Electronic Supplementary Material (ESI) for Organic & Biomolecular Chemistry.

Total synthesis of cyclomarins A, C and D, marine natural cyclopeptides with interesting biological activities

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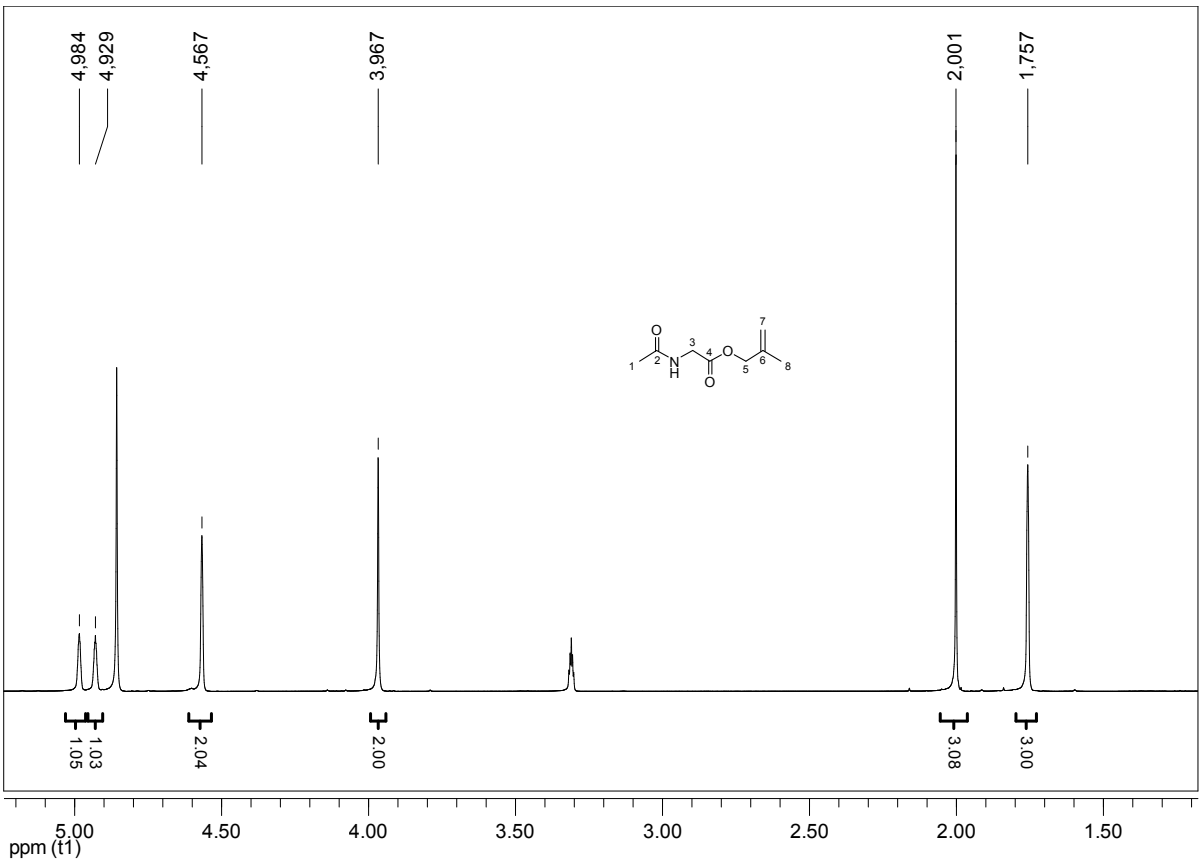
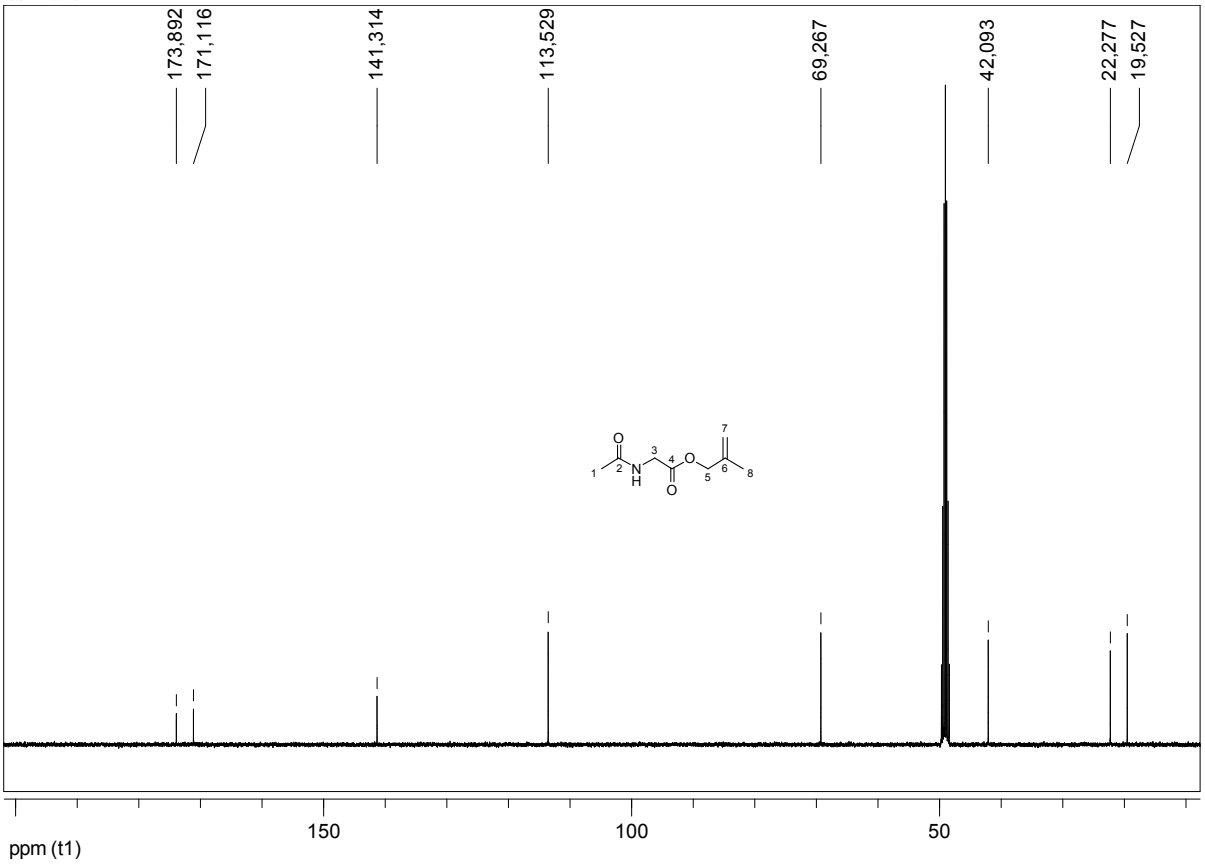
Supporting Information

Content

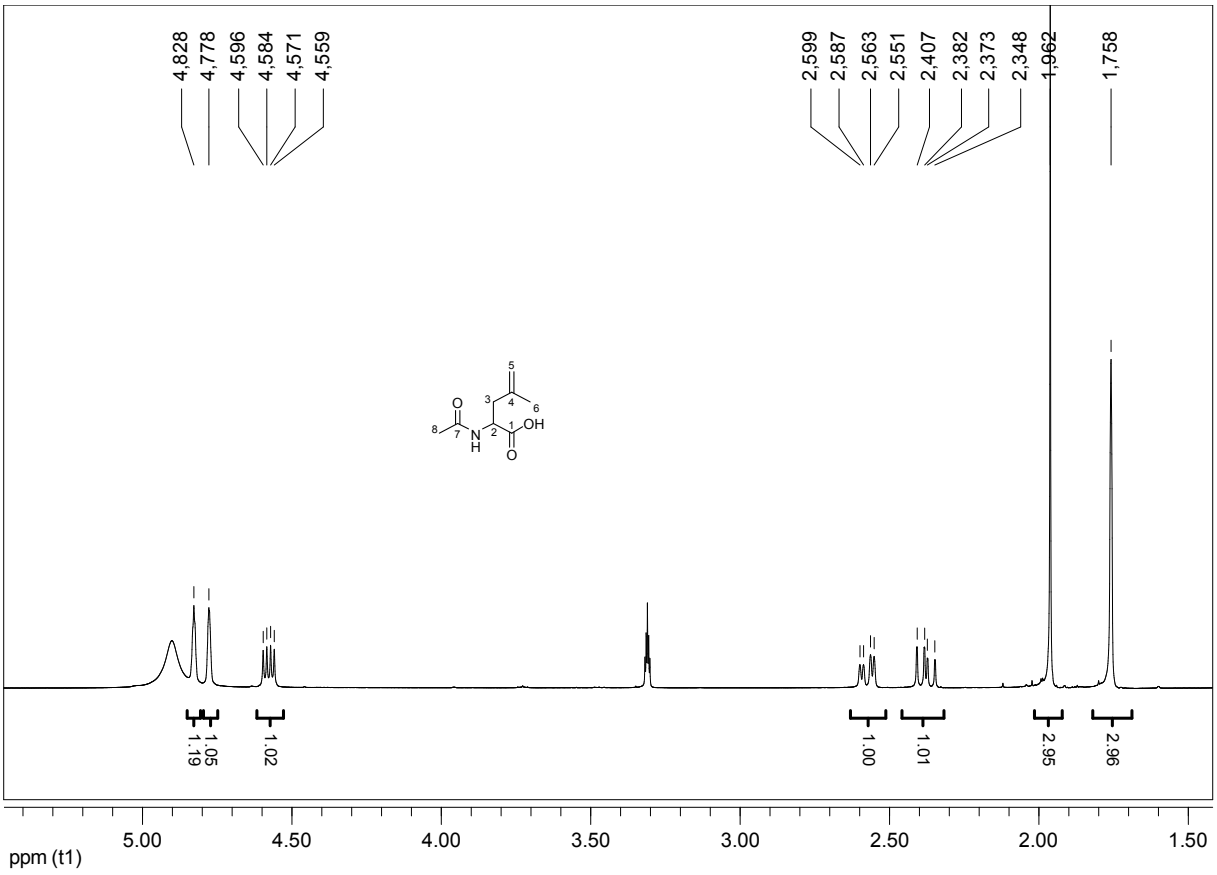
Copies of the NMR-Spectra

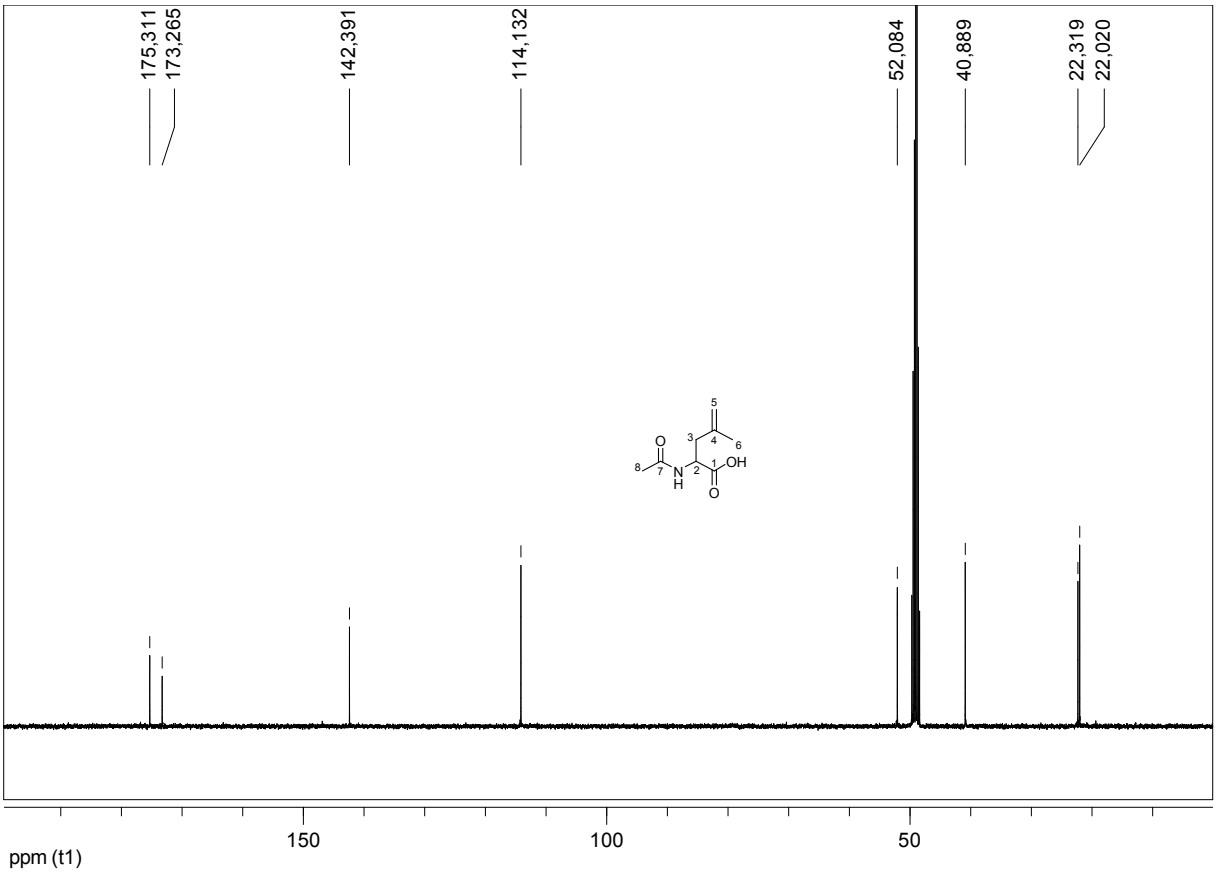
***N*-acetyl-glycine-(2-methallyl) ester (6)**



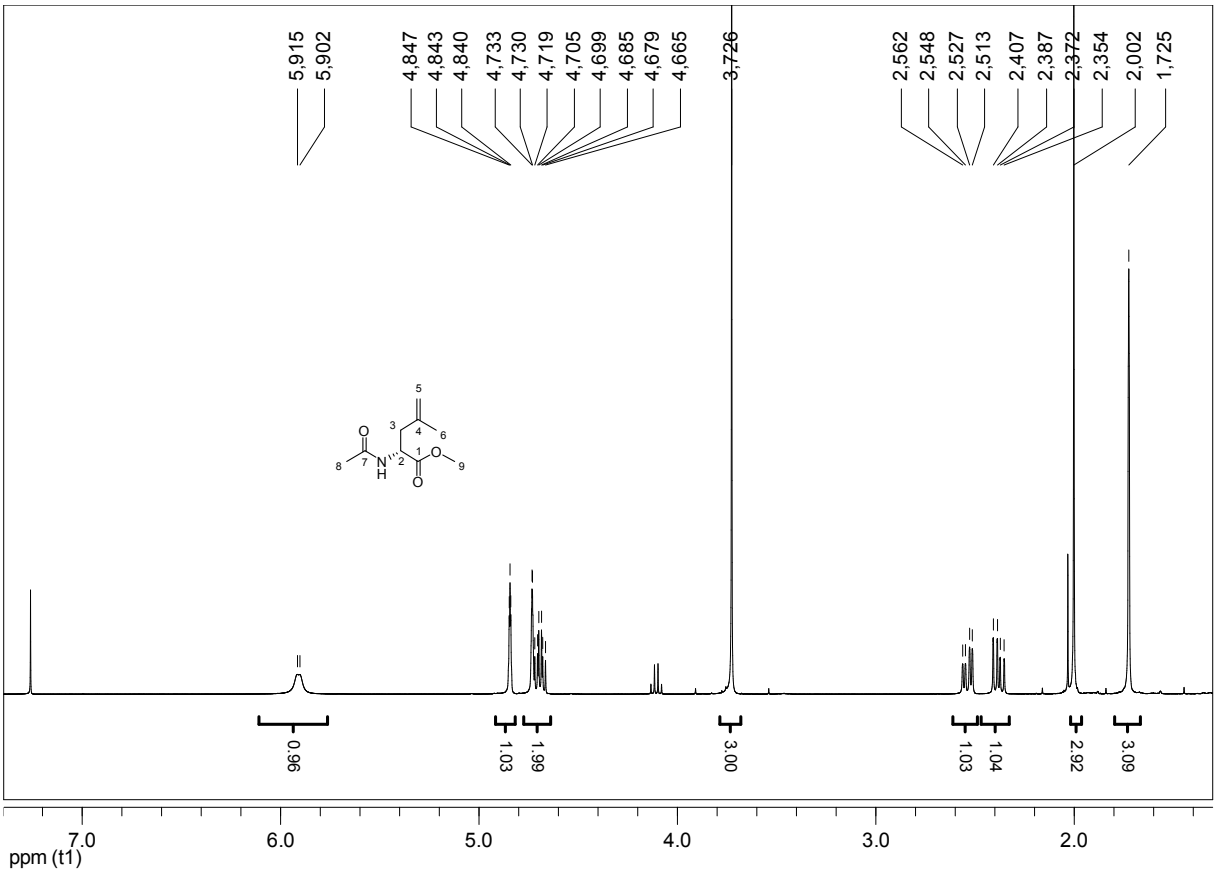


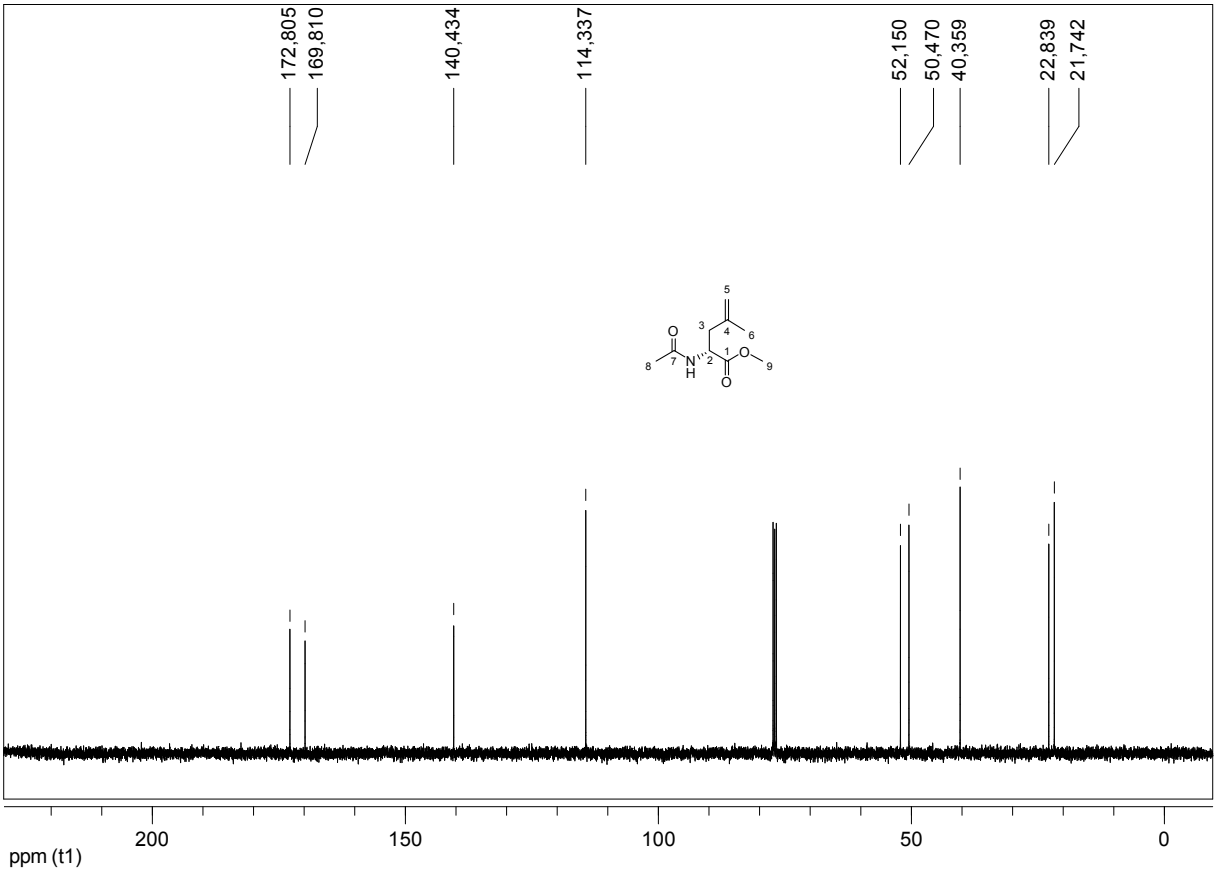
rac-N*-acetyl-4-dehydroleucine *(rac-7)



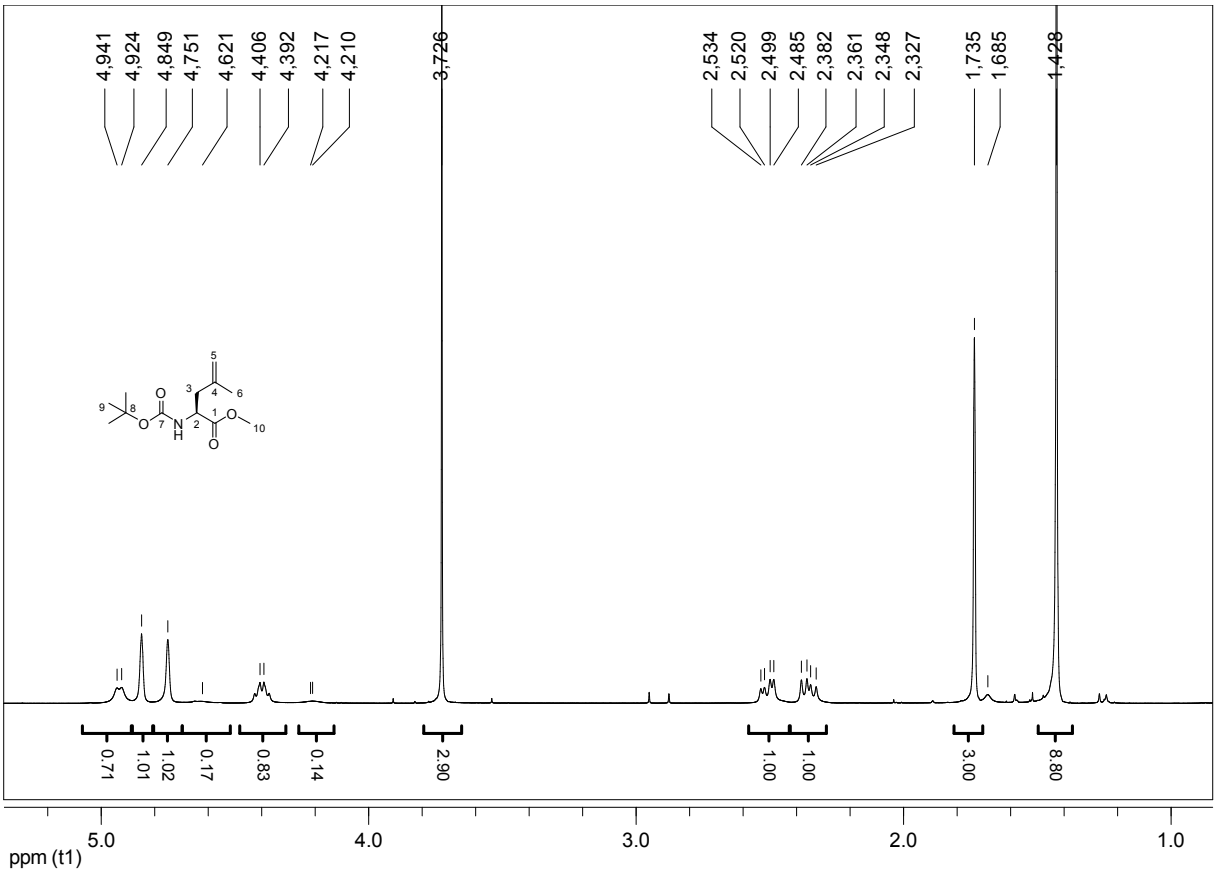


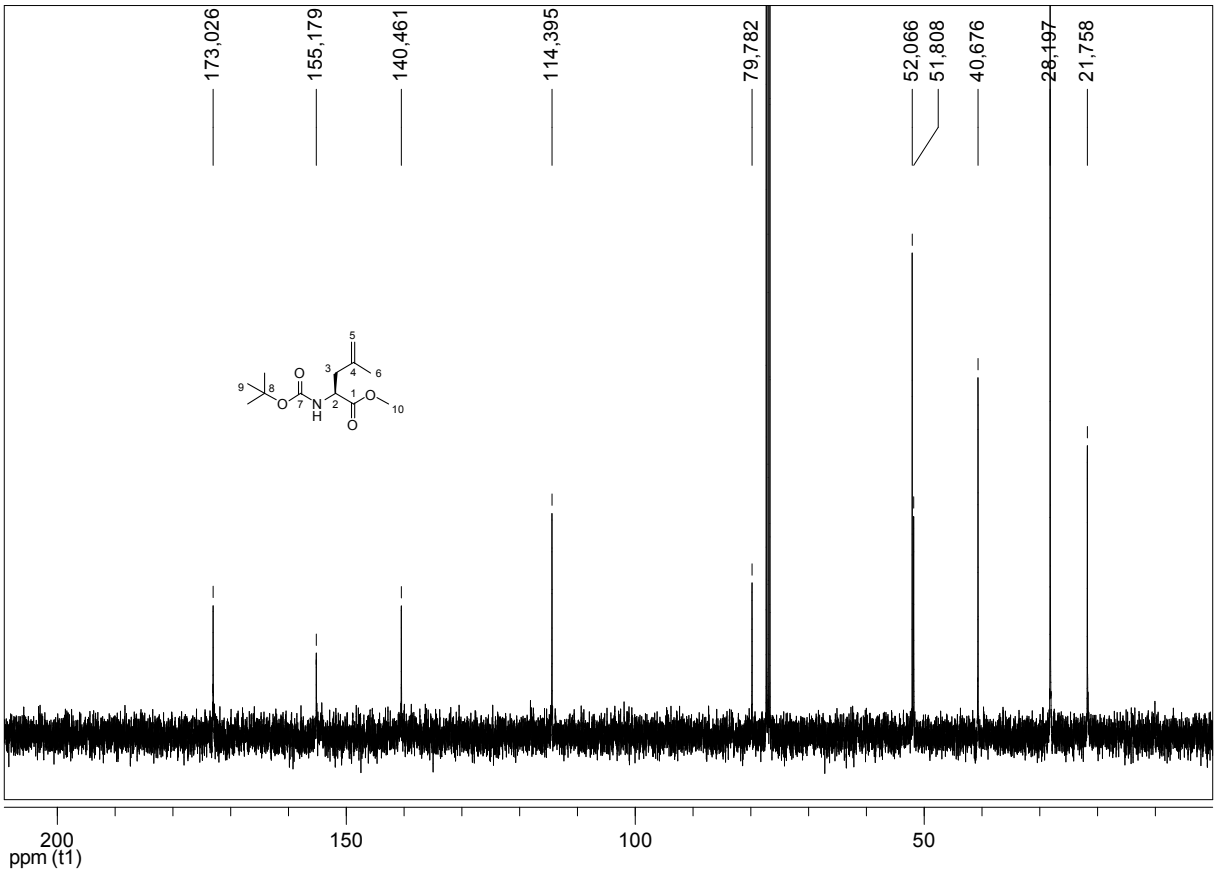
(*R*)-*N*-acetyl-4-dehydroleucine methyl ester [(*R*)-9]



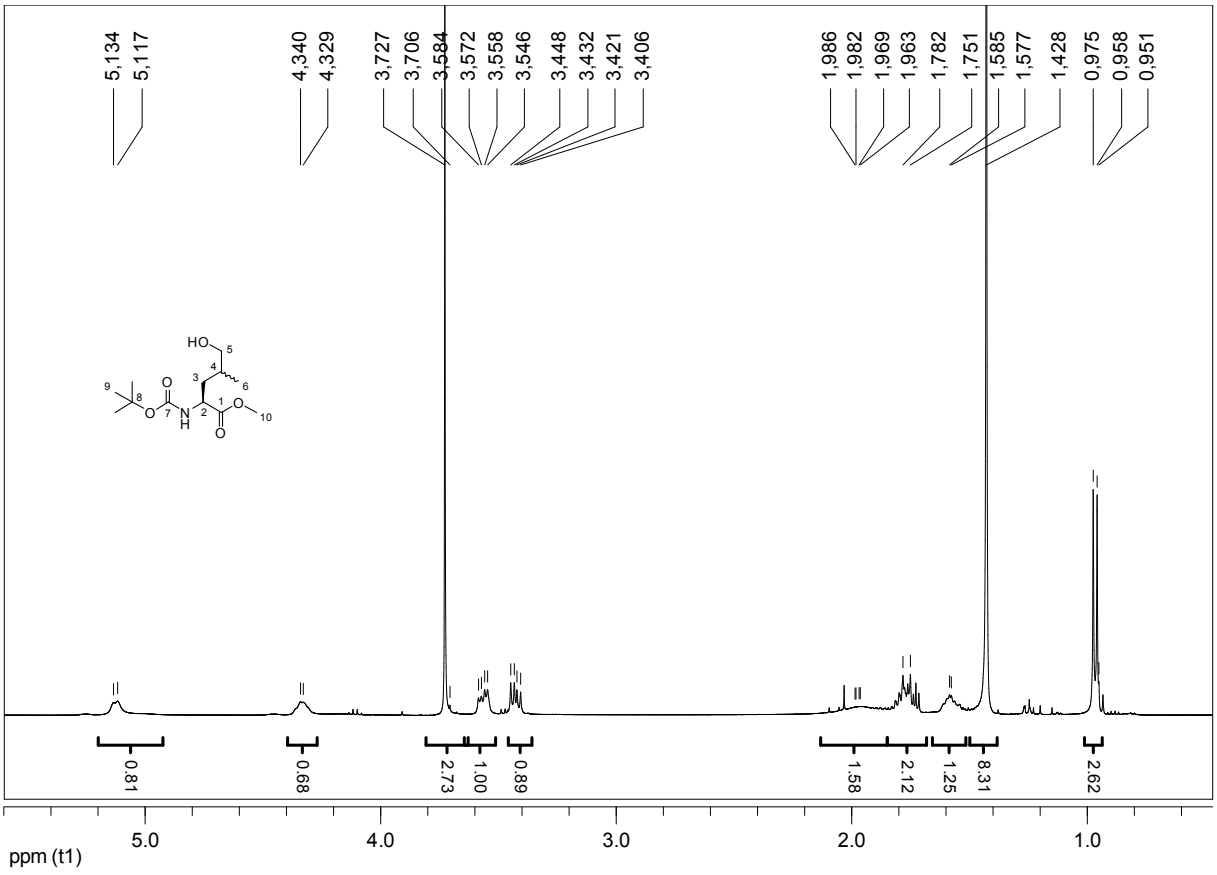


(*S*)-*N*-Boc-4-dehydroleucine methyl ester [(*S*)-10]





(2*S*,4*R*/*S*)-*N*-Boc-5-hydroxyleucine methyl ester (12)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2.73
1.00
0.89
1.58
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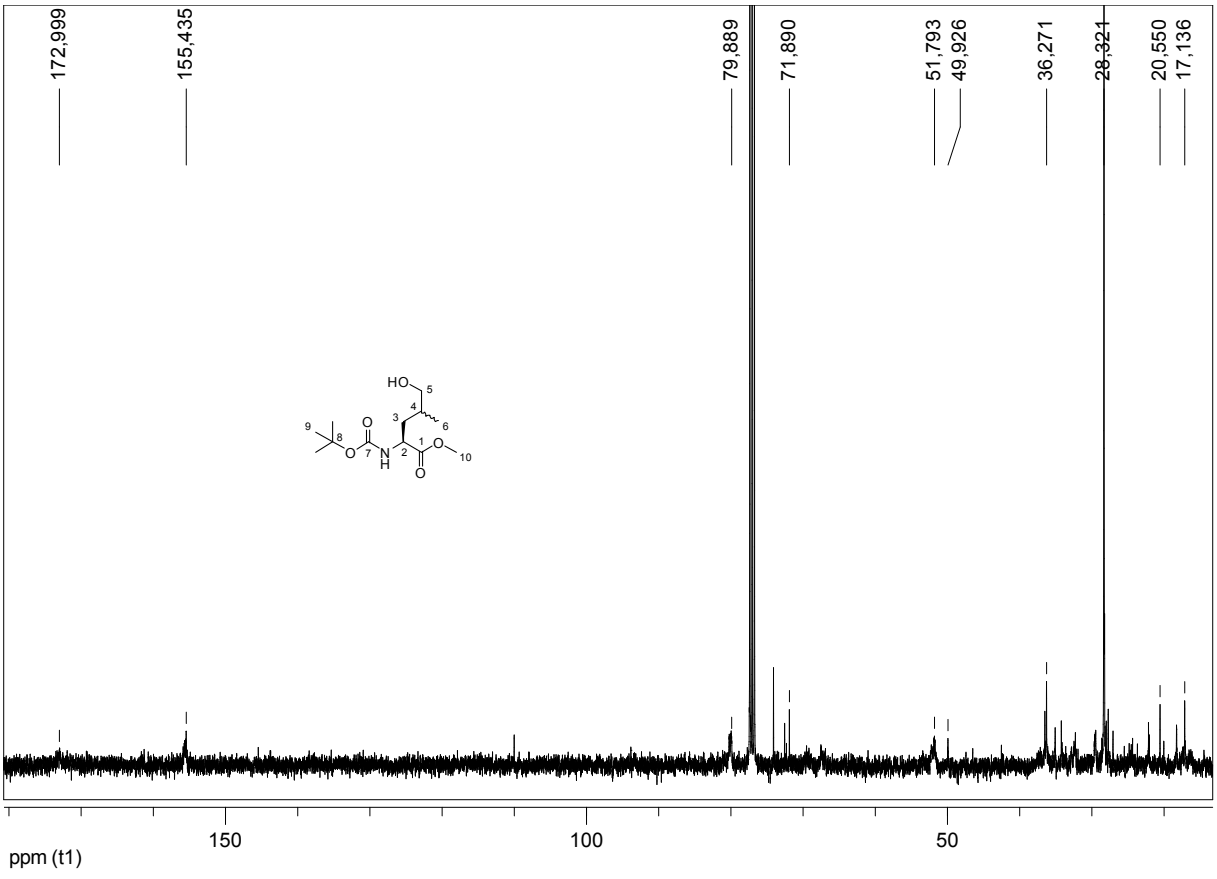
1.25
8.31
2.92
5.0
4.0
3.0
2.0
1.0
ppm (t1)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50
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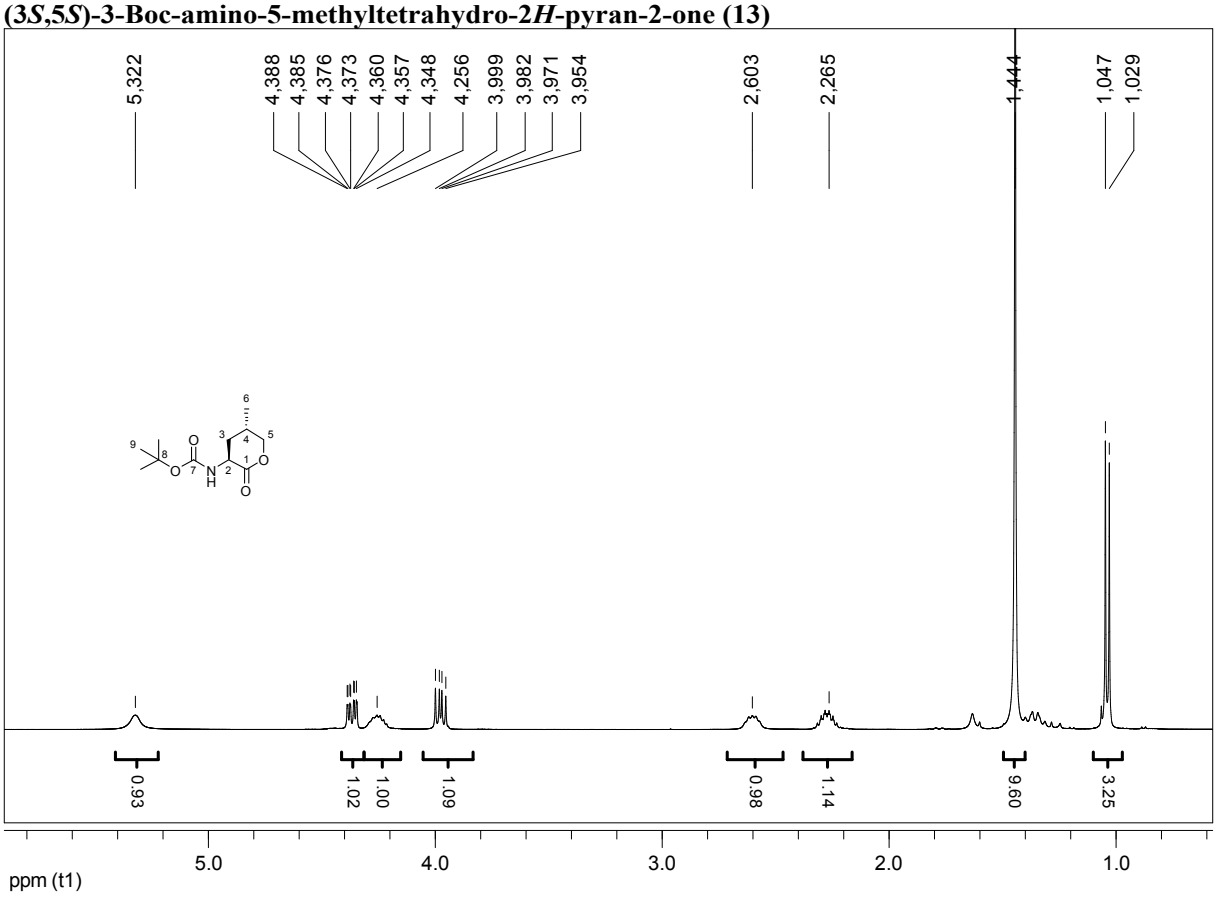
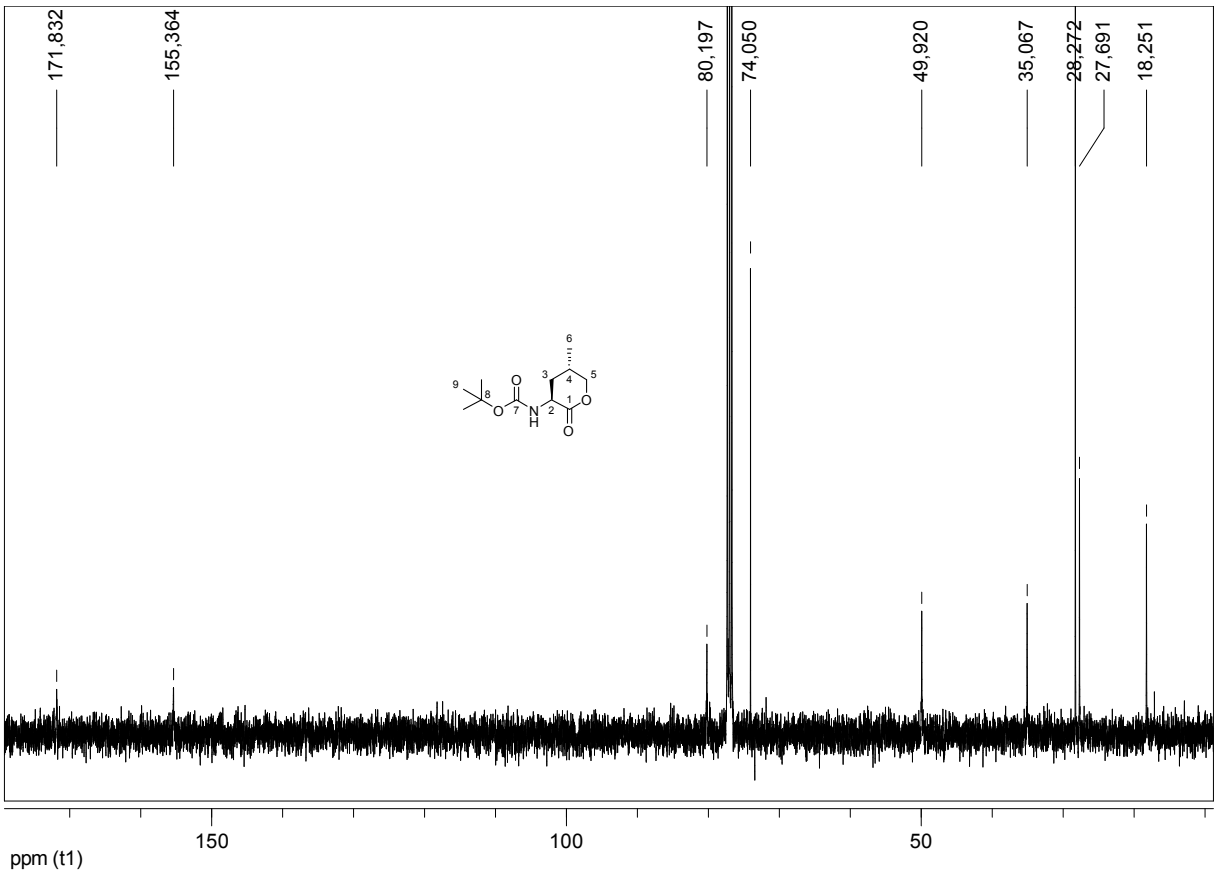
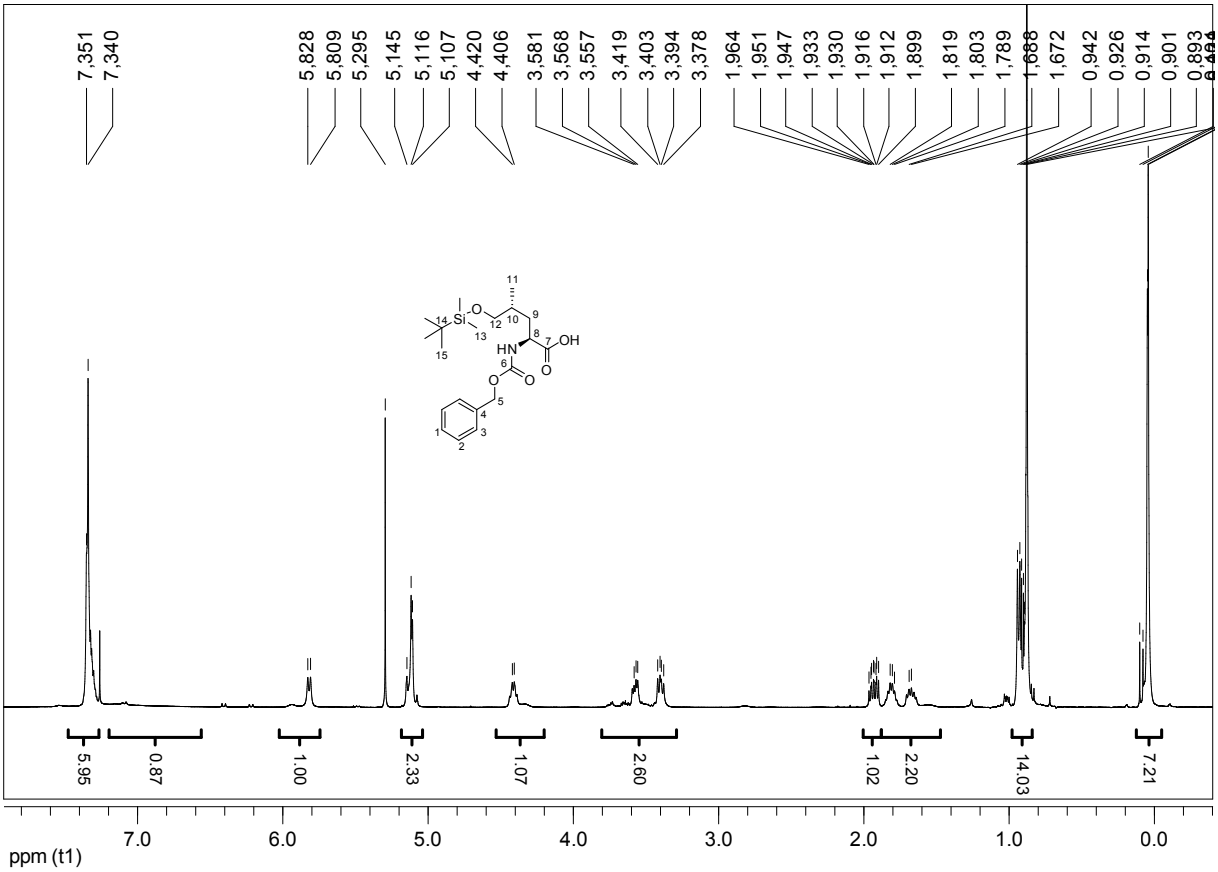
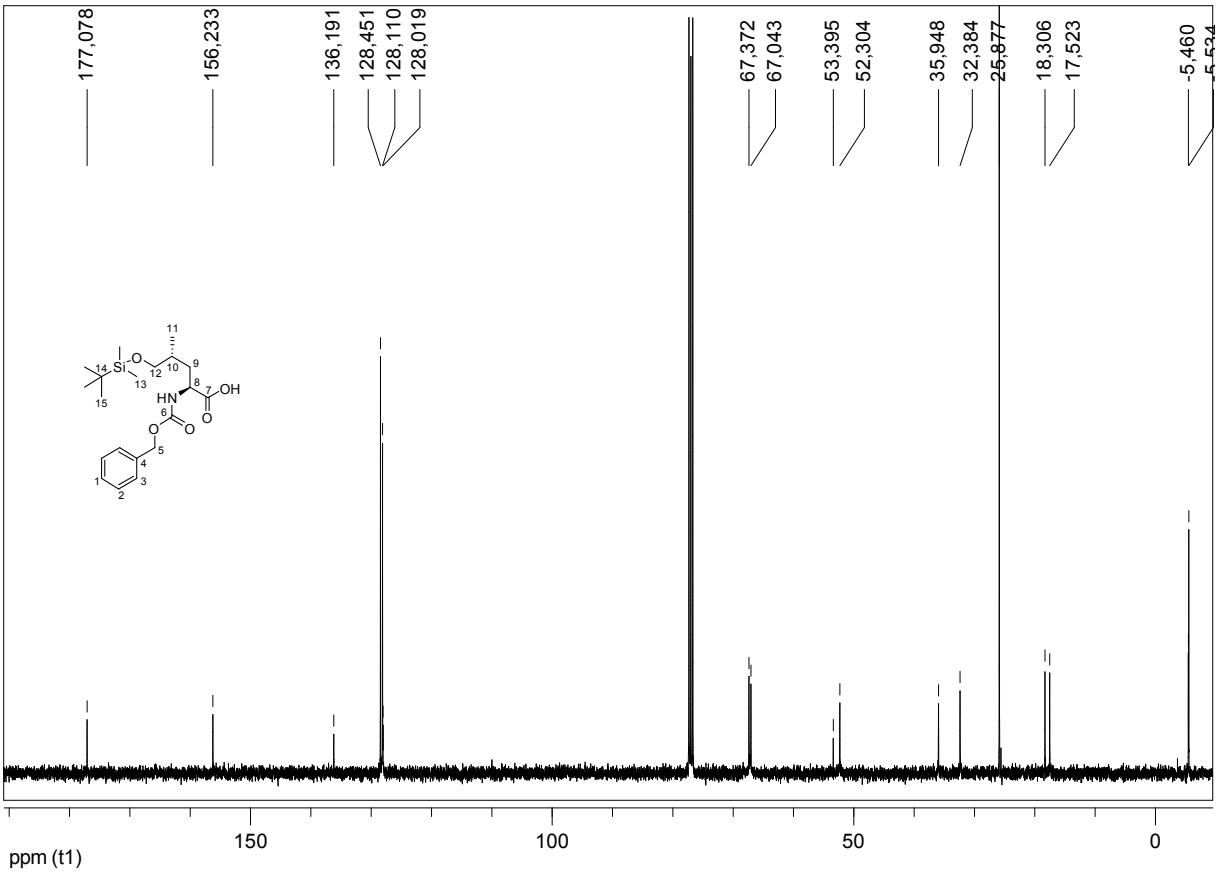
(3*S*,5*S*)-3-Boc-amino-5-methyltetrahydro-2*H*-pyran-2-one (13)



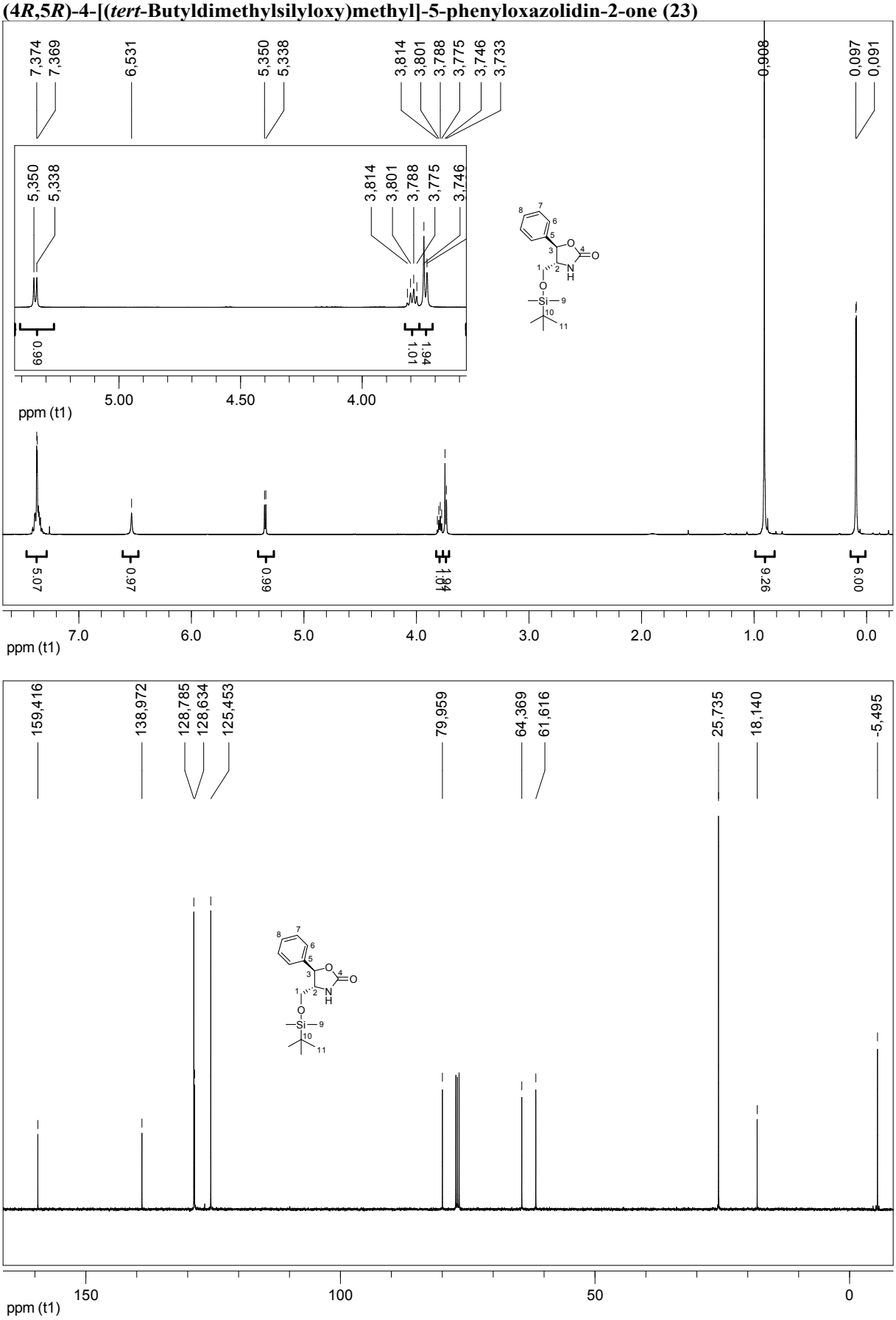


(2*S*,4*R*)-*N*-Cbz-4-methyl-5-[(*tert*-butyldimethylsilyl)oxy]-leucine (19)

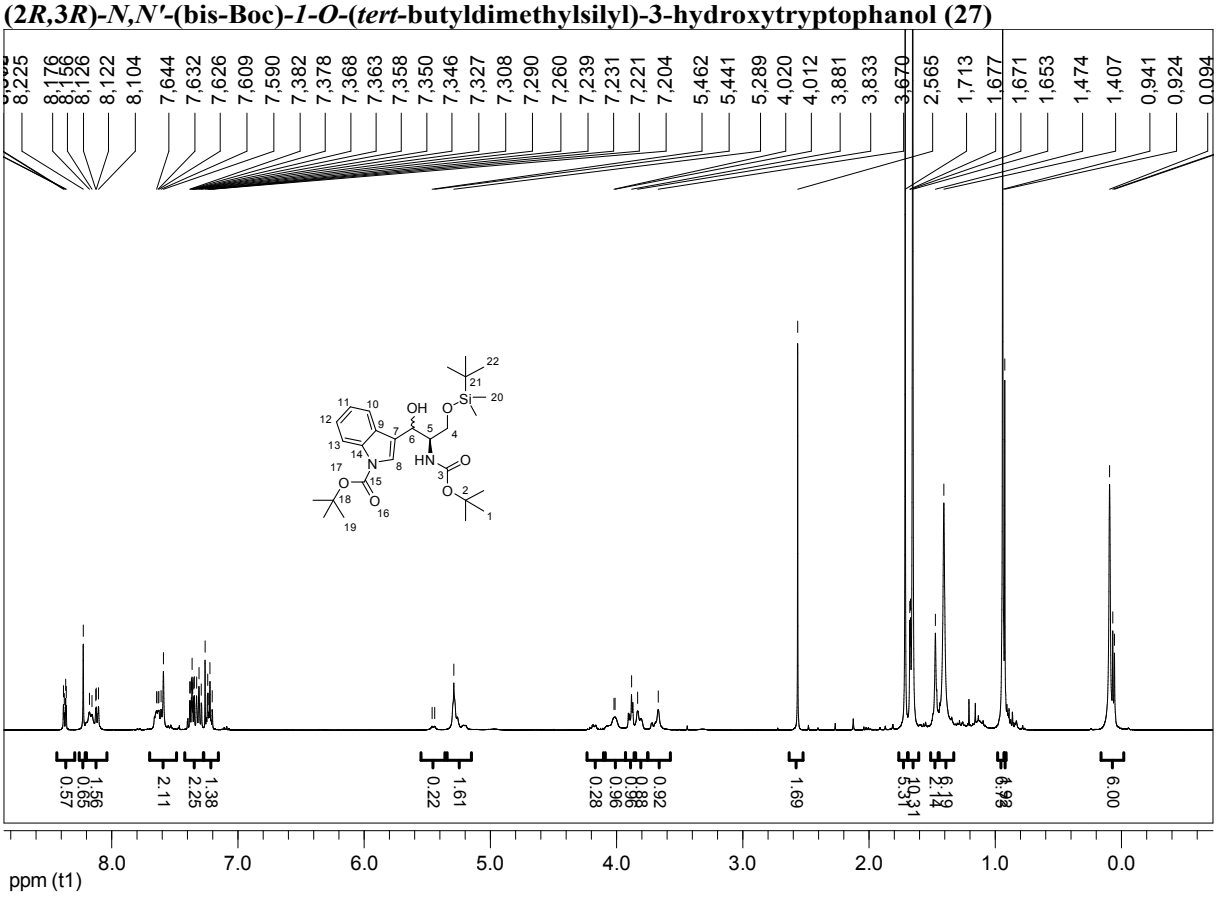


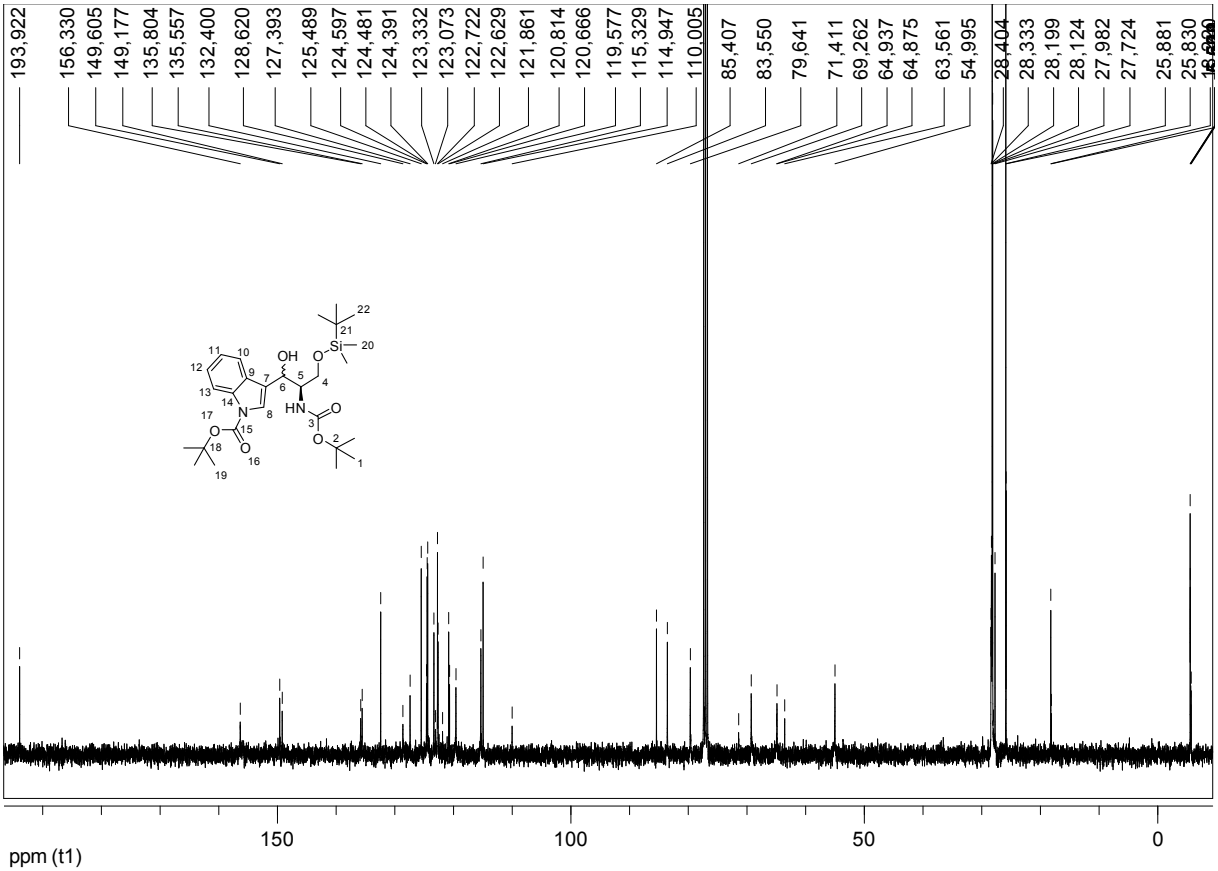


(4*R*,5*R*)-4-[(*tert*-Butyldimethylsilyloxy)methyl]-5-phenyloxazolidin-2-one (23)

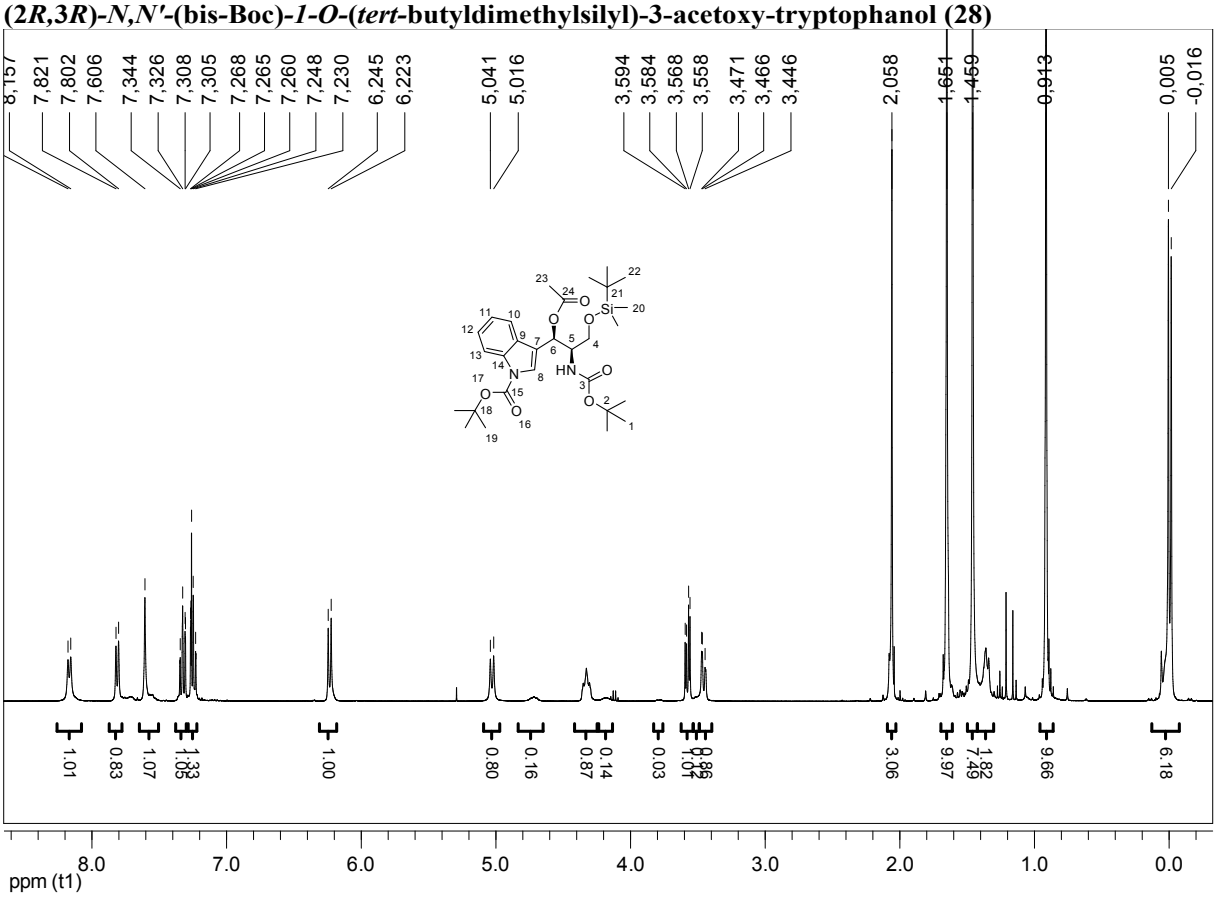


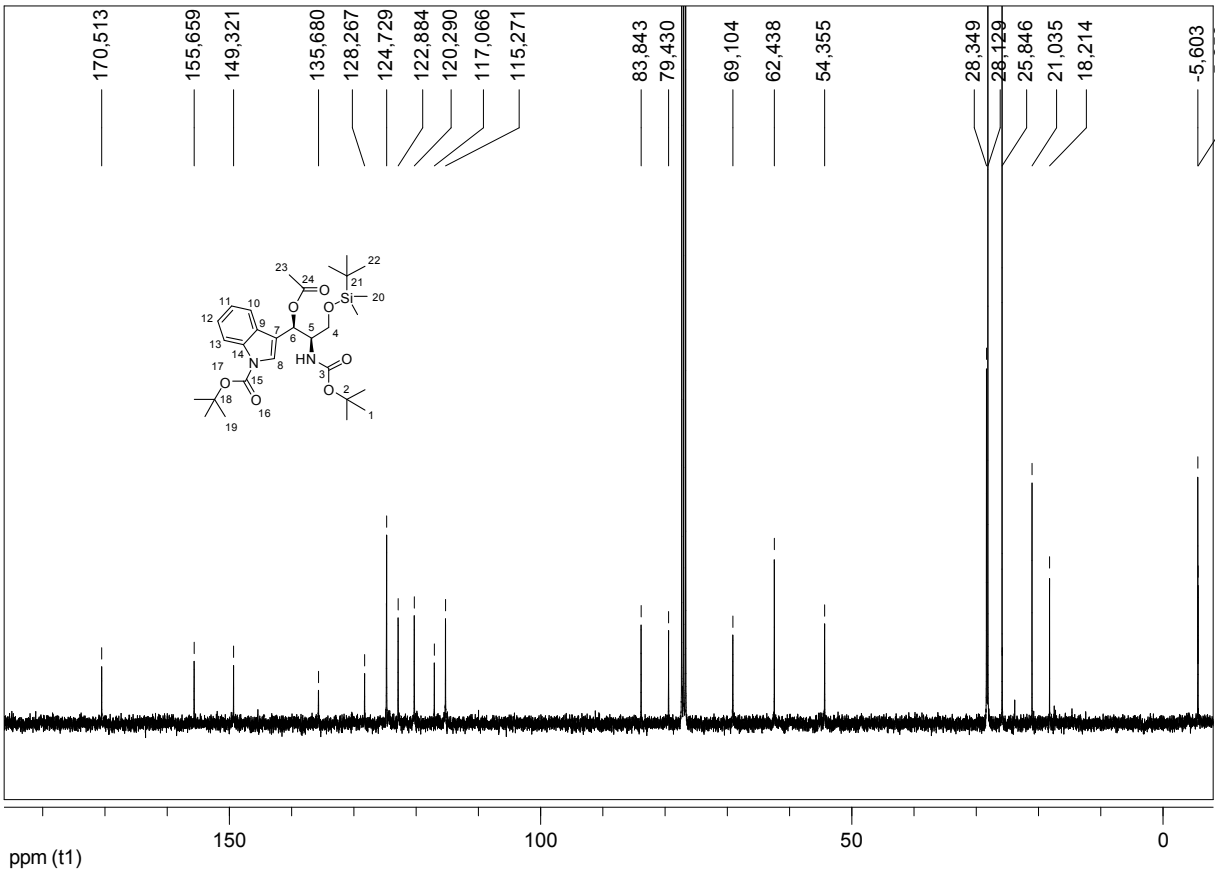
(2*R*,3*R*)-*N*,*N'*-(bis-Boc)-*1*-*O*-(*tert*-butyldimethylsilyl)-3-hydroxytryptophanol (27)



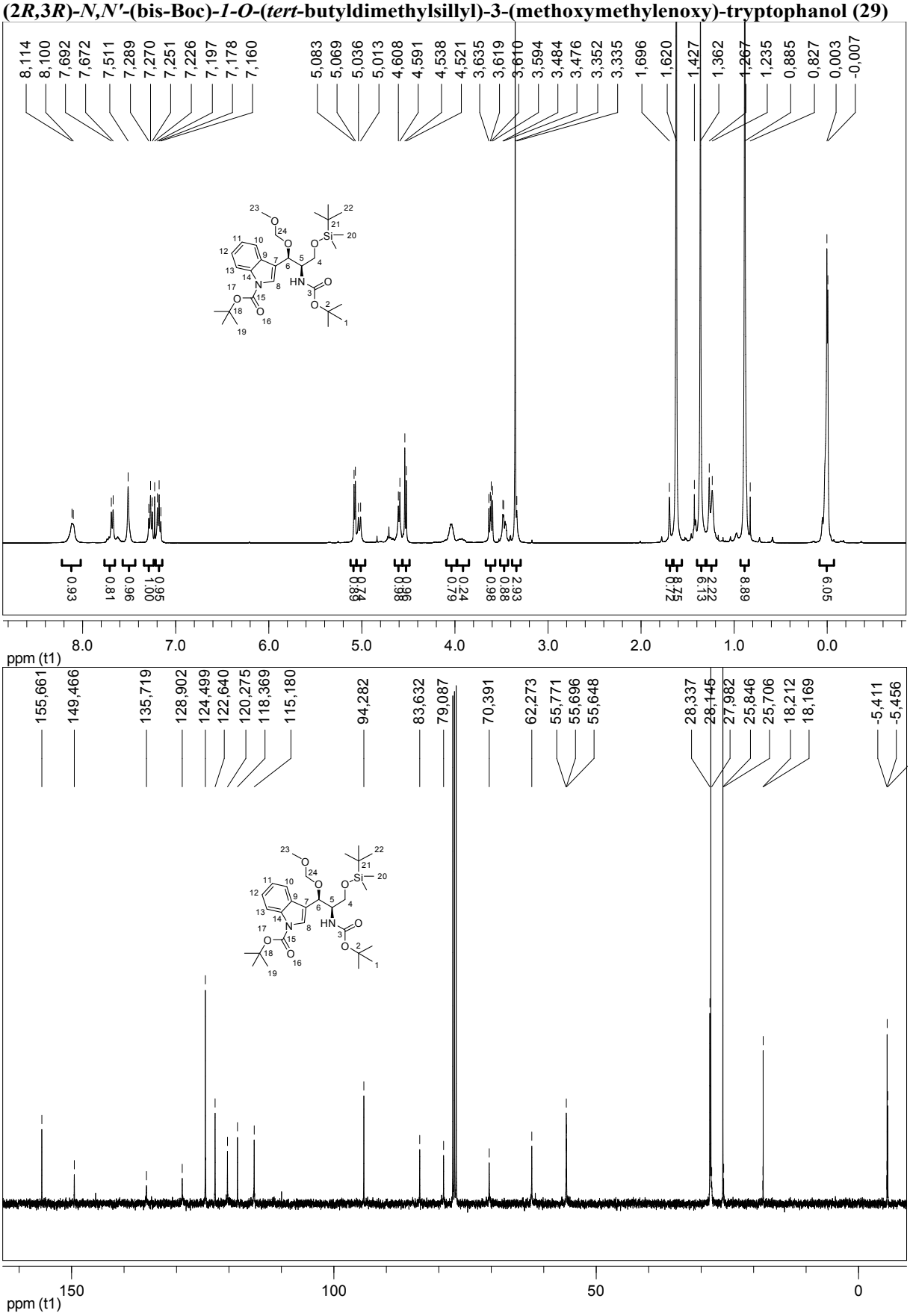


(2*R*,3*R*)-*N*,*N'*-(bis-Boc)-*1*-*O*-(*tert*-butyldimethylsilyl)-3-acetoxy-tryptophanol (28)

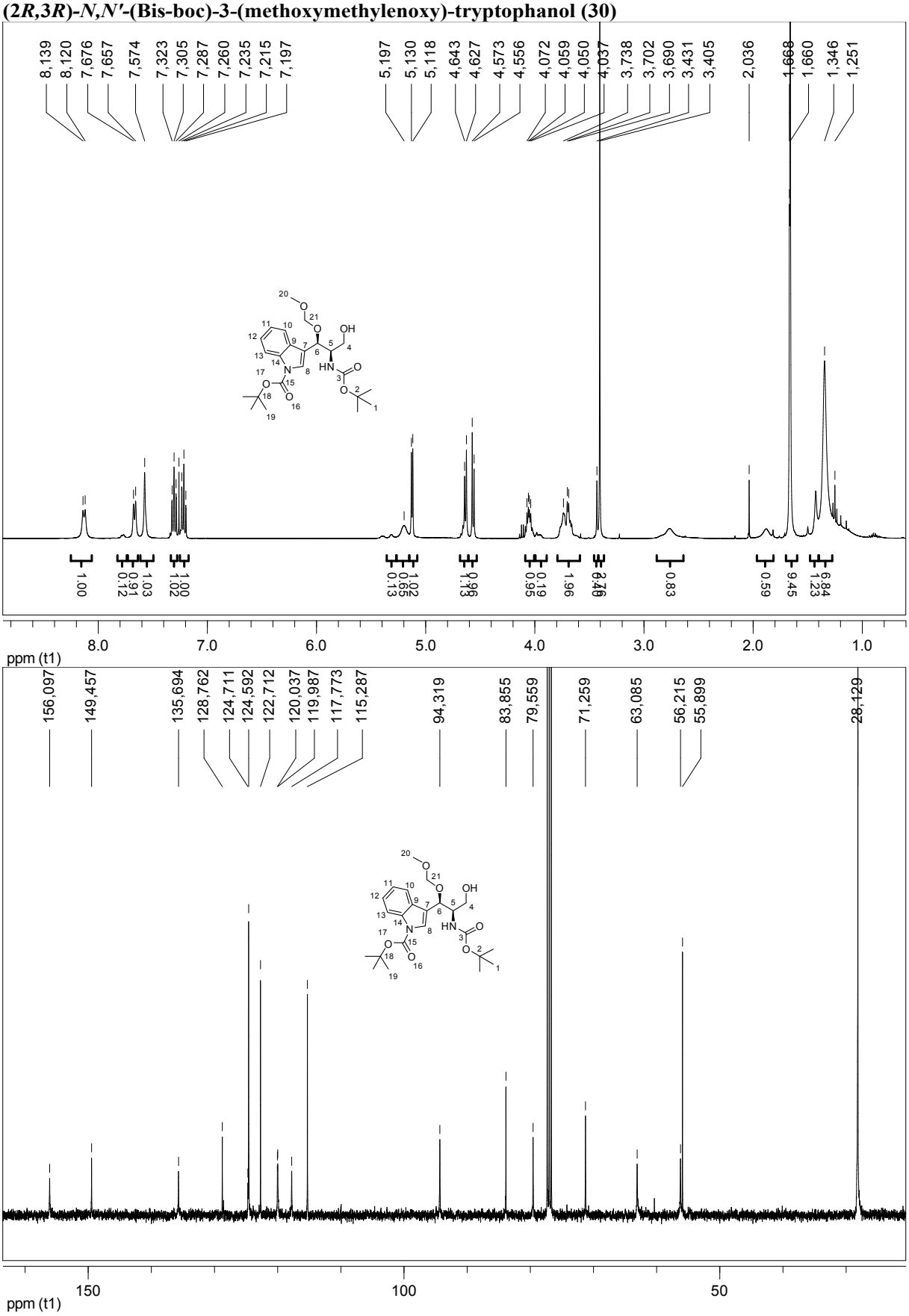




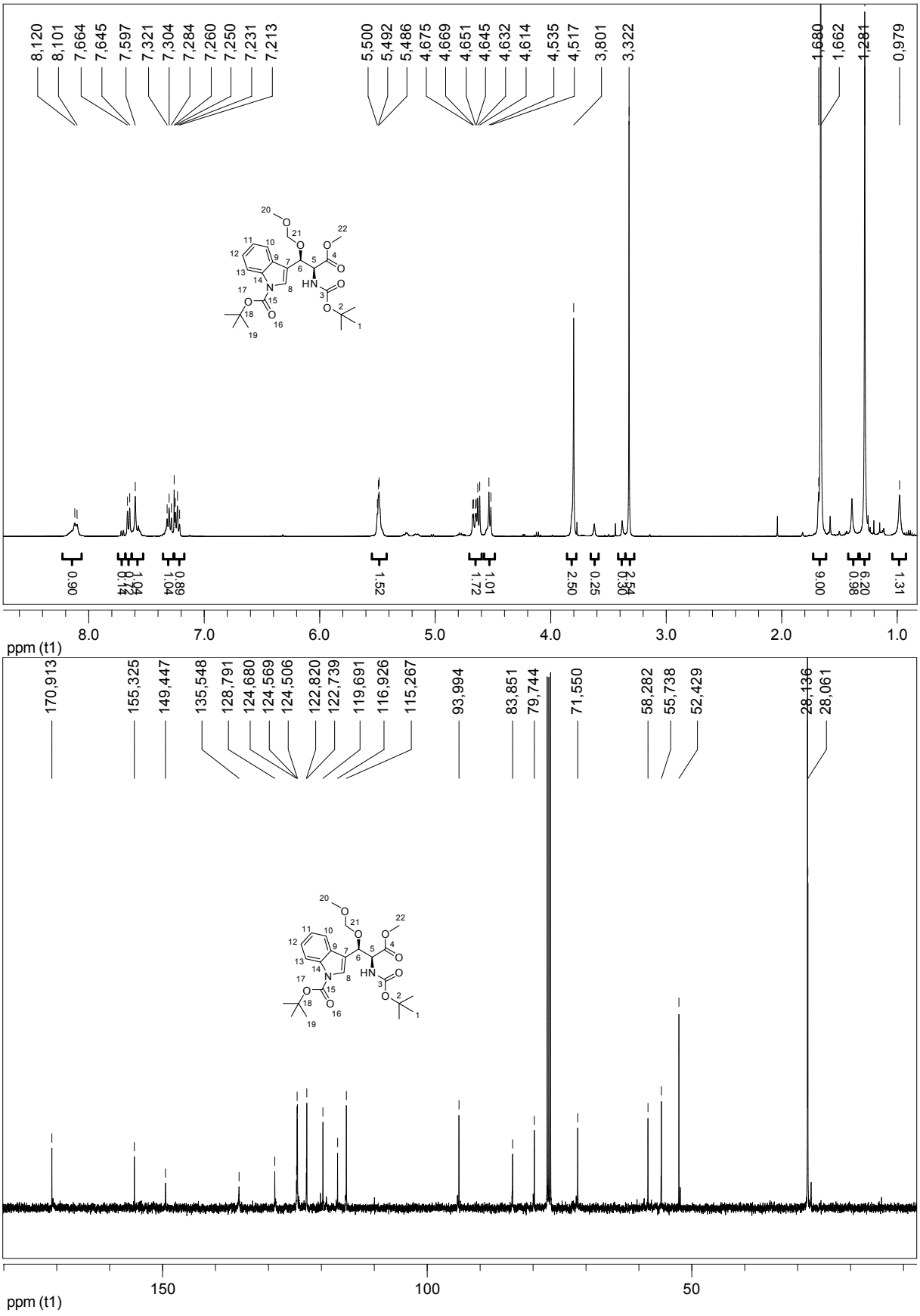
(2*R*,3*R*)-*N*,*N'*-(bis-Boc)-*1*-*O*-(*tert*-butyldimethylsillyl)-3-(methoxymethylenoxy)-tryptophanol (29)



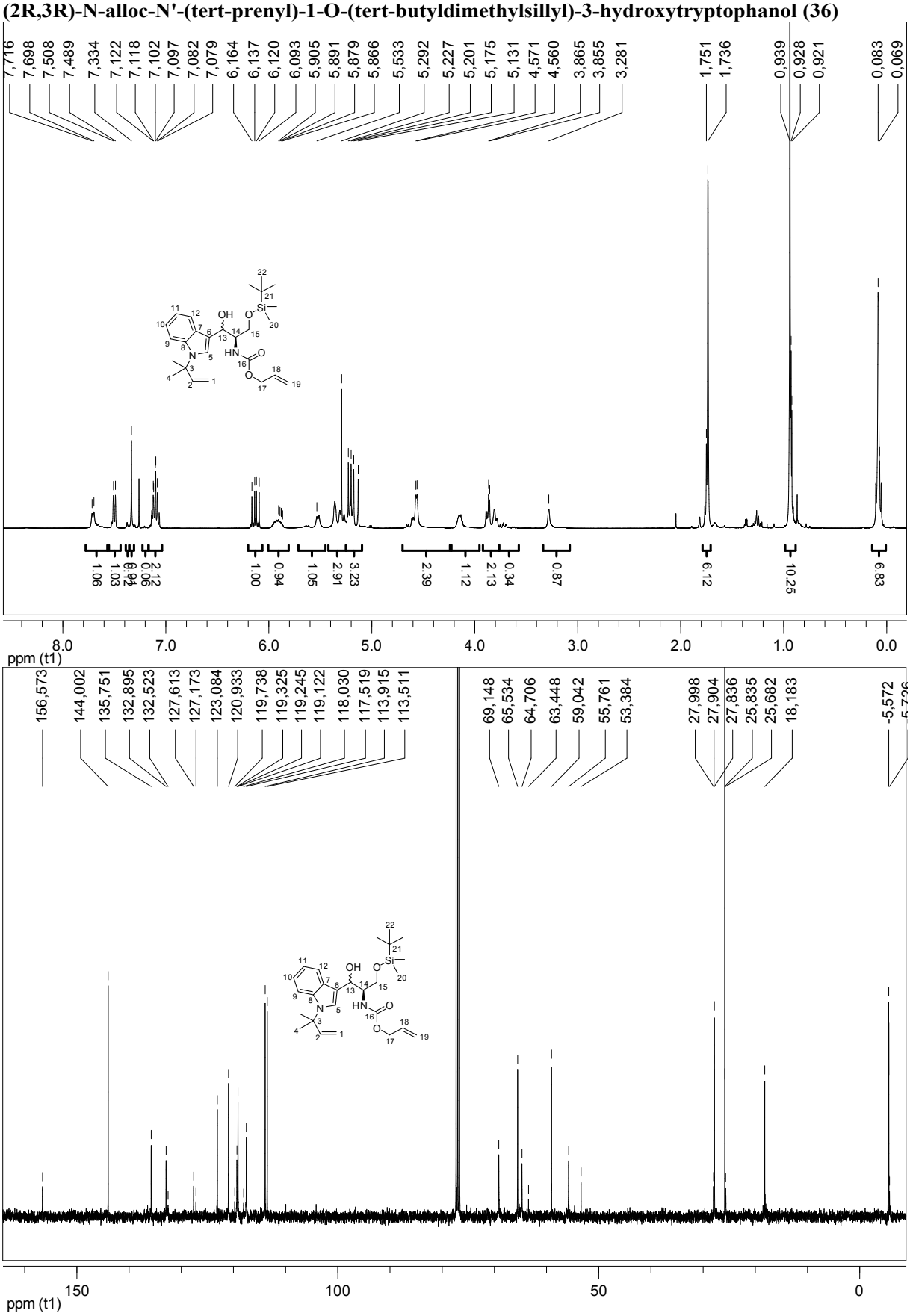
(2*R*,3*R*)-*N*,*N'*-(Bis-boc)-3-(methoxymethylenoxy)-tryptophanol (30)



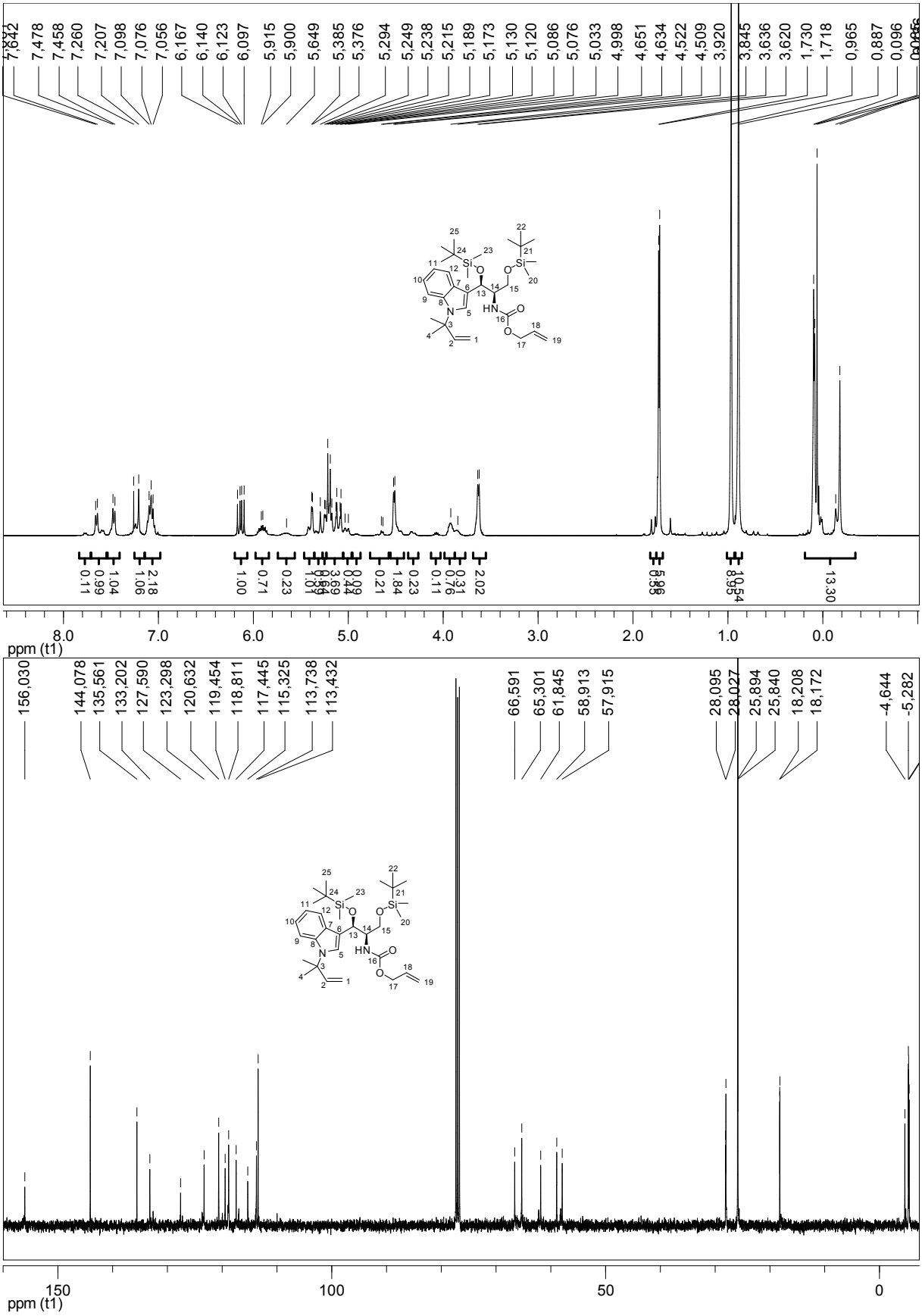
(2*S*,3*R*)-*N*,*N'*-(bis-Boc)-3-(methoxymethylenoxy)-tryptophan methyl ester (31)



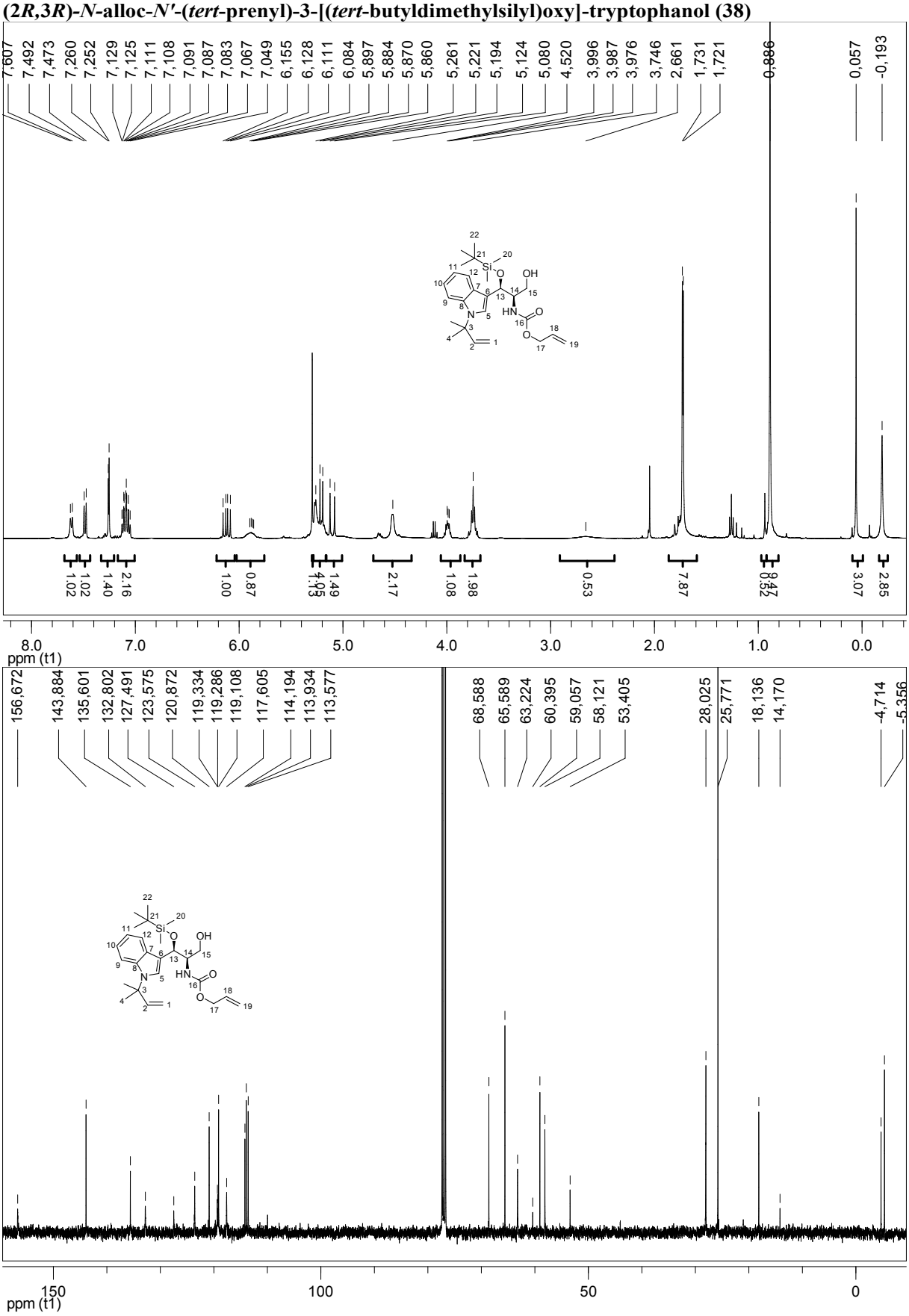
(2R,3R)-N-alloc-N'-(tert-prenyl)-1-O-(tert-butyldimethylsillyl)-3-hydroxytryptophanol (36)



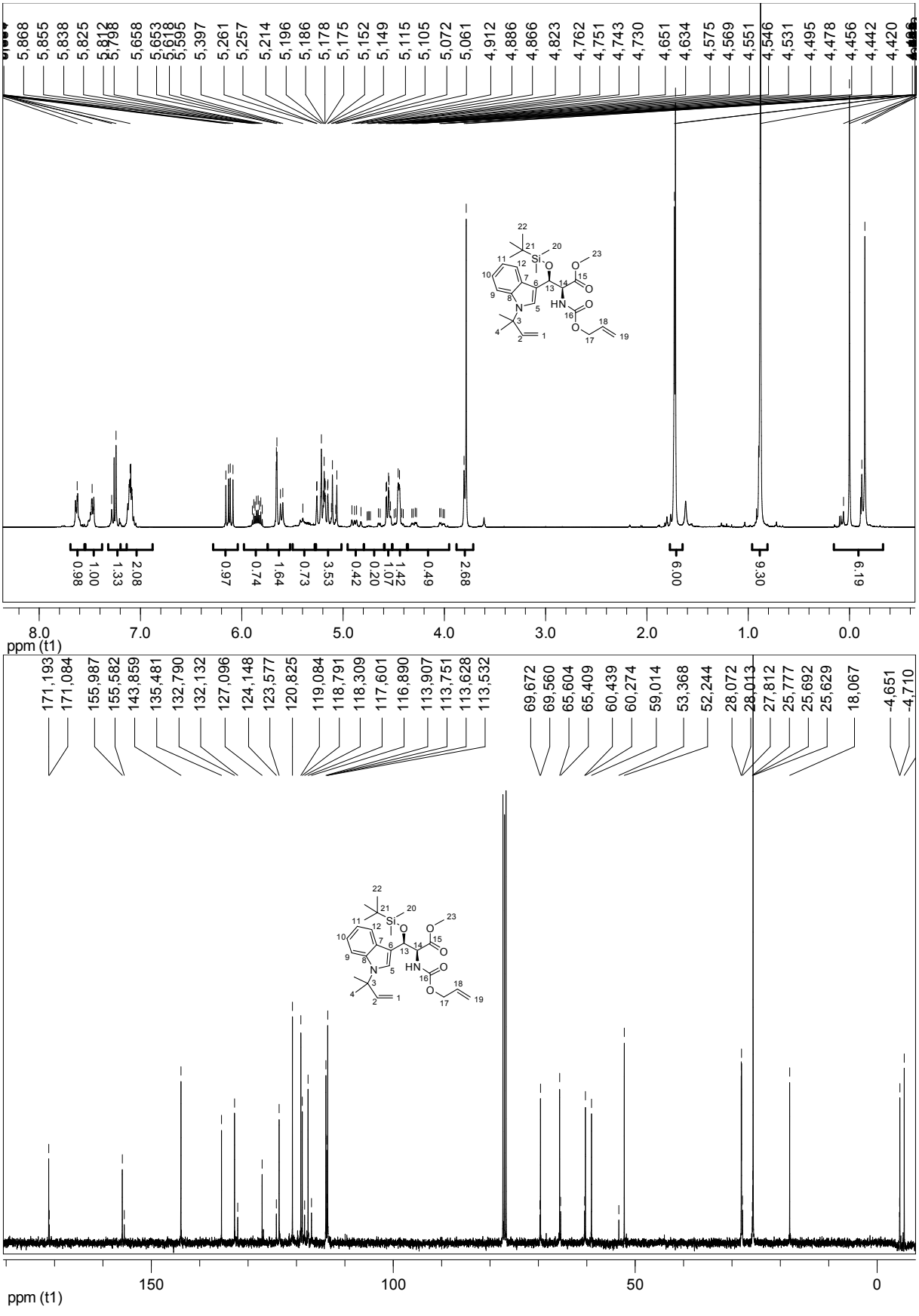
(2*R*,3*R*)-*N*-alloc-*N'*-(*tert*-prenyl)-*1*-*O*-(*tert*-butyldimethylsillyl)-3-[(*tert*-butyldimethylsilyl)oxy]-tryptophanol (37)



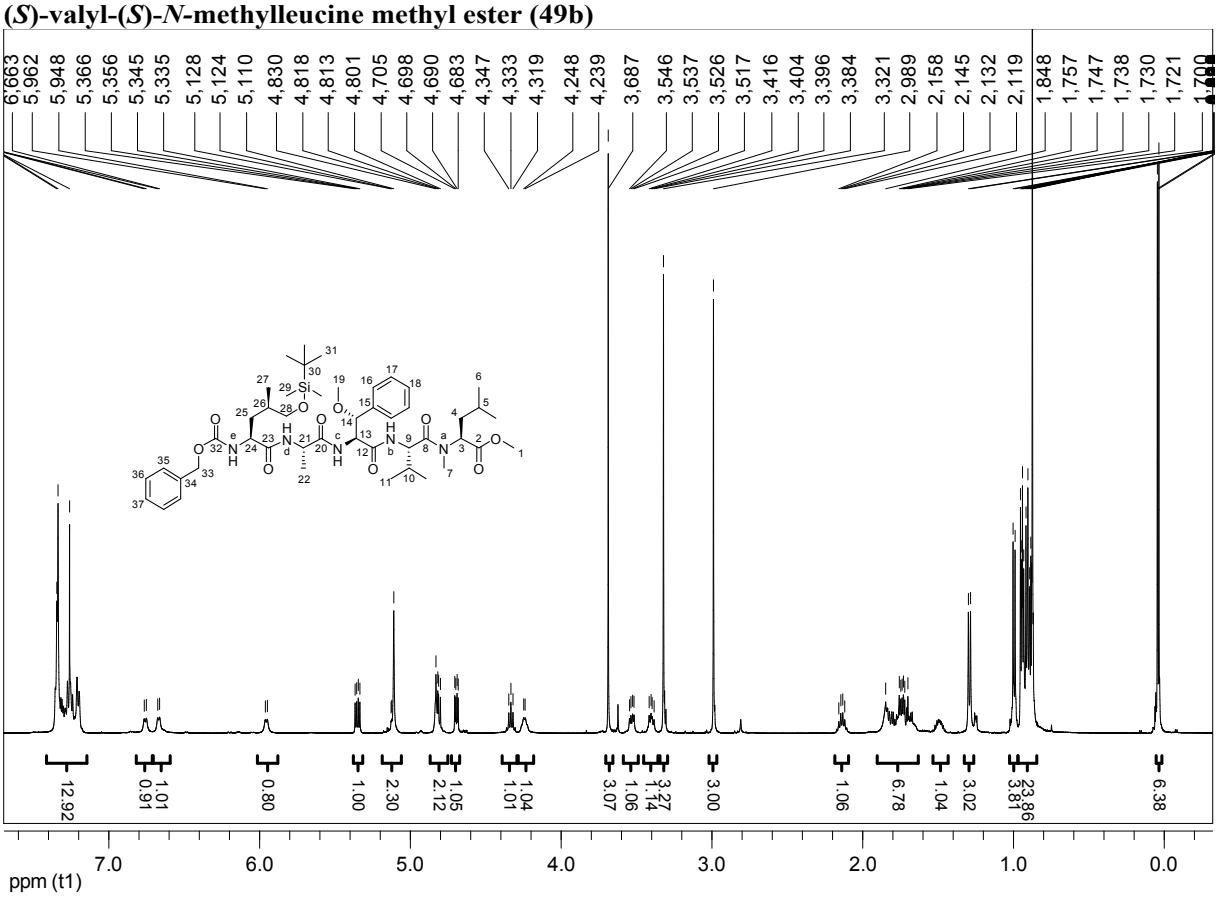
(2*R*,3*R*)-*N*-alloc-*N'*-(*tert*-prenyl)-3-[(*tert*-butyldimethylsilyl)oxy]-tryptophanol (38)

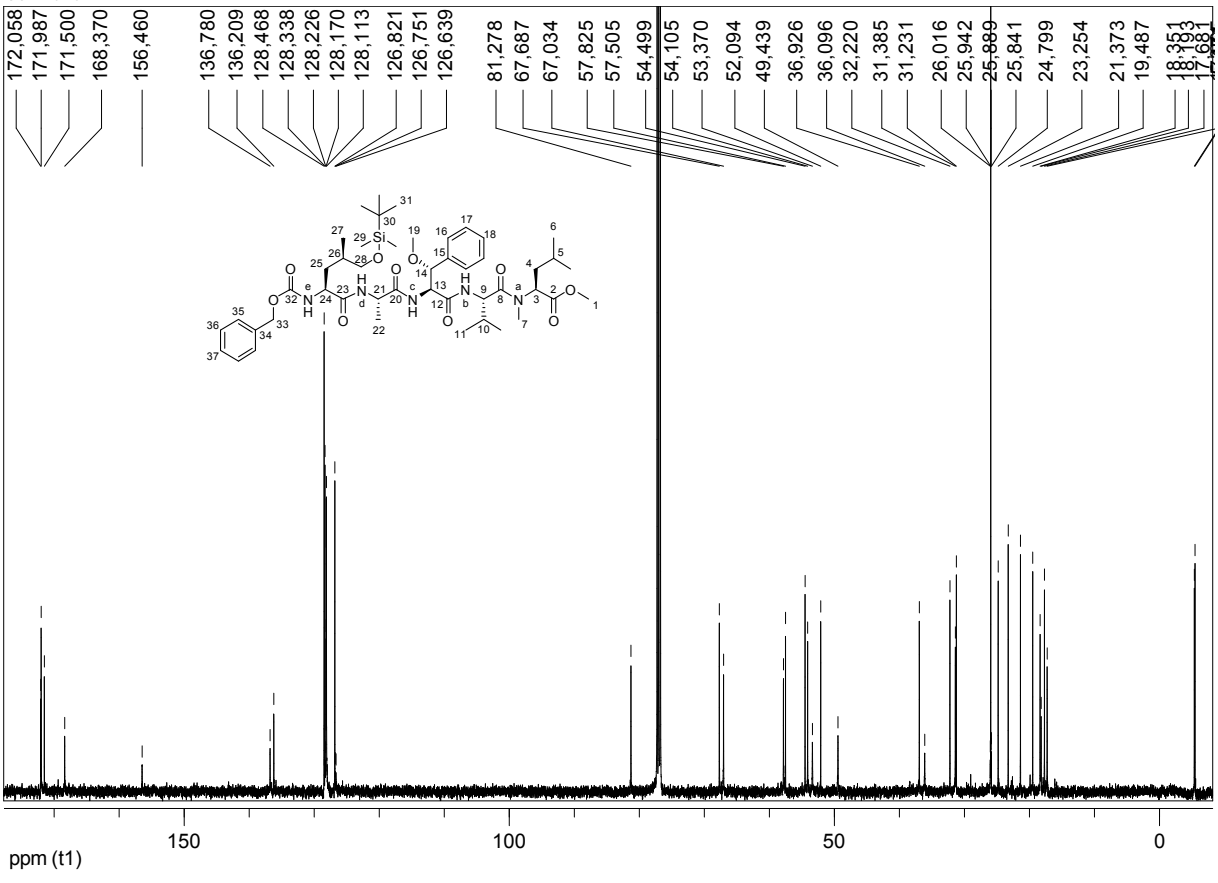


(2*S*,3*R*)-*N*-alloc-*N'*-(*tert*-prenyl)-3-[(*tert*-butyldimethylsilyl)oxy]-tryptophan methyl ester (39)

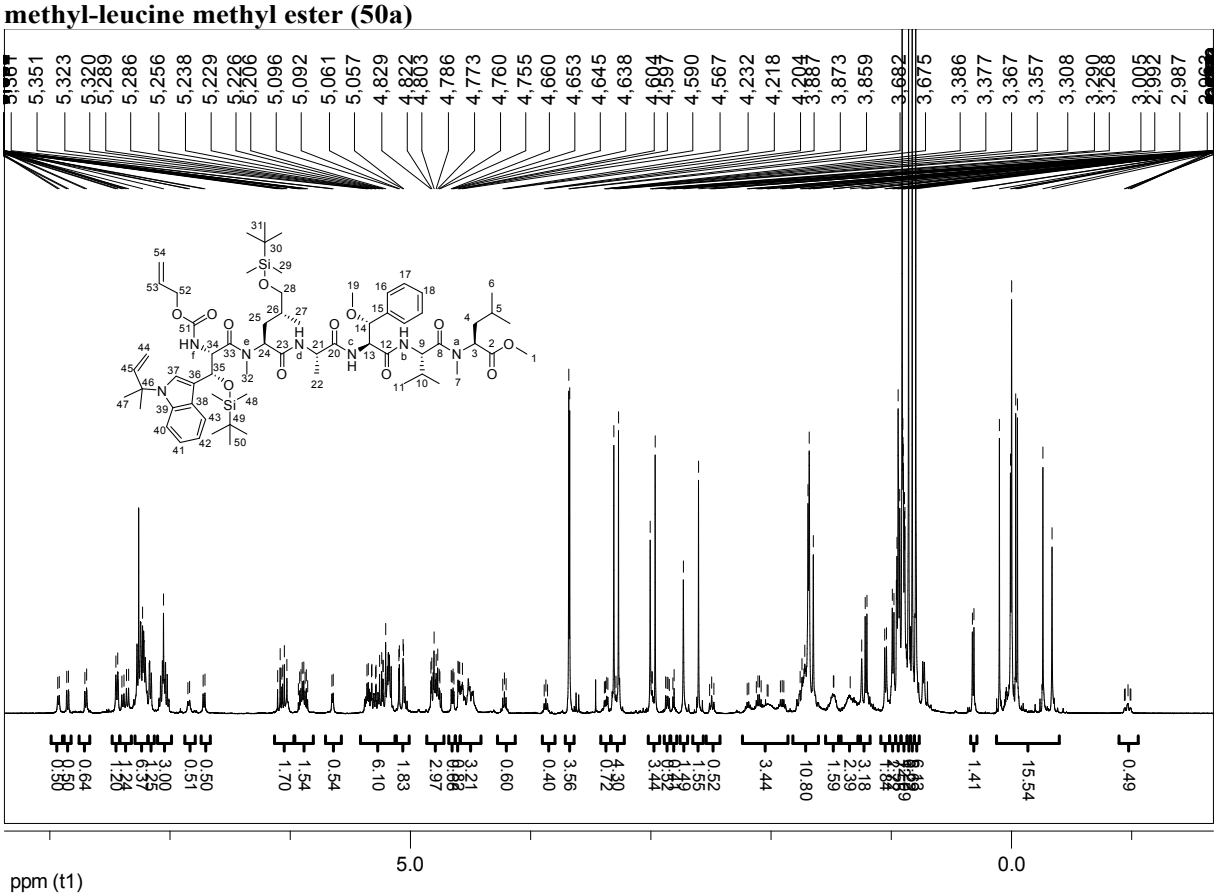


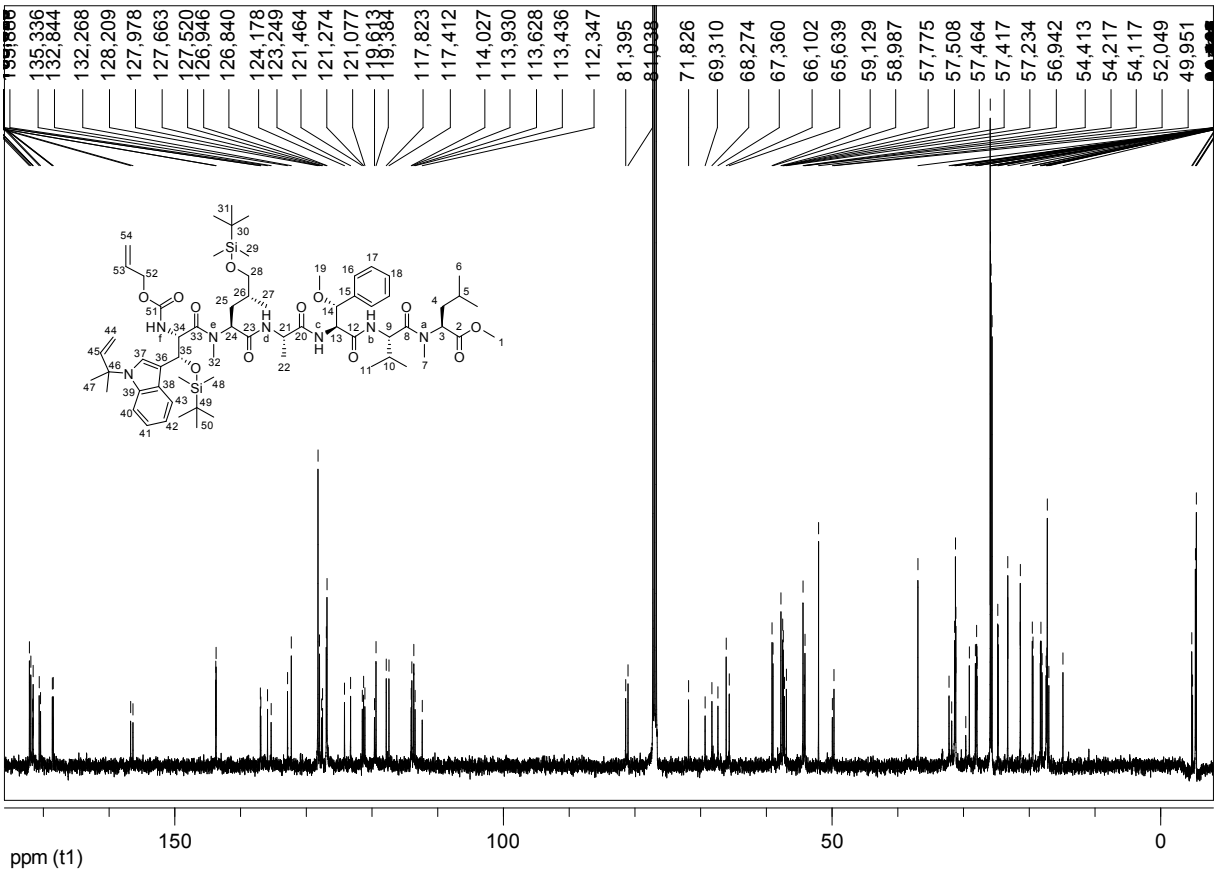
***N*-cbz-(2*S*,4*R*)-[5-(*tert*-butyldimethylsilyl)oxy-leucyl]-(*S*)-alanyl-(2*S*,3*R*)-(3-methoxyphenylalanyl)-(*S*)-valyl-(*S*)-*N*-methylleucine methyl ester (49b)**



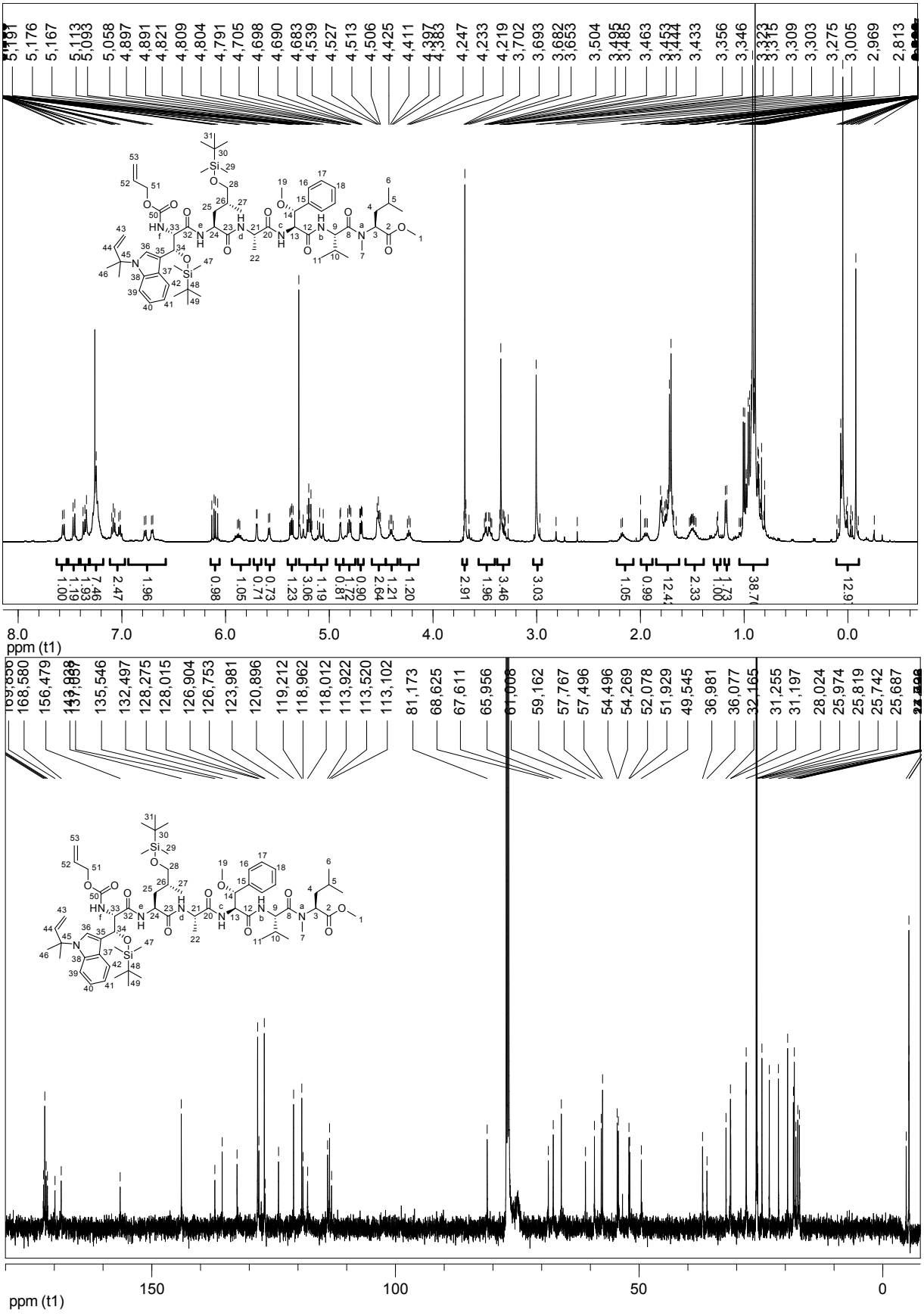


***N*-alloc-(2*S*,3*R*)-{*N*'-(*tert*-prenyl)-3-[(*tert*-butyldimethylsilyl)oxy]-tryptophanyl}-*N*-methyl-(2*S*,4*R*)-[5-(*tert*-butyldimethylsilyl)oxy-leucyl]-(*S*)-alanyl-(2*S*,3*R*)-(3-methoxyphenylalanyl)-(*S*)-valyl-(*S*)-*N*-methyl-leucine methyl ester (50a)**

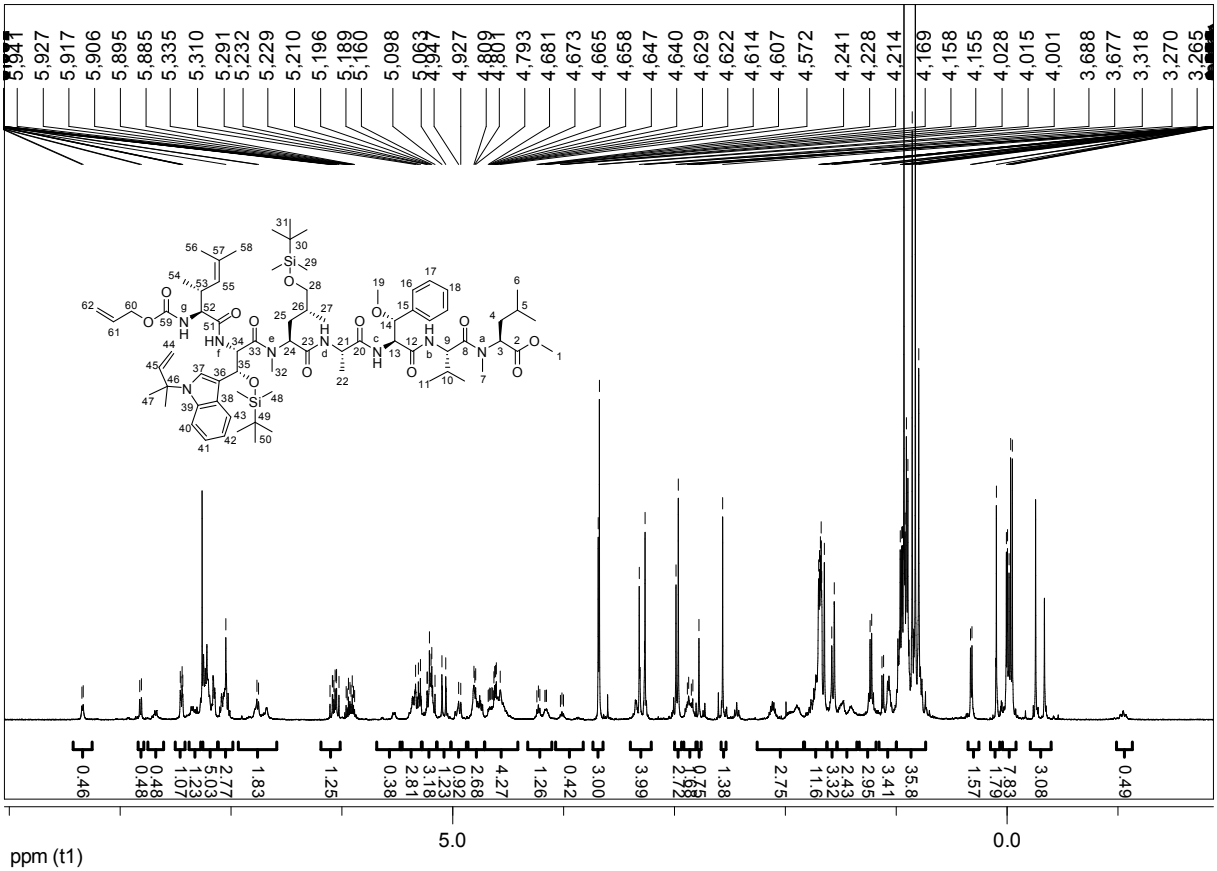


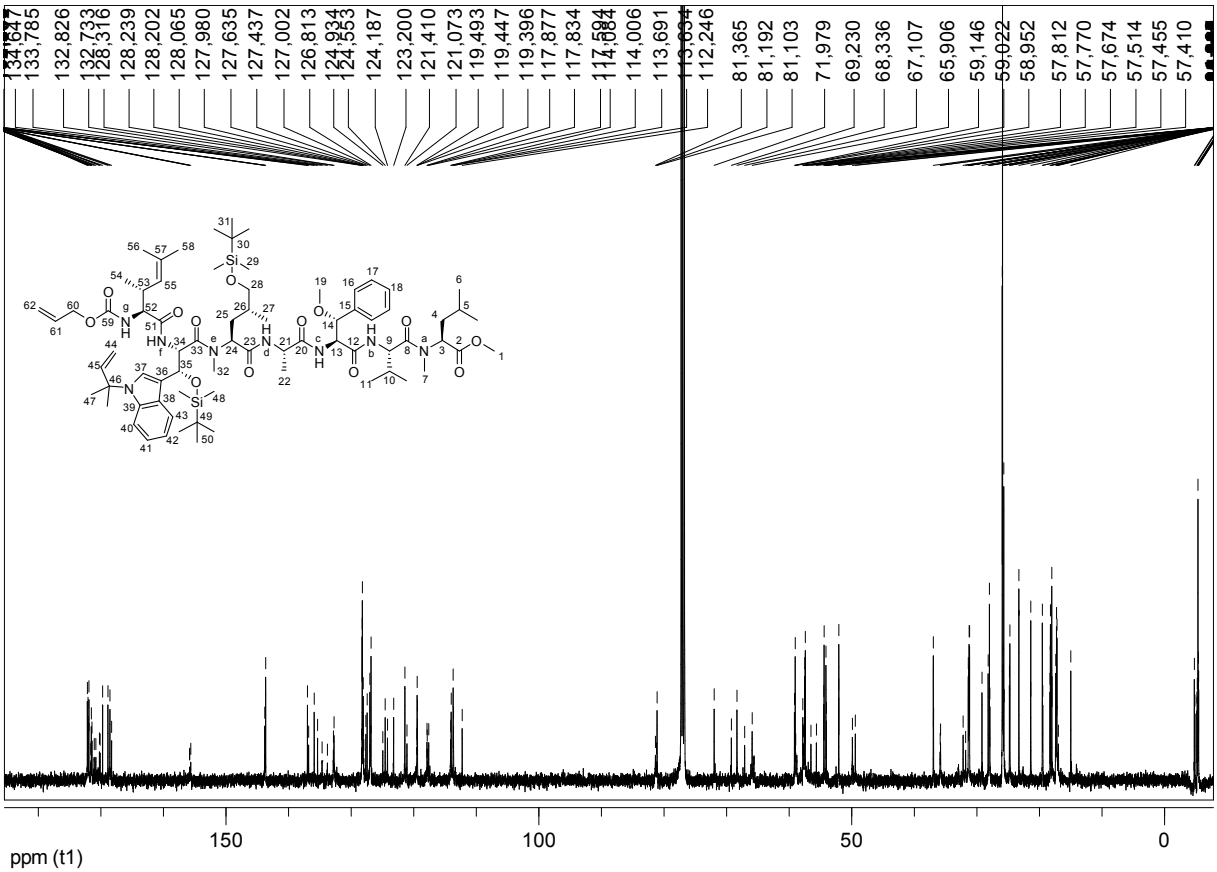


N-Alloc-(2S,3R)-{N'-(tert-prenyl)-3-[(tert-butyldimethylsilyl)oxy]-tryptophanyl}-(2S,4R)-[5-(tert-butyldimethylsilyl)oxy-leucyl]-(S)-alanyl-(2S,3R)-(3-methoxyphenylalanyl)-(S)-valyl-(S)-N-methyl-leucine methyl ester (50b)

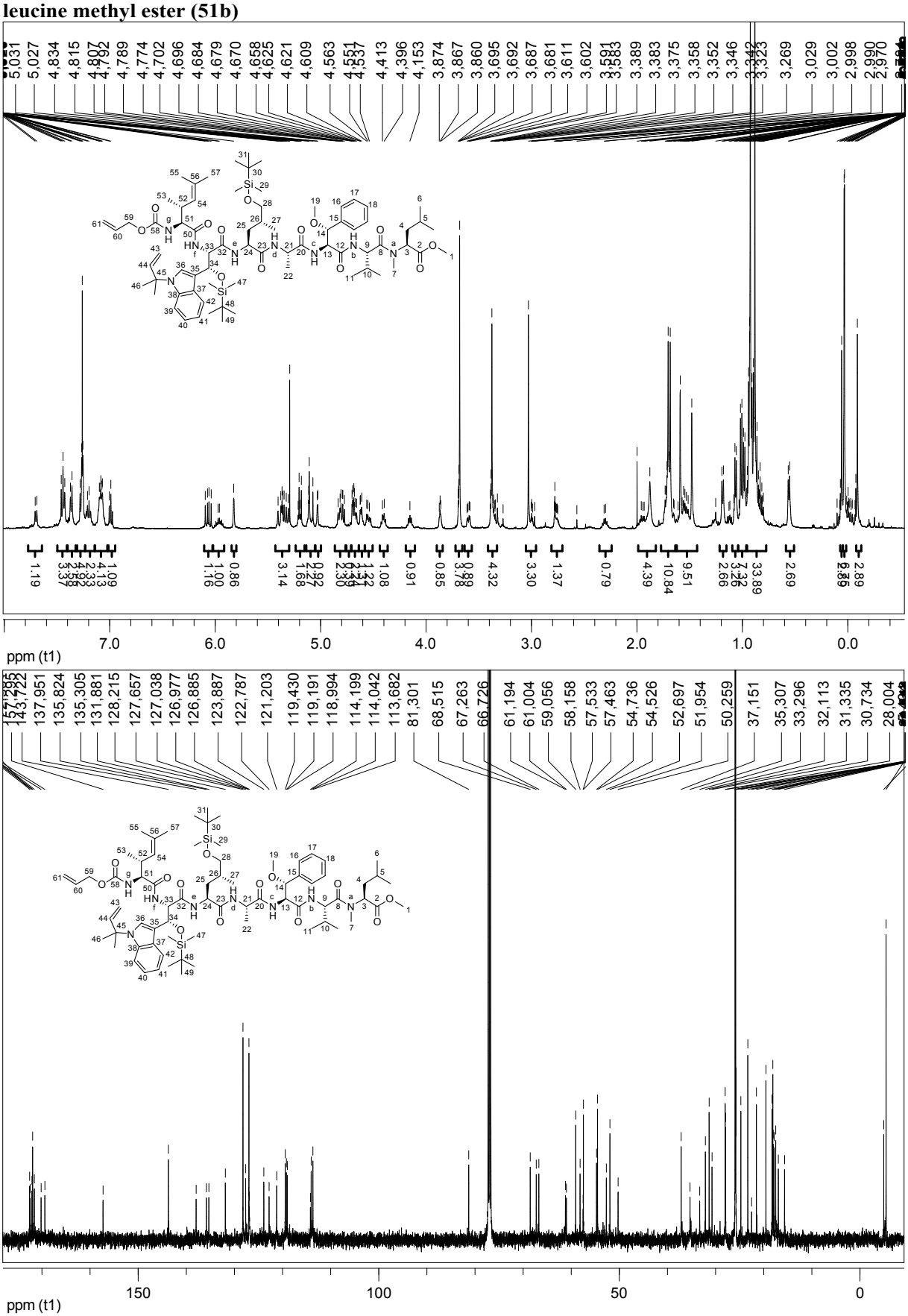


***N*-Alloc-(2*S*,3*R*)-(2-amino-3,5-dimethylhex-4-enoyl)- (2*S*,3*R*)-(2-amino-3,5-dimethylhex-4-enoyl)-(2*S*,3*R*)-{*N*'-(*tert*-prenyl)-3-[(*tert*-butyldimethylsilyl)oxy]-tryptophanyl}- *N*-methyl-(2*S*,4*R*)-[5-(*tert*-butyldimethylsilyl)oxy-leucyl]-(*S*)-alanyl-(2*S*,3*R*)-(3-methoxyphenylalanyl)-(*S*)-valyl-(*S*)-*N*-methyl-leucine methyl ester (51a)**

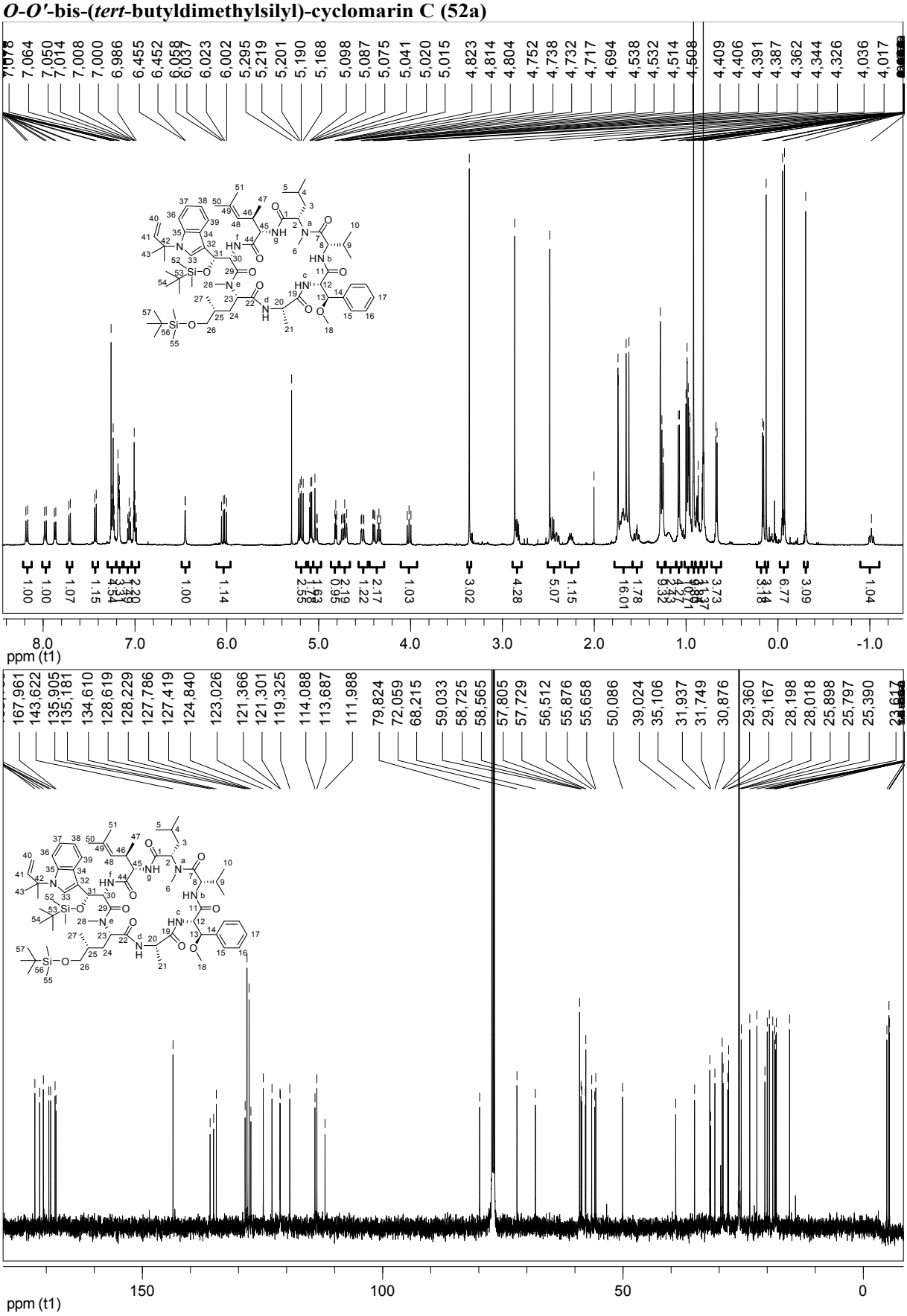




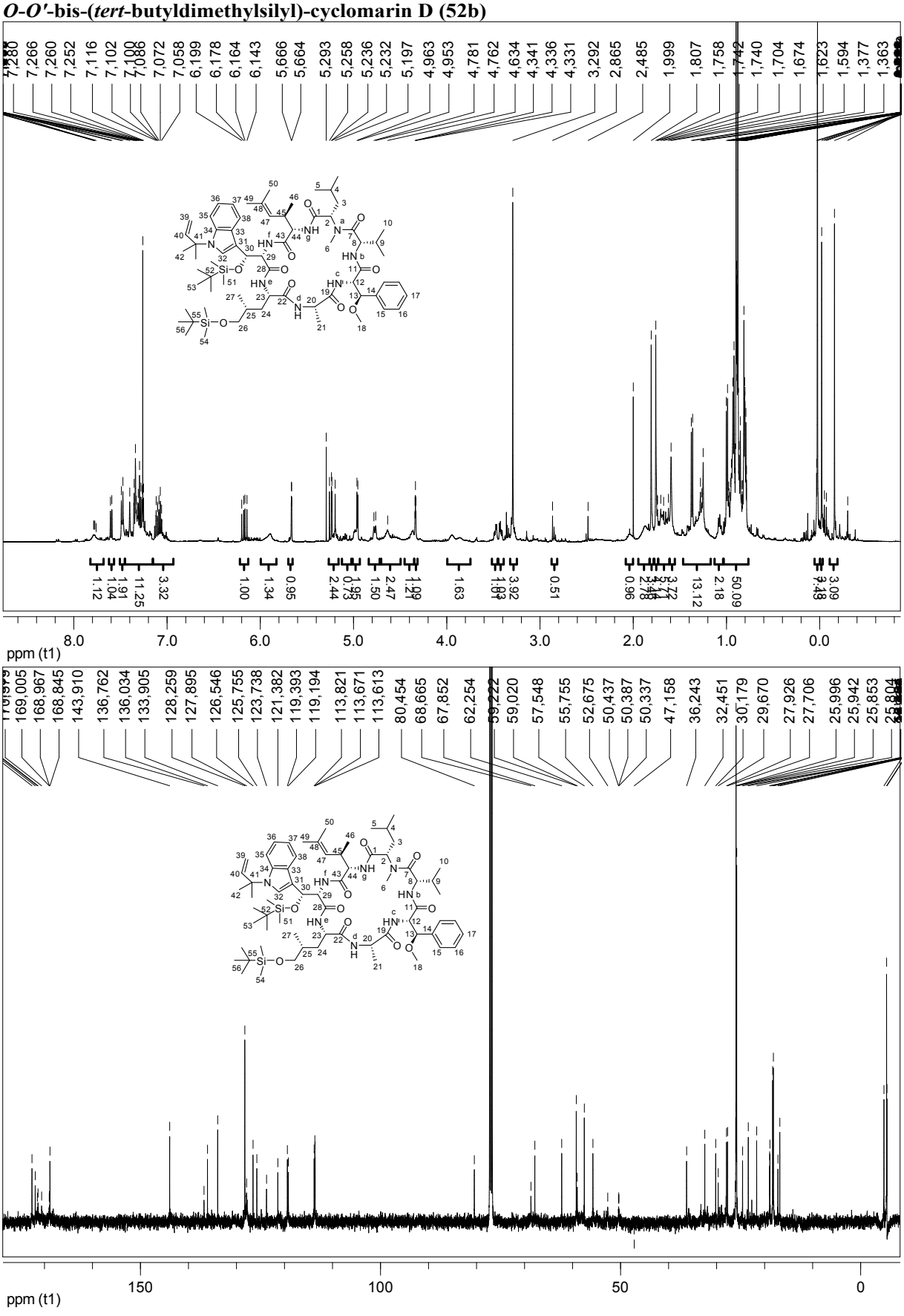
***N*-alloc-(2*S*,3*R*)-(2-amino-3,5-dimethylhex-4-enoyl)- (2*S*,3*R*)-(2-amino-3,5-dimethylhex-4-enoyl)-(2*S*,3*R*)-{*N*'-(*tert*-prenyl)-3-[(*tert*-butyldimethylsilyl)oxy]-tryptophanyl}-(2*S*,4*R*)-[5-(*tert*-butyldimethylsilyl)oxy-leucyl]-(*S*)-alanyl-(2*S*,3*R*)-(3-methoxyphenylalanyl)-(*S*)-valyl-(*S*)-*N*-methyl-leucine methyl ester (51b)**



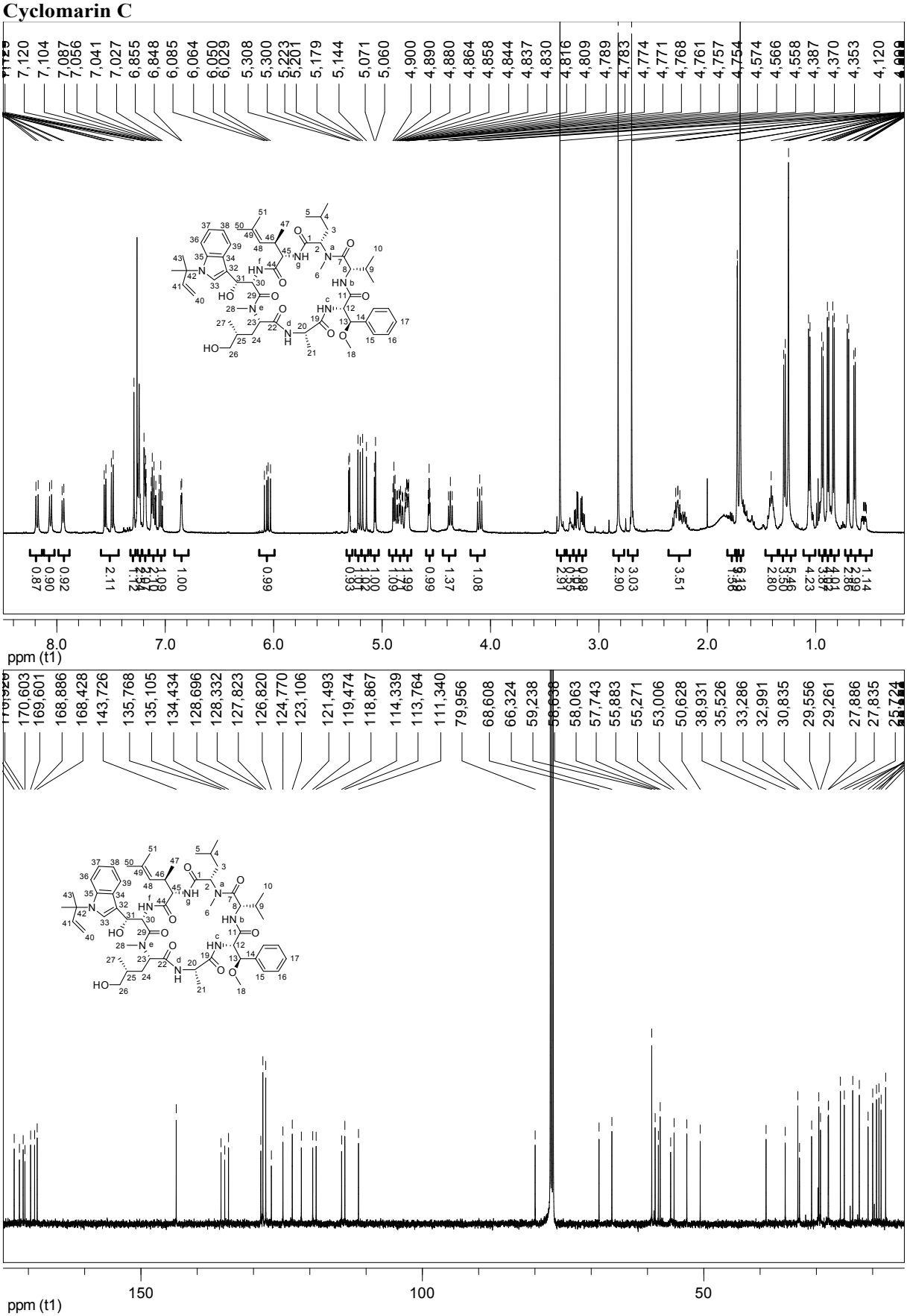
***O*-*O'*-bis-(*tert*-butyldimethylsilyl)-cyclomarin C (52a)**



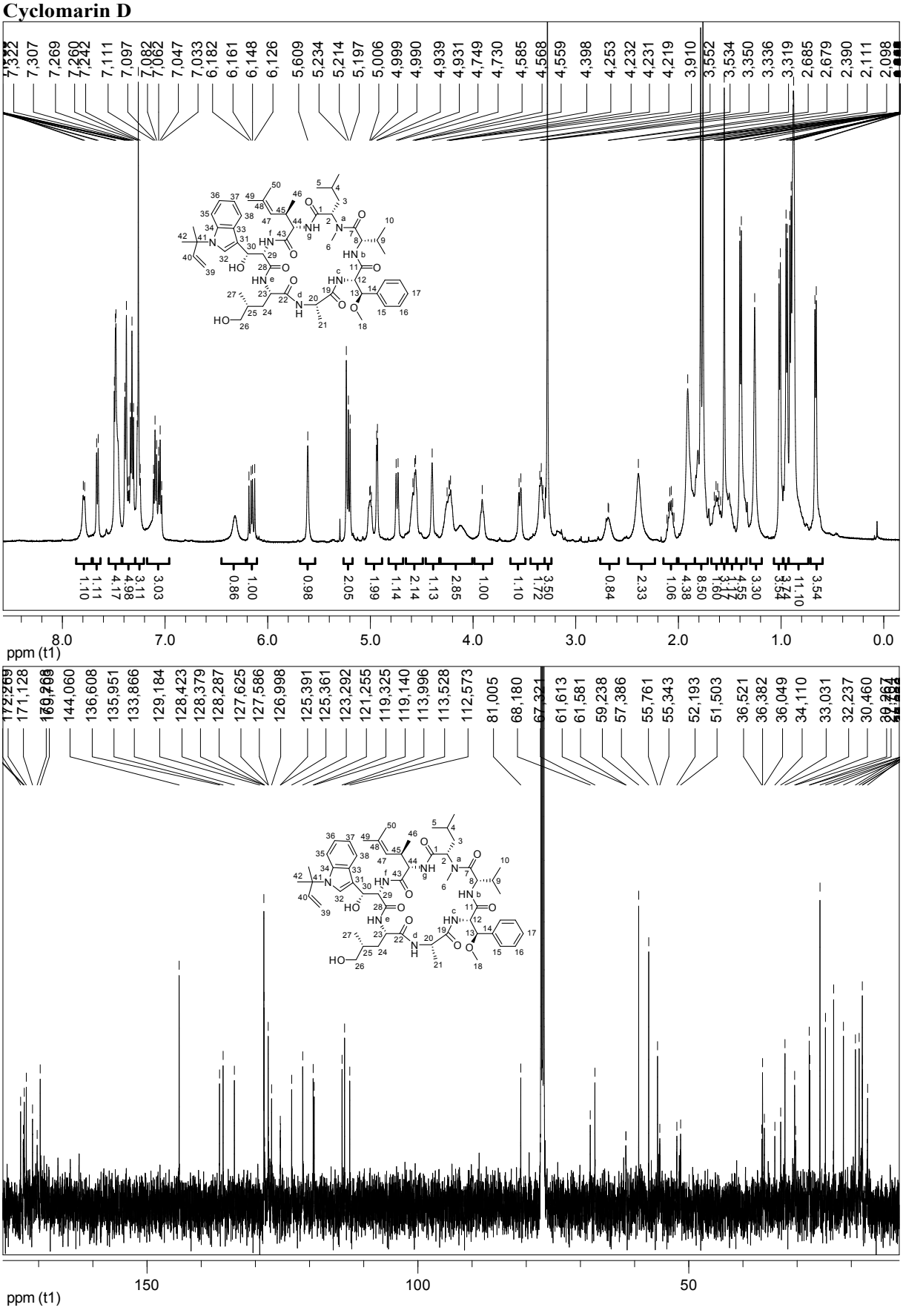
***O*-*O'*-bis-(*tert*-butyldimethylsilyl)-cyclomarin D (52b)**



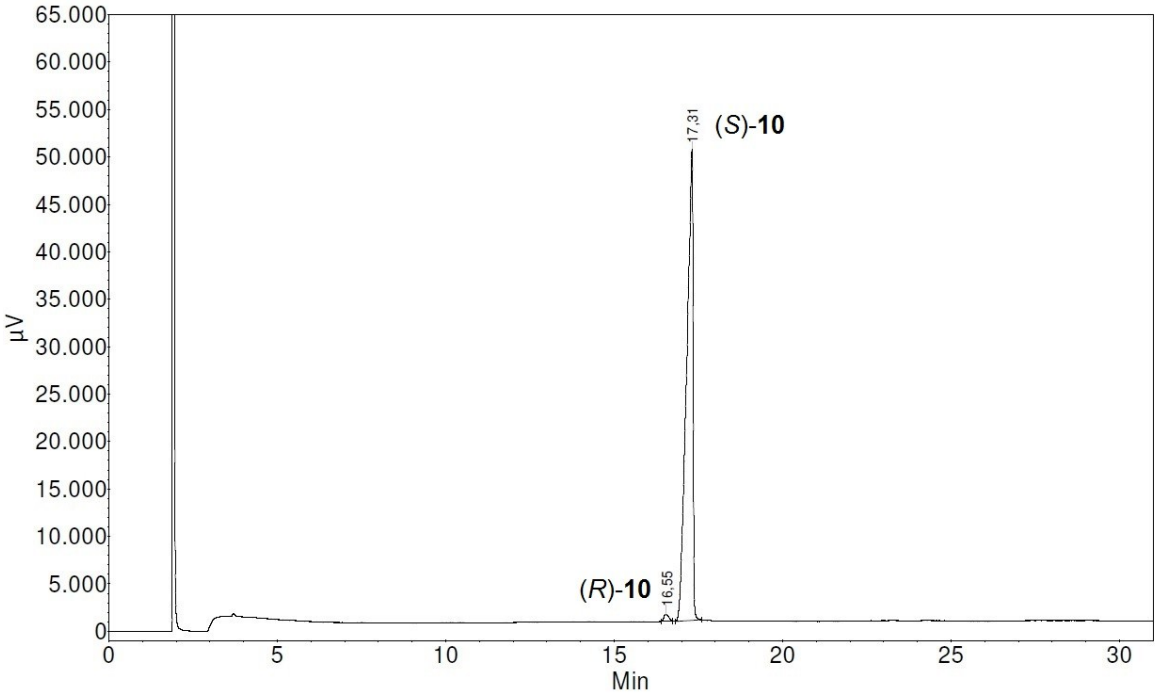
Cyclomarin C



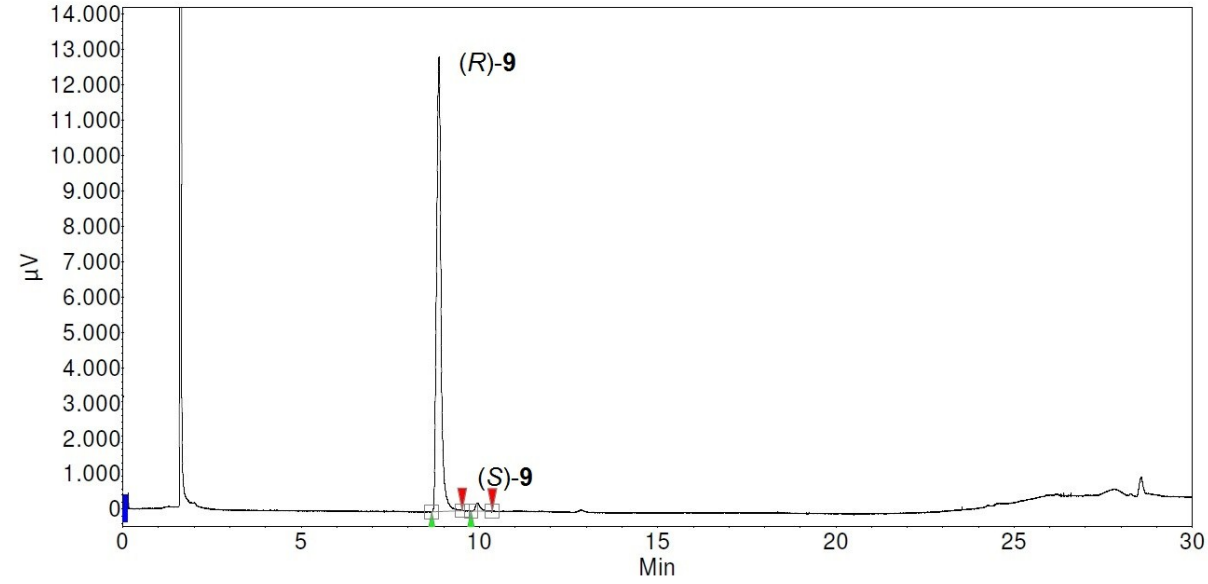
Cyclomarin D



Copies of selected GC-data

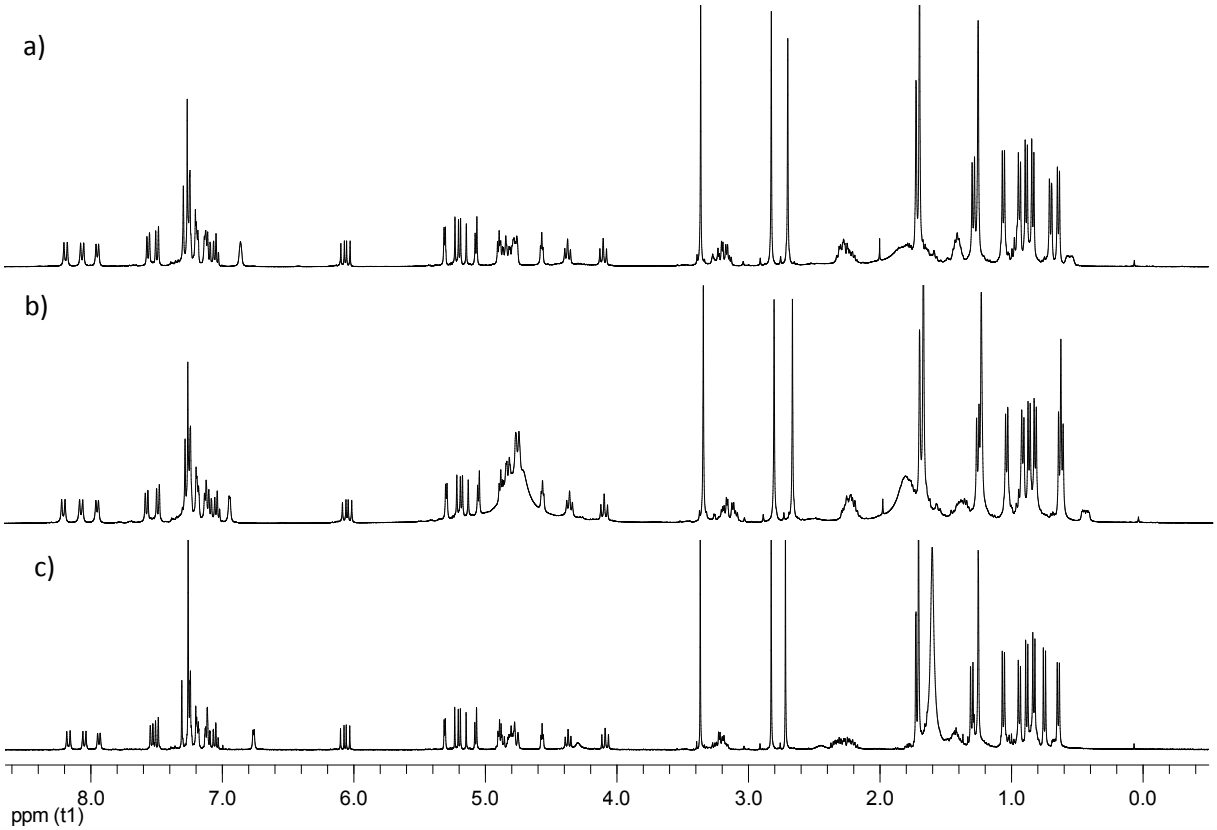


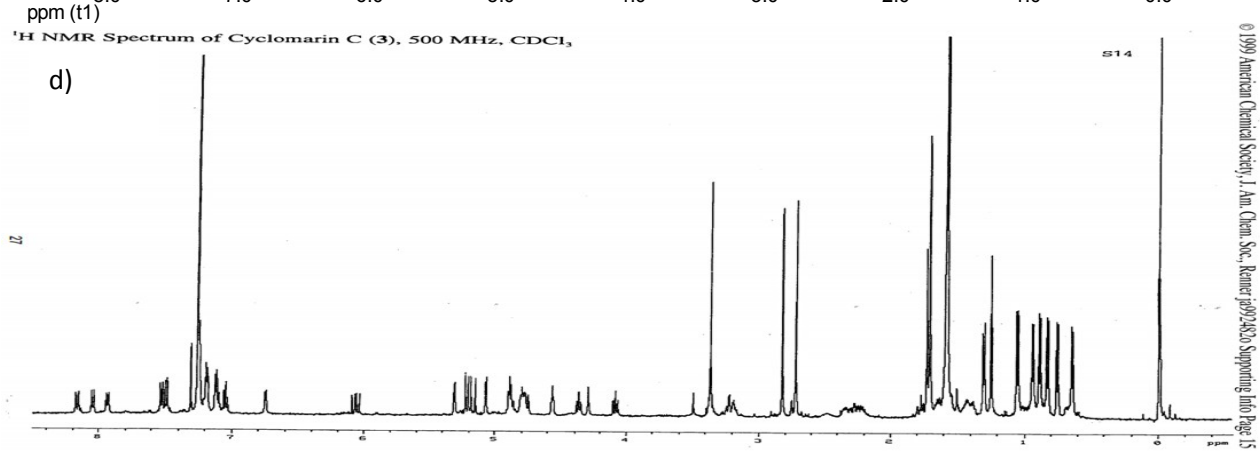
Chirasil-Dex-CB, T_0 [0 min] = 105 °C, 1.0 °C/min to 150 °C, 20.0 °C/min to 180 °C, injector 250 °C, detector: 275 °C:



Chirasil-Dex-CB, T_0 [20 min] = 120 °C, 20.0 °C/min to 180 °C, 180 °C for 5 min, injector 250 °C, detector: 275 °C:

NMR-Comparison (Cyclomarin C) with reported spectra





a) ^{1}H-NMR of synthetic cyclomarin C (16 mg) water-free,

b) ^{1}H-NMR of synthetic cyclomarin C (16 mg) with water (5 µL),

c) ^{1}H-NMR of synthetic cyclomarin C [solution from b), diluted with $CDCl_3$ 1:5],

d) ^{1}H-NMR of isolated cyclomarin C taken from: *J. Am. Chem. Soc.* **1999**, *121*, 11273–11276, supp. info.