Supporting Information

***Org. Commun*. 10:3 (2017) 144-177**

Synthesis and NMR characterization of dendrimers based on 2, 2-*bis*-(hydroxymethyl)-propanoic acid (*bis*-HMPA) containing peripheral amino acid residues for gene transfection

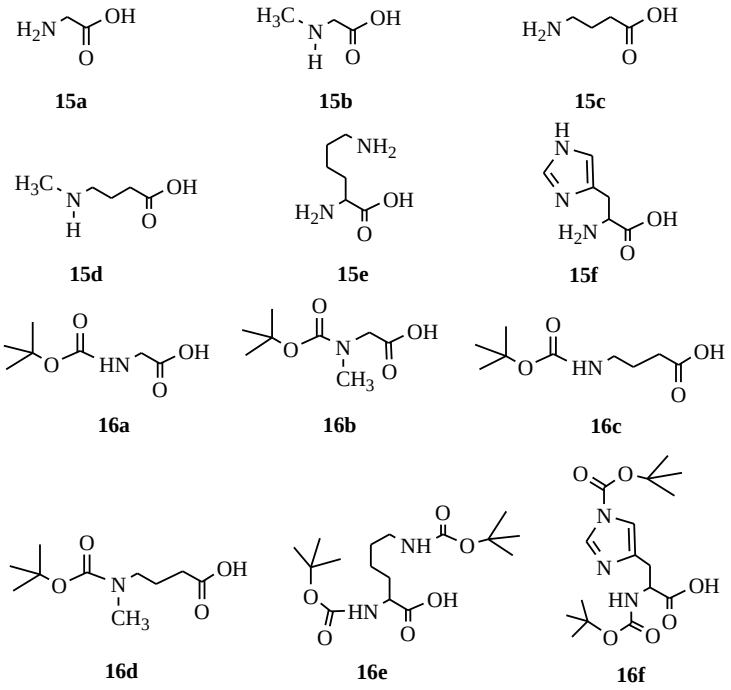
Silvana Alfei[1*], Sara Castellaro[1] and Gaby Brice Taptue[1]

[1]*Dipartimento di Farmacia (DIFAR), Università di Genova, Viale Cembrano,4 16148, Genova, Italia*

Table of content **Page**

[*] Corresponding author: E-mail: **alfei@difar.unige.it**Tel :+390103532296 Fax: +390103532684

Synthesis of *N*-BOC-amino acids 16a-f



*General Procedure for protecting Amino Acids **15a-f**:*

A solution of the amino acid and base in the proper solvent system was cooled to 0 °C and treated with di-*tert*-butylcarbonate (1.1 equiv./amino group). The mixture was left overnight at r.t. under magnetic stirring. The disappearance of amino acid was checked by TLC using EtOAc containing a spatula tip of ninhydrin as the eluent. The mixture was concentrated at reduced pressure to half the volume, extracted with hexane to remove unreacted di-*tert*-butylcarbonate and the organic phase was washed with satd. aq. $NaHCO_3$. The combined aqueous phases were cooled to 0 °C and acidified with 10% aq. $KHSO_4$ to pH = 2, extracted with Et_2O (**16a**) or EtOAc (**16b-f**) and dried (Na_2SO_4). The removal of the solvents at reduced pressure afforded the desired amino acid. Table 1 collects data for the preparation of protected amino acids **16a-f**.

Table 1. Preparation of BOC-protected amino acids **16a-f**

Amino acid (g; mmol)	**Solvent** v/v (mL)	**Base** (mmol)	***N*-BOC** Amino acid	**Yield** %
15a (1.00; 13.2)	*t*-BuOH (10)	NaOH 1N (14.5)	**16a**	84
15b (1.00; 11.2)	H_2O (100)	Et_3N (33.6)	**16b**	94
15c (1.00; 9.7)	Dioxane/H_2O 2/1 (30)	NaOH 1N (9.7)	**16c**	94
15d (2.00; 13.1)	Dioxane/H_2O 1/1 (18)	NaOH(s) (26.2)	**16d**	94
15e (2.00; 13.7)	Dioxane/H_2O 1/1 (40)	NaOH 1N (13.7)	**16e**	93
15f (1.00; 6.4)	DMF/H_2O 1/1.3 (5.9)	Et_3N (24.4)	**16f**	67

*N-BOC-Glycine (**16a**):*White crystalline powder, mixture of rotamers, m. p.: 88-90 °C (Lit.[1]: 87-88 °C). FTIR (KBr, cm^{-1}): 3500-2400 (OH), 3410 (NH), 1749 (C=O acid + urethane), 1535 (NH). ^{1}H NMR of rotamer A (minor) ($CDCl_3$, 300 MHz): δ = 1.46 [s, 9H, C(C*H*$_3$)$_3$], 3.91 (br d, 2H, C*H*$_2$COOH), 6.83 (br s, 1H, N*H*), 10.24 (br s, 1H, COO*H*). ^{13}C NMR of rotamer A (minor) ($CDCl_3$, 75.5 MHz): δ = 28.28 [C(*C*H$_3$)$_3$], 43.40 (N*C*H$_3$), 81.83 [*C*(CH$_3$)$_3$], 157.29 (*C*=O urethane), 174.04 (*C*=O acid). ^{1}H NMR of rotamer B (major) ($CDCl_3$, 300 MHz): δ = 1.46 [s, 9H, C(C*H*$_3$)$_3$], 3.97 (d, 2H, *J* = 5.3 Hz, C*H*$_2$COOH), 5.19 (br s, 1H, N*H*), 10.24 (br s, 1H, COO*H*). ^{13}C NMR of rotamer B (major) ($CDCl_3$, 75.5 MHz): δ = 28.28 [C(*C*H$_3$)$_3$], 42.24 (N*C*H$_3$), 80.44 [*C*(CH$_3$)$_3$], 156.03 (*C*=O urethane), 174.83 (*C*=O acid). NMR data were consistent with those of the literature.[1]

*N-BOC-Sarcosine (**16b**):* Off-white crystalline powder, mixture of rotamers. m. p.: 88-90 °C. FTIR (KBr, cm^{-1}): 3500-2400 (OH), 3114 (NH), 1764 (C=O acid), 1751 (C=O urethane). ^{1}H NMR of rotamer A ($CDCl_3$, 300 MHz): δ = 1.44 [s, 9H C(C*H*$_3$)$_3$], 2.94 (s, 3H, NC*H*$_3$), 3.95 (s, 2H, C*H*$_2$COOH). ^{13}C NMR of rotamer A ($CDCl_3$, 75.5 MHz): δ = 28.26 [C(*C*H$_3$)$_3$], 35.57 (N*C*H$_3$), 50.21 (*C*H$_2$COOH), 80.67 [*C*(CH$_3$)$_3$], 155.63 (*C*=O urethane), 175.03 (*C*=O acid). ^{1}H NMR of rotamer B ($CDCl_3$, 300 MHz): δ = 1.47 [s, 9H C(C*H*$_3$)$_3$], 2.95 (s, 3H, NC*H*$_3$), 4.03 (s, 2H, C*H*$_2$COOH). ^{13}C NMR of rotamer B ($CDCl_3$, 75.5 MHz): δ = 28.32 [C(*C*H$_3$)$_3$], 35.64 (N*C*H$_3$), 50.78 (*C*H$_2$COOH), 80.67 [*C*(CH$_3$)$_3$], 156.43 (*C*=O urethane), 175.14 (*C*=O acid). NMR data were consistent with those of the literature.[2]

*N-BOC-GABA (**16c**):* Yellowish viscous resin, mixture of rotamers. FTIR (film, cm^{-1}): 3500-2400 (OH), 3345 (NH), 1715 (C=O acid + urethane), 1528 (NH). ^{1}H NMR ($CDCl_3$, 300 MHz): δ = 1.44 [s, 9H, C(C*H*$_3$)$_3$], 1.82 (m, 2H, CH$_2$C*H*$_2$CH$_2$), 2.39 (t, 2H, *J* = 7.3 Hz, C*H*$_2$COOH), 3.17 (m, 2H, C*H*$_2$NH), 4.81 (major) and 6.11 (two br s, 1H, N*H*), 10.78 (br s, 1H, O*H*). ^{13}C NMR ($CDCl_3$, 75.5 MHz): δ = 25.15 (CH$_2$*C*H$_2$CH$_2$), 28.39 [C(*C*H$_3$)$_3$], 31.35(*C*H$_2$COOH), 40.21 (major) and 40.96 (*C*H$_2$NH), 79.47 (major) and 80.75 [*C*(CH$_3$)$_3$], 156.26 (major) and 157.76 (*C*=O urethane),178.26 (*C*=O acid). NMR data were consistent with those of the literature.[3]

*Synthesis of N-Methyl-GABA (**15d**):*

A mixture of *N*-methylpyrrolidone (1.00 g, 0.010 mol, 0.97 mL), NaOH (1.62 g, 0.04 mol) and H_2O (6 mL) was kept at reflux under magnetic stirring for 4 h then added with 12 M HCl up to pH = 1-2. The removal of the solvent at reduced pressure gave a solid residue which was treated with hot EtOH filtered and washed with the same solvent to extract the desidered product, the solvent was removed under reduced pressure to obtain an oil which was crystallized with acetonitrile to afford *N*-methyl-GABA hydrochloride as a off-white hygroscopic solid (0.9214 g, 0.0060 mol, 59 %, Mp. 115-119 °C). A portion of 0.4848 g was washed in turn with acetone and diethyl ether achieving **15d** as crystalline powder (0.4465 g, 0.0029 mol).

*N-Methyl-GABA (**15d**):* White crystalline powder, m. p.: 122-123 ° C, Lit.[4] 120-121 °C. FTIR (KBr, cm^{-1}): 3500-2400 (OH + NH_2^+), 1732 (C=O), 1571 (NH). ^{1}H NMR (DMSO-d_6, 300 MHz): δ = 1.84 (m, 2H, CH$_2$C*H*$_2$CH$_2$), 2.36 (t, 2H, *J* = 7.4 Hz, C*H*$_2$COOH), 2.49 (s, 3H, C*H*$_3$NH$_2^+$), 2.86 (t, 2H, *J* = 7.4 Hz, C*H*$_2$NH$_2^+$), 9.22 (broad s, 1H, N*H*$_2^+$). ^{13}C NMR (DMSO-d_6, 75.5 MHz): δ 22.24 (CH$_2$*C*H$_2$CH$_2$), 31.96 (*C*H$_2$COOH), 33.48 (*C*H$_3$NH$_2^+$), 48.79 (*C*H$_2$NH$_2^+$), 174.90 (*C*=O acid).

N-Methyl-GABA hydrochloride was used in the BOC-protection reaction as described above to give *N*-methyl-*N*-BOC-GABA (**16d**).

*N-methyl-N-BOC-GABA (**16d**):* Yellowish viscous resin. FTIR (film, cm^{-1}): 3500-2400 (OH), 3166 (NH), 1728 (C=O acid + urethane). ^{1}H NMR ($CDCl_3$, 300 MHz): δ = 1.45 [s, 9H, C(C*H*$_3$)$_3$], 1.84 (m, 2H, CH$_2$C*H*$_2$CH$_2$), 2.36 (t, 2H, *J* = 7.3 Hz, C*H*$_2$COOH), 2.85 (s, 3H, C*H*$_3$N), 3.28 (t, 2H, *J* = 7.3 Hz, C*H*$_2$N), 10.78 (br s, 1H, *OH*). ^{13}C NMR ($CDCl_3$, 75.5 MHz): δ = 22.88 (CH$_2$*C*H$_2$CH$_2$), 28.41 [C(*C*H$_3$)$_3$], 31.11 (*C*H$_2$COOH), 34.16 (*C*H$_3$N), 47.94 (*C*H$_2$N), 79.79 [*C*(CH$_3$)$_3$], 156.05 (*C*=O urethane), 178.43 (*C*=O acid). NMR data were consistent with those of the literature.[5]

*$^{\alpha}$N, $^{\varepsilon}$N -diBOC-L-Lysine (**16e**):* Off-white glassy solid, mixture of rotamers. FTIR (KBr, cm^{-1}): 3500-2400 (OH), 3374 (NH), 1713 (C=O acid + urethane), 1529 (NH). ^{1}H NMR ($CDCl_3$, 300 MHz): δ = 1.45 [s, 18H, C(C*H*$_3$)$_3$], 1.30-2.00 (m, 6H, C*H*$_2$C*H*$_2$C*H*$_2$), 3.11 (m, 2H, C*H*$_2$NH), 4.11-4.38 (m, 1H, C*H*NH), 4.70 and 6.30 (two m, 1H, $^{\varepsilon}$N*H*), 5.27 (d, *J* = 7.9 Hz, 1H, $^{\alpha}$N*H*), 8.50 (broad s, 1H, *OH*). ^{13}C NMR ($CDCl_3$, 75.5 MHz): δ = 22.42 (*C*H$_2$), 28.35 [C(*C*H$_3$)$_3$], 28.42 [C(*C*H$_3$)$_3$], 29.45 (*C*H$_2$), 32.10 (*C*H$_2$), 40.13 (major) and 41.24

(C*H*$_2$NH), 53.24 (major) and 54.58 (C*H*NH), 79.34 (major) and 80.86 [*C*(CH$_3$)$_3$], 79.95 (major) and 81.48 [*C*(CH$_3$)$_3$], 155.79 (major) and 156.88 (*C*=O urethane), 156.33 (major) and 158.16 (*C*=O urethane), 176.27 (*C*=O acid). NMR data were consistent with those of the literature.[6]

*$^{\alpha}$N, ^{im}N -diBOC-L-Histidine (**16f**):* Off-white solid, mixture of regioisomers, m. p. : 165-168. Lit.[7]: 165-167 °C. FTIR (KBr, cm^{-1}): 3500-2400 (OH), 3406 (NH), 3141 (CH=), 1762 (C=O acid), 1714 (C=O urethane), 1497 (NH). ^{1}H NMR (CDCl$_3$, 300 MHz): δ = 1.47 [s, 9H, C(C*H*$_3$)$_3$], 1.60 [s, 9H, C(C*H*$_3$)$_3$], 3.15-3.34 (m, 2H, C*H*$_2$), 4.49 (m, 1H, C*H*NH), 5.49 (d, 1H *J* = 5.8 Hz, N*H*), 7.21 (s, 1H, C*H* imidazole), 8.17 (s, 1H, C*H* imidazole). ^{13}C NMR (CDCl$_3$, 75.5 MHz): δ = 27.86 [C(*C*H$_3$)$_3$], 28.39 [C(*C*H$_3$)$_3$], 29.71 (*C*H$_2$), 52.77 (CHNH), 79.74 [*C*(CH$_3$)$_3$], 86.57 [*C*(CH$_3$)$_3$], 115.63 (*C*H imidazole), 136.40 (quaternary *C* imidazole), 136.92 (*C*H imidazole), 146.29 (*C*=O urethane), 155.21(*C*=O urethane), 173.02 (*C*=O acid).

References

[1] Houen, G. ; Struve, C.; Søndergaard, R.; Friis, T.; Anthoni, U. ; Nielsen, P. H.; Christophersen, C.; Petersen, B. O.; Duus. Standard substrate specificity of the bovine serum amine oxidase and in situ characterisation of aminoaldehydes by NMR spectroscopy. *Bioorg. Med. Chem.* **2005**, *13*, 3783-3796.

[2] Yoon, U.C.; Jin, Y.X.; Oh, S.W.; Park, C.H.; Park, J.H.; Campana, C. F.; Cai, X., Duesler, E. N.; Mariano, P. S. A Synthetic Strategy for the Preparation of Cyclic Peptide Mimetics Based on SET-Promoted Photocyclization Processes. *J. Am. Chem. Soc.* **2003**, *125*, 10664-10671.

[3] Guenin, E. ; Monteil, M. ; Bouchemal, N.; Prangé, T.; Lecouvey, M.. Syntheses of phosphonic esters of alendronate, pamidronate and neridronate. *Eur. J. Org. Chem*. **2007**, *20*, 3380-3391.

[4] Andersson, L. ; Kühler, T.; Nilsson, M. Preparation of 3-carboxy-N, N, N-trimethylpropanaminium chloride (γ-butyrobetaine hydrochloride. *Synthesis* **1981**, *6,* 468-469.

[5] Kane, B. E.; Grant, M. K. O.; El-Fakahani, E. E.; Ferguson, D. M. Synthesis and evaluation of xanomeline analogs-Probing the wash-resistant phenomenon at the M1 muscarinic acetylcholine receptor. *Bioorg. Med. Chem.* **2008**, *16*, 1376-1392.

[6] Milner, S. J. ; Seve, A.; Snelling, A. M.; Thomas, G. H.; Kerrr, K. G.; Routledge, A.; Duhme-Klair, A.K. Staphyloferrin A as siderophore-component in fluoroquinolone-based Trojan horse antibiotics *Org. Biomol. Chem.* **2013**, *11*, 3461-3468.

[7] Muri, E. M. F. ; Gomes Jr., M. Costa, J. S. ; Alencar, F. L. ; Sales Jr., A. ; Bastos, M. L. ; Hernandez-Valdes, R. ; Albuquerque, M. G. ;. da Cunha, E. F. F ; Alencastro, R. B. ; Williamson, J. S. ; Antunes, O. A. C. -t-Boc-amino acid esters of isomannide potential inhibitors of serine proteases *Amino Acids* **2004,** *27*, 153-159.

.

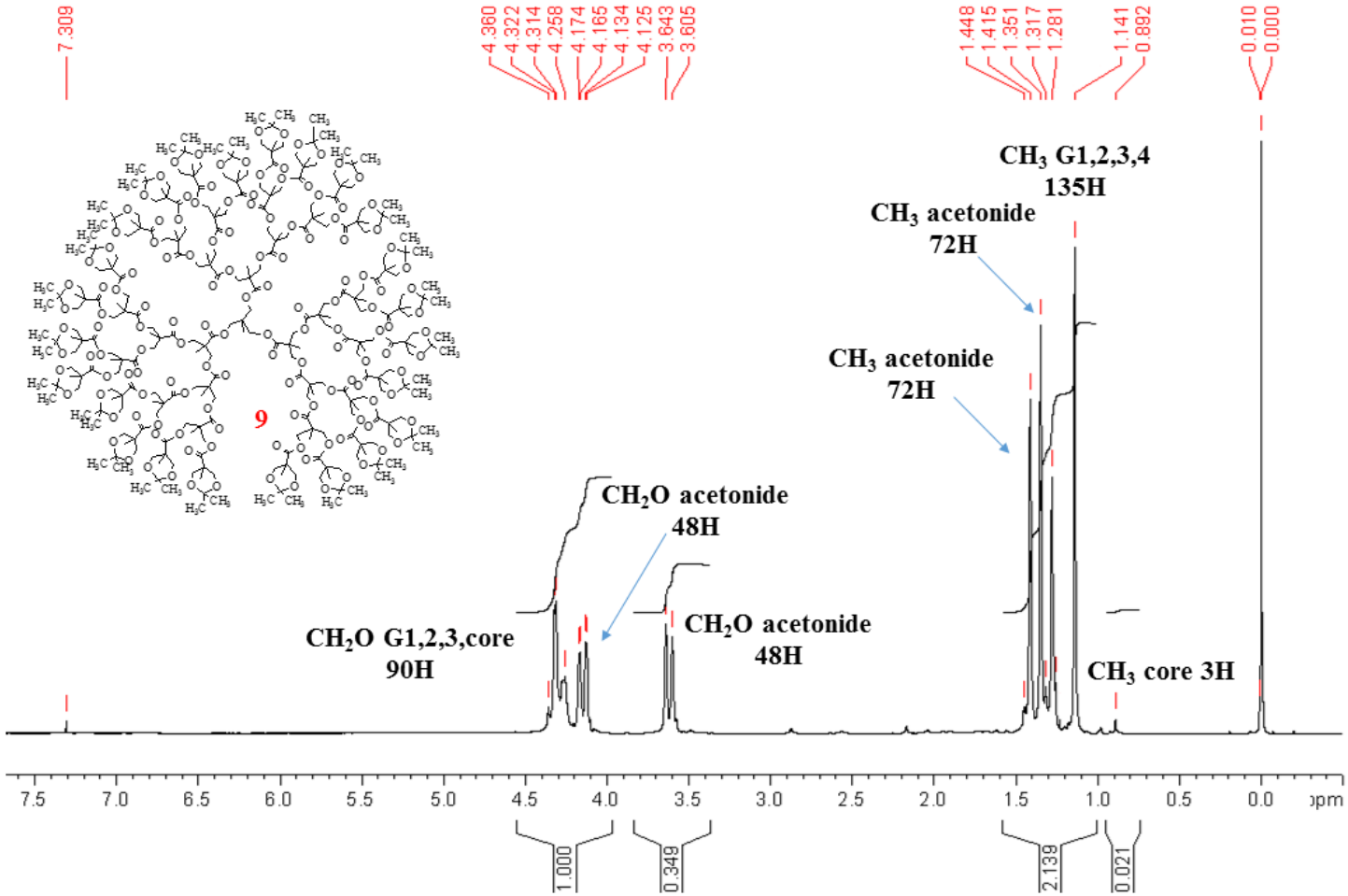


Figure S1. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound **G4(A) (9)**

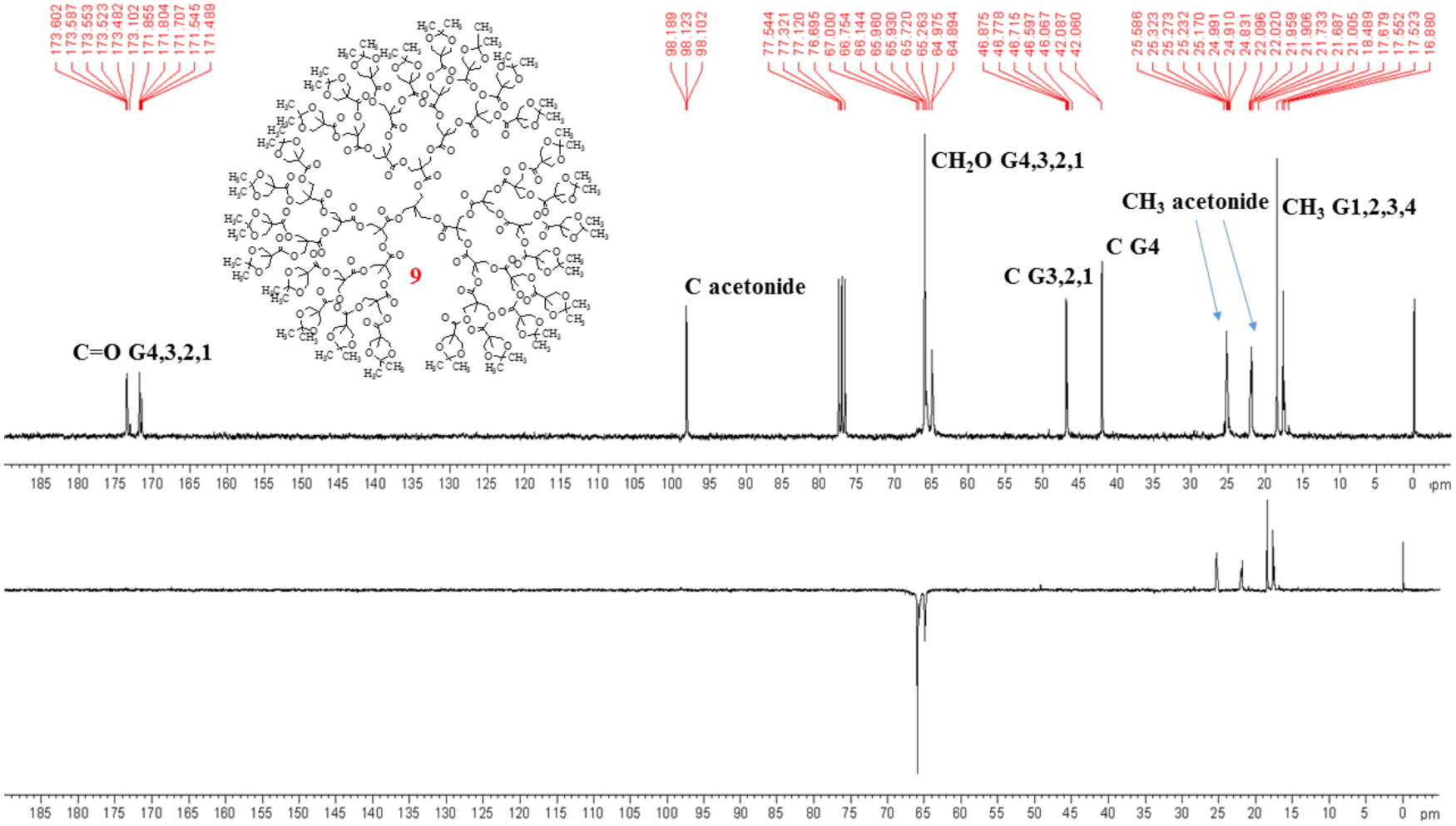


Figure S2. ^{13}H NMR and DEPT-135 (DMSO-d_6, 75.5 MHz) spectra of compound **G4(A)** (**9**)

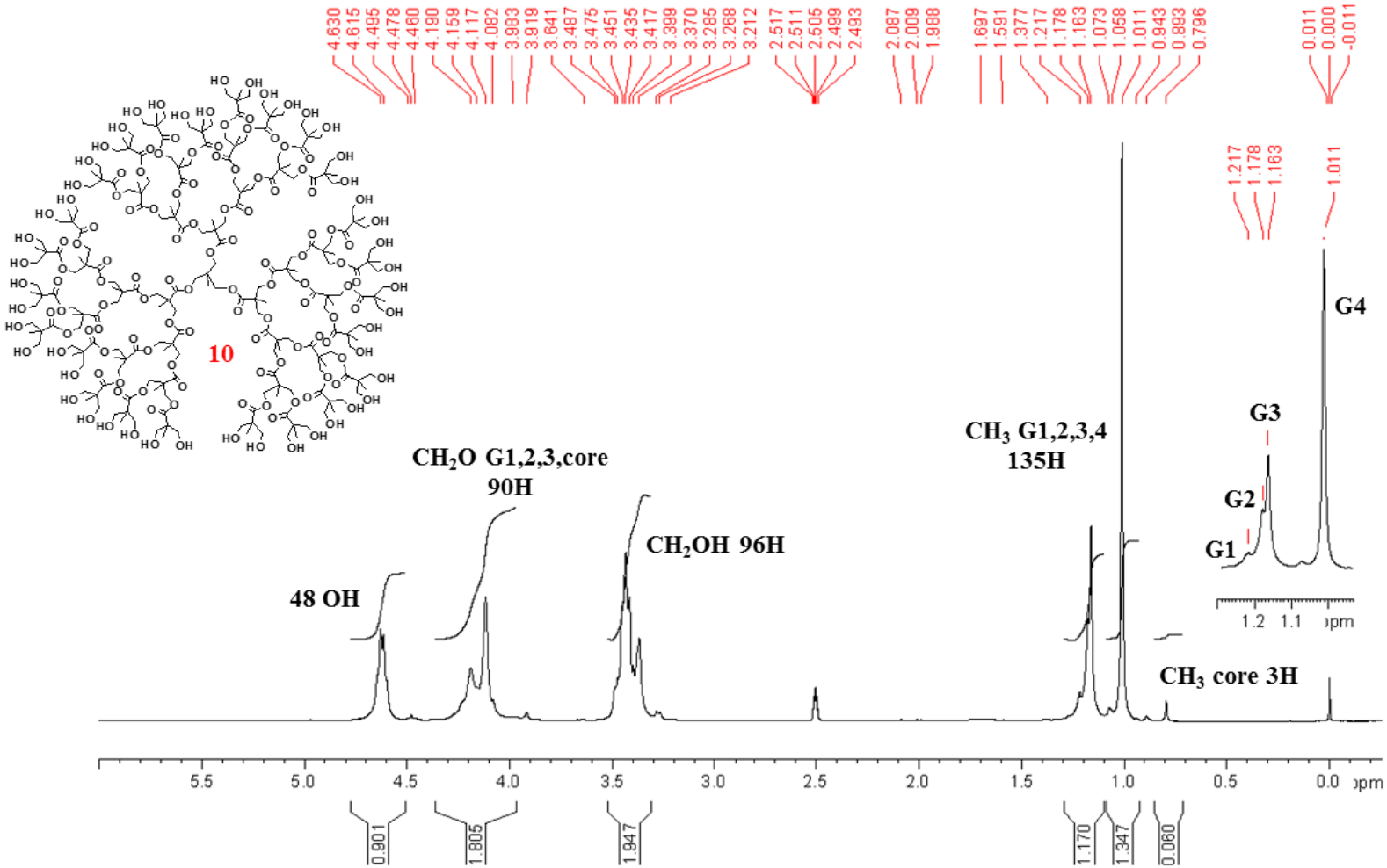


Figure S3. ^{1}H NMR (DMSO-d_6, 300 MHz) spectrum of compound **G4(OH)** (**10**)

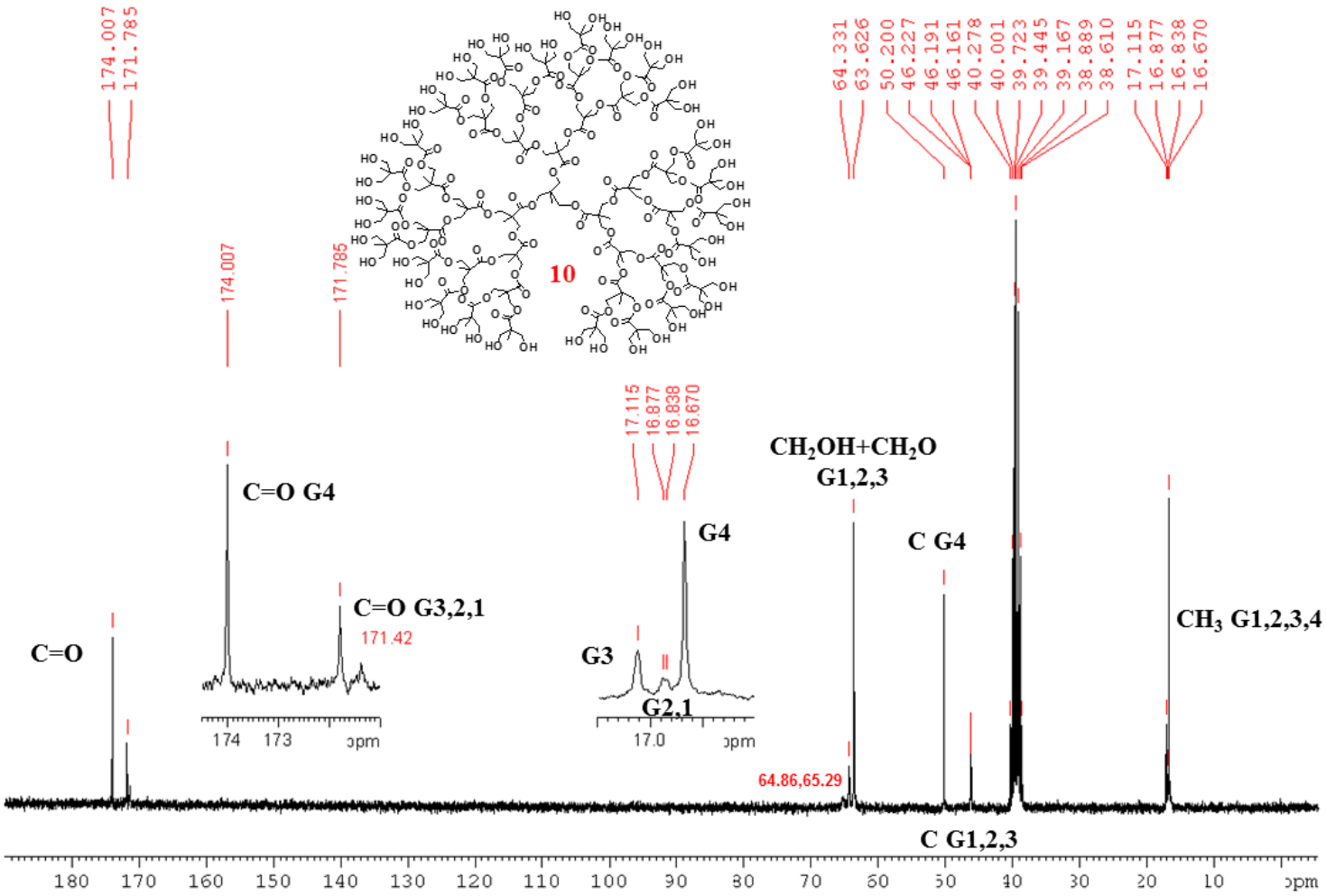


Figure S4. ^{13}C NMR (DMSO-d_6, 75.5 MHz) spectrum of compound **G4(OH)** (**10**)

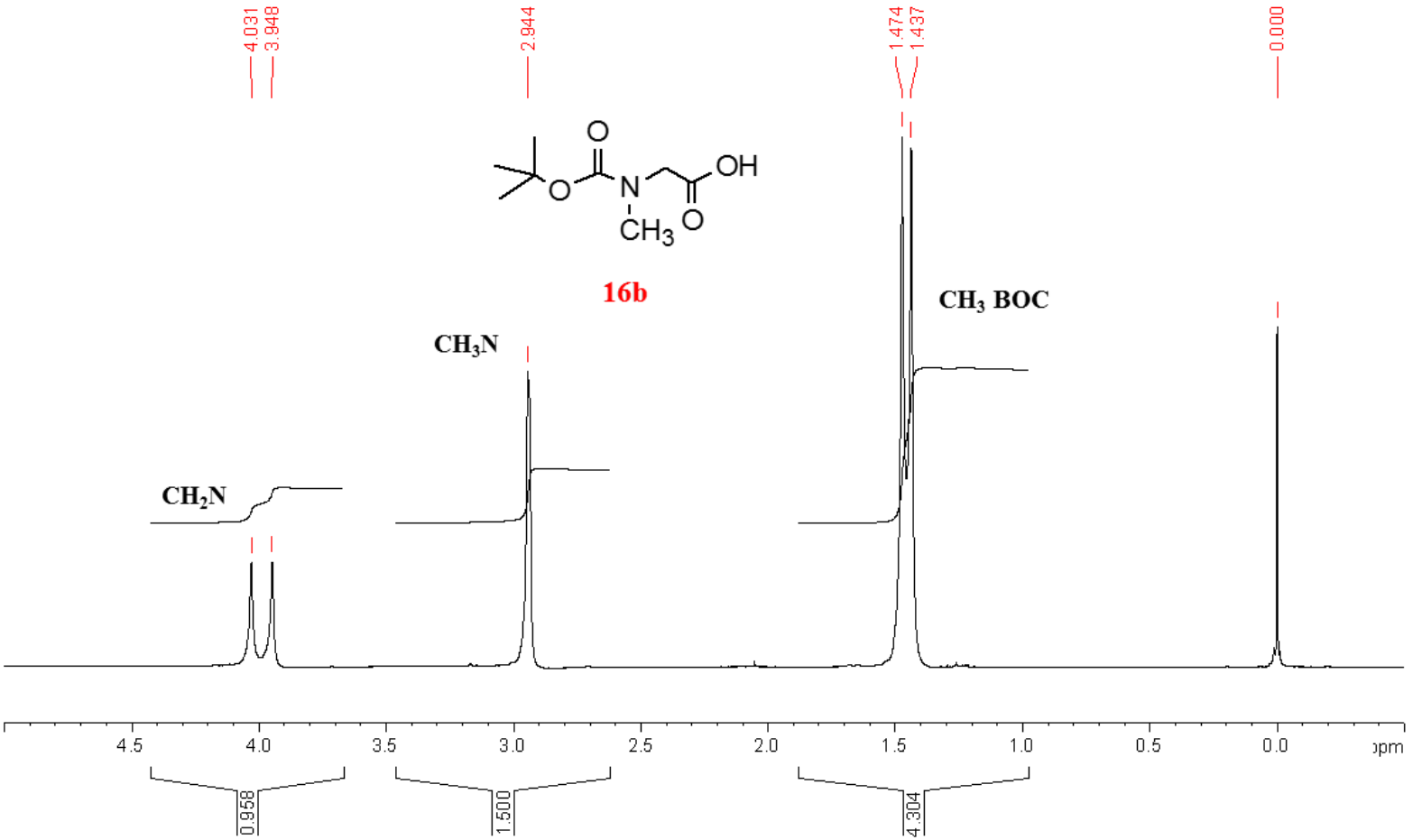


Figure S5. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum of **16b**.

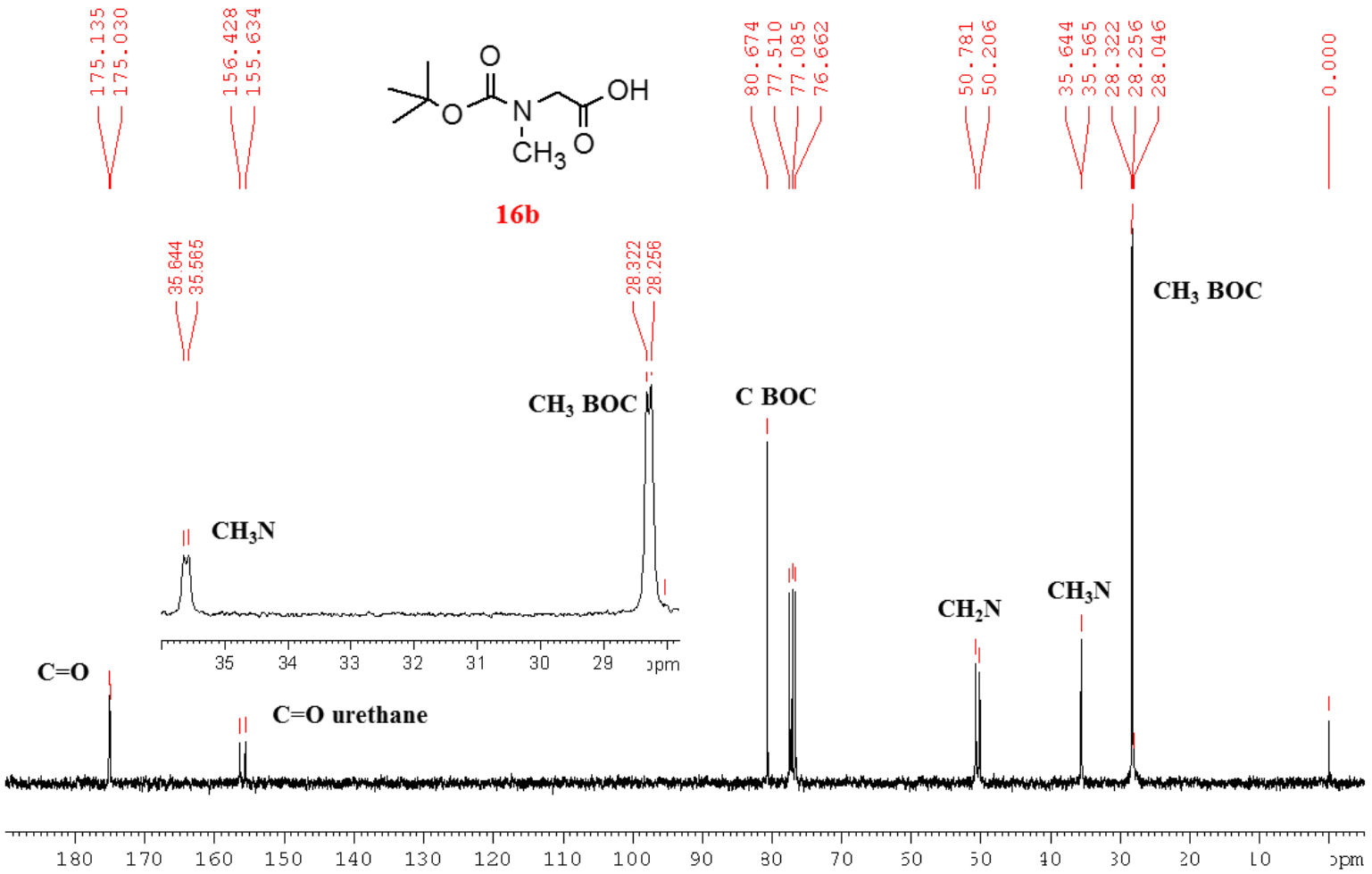


Figure S6. ^{13}C NMR ($CDCl_3$, 75.5 MHz) spectrum of compound **16b**

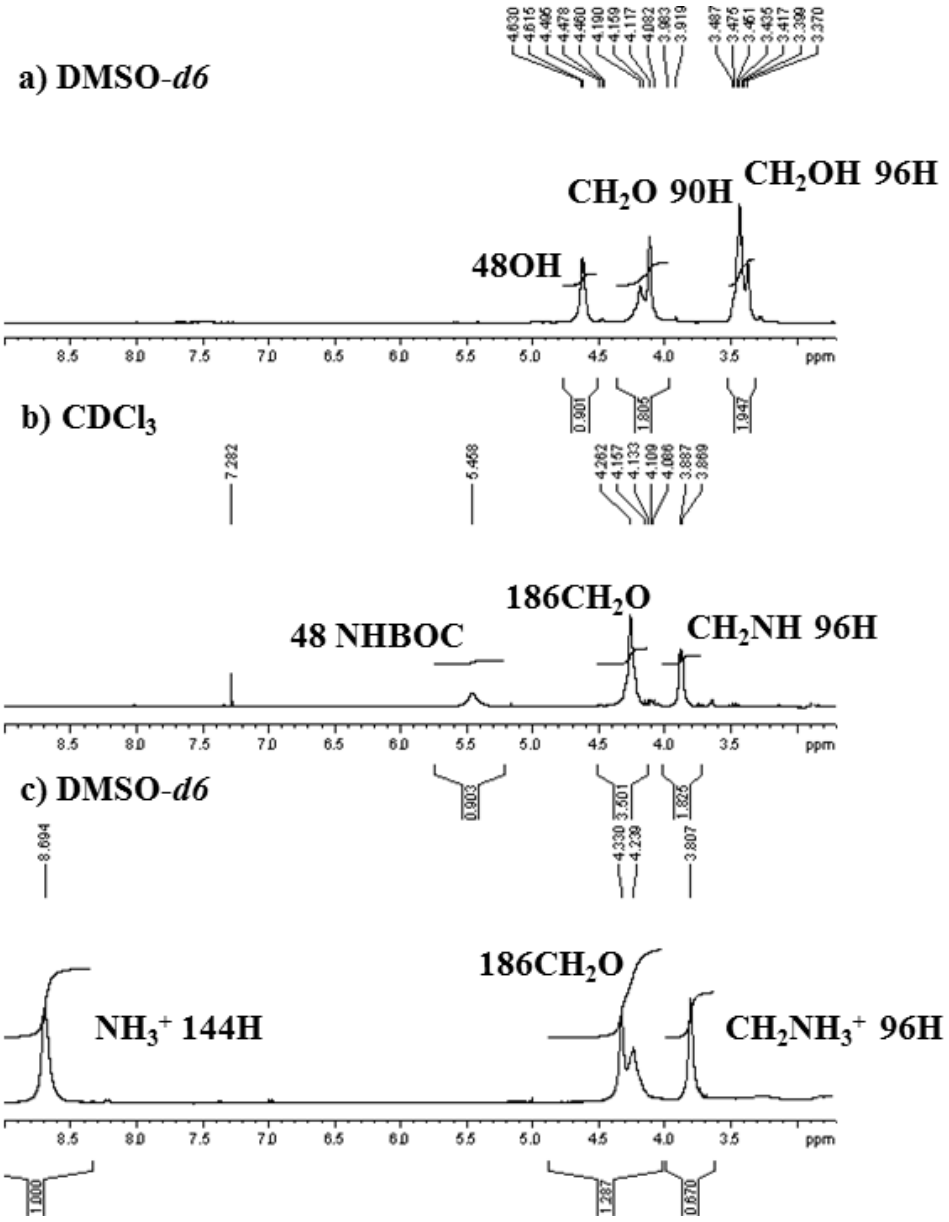


Figure S7. Comparison of ^{1}H NMR spectra of **G4(OH)** (**10**) (a), **G4(16a) (17)** (b) and **G4(15aHCl) (23)** (c)

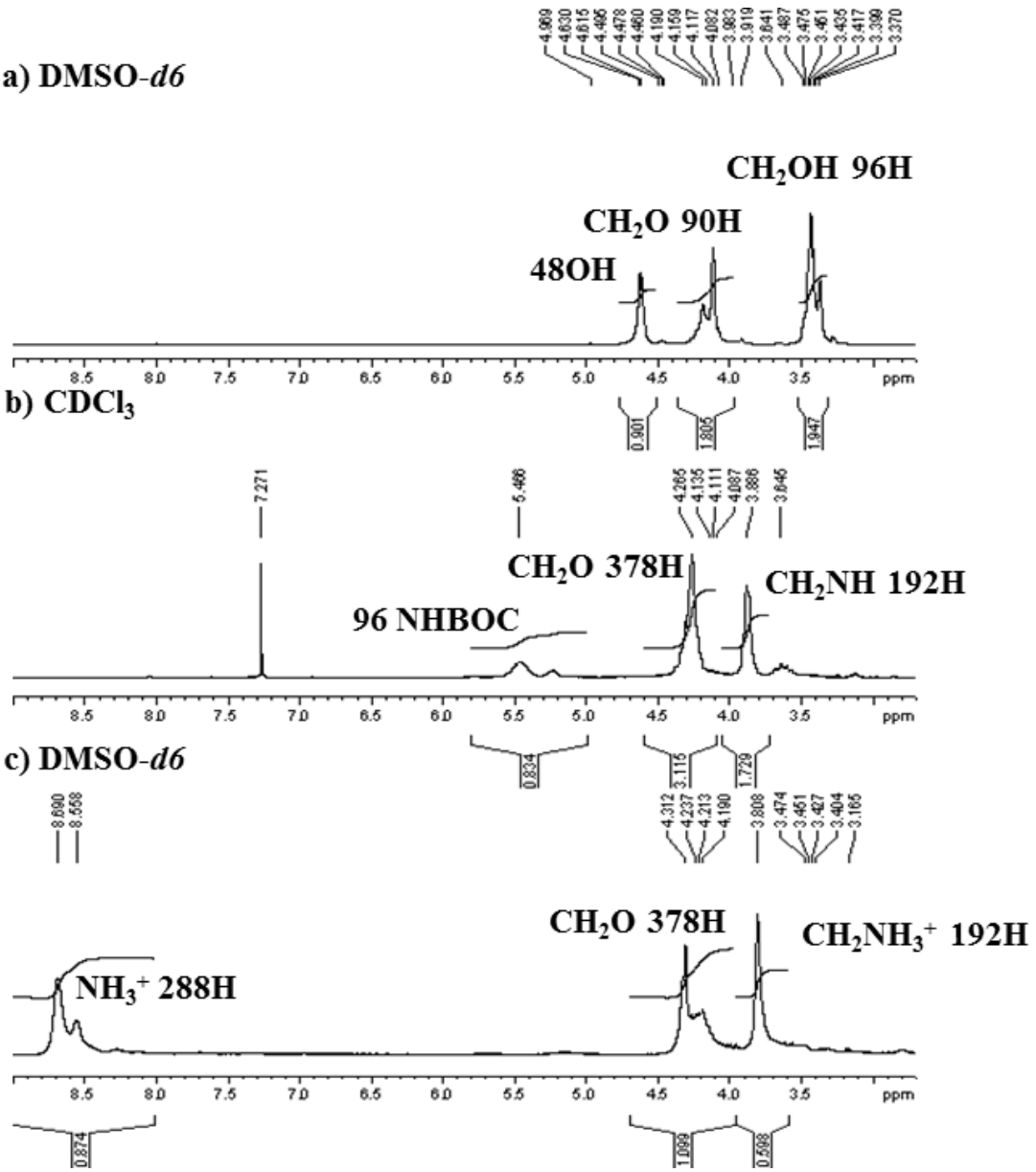


Figure S8. Comparison of ^{1}H NMR spectra of **G4(OH)** (**10**) (a), **G5(16a) (47)** (b) and **G5(15aHCl) (56)** (c)

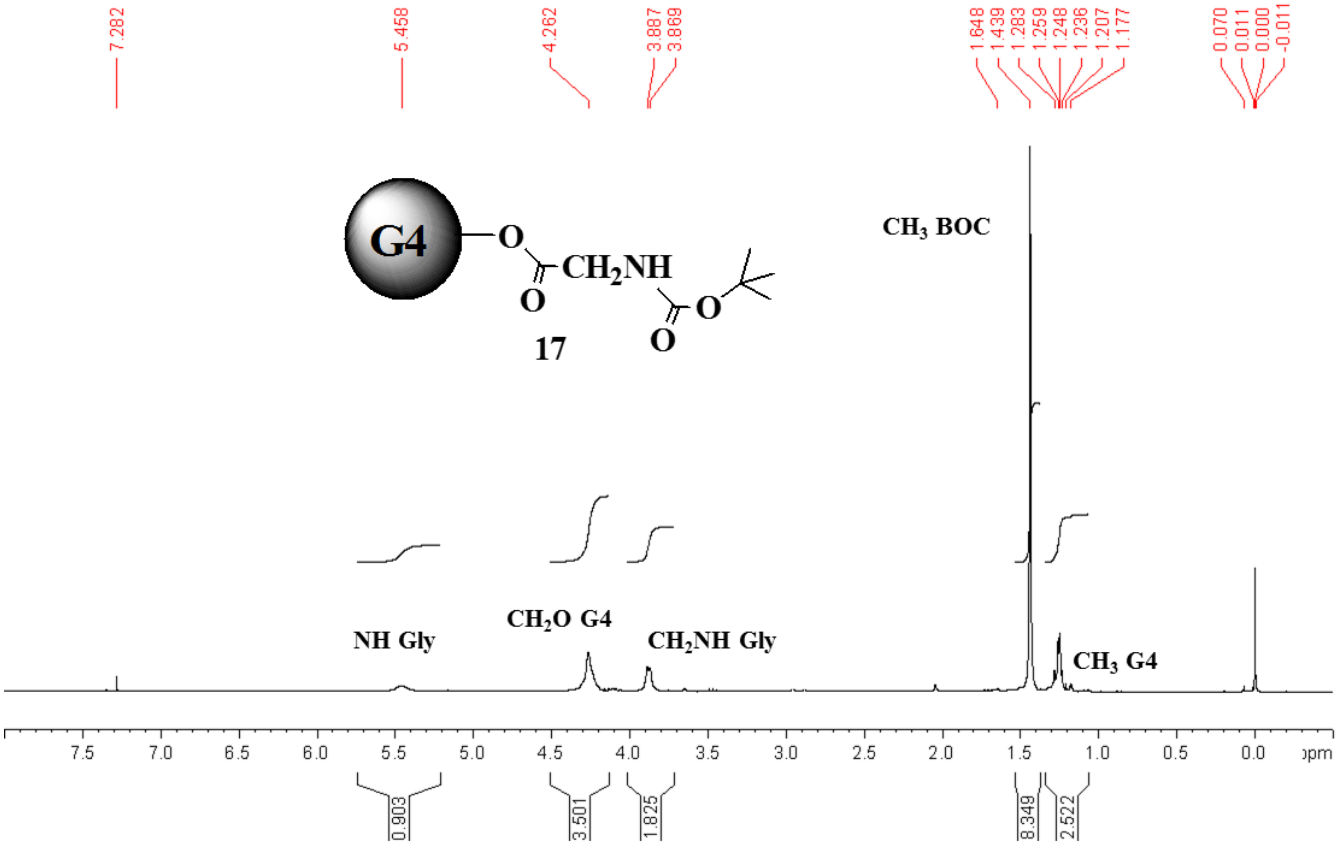


Figure S9. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum of compound **17**

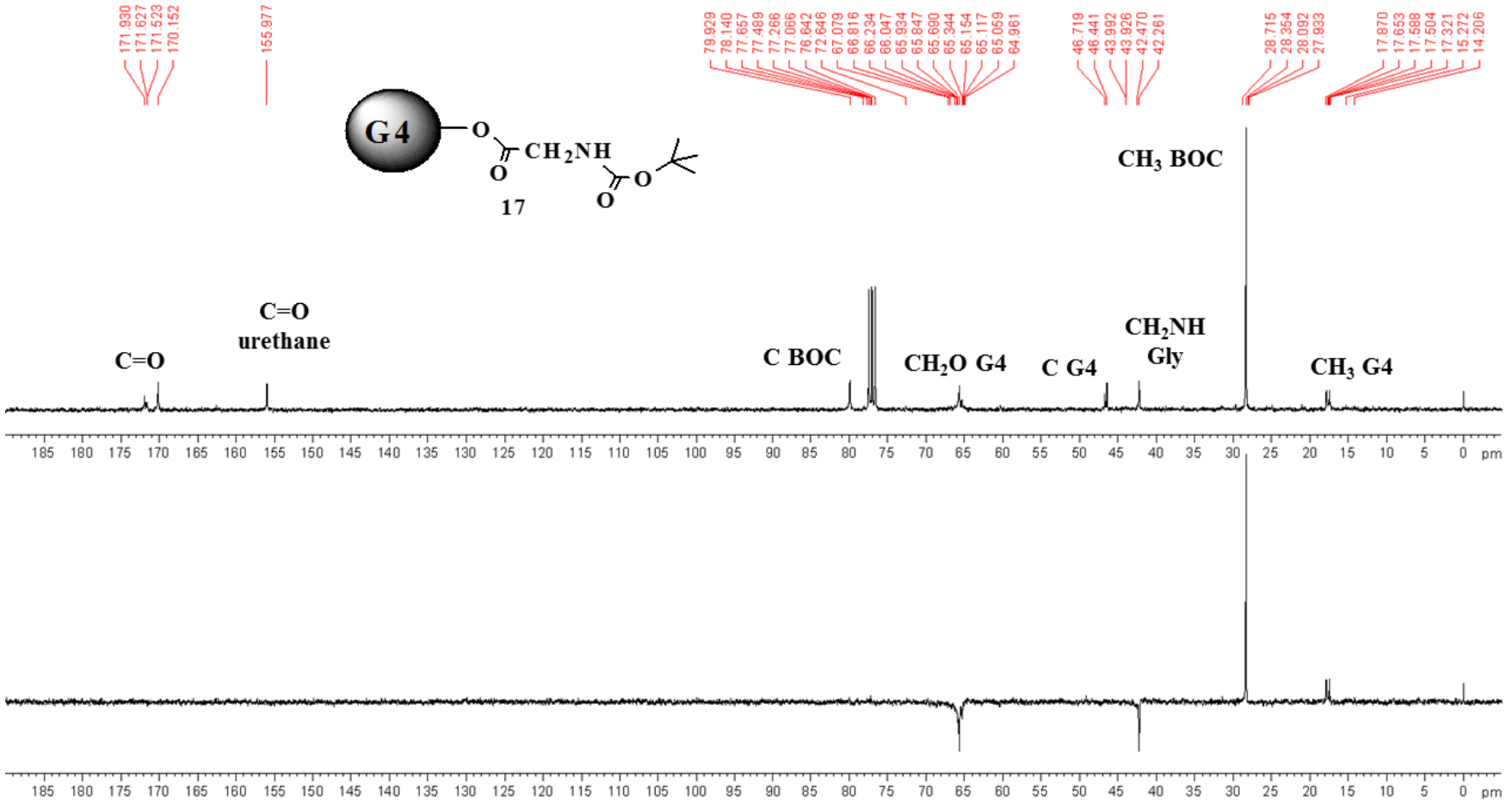


Figure S10. ^{13}C NMR and DEPT-135 ($CDCl_3$, 75.5 MHz) spectra of compound **17**

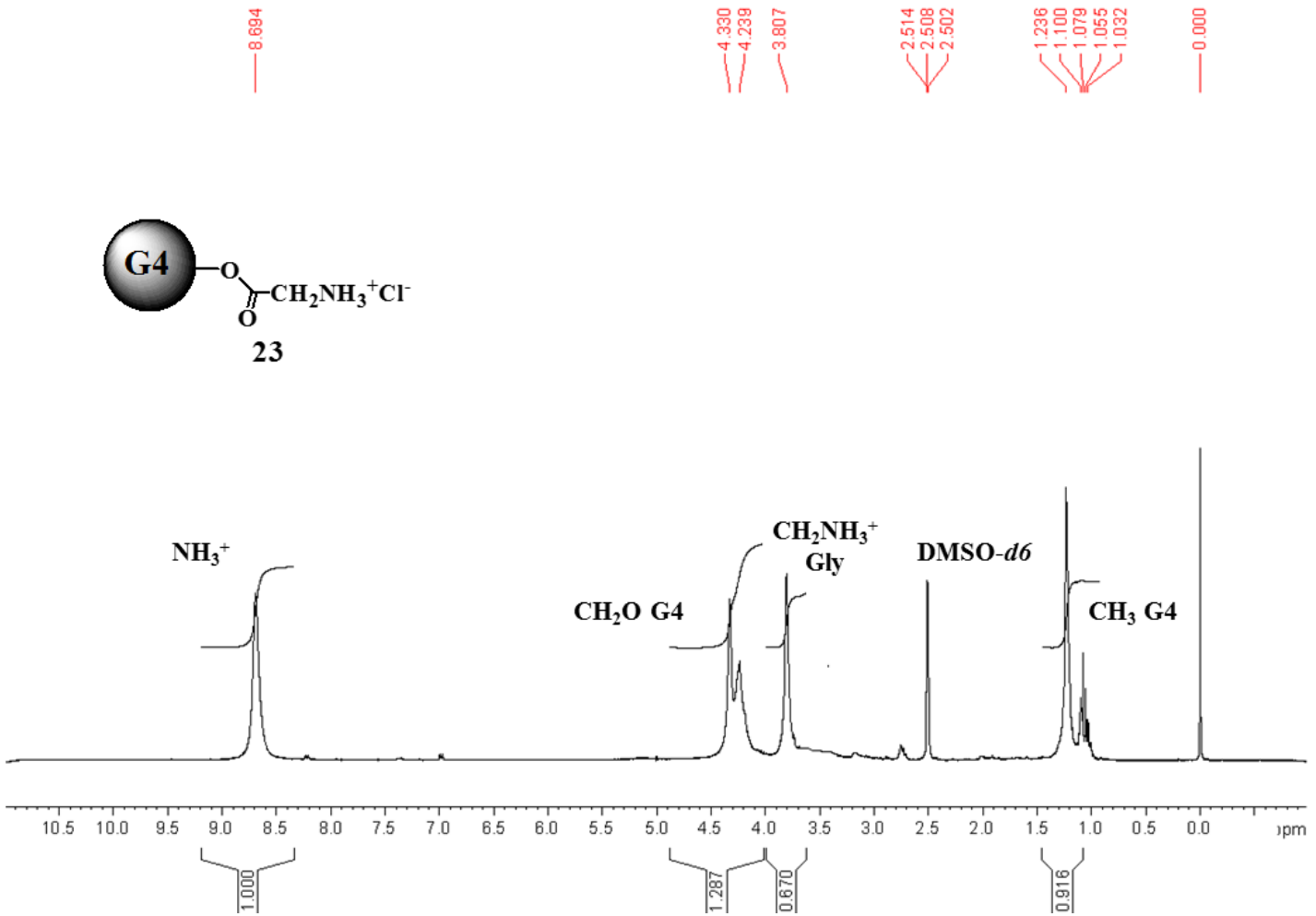


Figure S11. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound **23**

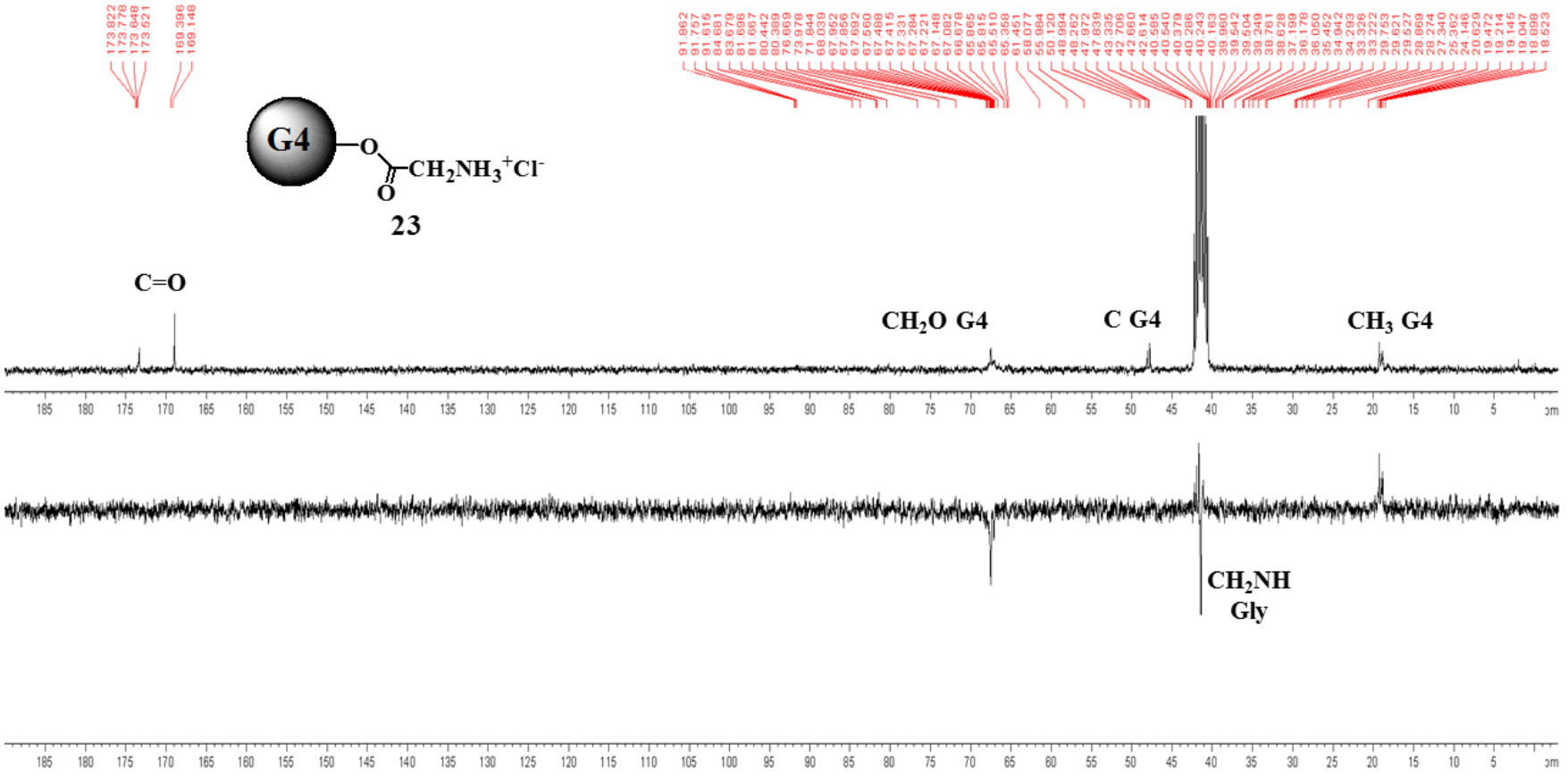


Figure S12. ^{13}C NMR and DEPT-135 (DMSO-*d6*, 75.5 MHz) spectra of compound **23**

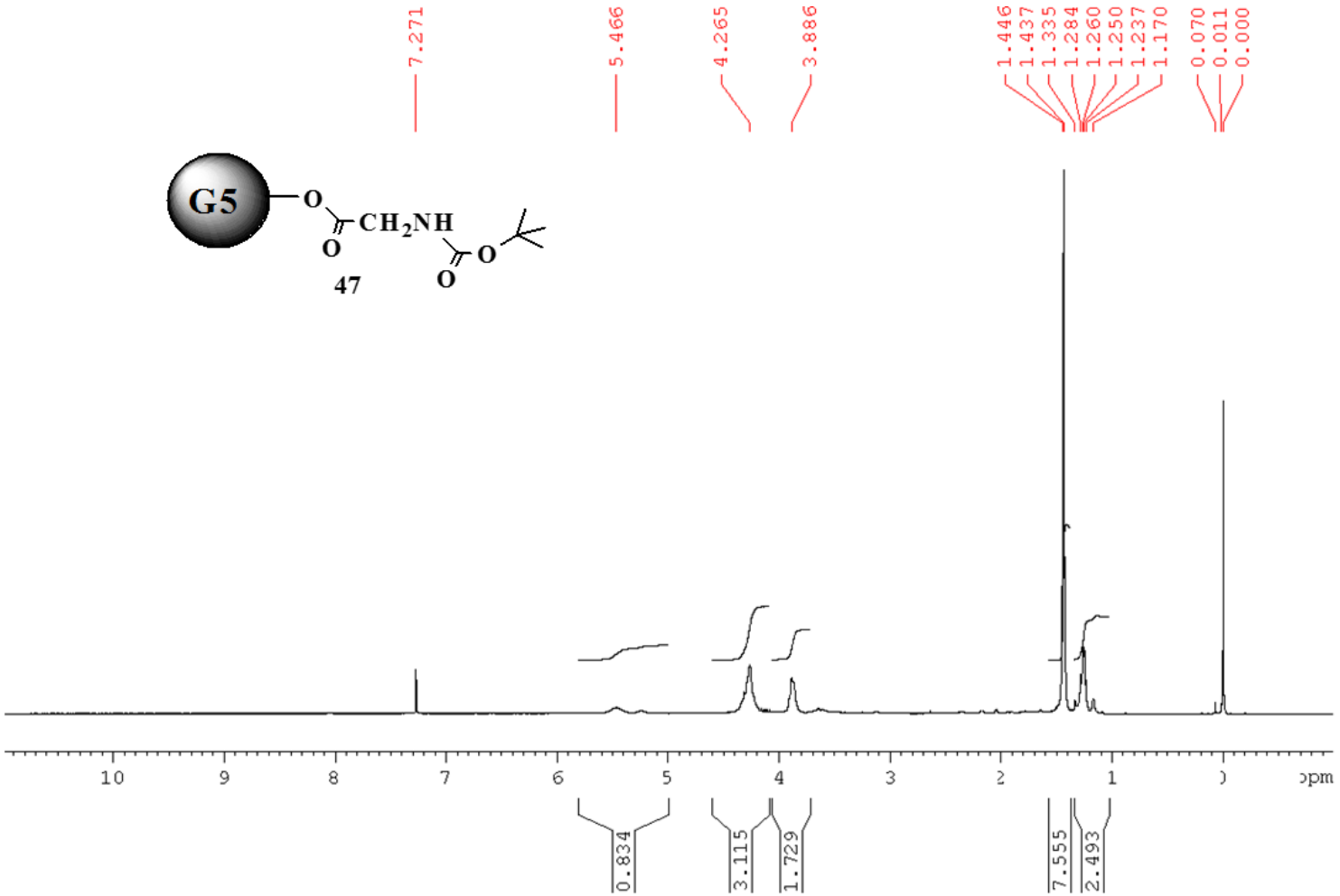


Figure S13. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum of compound **47**

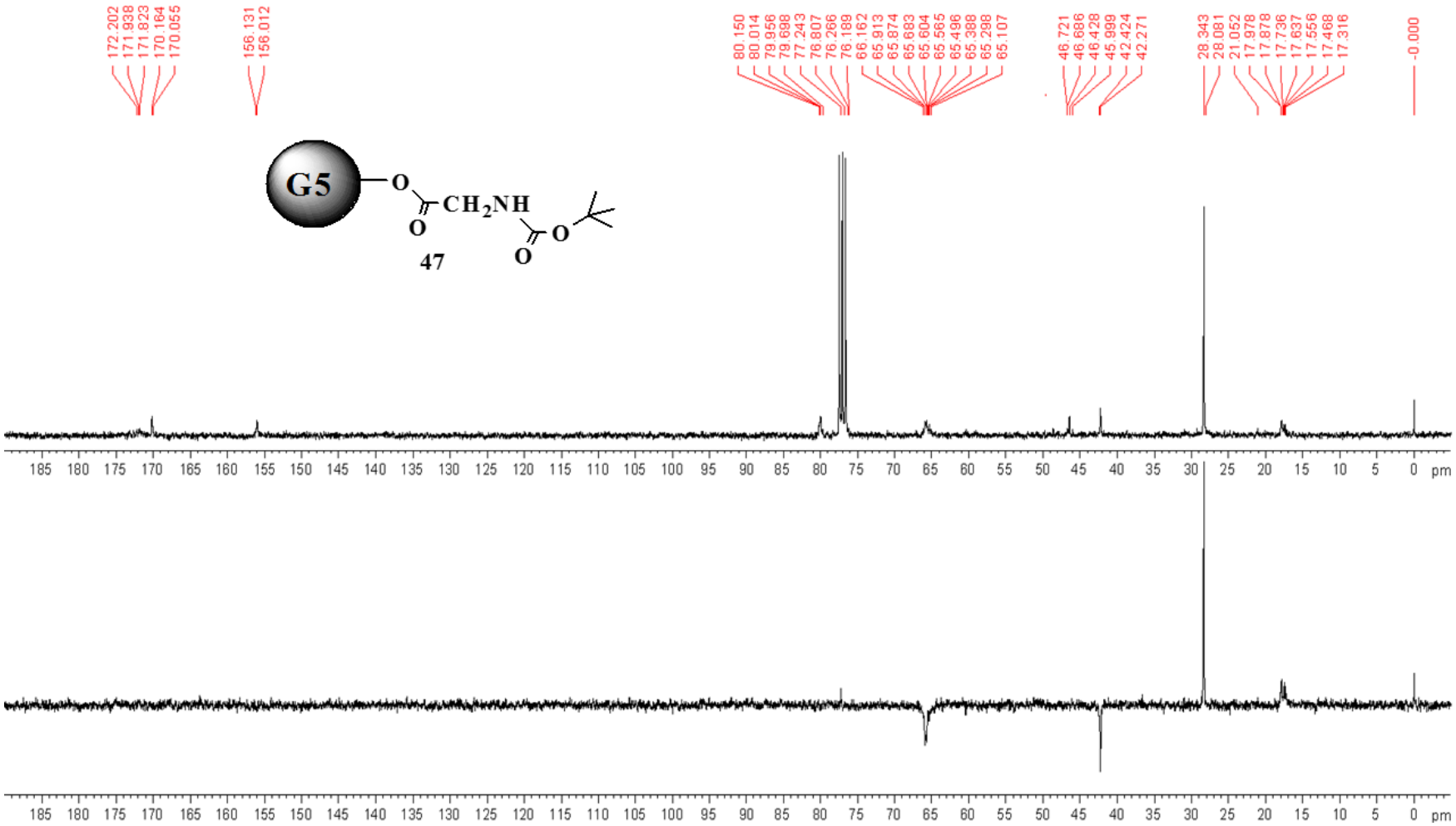


Figure S14. ^{13}C NMR and DEPT-135 ($CDCl_3$, 75.5 MHz) spectra of compound **47**

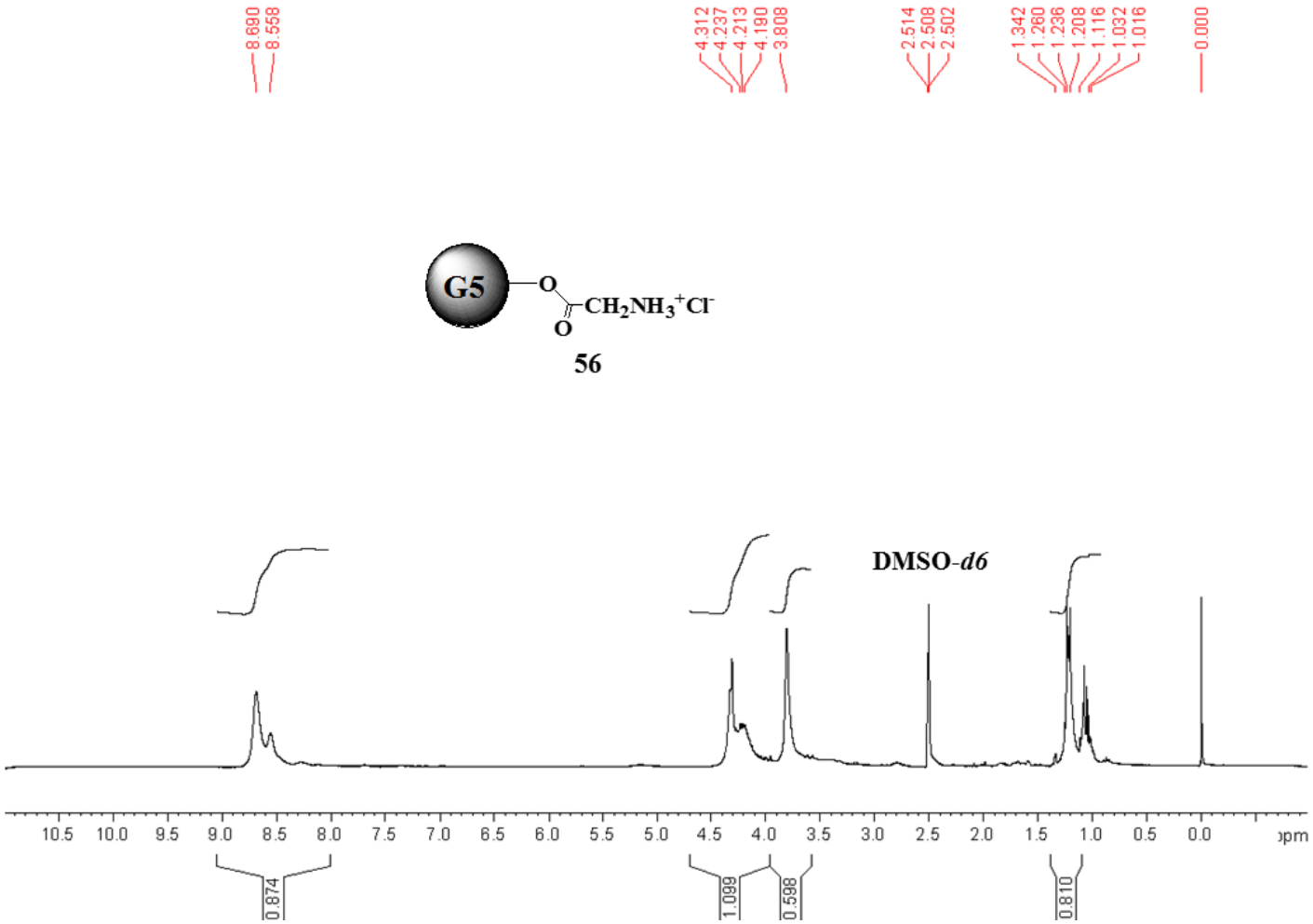


Figure S15. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound **56**

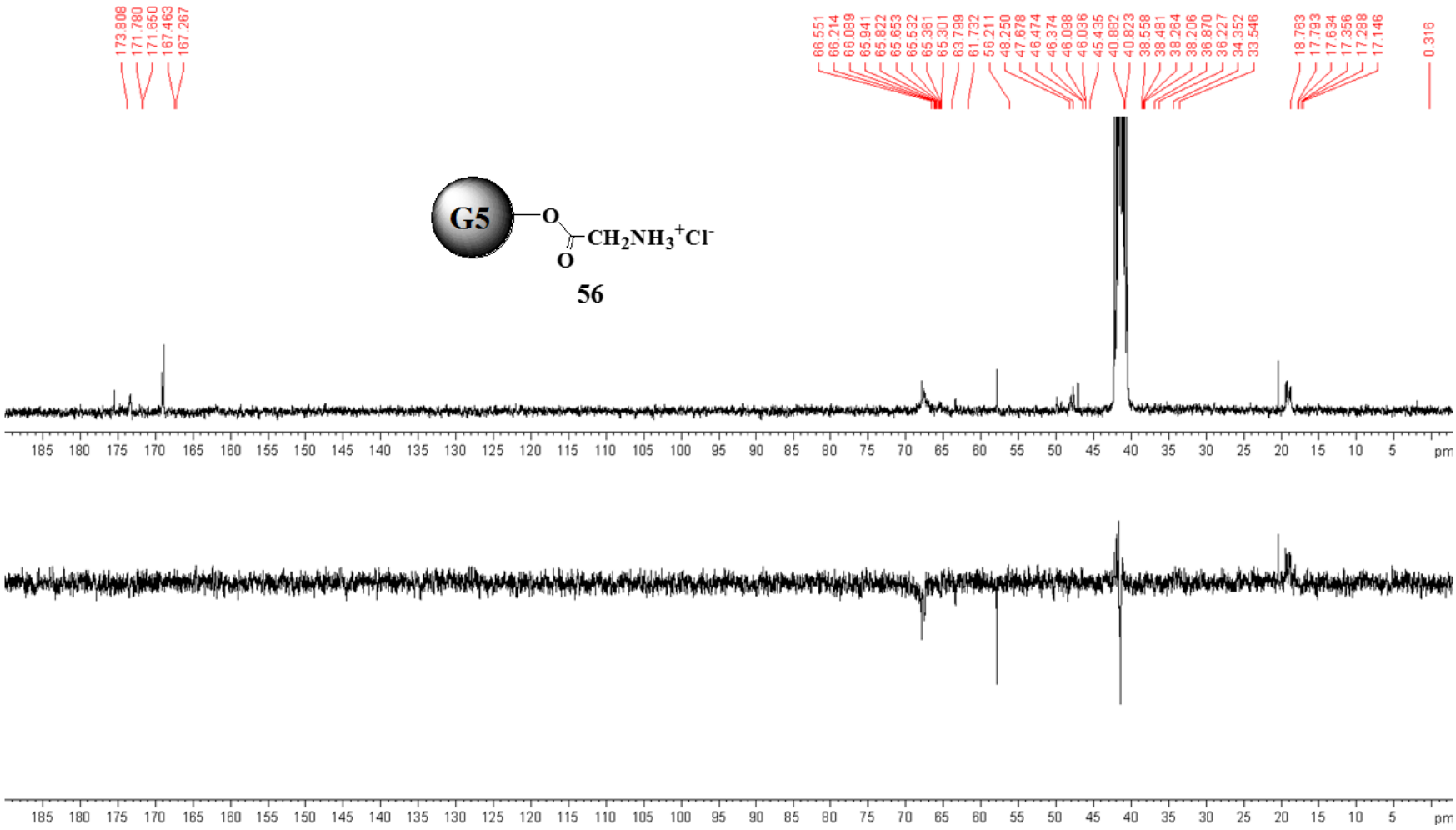


Figure S16. ^{13}C NMR and DEPT-135 (DMSO-*d6*, 75.5 MHz) spectra of compound **56**

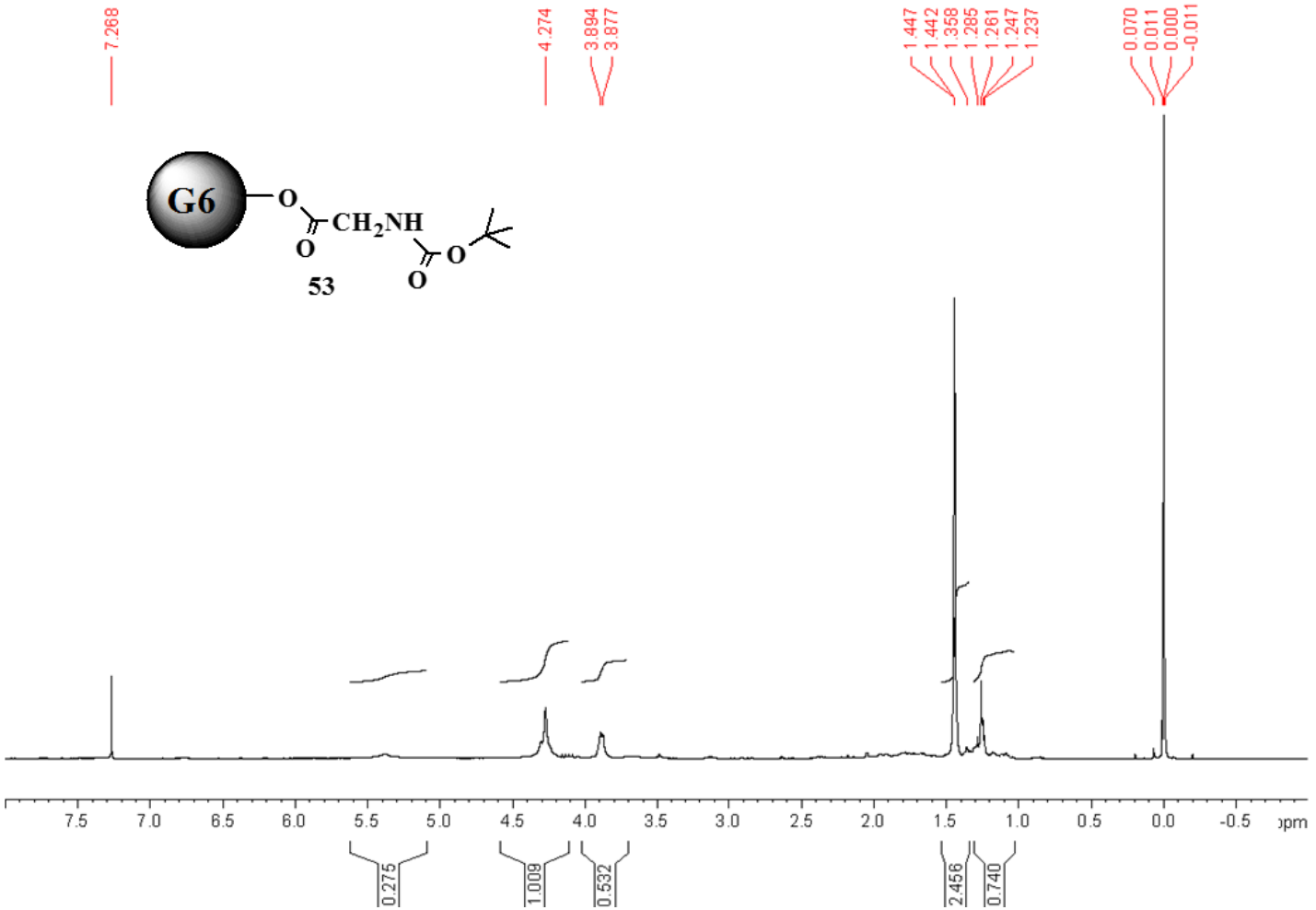


Figure S17. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum of compound **53**

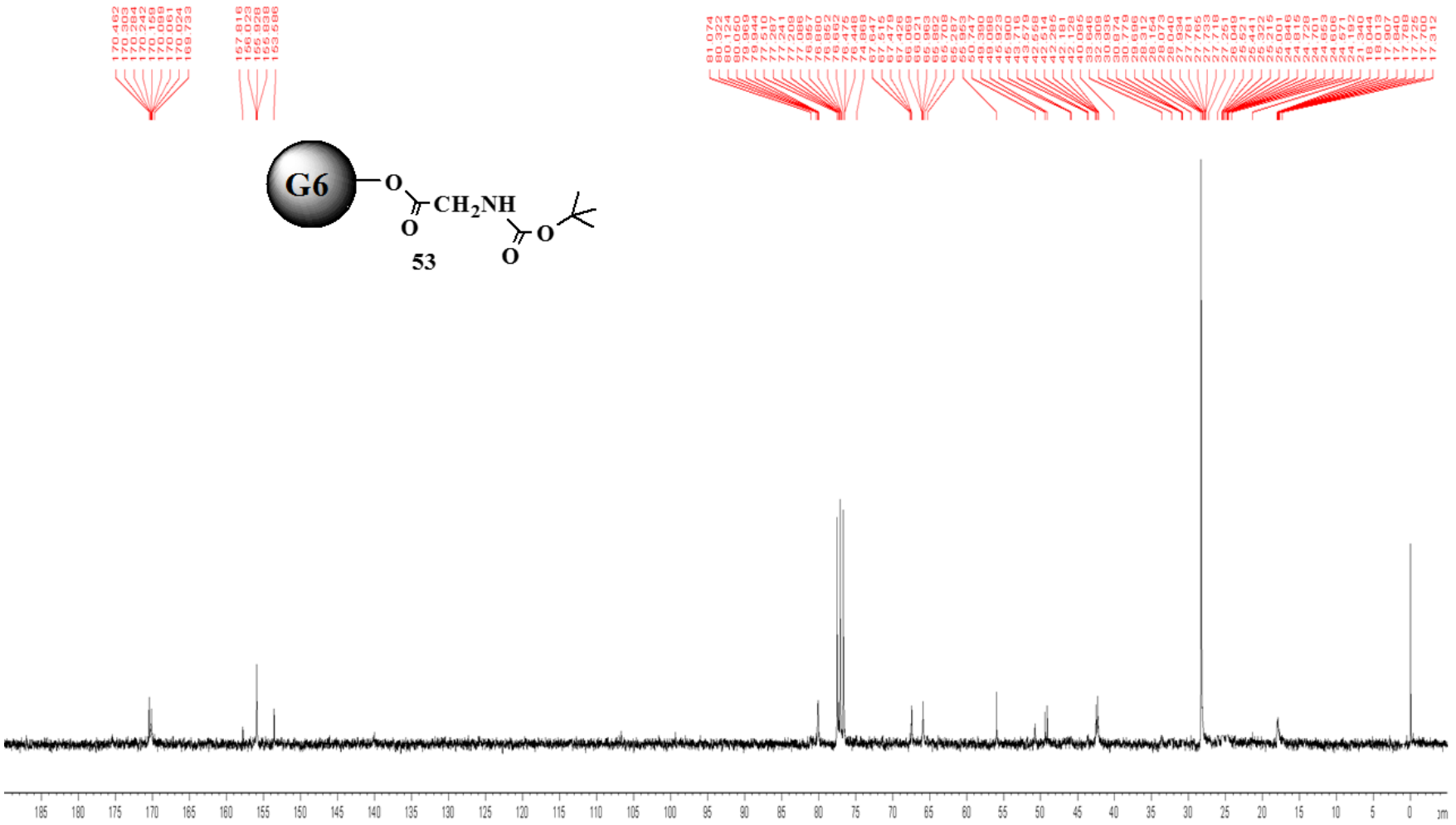


Figure S18. ^{13}C NMR ($CDCl_3$, 75.5 MHz) spectrum of compound **53**

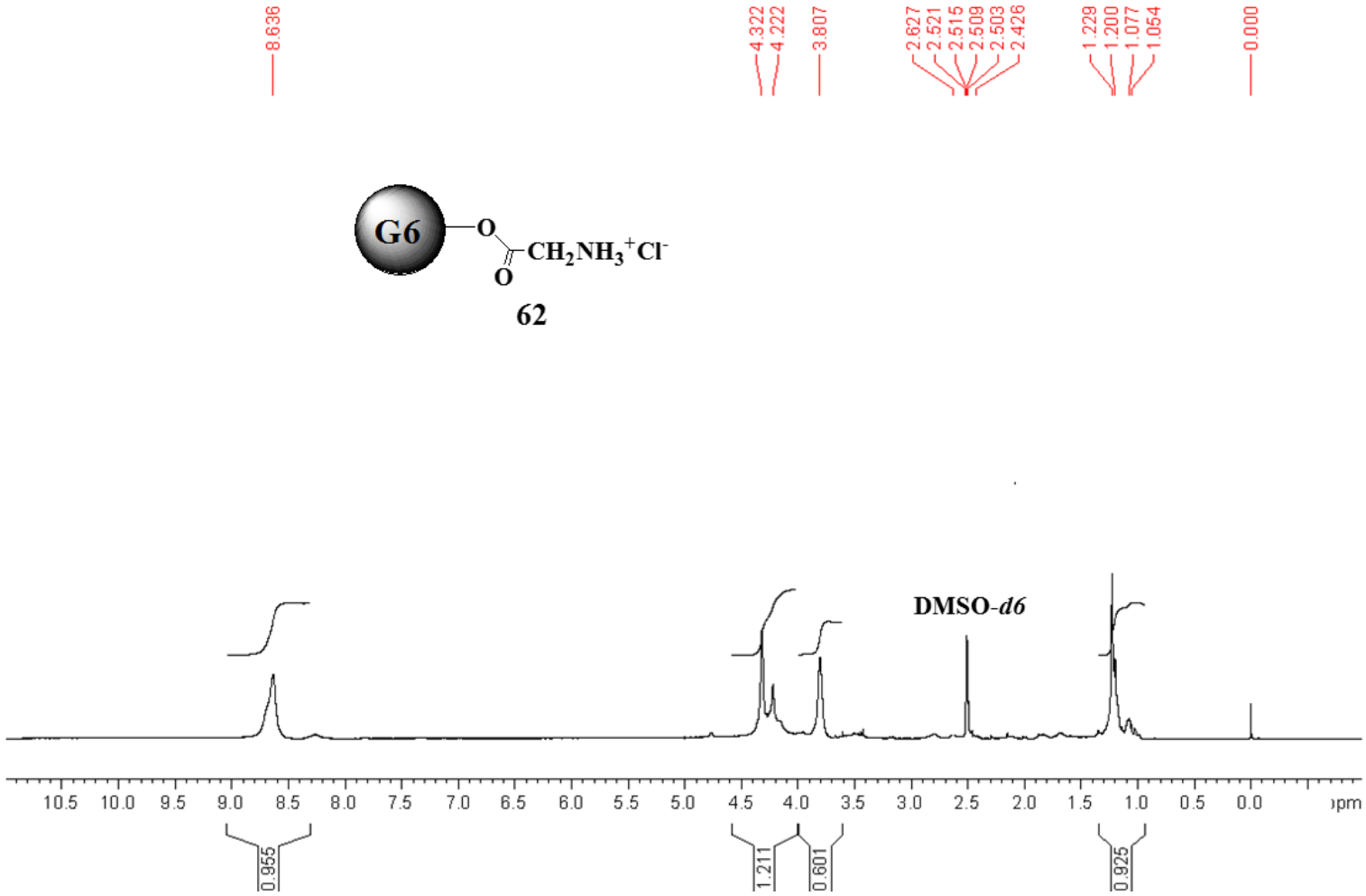


Figure S19. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectra of compound **62**

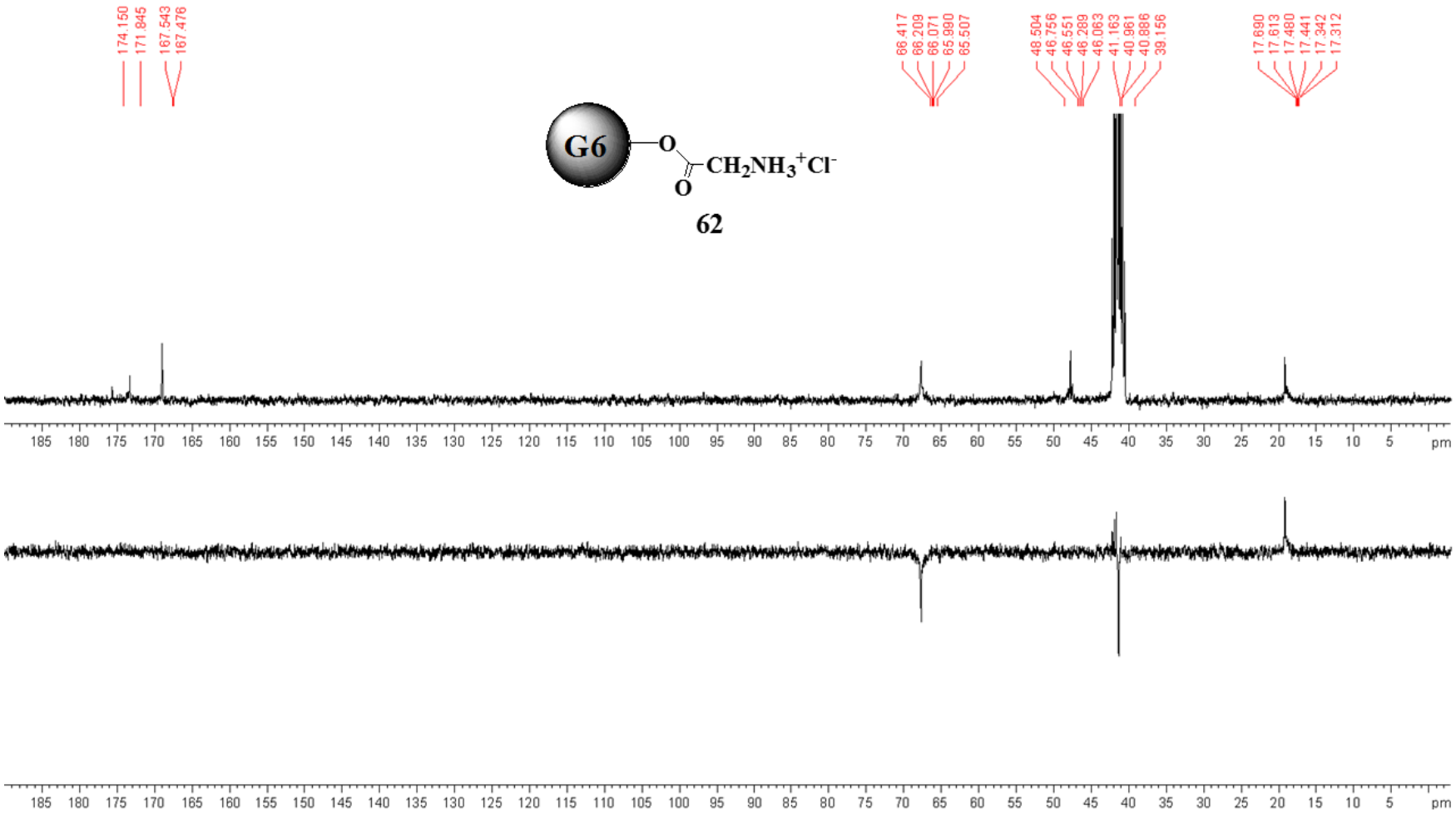


Figure S20. ^{13}C NMR and DEPT-135 (DMSO-*d6*, 75.5 MHz) spectra of compound **62**

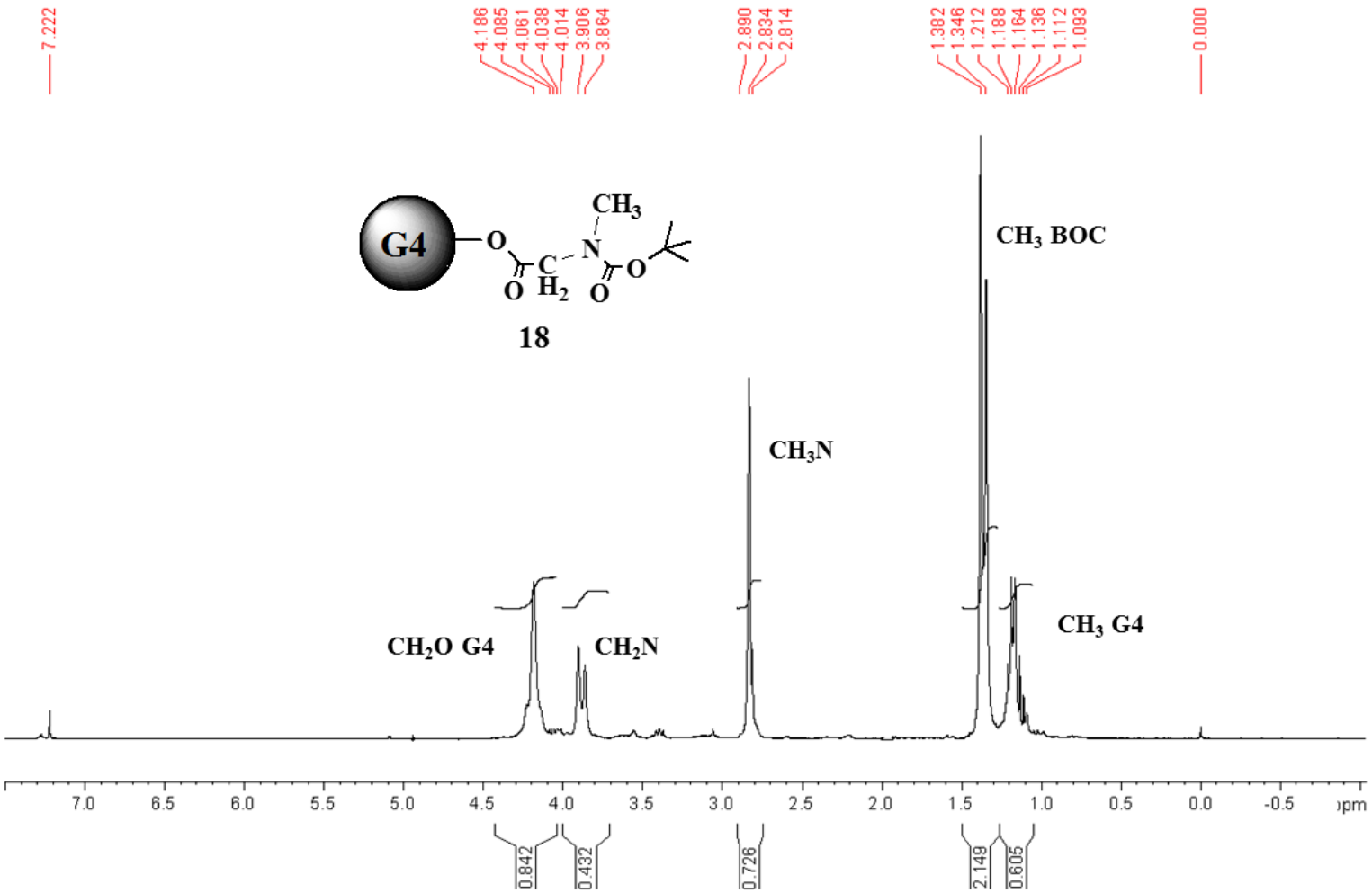


Figure S21. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum of compound **18**

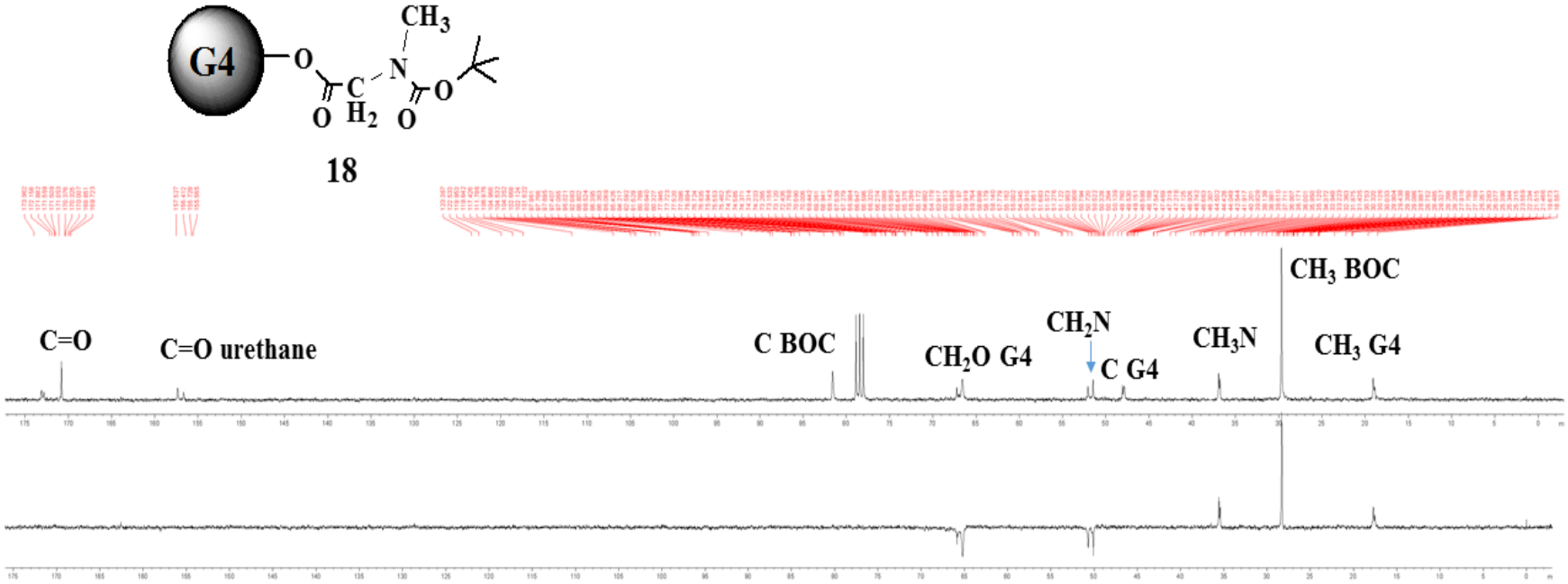


Figure S22. ^{13}C NMR and DEPT-135 ($CDCl_3$, 75.5 MHz) spectra of compound **18**

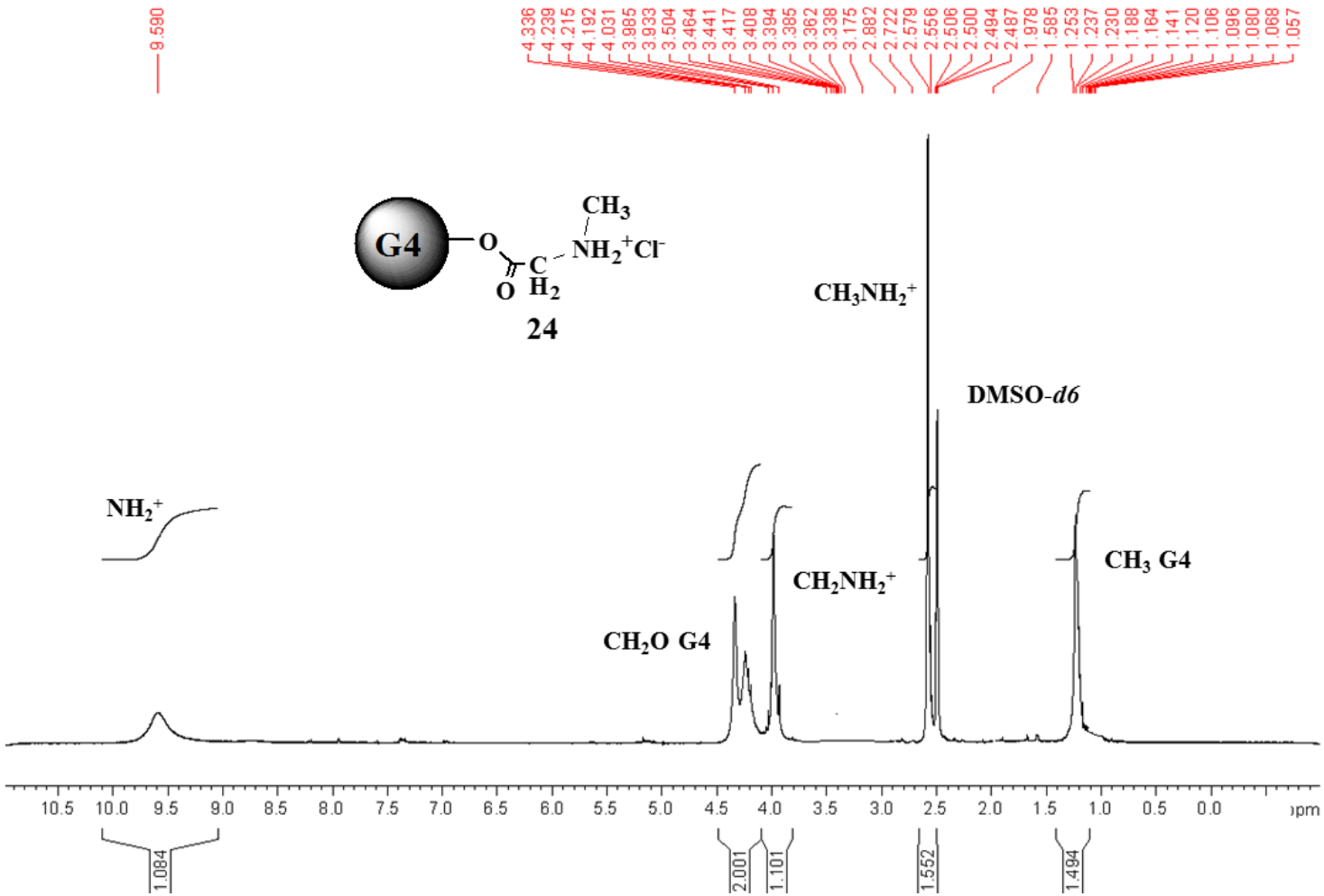


Figure S23. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound **24**

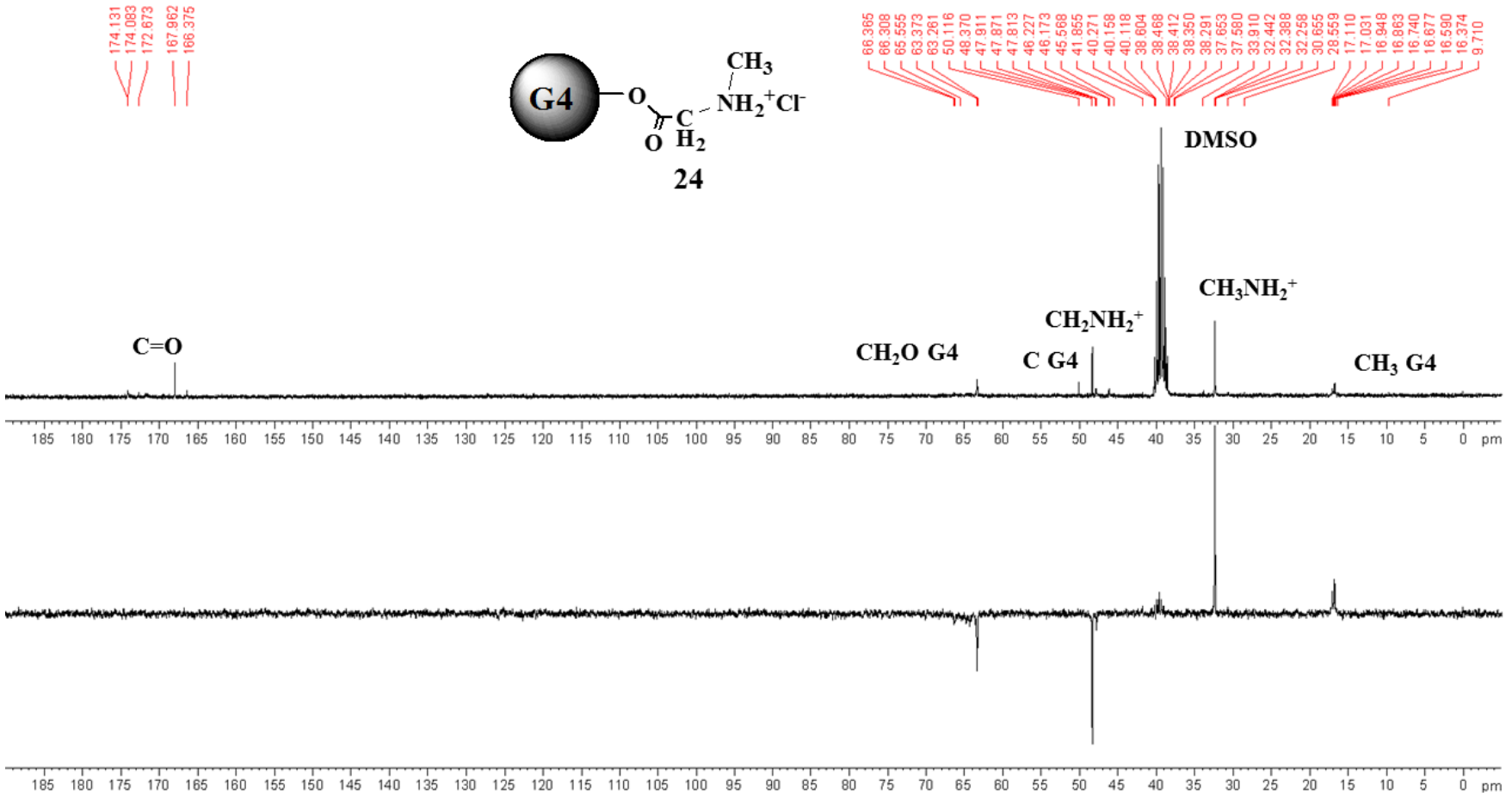


Figure S24. ^{13}C NMR and DEPT-135 (DMSO-*d6*, 75.5 MHz) spectra of compound **24**

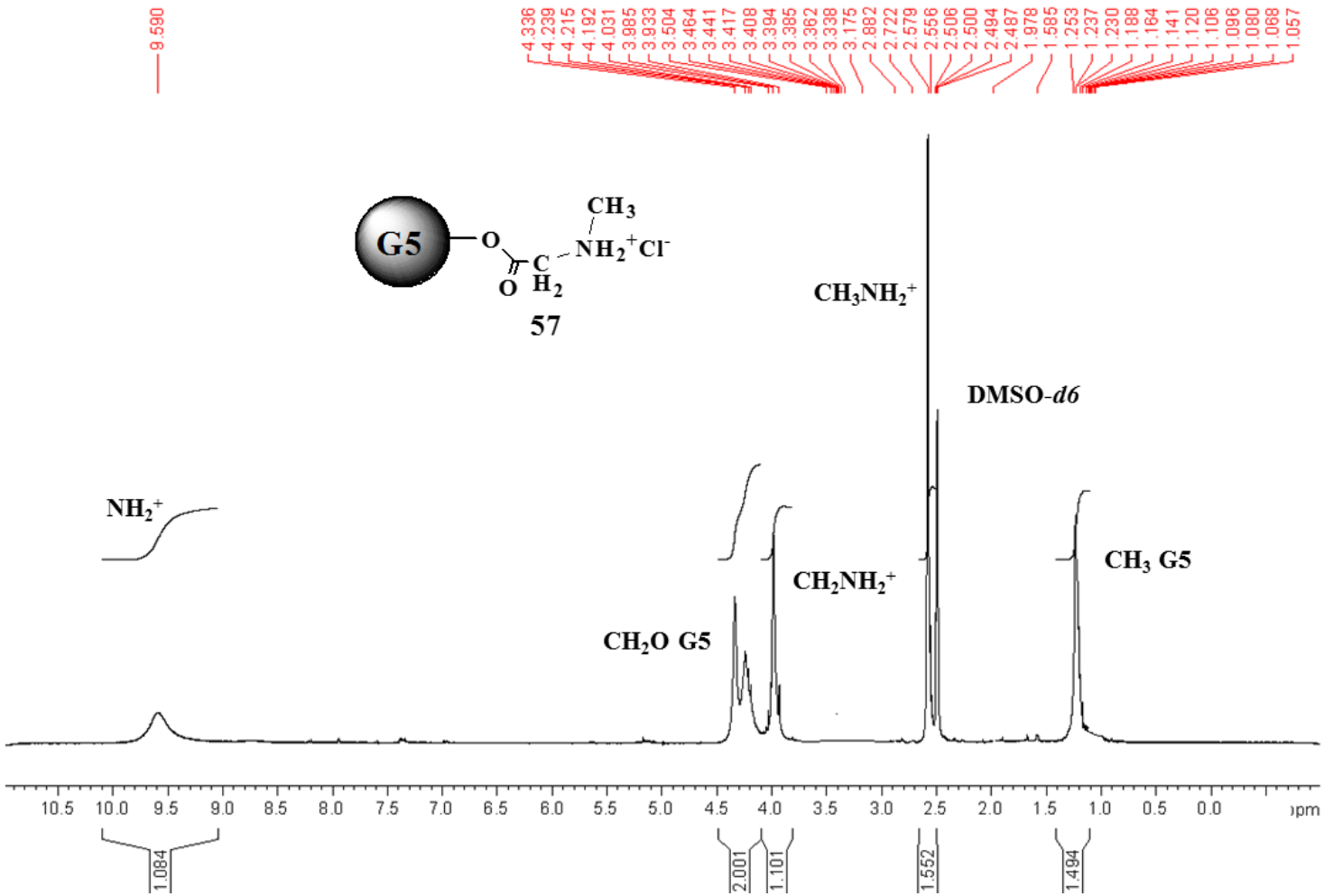


Figure S25. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound 57

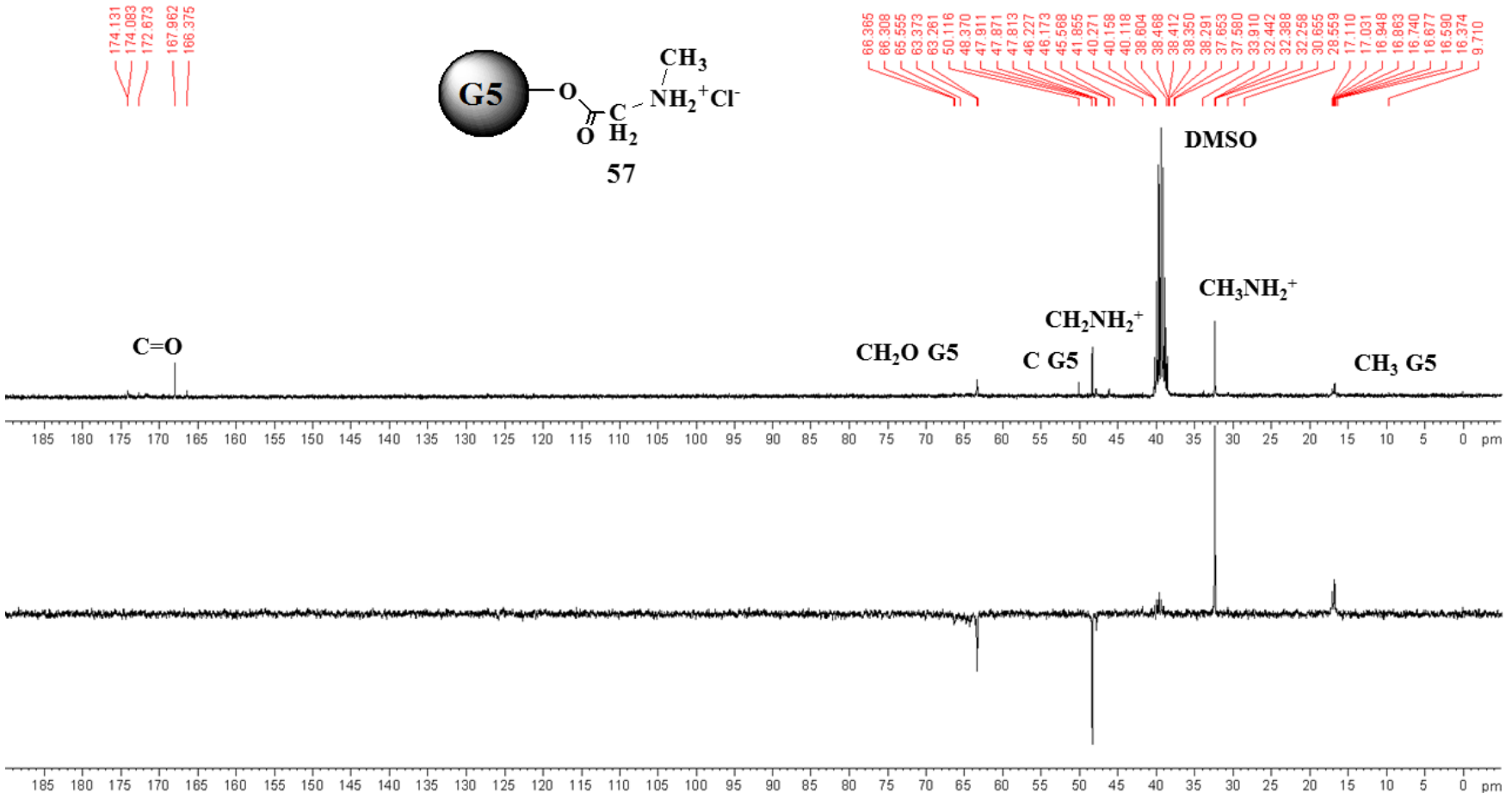


Figure S26. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound **57**

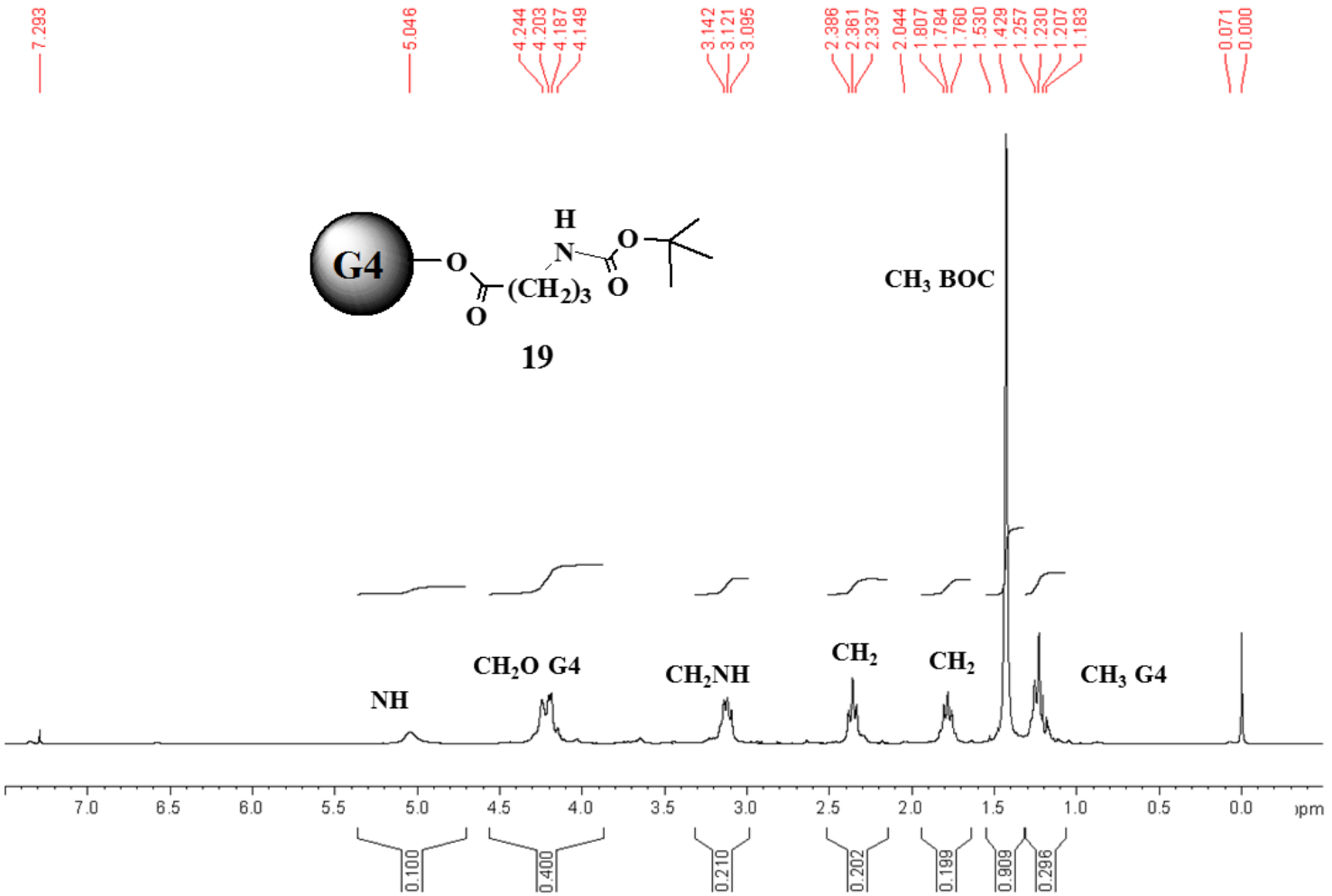


Figure S27. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum of compound **19**

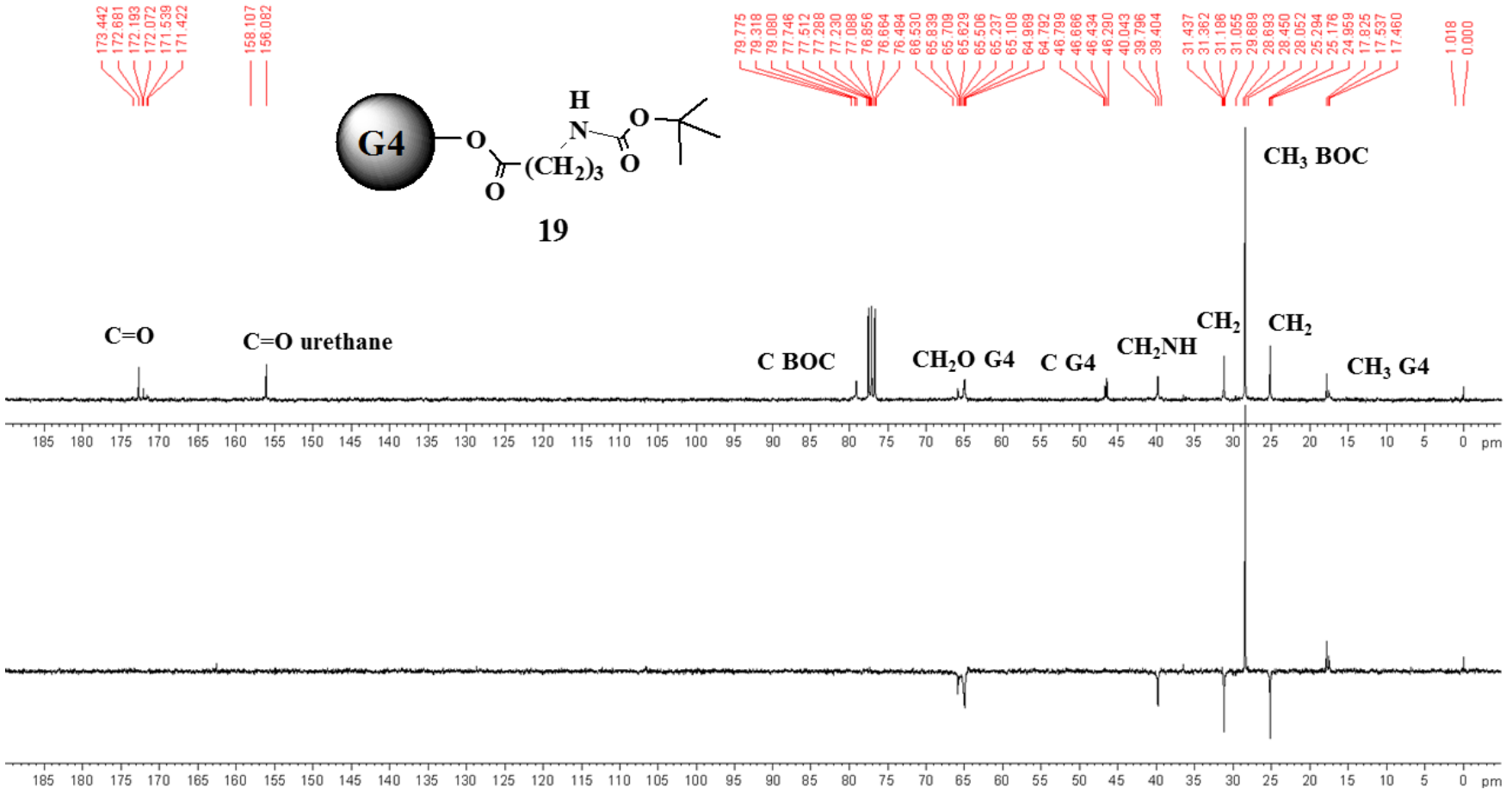


Figure S28. ^{13}C NMR and DEPT-135 ($CDCl_3$, 75.5 MHz) spectra of compound **19**

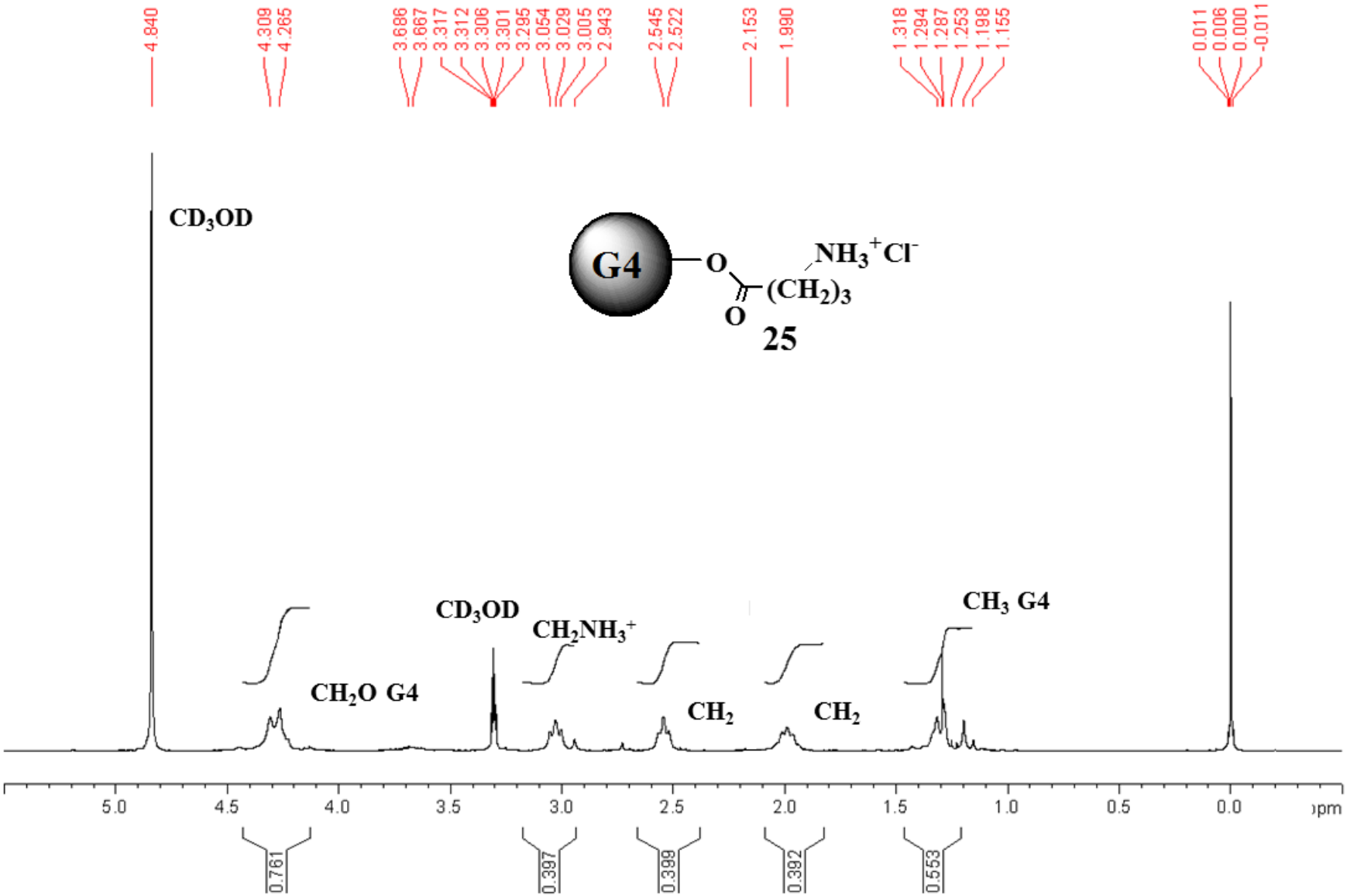


Figure S29. ^{1}H NMR (CD_3OD, 300 MHz) spectrum of compound **25**

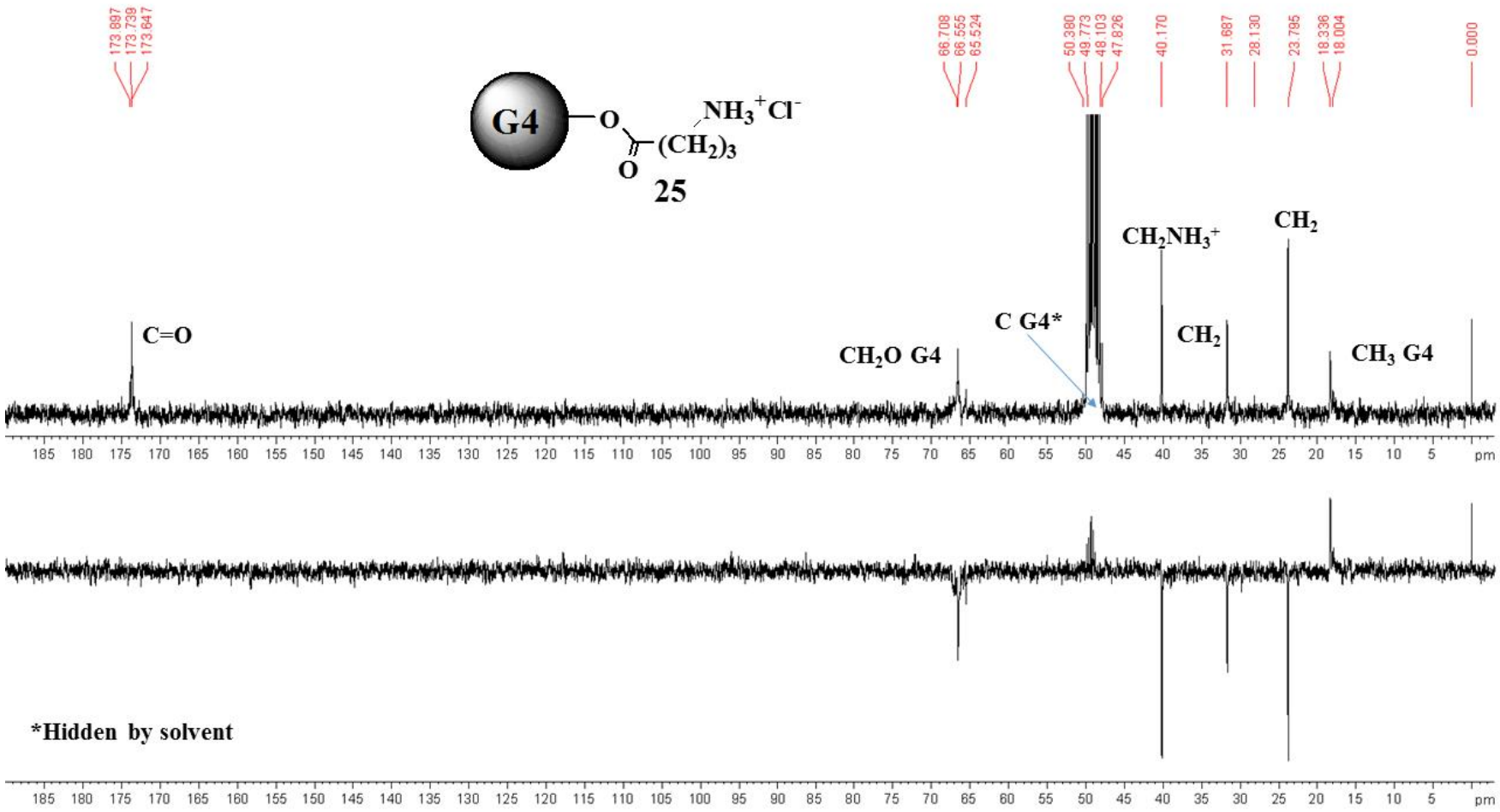


Figure S30. ^{13}C NMR and DEPT-135 (CD_3OD, 75.5 MHz) spectra of compound **25**

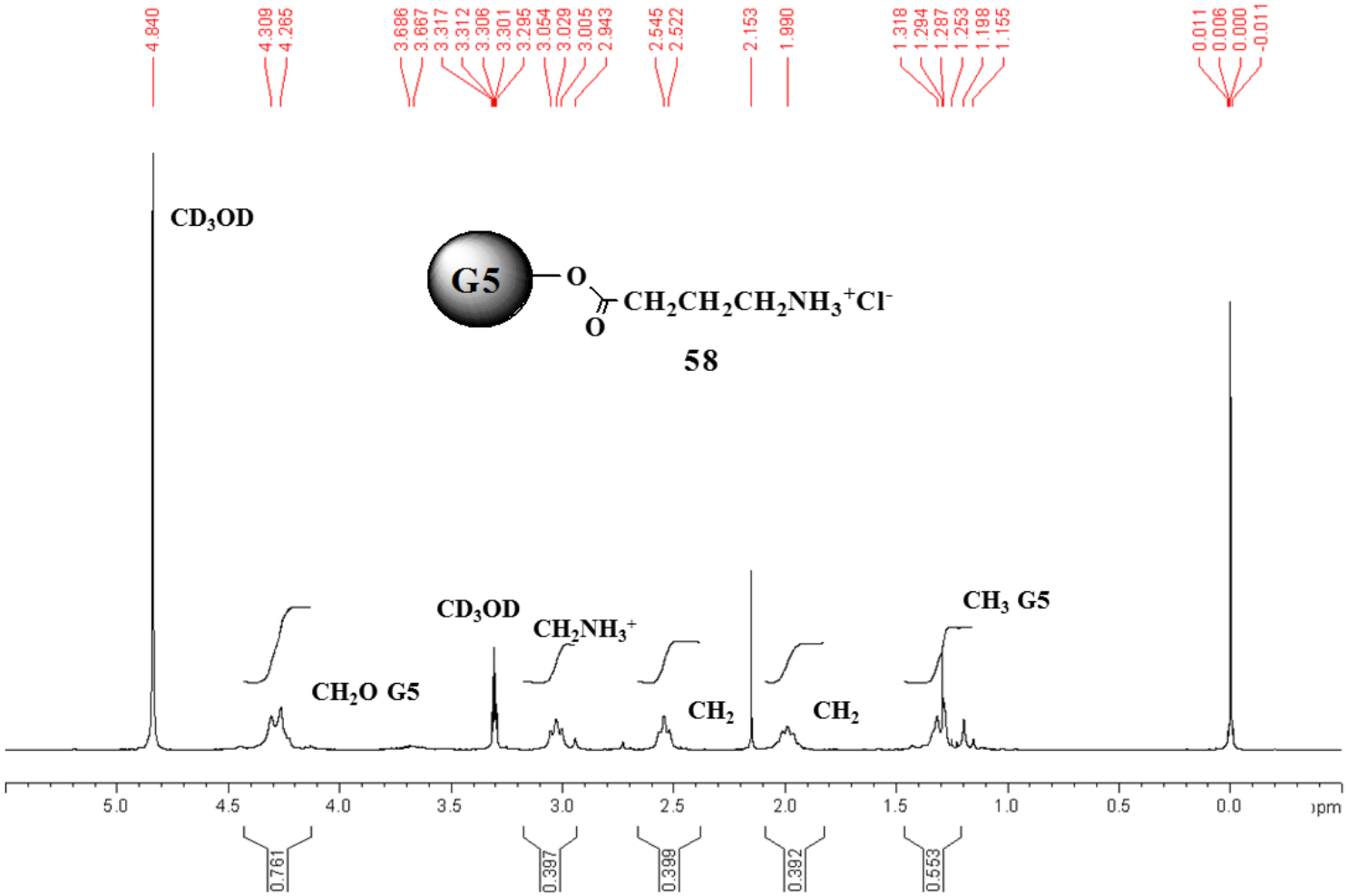


Figure S31. ^{1}H NMR (CD_3OD, 300 MHz) spectrum of compound **58**

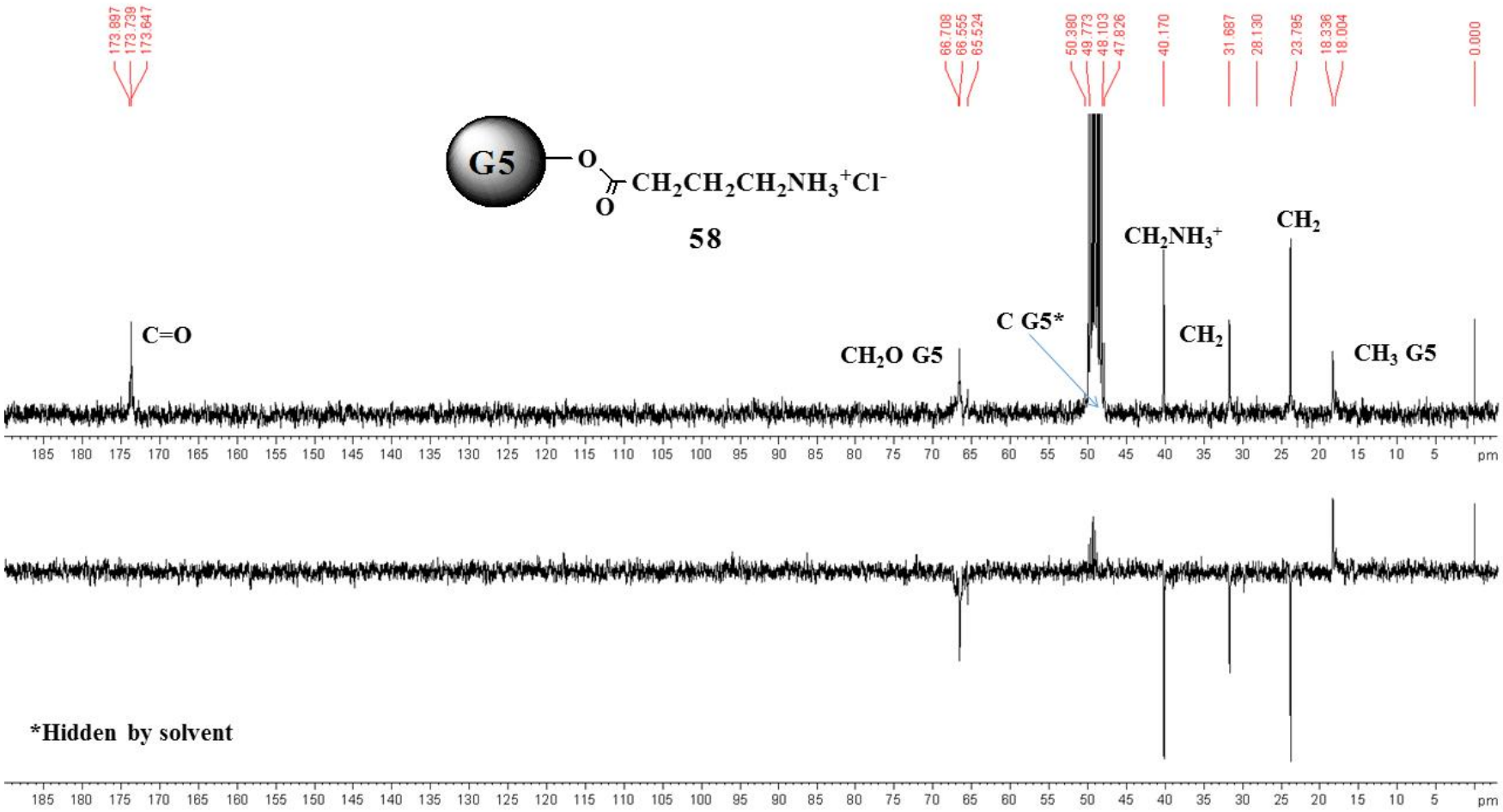


Figure S32. ^{13}C NMR and DEPT-135 (CD_3OD, 75.5 MHz) spectra of compound **58**

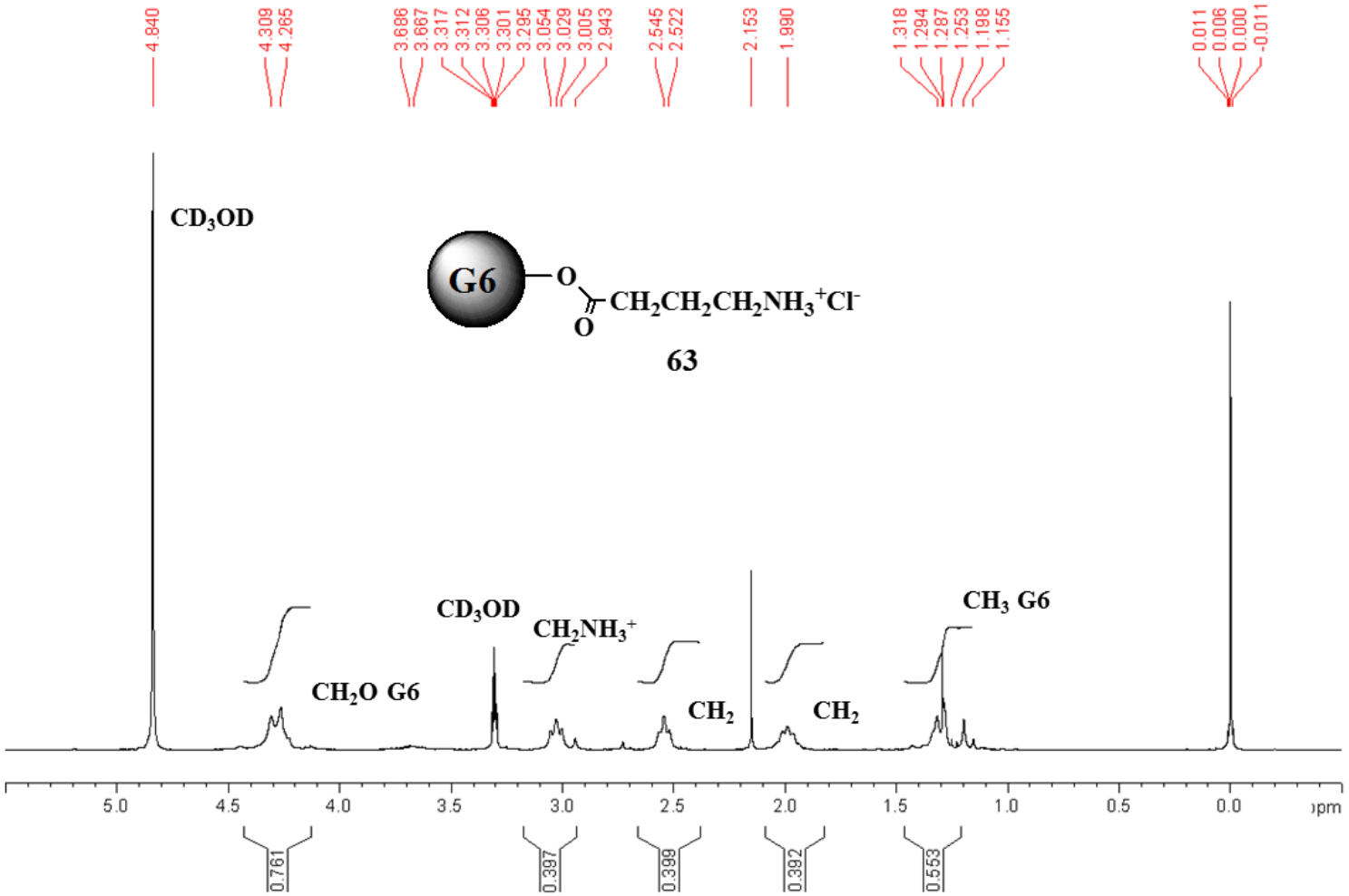


Figure S33. ^{1}H NMR (CD_3OD, 300 MHz) spectrum of compound **63**

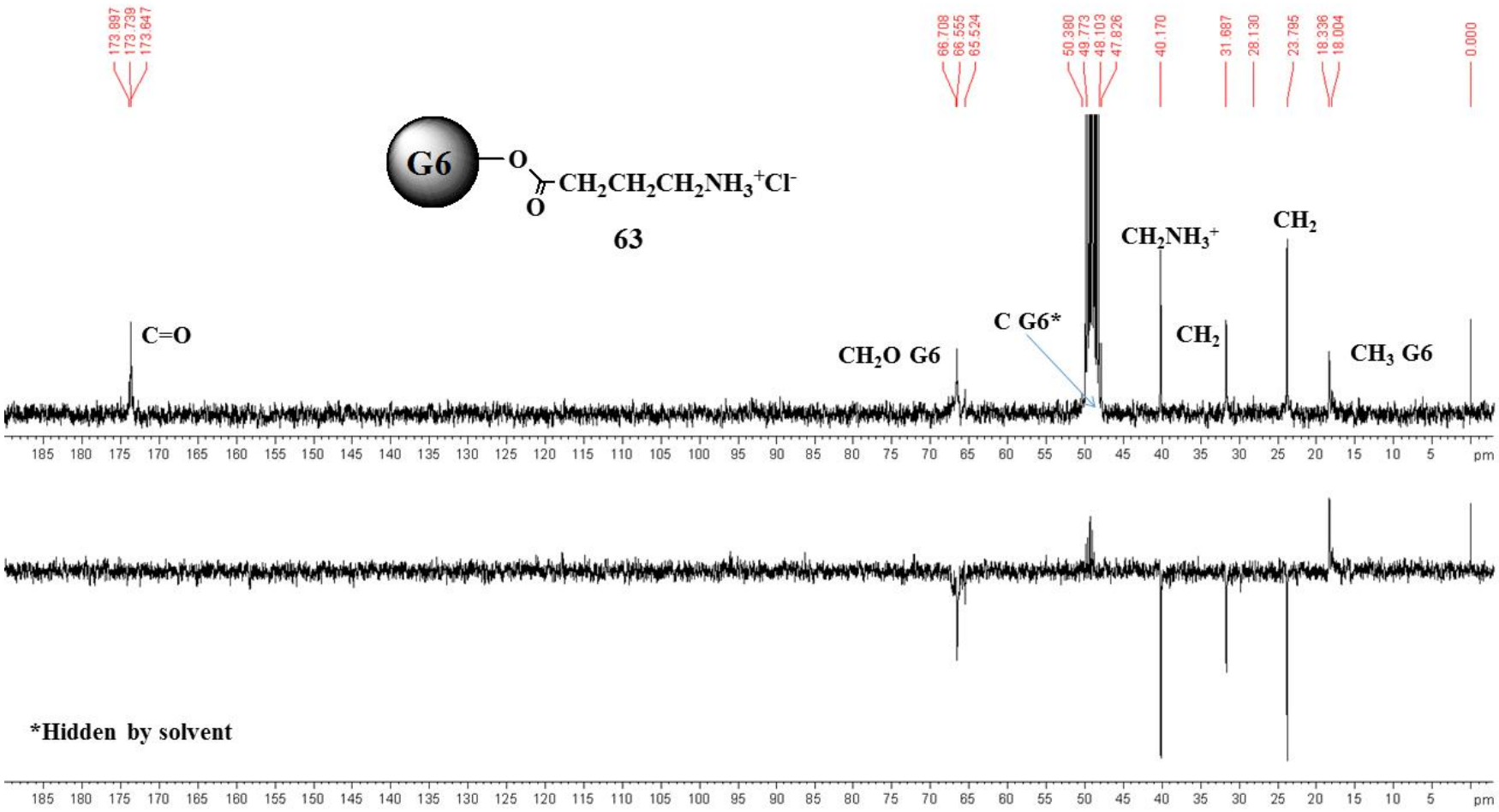


Figure S34. ^{13}C NMR and DEPT-135 (CD_3OD, 75.5 MHz) spectra of compound **63**

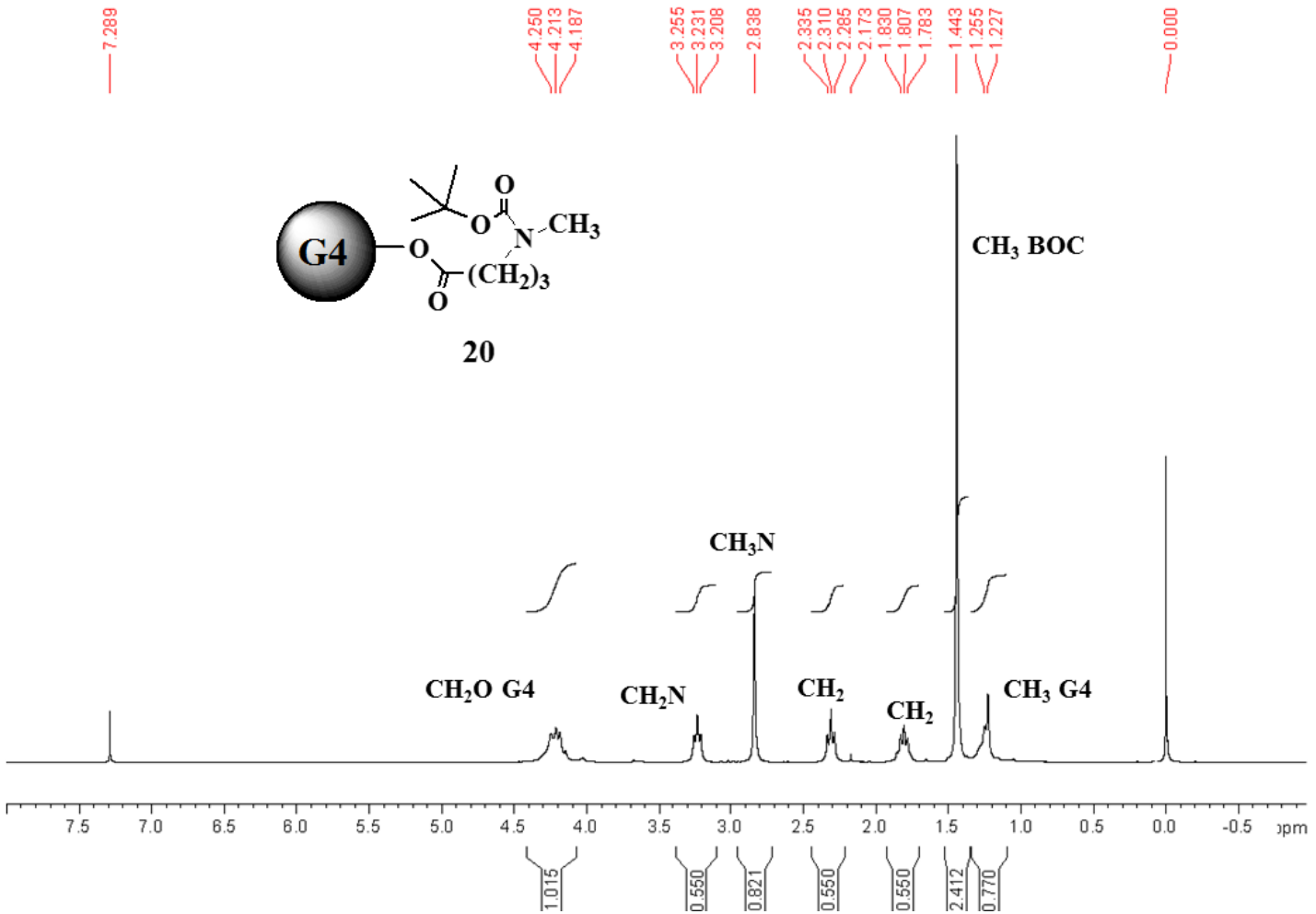


Figure S35. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum of compound **20**

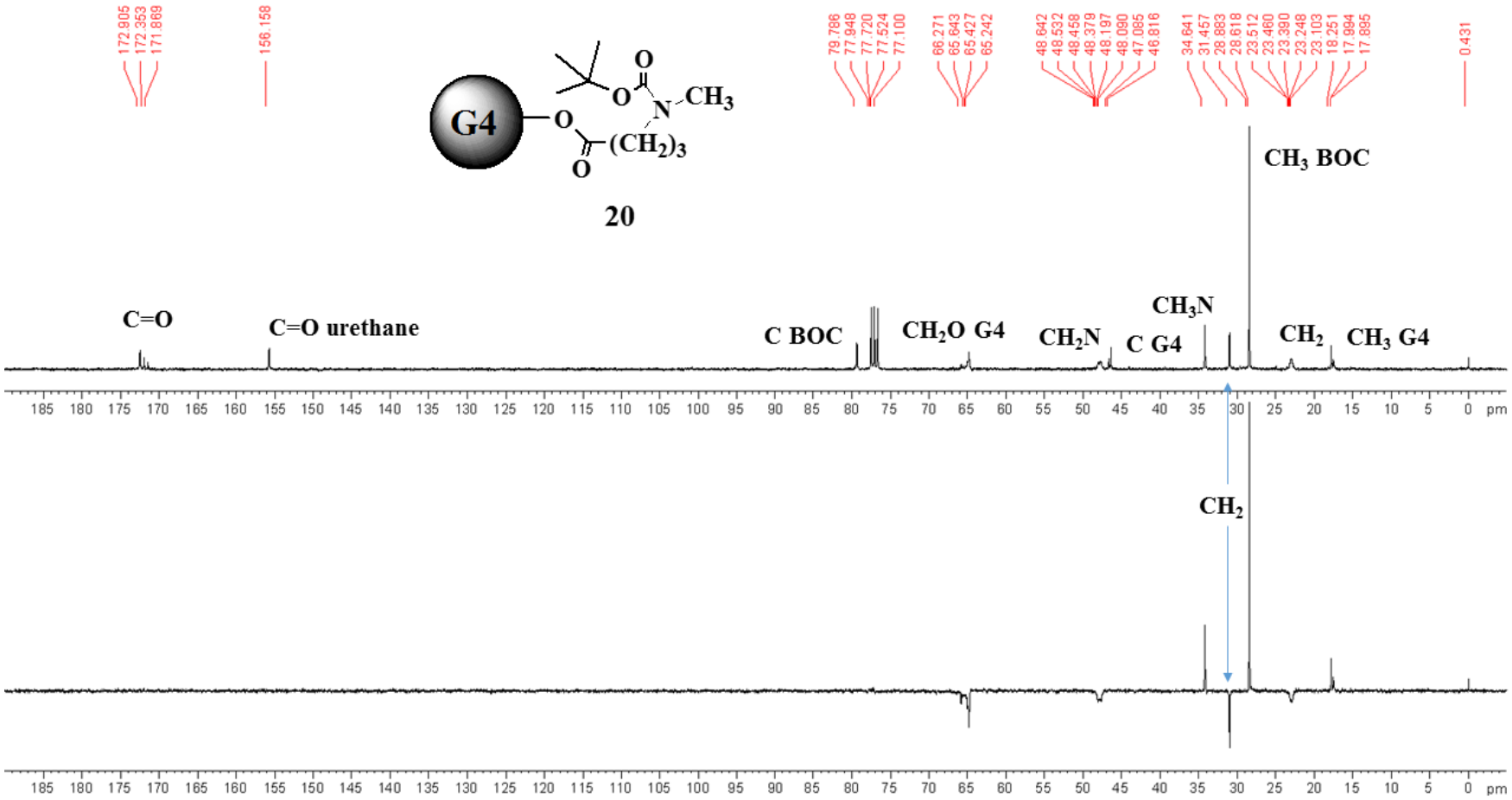


Figure S36. ^{13}C NMR and DEPT-135 ($CDCl_3$, 75.5 MHz) spectra of compound **20**

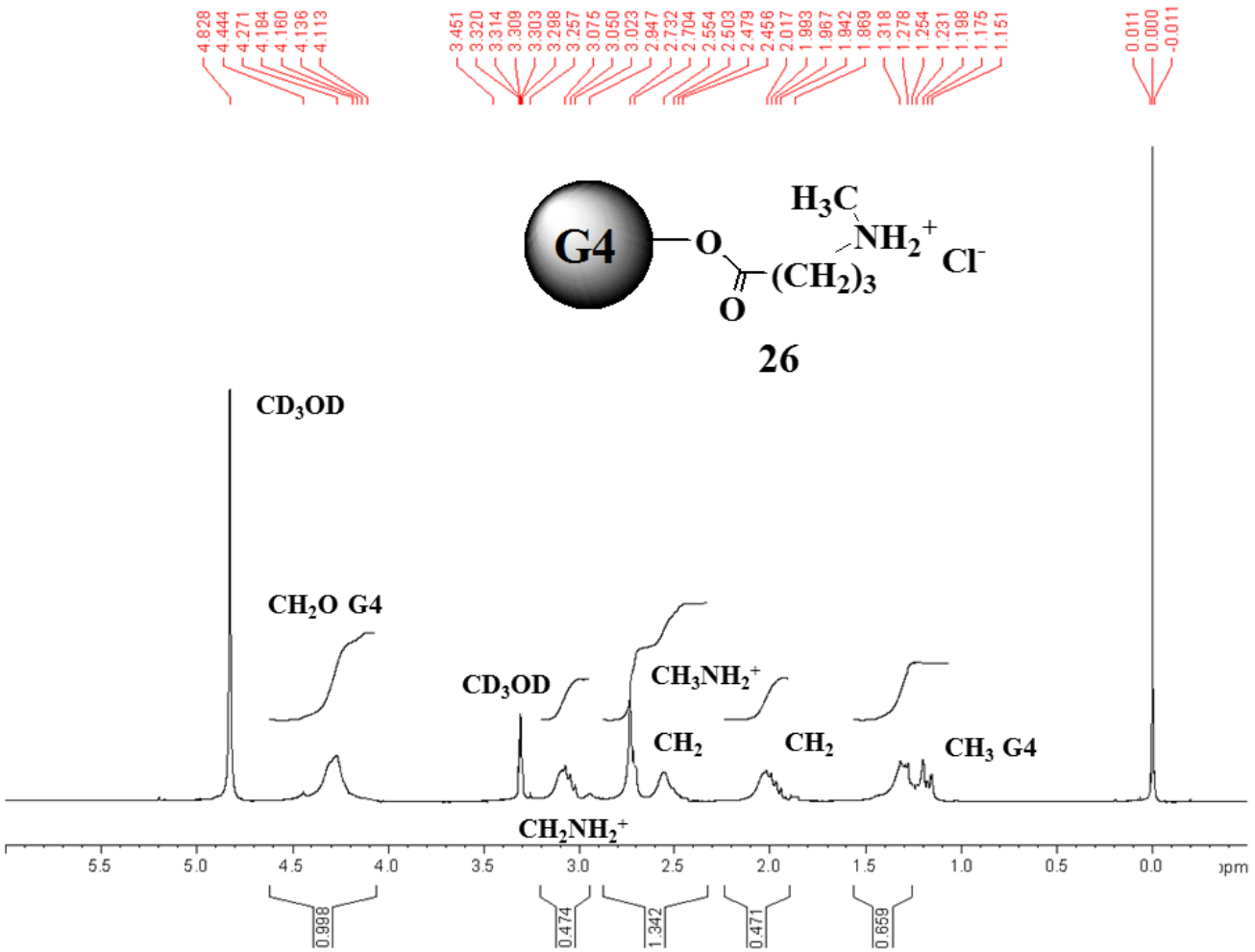


Figure S37. ^{1}H NMR (CD_3OD, 300 MHz) spectrum of compound **26**

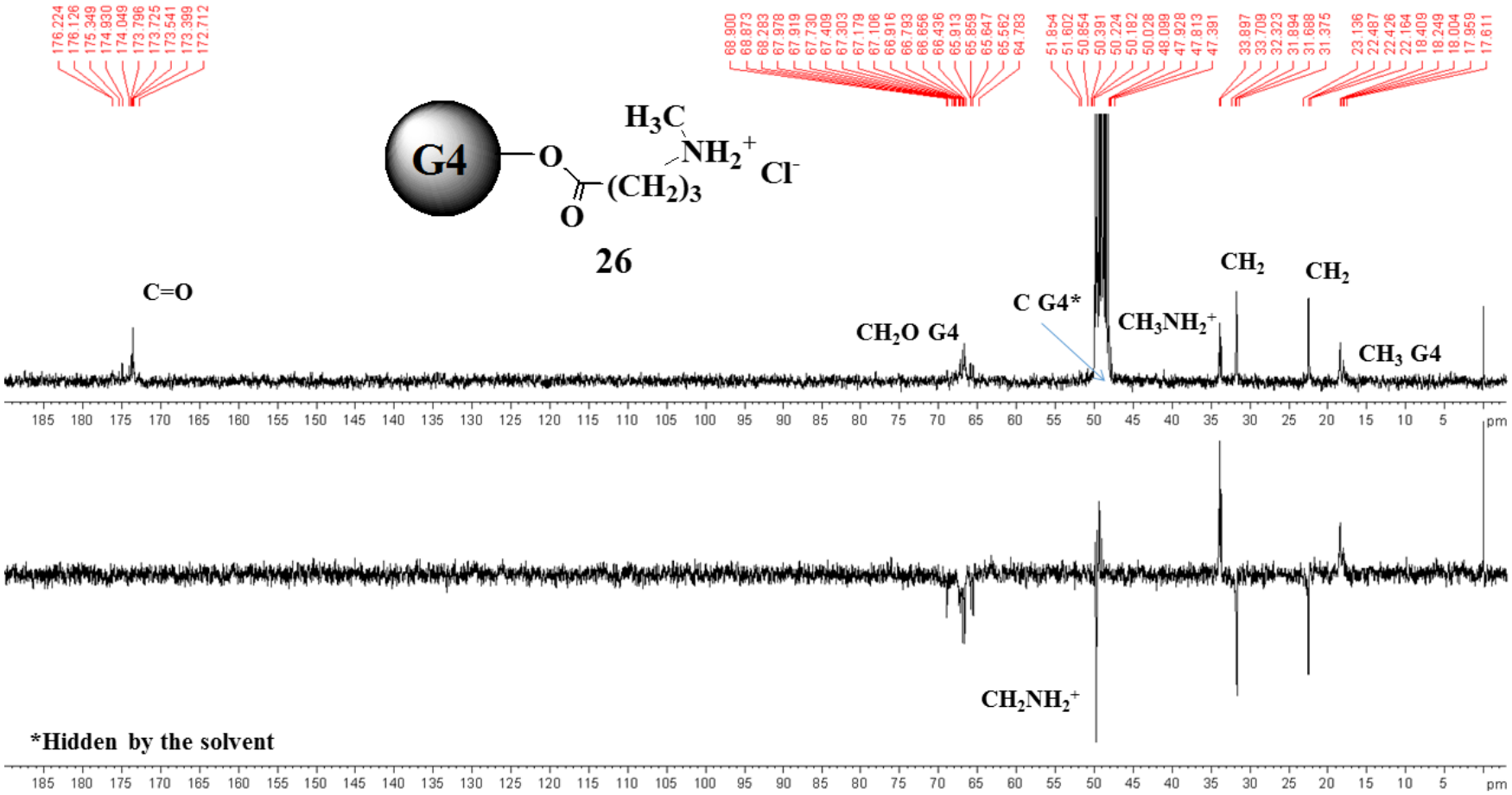


Figure S38. ^{13}C NMR and DEPT-135 (CD_3OD, 75.5 MHz) spectra of compound **26**

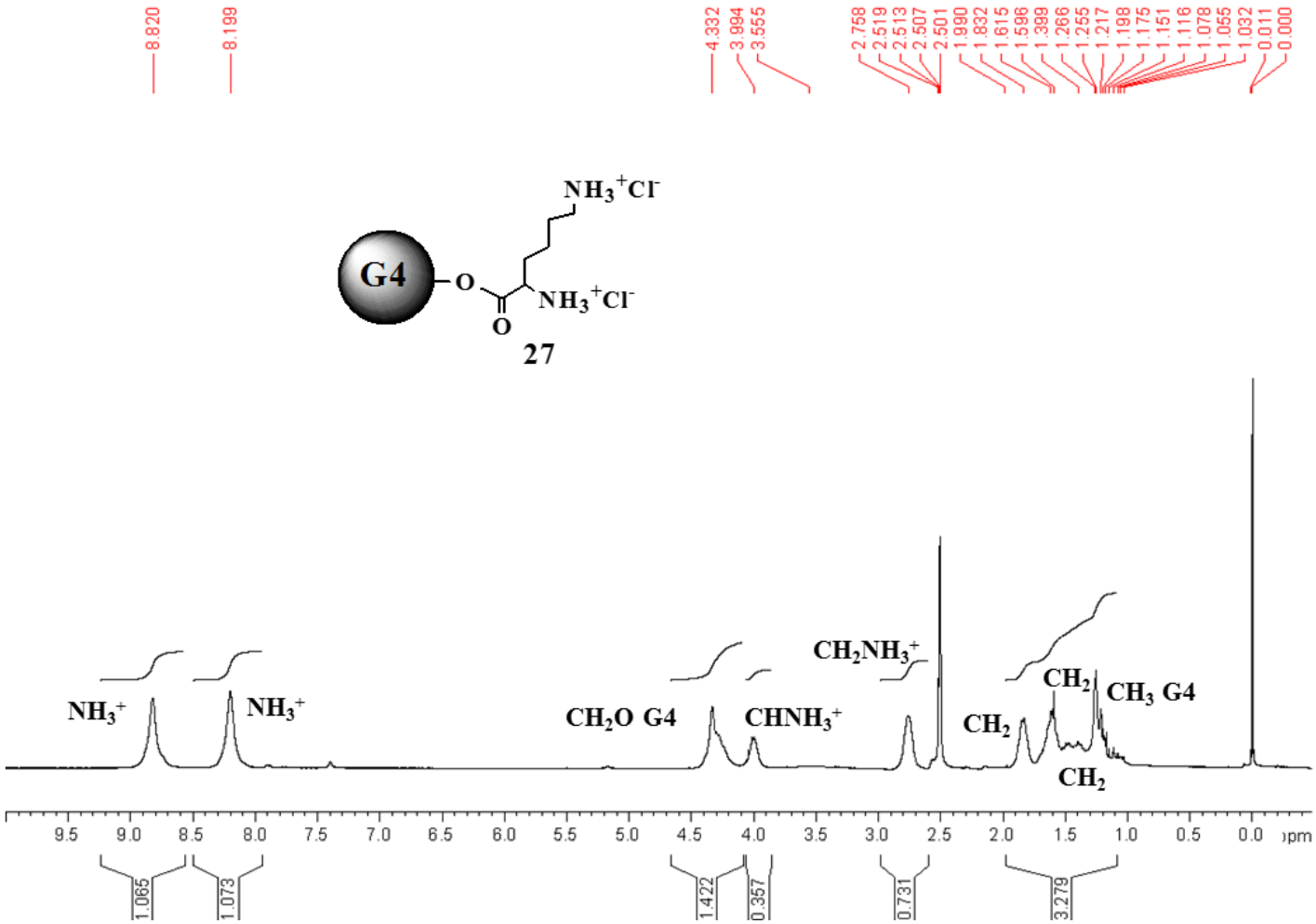


Figure S39. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound **24**

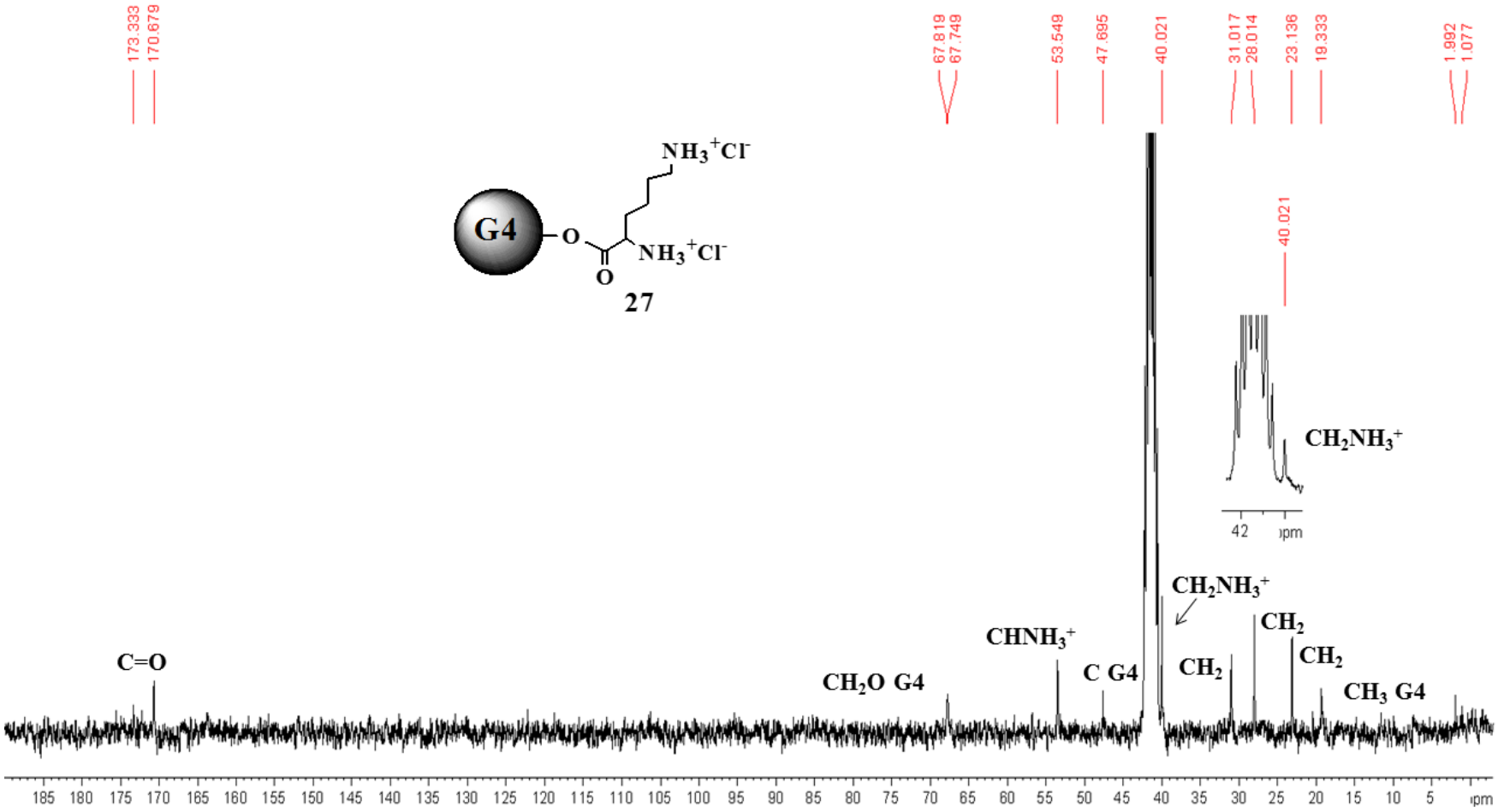


Figure S40. ^{13}C NMR and DEPT-135 (DMSO-*d6*, 75.5 MHz) spectra of compound **27**

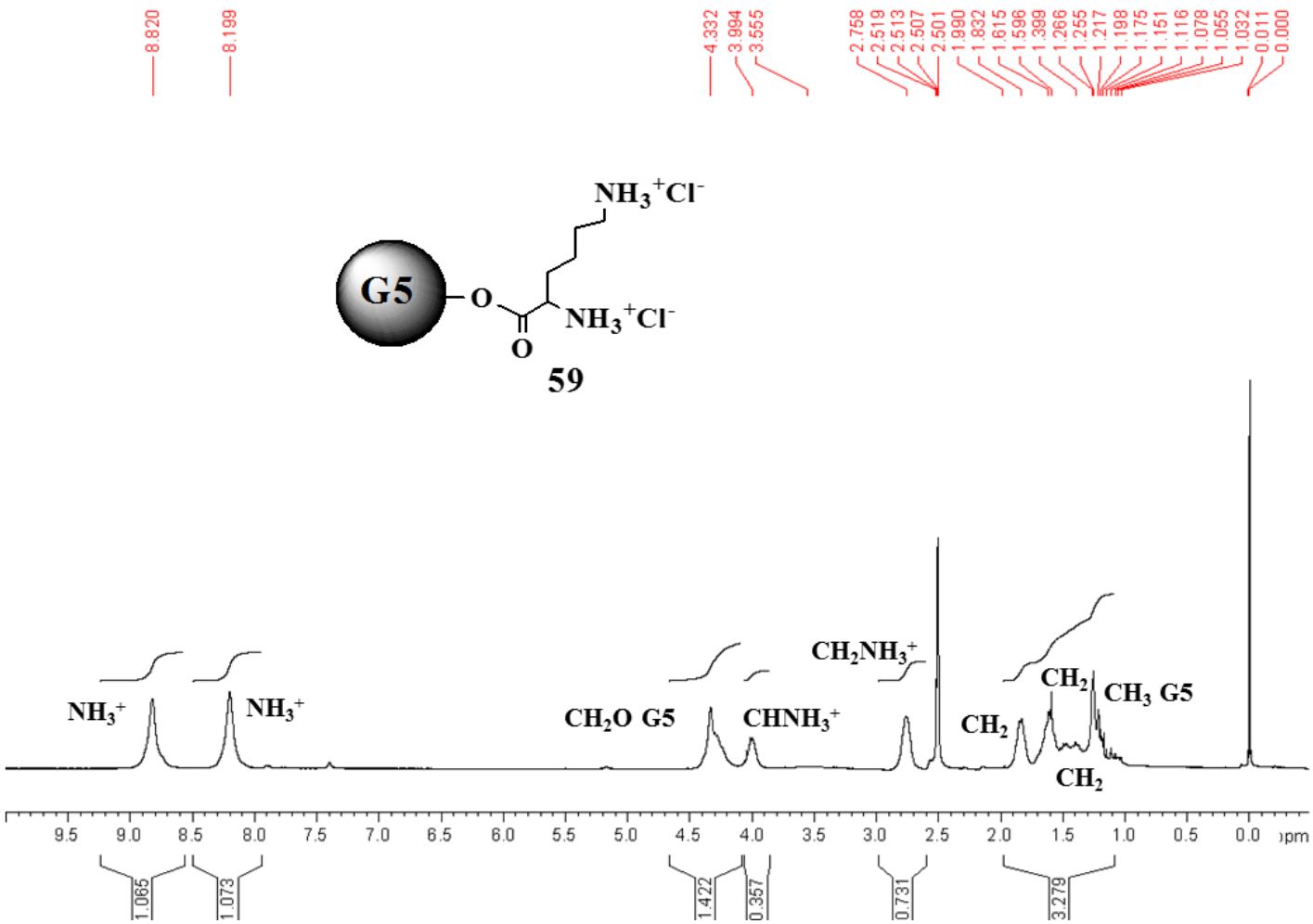


Figure S41. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound **59**

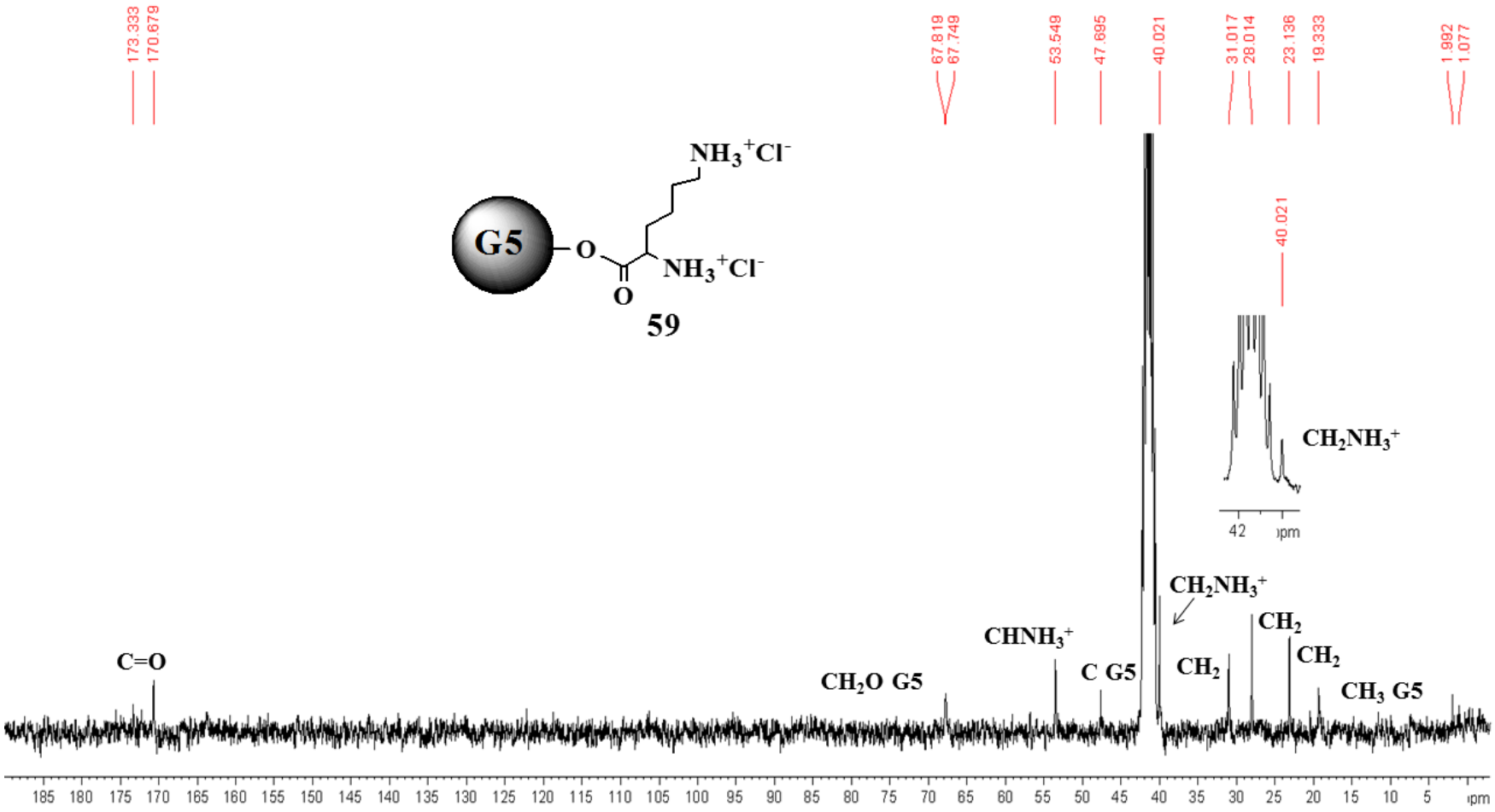


Figure S42. ^{13}C NMR and DEPT-135 (DMSO-*d6*, 75.5 MHz) spectra of compound **59**

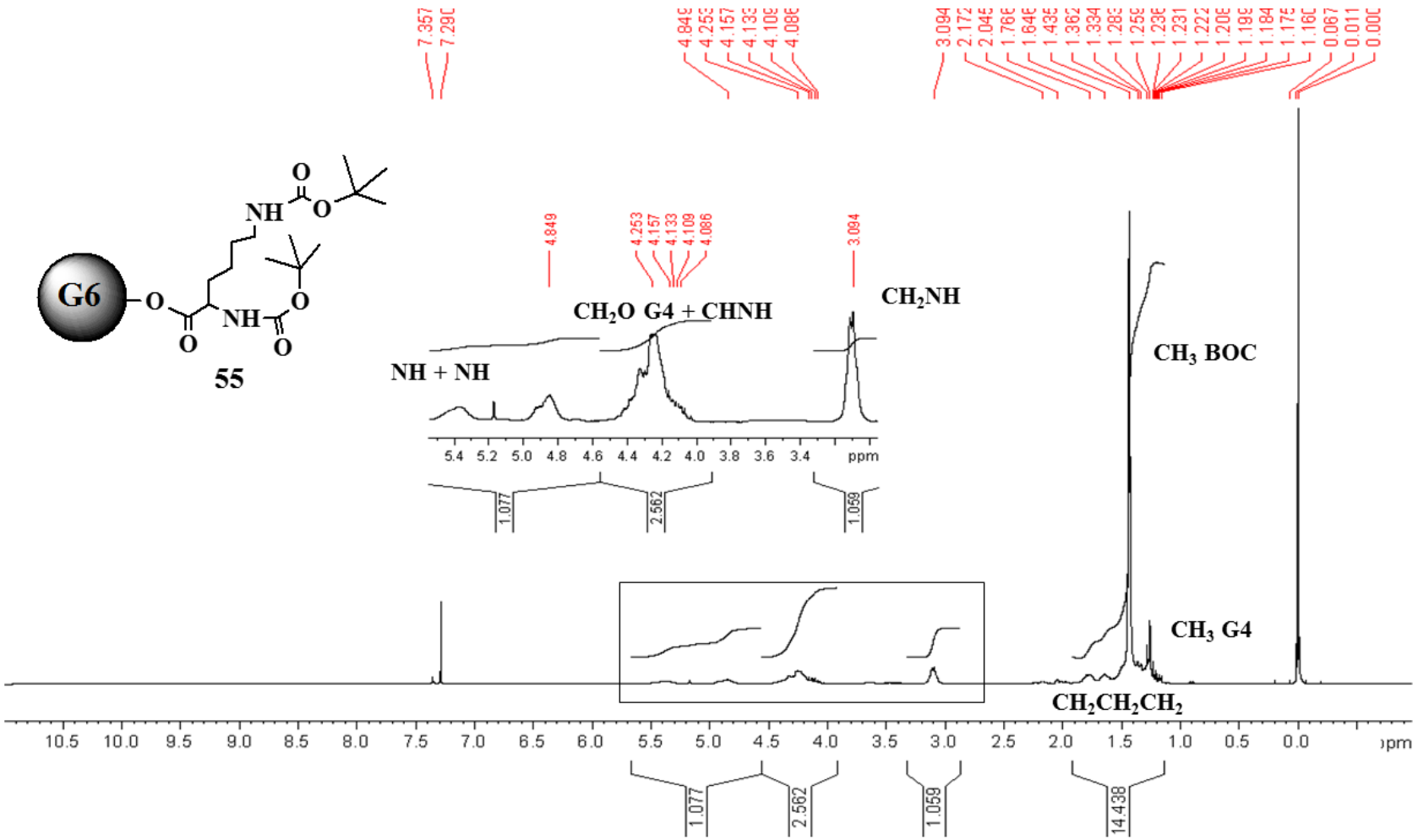


Figure S43. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum of compound **55**

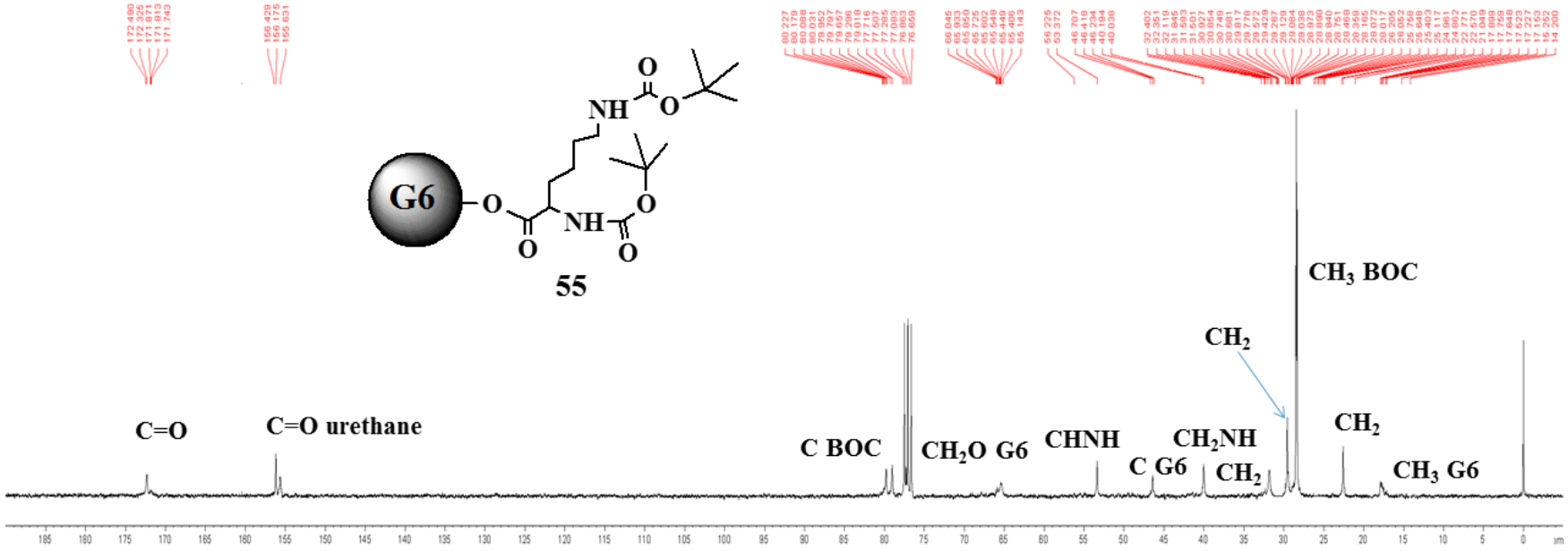


Figure S44. ^{13}C NMR ($CDCl_3$, 75.5 MHz) spectrum of compound **55**

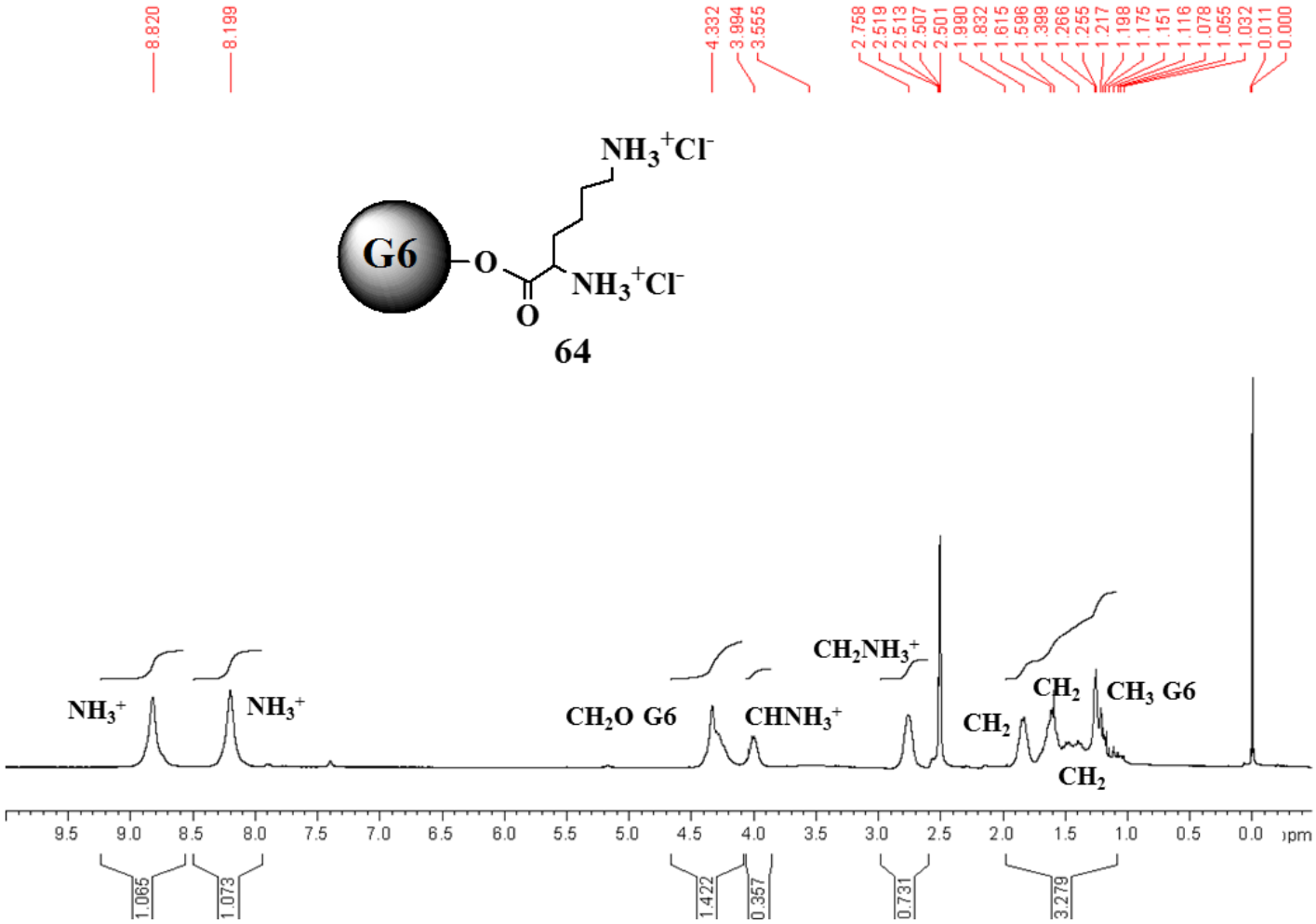


Figure S45. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound **64**

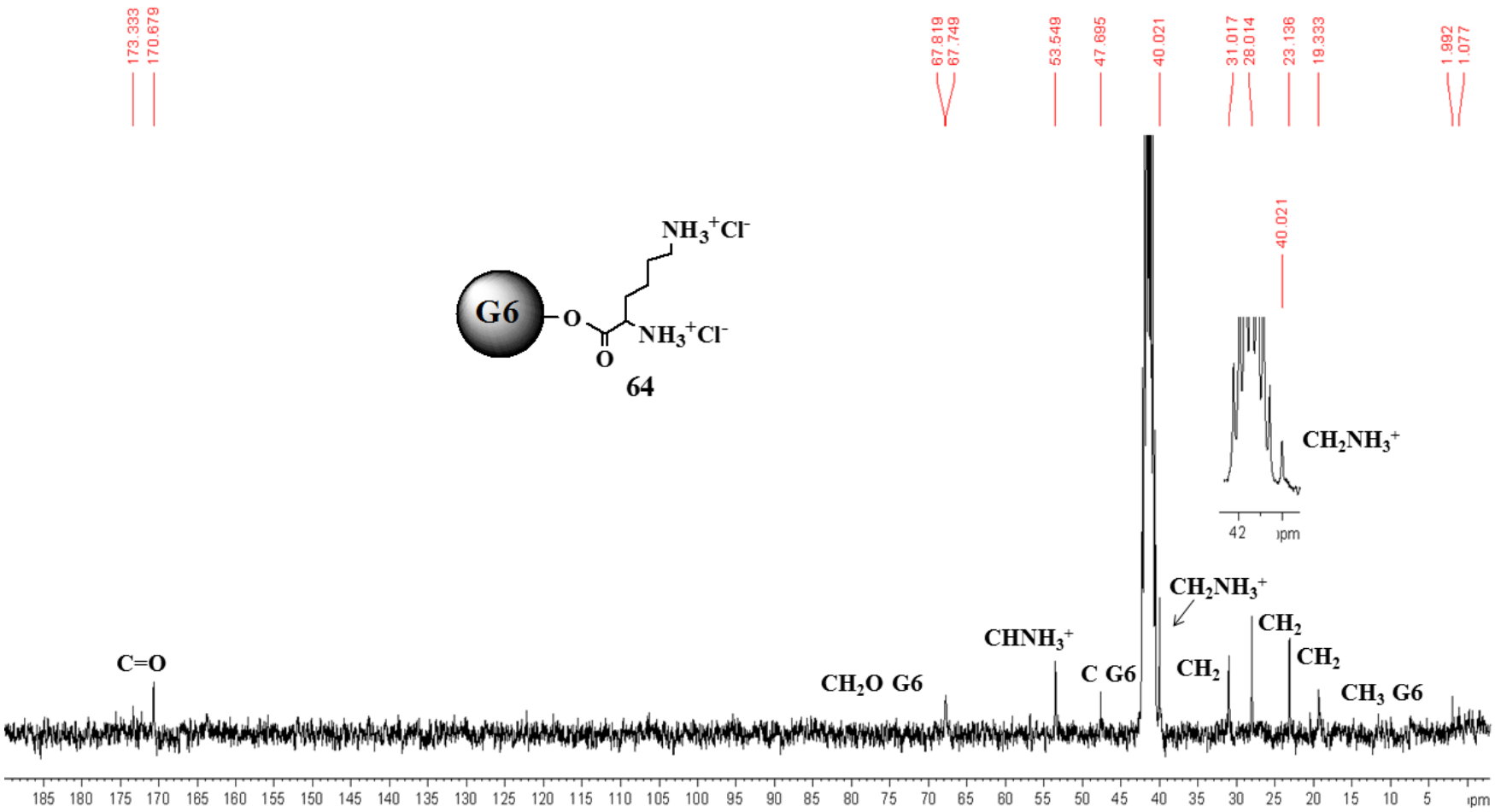


Figure S46. ^{13}C NMR (DMSO-*d6*, 75.5 MHz) spectrum of compound **64**

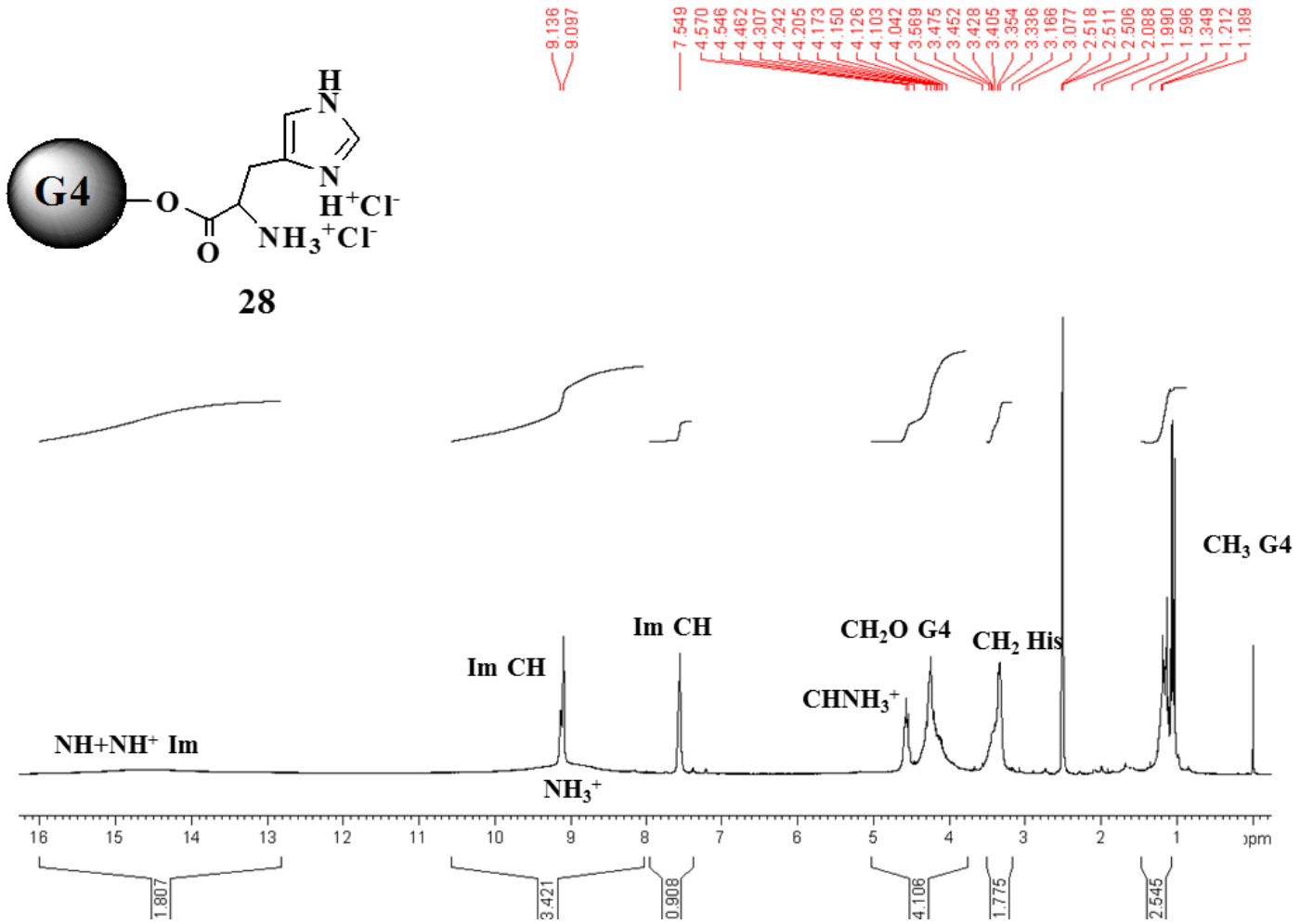


Figure S47. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound **28**

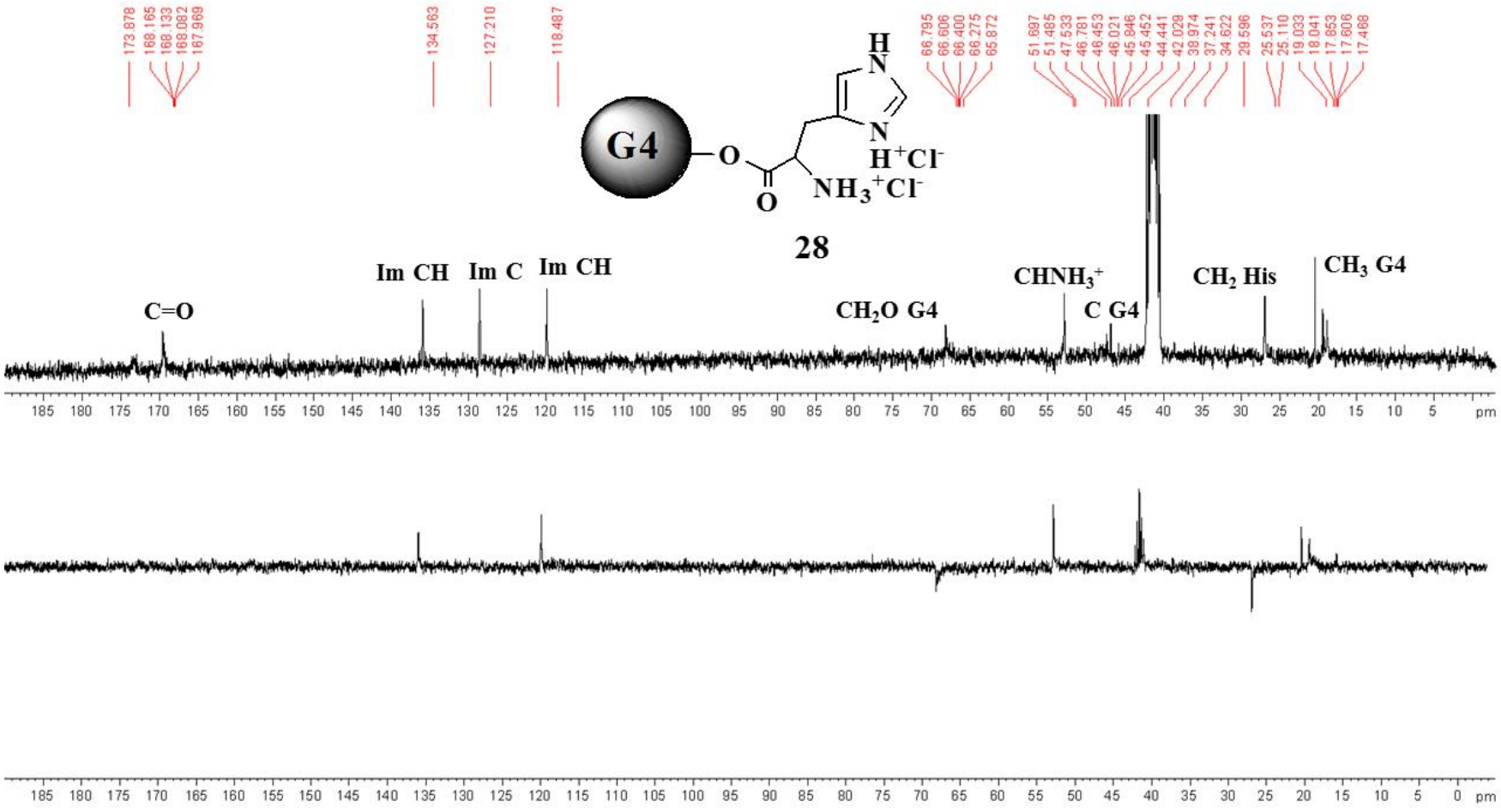


Figure S48. ^{13}C NMR and DEPT-135 (DMSO-*d6*, 75.5 MHz) spectra of compound **28**

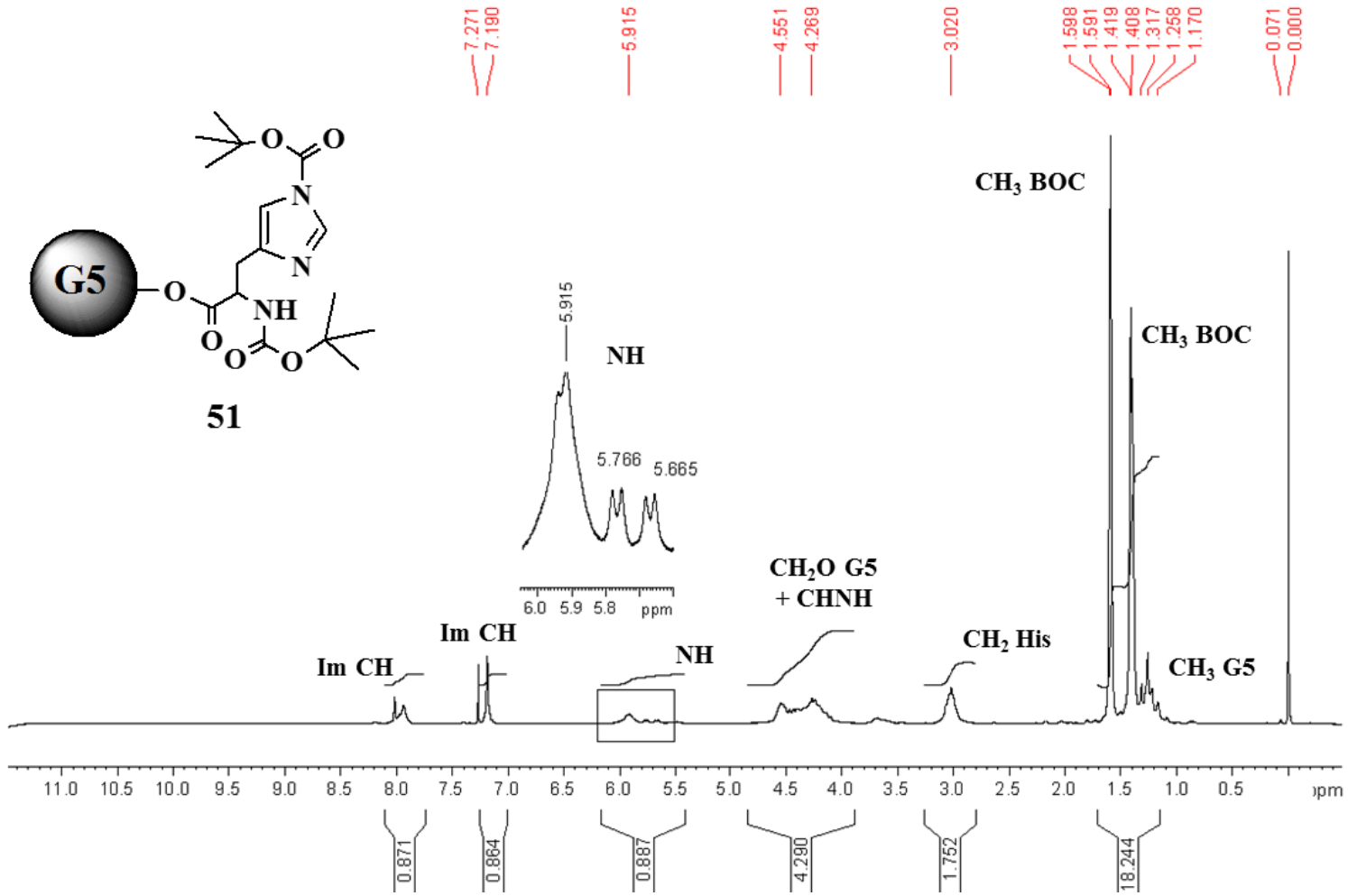


Figure S49. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum of compound **51**

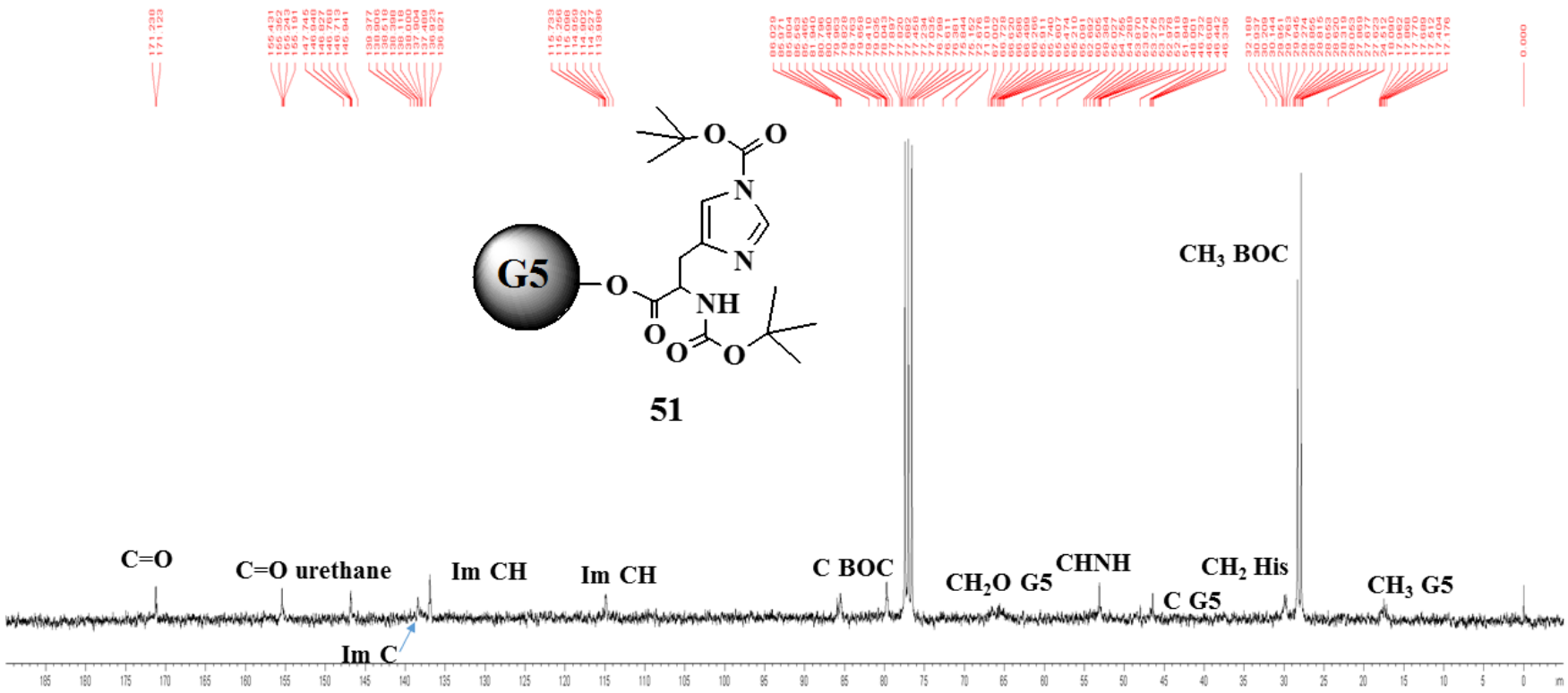


Figure S50. ^{13}C NMR ($CDCl_3$, 75.5 MHz) spectrum of compound **51**

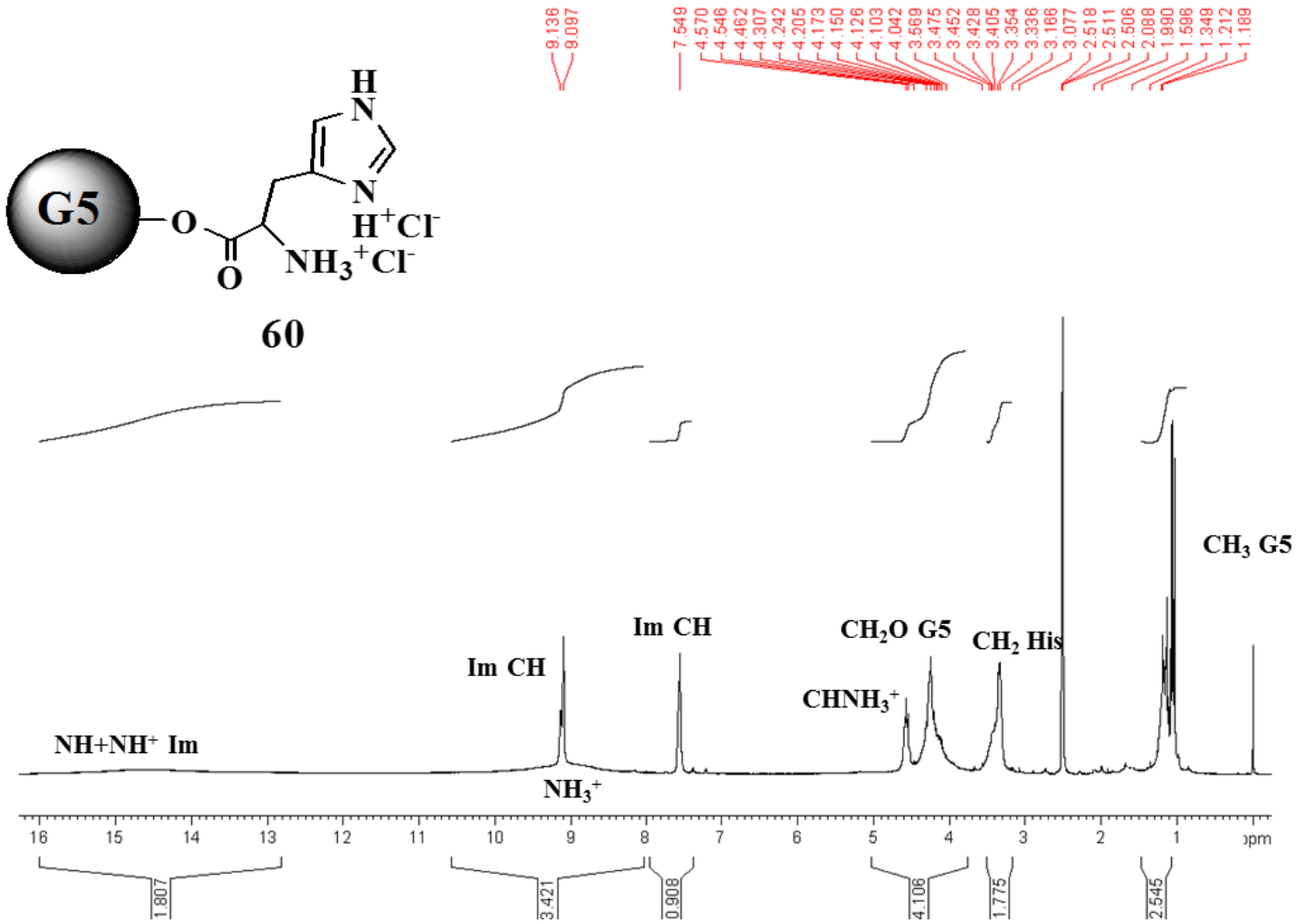


Figure S51. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound **60**

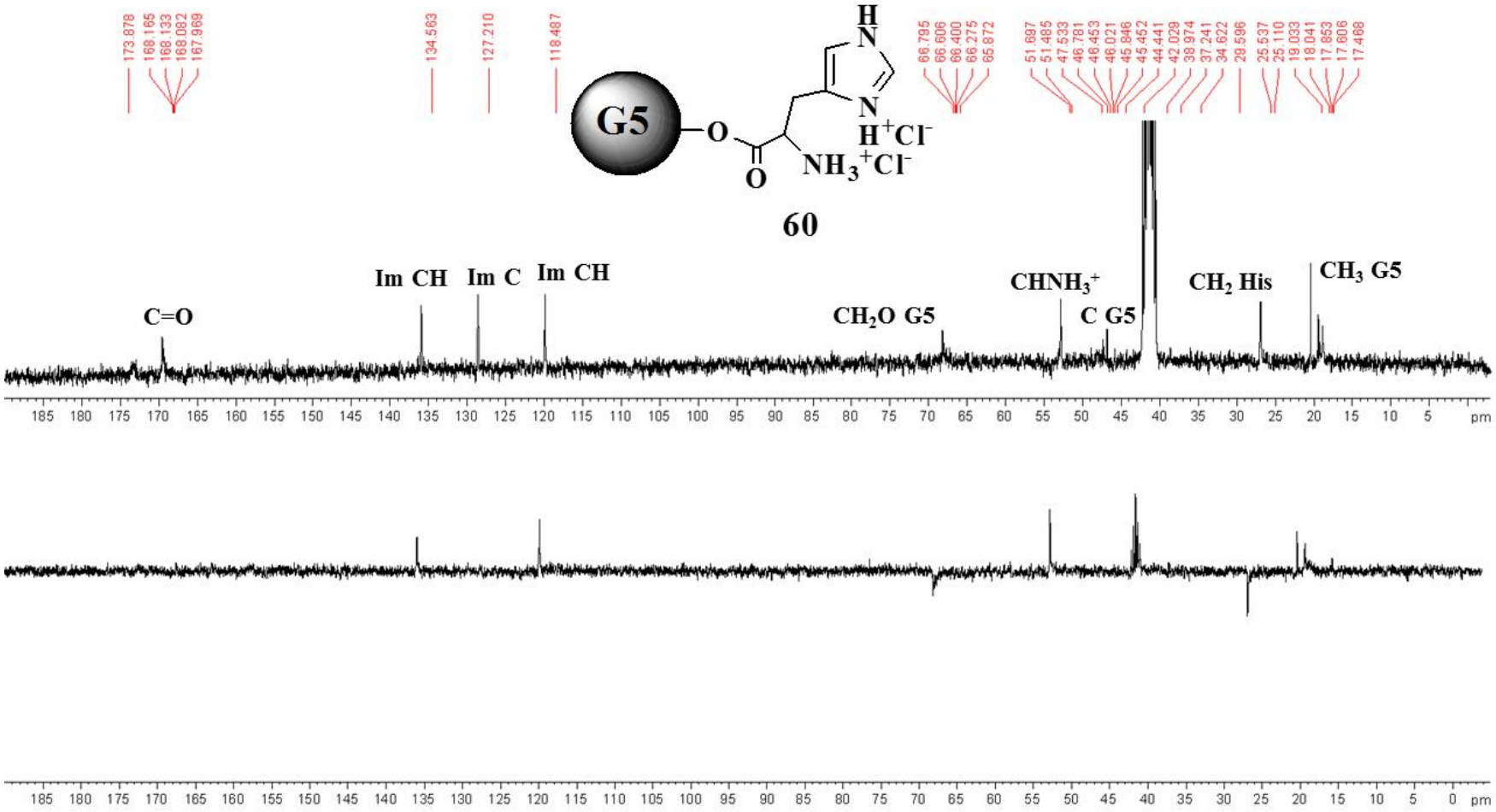


Figure S52. ^{13}C NMR and DEPT-135 (DMSO-*d6*, 75.5 MHz) spectra of compound **60**

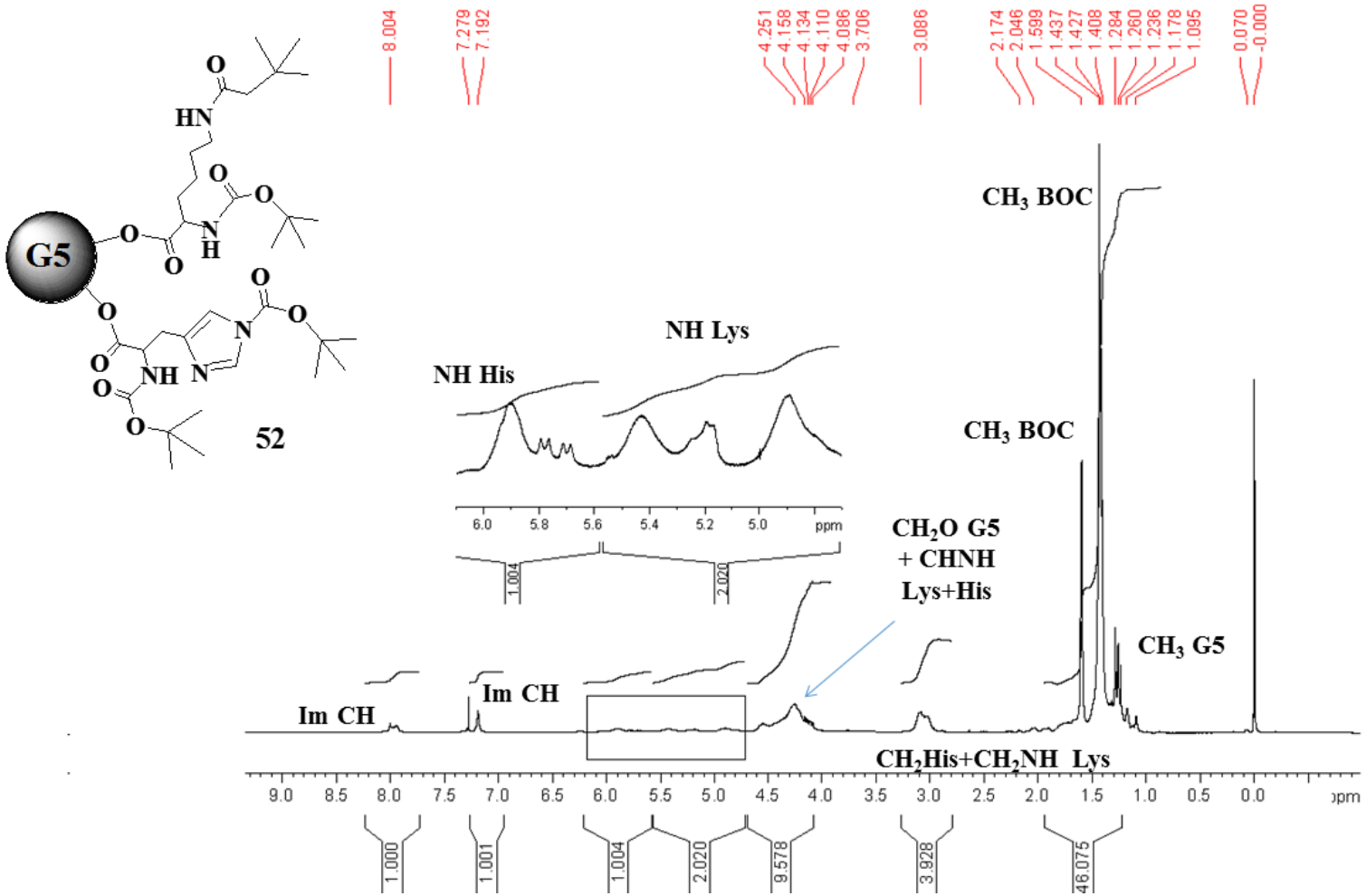


Figure S53. ^{1}H NMR ($CDCl_3$, 300 MHz) spectrum of compound **52**

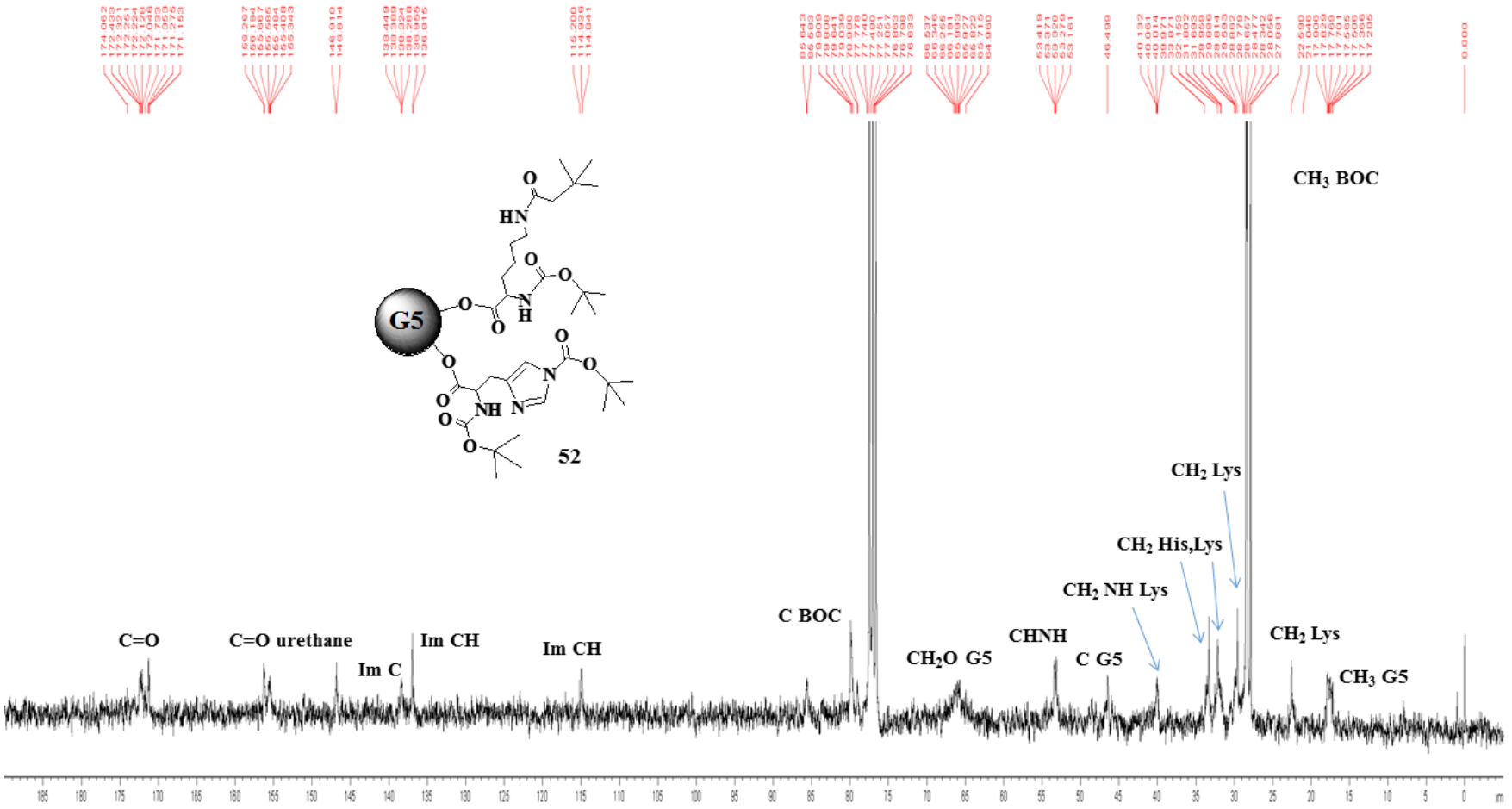


Figure S54. ^{13}C NMR ($CDCl_3$, 75.5 MHz) spectrum of compound **52**

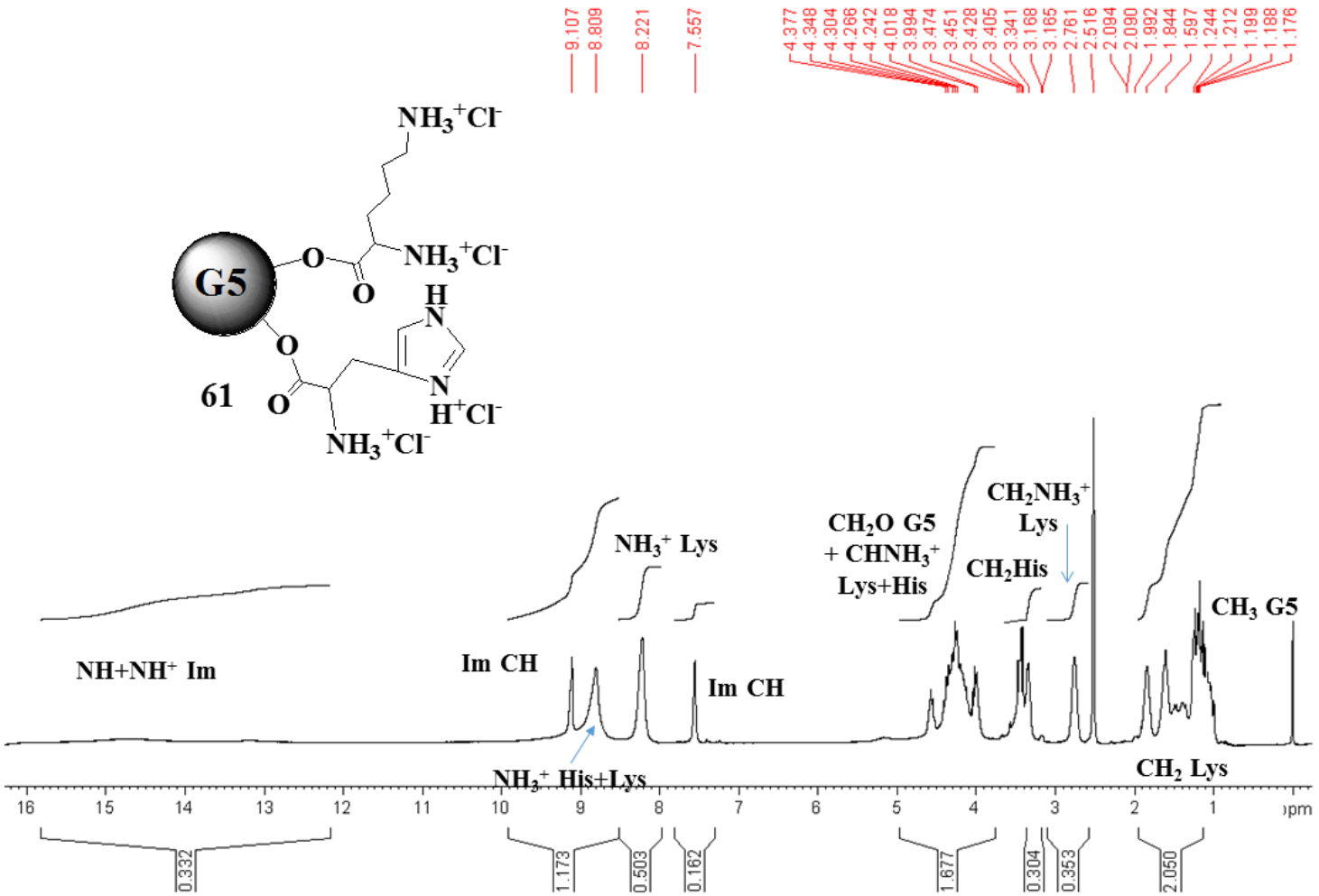


Figure S55. ^{1}H NMR (DMSO-*d6*, 300 MHz) spectrum of compound **61**

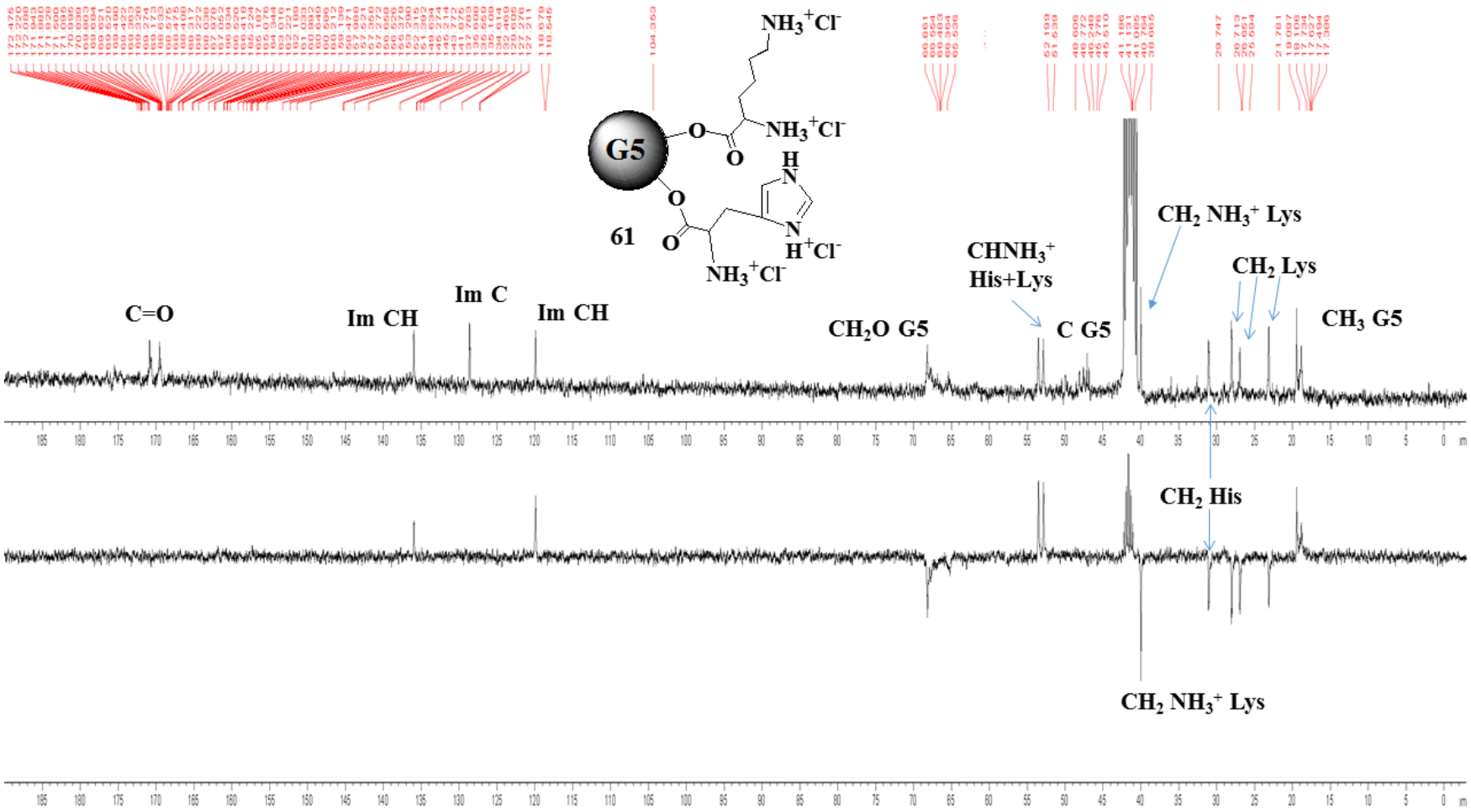


Figure S56. ^{13}C NMR and DEPT-135 (DMSO-*d6*, 75.5 MHz) spectra of compound **61**

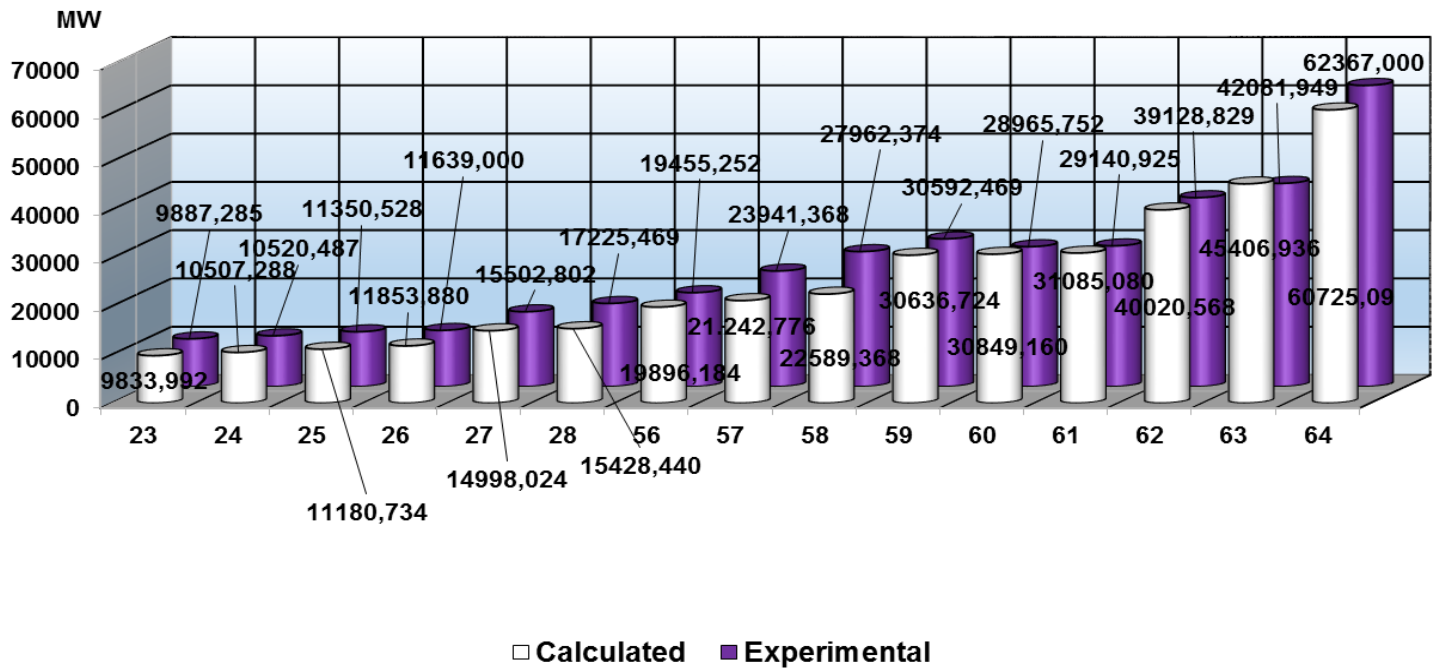


Figure S57. Comparison between computed and experimental molecular weighs of all prepared dendrimers

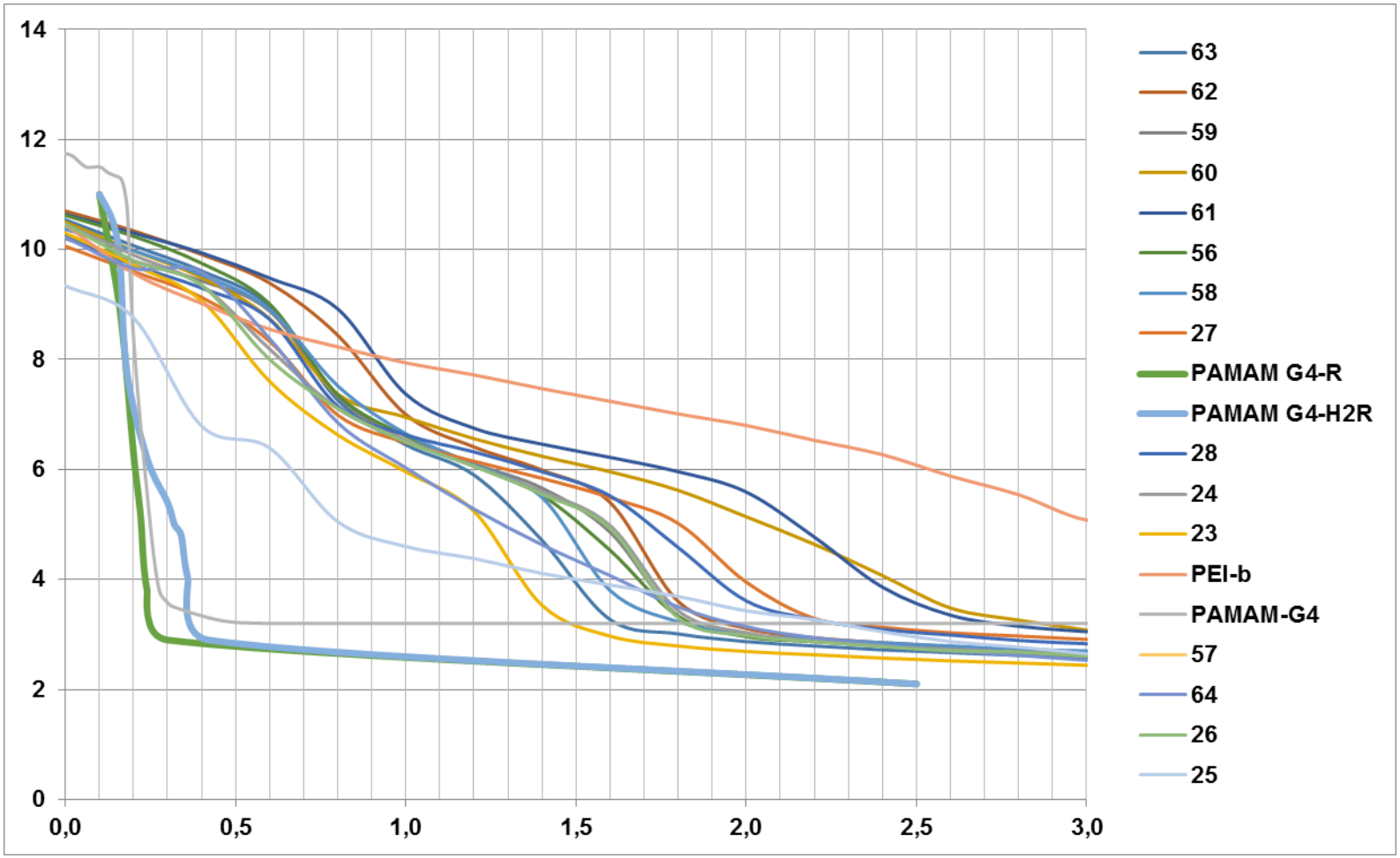


Figure S58. Potentiometric titration curves of all prepared dendrimers compared with PEI-b and G4-PAMAMs

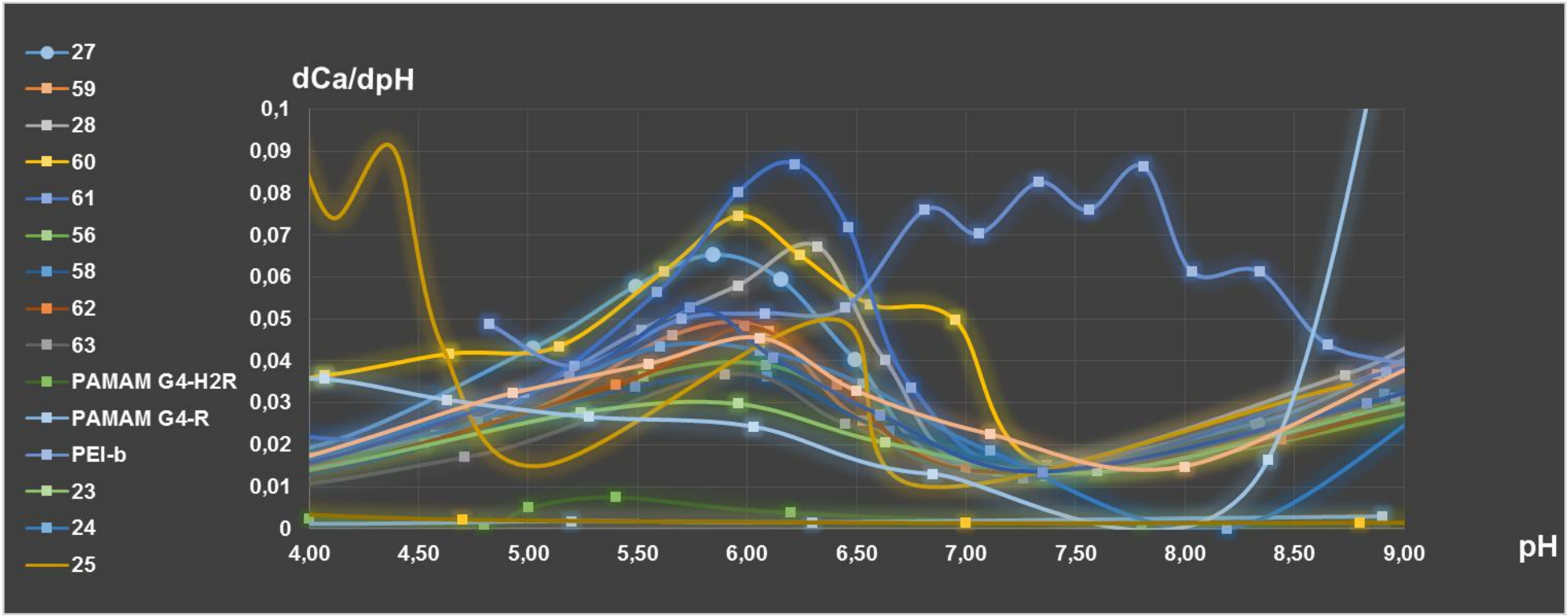


Figure S59. Buffer capacity (β) of all prepared dendrimers compared with PEI-b and G4-PAMAMs

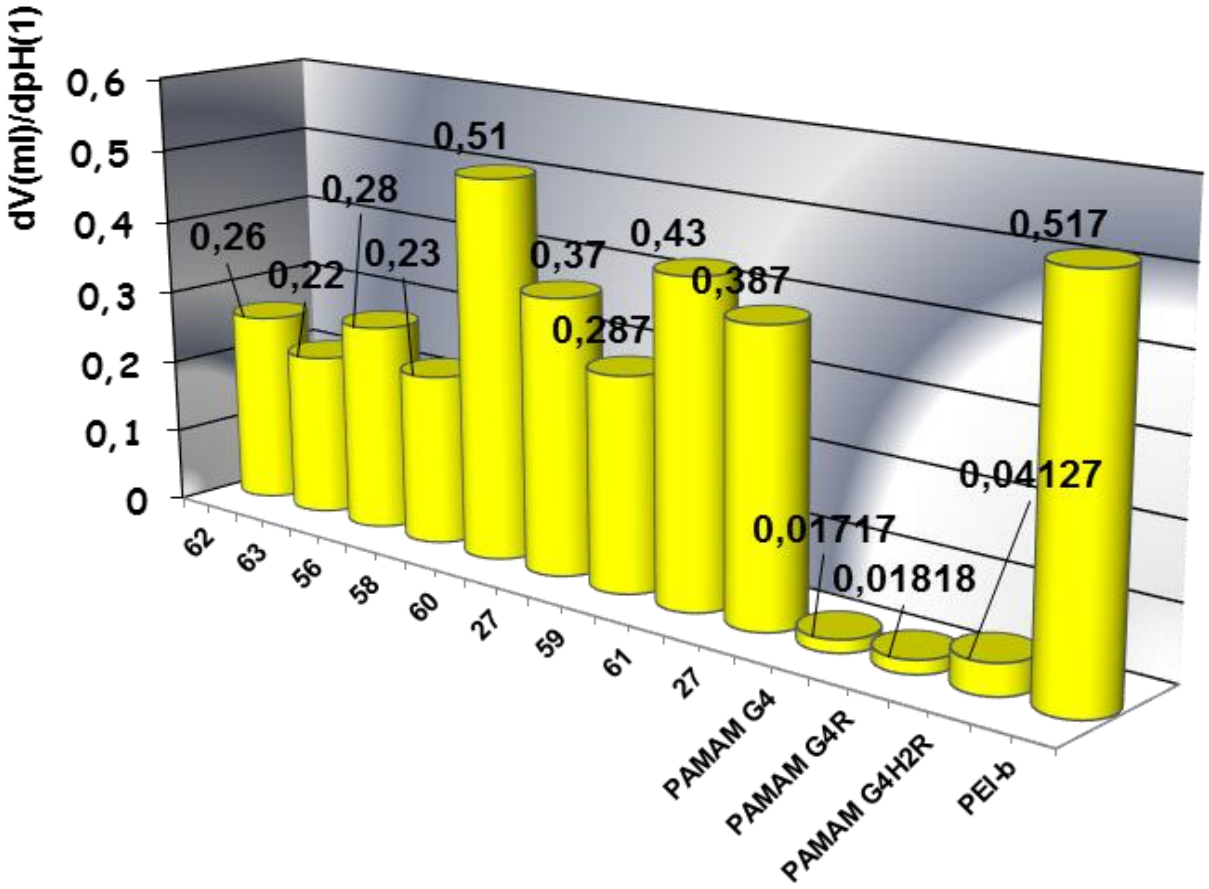


Figure S60. Average buffer capacity ($\overline{\beta}$) of all prepared dendrimers compared with PEI-b and G4-PAMAMs

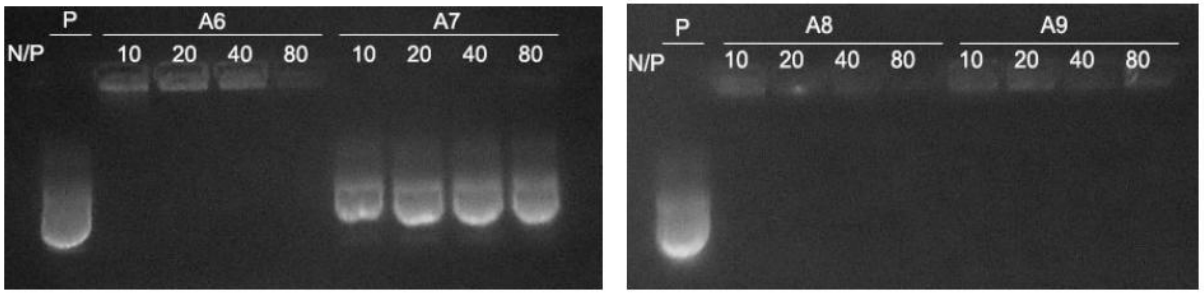


Figure S61. *p*DNA binding assay. P = *p*DNA, A6 = **61**, A7 = **60**, A8 = **59**, A9 = **27**

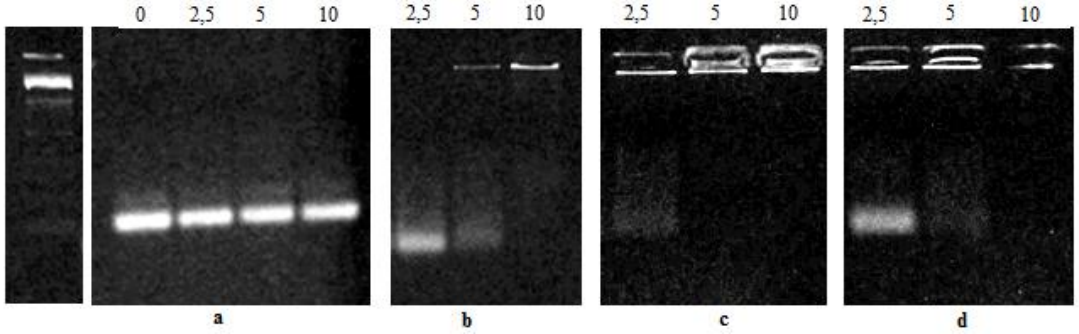


Figure S62. *si*RNA adhesion assay: **60** (a), **27** (b), **61** (c), **59** (d).

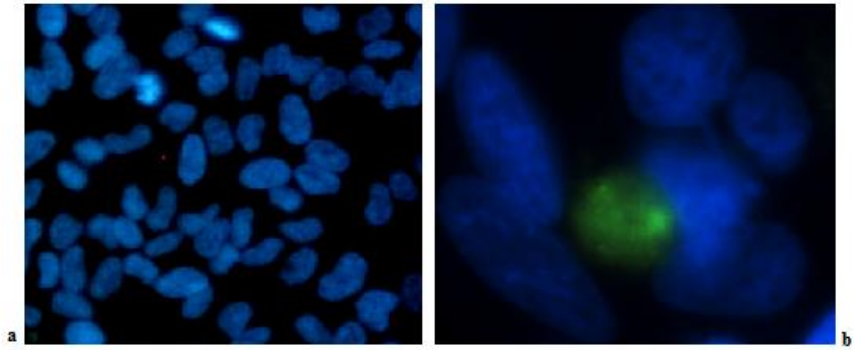


Figure S63. Images obtained with a double fluorescence microscope on transfected cells in incomplete culture medium (a) and in complete medium (b).

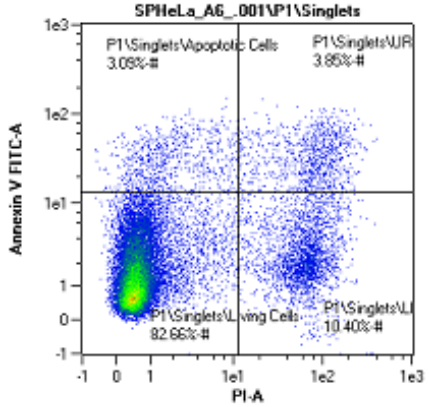


Figure S64. Cytofluorometric analysis of compound **27**.