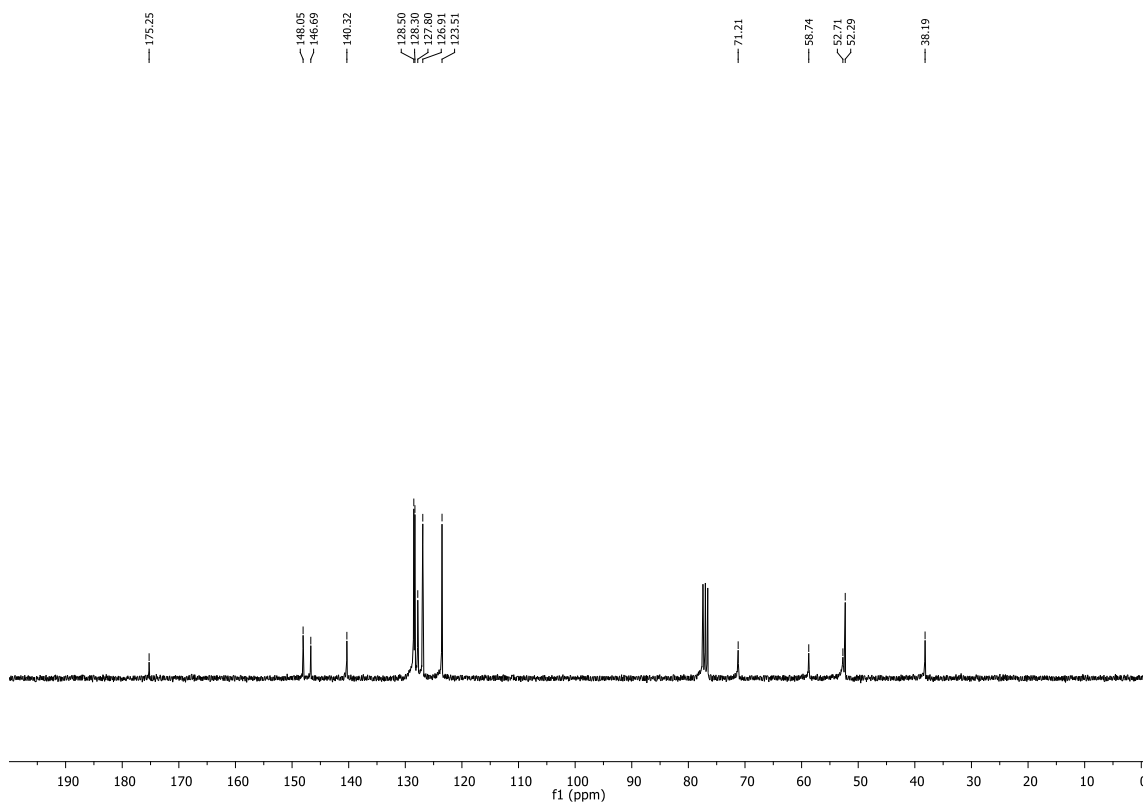
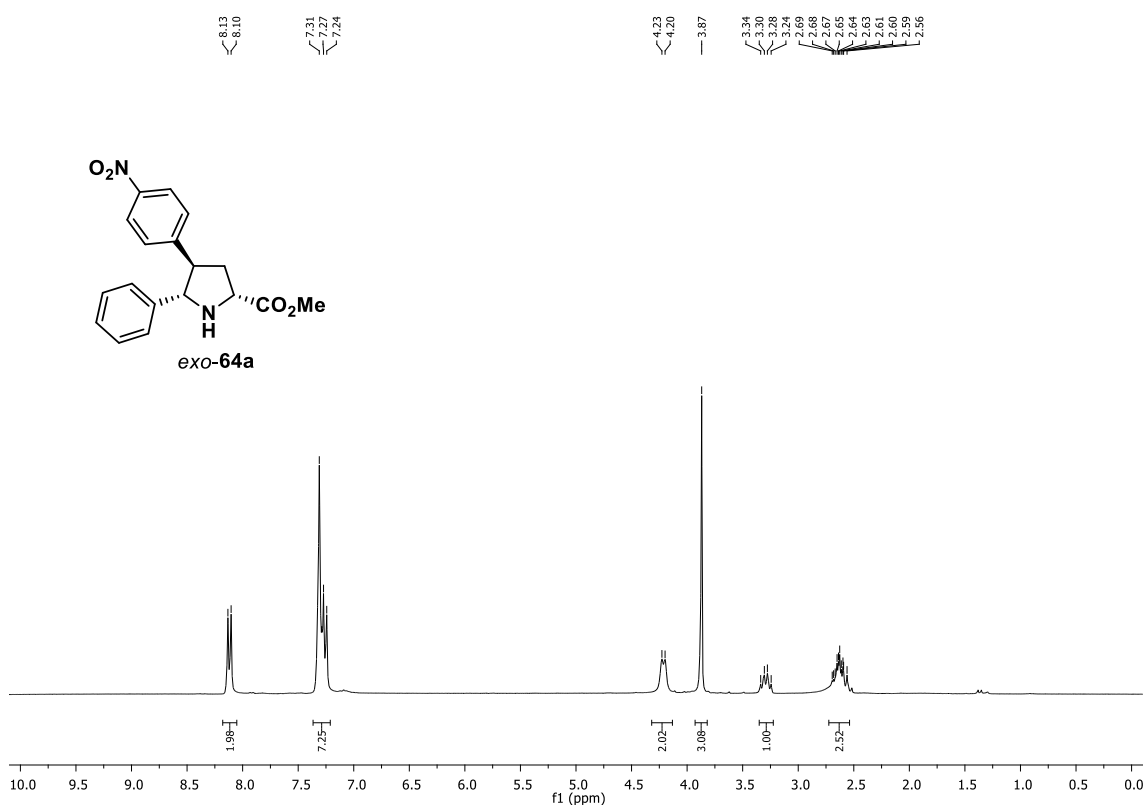
4-Methylsulfonylstyrene (59f)



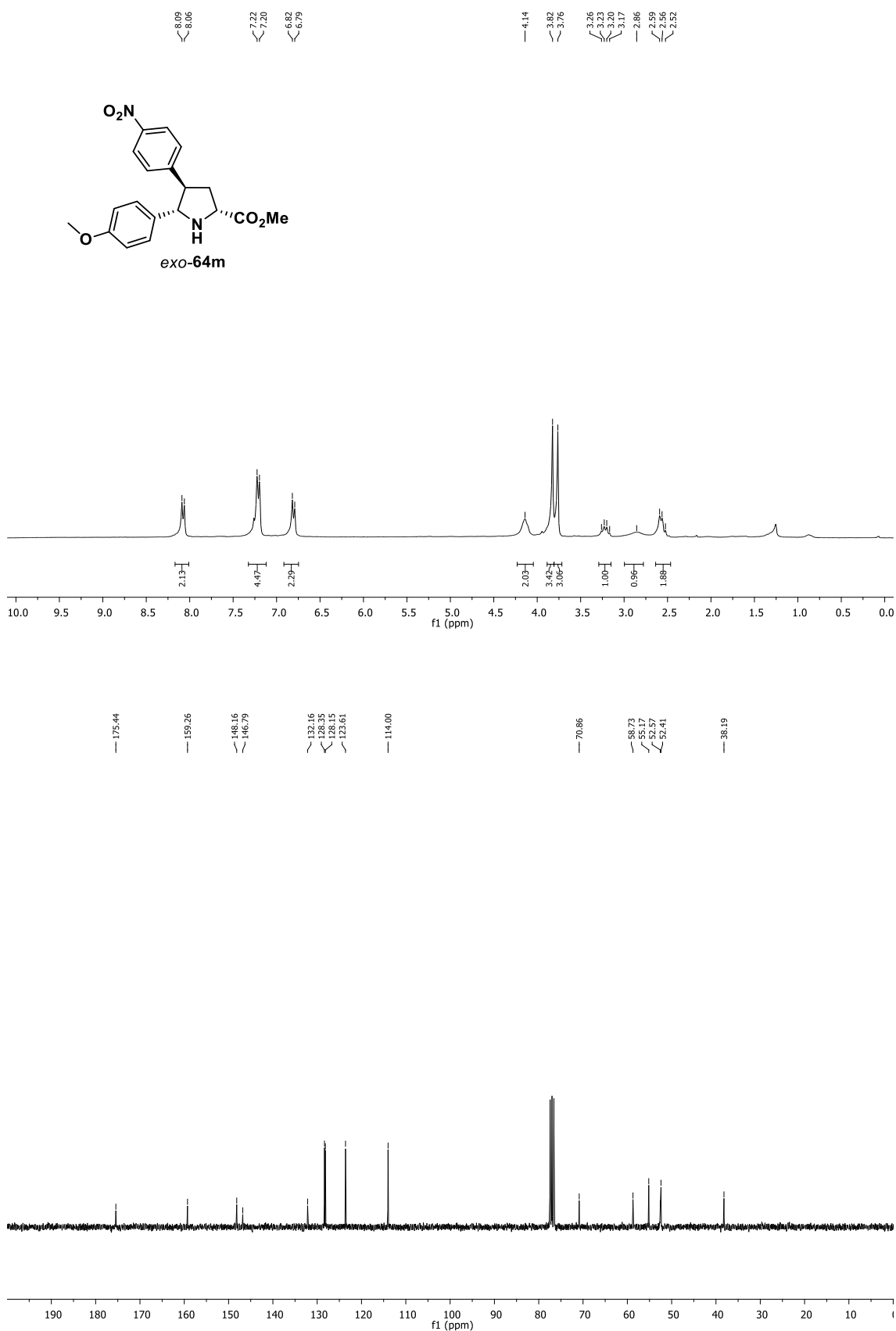
4-(4-Nitrophenyl)styrene (63)



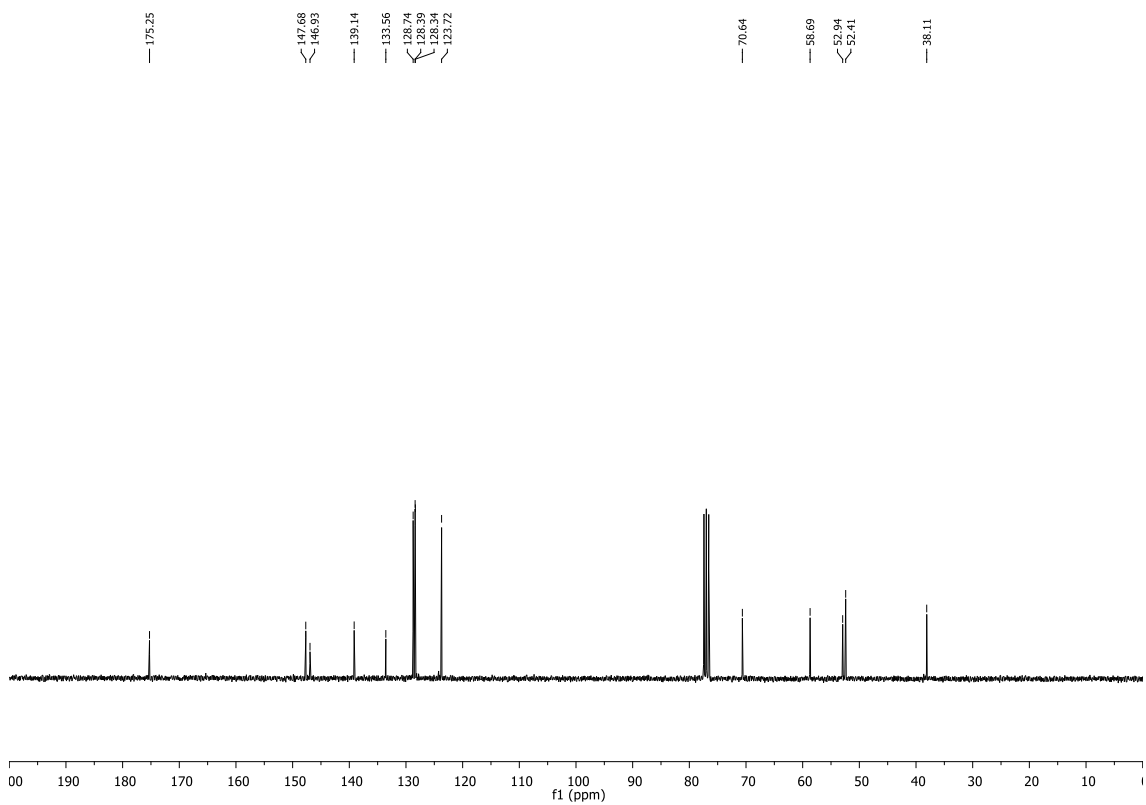
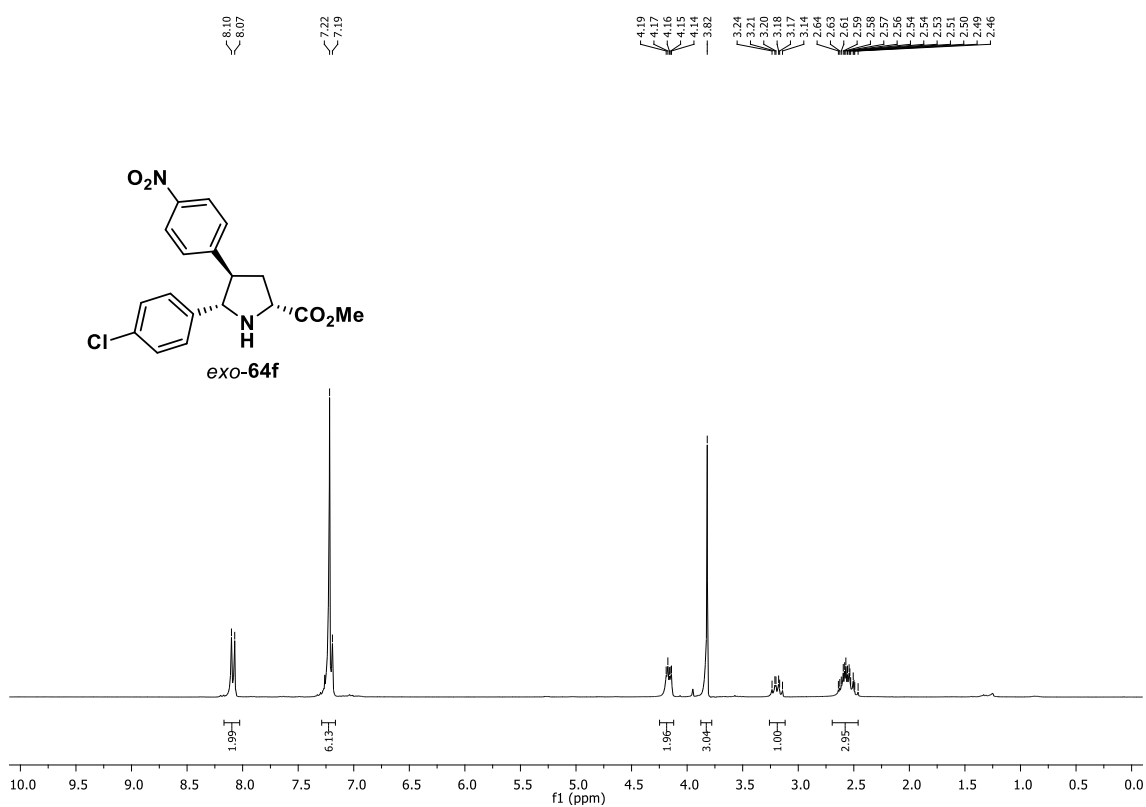
(2*R*,4*R*,5*S*)-Methyl 4-(4-Nitrophenyl)-5-phenylpyrrolidine-2-carboxylate (*exo*-64a)



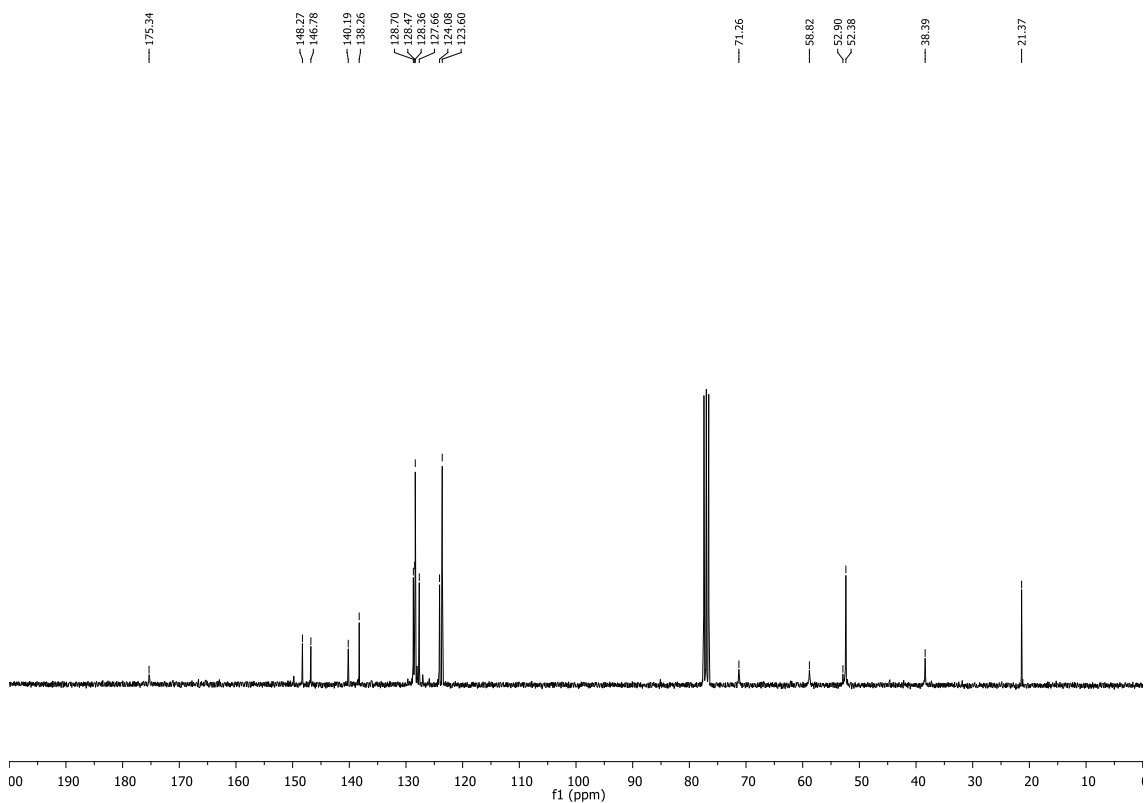
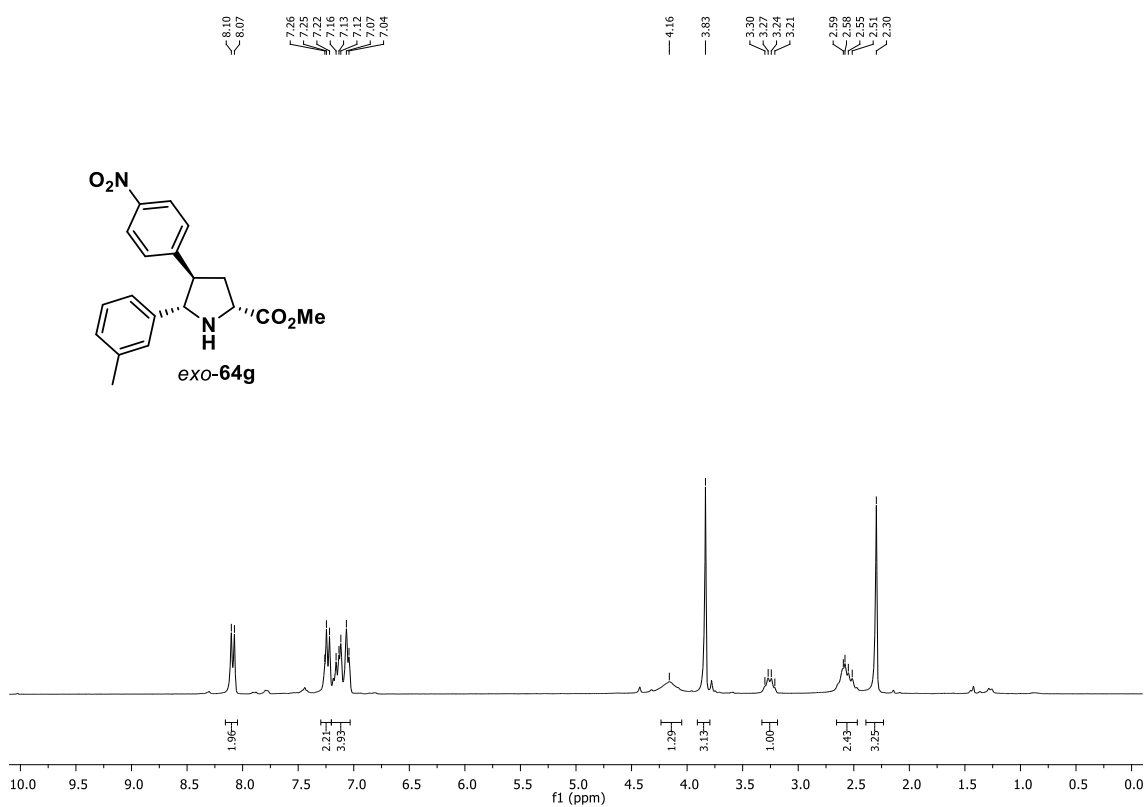
(2*R*,4*R*,5*S*)-Methyl 5-(4-methoxyphenyl)-4-(4-nitrophenyl)pyrrolidine-2-carboxylate
(*exo*-64m)



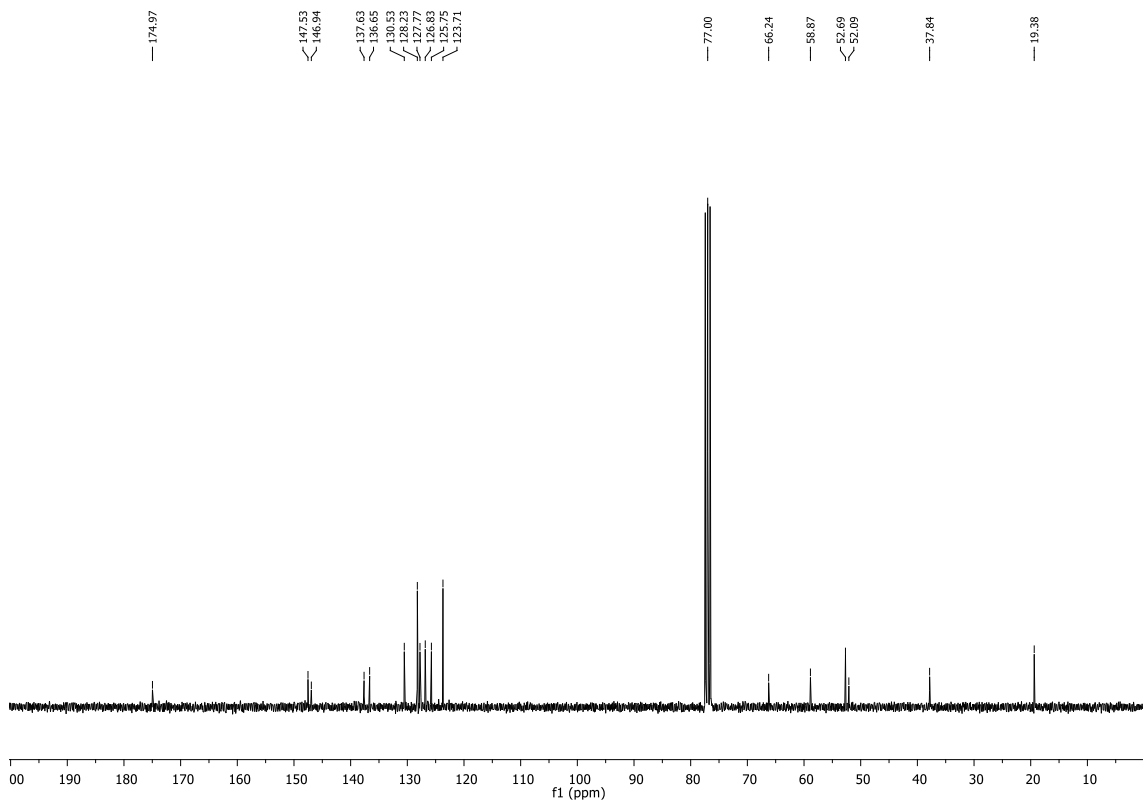
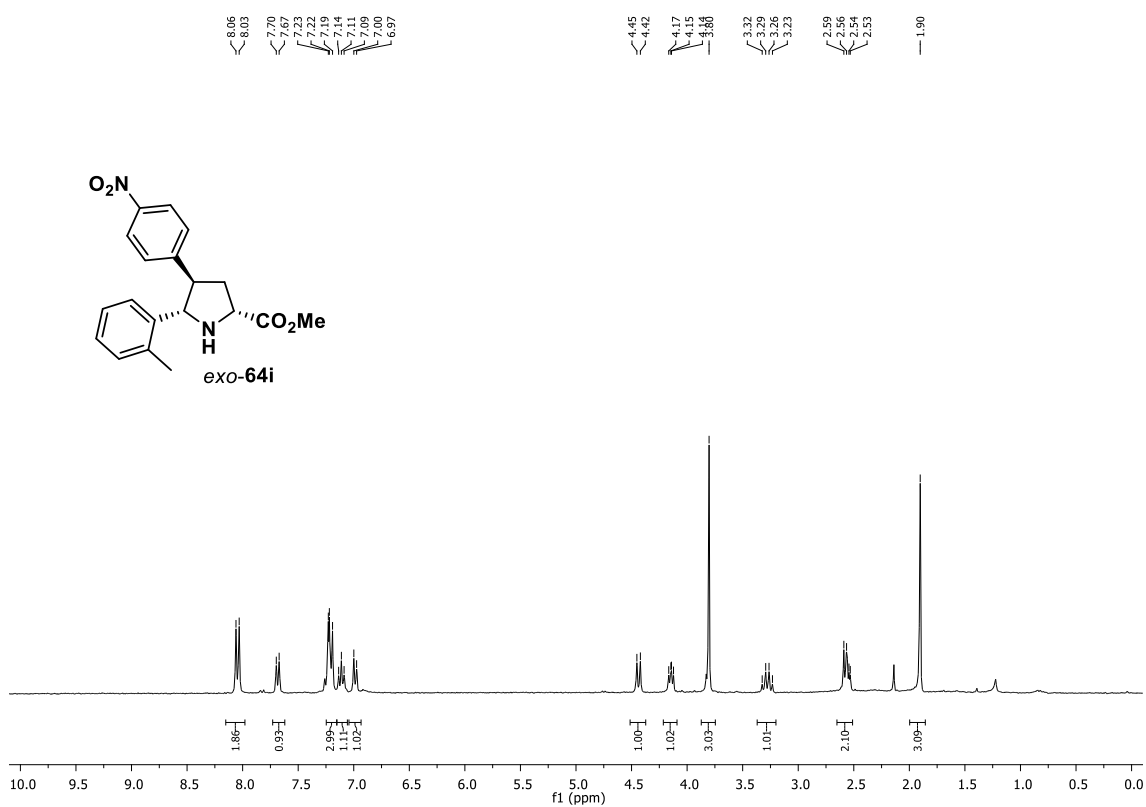
(2*R*,4*R*,5*S*)-Methyl 5-(4-chlorophenyl)-4-(4-nitrophenyl)pyrrolidine-2-carboxylate (*exo*-64f)



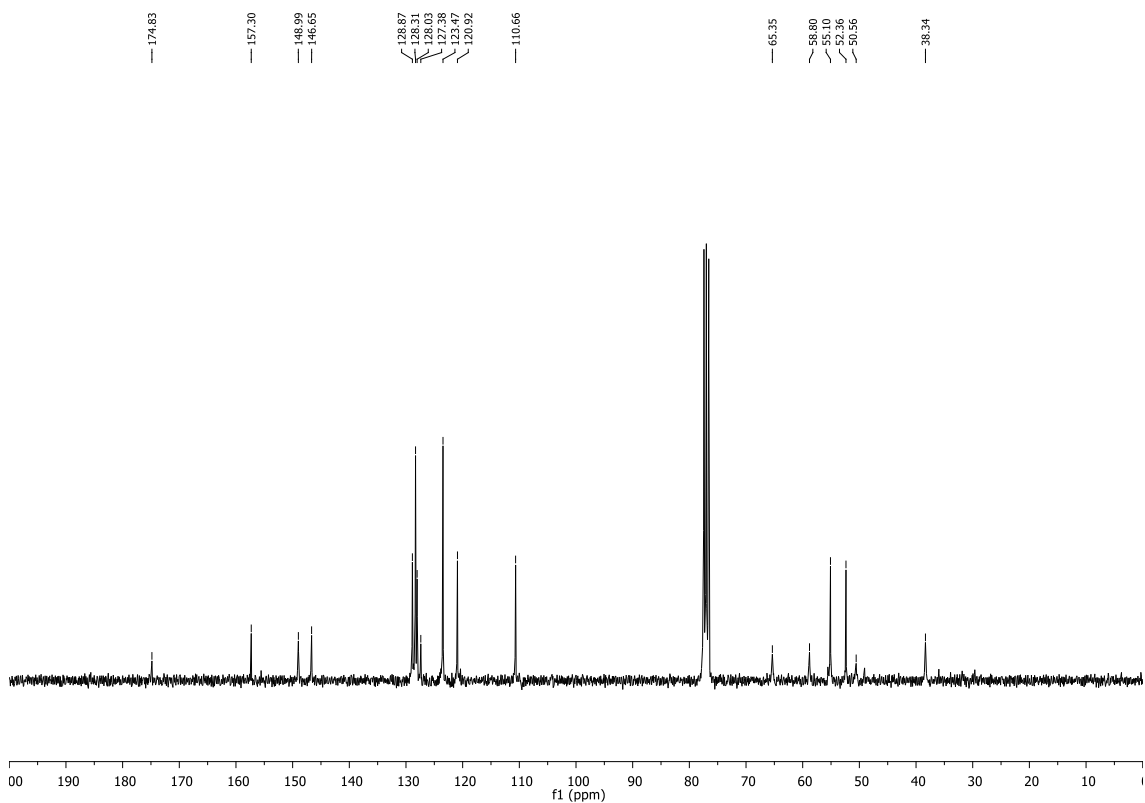
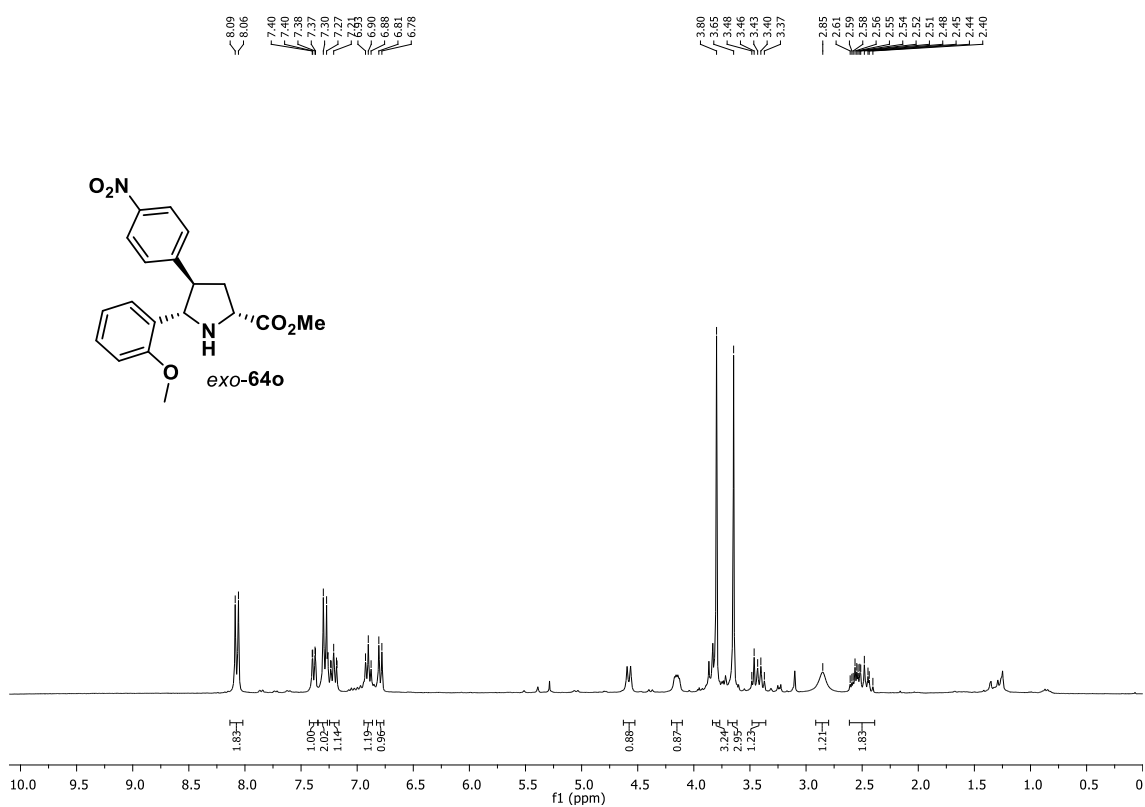
(2*R*,4*R*,5*S*)-Methyl 4-(4-nitrophenyl)-5-(*m*-tolyl)pyrrolidine-2-carboxylate (*exo*-64g)



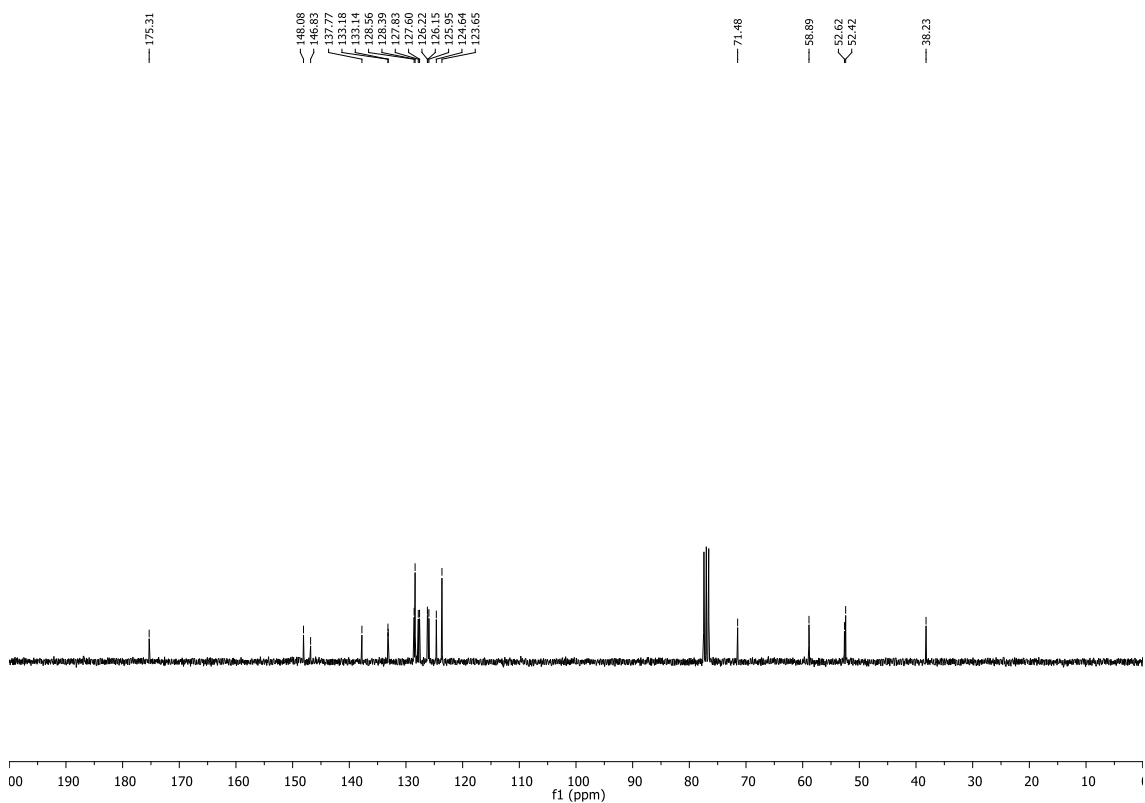
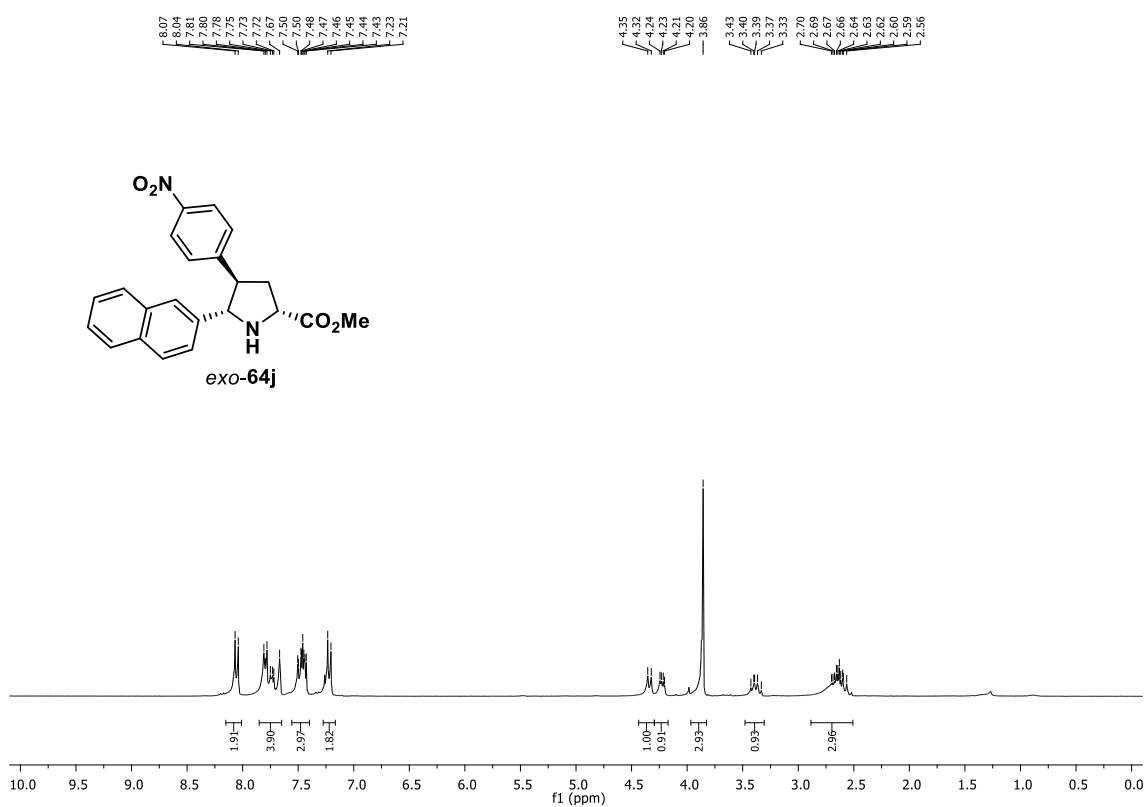
(2*R*,4*R*,5*S*)-Methyl 4-(4-nitrophenyl)-5-(*o*-tolyl)pyrrolidine-2-carboxylate (exo-64i)



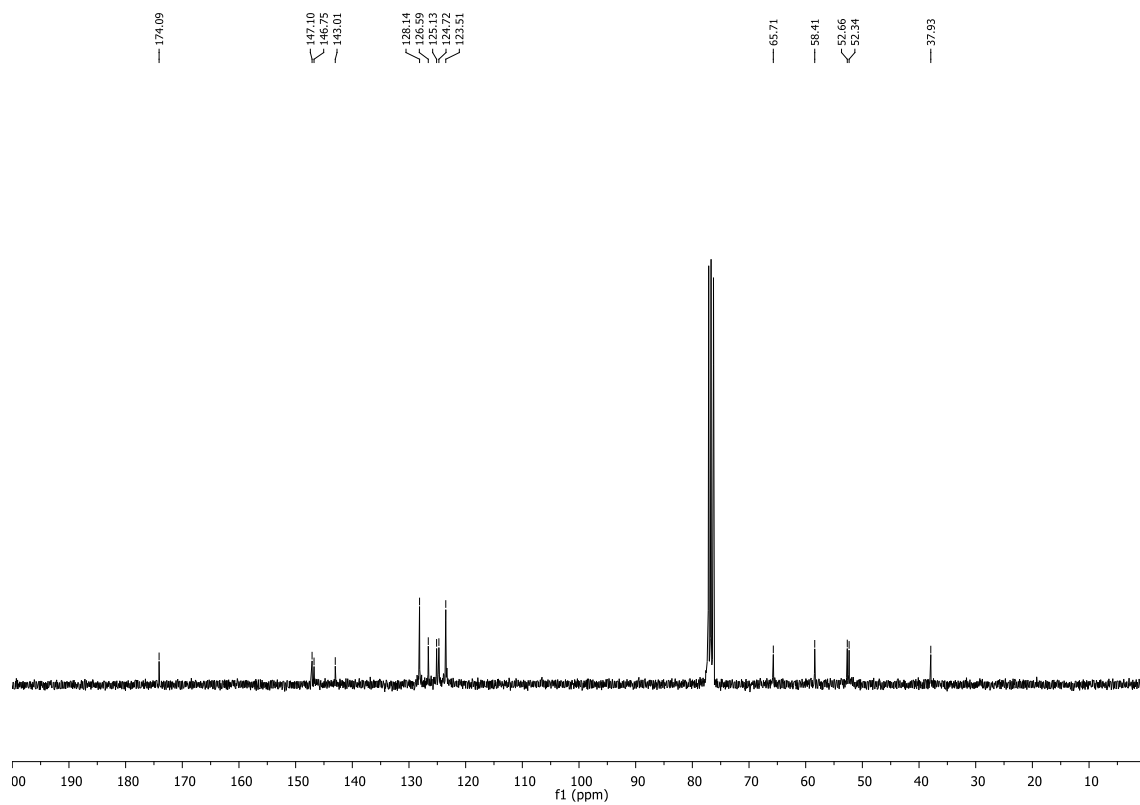
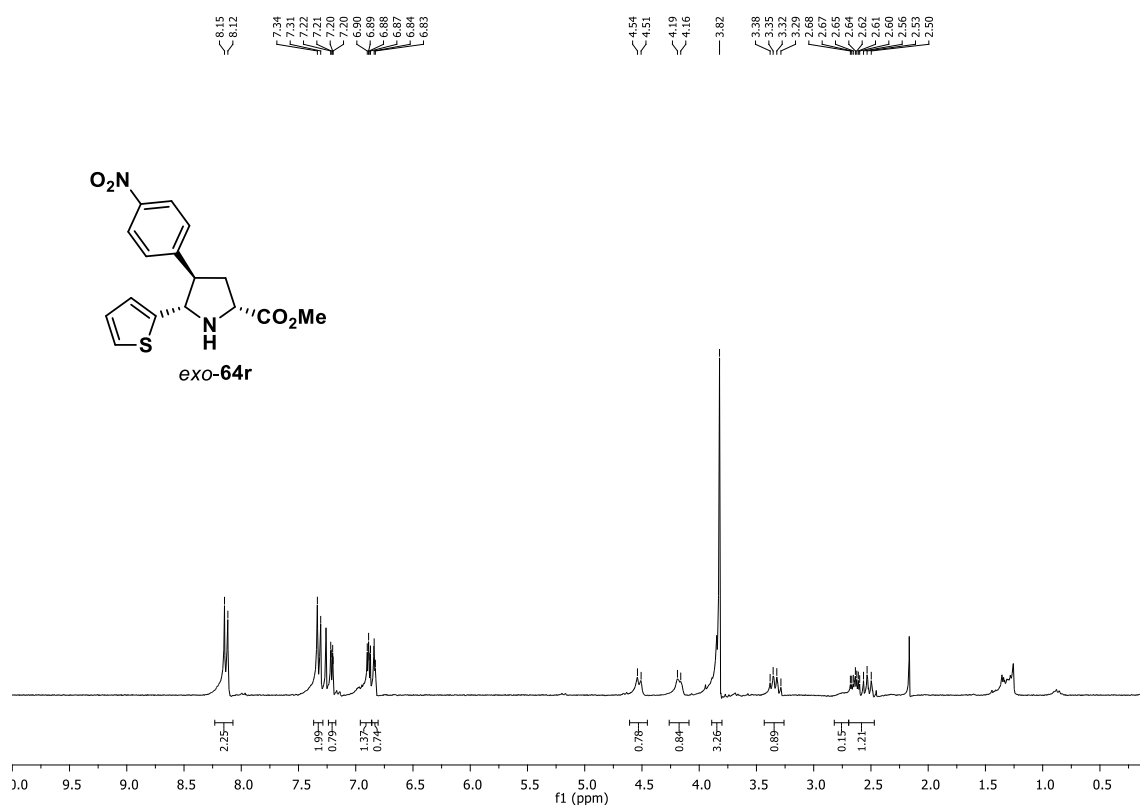
(2*R*,4*R*,5*S*)-Methyl 5-(*o*-methoxyphenyl)-4-(4-nitrophenyl)pyrrolidine-2-carboxylate (*exo*-64o)



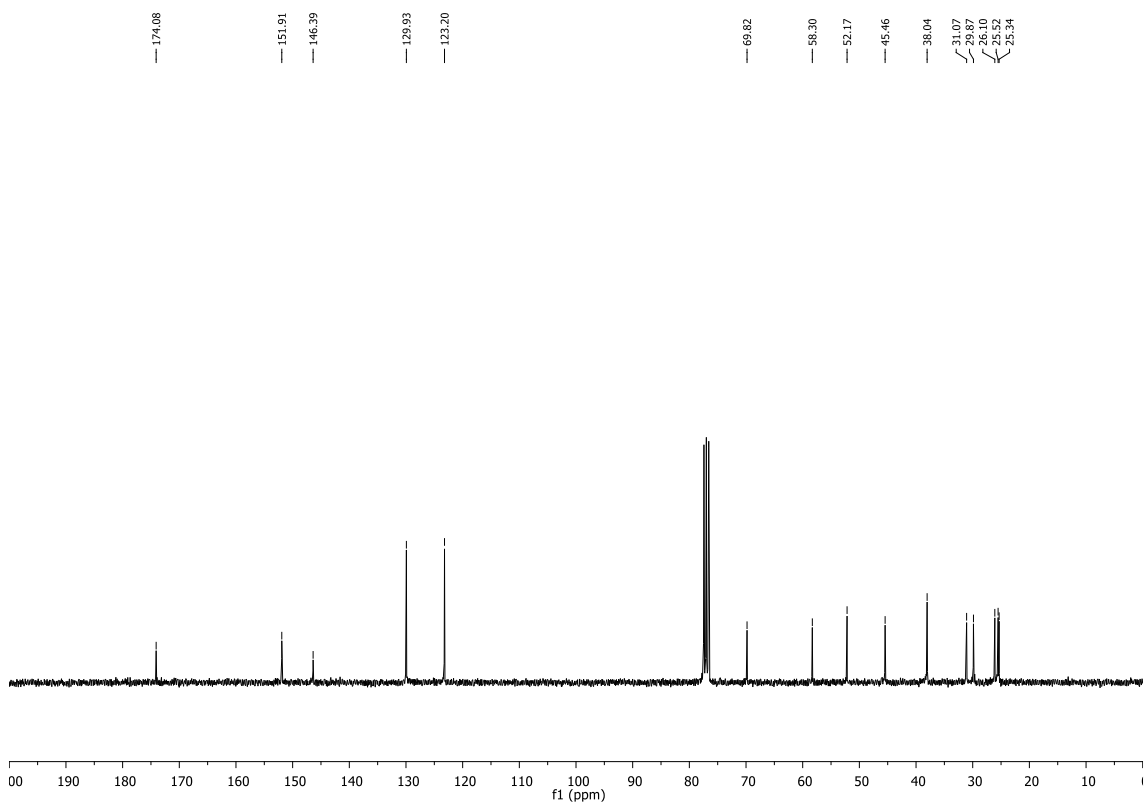
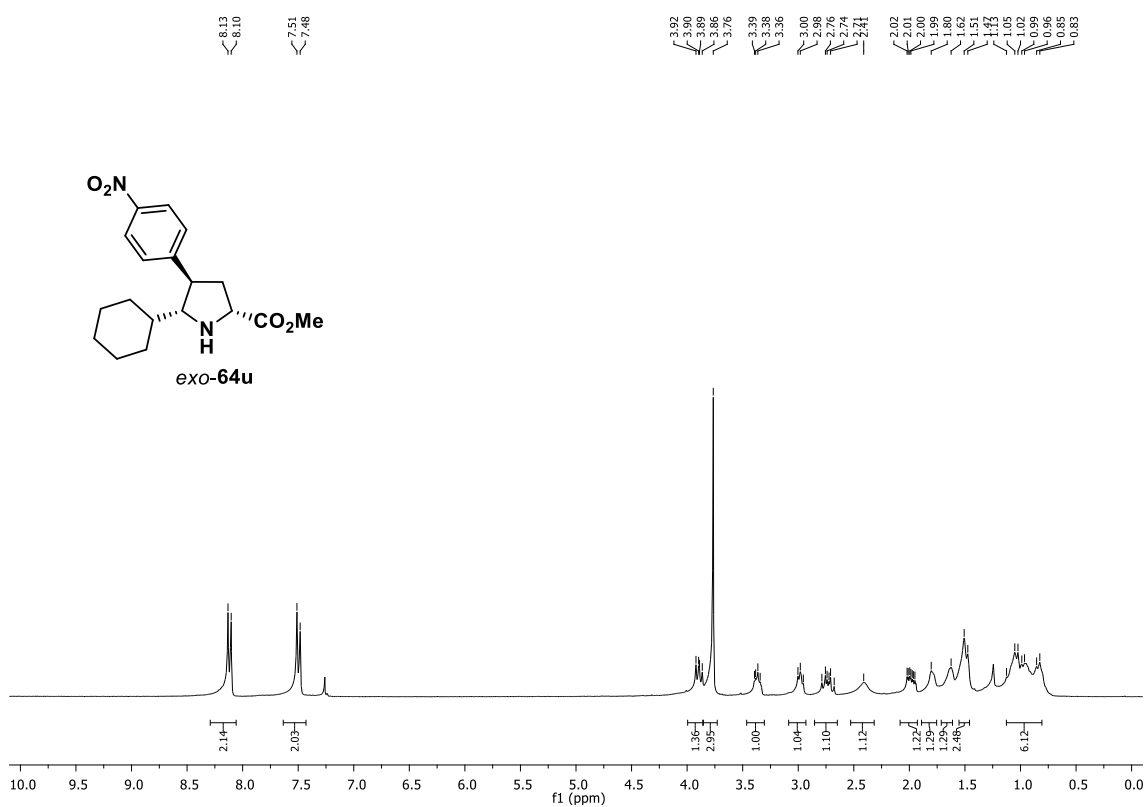
(2*R*,4*R*,5*S*)-Methyl 5-(naphthalen-2-yl)-4-(4-nitrophenyl)pyrrolidine-2-carboxylate (*exo*-64j)



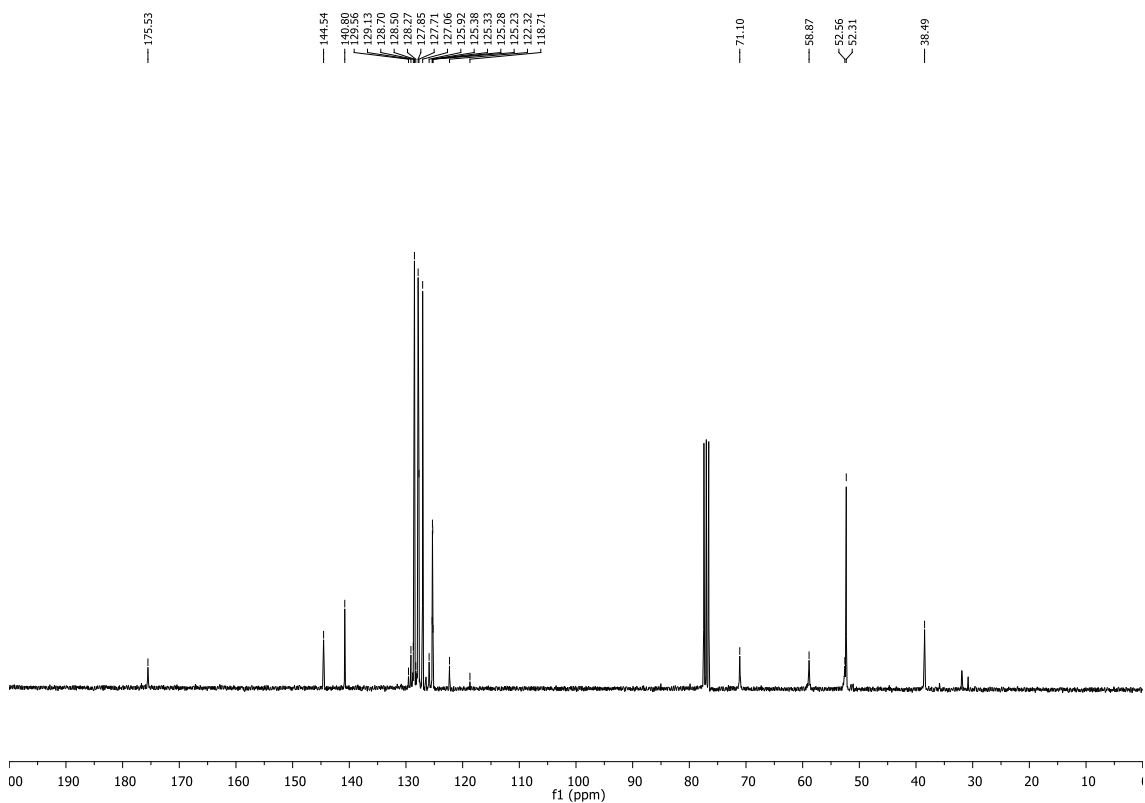
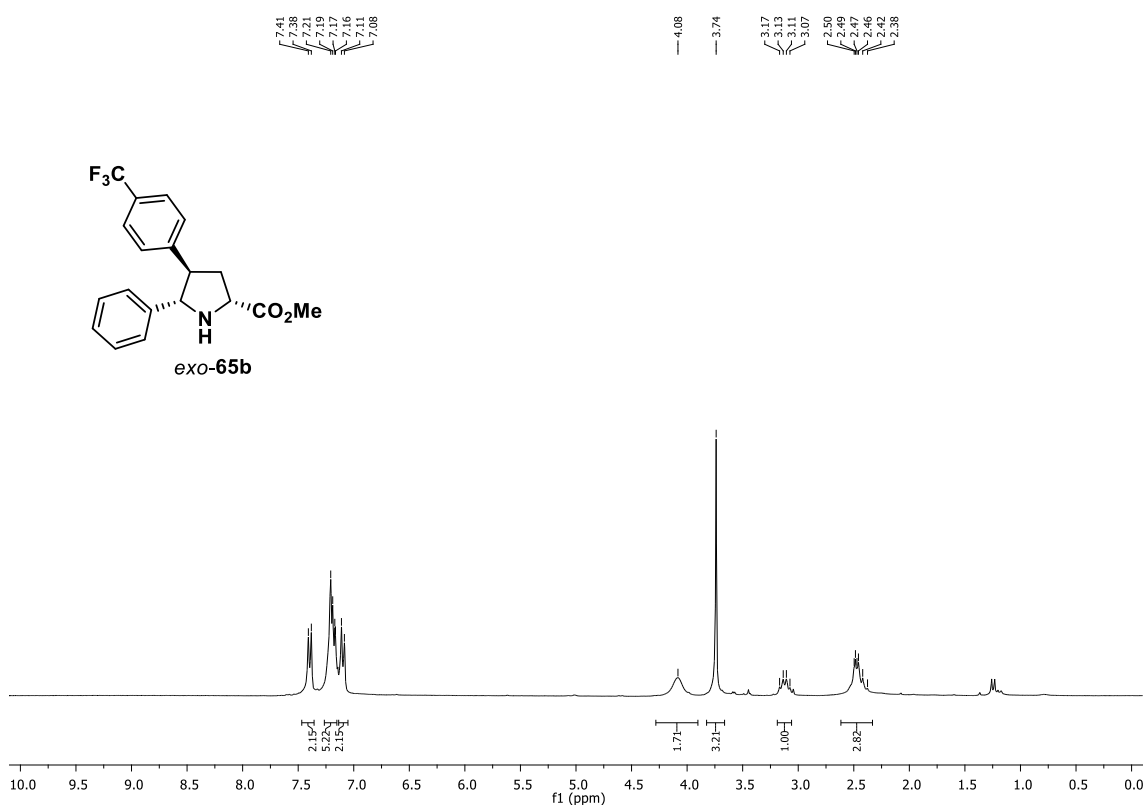
(2*R*,4*R*,5*S*)-Methyl 4-(4-nitrophenyl)-5-(thiophen-2-yl)pyrrolidine-2-carboxylate (*exo*-64r)



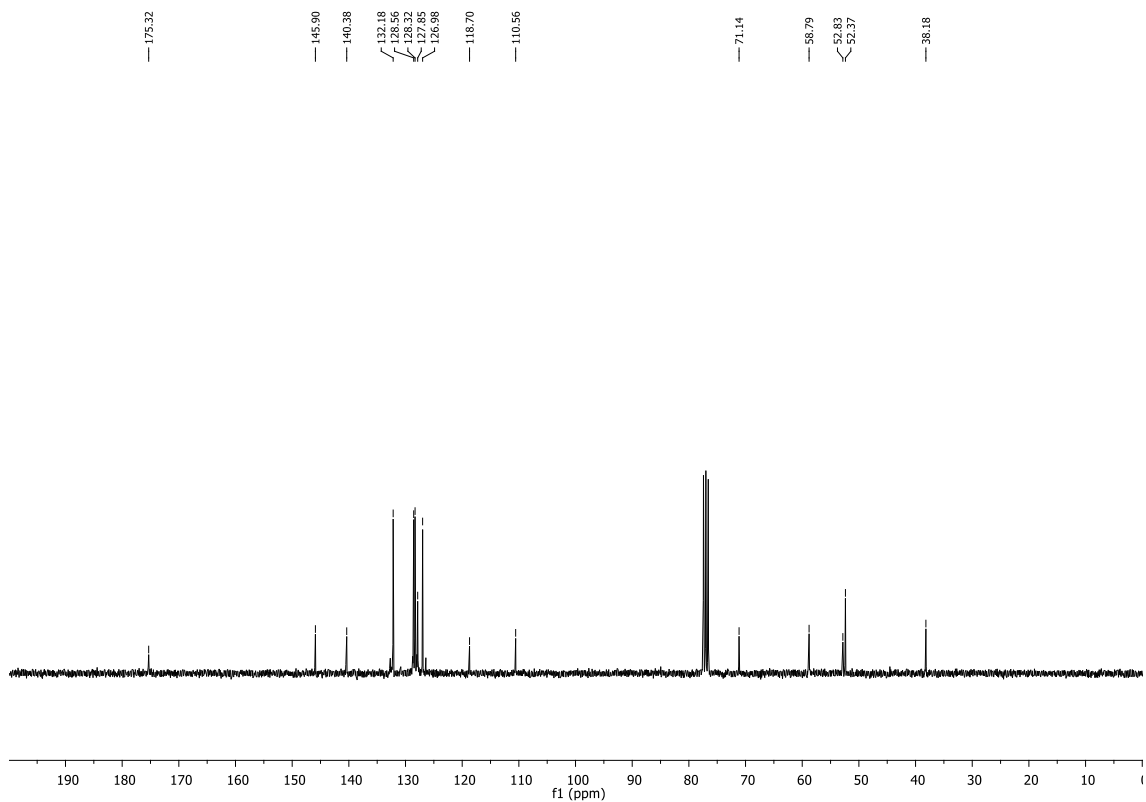
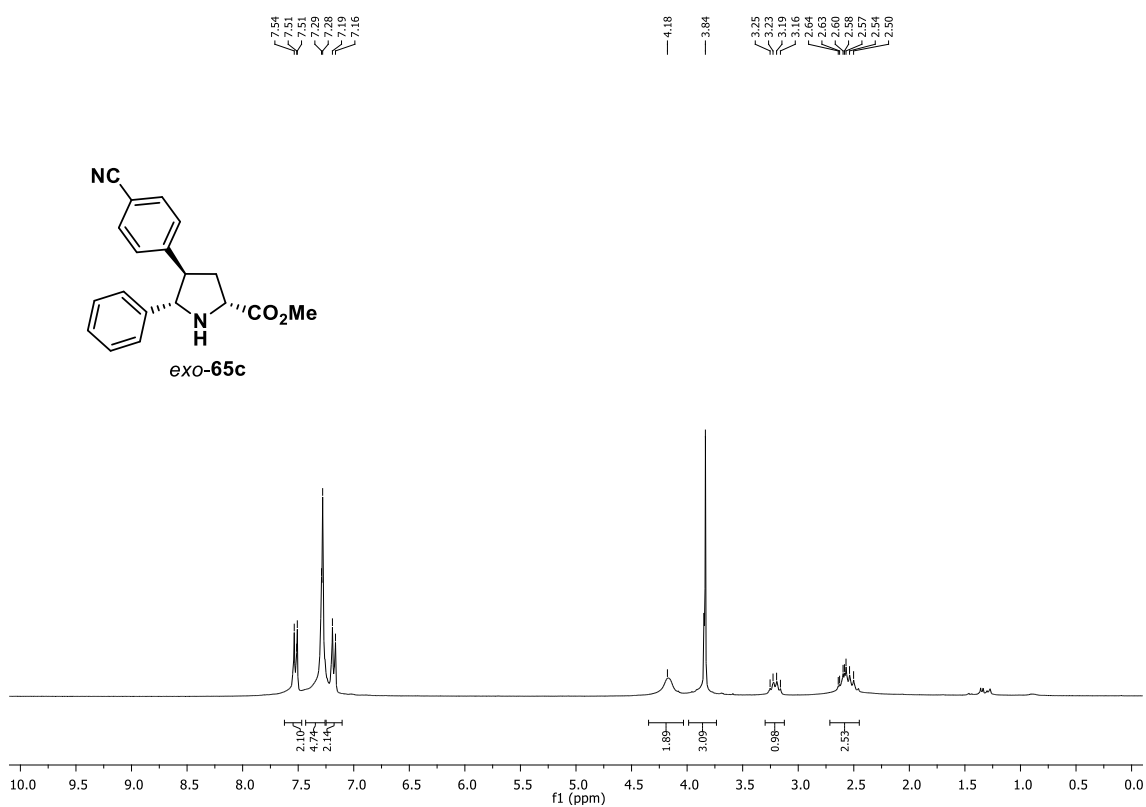
(2*R*,4*R*,5*S*)-Methyl 5-(cyclohexyl)-4-(4-nitrophenyl)pyrrolidine-2-carboxylate (*exo*-64u)



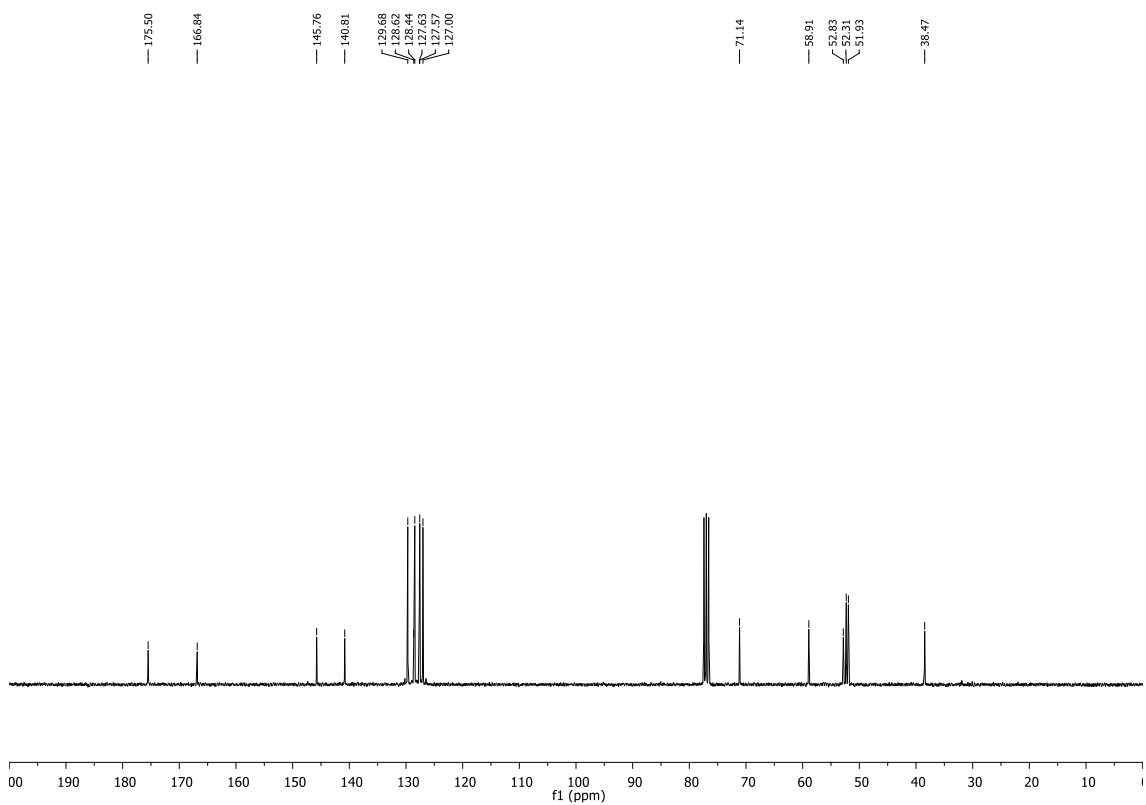
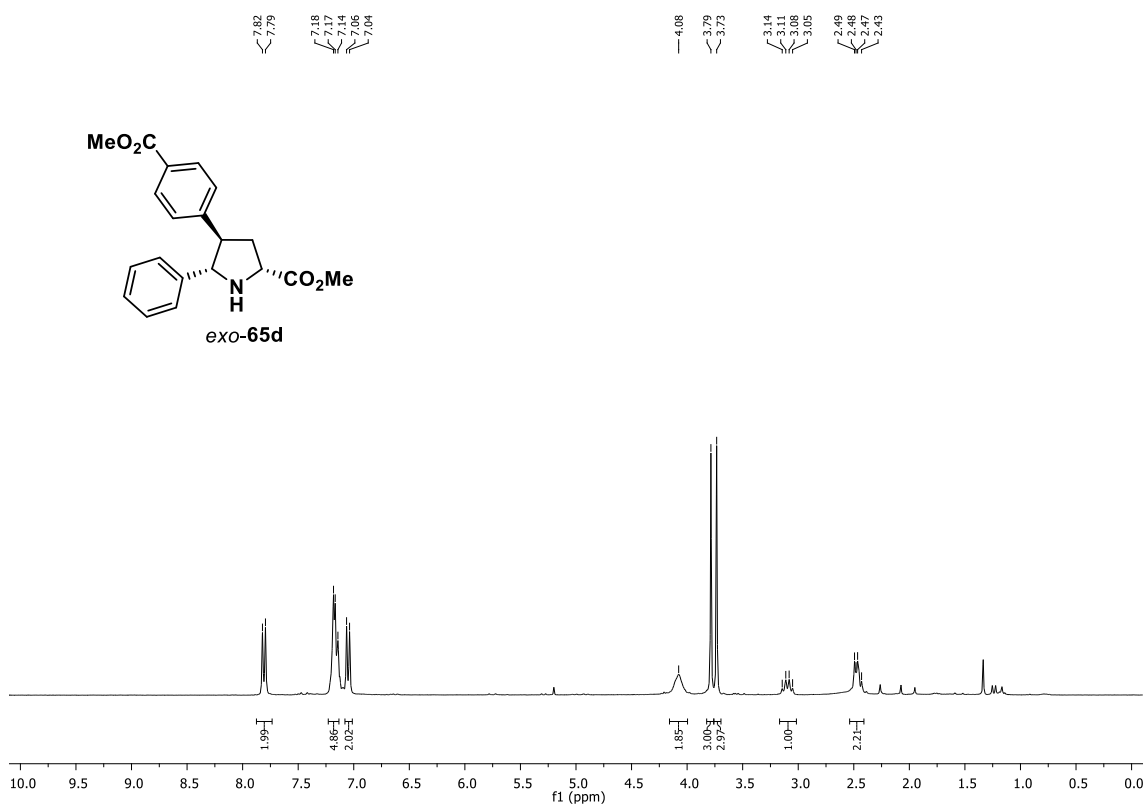
(2*R*,4*R*,5*S*)-Methyl 5-phenyl-4-(4-(trifluoromethyl)phenyl)pyrrolidine-2-carboxylate (*exo*-65b)



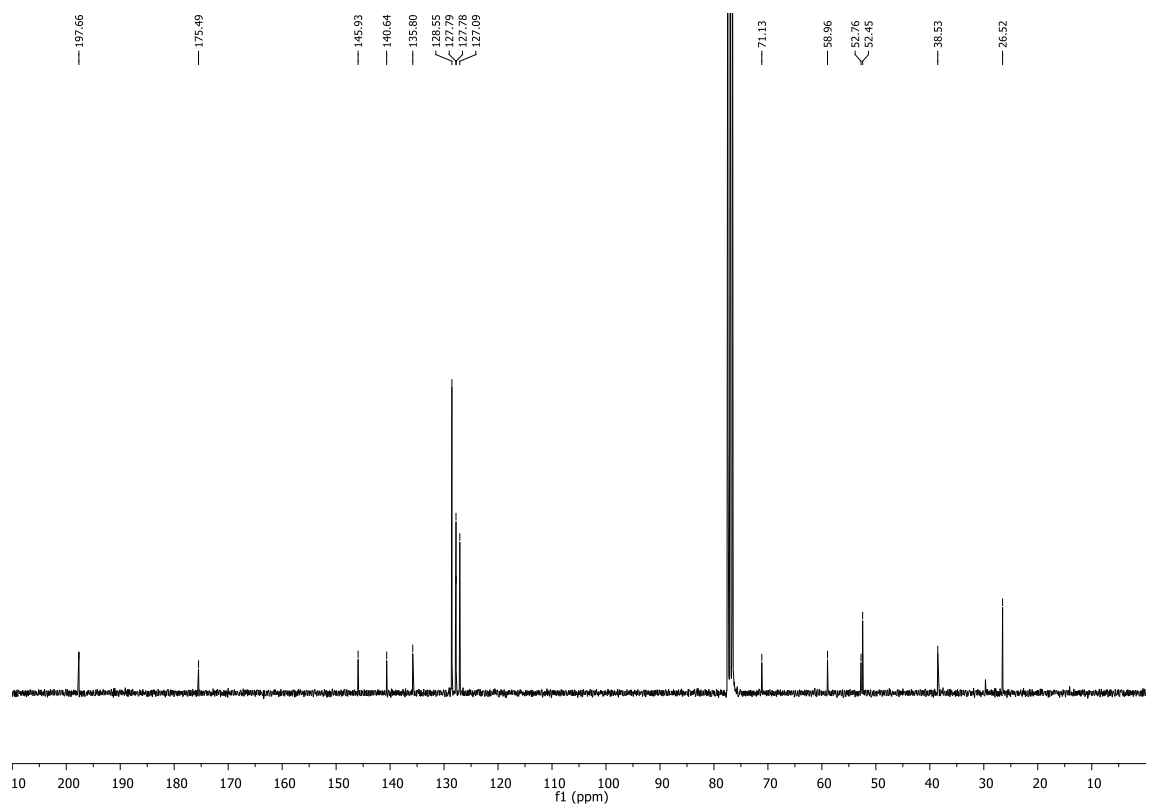
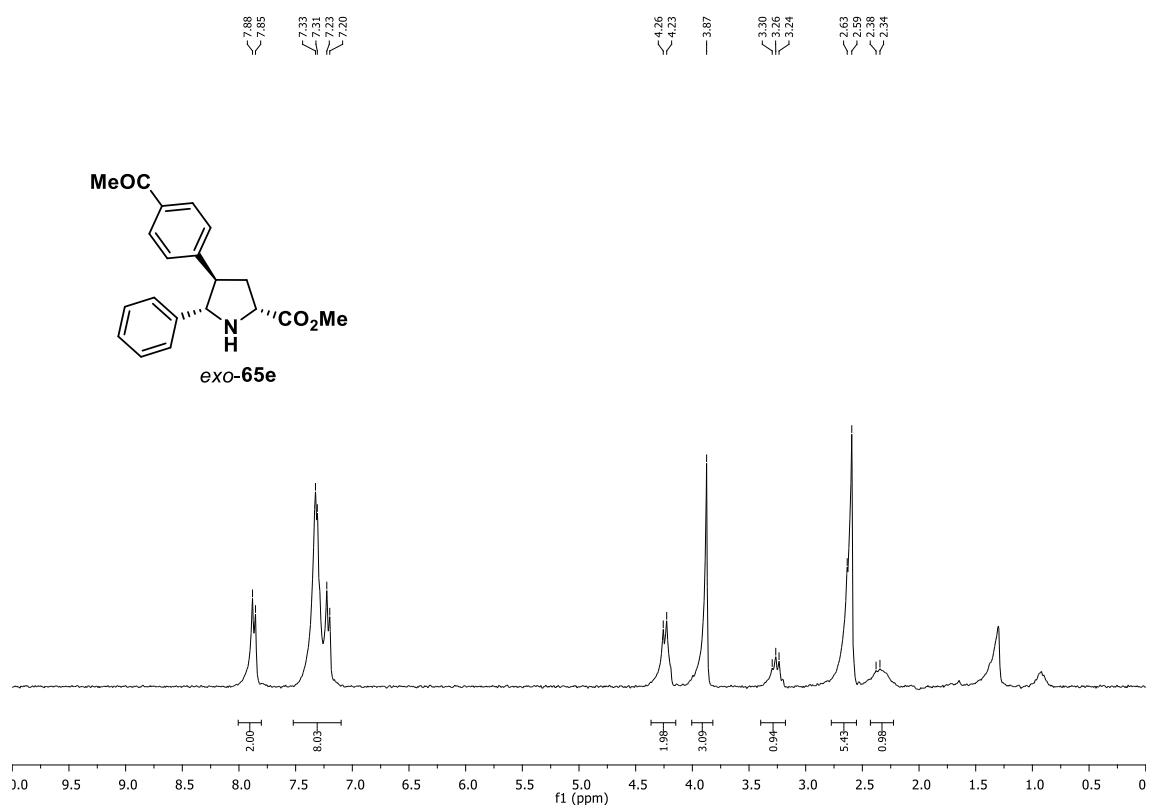
(2*R*,4*R*,5*S*)-Methyl 4-(4-cyanophenyl)-5-phenylpyrrolidine-2-carboxylate (*exo*-65c)



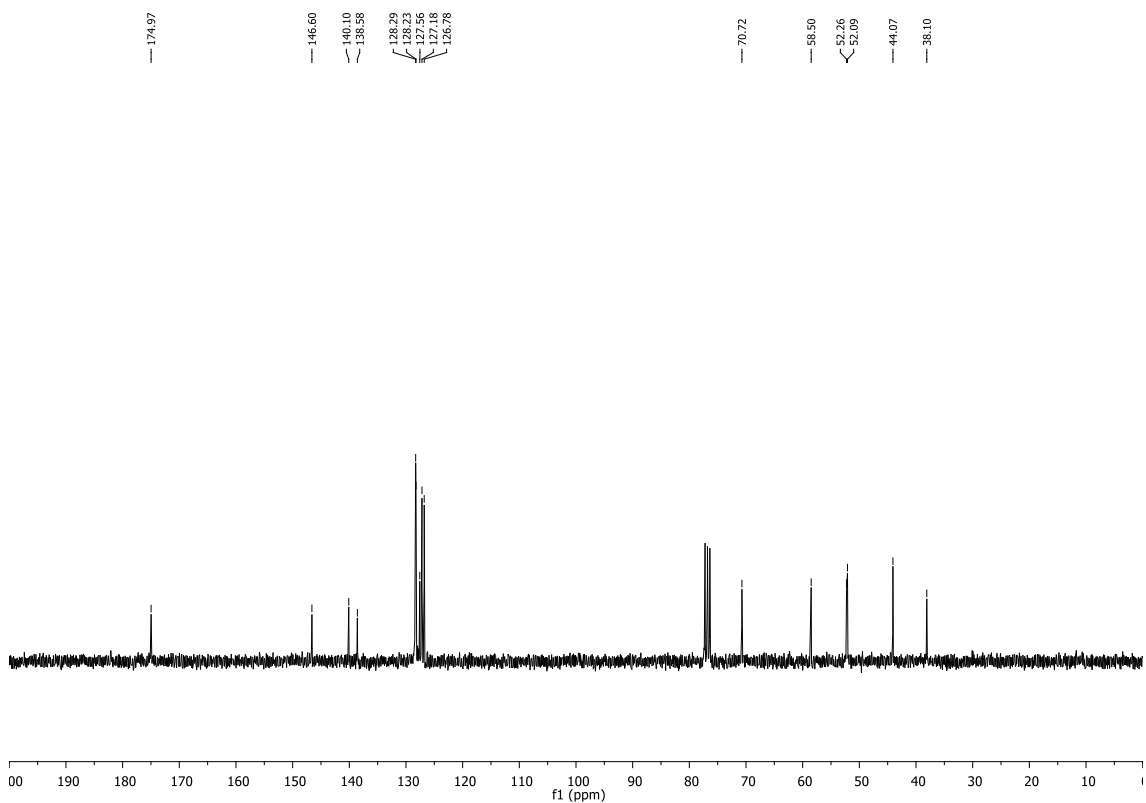
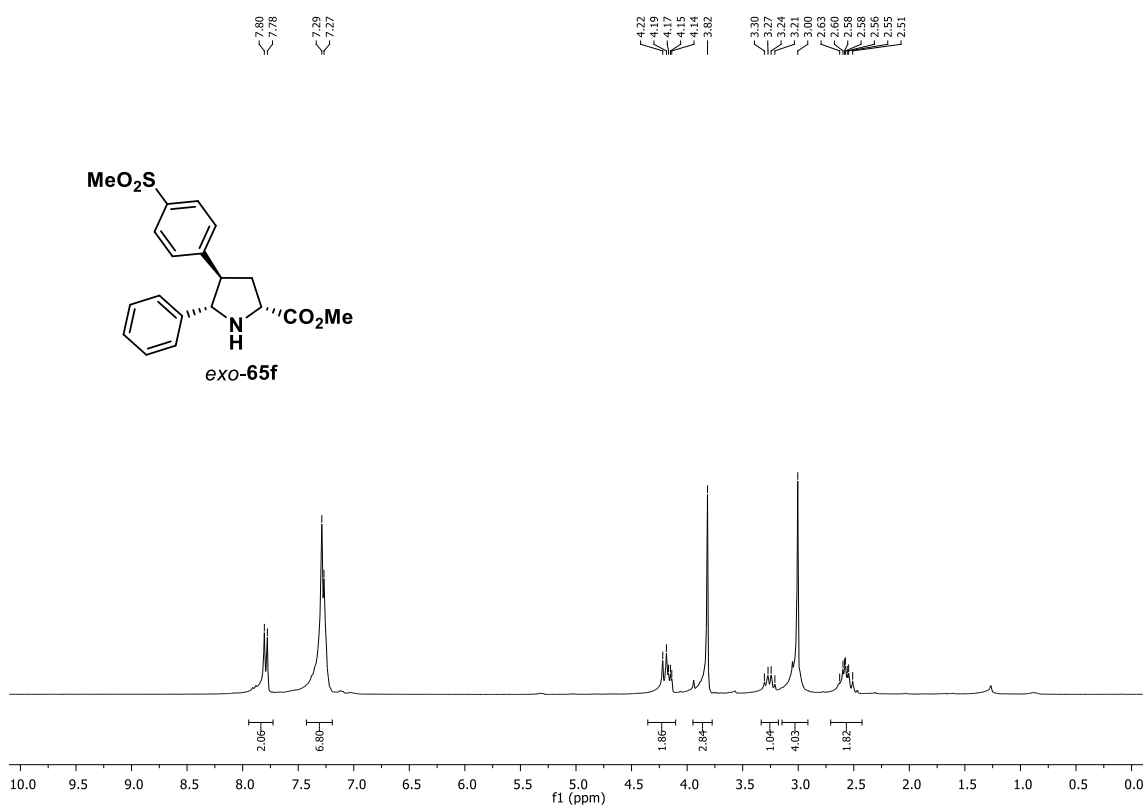
(2*R*,4*R*,5*S*)-Methyl 4-(4-(methoxycarbonyl)phenyl)-5-phenylpyrrolidine-2-carboxylate
(*exo*-65d)



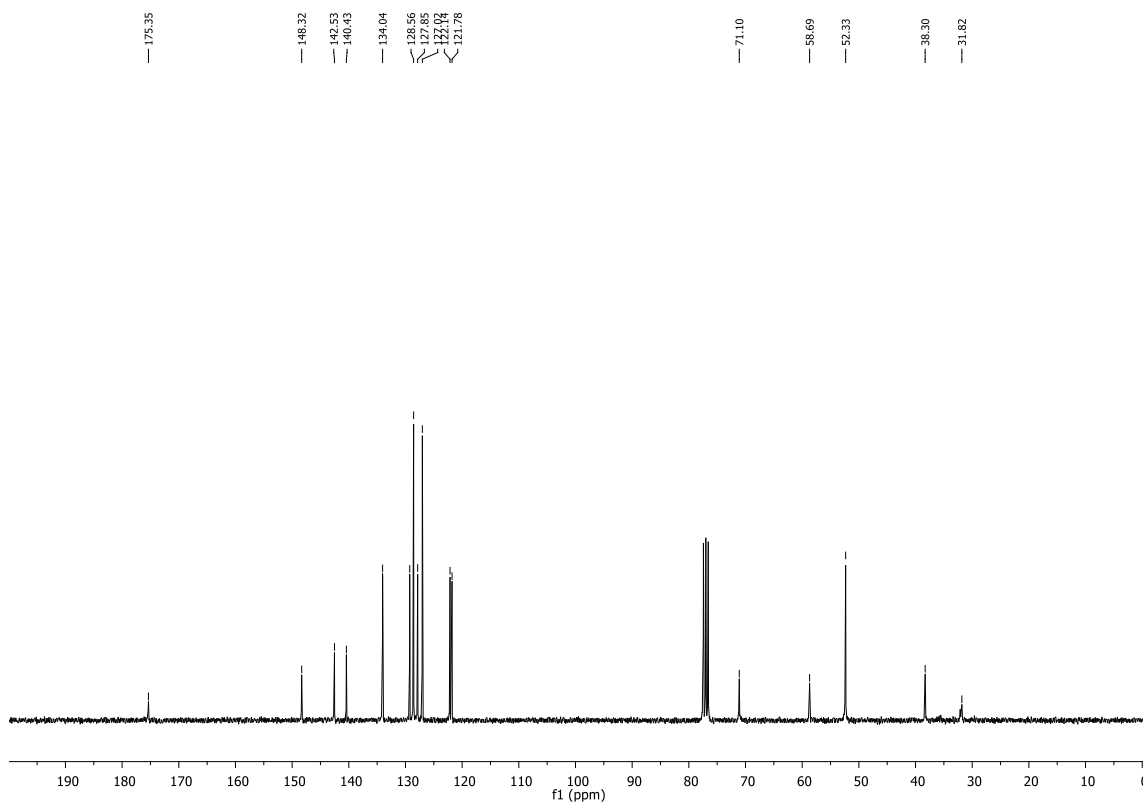
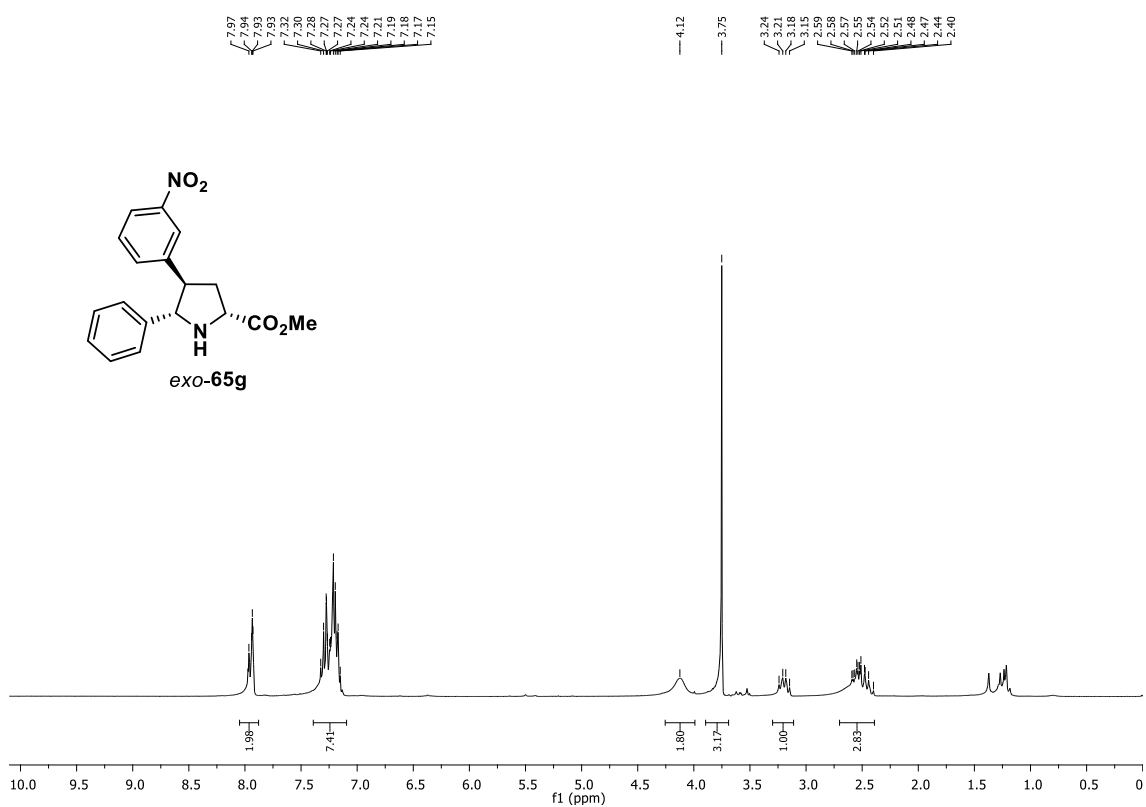
(2*R*,4*R*,5*S*)-Methyl 4-(4-acetylphenyl)-5-phenylpyrrolidine-2-carboxylate (*exo*-65e)



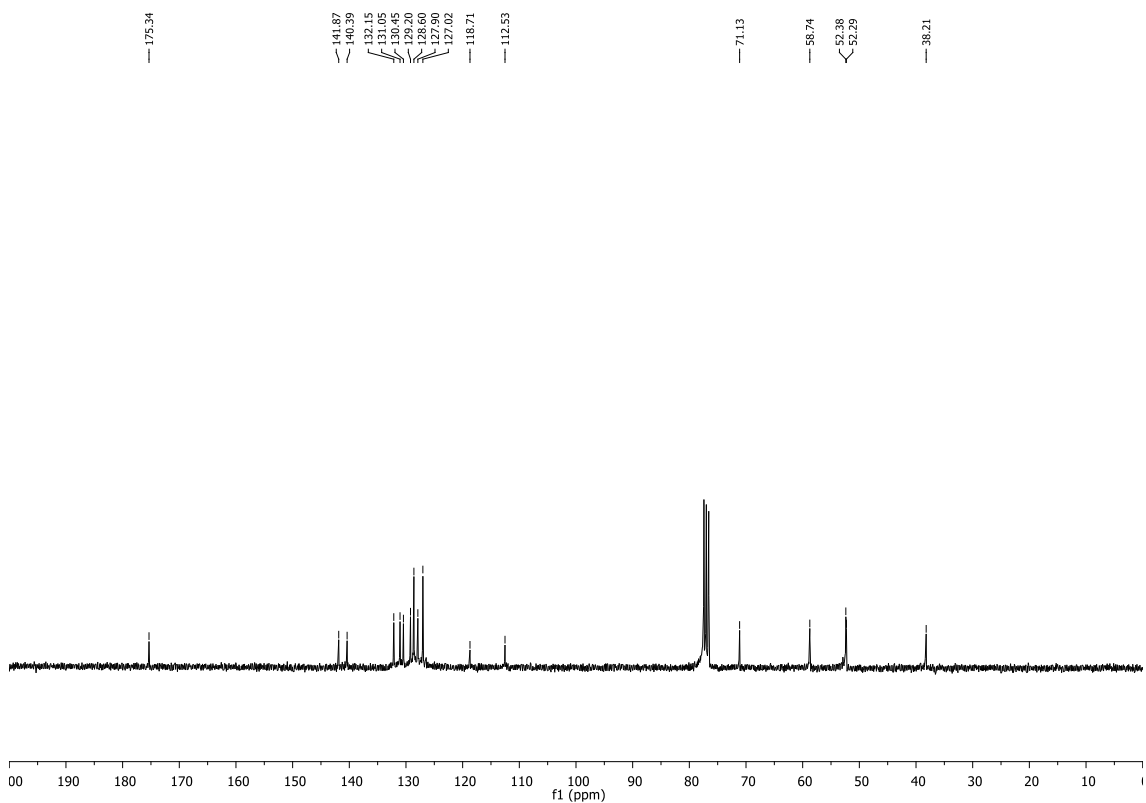
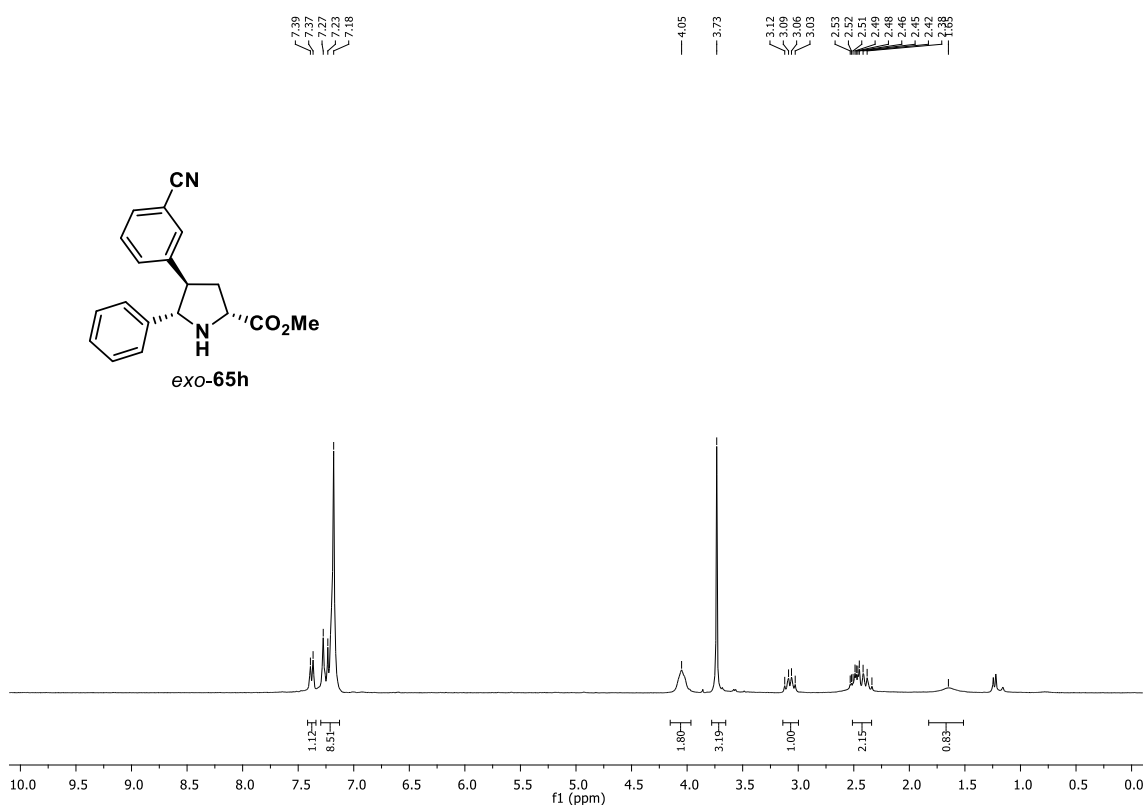
(2*R*,4*R*,5*S*)-Methyl 4-(4-(methylsulfonyl)phenyl)-5-phenylpyrrolidine-2-carboxylate (*exo*-65f)



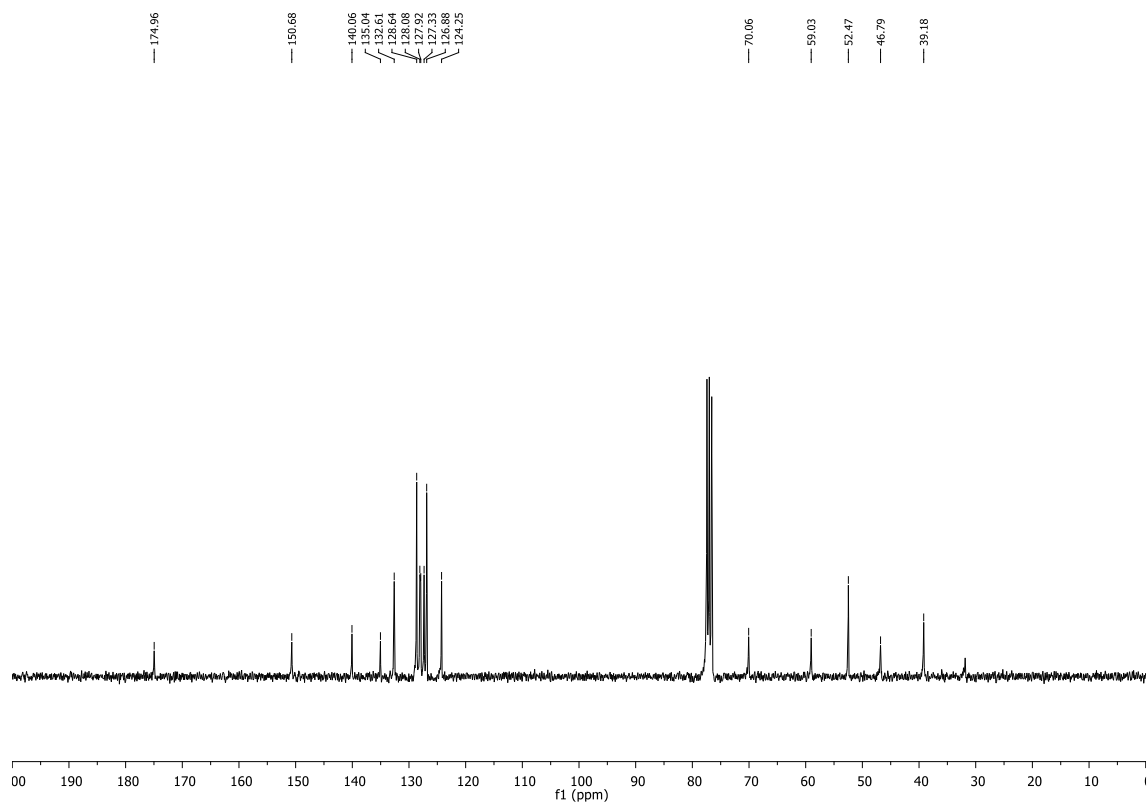
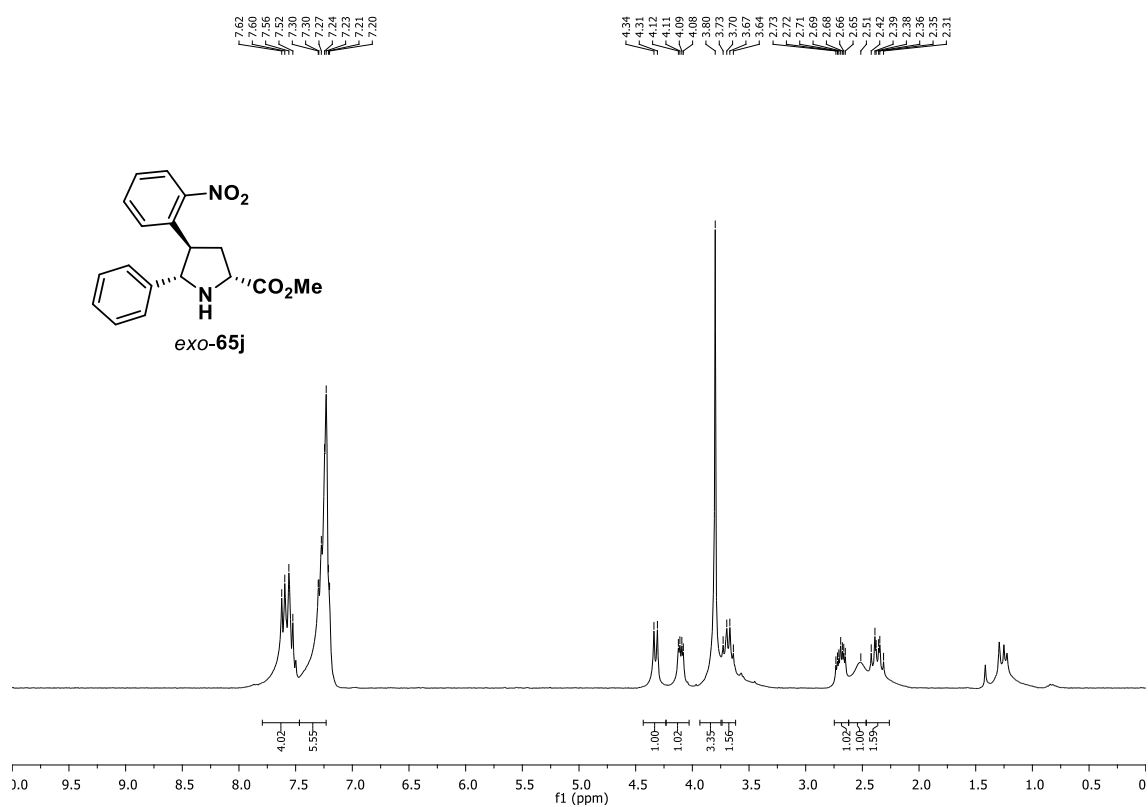
(2*R*,4*R*,5*S*)-Methyl 4-(3-nitrophenyl)-5-phenylpyrrolidine-2-carboxylate (*exo*-65g)



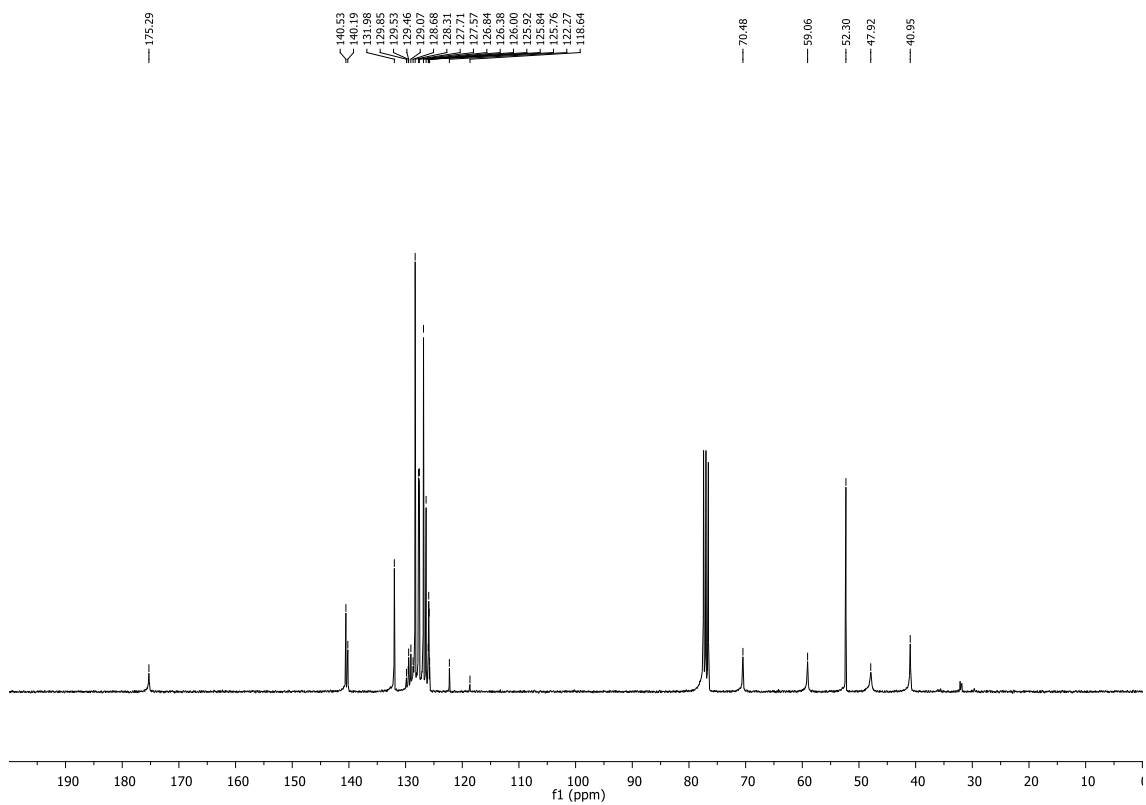
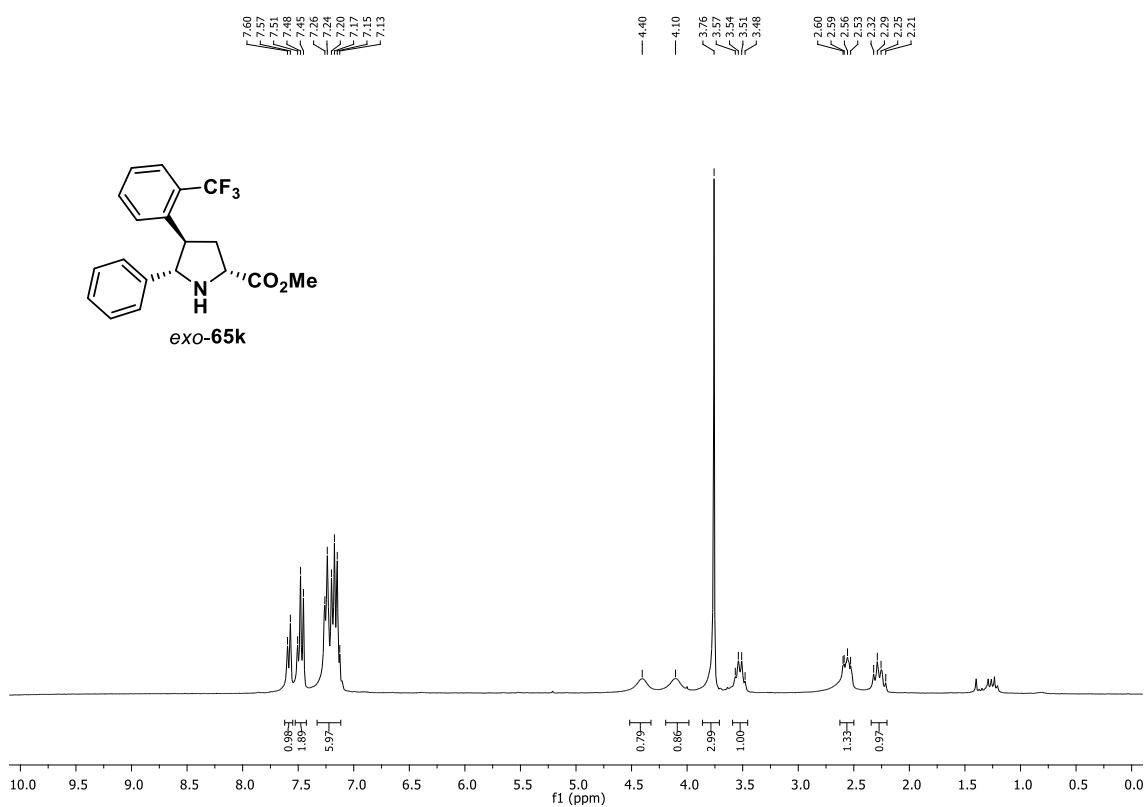
(2*R*,4*R*,5*S*)-Methyl 4-(3-cyanophenyl)-5-phenylpyrrolidine-2-carboxylate (*exo*-65h)

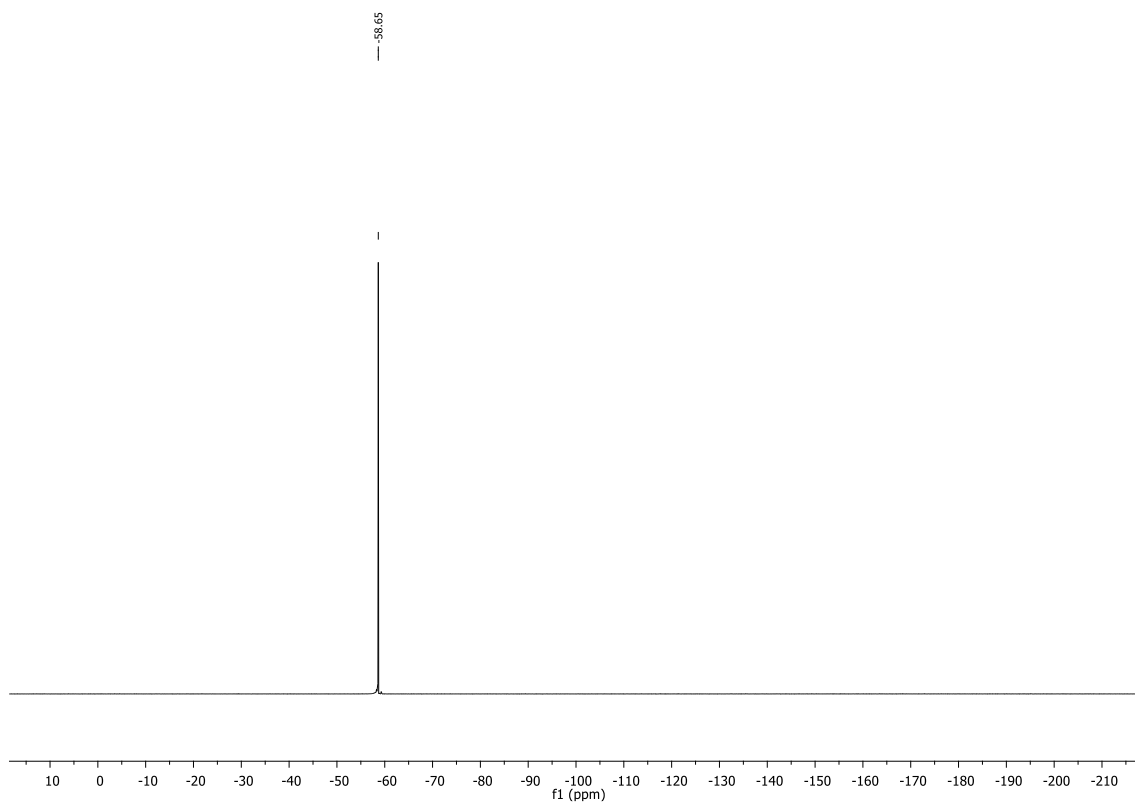


(2*R*,4*R*,5*S*)-Methyl 4-(2-nitrophenyl)-5-phenylpyrrolidine-2-carboxylate (*exo*-65j)

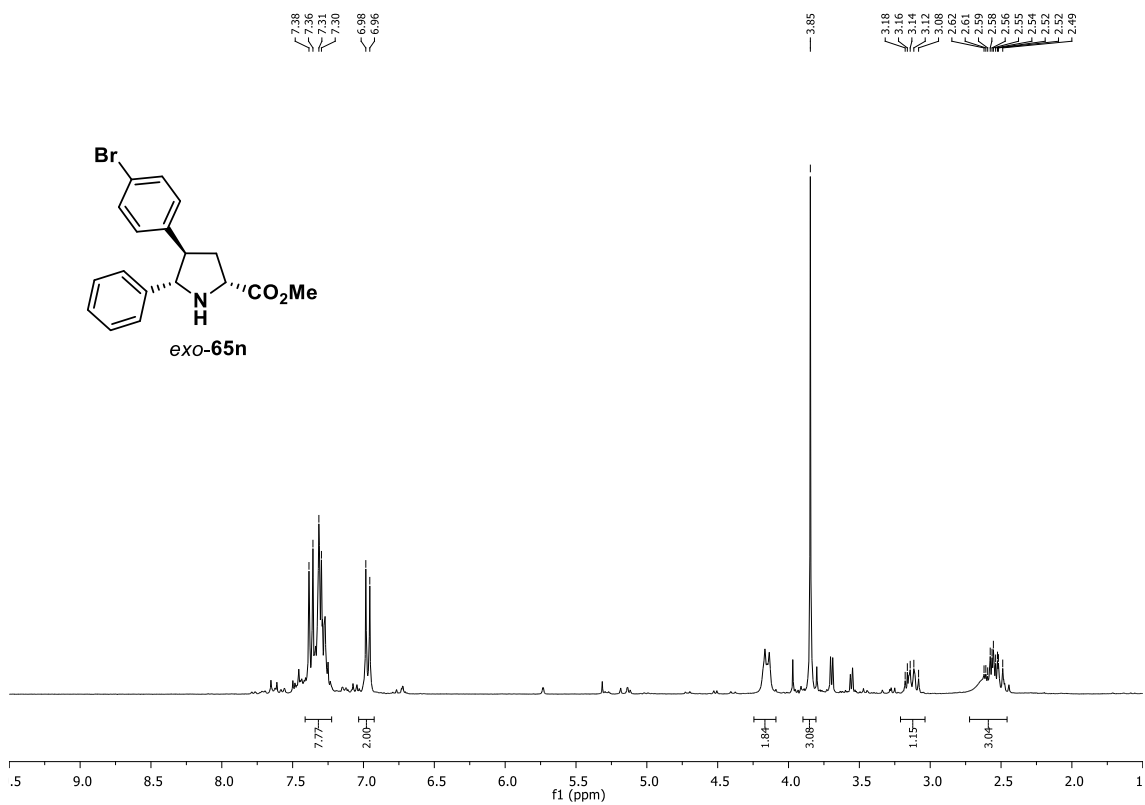


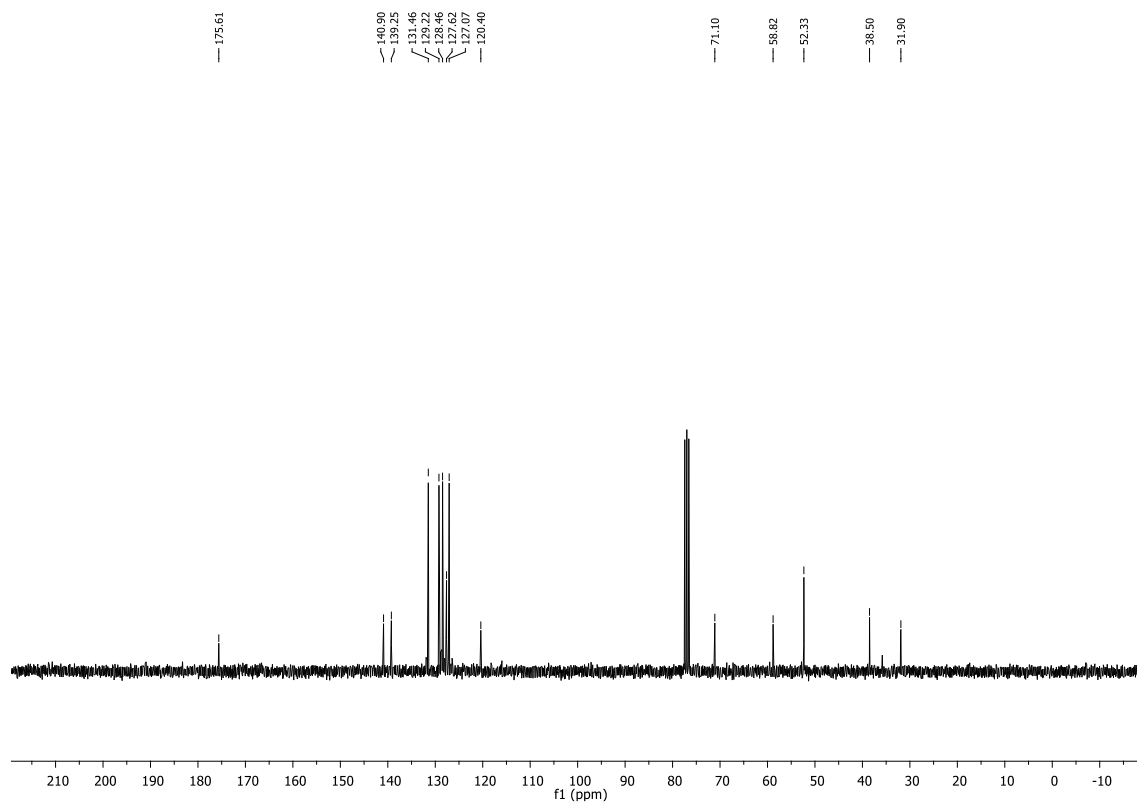
(2*R*,4*R*,5*S*)-Methyl 5-phenyl-4-(2-(trifluoromethyl)phenyl)pyrrolidine-2-carboxylate (*exo*-65k)



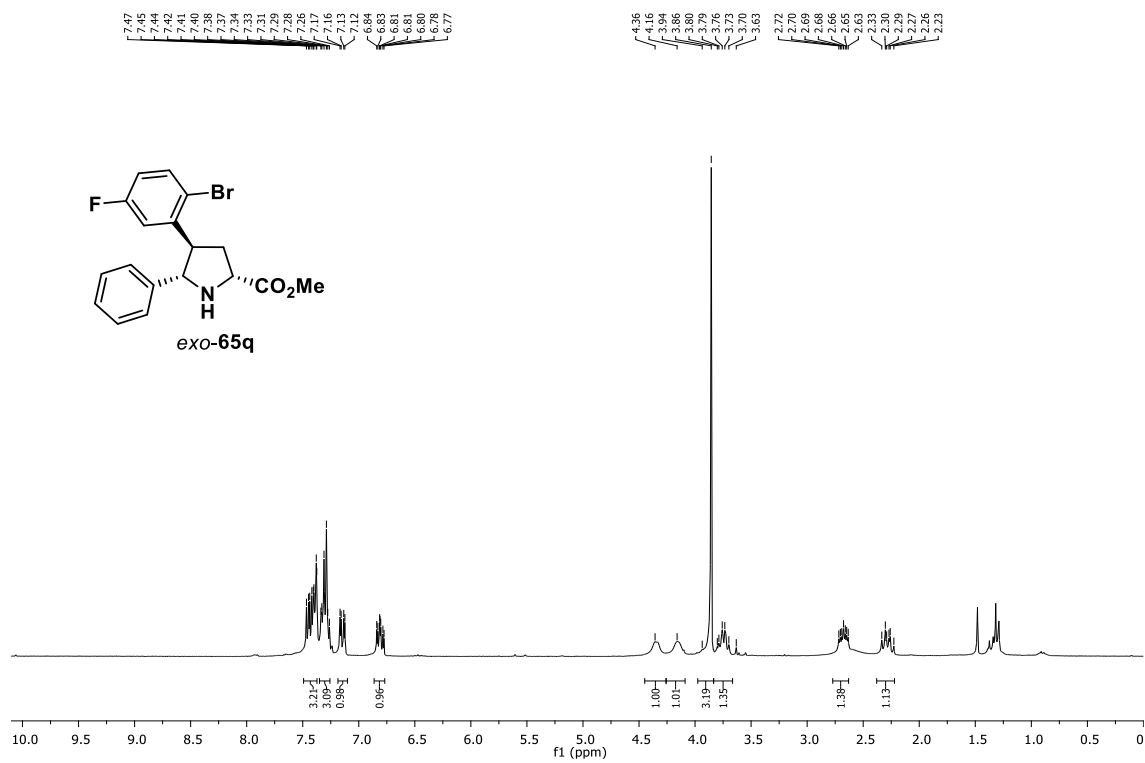


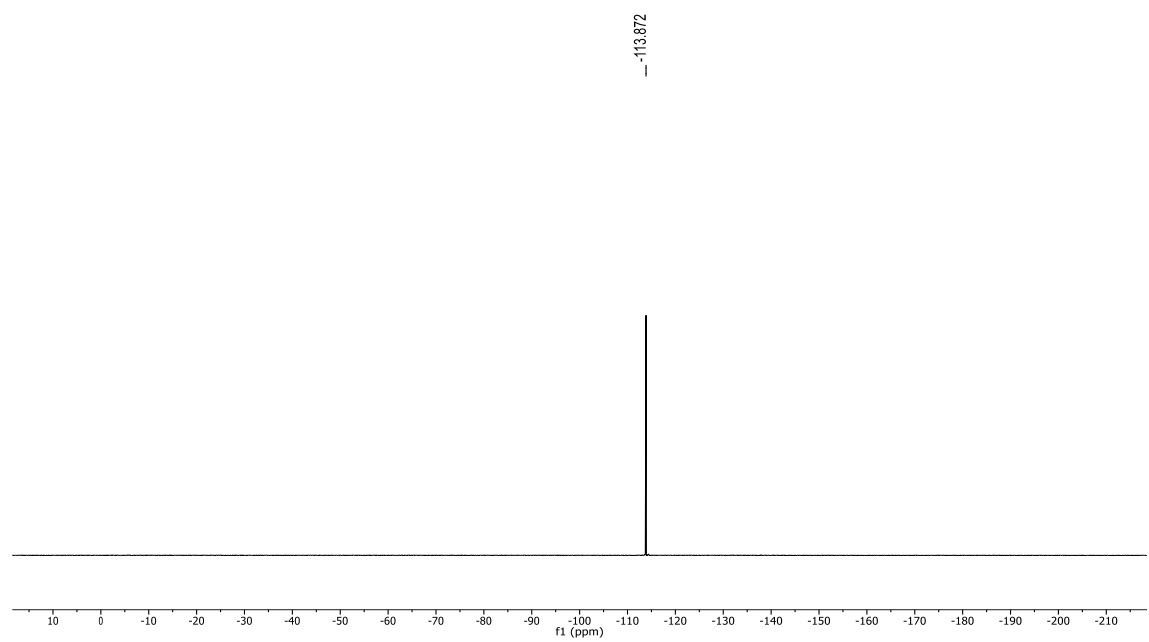
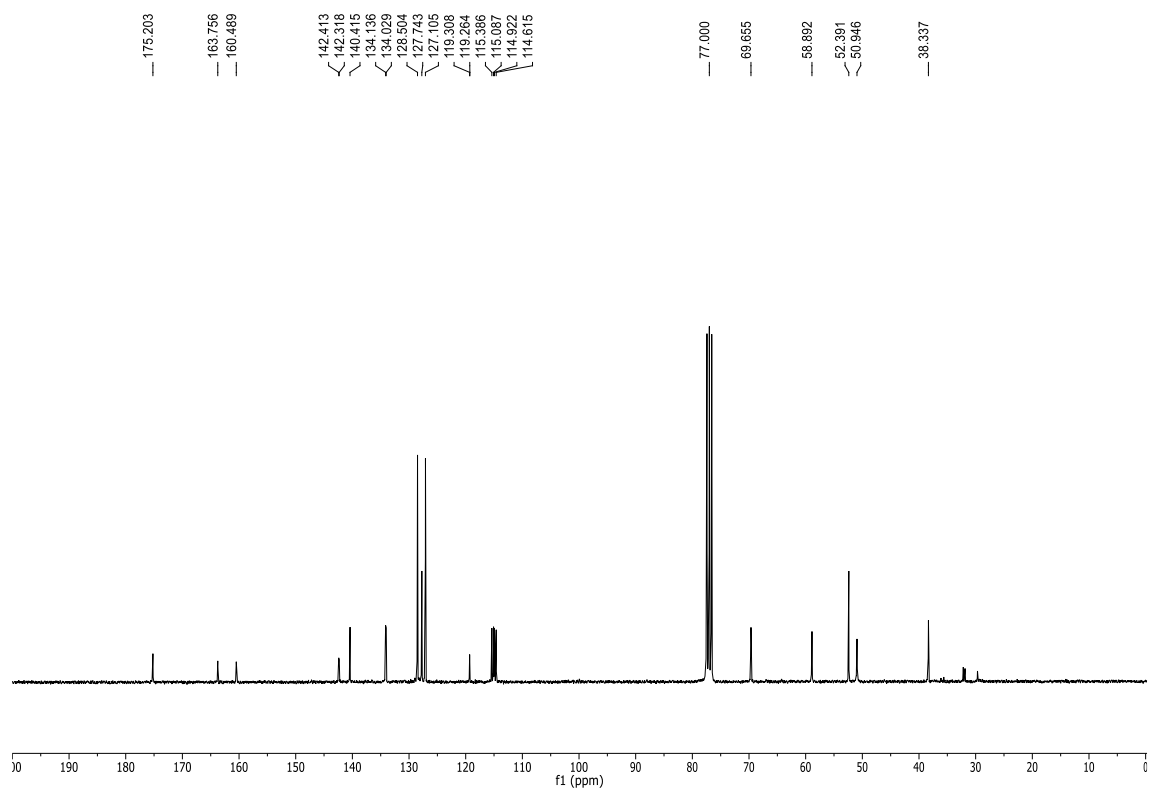
(2*R*,4*R*,5*S*)-Methyl 4-(4-bromophenyl)-5-phenylpyrrolidine-2-carboxylate (*exo*-65n)



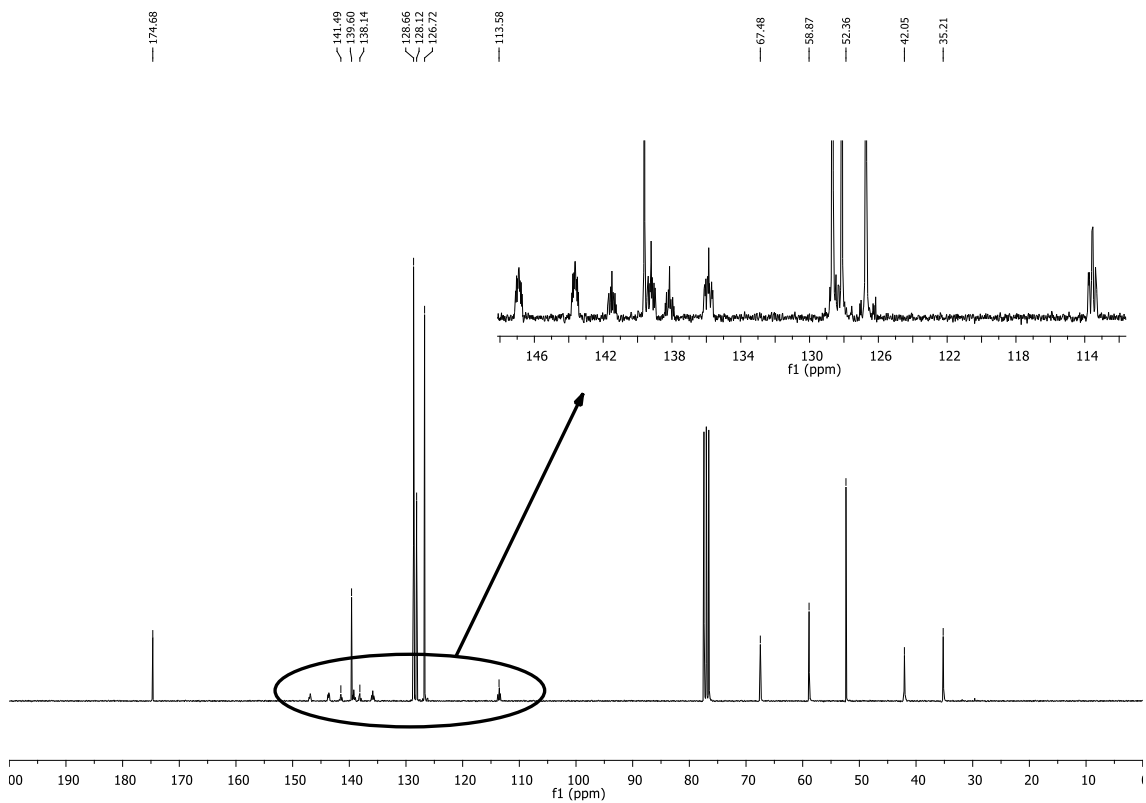
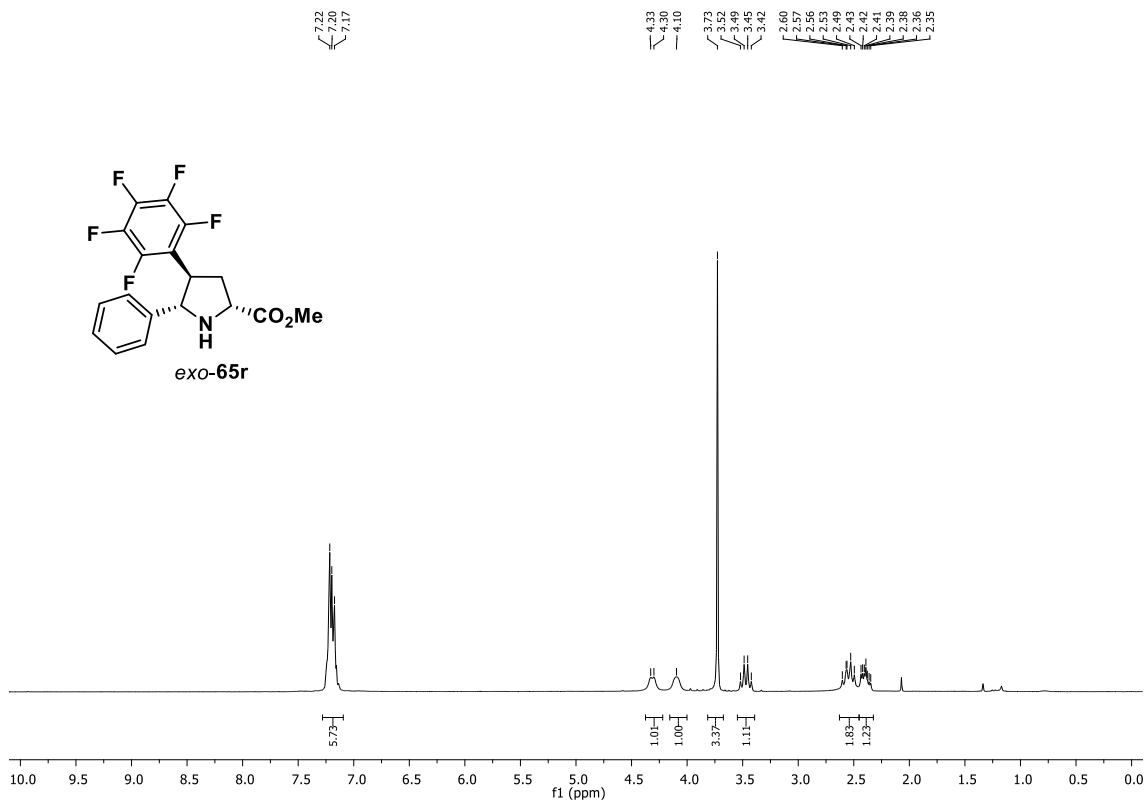


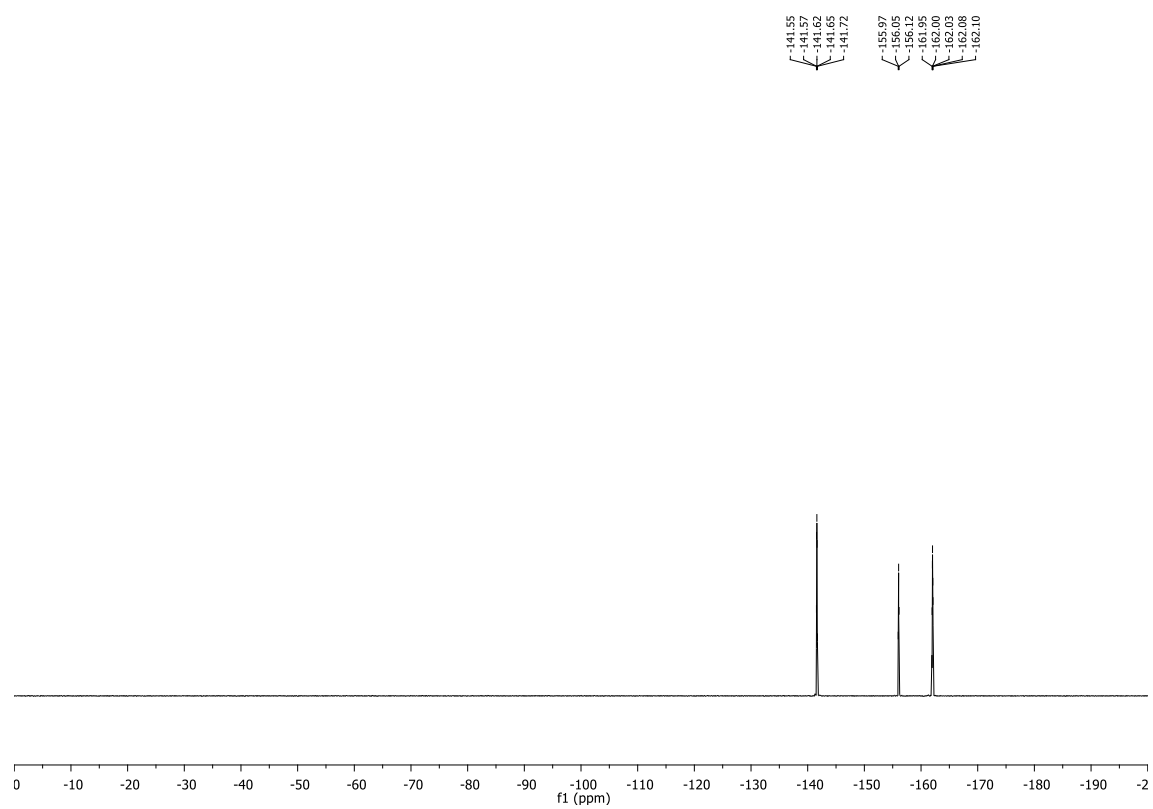
(2R,4R,5S)-Methyl 4-(2-bromo-5-fluorophenyl)-5-phenylpyrrolidine-2-carboxylate (exo-65q)



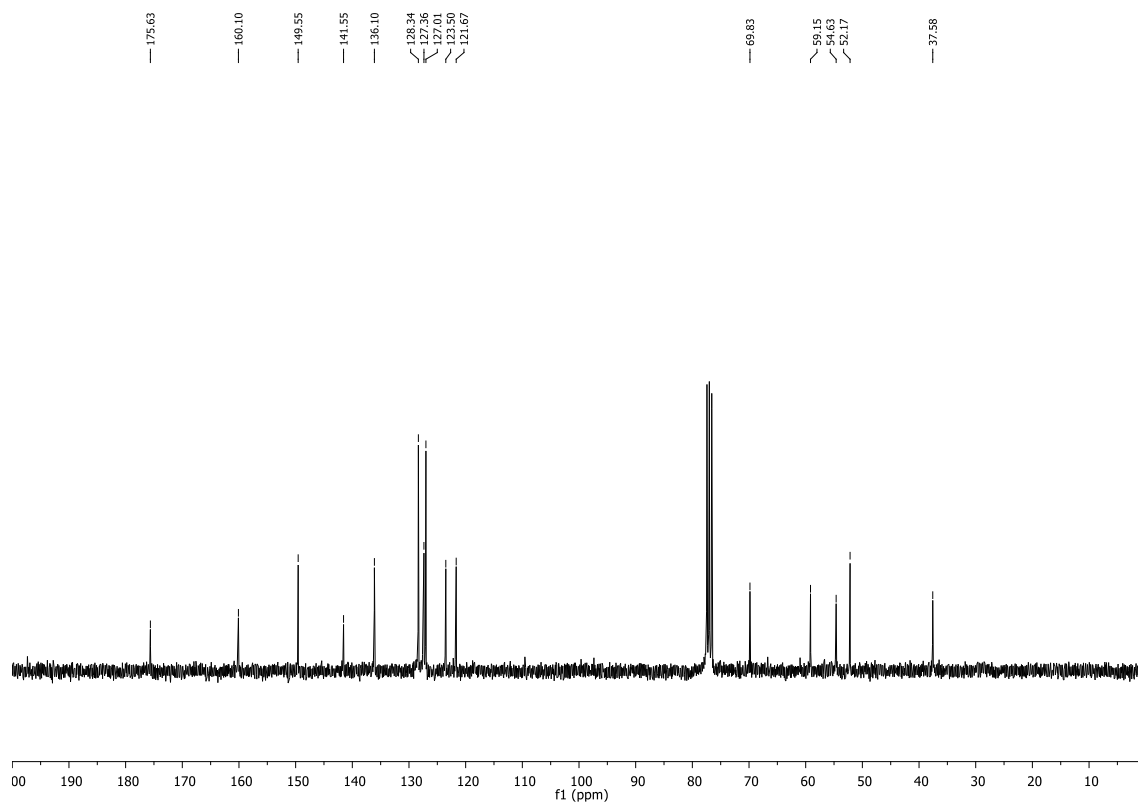
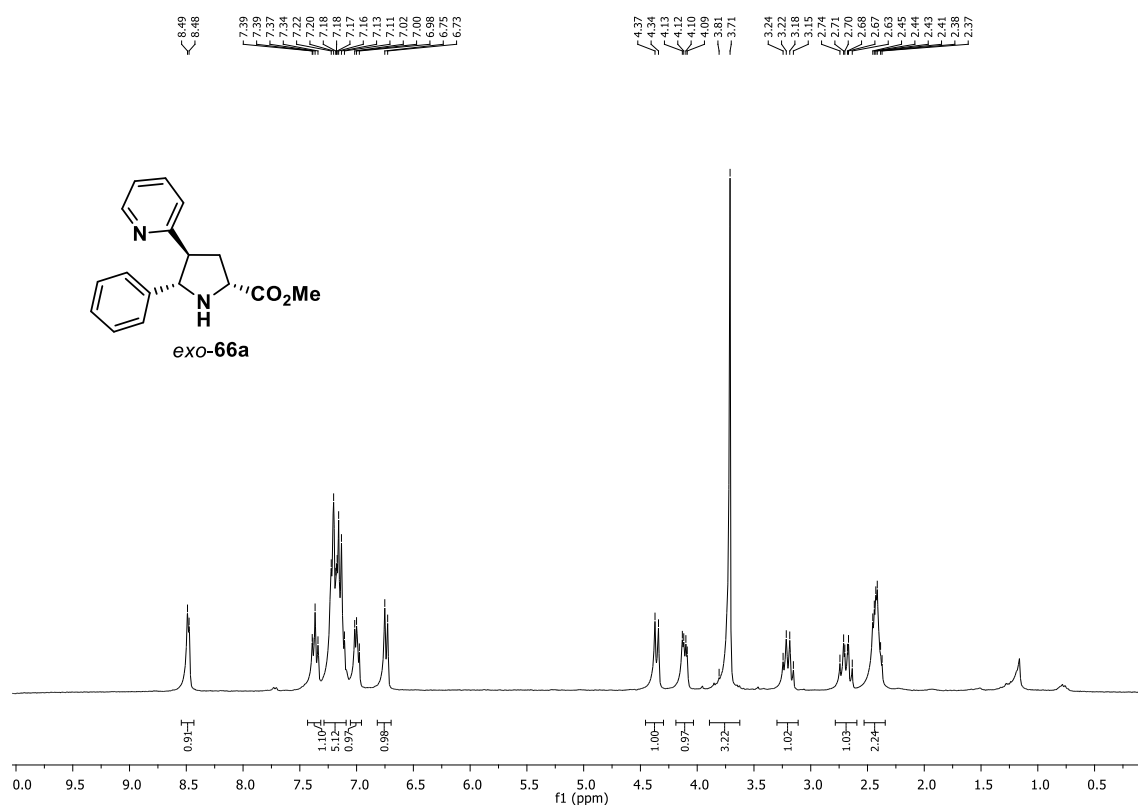


(2*R*,4*R*,5*S*)-Methyl 4-(perfluorophenyl)-5-phenylpyrrolidine-2-carboxylate (*exo*-65r)

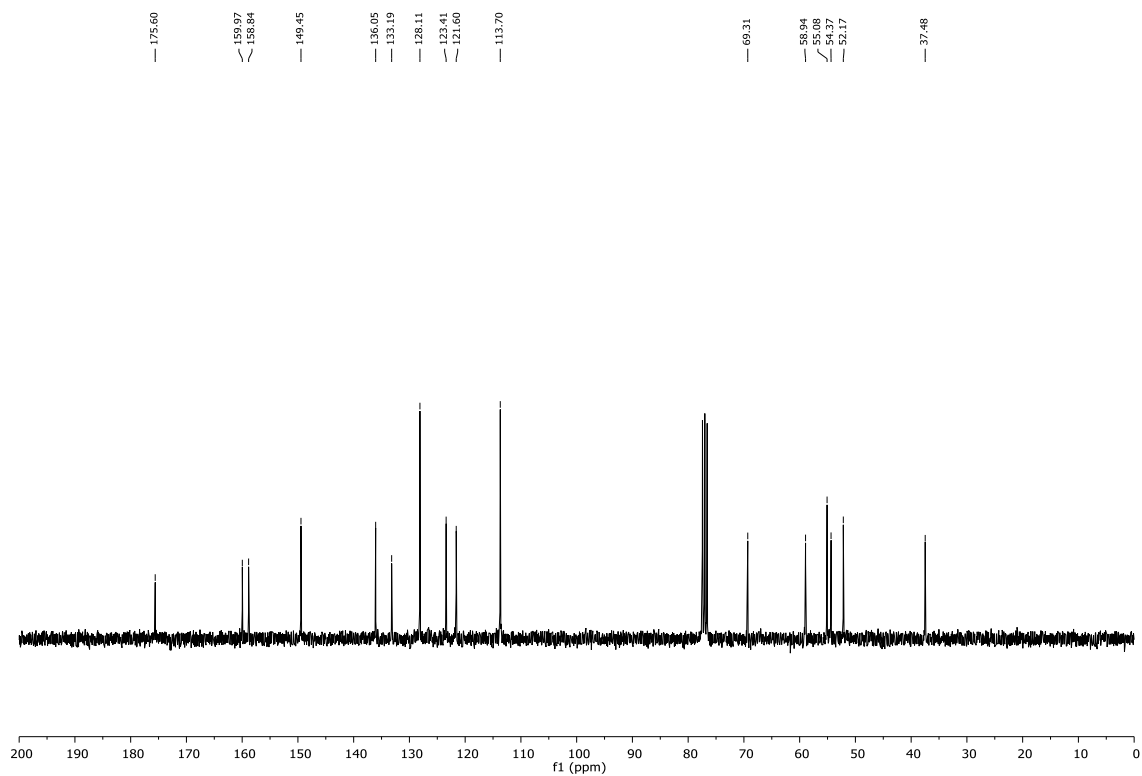
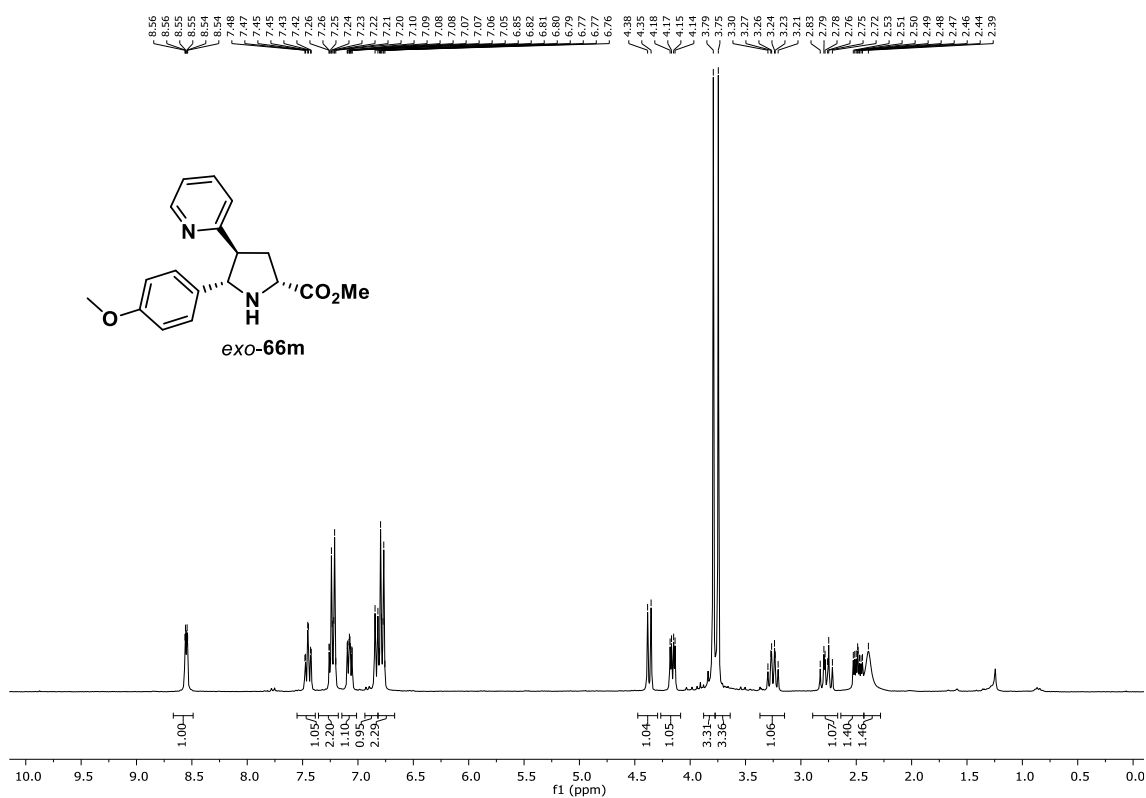




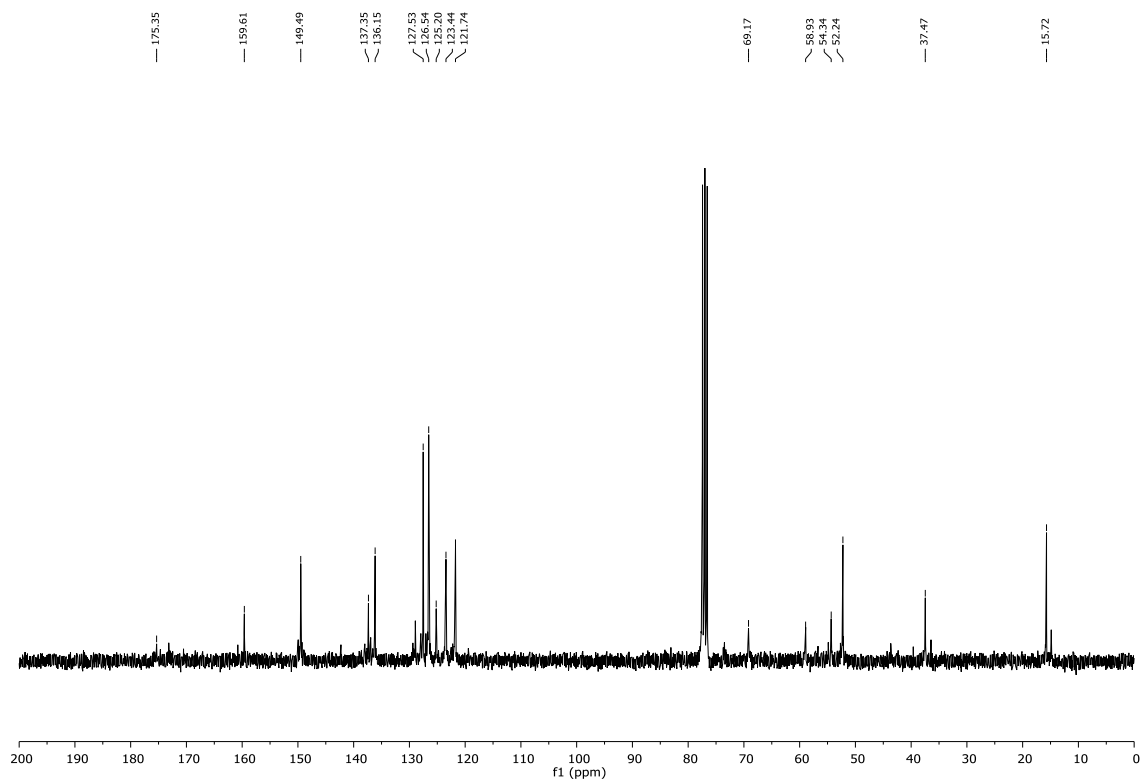
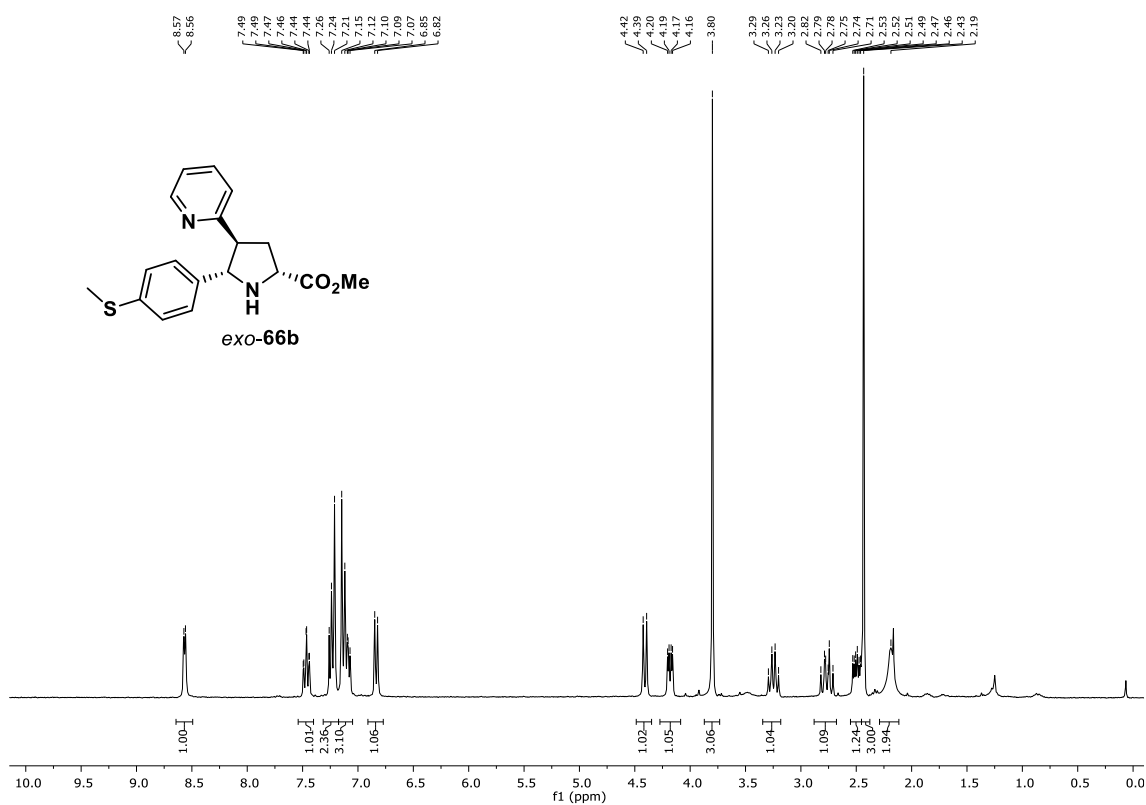
(2*R*,4*S*,5*S*)-Methyl 5-phenyl-4-(pyridin-2-yl)pyrrolidine-2-carboxylate (*exo*-66a)



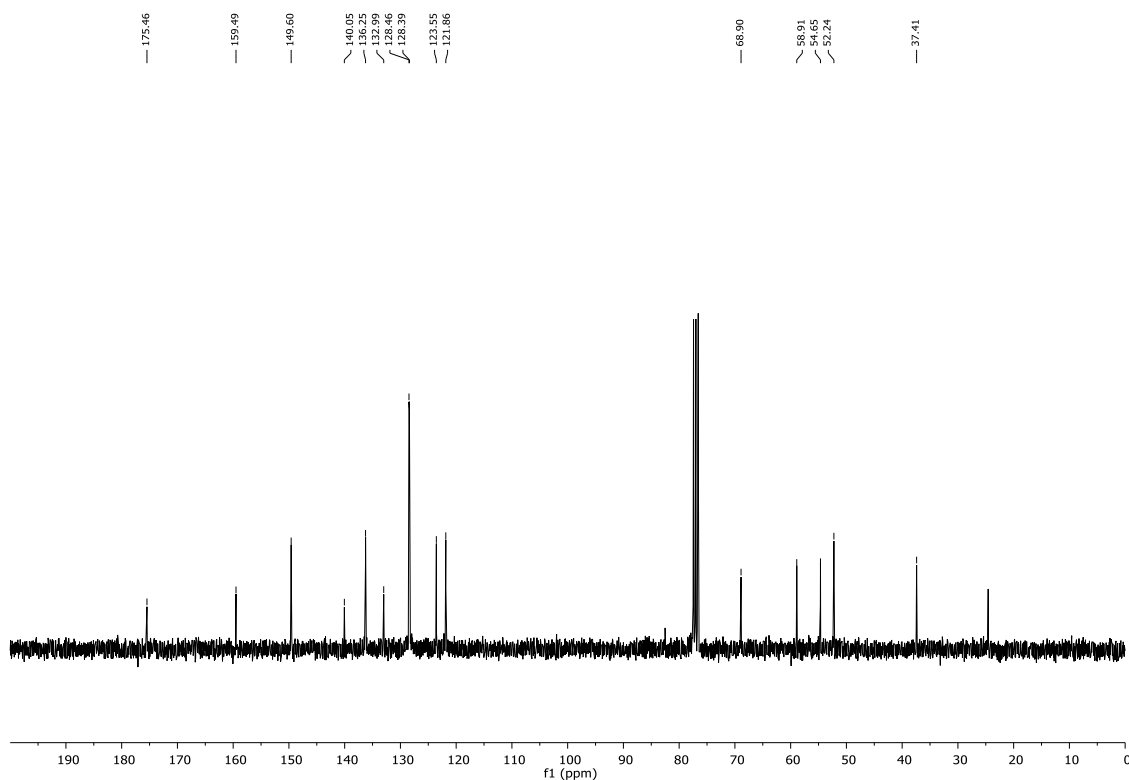
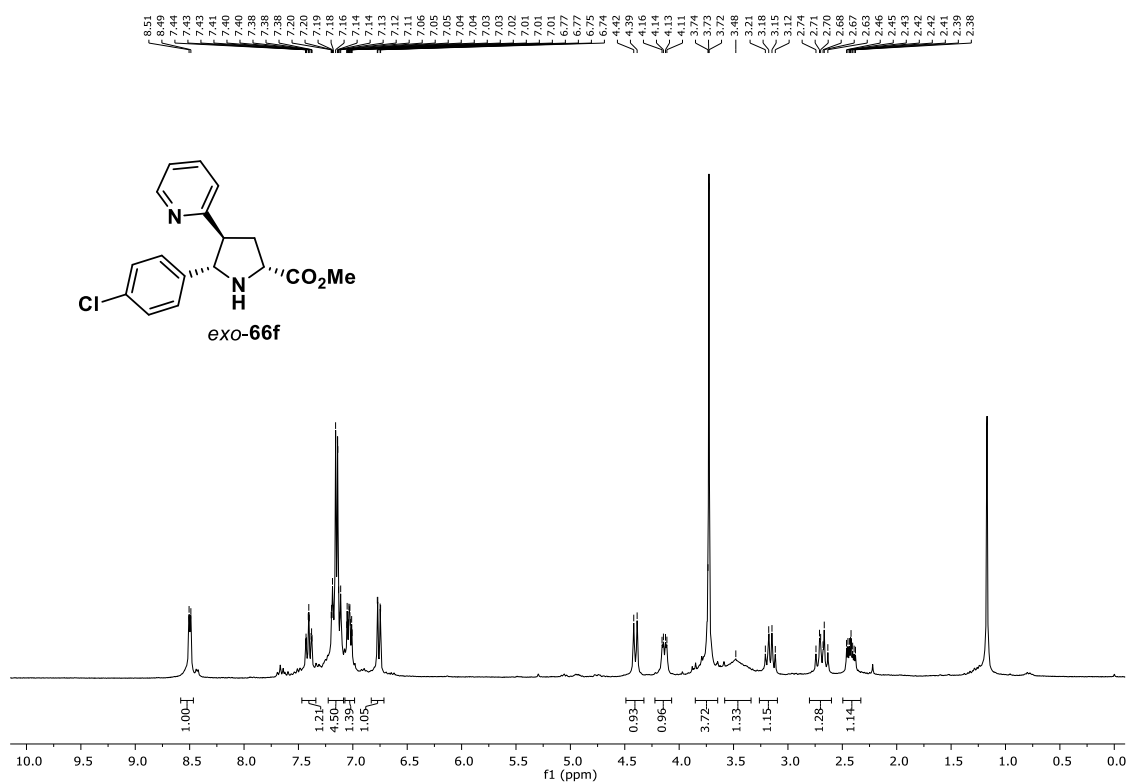
(2*R*,4*S*,5*S*)-Methyl 5-(4-methoxyphenyl)-4-(pyridin-2-yl)pyrrolidine-2-carboxylate (*exo*-66m)



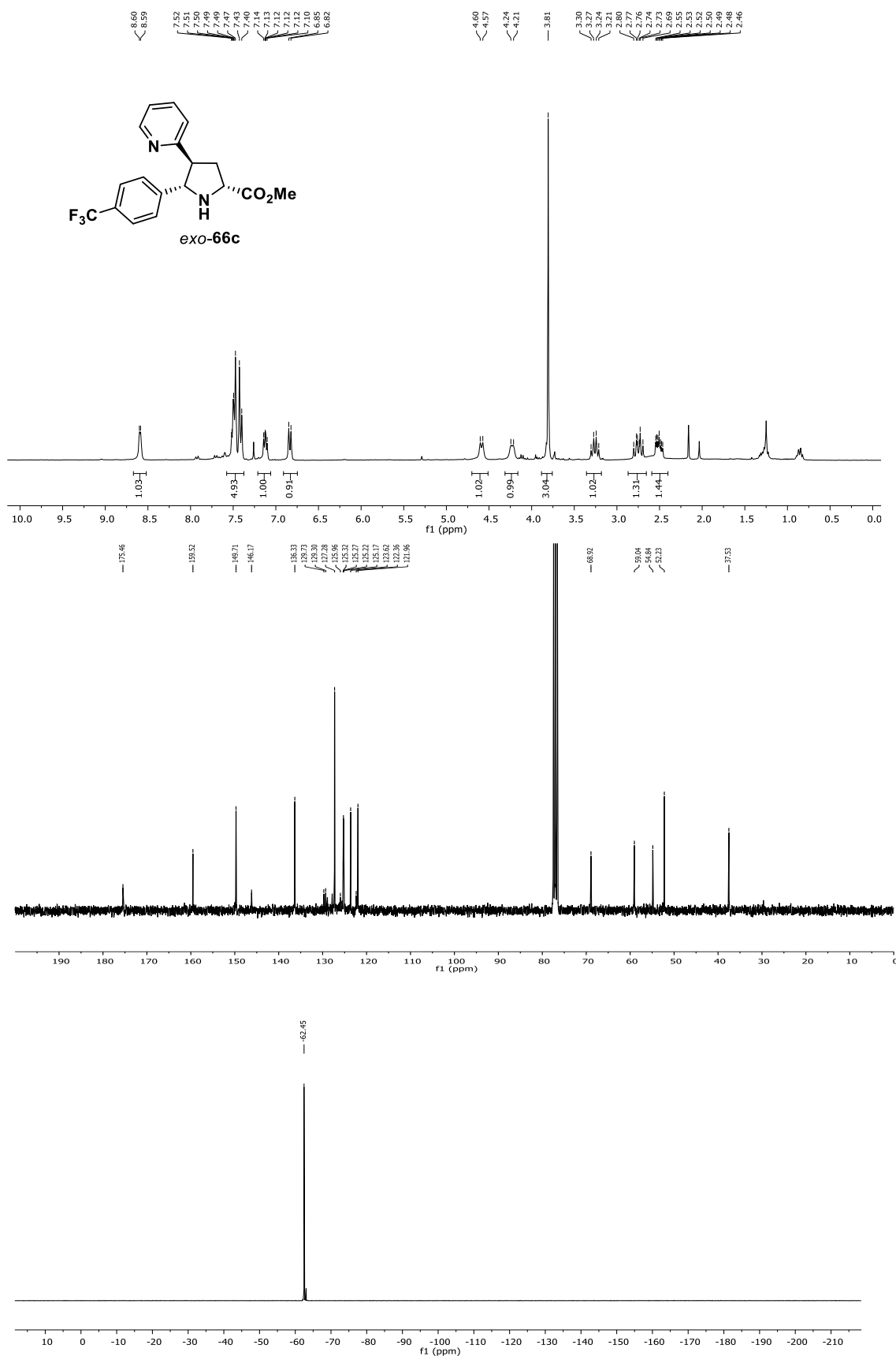
(2*R*,4*S*,5*S*)-Methyl 5-(4-methylthiophenyl)-4-(pyridin-2-yl)pyrrolidine-2-carboxylate (*exo*-66b)



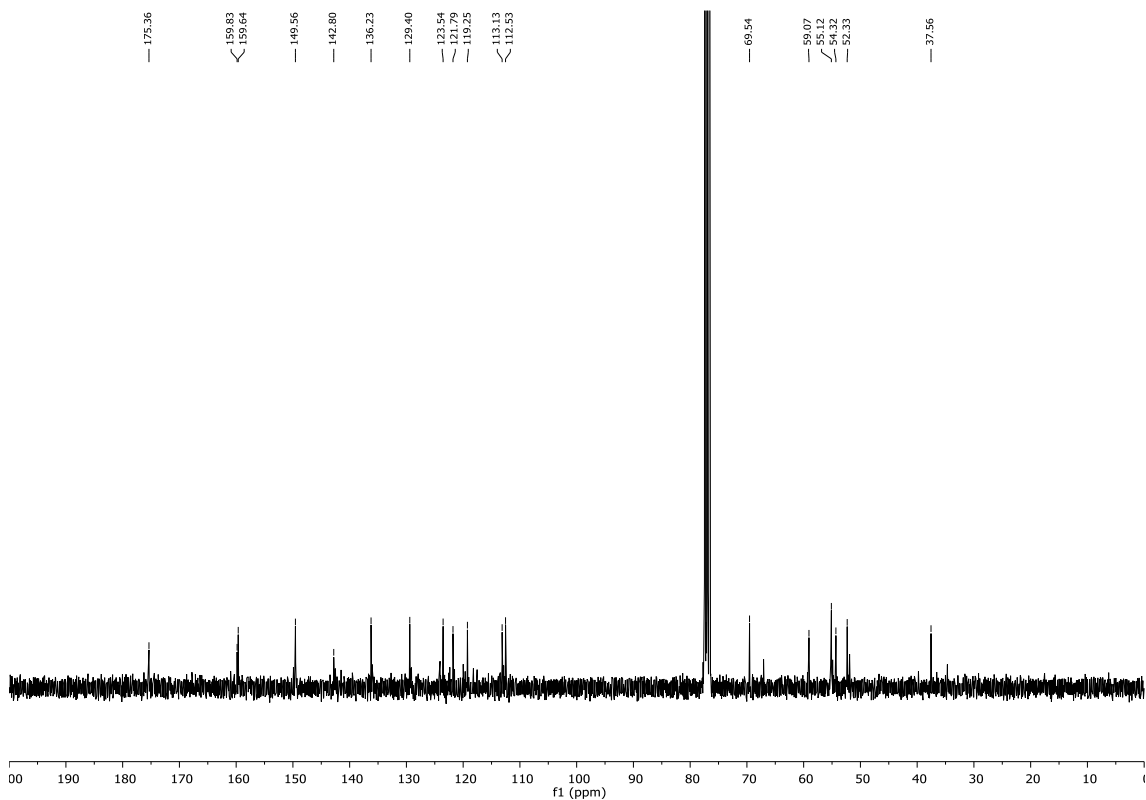
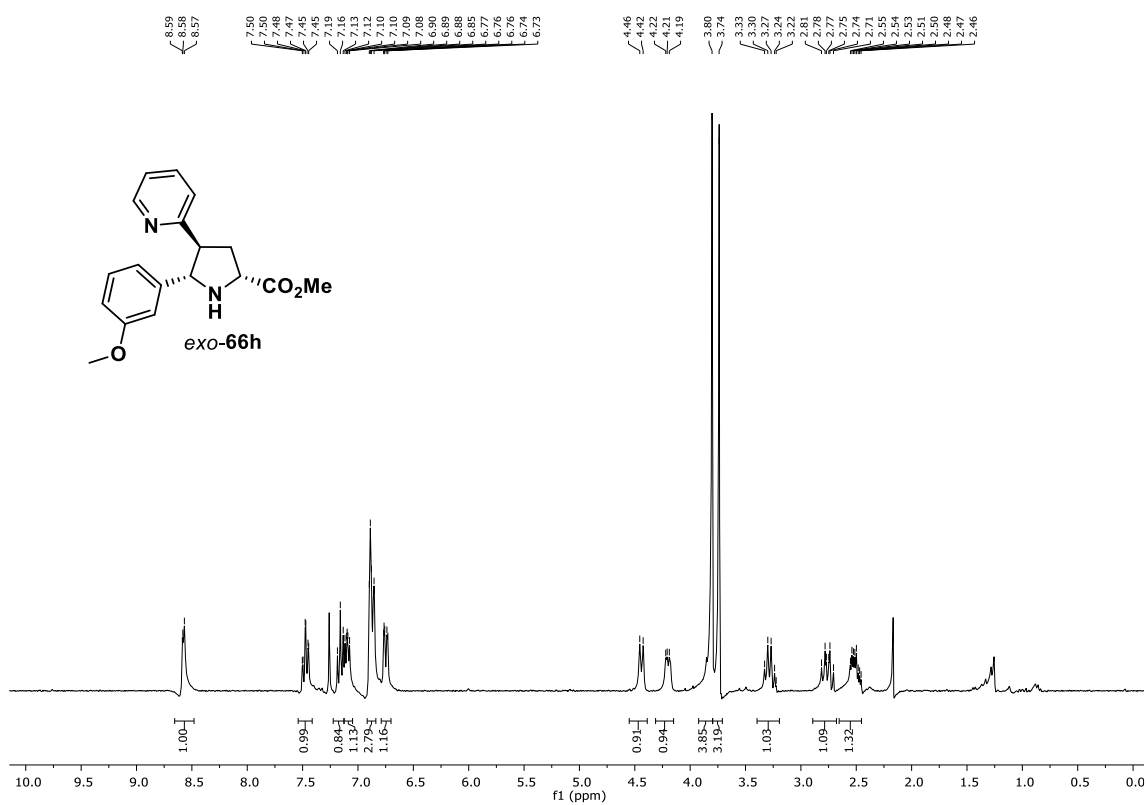
(2*R*,4*S*,5*S*)-Methyl 5-(4-chlorophenyl)-4-(pyridin-2-yl)pyrrolidine-2-carboxylate (*exo*-66f)



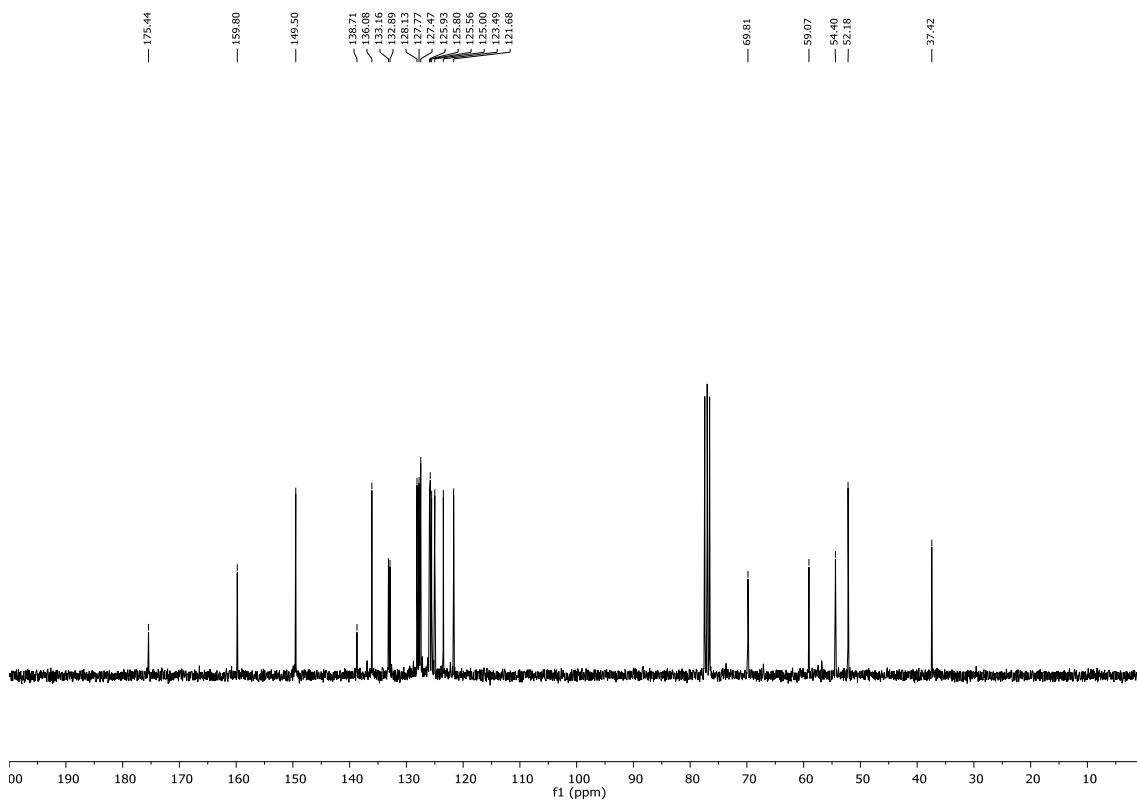
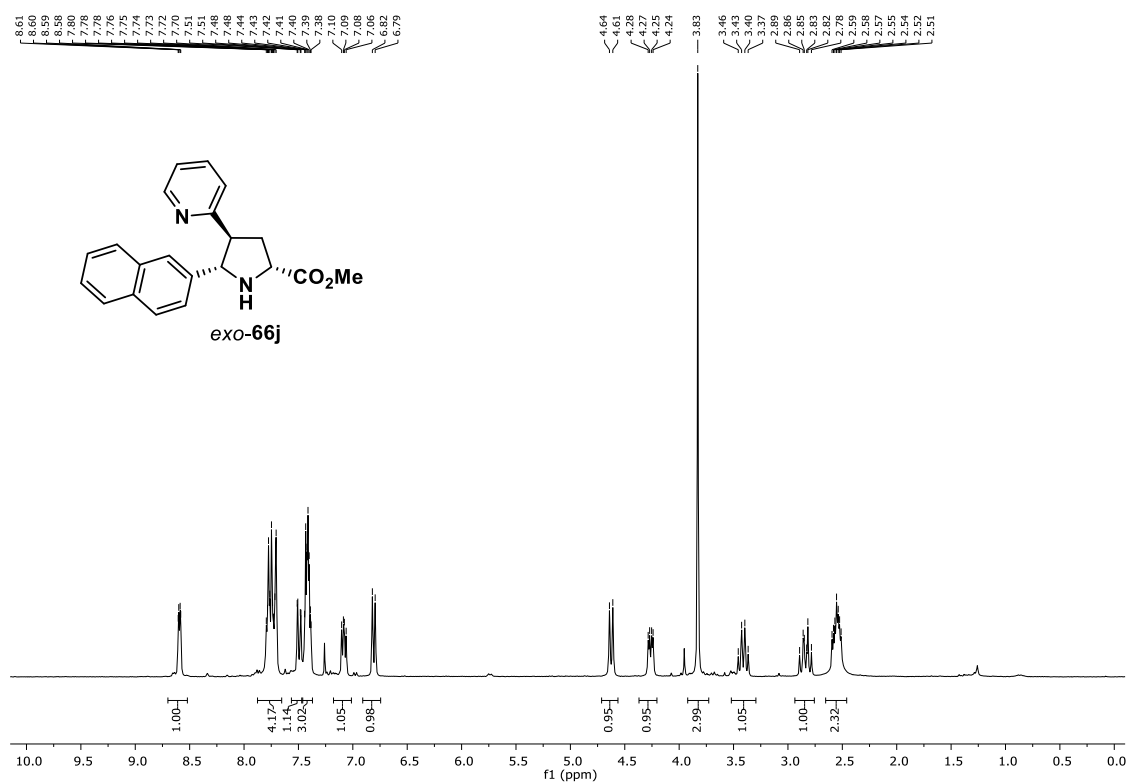
(2*R*,4*S*,5*S*)-Methyl 4-(pyridin-2-yl)-5-(4-(trifluoromethyl)phenyl)pyrrolidine-2-carboxylate
(*exo*-66c)



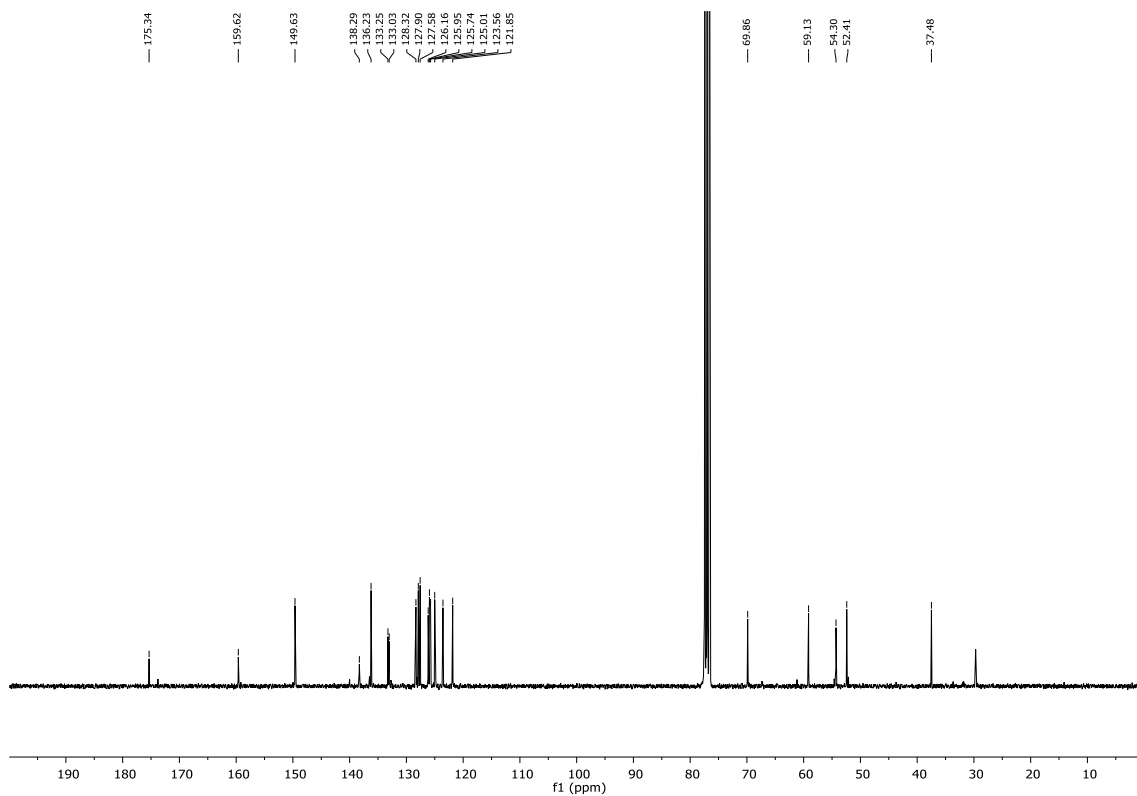
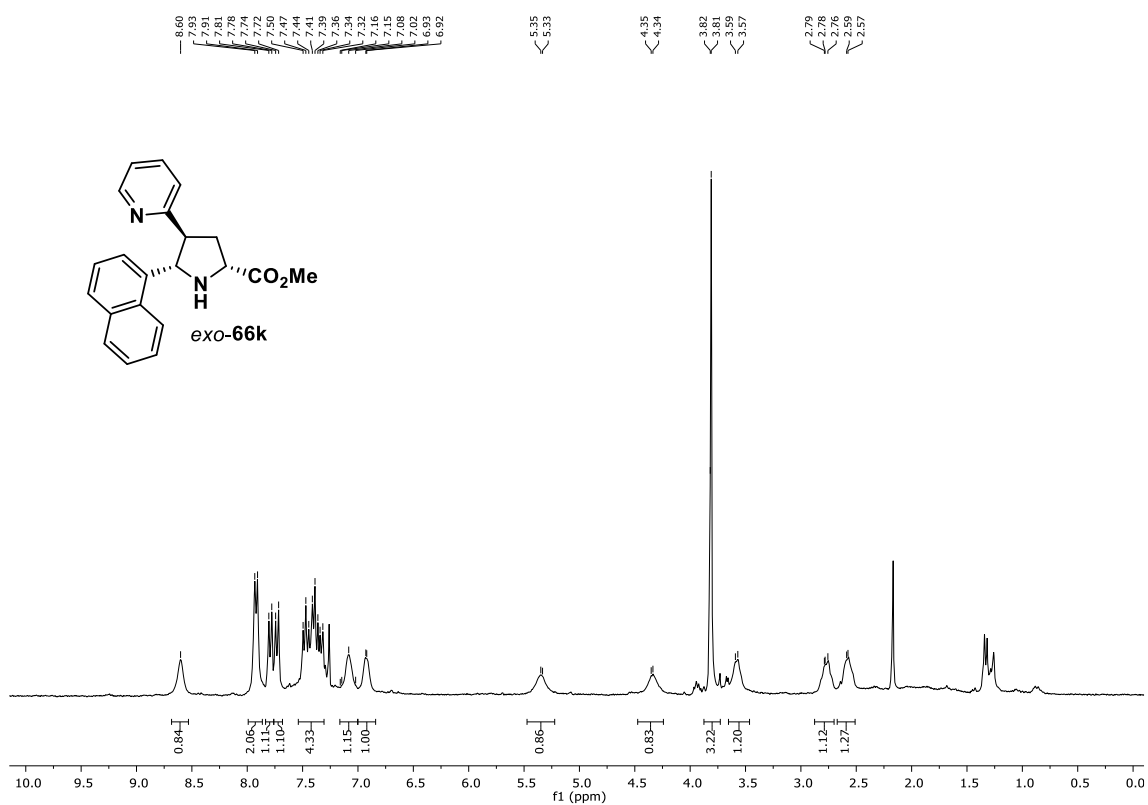
(2*R*,4*S*,5*S*)-Methyl 5-(3-methoxyphenyl)-4-(pyridin-2-yl)pyrrolidine-2-carboxylate (*exo*-66h)



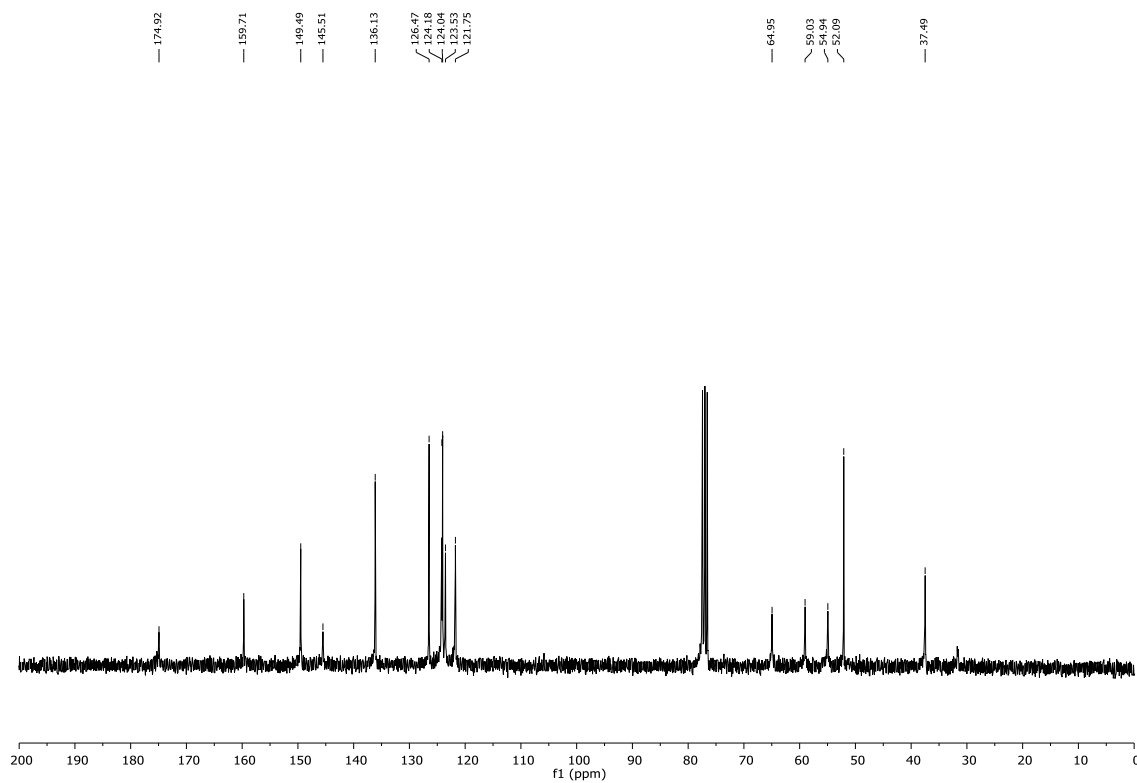
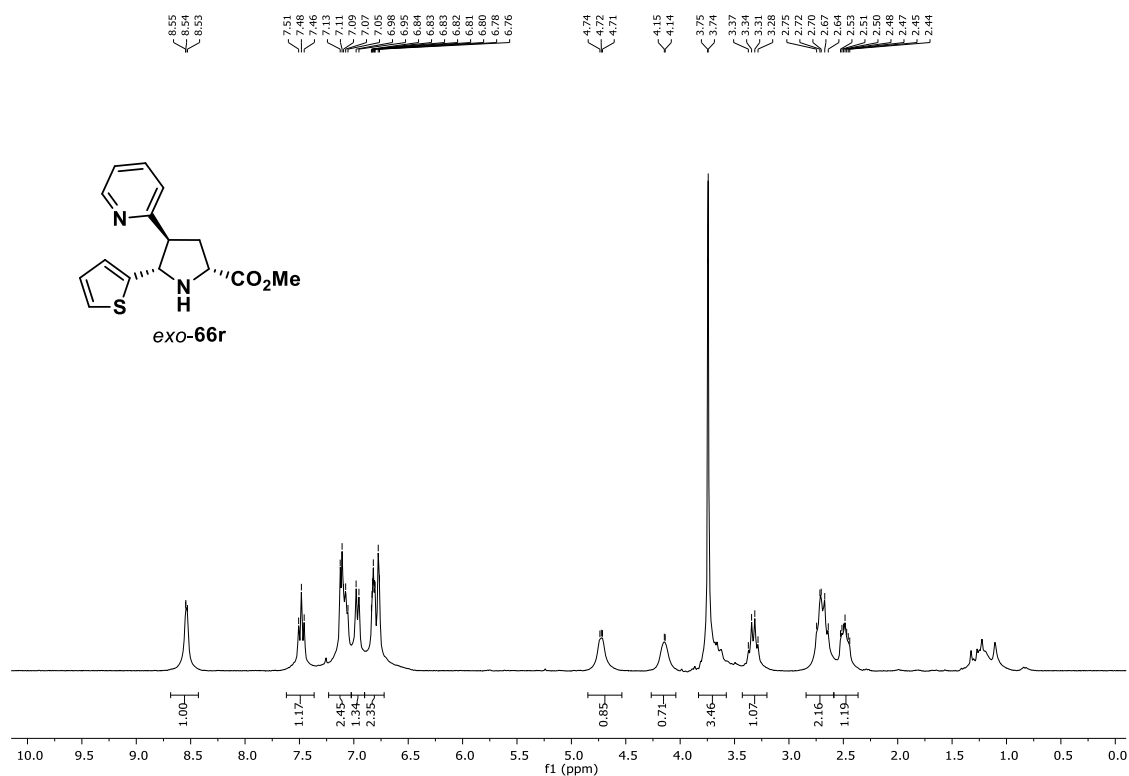
(2*R*,4*S*,5*S*)-Methyl 5-(naphthalen-2-yl)-4-(pyridin-2-yl)pyrrolidine-2-carboxylate (*exo*-66j)



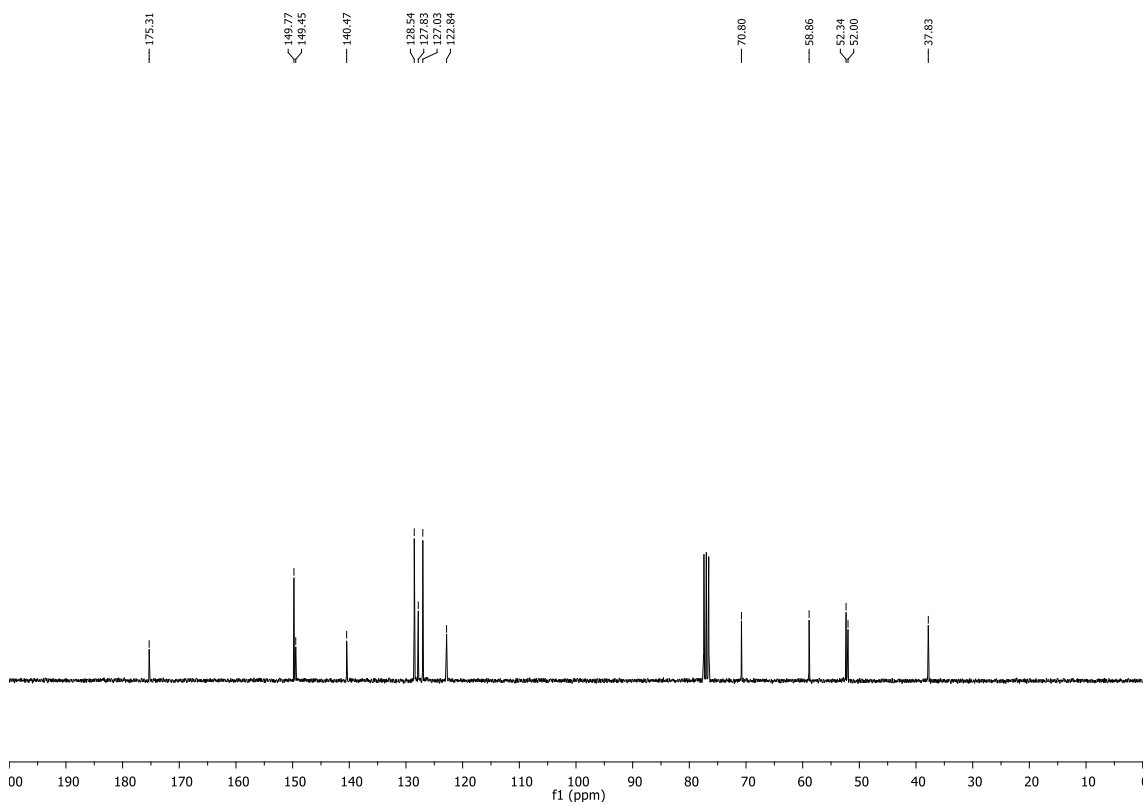
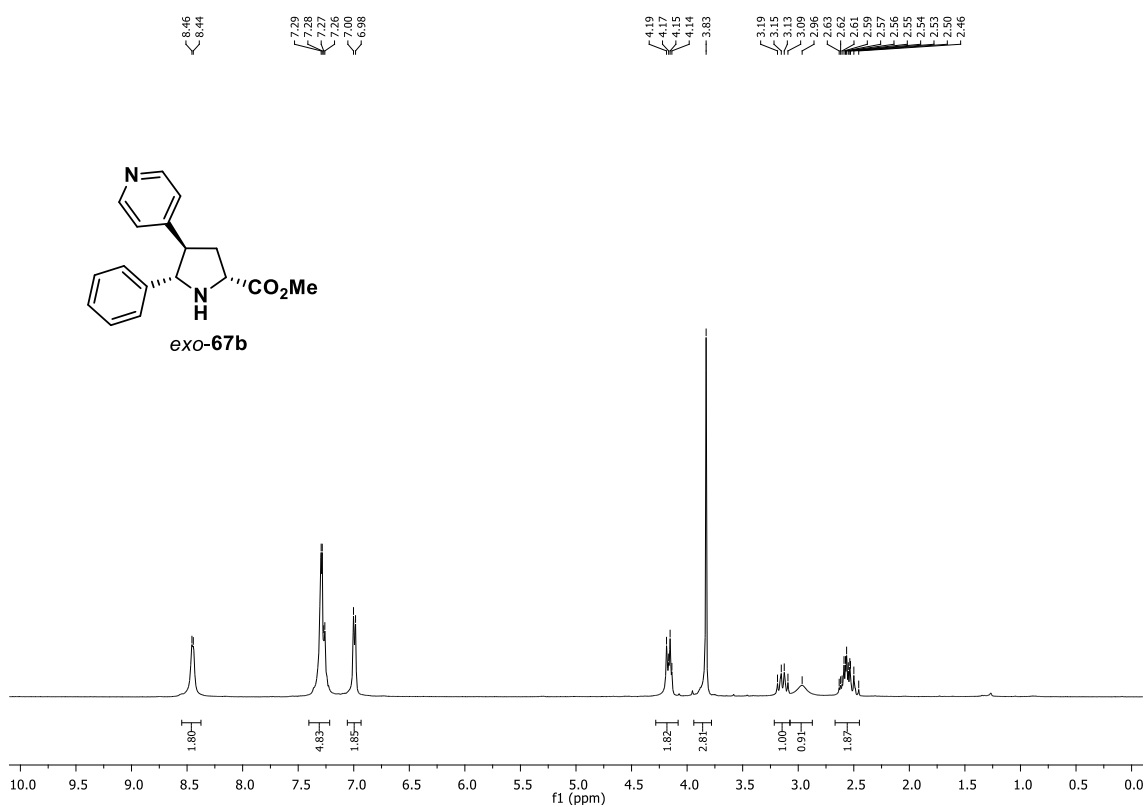
(2*R*,4*S*,5*S*)-Methyl 5-(naphthalen-1-yl)-4-(pyridin-2-yl)pyrrolidine-2-carboxylate (*exo*-66k)



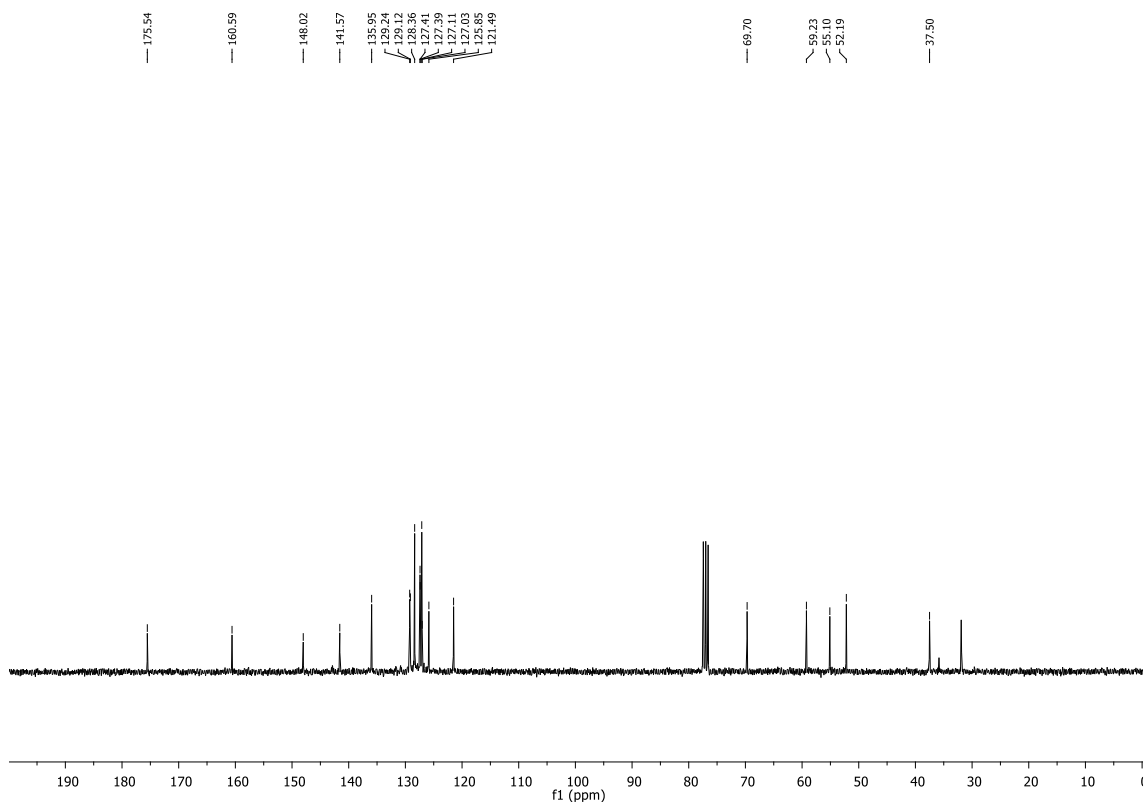
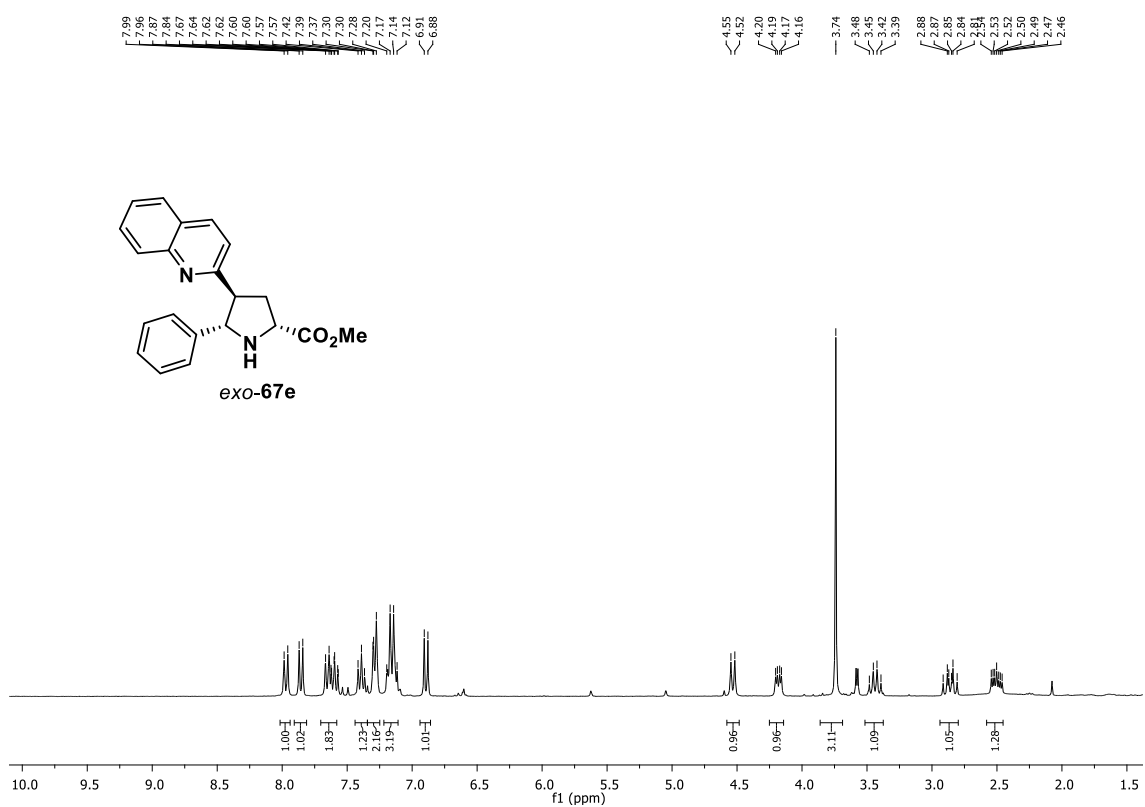
(2*R*,4*S*,5*S*)-Methyl 4-(pyridin-2-yl)-5-(thiophen-2-yl)-pyrrolidine-2-carboxylate (*exo*-66r)



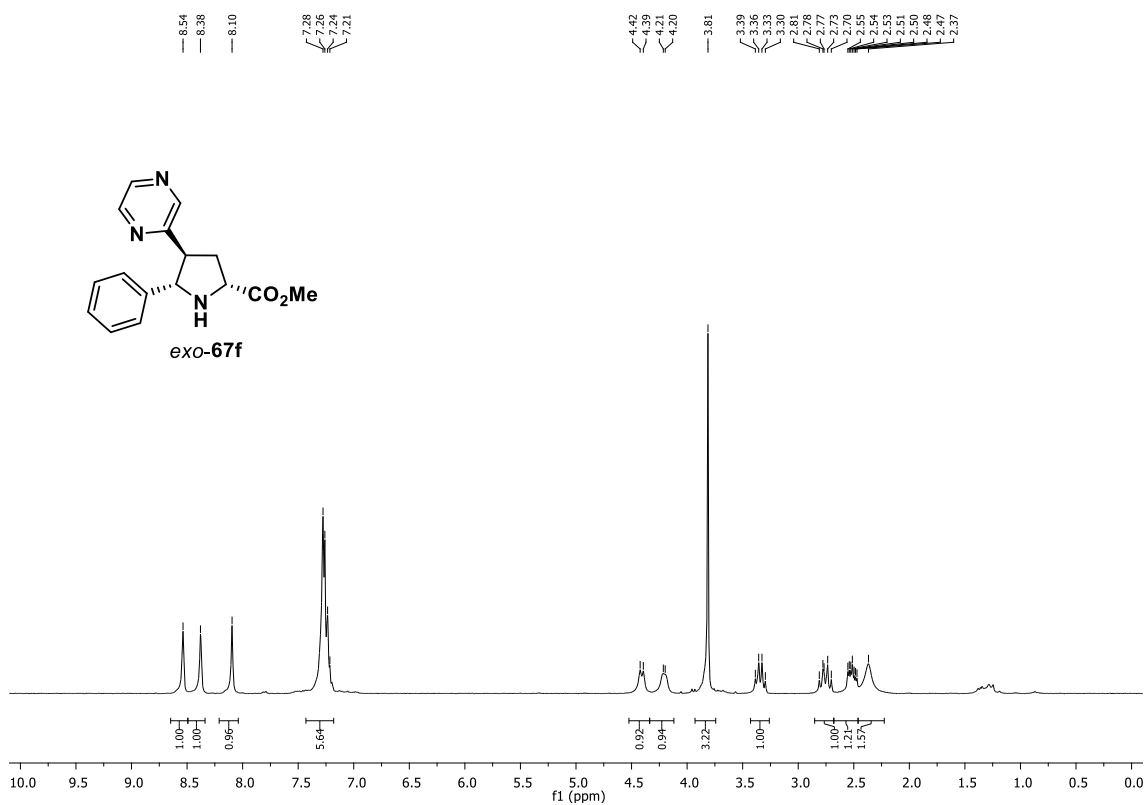
(2*R*,4*S*,5*S*)-Methyl 5-phenyl-4-(pyridin-4-yl)pyrrolidine-2-carboxylate (*exo*-67b)



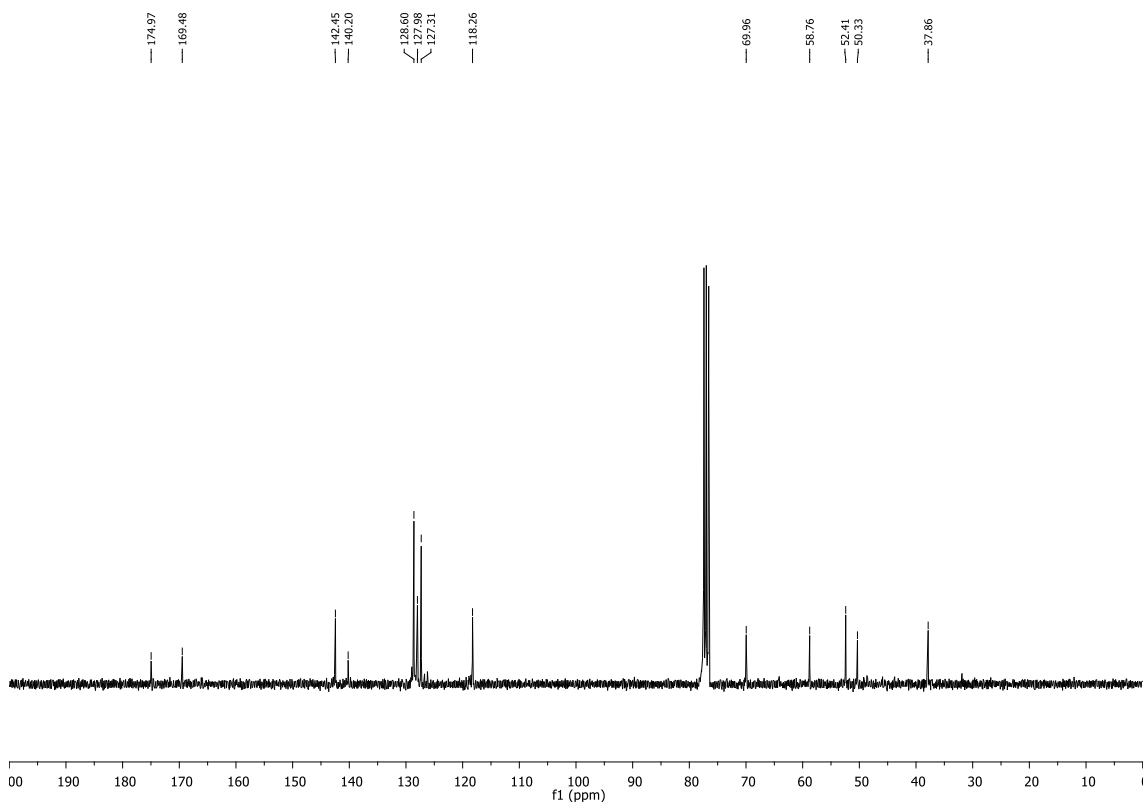
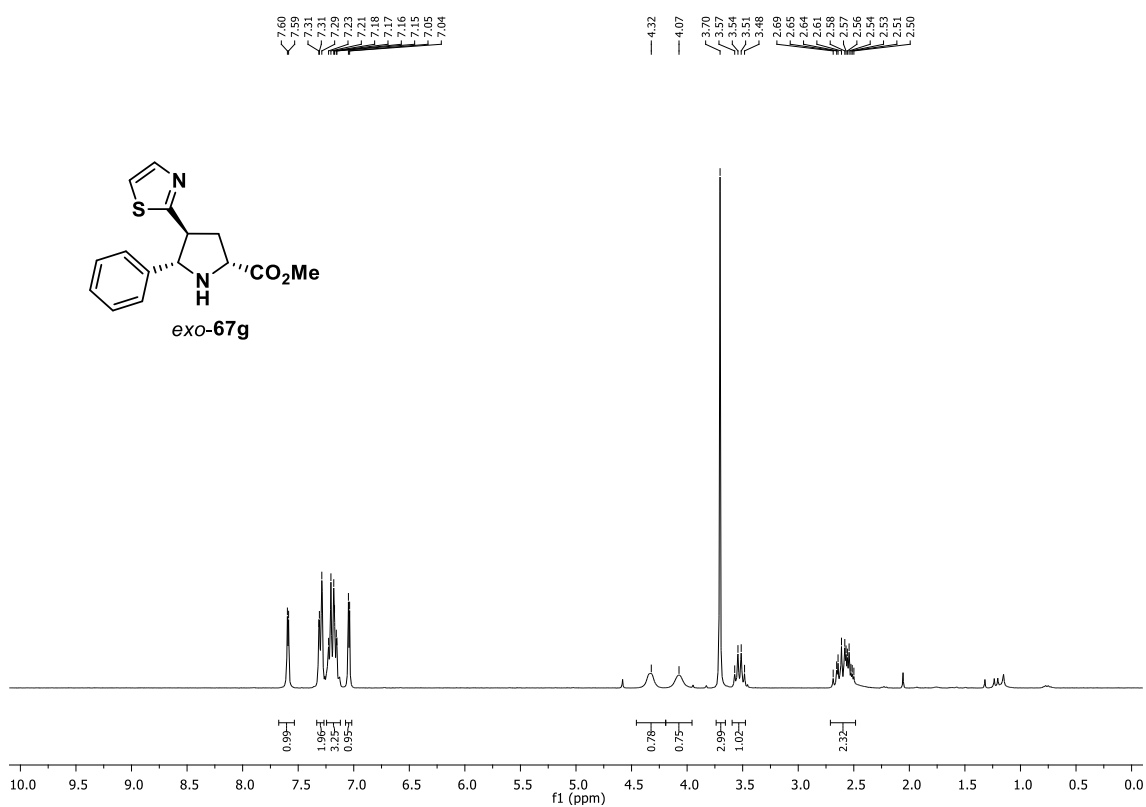
(2*R*,4*S*,5*S*)-Methyl 5-phenyl-4-(quinolin-2-yl)pyrrolidine-2-carboxylate (*exo*-67e)



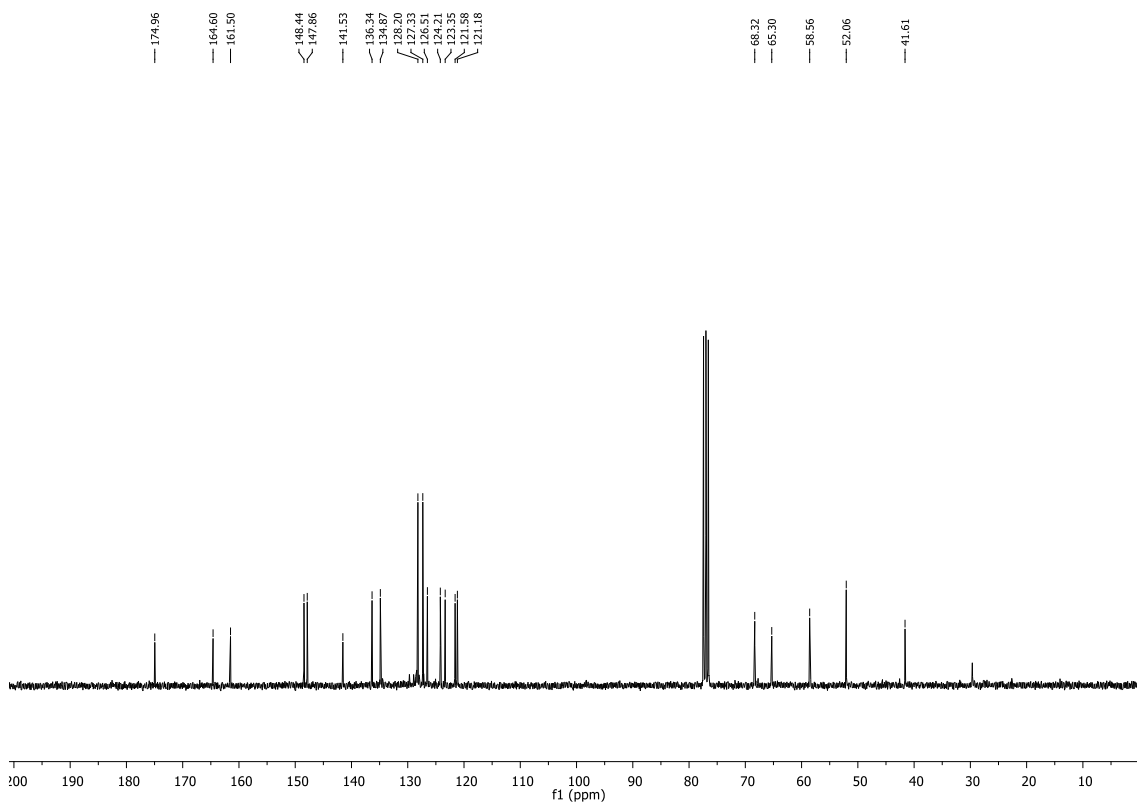
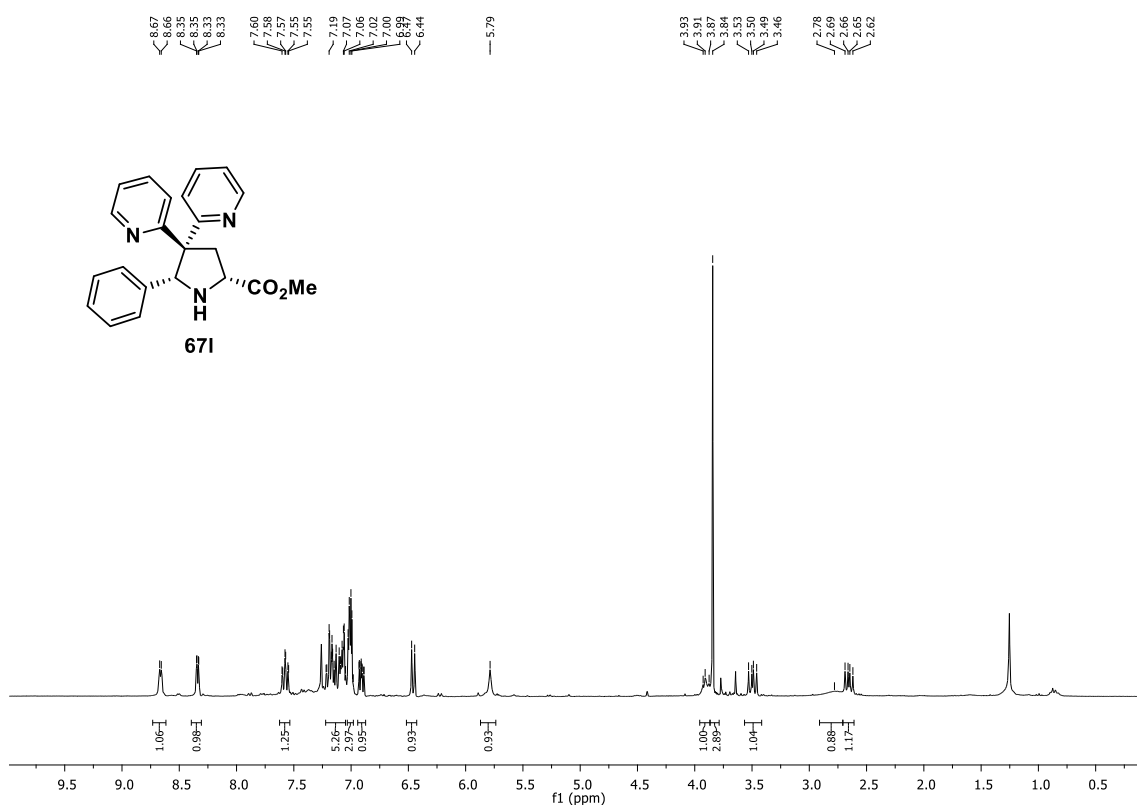
(2*R*,4*S*,5*S*)-Methyl 5-phenyl-4-(pyrazin-2-yl)pyrrolidine-2-carboxylate (*exo*-67f)



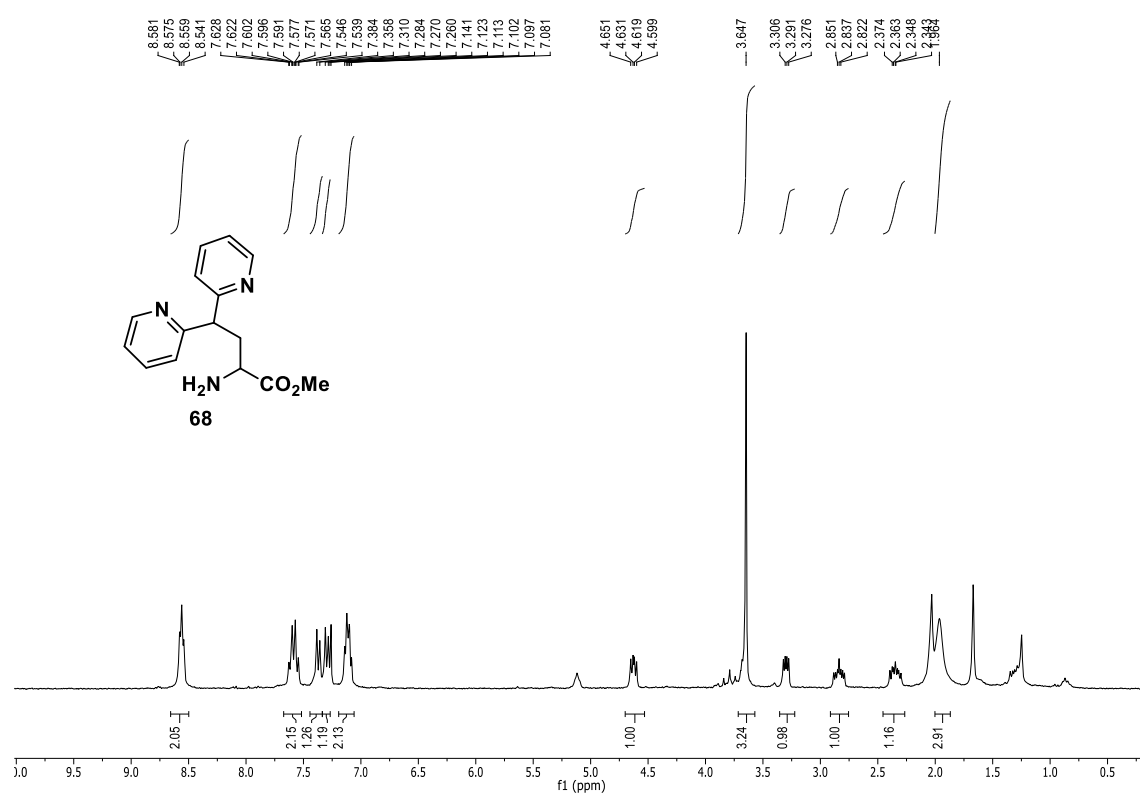
(2*R*,4*S*,5*S*)-Methyl 5-phenyl-4-(thiazol-2-yl)pyrrolidine-2-carboxylate (*exo*-67g)



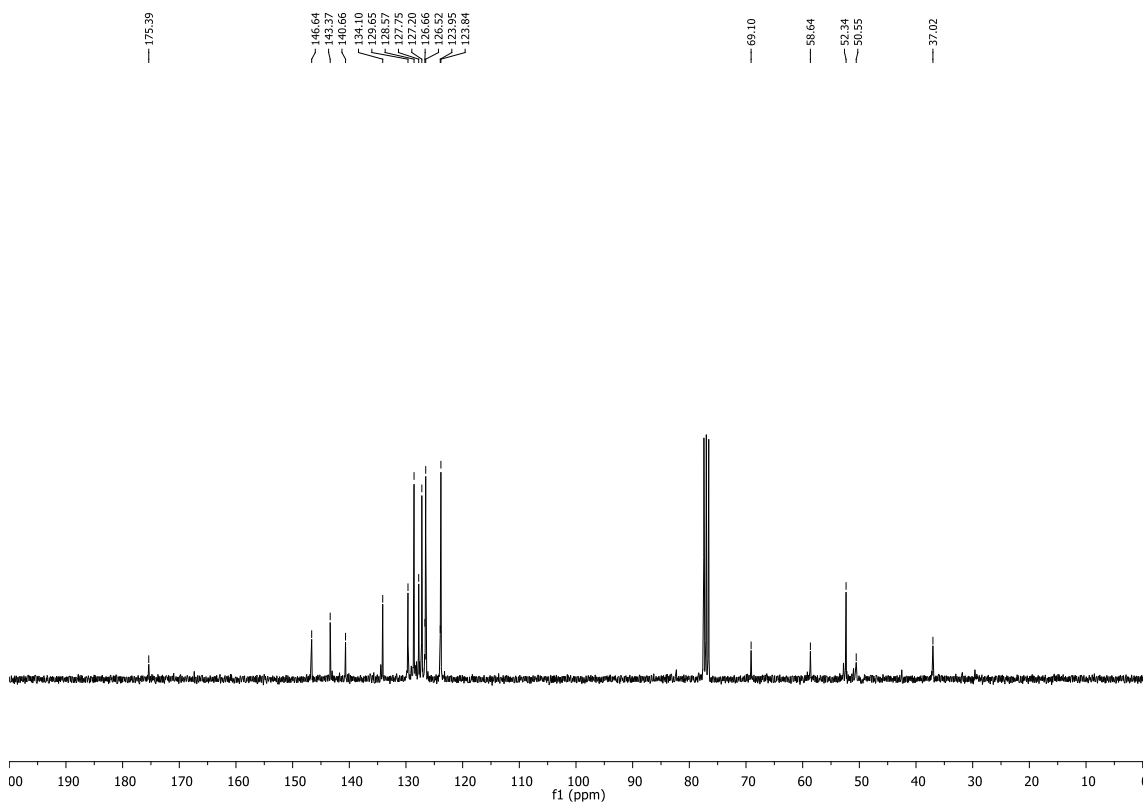
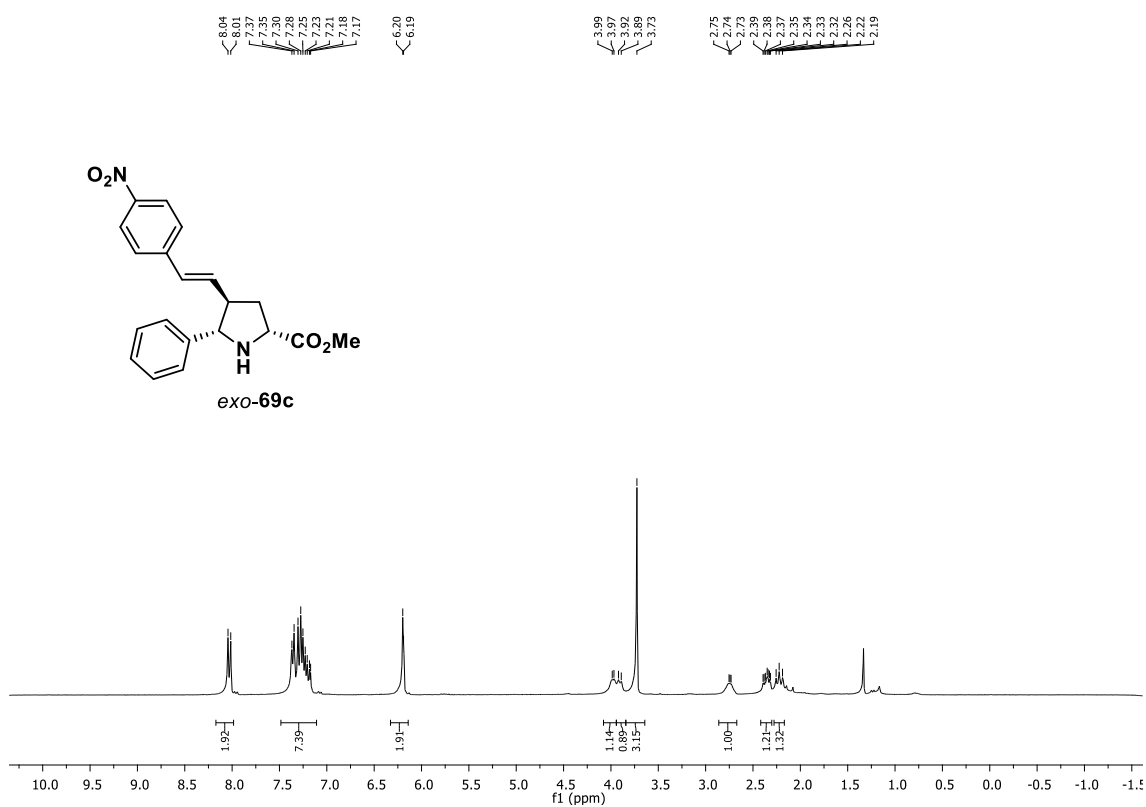
(2*R*,5*R*)-Methyl 5-phenyl-4,4-di(pyridin-2-yl)pyrrolidine-2-carboxylate (67l)



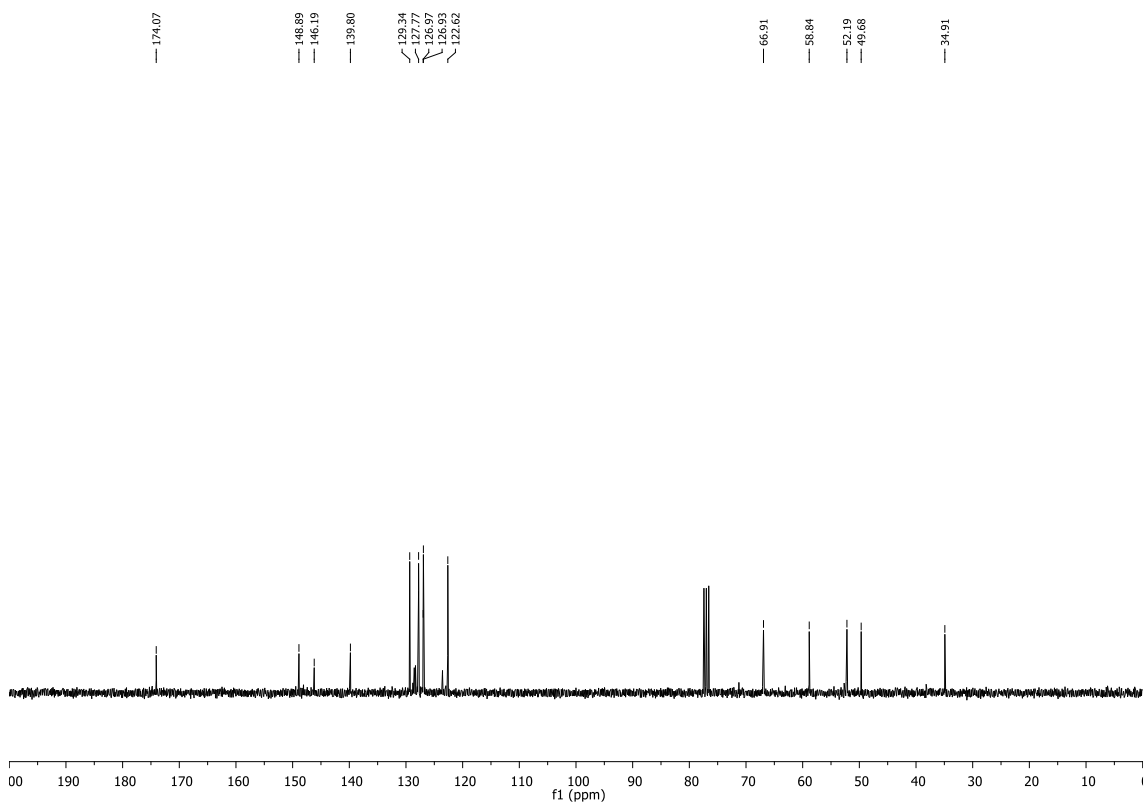
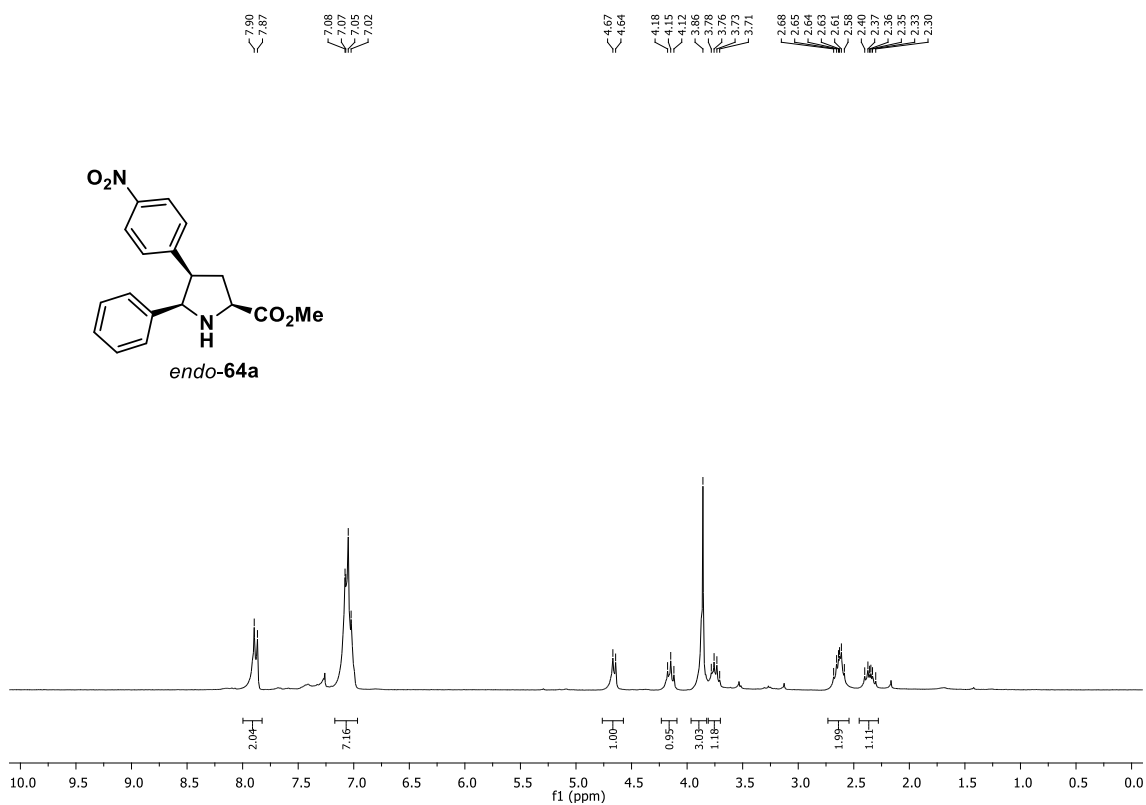
Methyl 2-amino-4,4-di(pyridin-2-yl)butanoate (68)



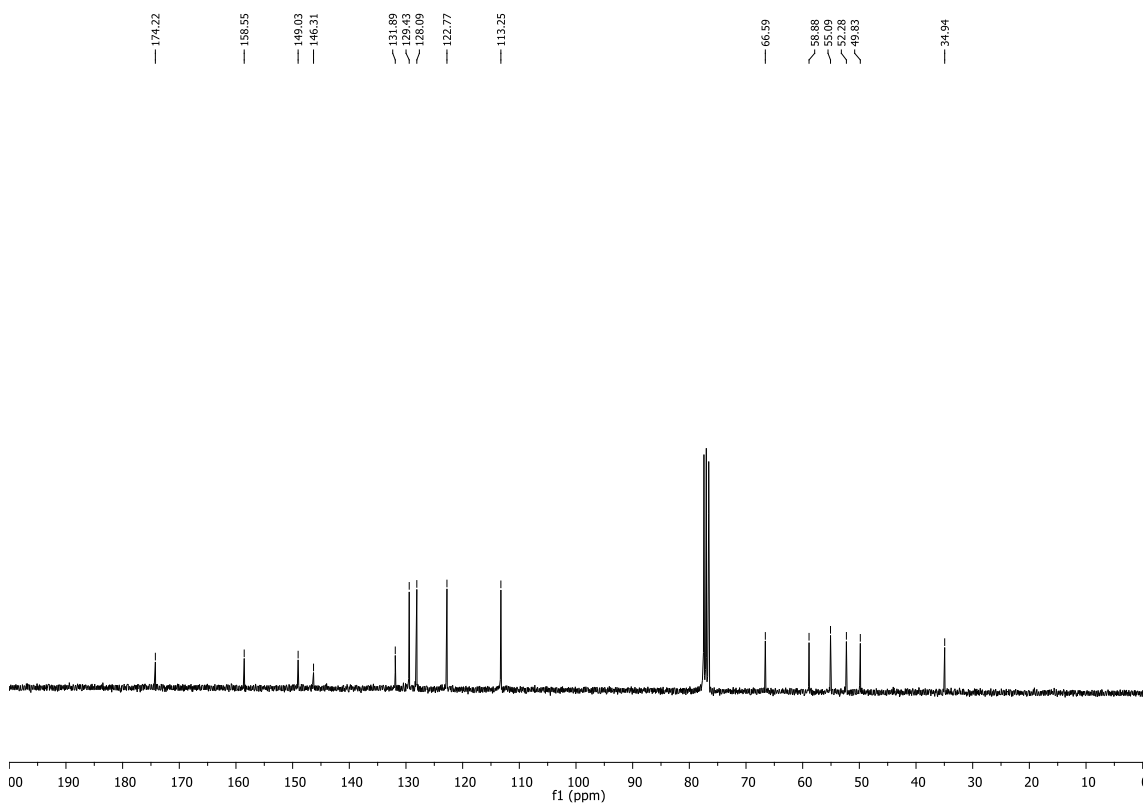
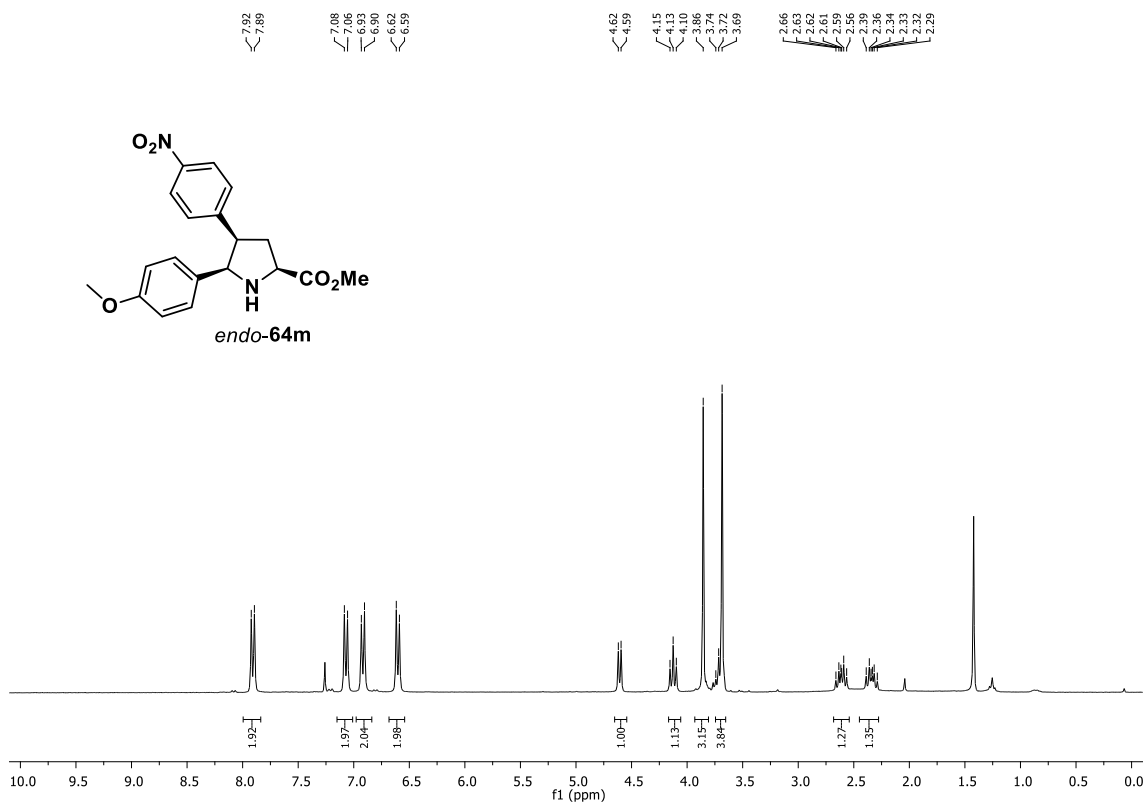
(2*R*,4*R*,5*S*)-Methyl 4-(4-((*E*)-2-nitrovinyl)phenyl)-5-phenylpyrrolidine-2-carboxylate (*exo*-69c)



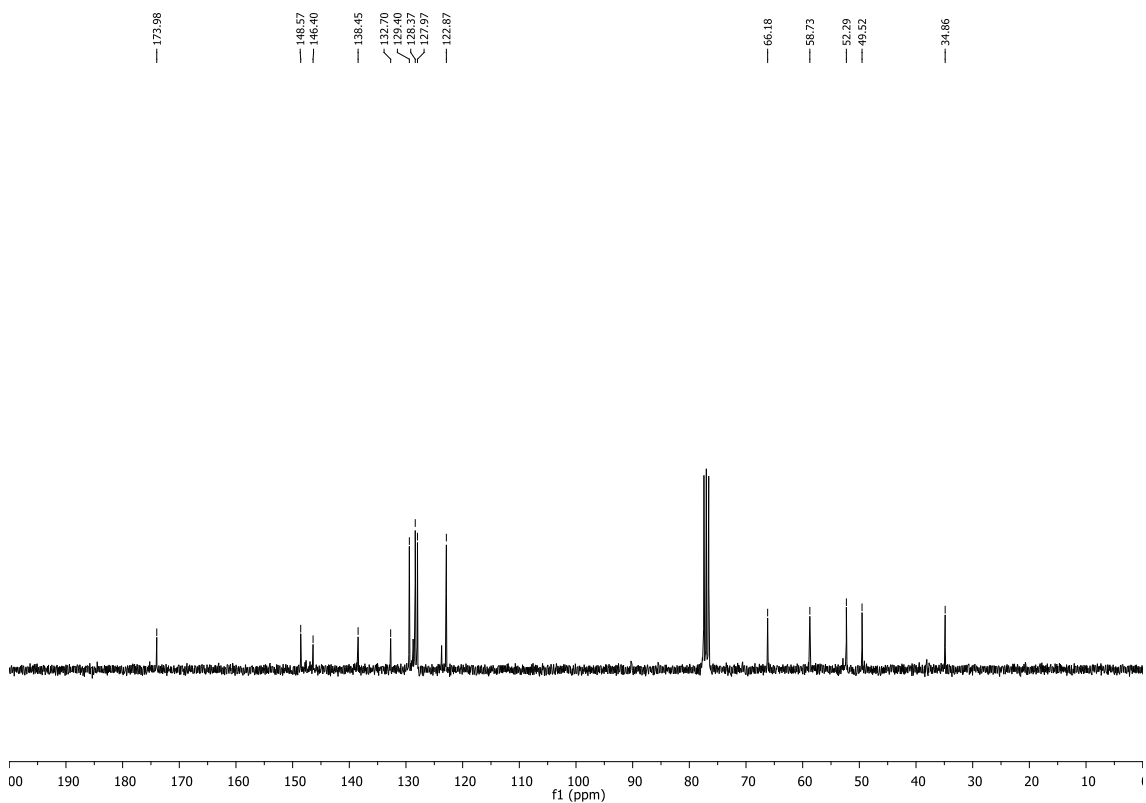
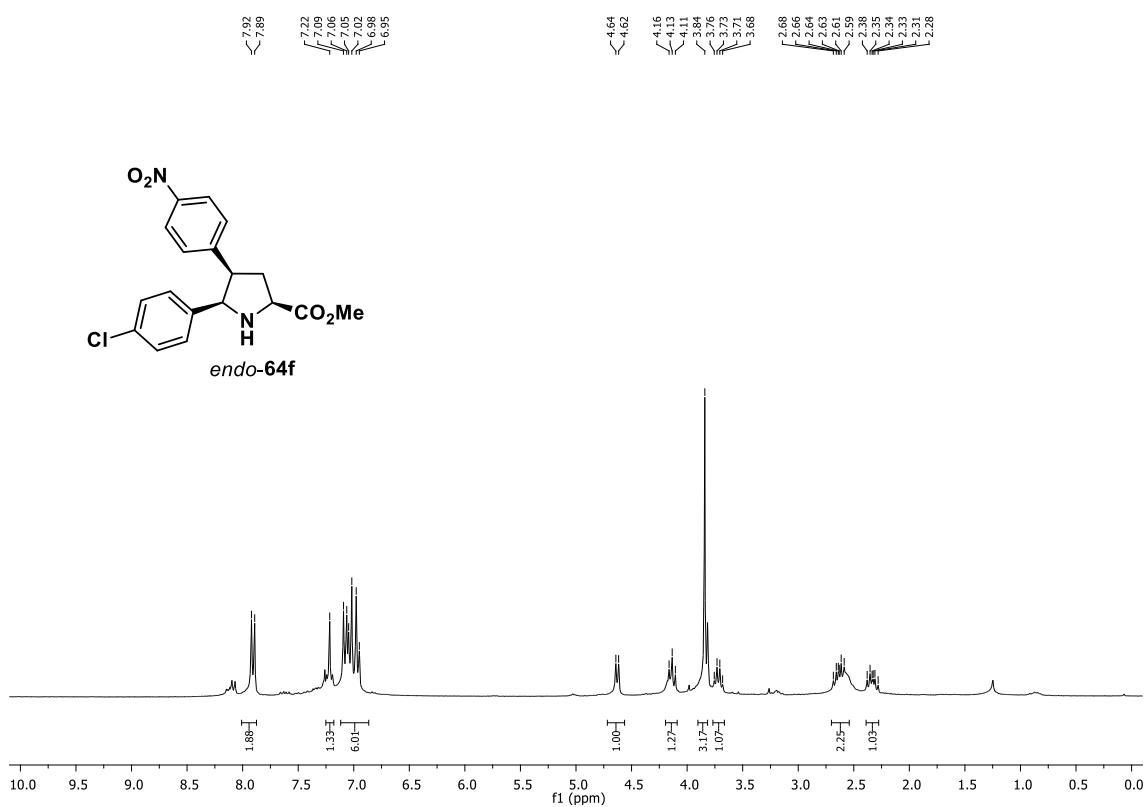
(2*S*,4*R*,5*R*)-Methyl 4-(4-nitrophenyl)-5-phenylpyrrolidine-2-carboxylate (*endo*-64a)



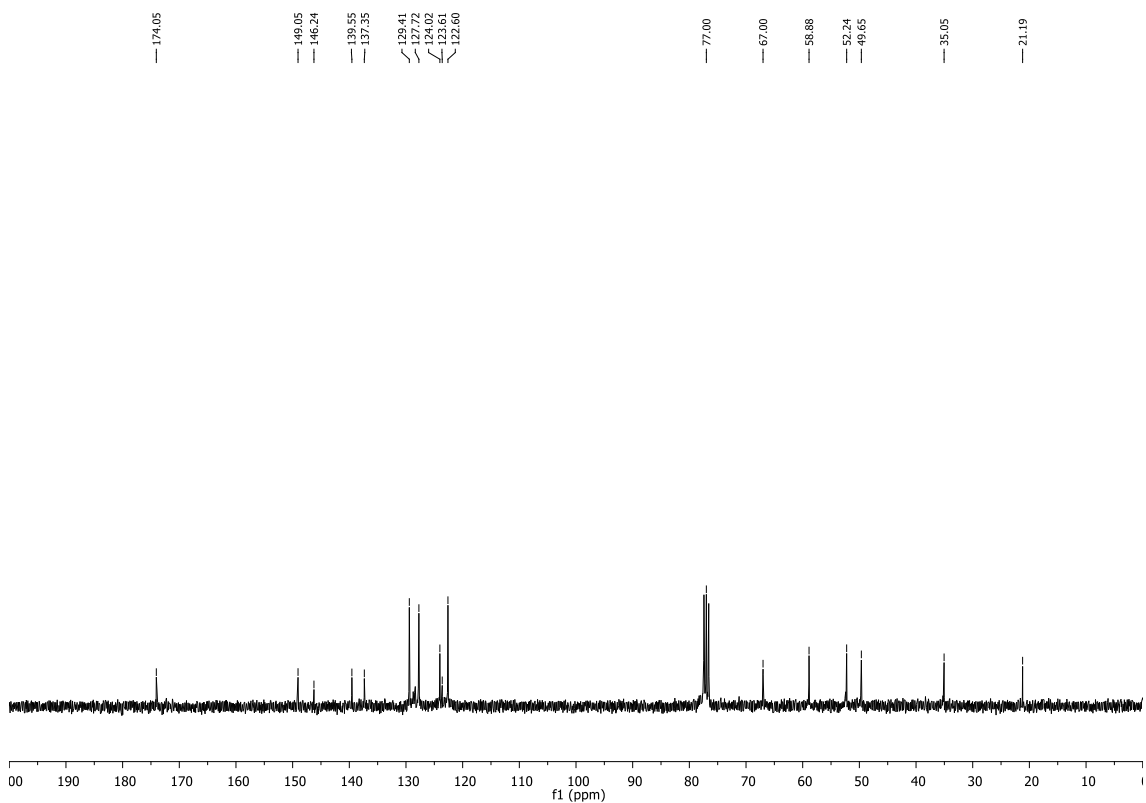
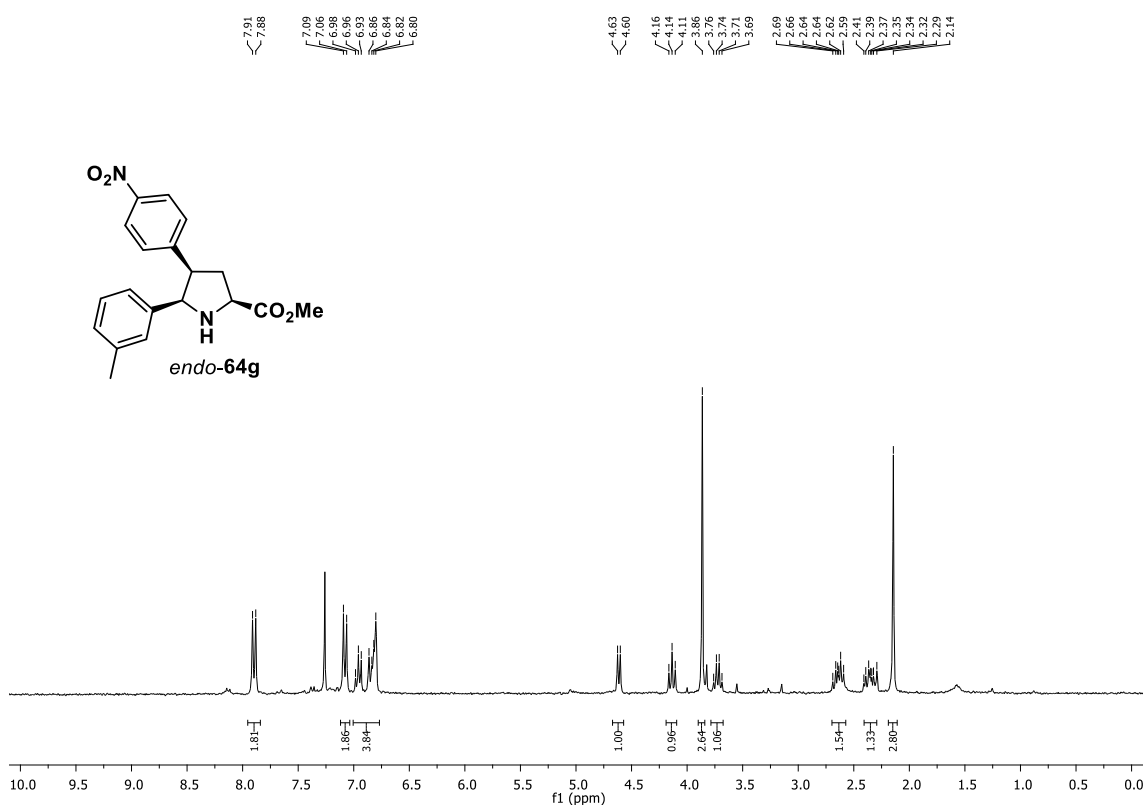
(2*S*,4*R*,5*R*)-Methyl 5-(4-methoxyphenyl)-4-(4-nitrophenyl)pyrrolidine-2-carboxylate
(endo-64m)



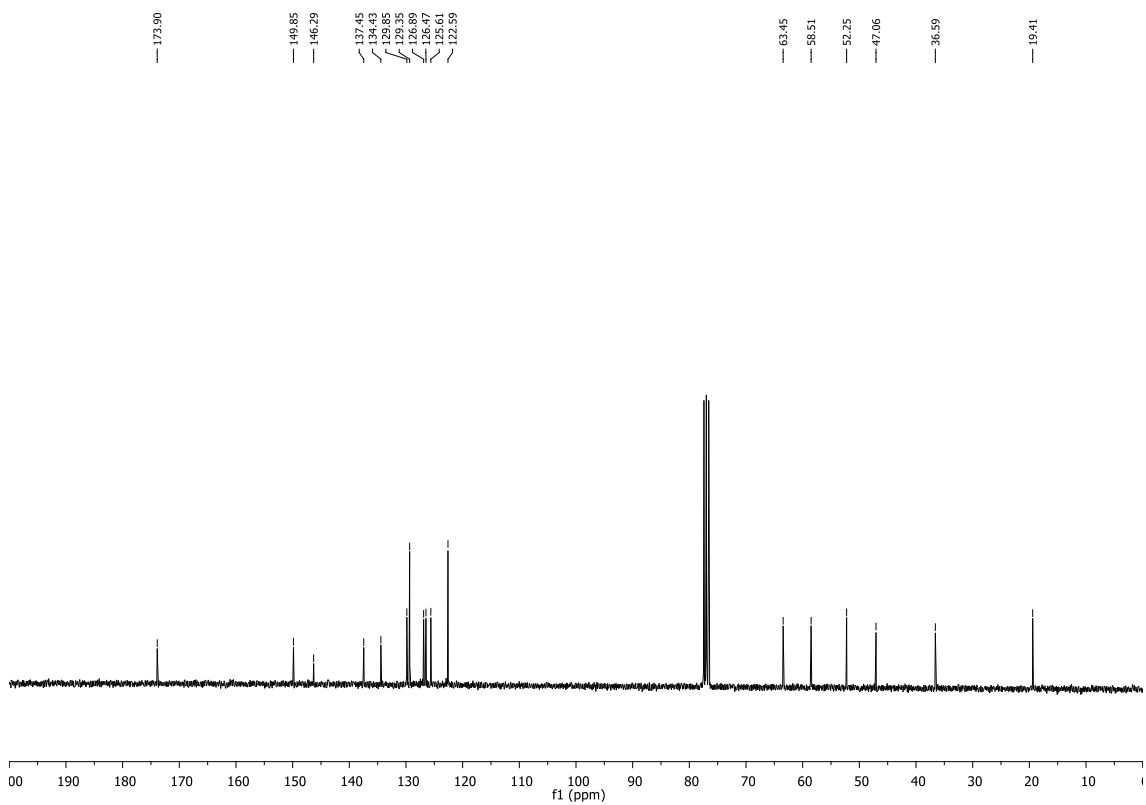
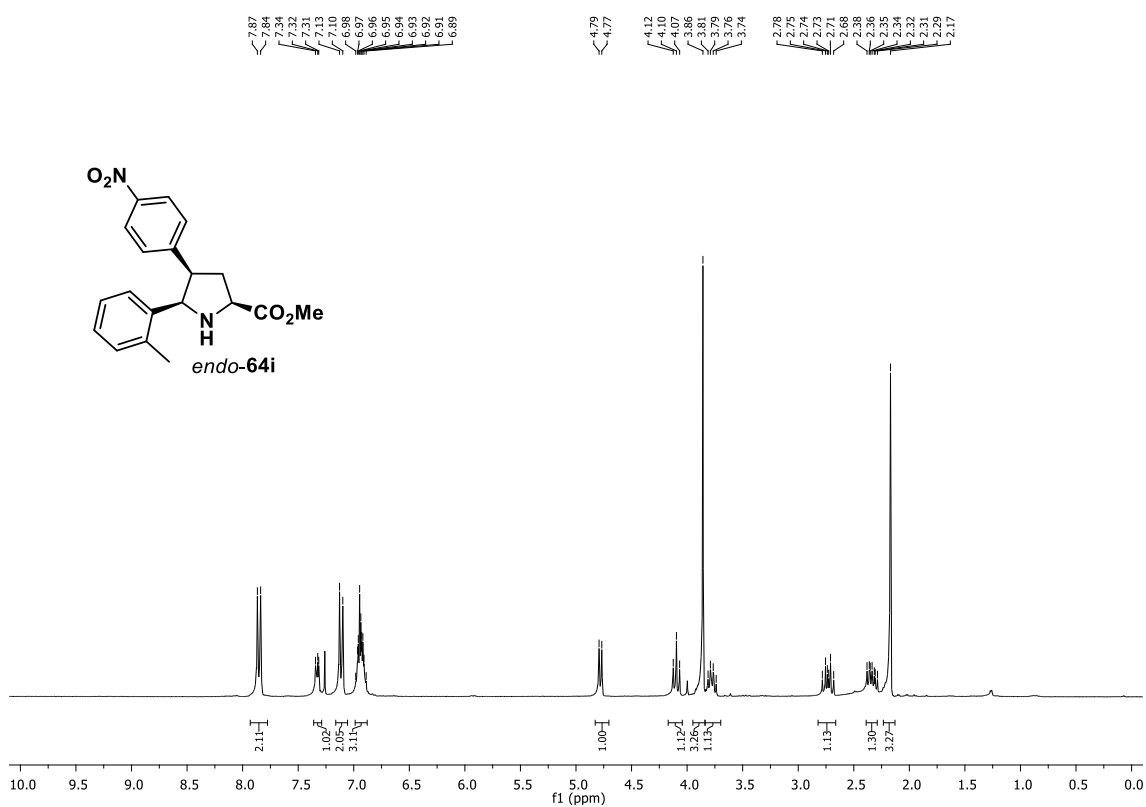
(2*S*,4*R*,5*R*)-Methyl 5-(4-chlorophenyl)-4-(4-nitrophenyl)pyrrolidine-2-carboxylate (*endo*-64f)



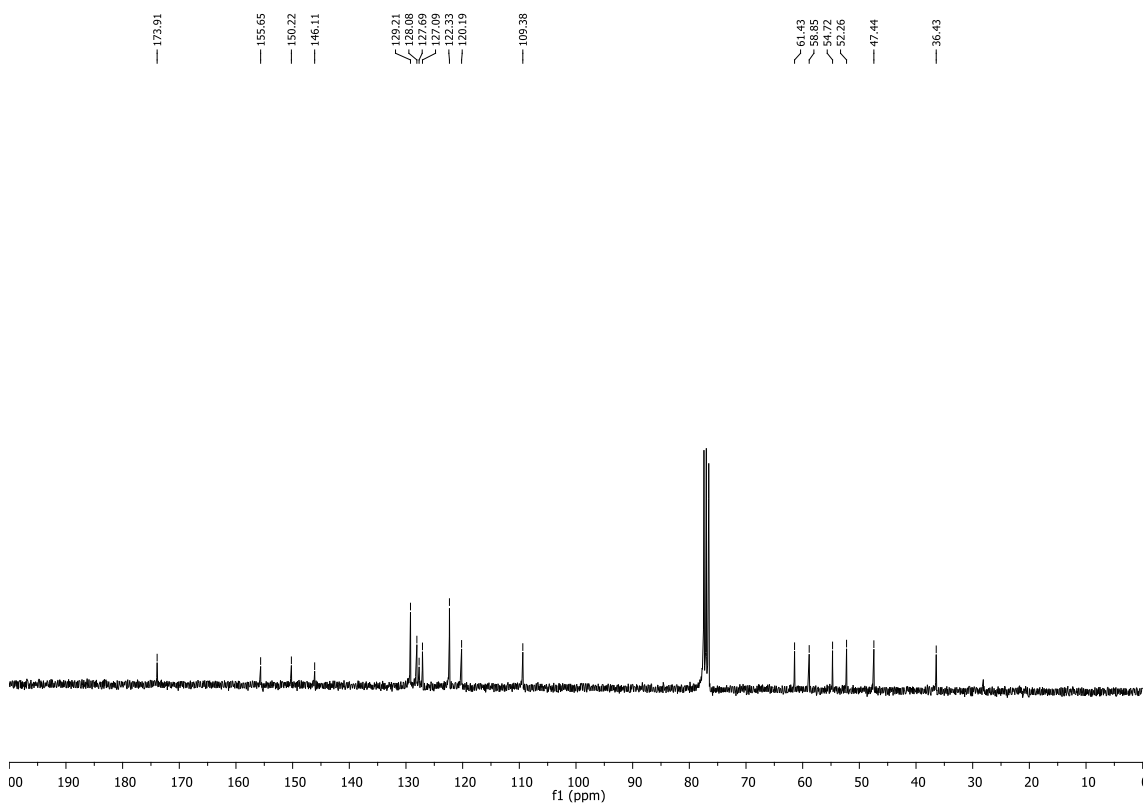
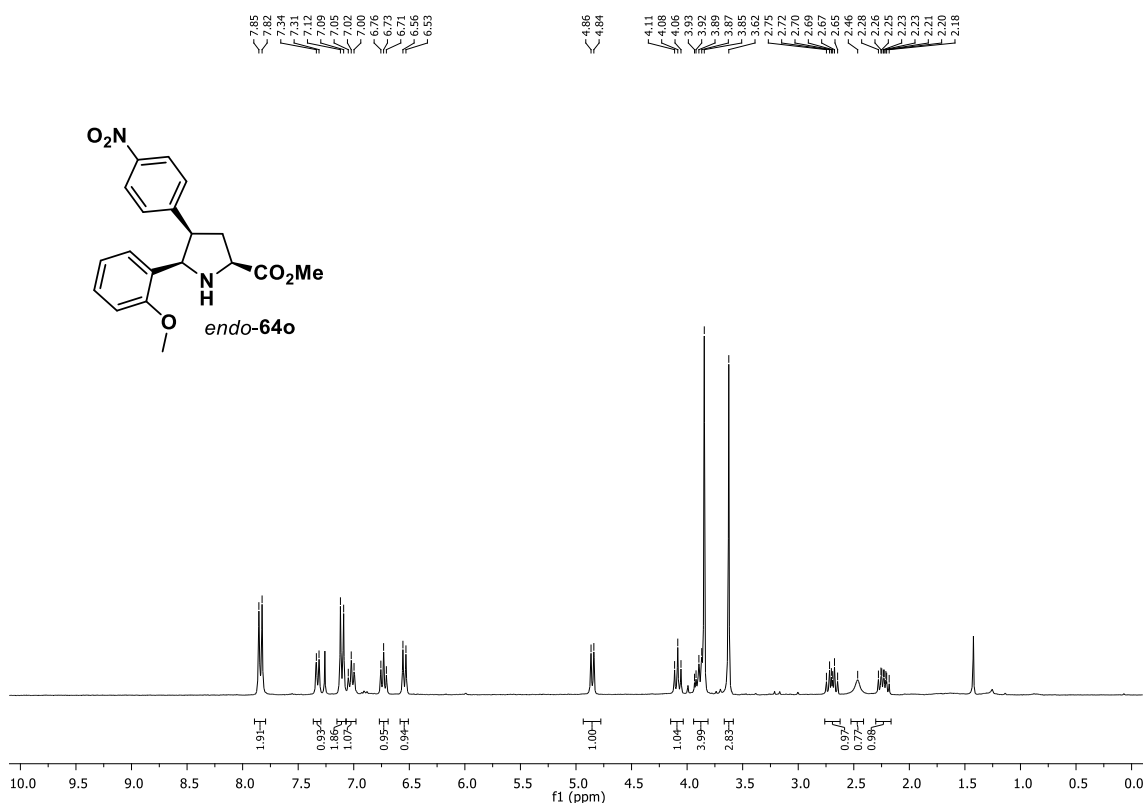
(2*S*,4*R*,5*R*)-Methyl 4-(4-nitrophenyl)-5-(*m*-tolyl)pyrrolidine-2-carboxylate (*endo*-64g)



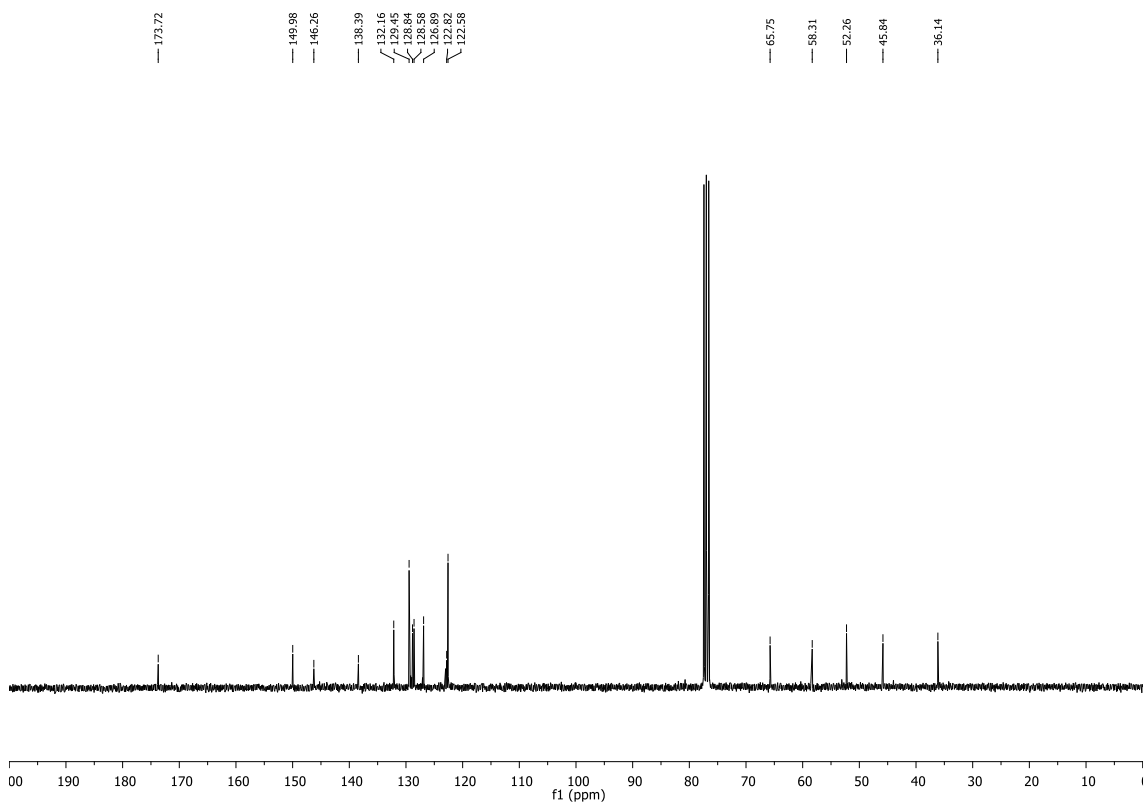
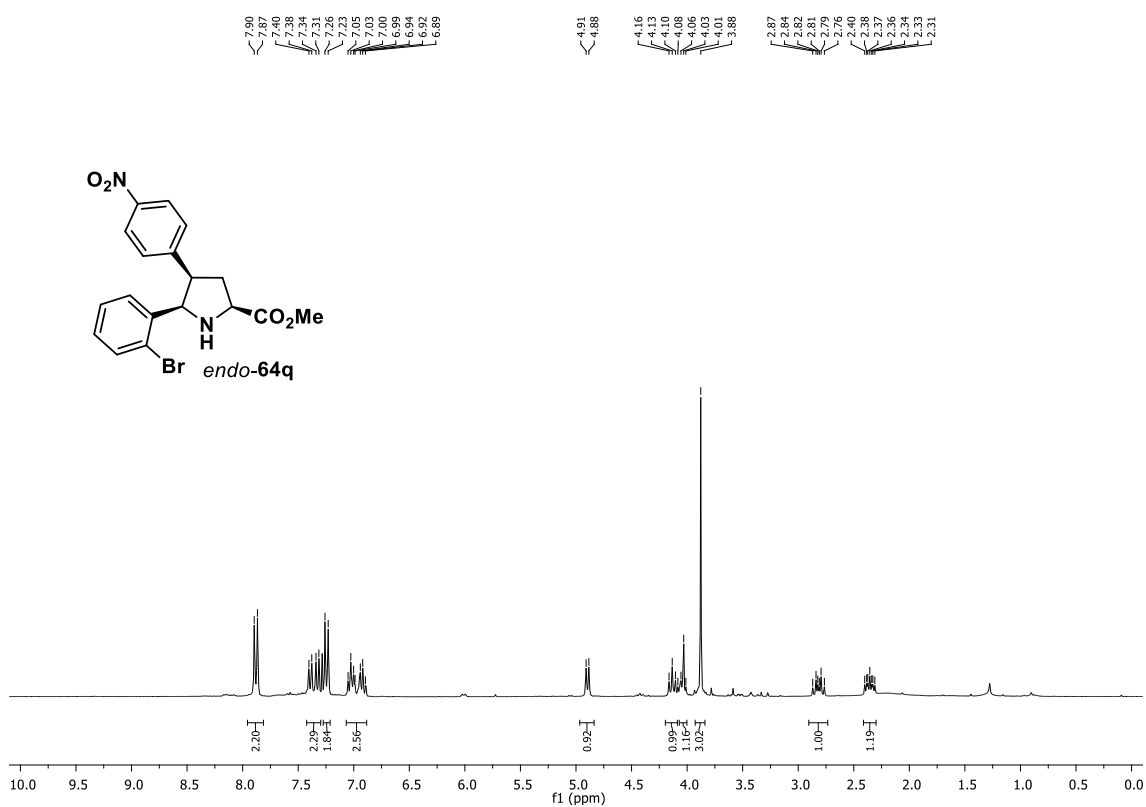
(2*S*,4*R*,5*R*)-Methyl 4-(4-nitrophenyl)-5-(*o*-tolyl)pyrrolidine-2-carboxylate (*endo*-64i)



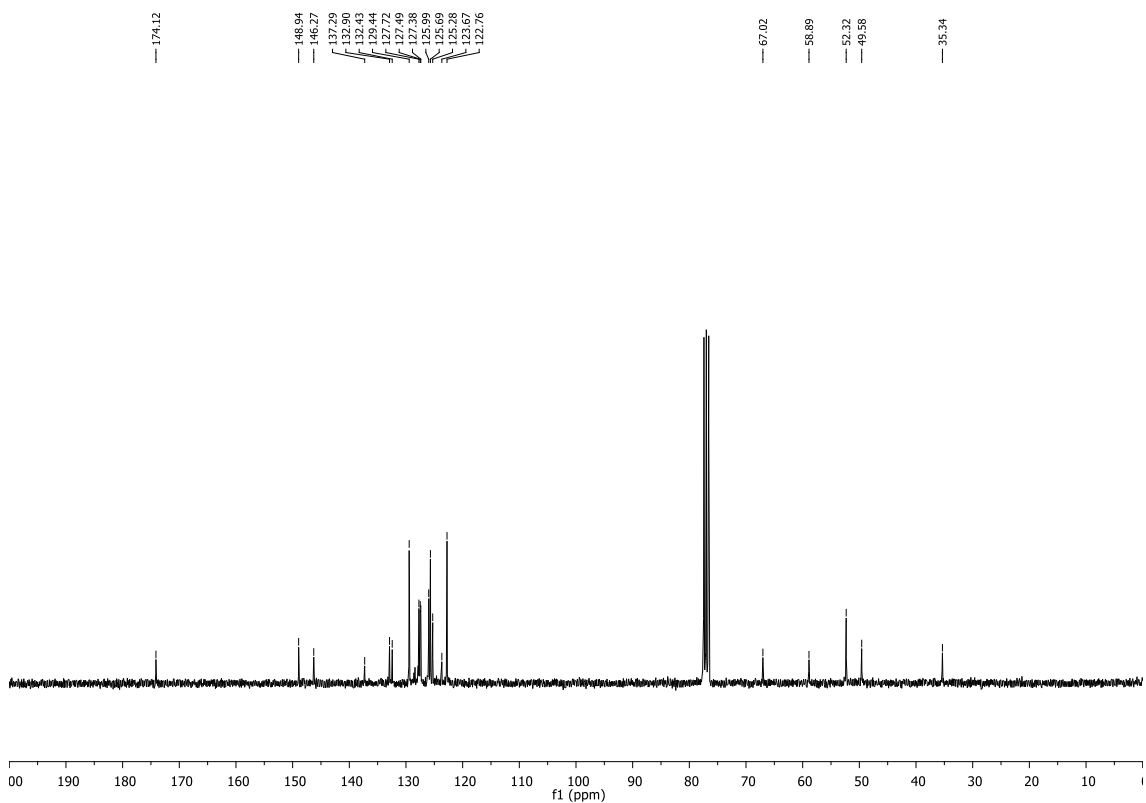
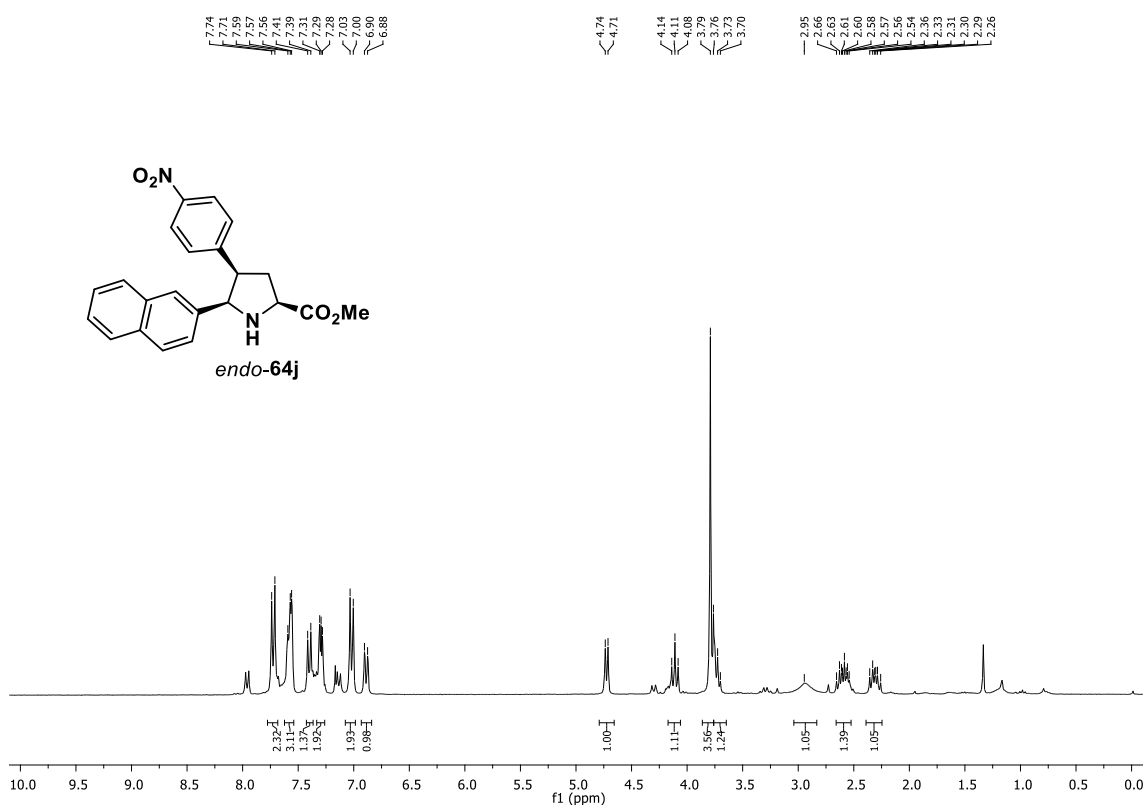
(2*S*, 4*R*, 5*R*)-Methyl 5-(2-methoxyphenyl)-4-(4-nitrophenyl)pyrrolidine-2-carboxylate
(endo-64o)



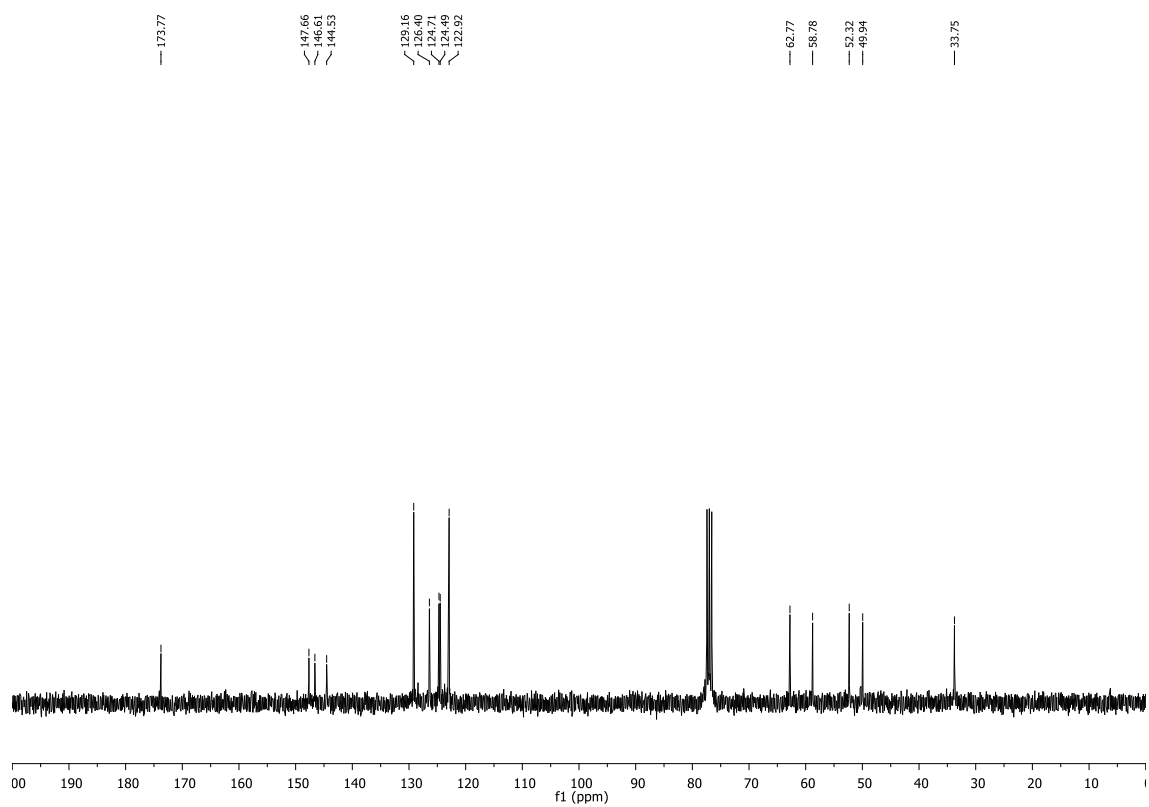
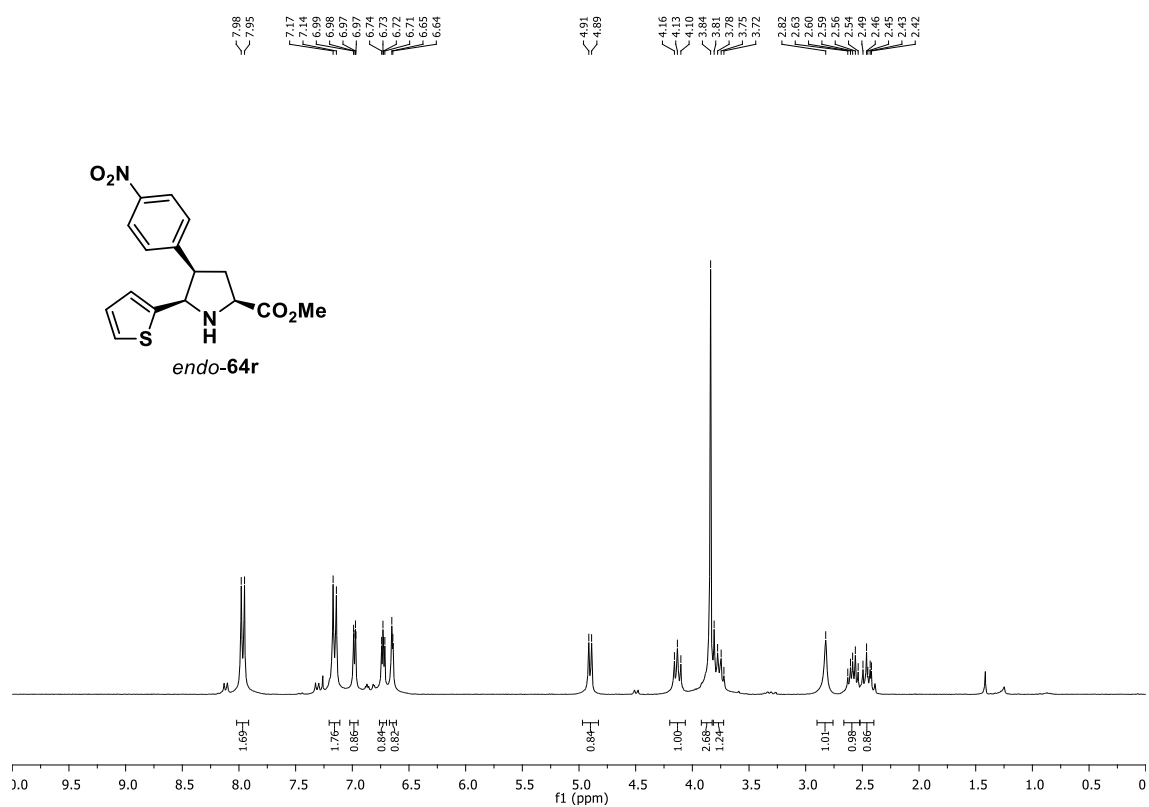
(2*S*, 4*R*, 5*R*)-Methyl 5-(2-bromophenyl)-4-(4-nitrophenyl)pyrrolidine-2-carboxylate (*endo*-64q)



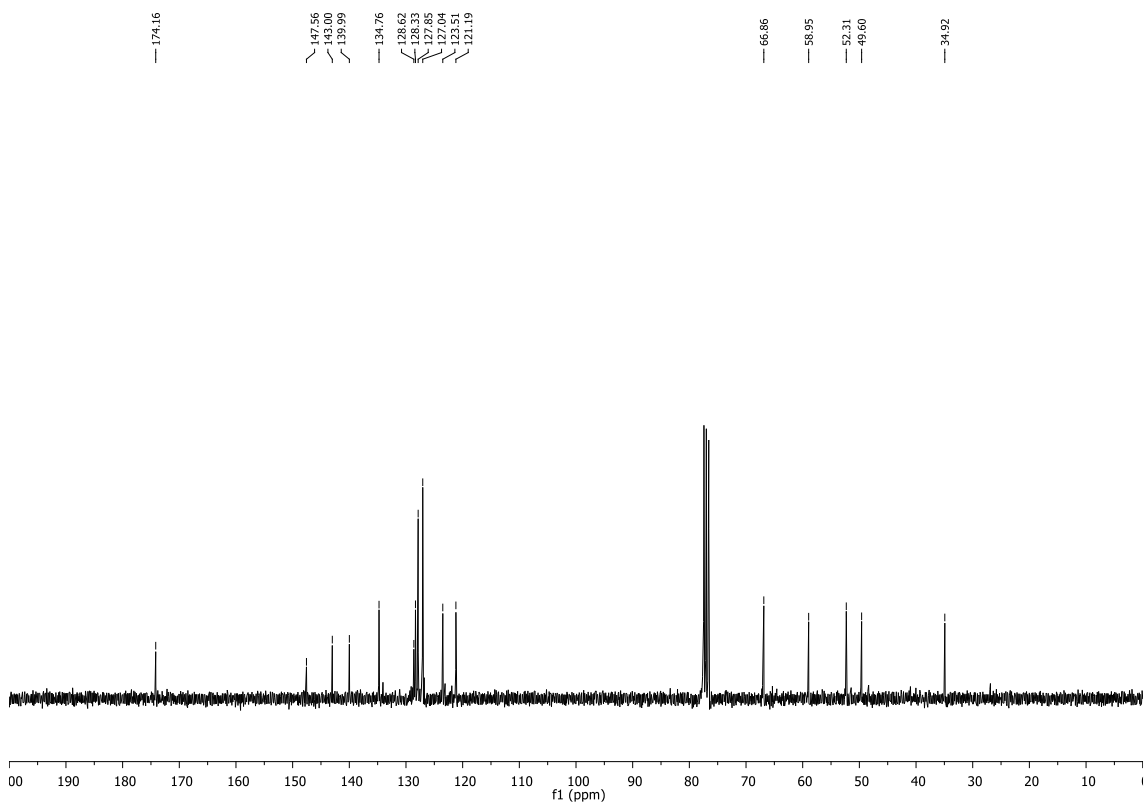
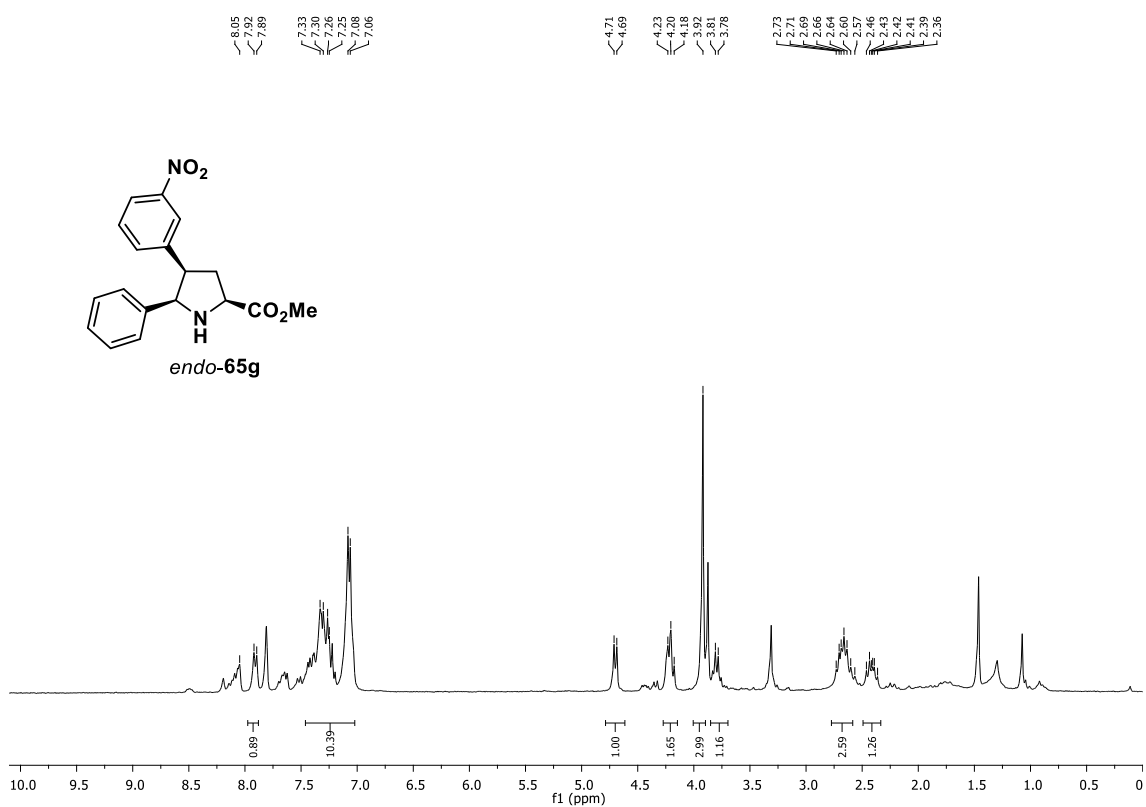
(2*S*,4*R*,5*R*)-Methyl 5-(naphthalen-2-yl)-4-(4-nitrophenyl)pyrrolidine-2-carboxylate (*endo*-64j)



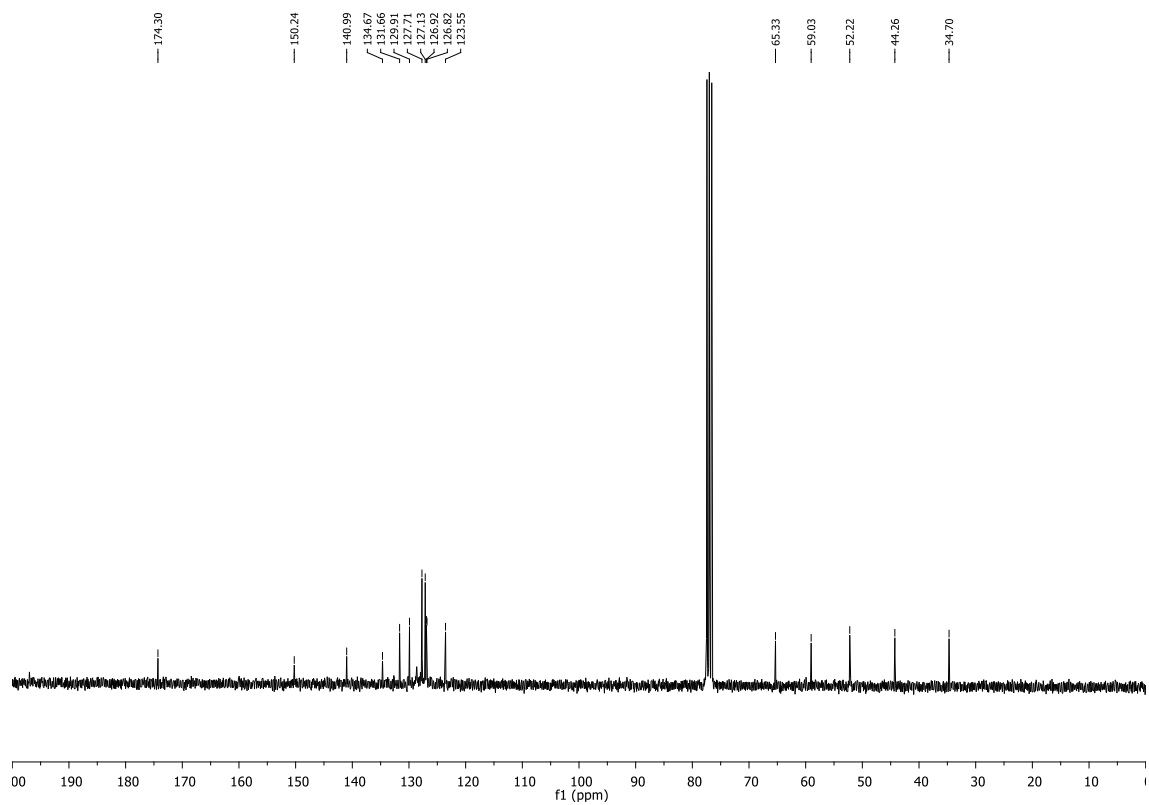
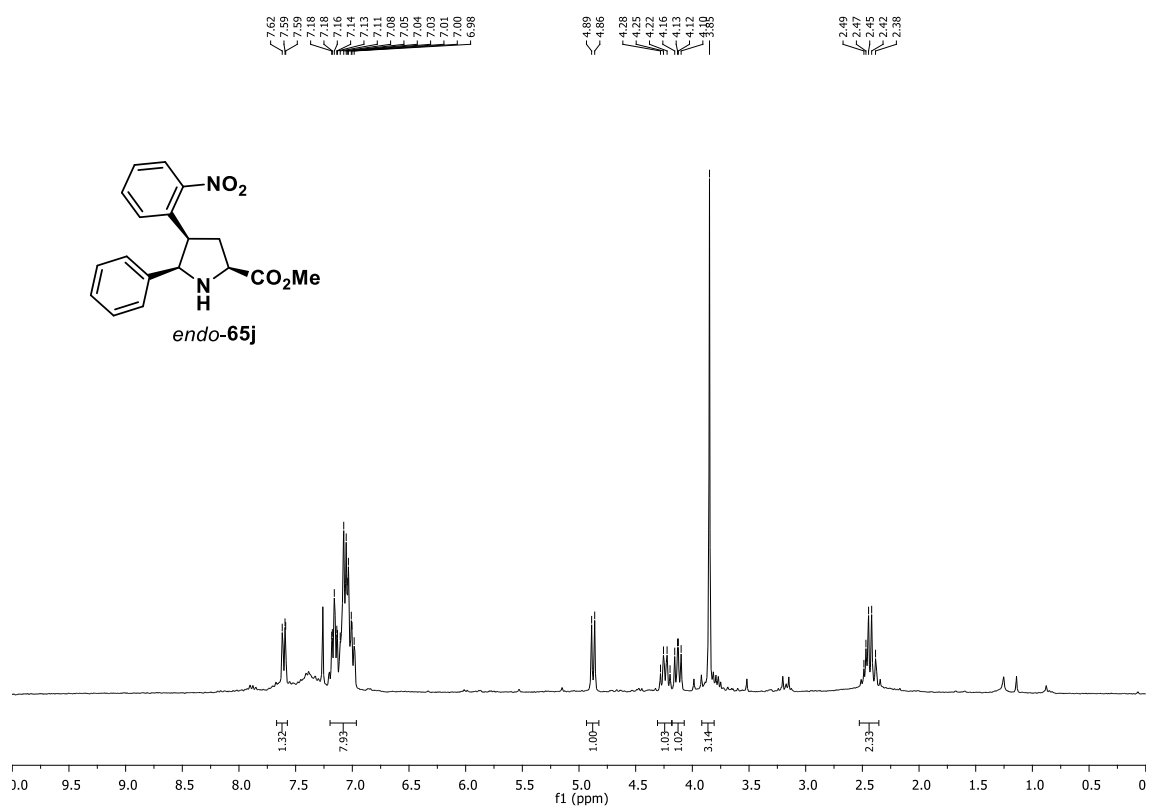
(2*S*,4*R*,5*R*)-Methyl 4-(4-nitrophenyl)-5-(thiophen-2-yl)pyrrolidine-2-carboxylate (*endo*-64r)



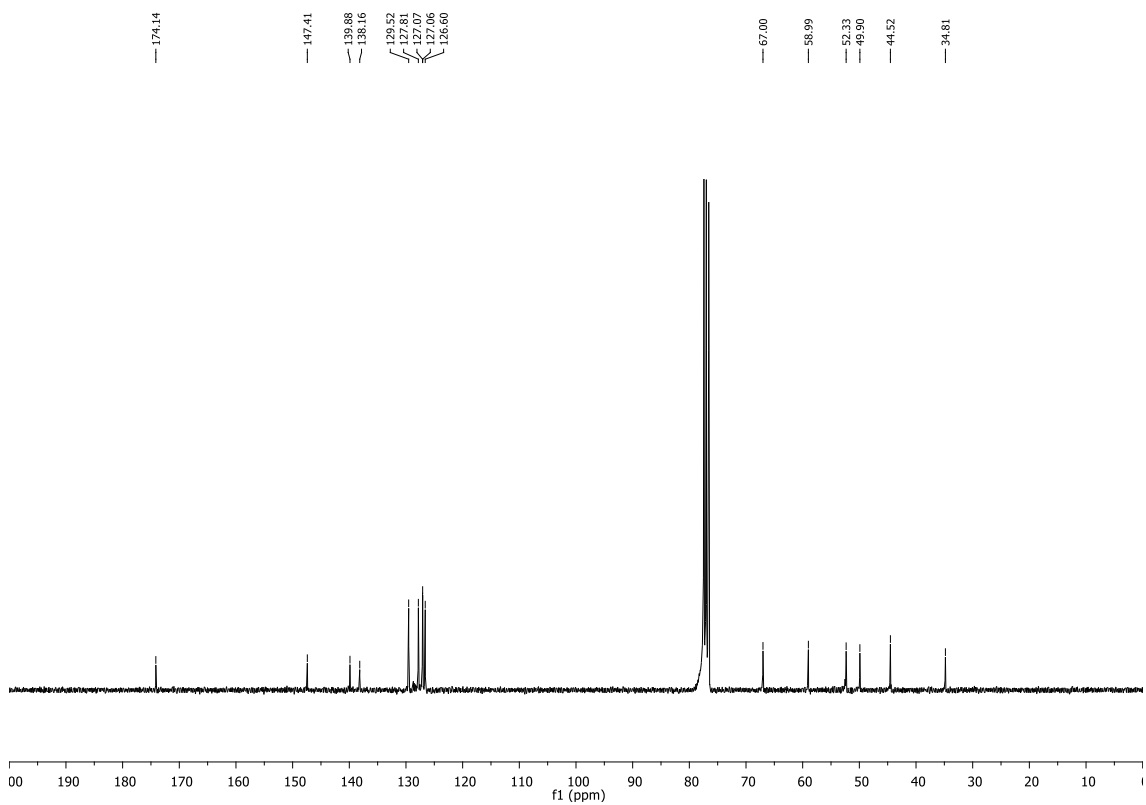
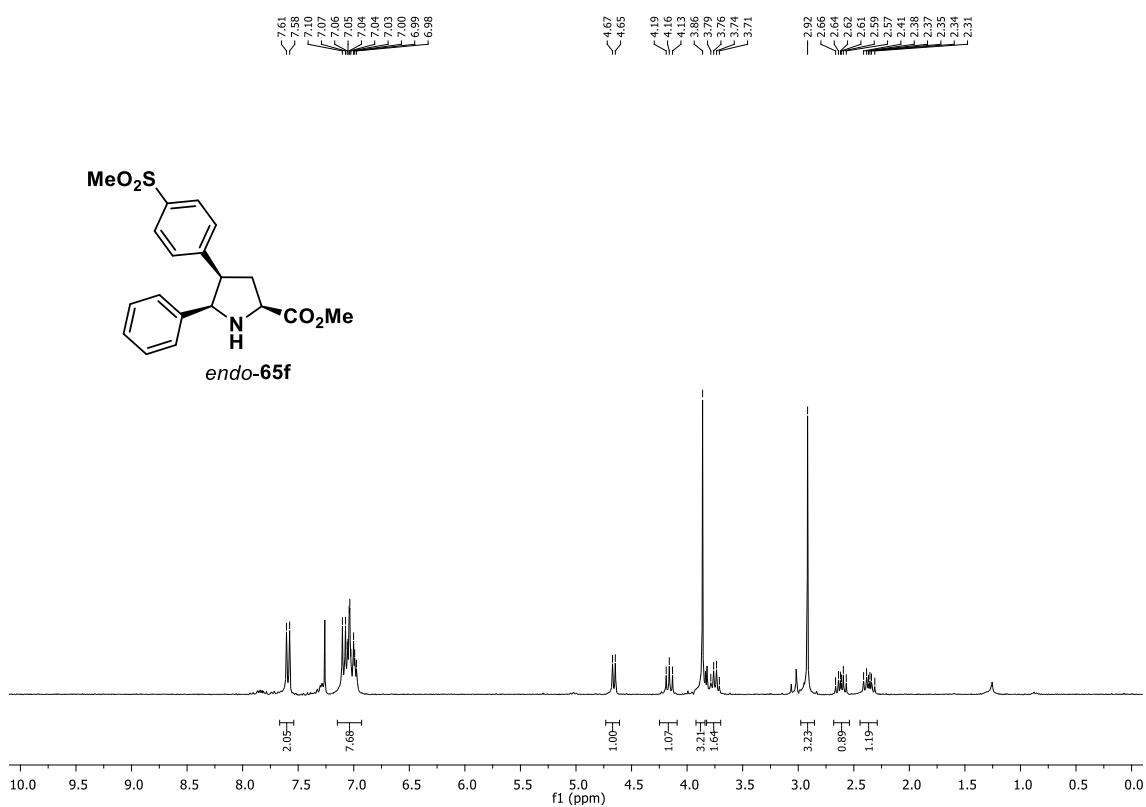
(2*S*,4*R*,5*R*)-Methyl 4-(3-nitrophenyl)-5-phenylpyrrolidine-2-carboxylate (*endo*-65g)



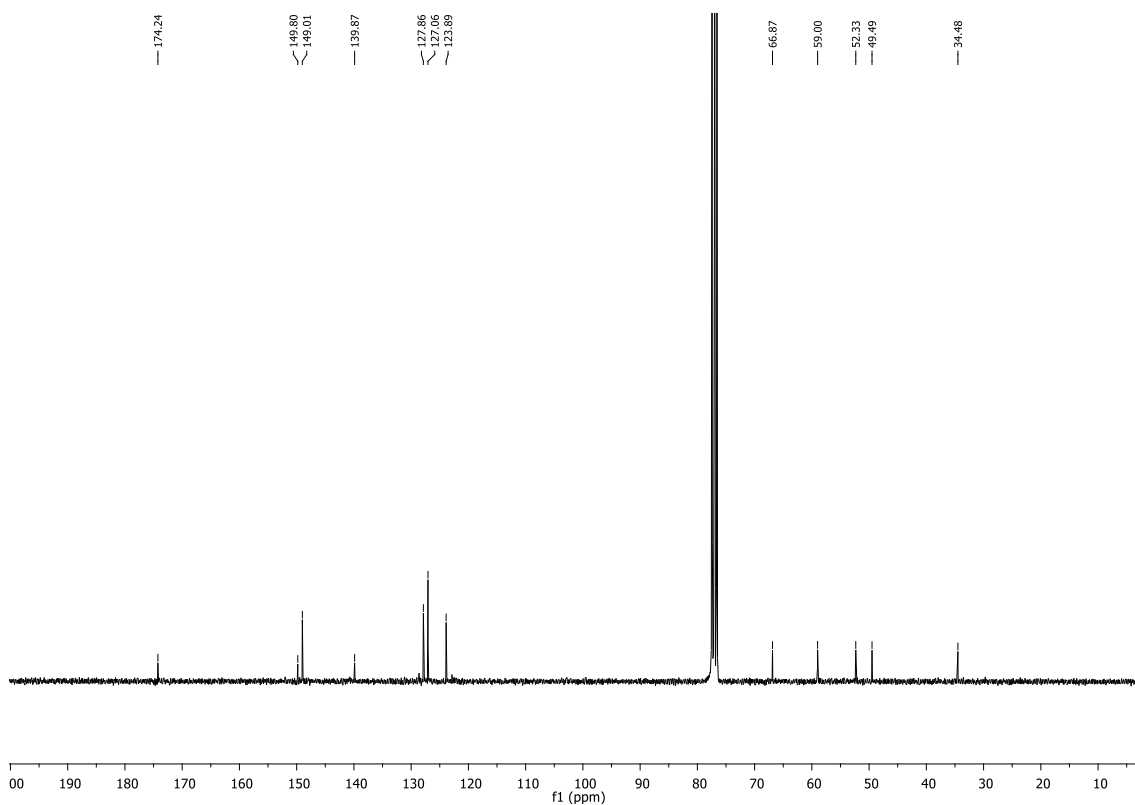
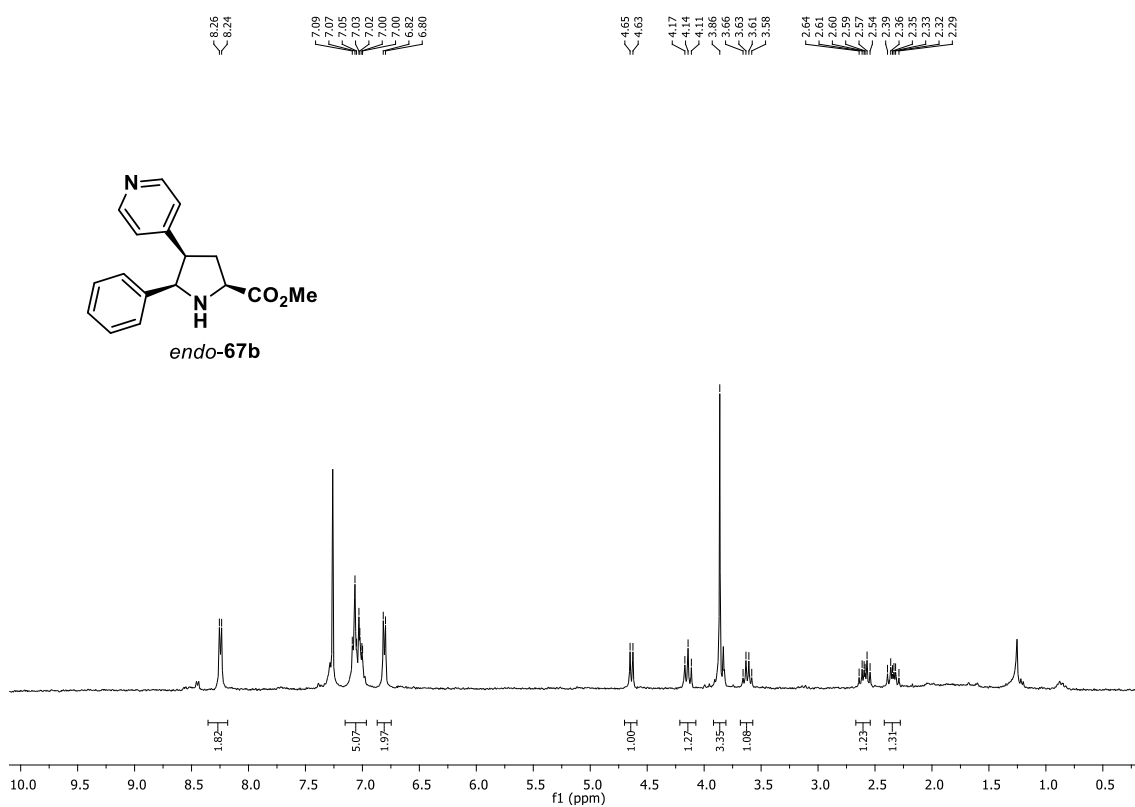
(2*S*,4*R*,5*R*)-Methyl 4-(2-nitrophenyl)-5-phenylpyrrolidine-2-carboxylate (*endo*-65j)



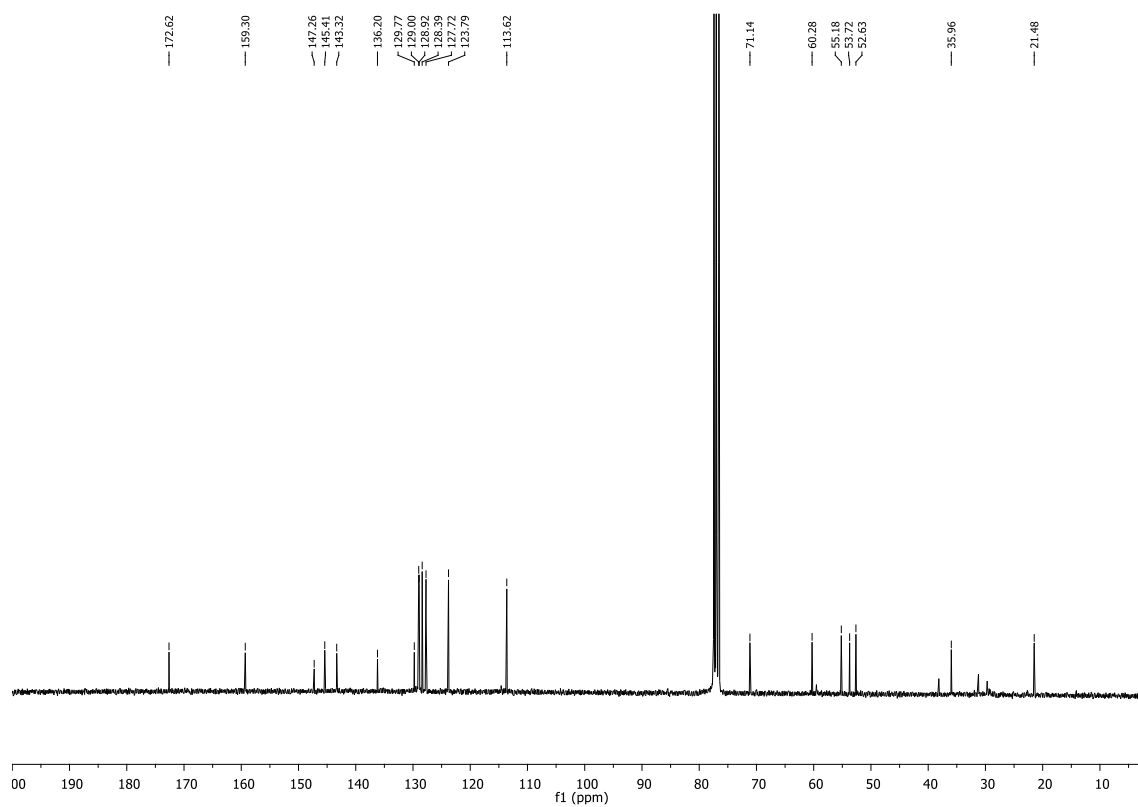
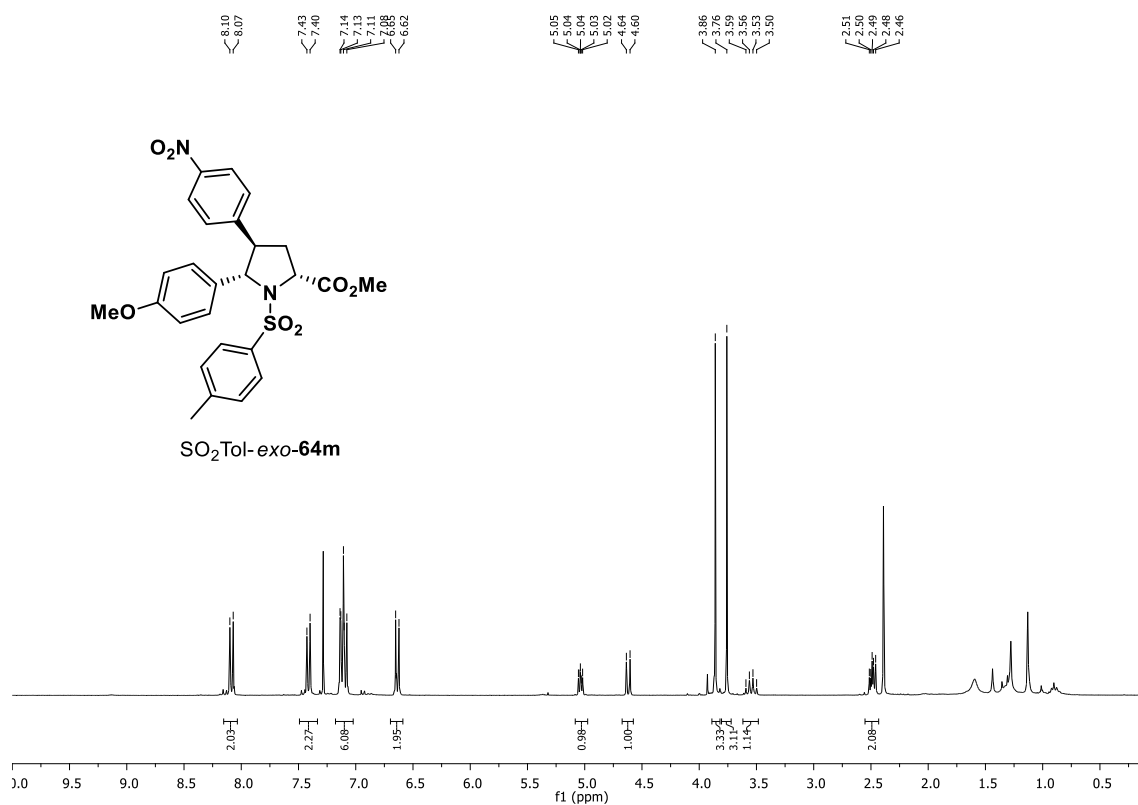
(2*S*,4*R*,5*R*)-Methyl 4-(4-(methylsulfonyl)phenyl)-5-phenylpyrrolidine-2-carboxylate (*endo*-65f)



(2*S*,4*R*,5*R*)-Methyl 5-phenyl-4-(pyridin-4-yl)pyrrolidine-2-carboxylate (*endo*-67b)



(2*R*,4*R*,5*S*)-Methyl 5-(4-methoxyphenyl)-4-(4-nitrophenyl)-1-tosylpyrrolidine-2-carboxylate (SO₂Tol-*exo*-64m)



(2*S*,4*R*,5*R*)-Methyl 5-phenyl-4-(4-nitrophenyl)-1-tosylpyrrolidine-2-carboxylate
(SO₂Tol-endo-64a)

