

Monoaminophosphorylated Pillar[5]arenes as Hosts for Alkaneamines

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Electronic Supplementary Information (98 pages)

Fig. S1. ^1H NMR spectrum of 1,4-dimethoxypillar[5]arene (*1*), CDCl_3 , 298 K, 400 MHz.

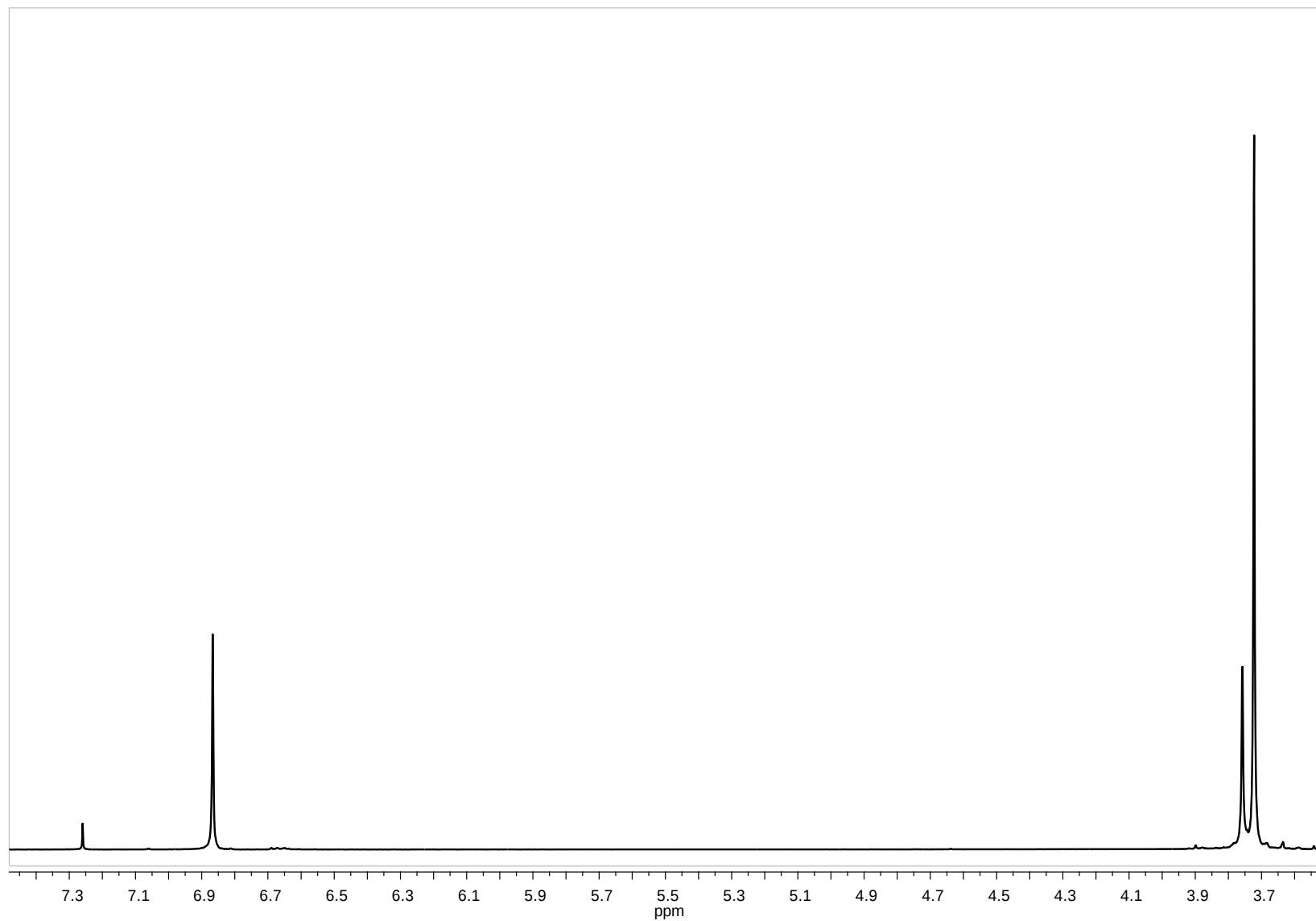


Fig. S2. ^1H NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-hydroxypillar[5]arene (**2**), CDCl_3 , 298 K, 400 MHz.

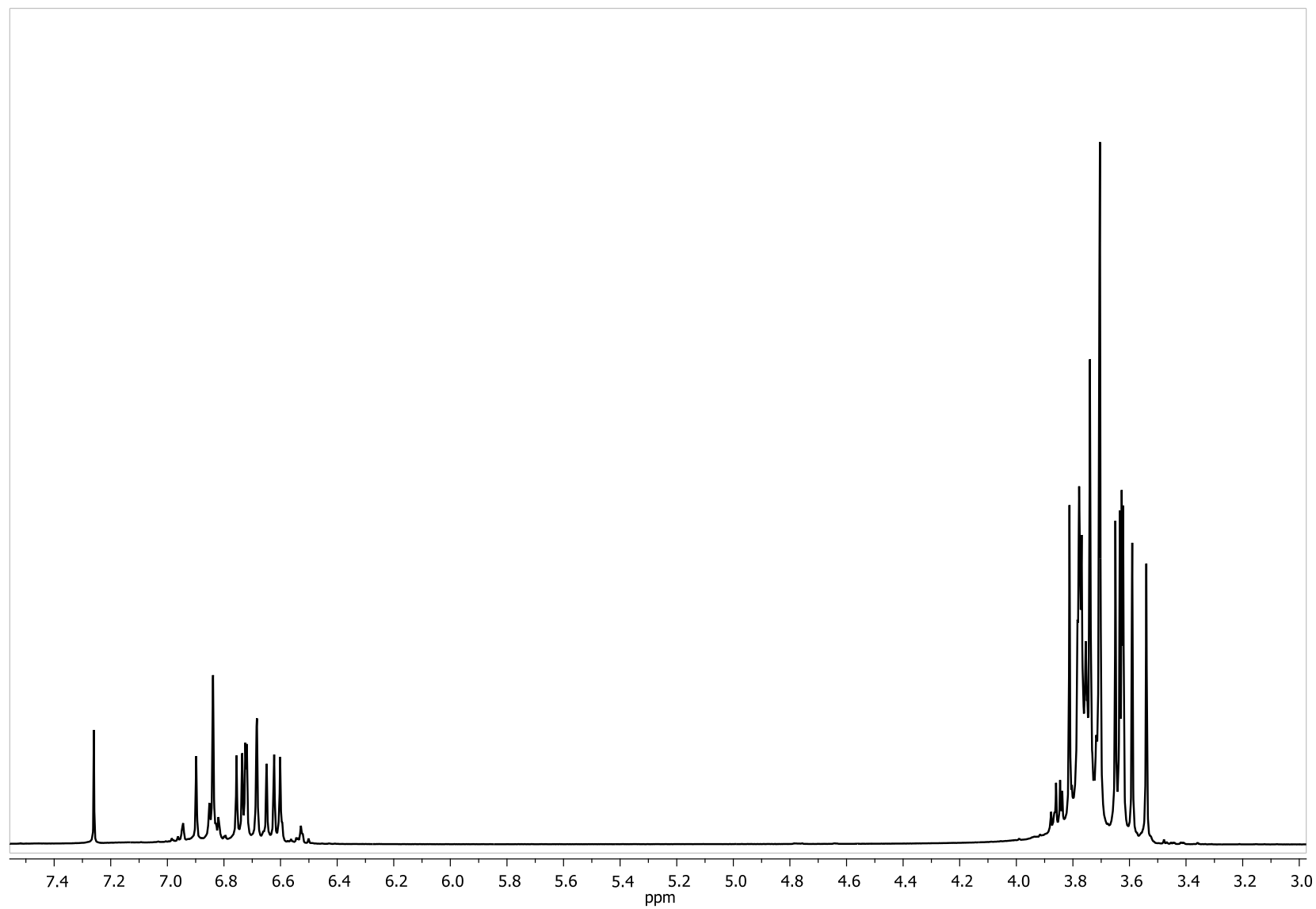


Fig. S3. ^1H NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-(3'-phthalimidepropoxy)-pillar[5]arene (**3**), CDCl_3 , 298 K, 400 MHz.

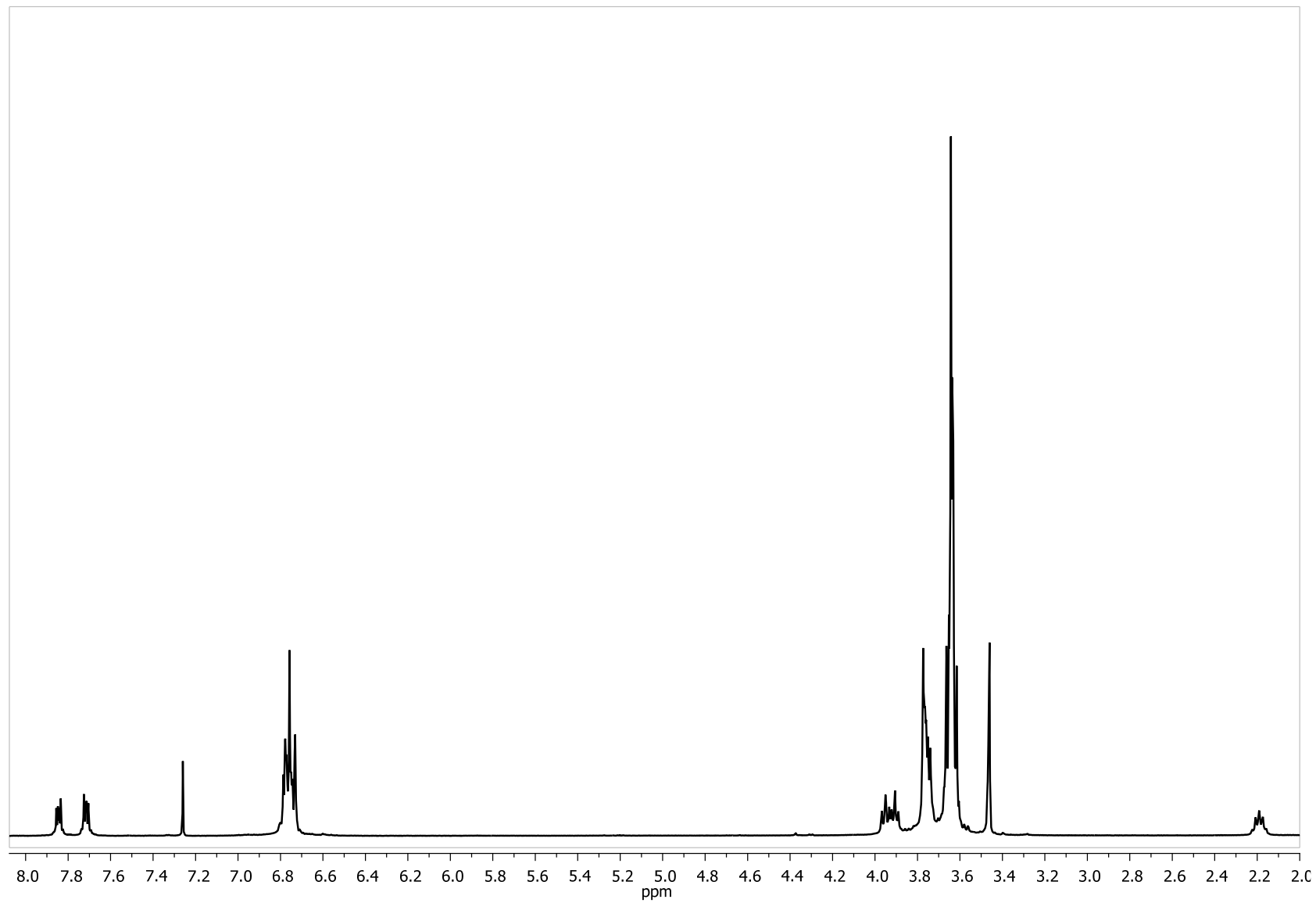


Fig. S4. ^1H NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-(3'-aminopropoxy)-pillar[5]arene (**4**), DMSO- d_6 , 298K, 400 MHz.

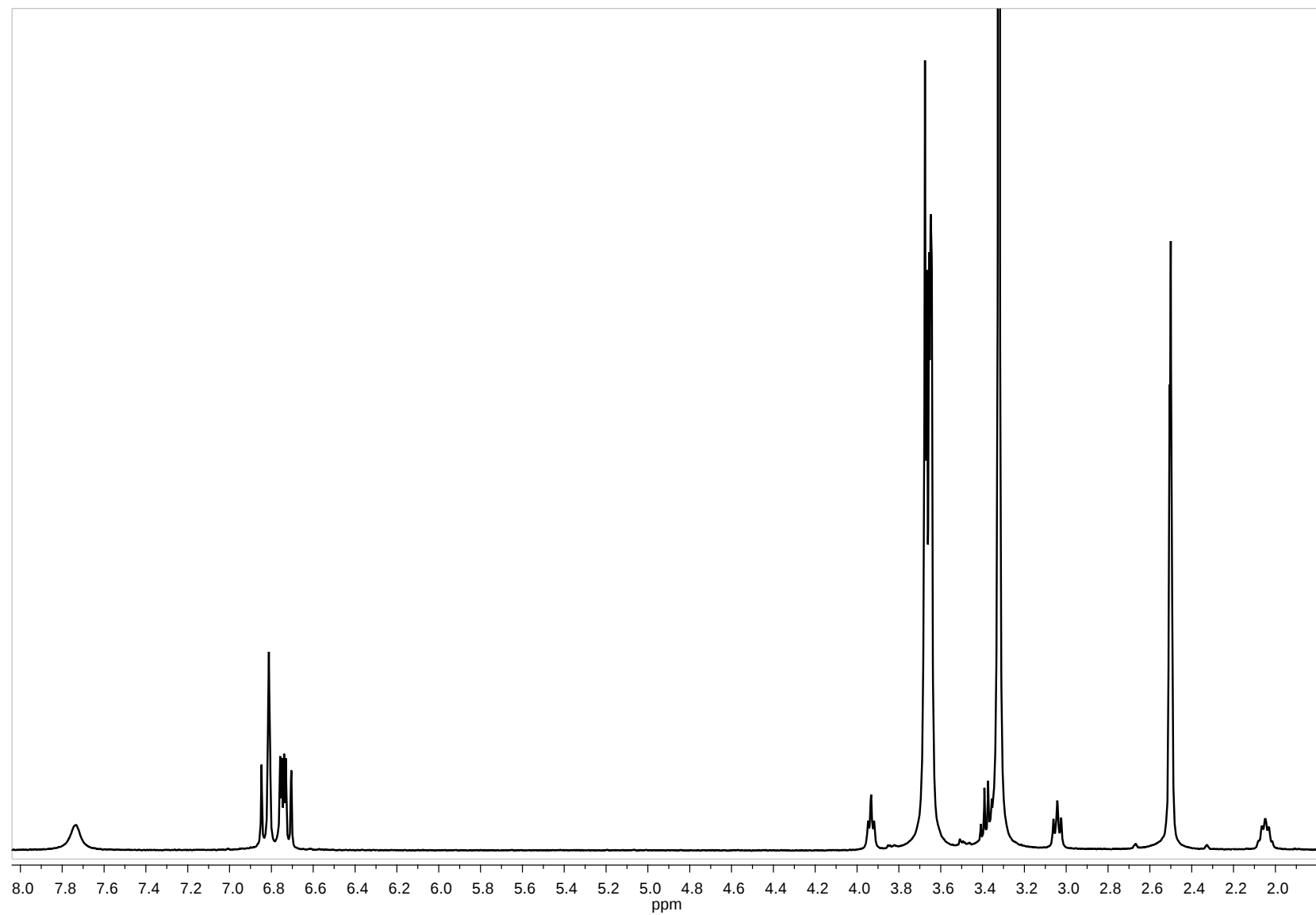


Fig. S5. ^1H NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-methylethyl]-(3'-aminopropoxy)}-pillar[5]arene (**5**), CDCl_3 , 298 K, 400 MHz.

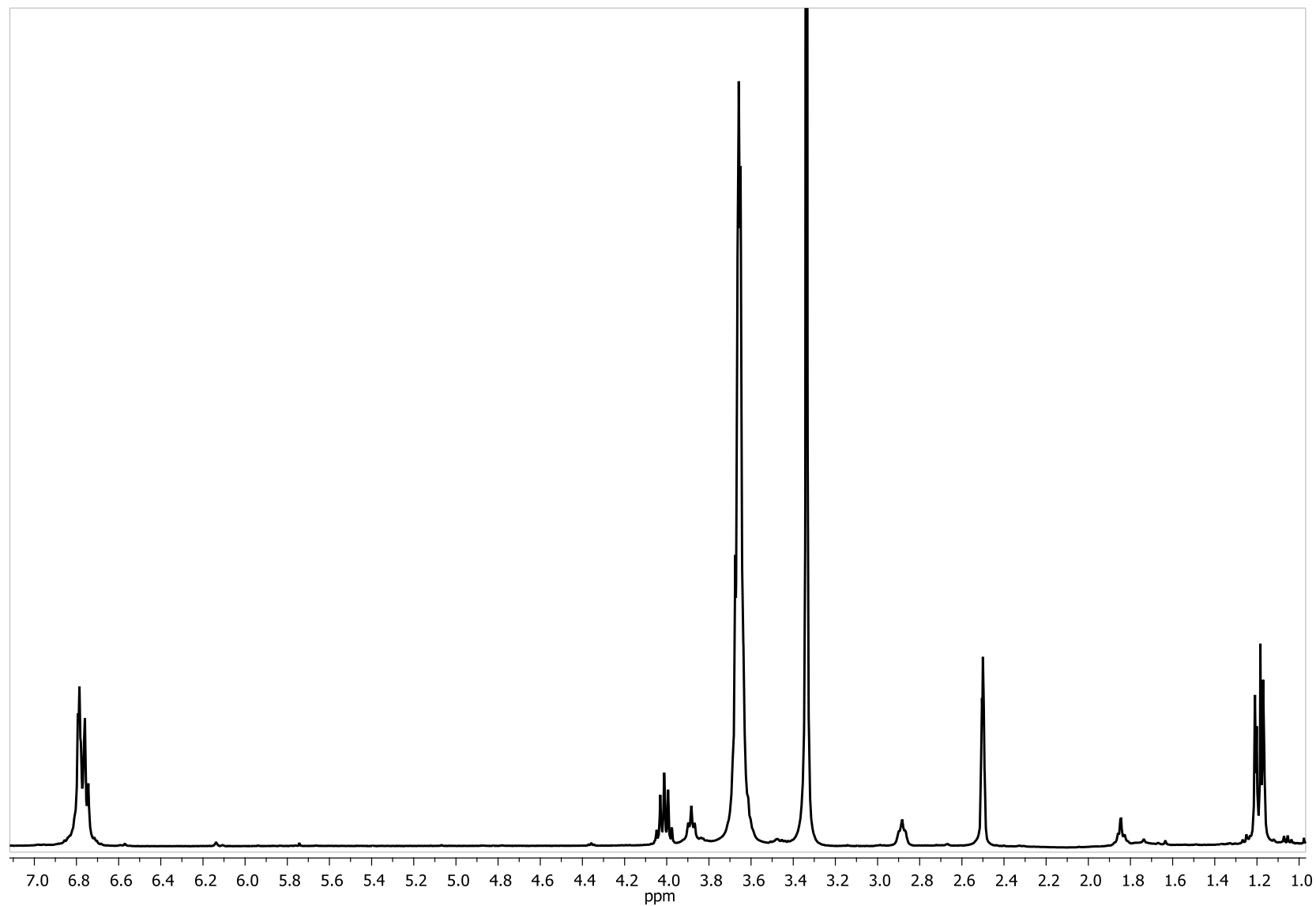


Fig. S6. ^1H NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-cyclopentyl]-(3'-aminopropoxy)}-pillar[5]arene (**6**), CDCl_3 , 298 K, 400 MHz.

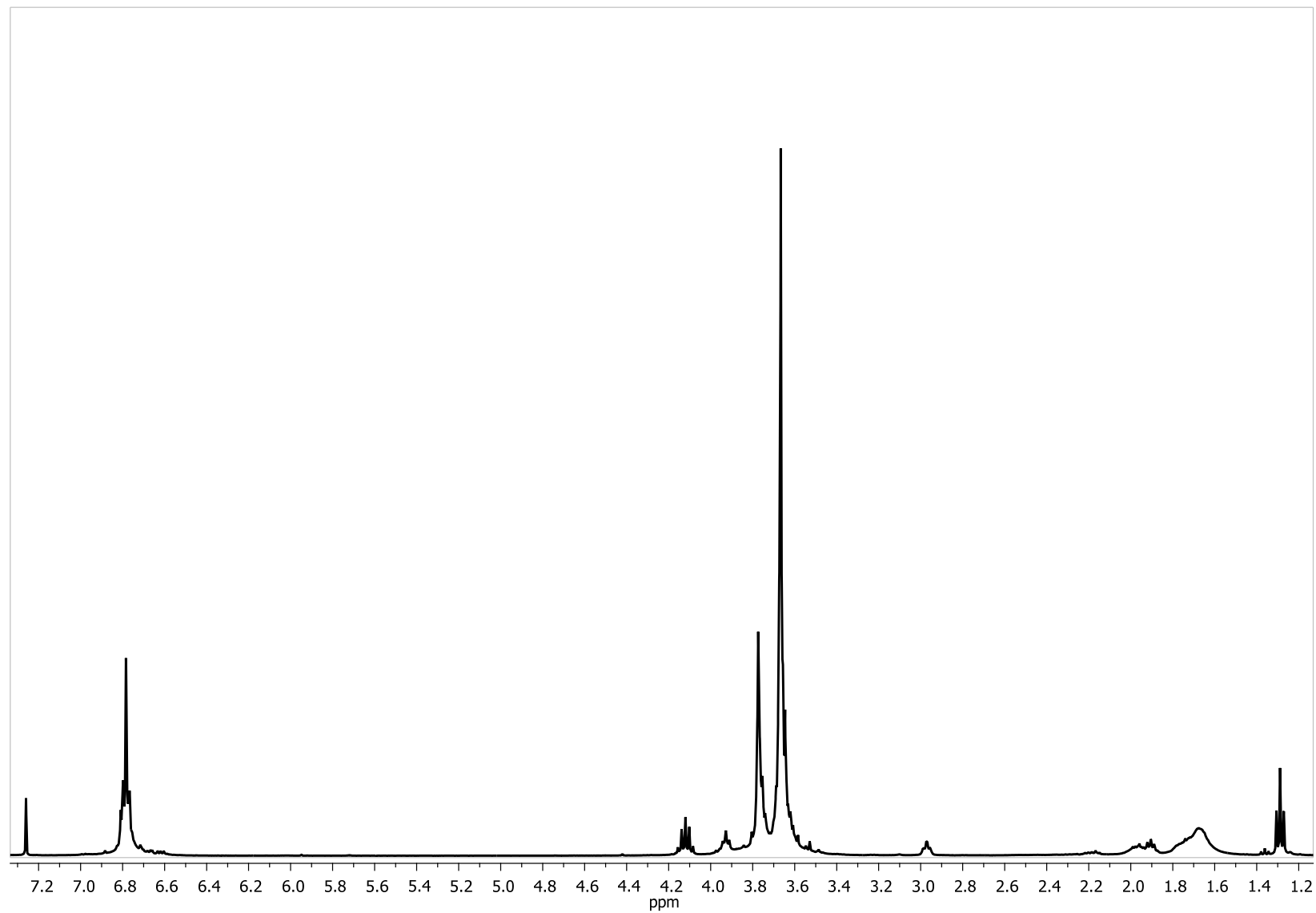


Fig. S7. ^1H NMR spectrum 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-cyclohexyl]-(3'-aminopropoxy)-pillar[5]arene (7), CDCl_3 , 298 K, 400 MHz.

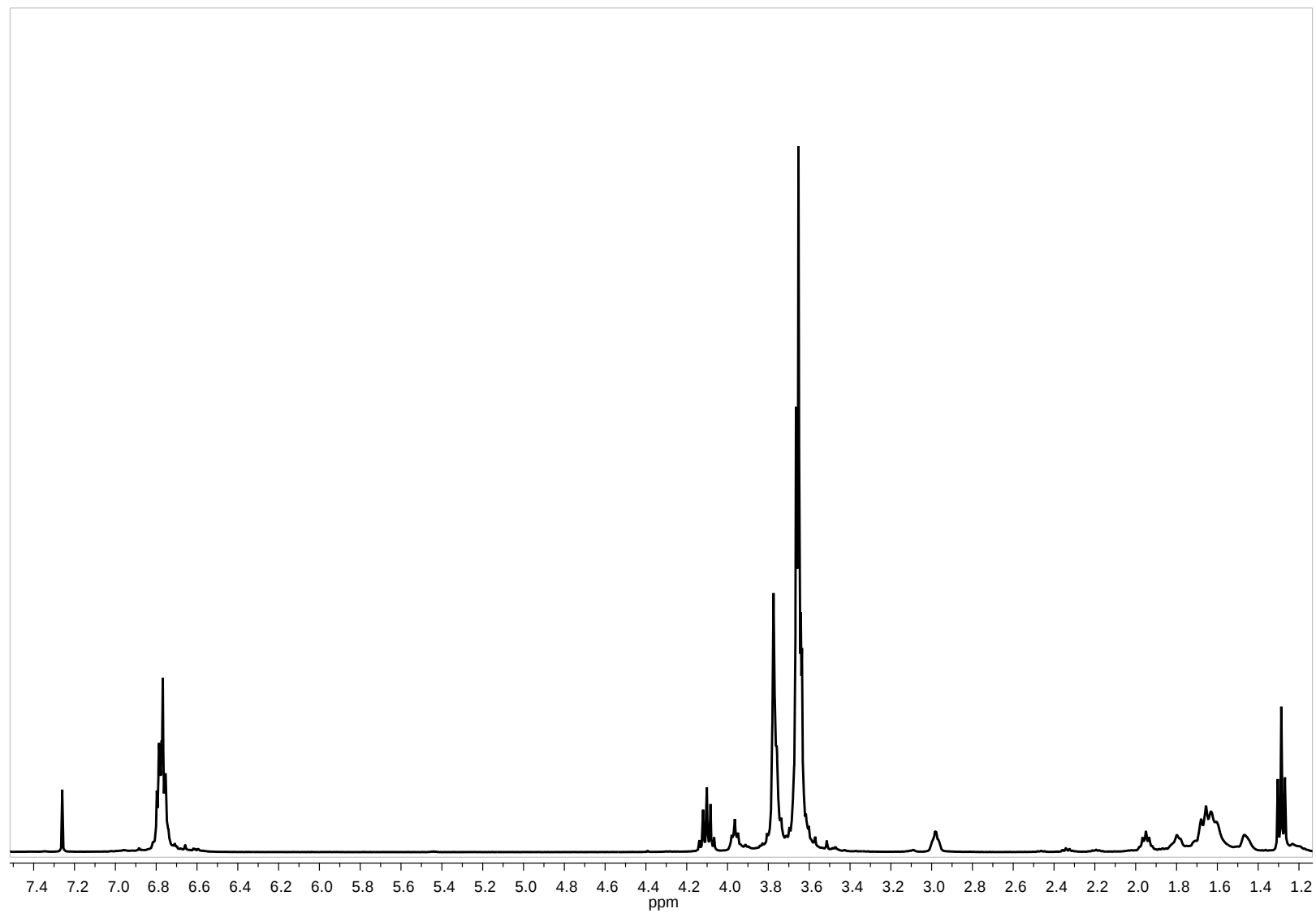


Fig. S8. $^{31}\text{P}\{^1\text{H}\}$ NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-methylethyl]-(3'-aminopropoxy)-pillar[5]arene (5), CDCl_3 , 298 K, 162 MHz.

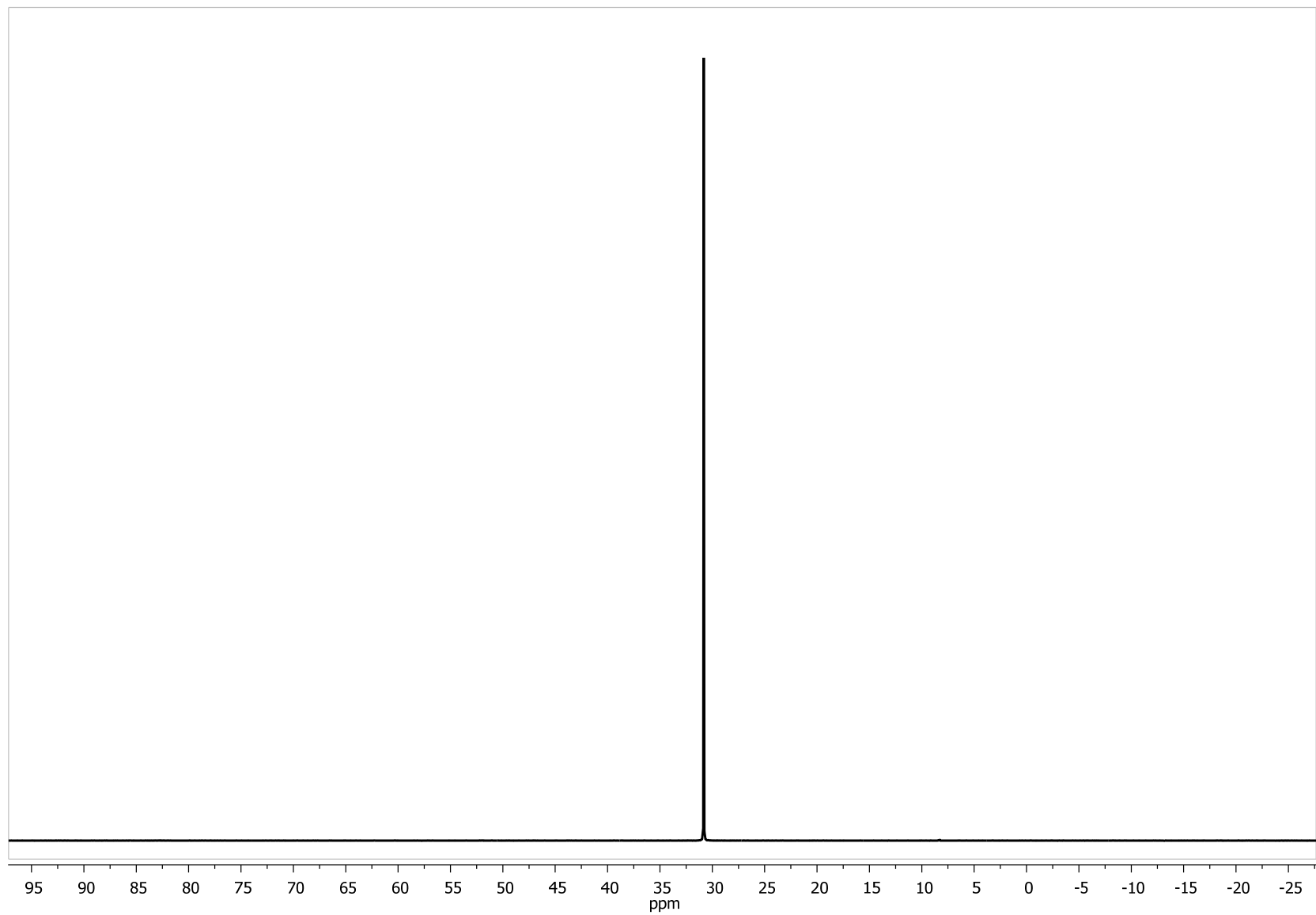


Fig. S9. $^{31}\text{P}\{^1\text{H}\}$ NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-cyclopentyl]-(3'-aminopropoxy)}-pillar[5]arene (**6**), CDCl_3 , 298 K, 162 MHz.

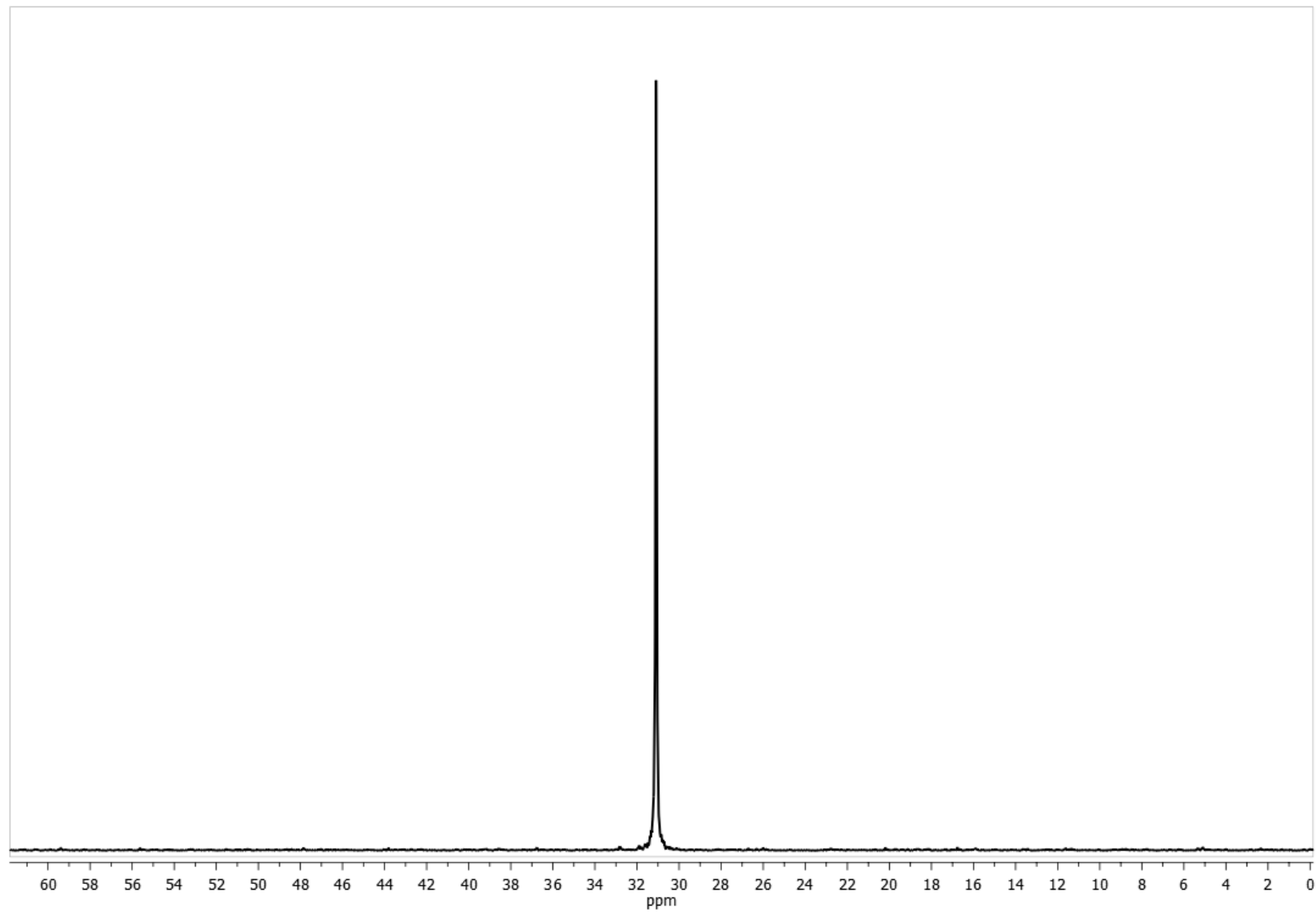


Fig. S10. $^{31}\text{P}\{^1\text{H}\}$ NMR spectrum 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-cyclohexyl]-(3'-aminopropoxy)-pillar[5]arene (7), CDCl_3 , 298 K, 162 MHz.

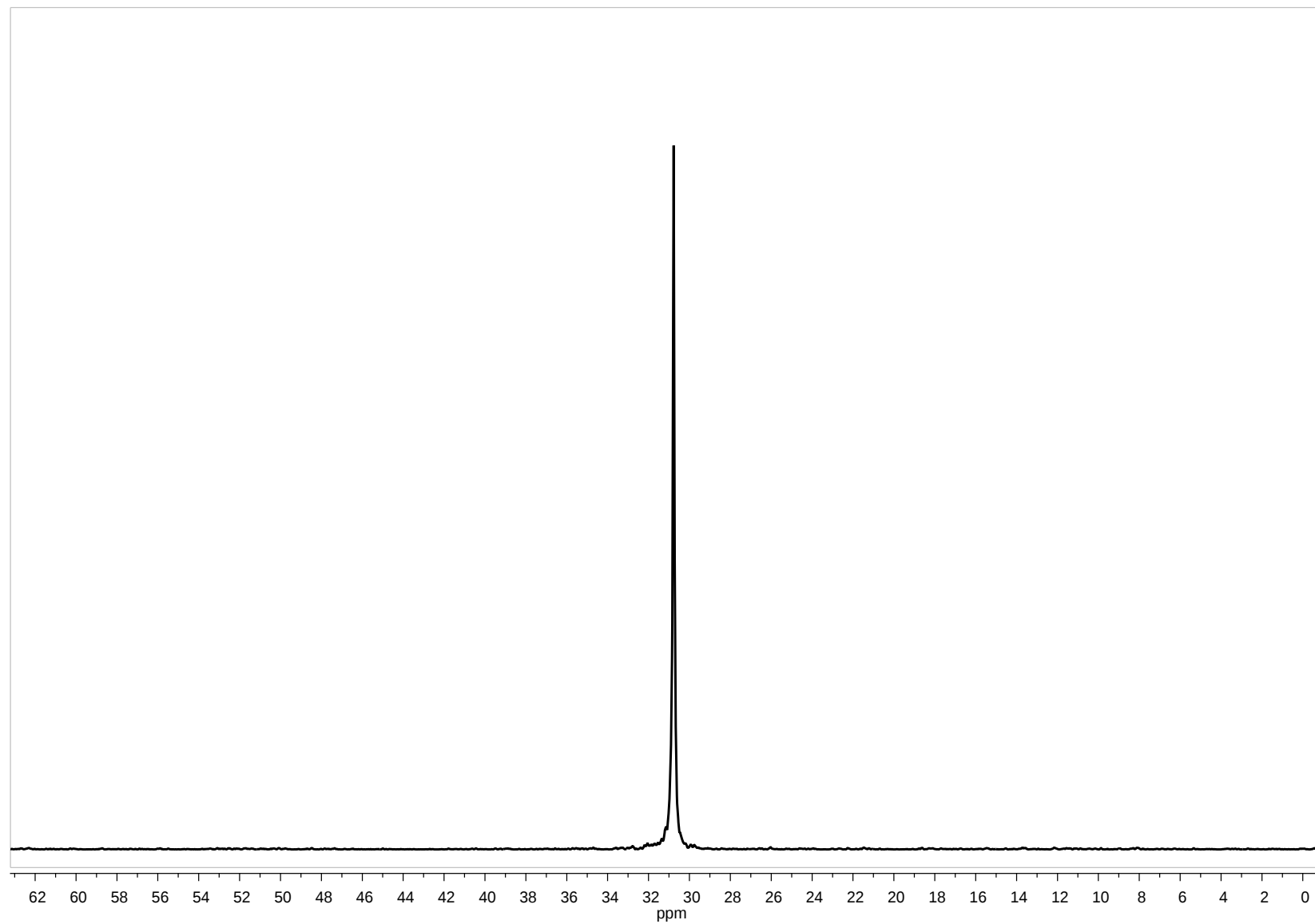


Fig. S11. ^{13}C NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-(3'-phthalimidepropoxy)-pillar[5]arene (**3**), CDCl_3 , 298 K, 100 MHz.

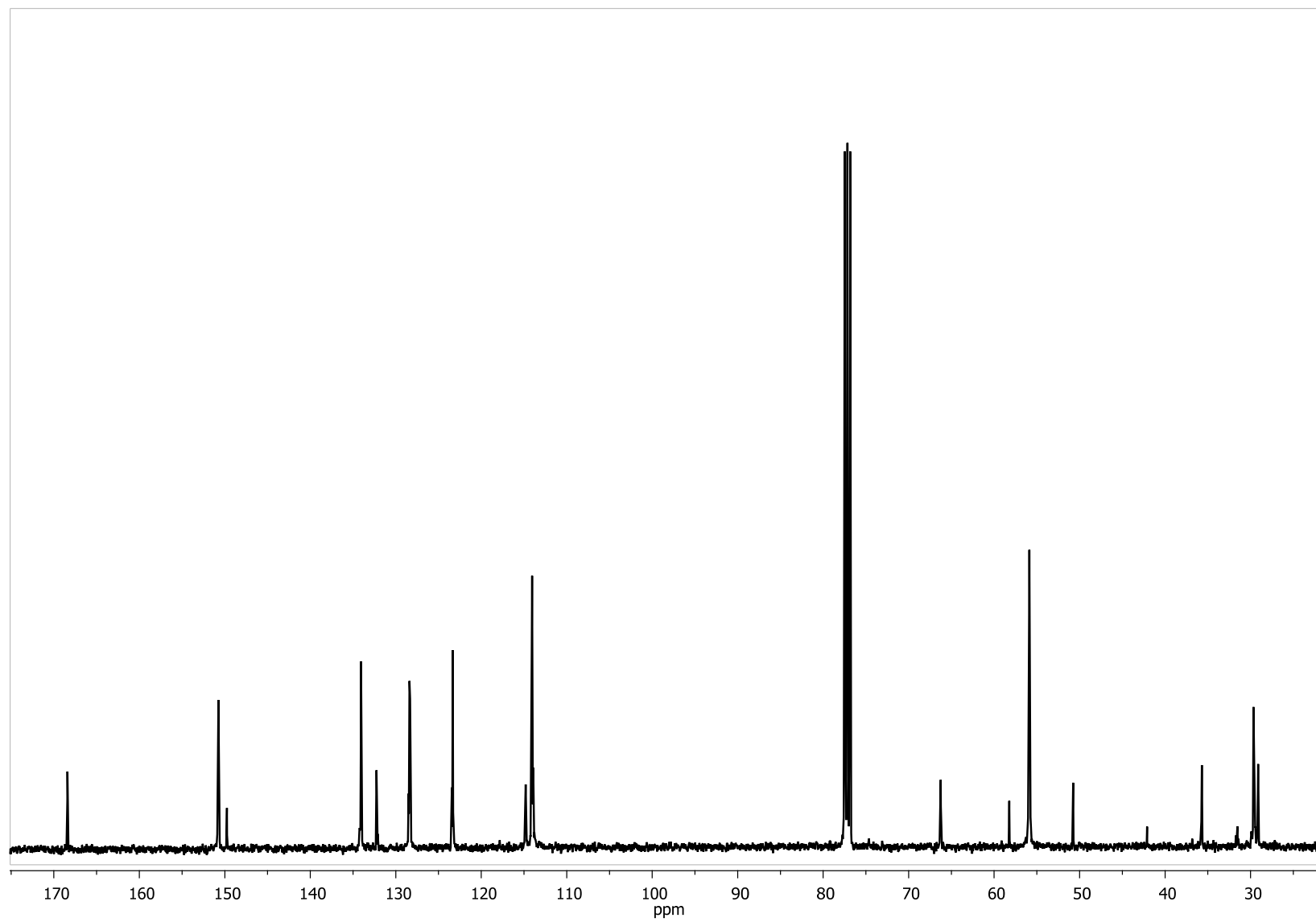


Fig. S12. ^{13}C NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-(3'-aminopropoxy)-pillar[5]arene (**4**), DMSO- d_6 , 298 K, 100 MHz.

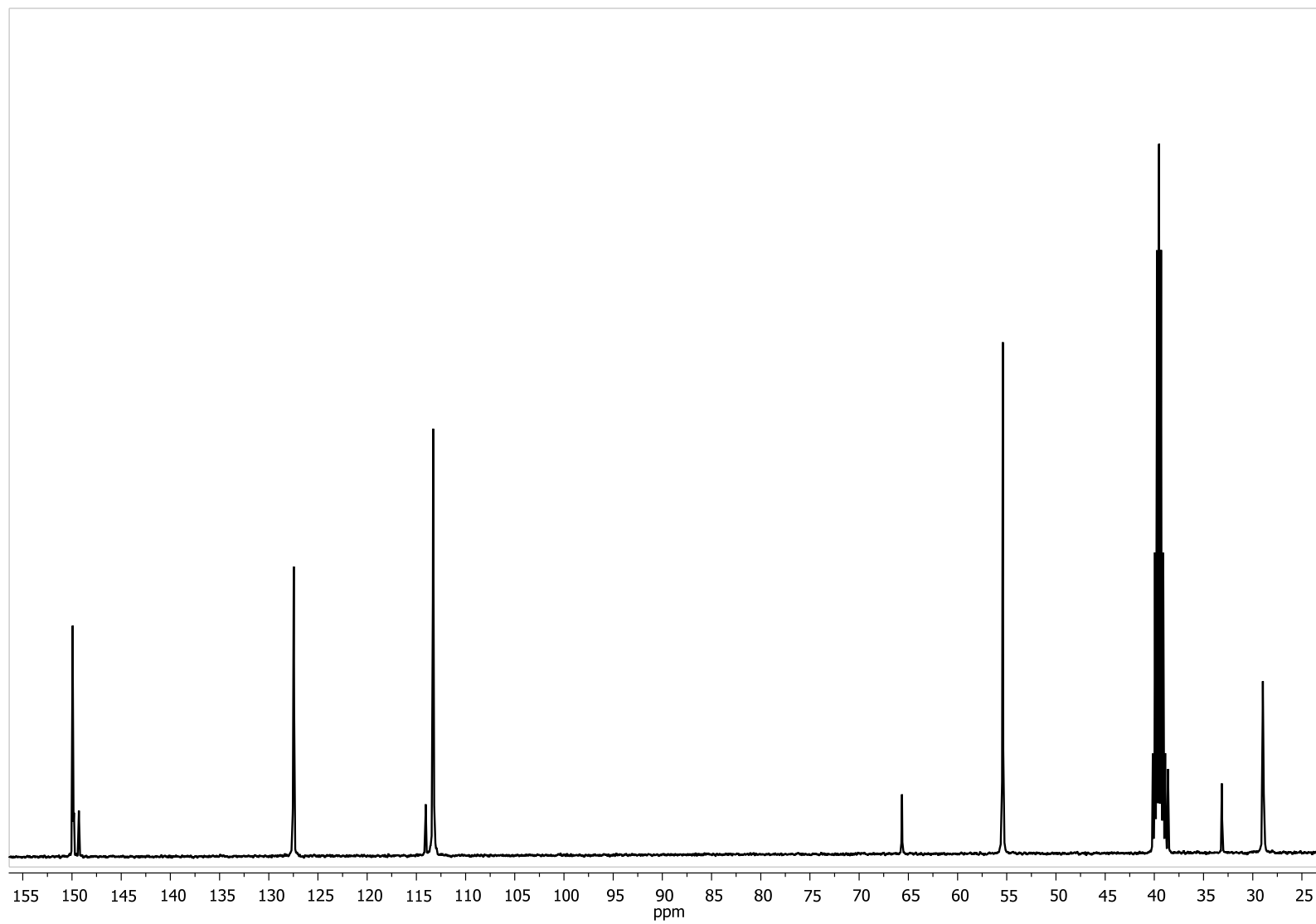


Fig. S13. ^{13}C NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-methylethyl]-(3'-aminopropoxy)}-pillar[5]arene (**5**), DMSO- d_6 , 298 K, 100 MHz.

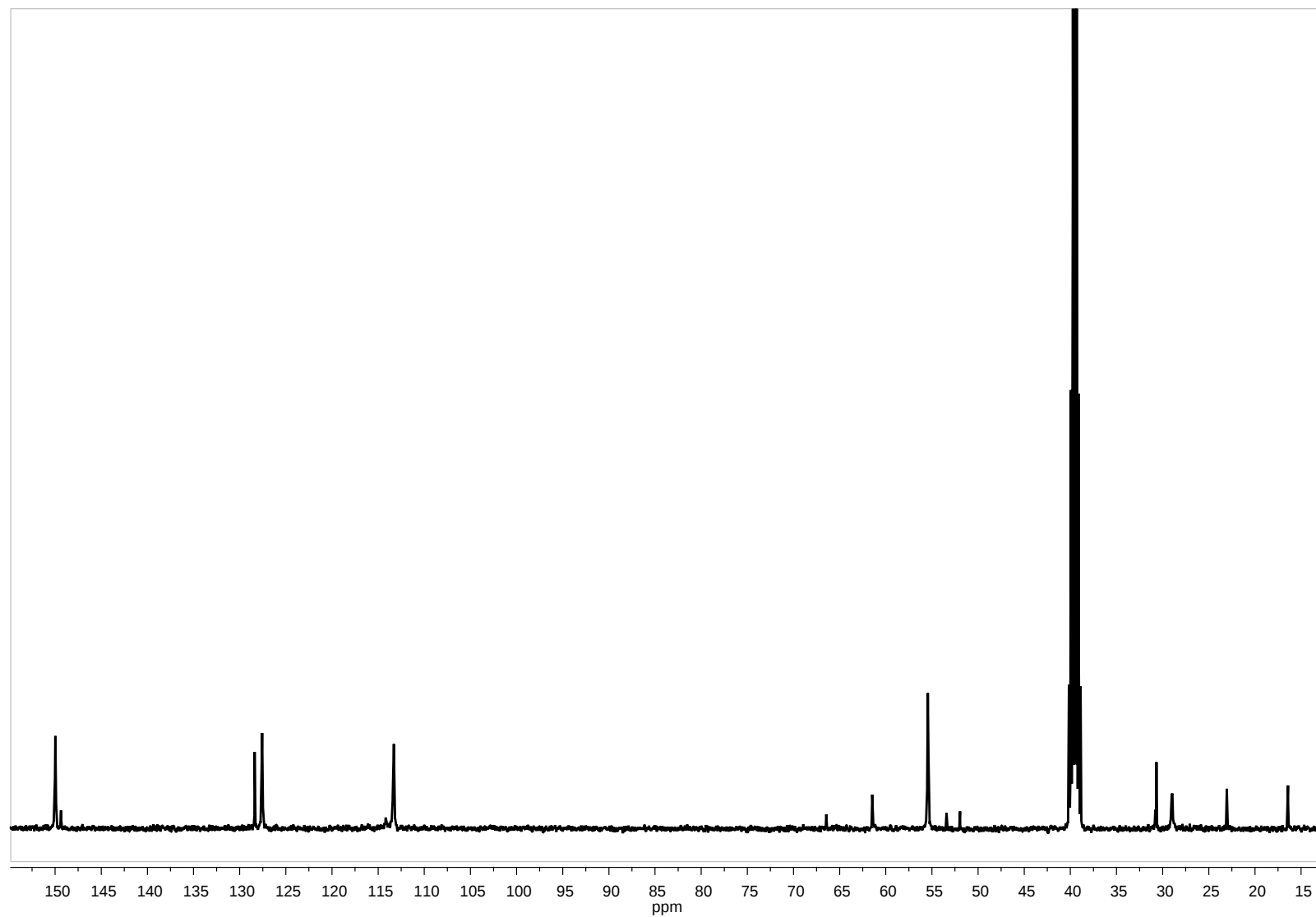


Fig. S14. ^{13}C NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-cyclopentyl]-(3'-aminopropoxy)}-pillar[5]arene (**6**), CDCl_3 , 298 K, 100 MHz.

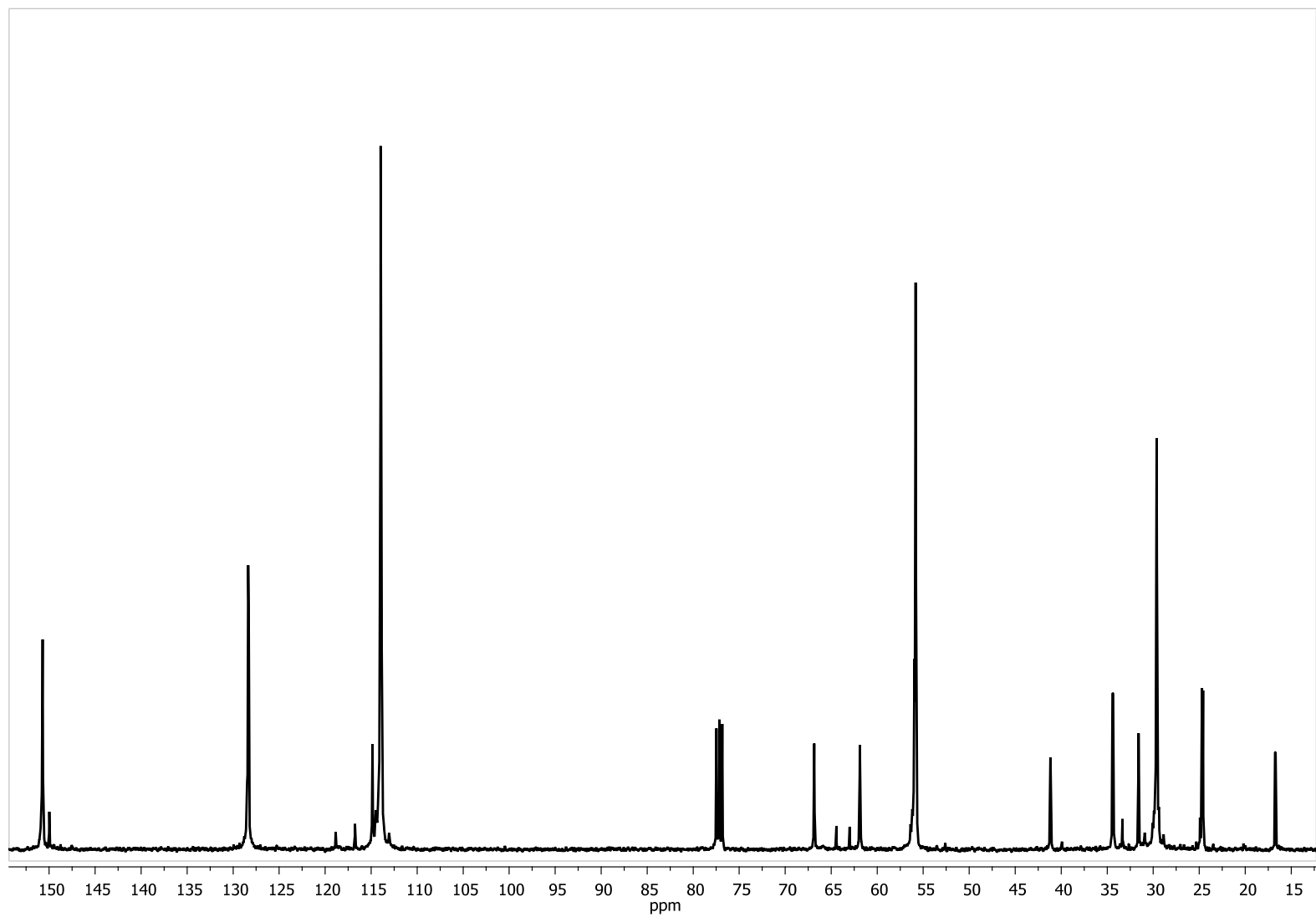


Fig. S15. ^{13}C NMR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-cyclohexyl]-(3'-aminopropoxy)}-pillar[5]arene (**7**), DMSO- d_6 , 298 K, 100 MHz.

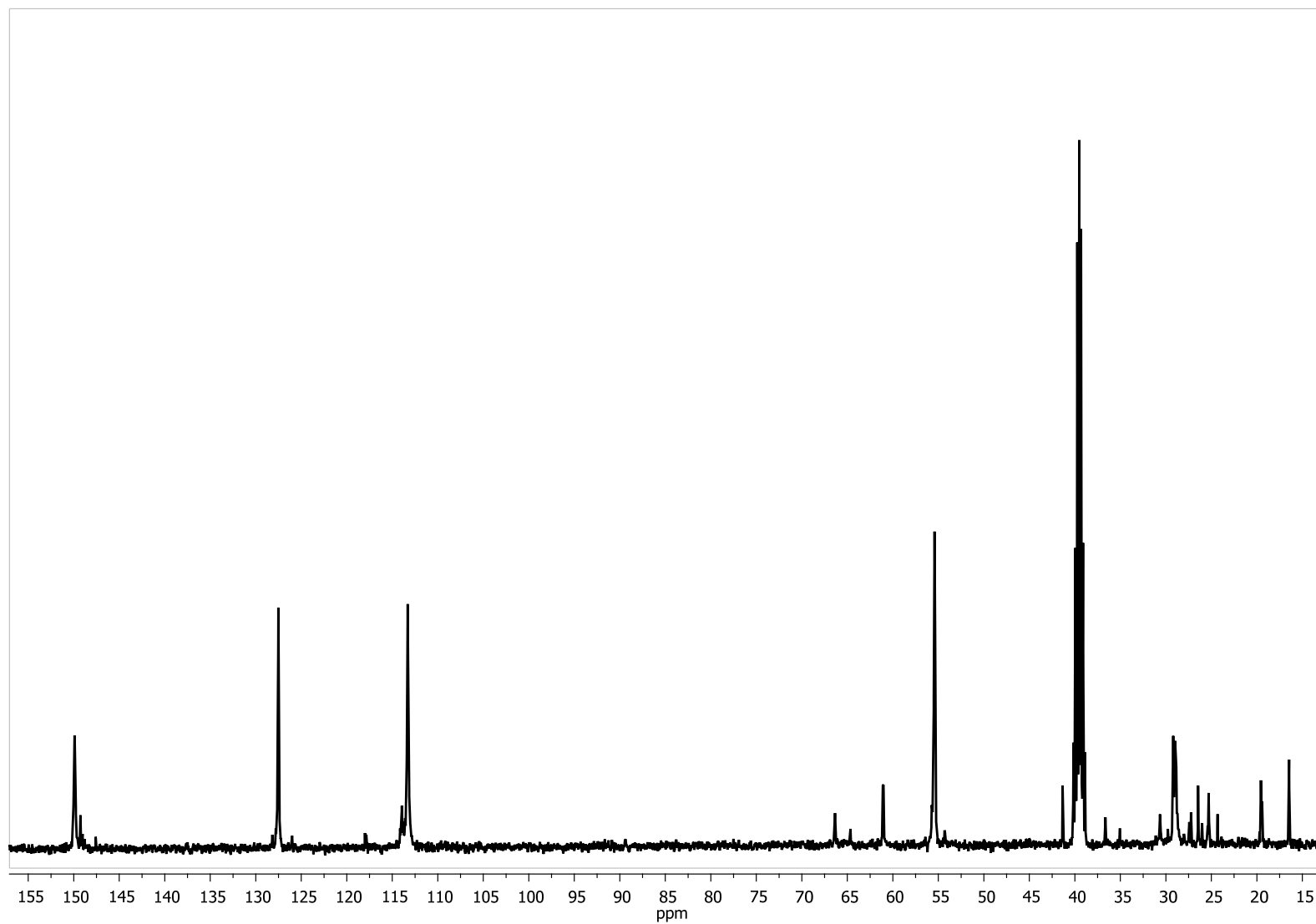


Fig. S16. Mass spectrum (MALDI-TOF) of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-(3'-phthalimidepropoxy)-pillar[5]arene (3).

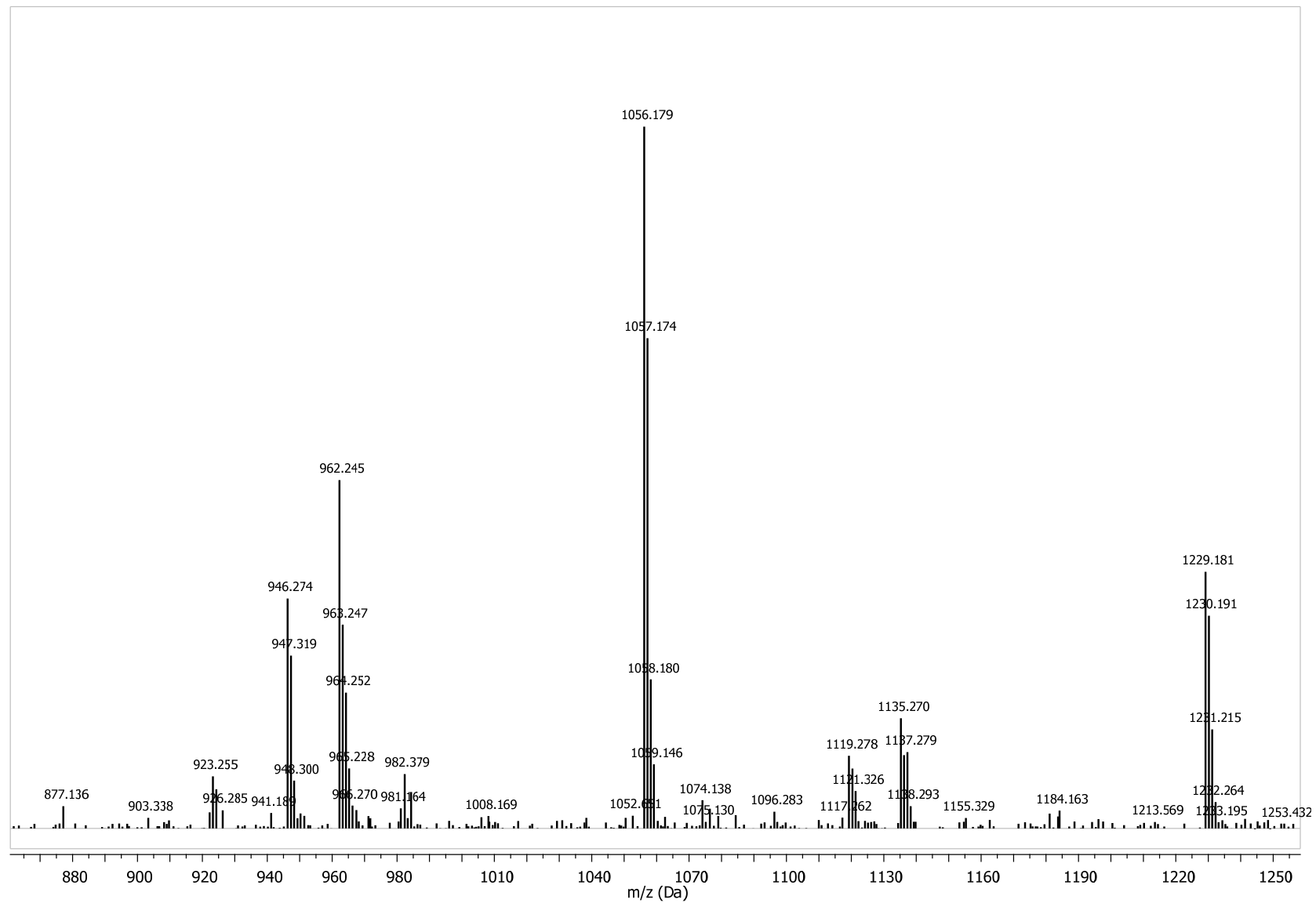


Fig. S17. Mass spectrum (MALDI-TOF) of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-(3'-aminopropoxy)-pillar[5]arene (4).

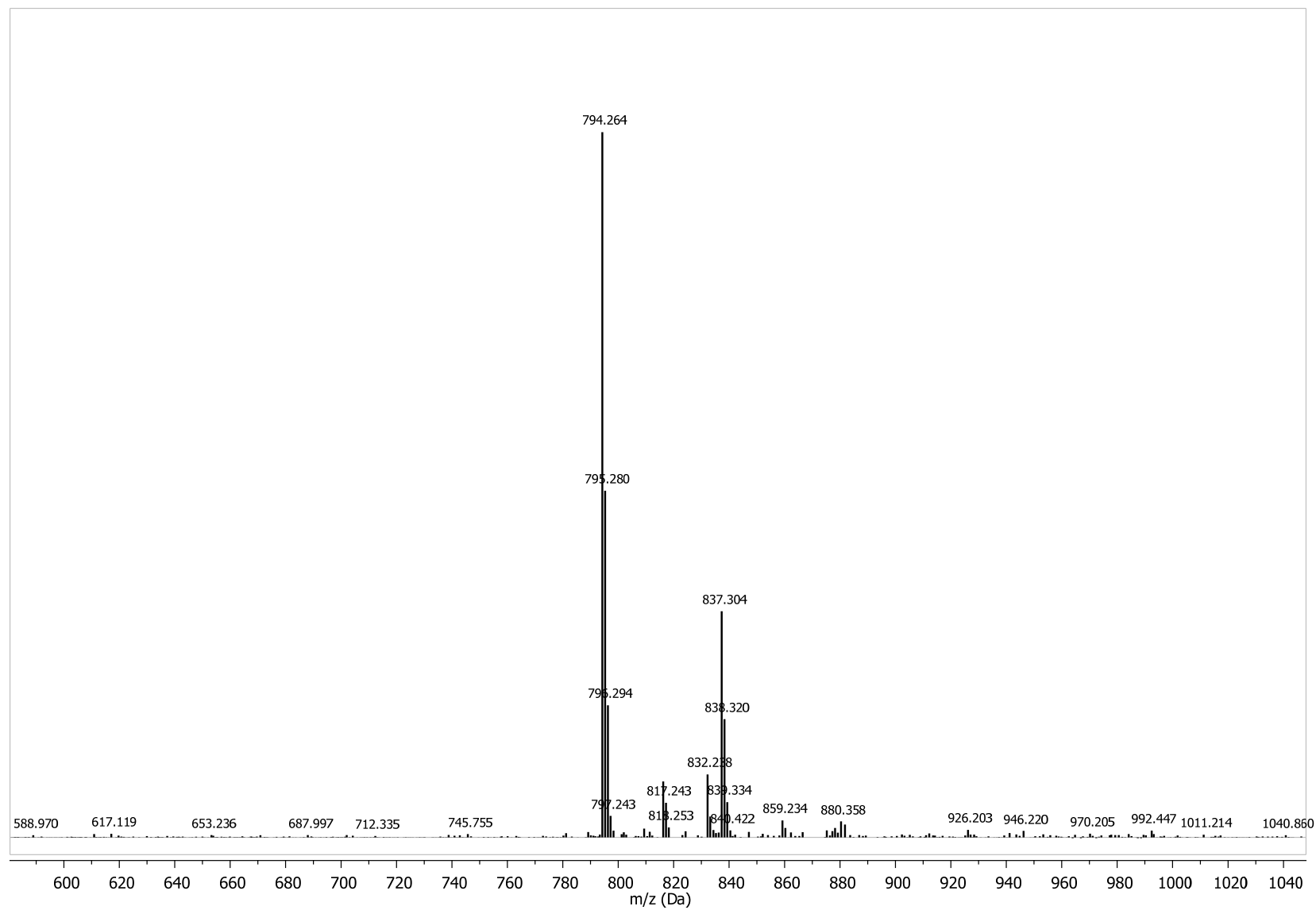


Fig. S18. Mass spectrum (ESI) of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-methylethyl]-(3'-aminopropoxy)}-pillar[5]arene (5).

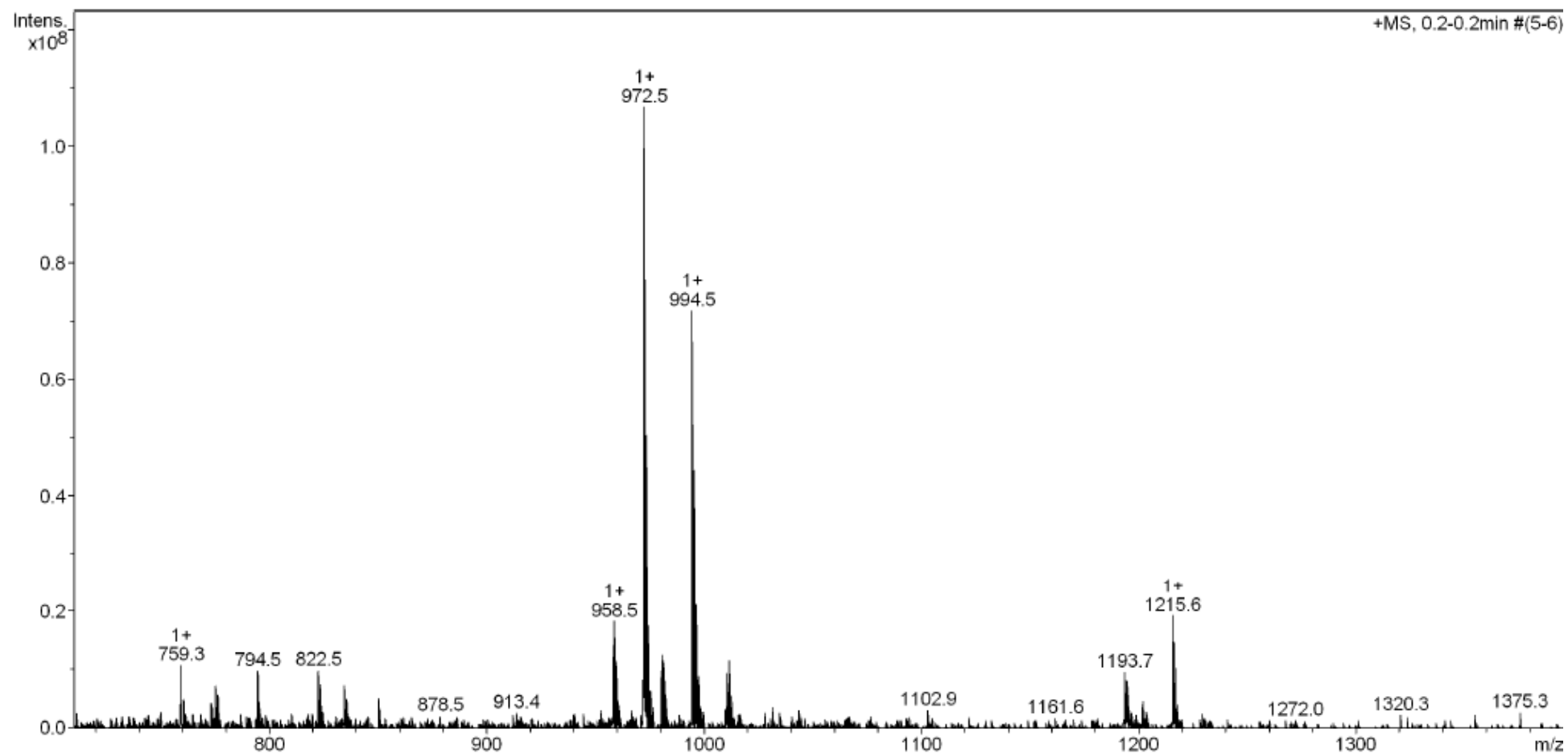


Fig. S19. Mass spectrum (ESI) of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-cyclopentyl]-(3'-aminopropoxy)}-pillar[5]arene (**6**).

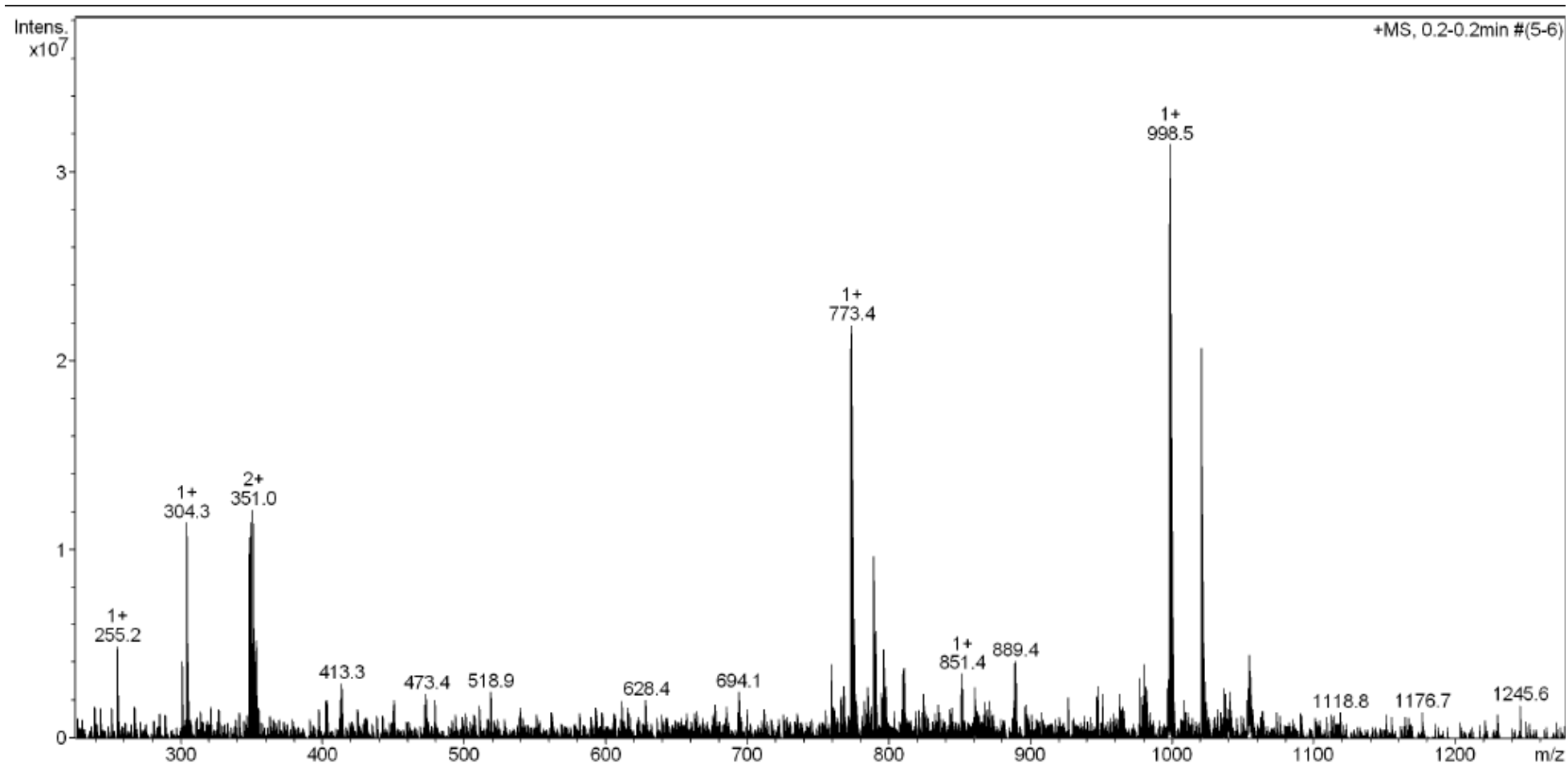


Fig. S20. Mass spectrum (ESI) of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-cyclohexyl]-(3'-aminopropoxy)}-pillar[5]arene (**7**).

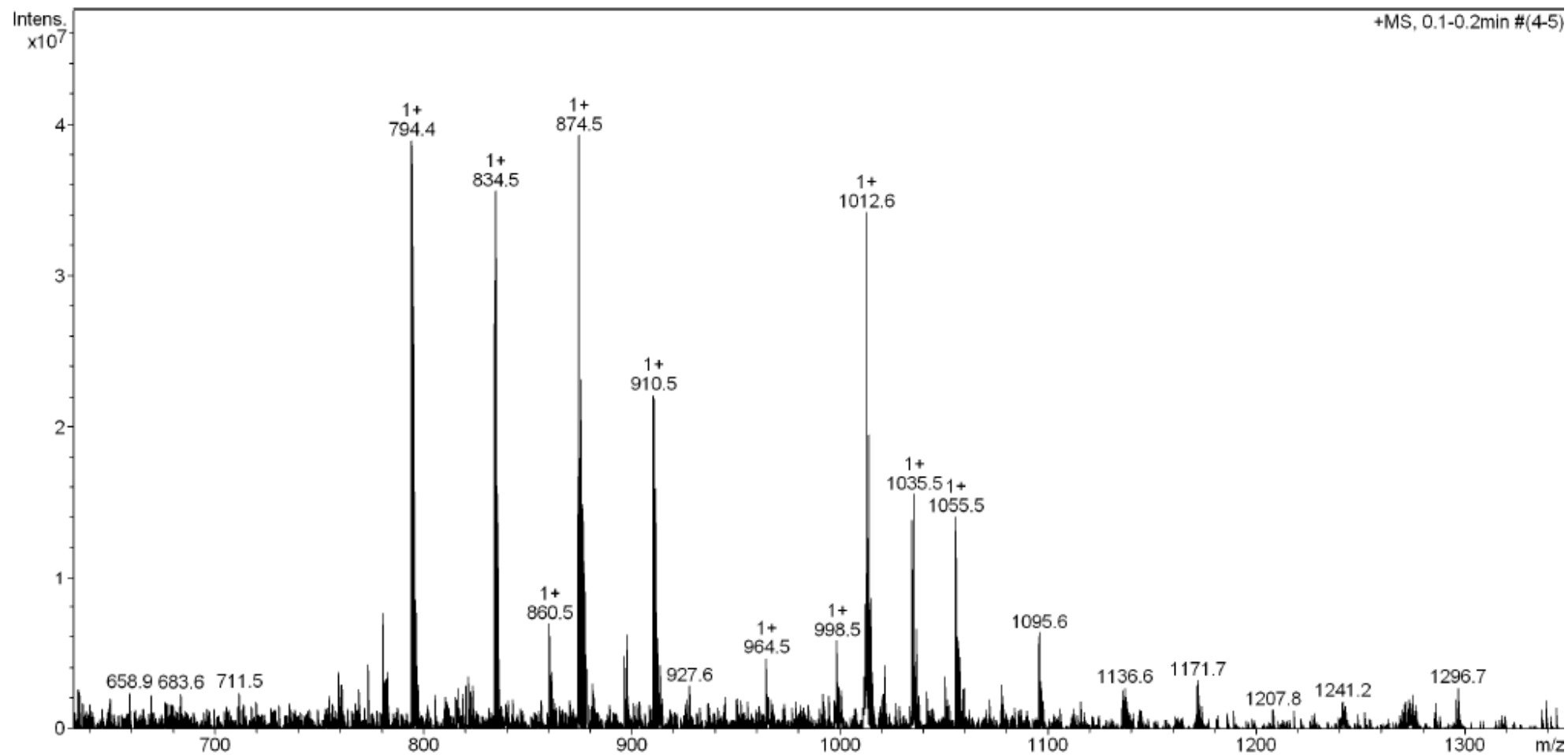


Fig. S21. IR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-(3'-phthalimidepropoxy)-pillar[5]arene (3).

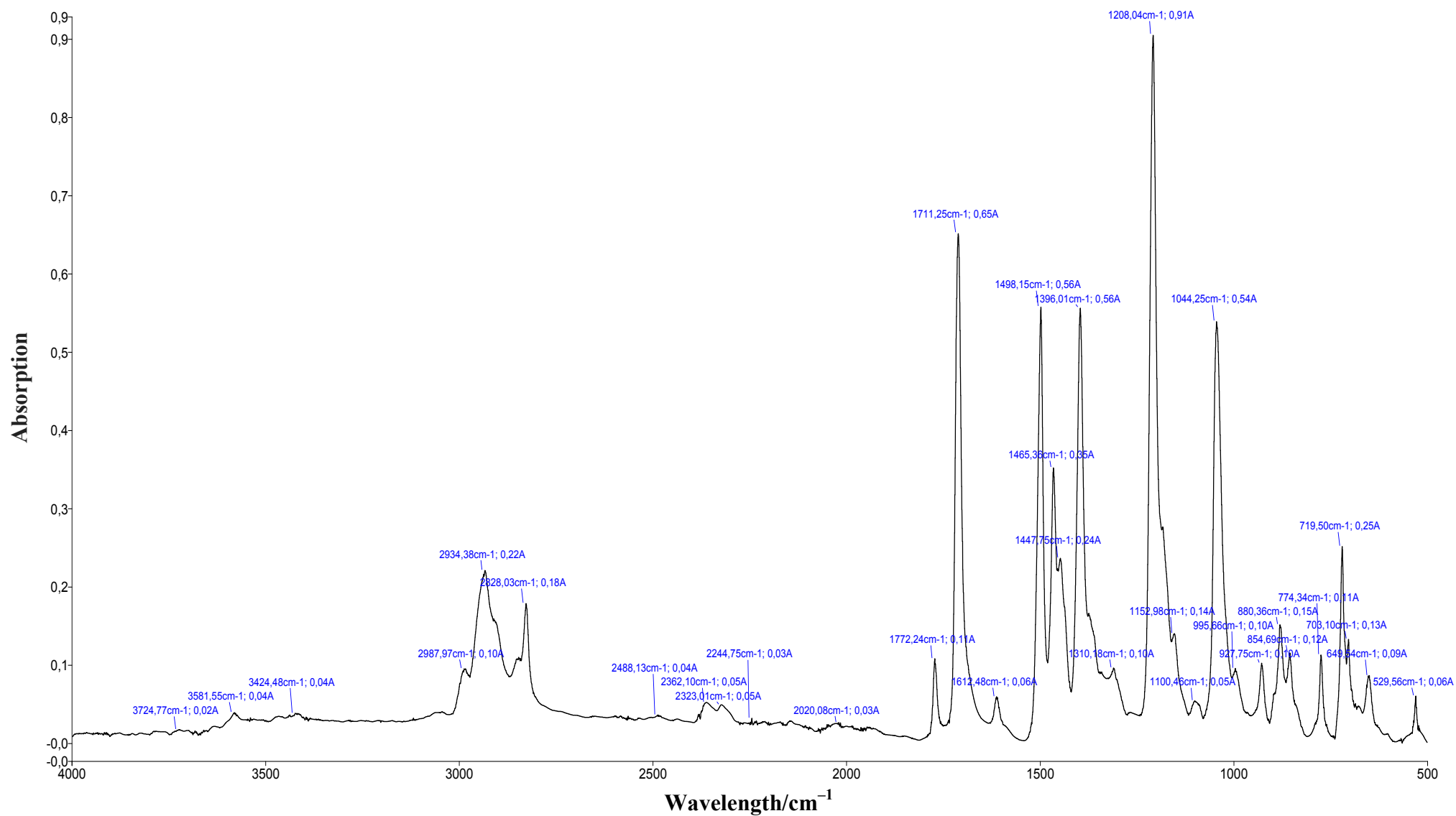


Fig. S22. IR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-(3'-aminopropoxy)-pillar[5]arene (4).

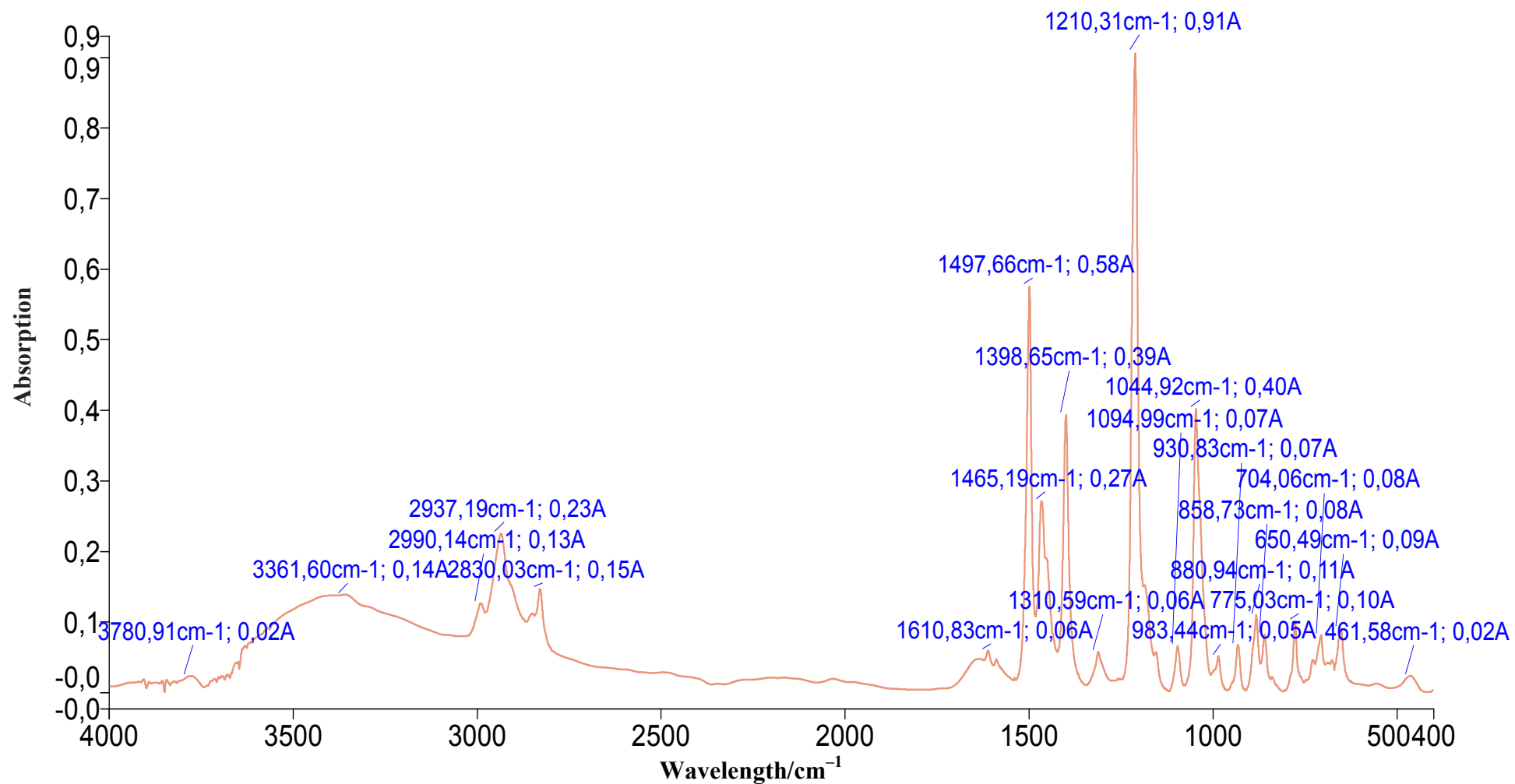


Fig. S23. IR spectrum 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-methylethyl]-(3'-aminopropoxy)}-pillar[5]arene (5).

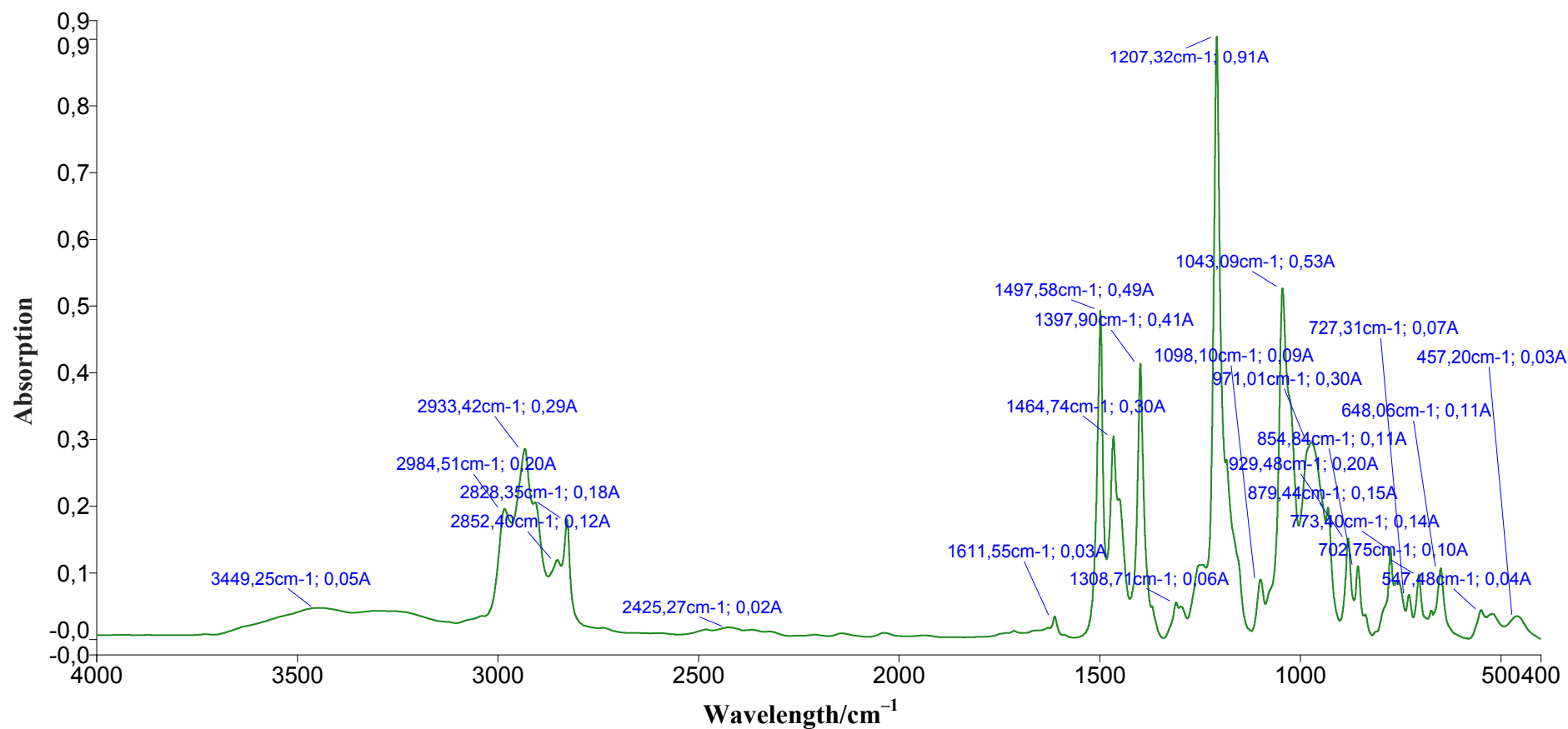


Fig. S24. IR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-cyclopentyl]-(3'-aminopropoxy)}-pillar[5]arene (**6**).

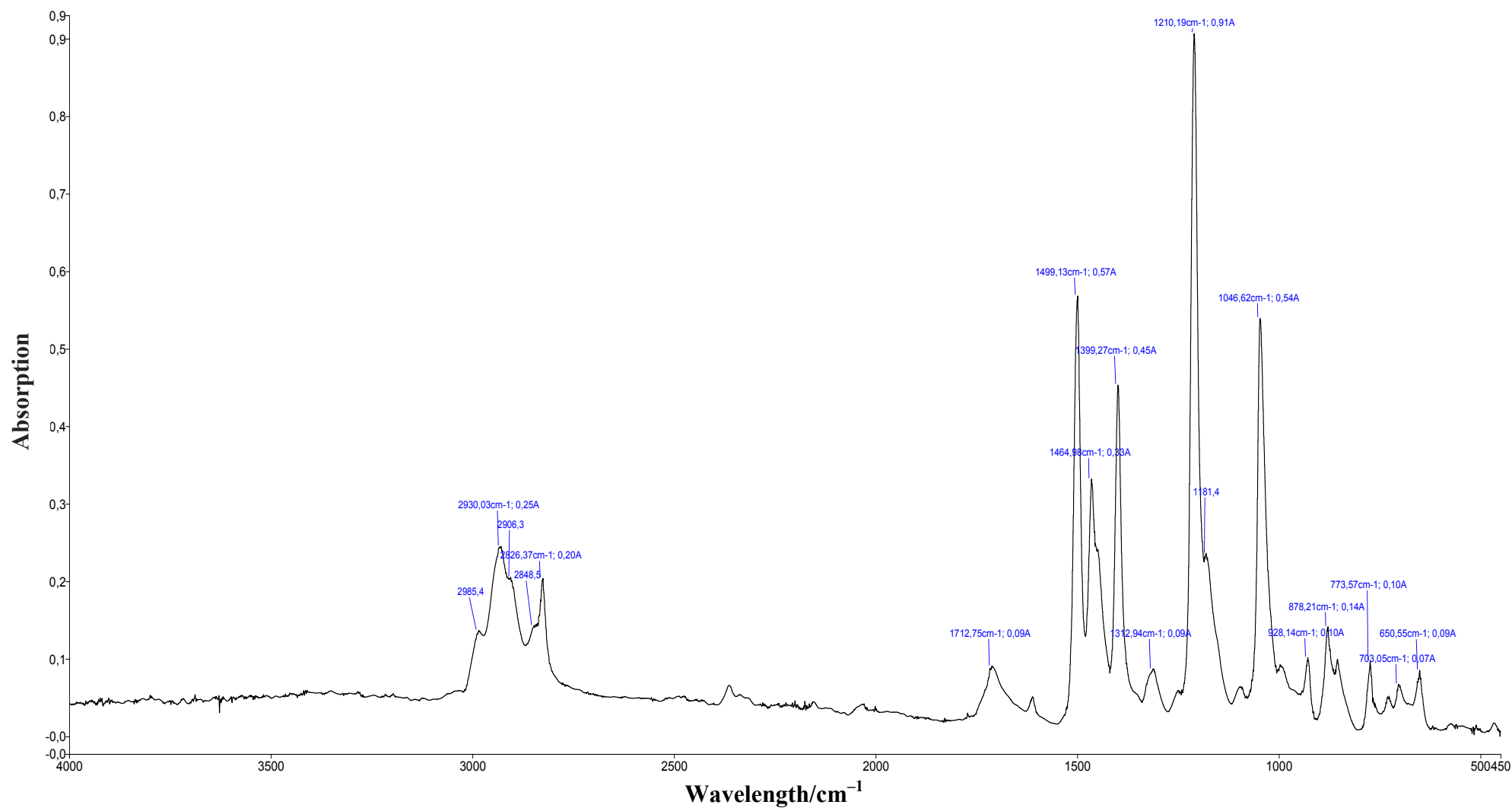


Fig. S25. IR spectrum of 4,8,14,18,23,26,28,31,32-nonamethoxy-35-{N-[1-(O,O-diethylphosphoryl)-1-cyclohexyl]-(3'-aminopropoxy)}-pillar[5]arene (7).

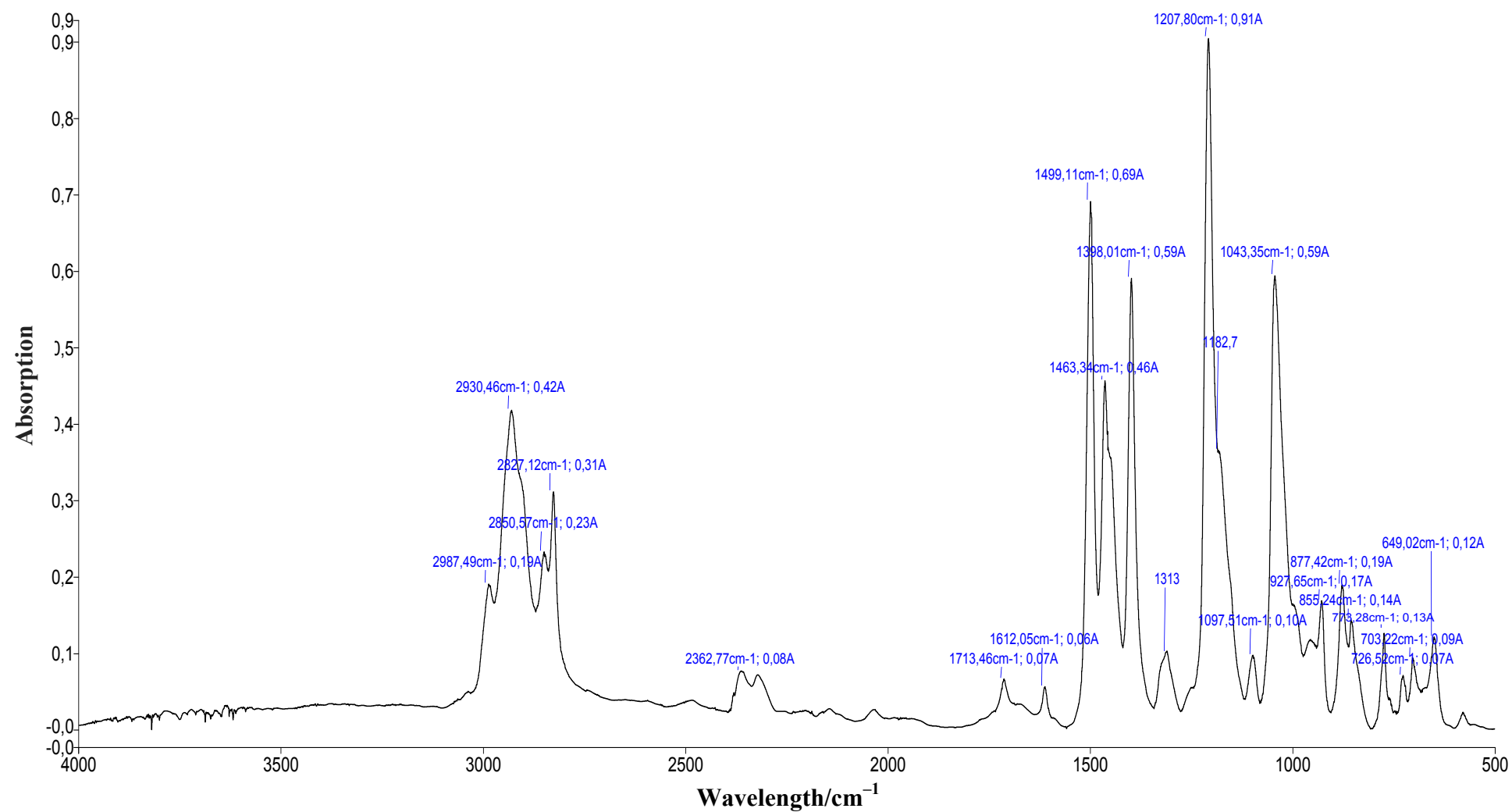


Fig. S26. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) isopropylamine (G1) (0.01 M); b) isopropylamine (G1) (0.01 M) + **4** (0.01 M); c) **4** (0.01 M).

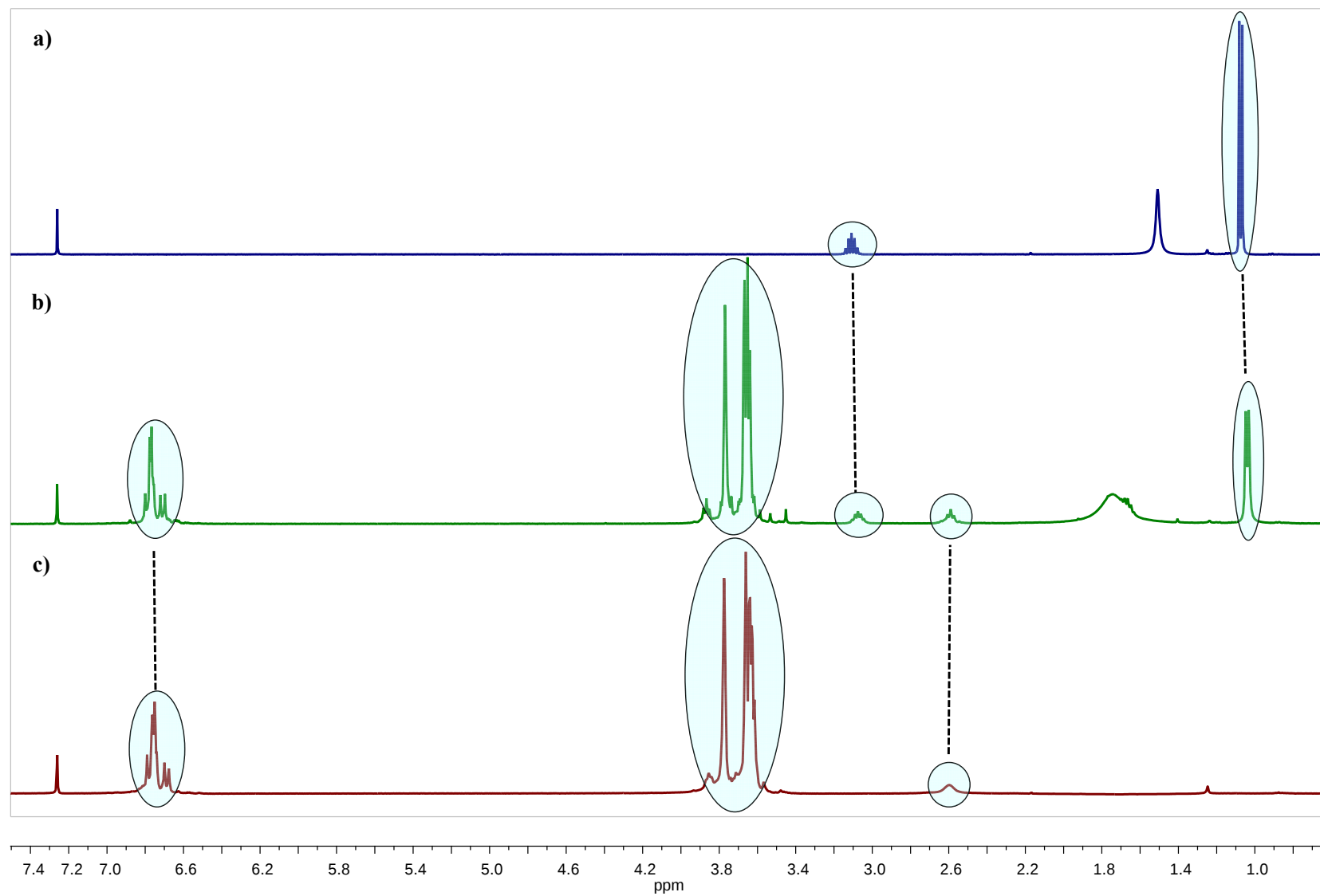


Fig. S27. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) benzylamine (G2) (0.01 M); b) benzylamine (G2) (0.01 M) + **4** (0.01 M); c) **4** (0.01 M).

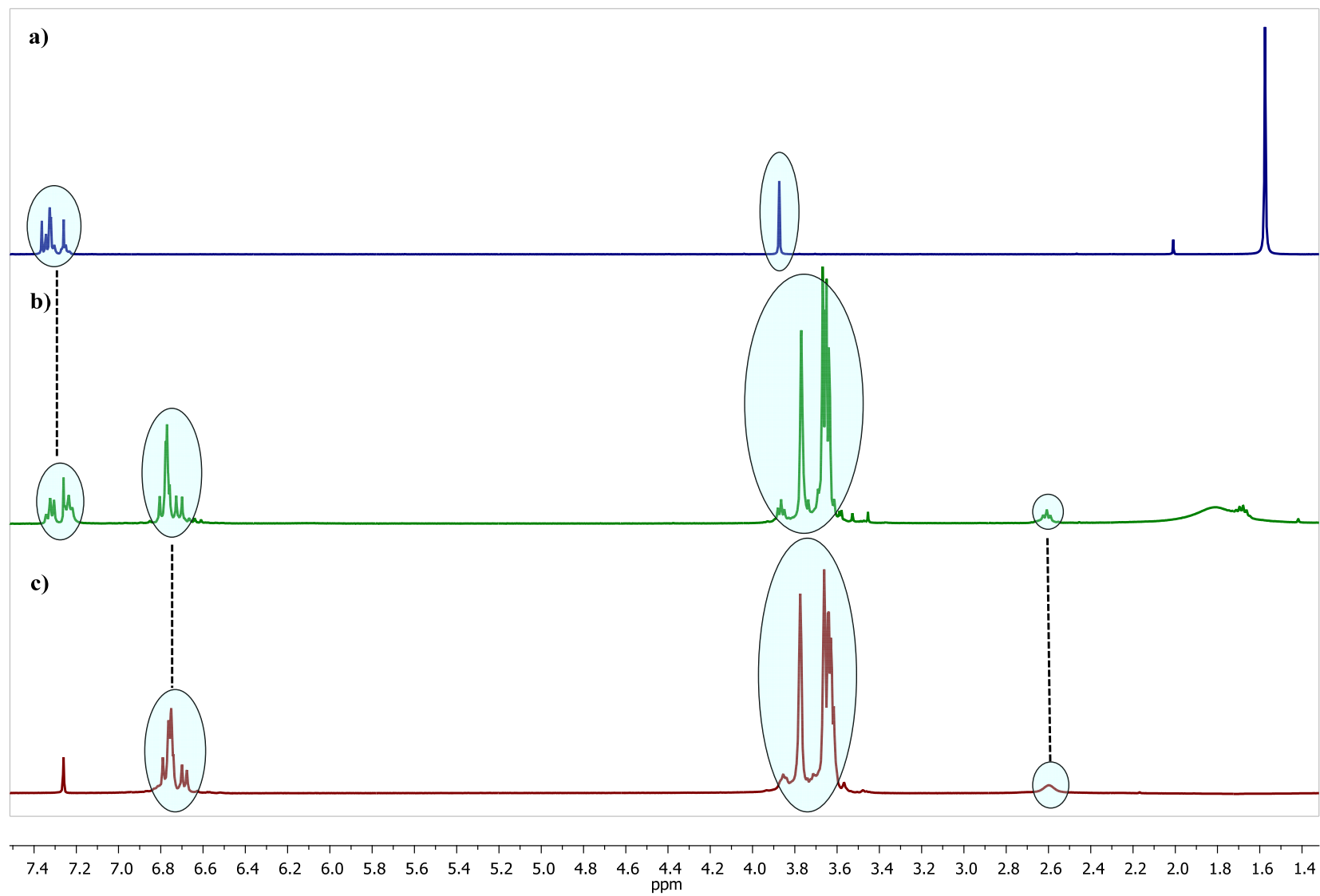


Fig. S28. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) octylamine (G3) (0.01 M); b) octylamine (G3) (0.01 M) + **4** (0.01 M); c) **4** (0.01 M).

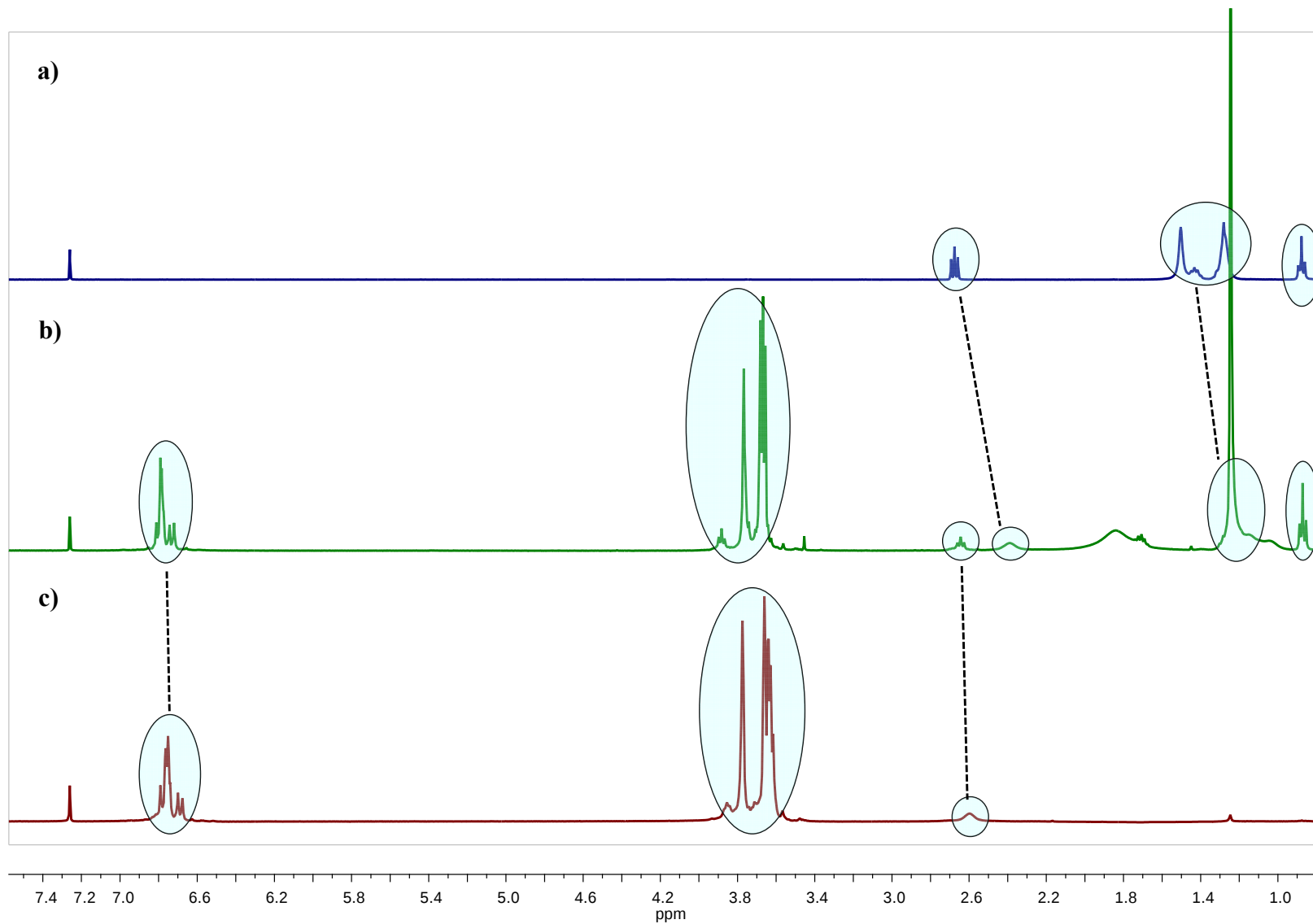


Fig. S29. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) dodecylamine (G4) (0.01 M); b) dodecylamine (G4) (0.01 M) + 4 (0.01 M); c) 4 (0.01 M).

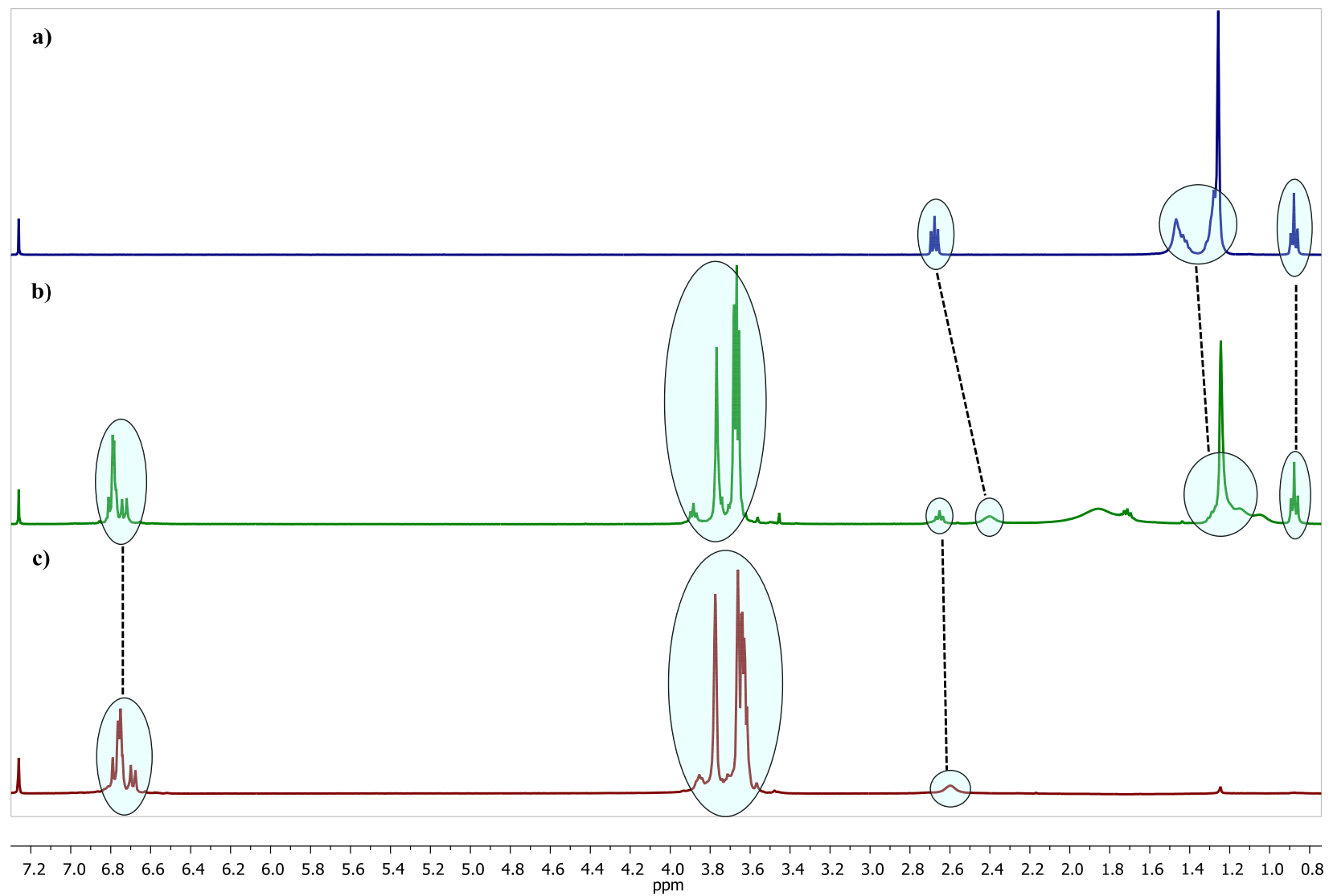


Fig. S30. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) octadecylamine (G5) (0.01 M); b) octadecylamine (G5) (0.01 M) + **4** (0.01 M); c) **4** (0.01 M).

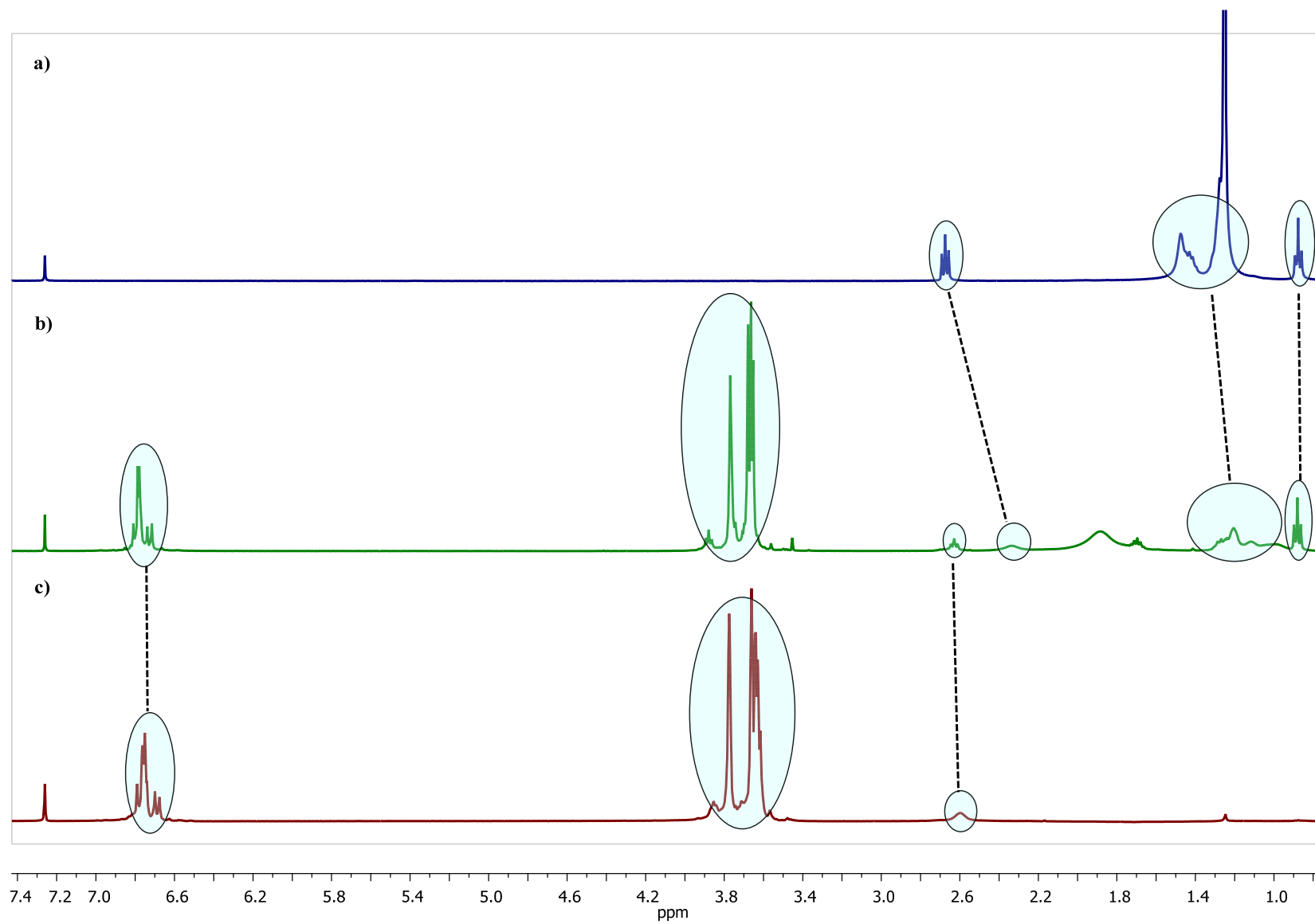


Fig. S31. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) isopropylamine (G1) (0.01 M); b) isopropylamine (G1) (0.01 M) + **5** (0.01 M); c) **5** (0.01 M).

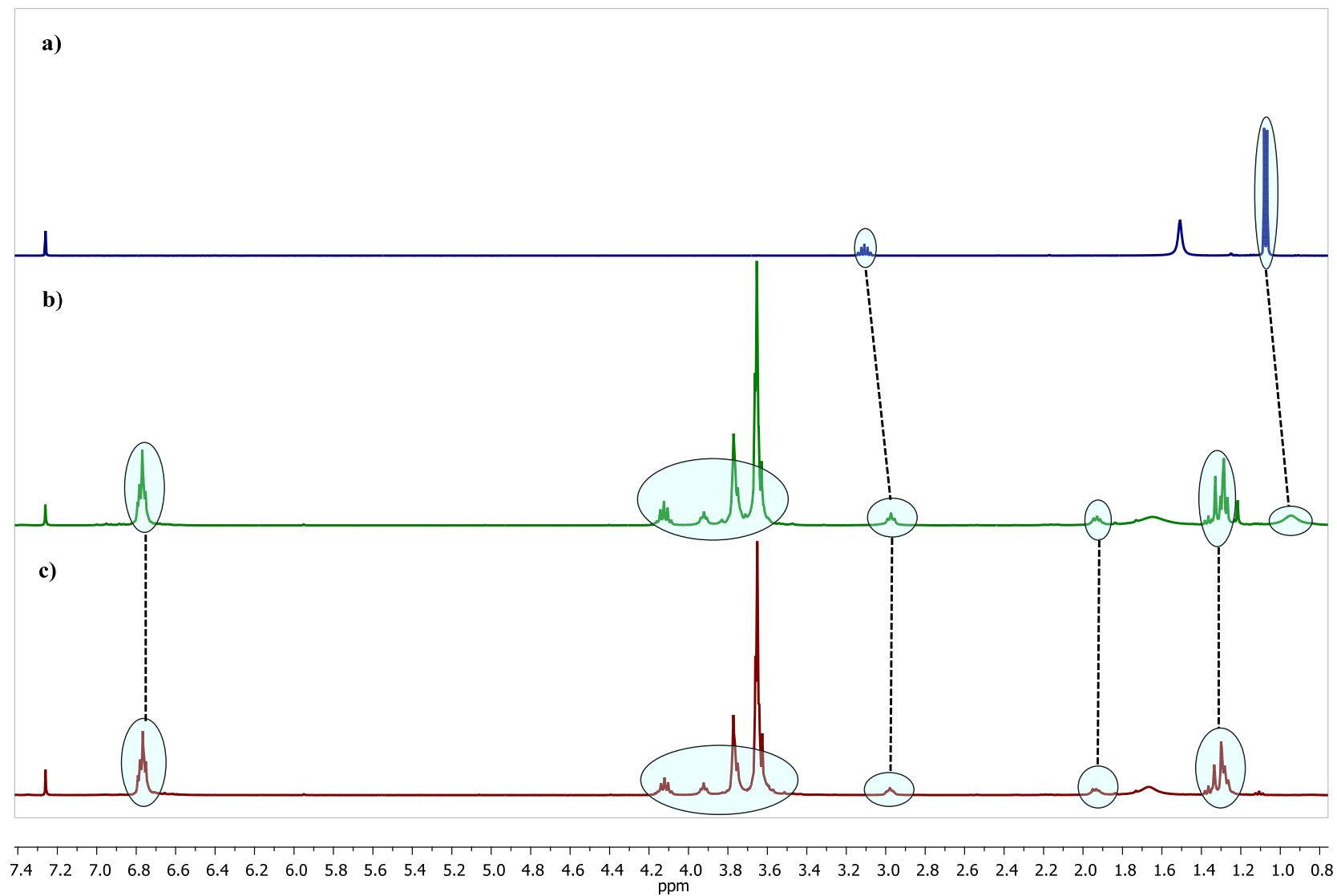


Fig. S32. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) benzylamine (G2) (0.01 M); b) benzylamine (G2) (0.01 M) + **5** (0.01 M); c) **5** (0.01 M).

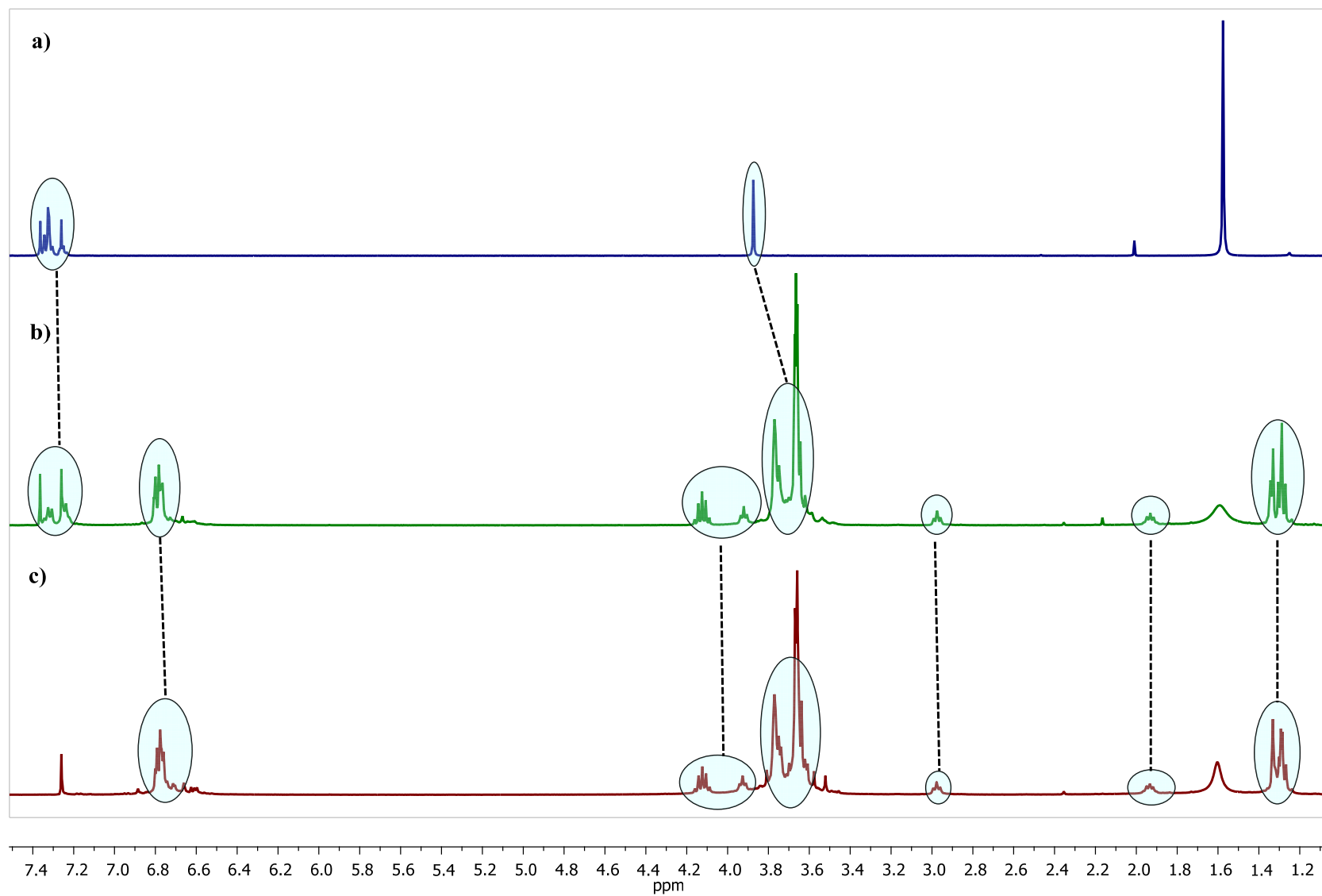


Fig. S33. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) octylamine (G3) (0.01 M); b) octylamine (G3) (0.01 M) + **5** (0.01 M); c) **5** (0.01 M).

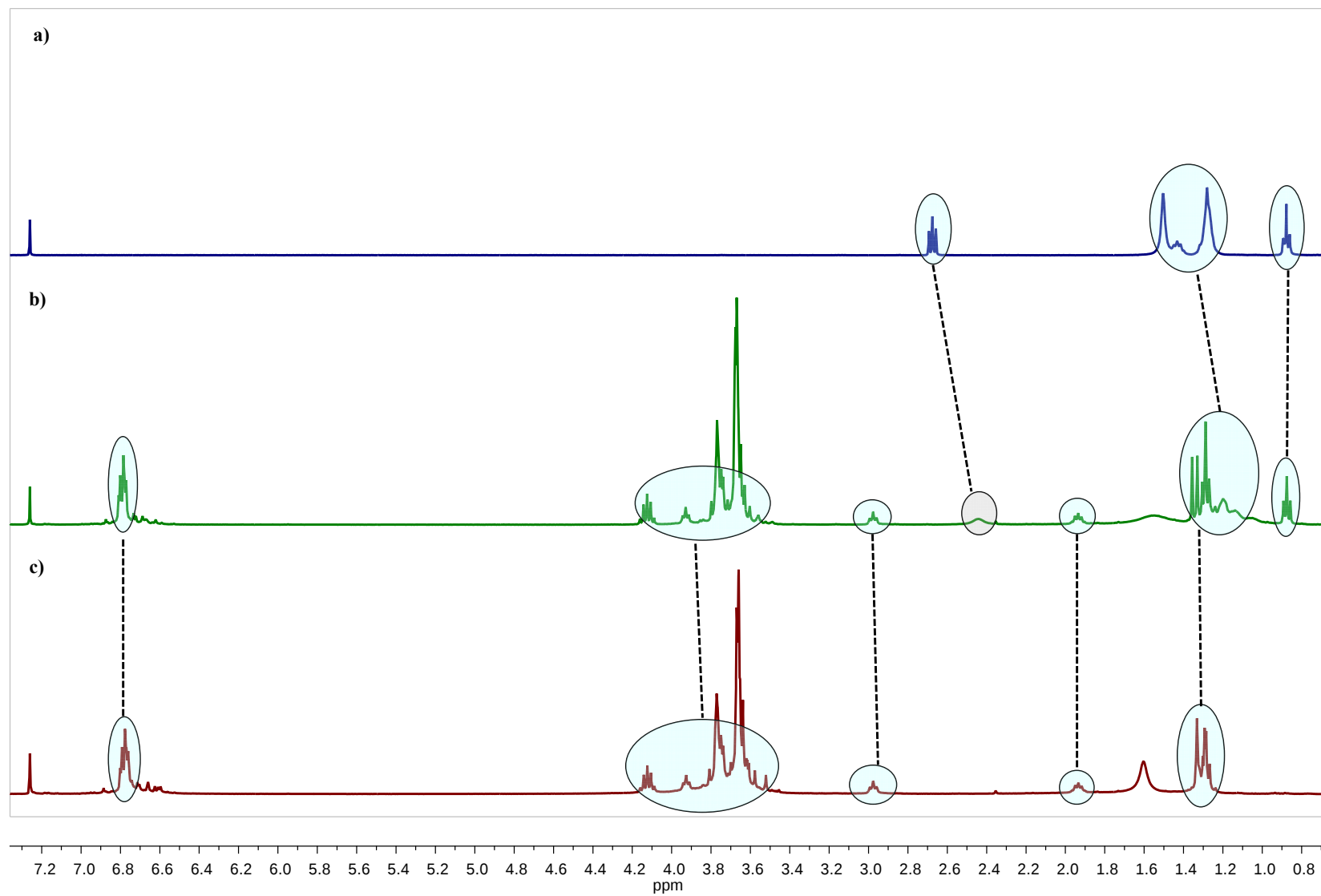


Fig. S34. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) dodecylamine (G4) (0.01 M); b) dodecylamine (G4) (0.01 M) + **5** (0.01 M); c) **5** (0.01 M).

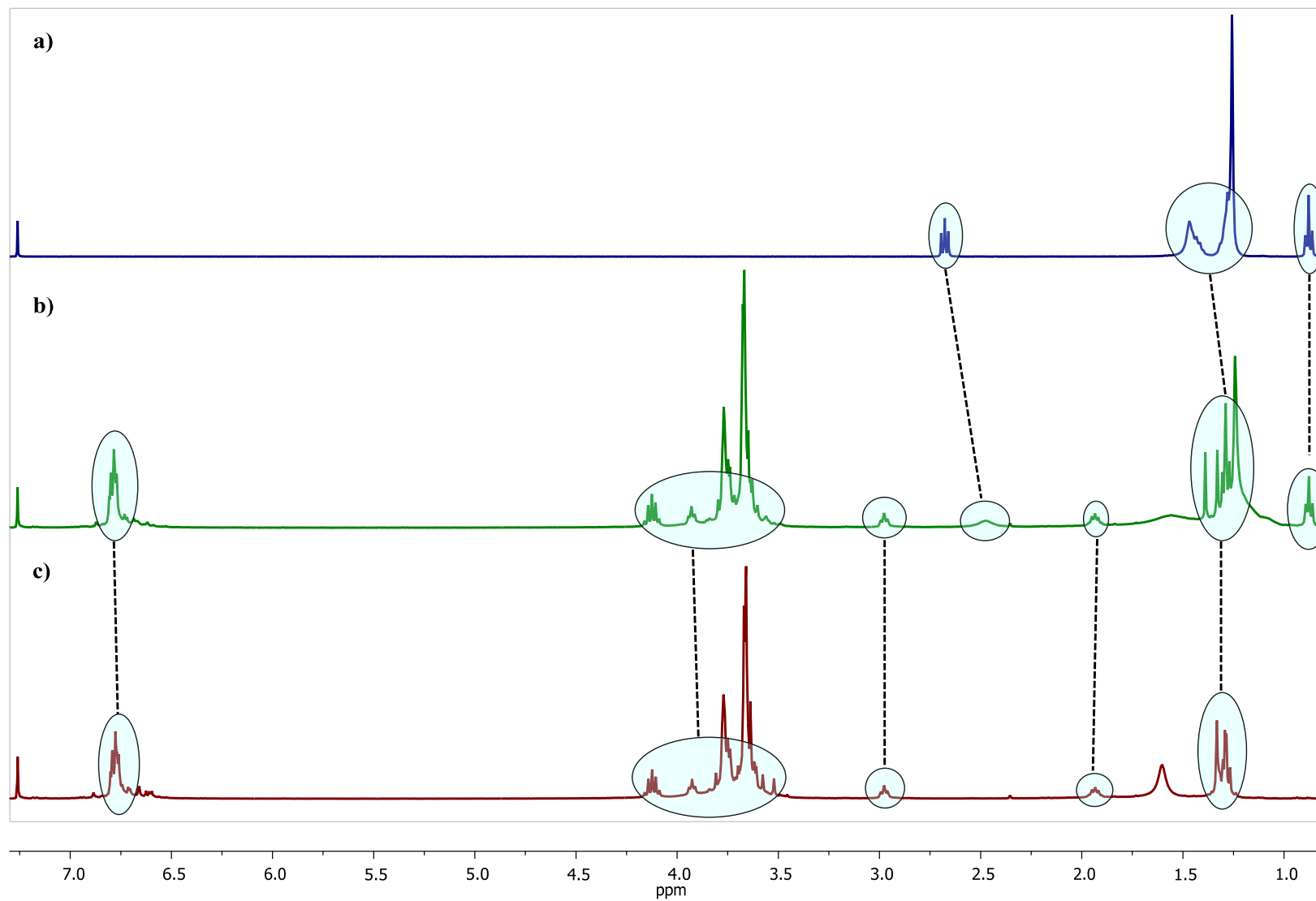


Fig. S35. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) octadecylamine (G5) (0.01 M); b) octadecylamine (G5) (0.01 M) + 5 (0.01 M); c) 5 (0.01 M).

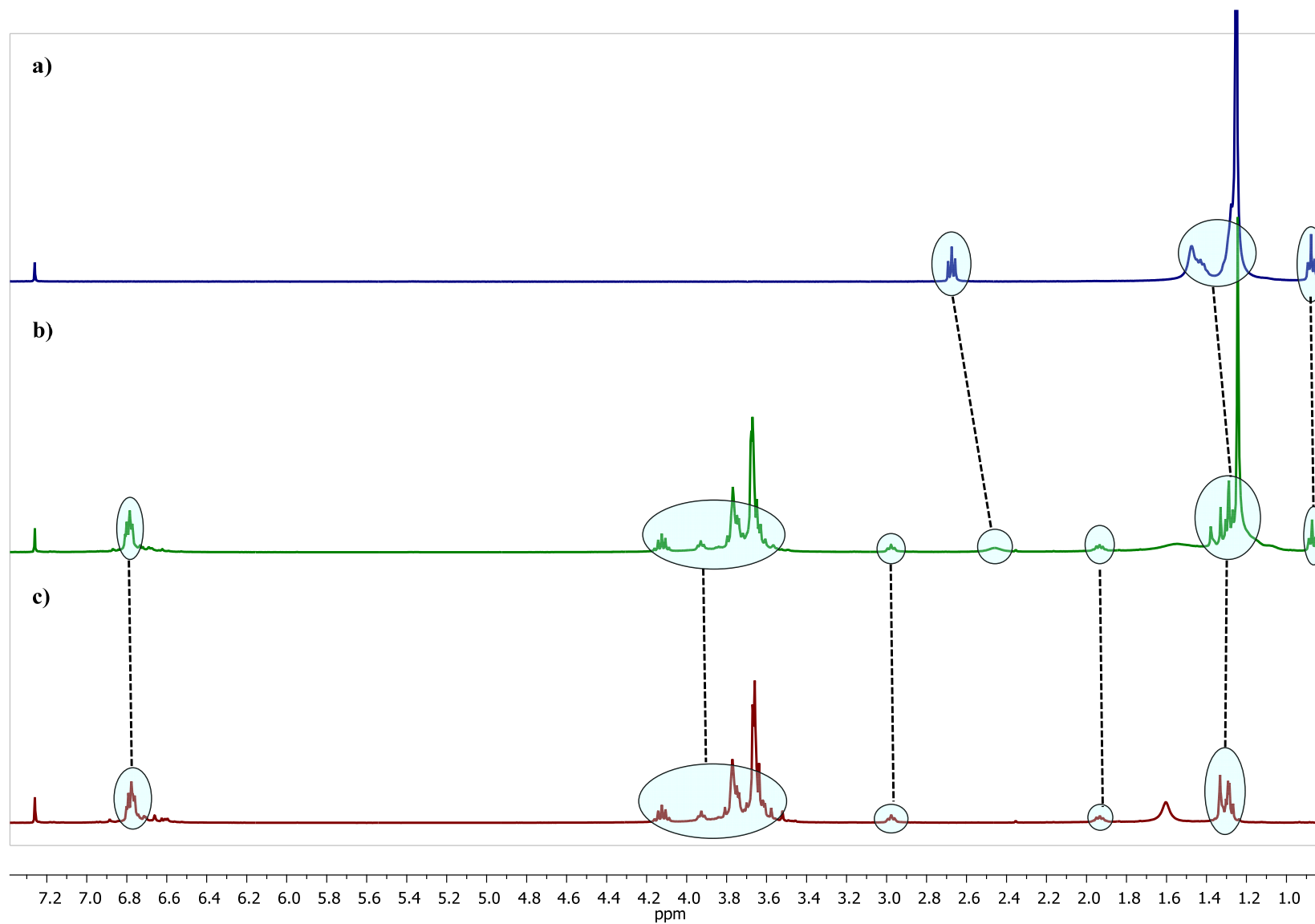


Fig. S36. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) isopropylamine (G1) (0.01 M); b) isopropylamine (G1) (0.01 M) + **6** (0.01 M); c) **6** (0.01 M).

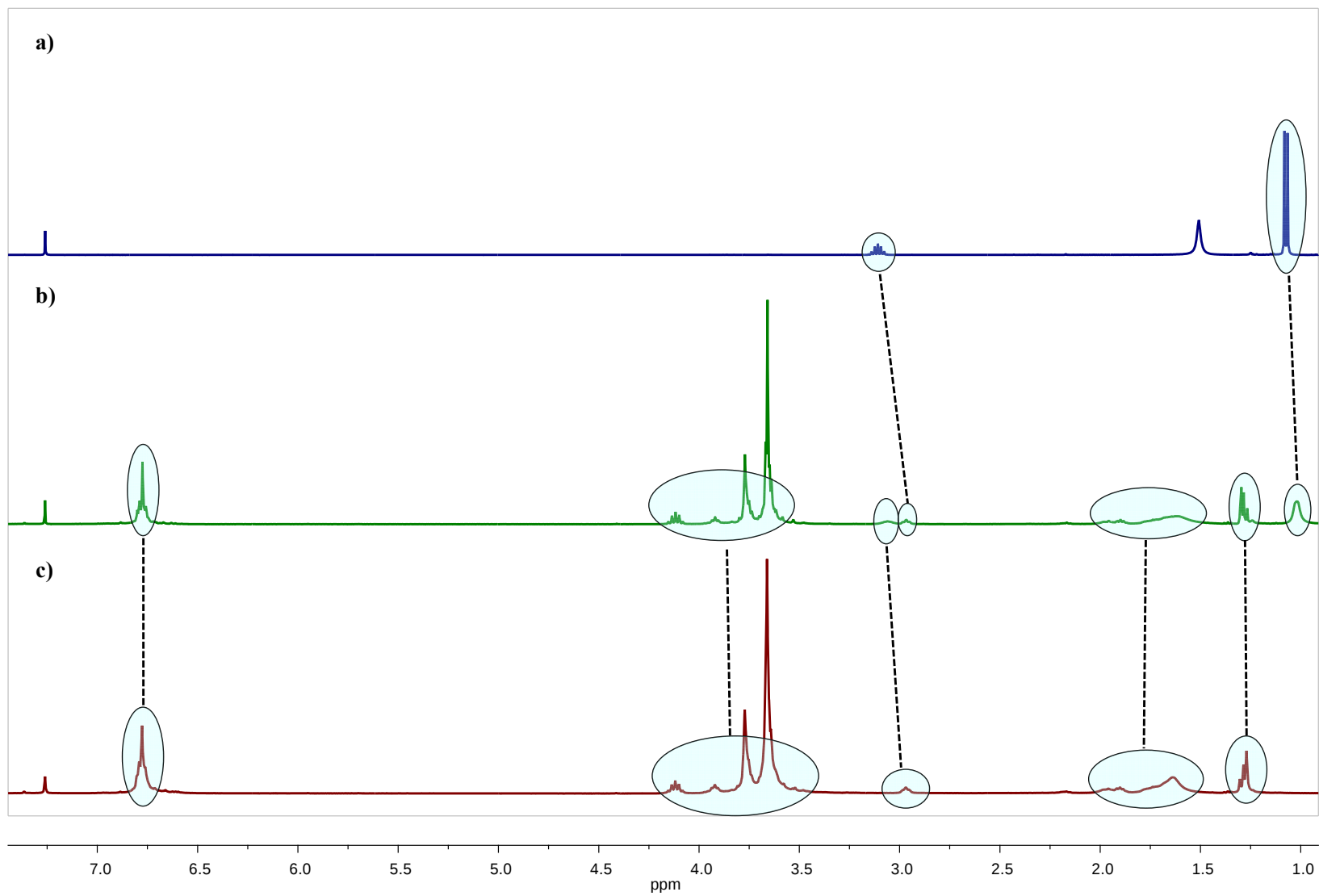


Fig. S37. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) benzylamine (G2) (0.01 M); b) benzylamine (G2) (0.01 M) + **6** (0.01 M); c) **6** (0.01 M).

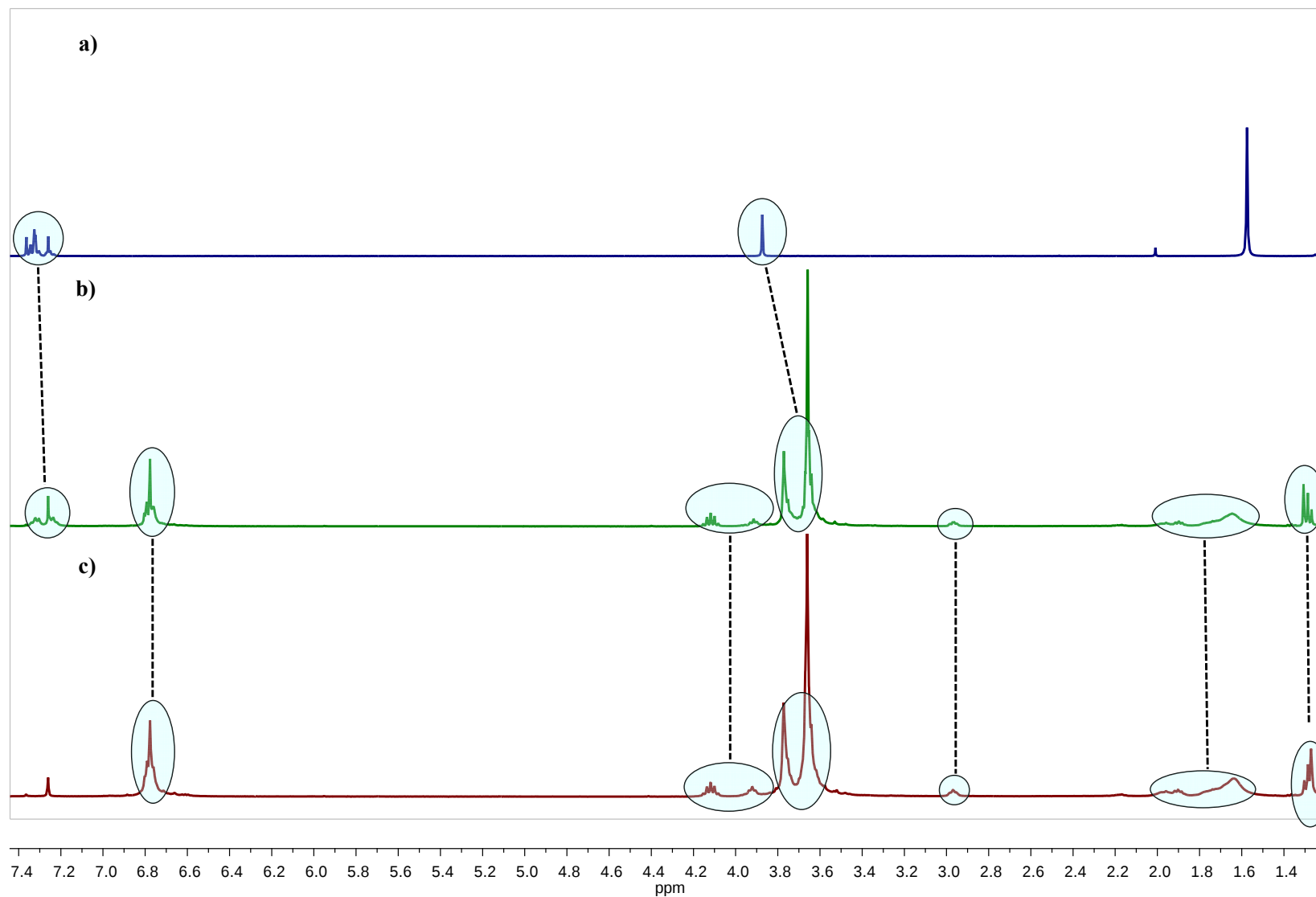


Fig. S38. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) octylamine (G3) (0.01 M); b) octylamine (G3) (0.01 M) + **6** (0.01 M); c) **6** (0.01 M).

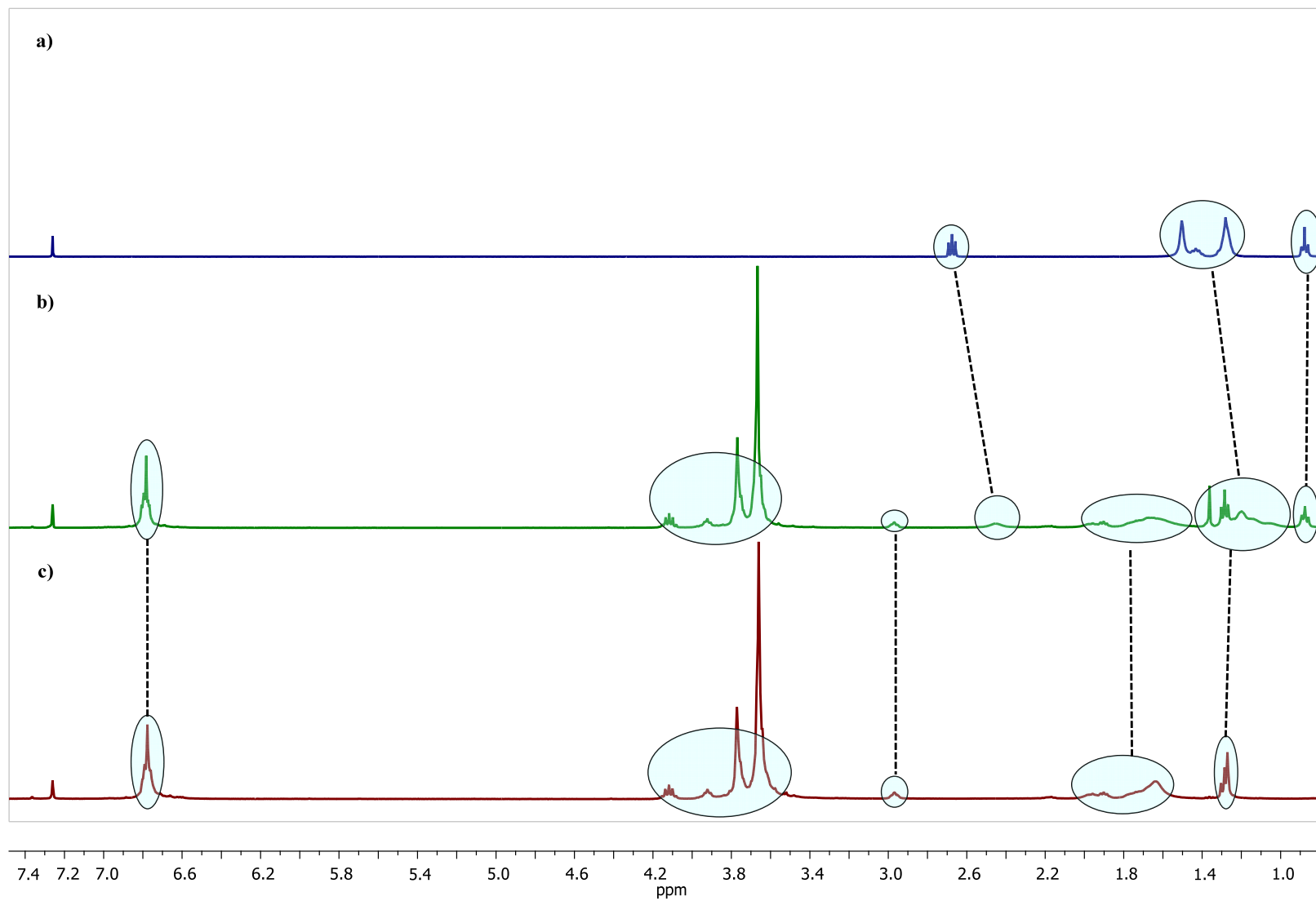


Fig. S39. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) dodecylamine (G4) (0.01 M); b) dodecylamine (G4) (0.01 M) + **6** (0.01 M); c) **6** (0.01 M).

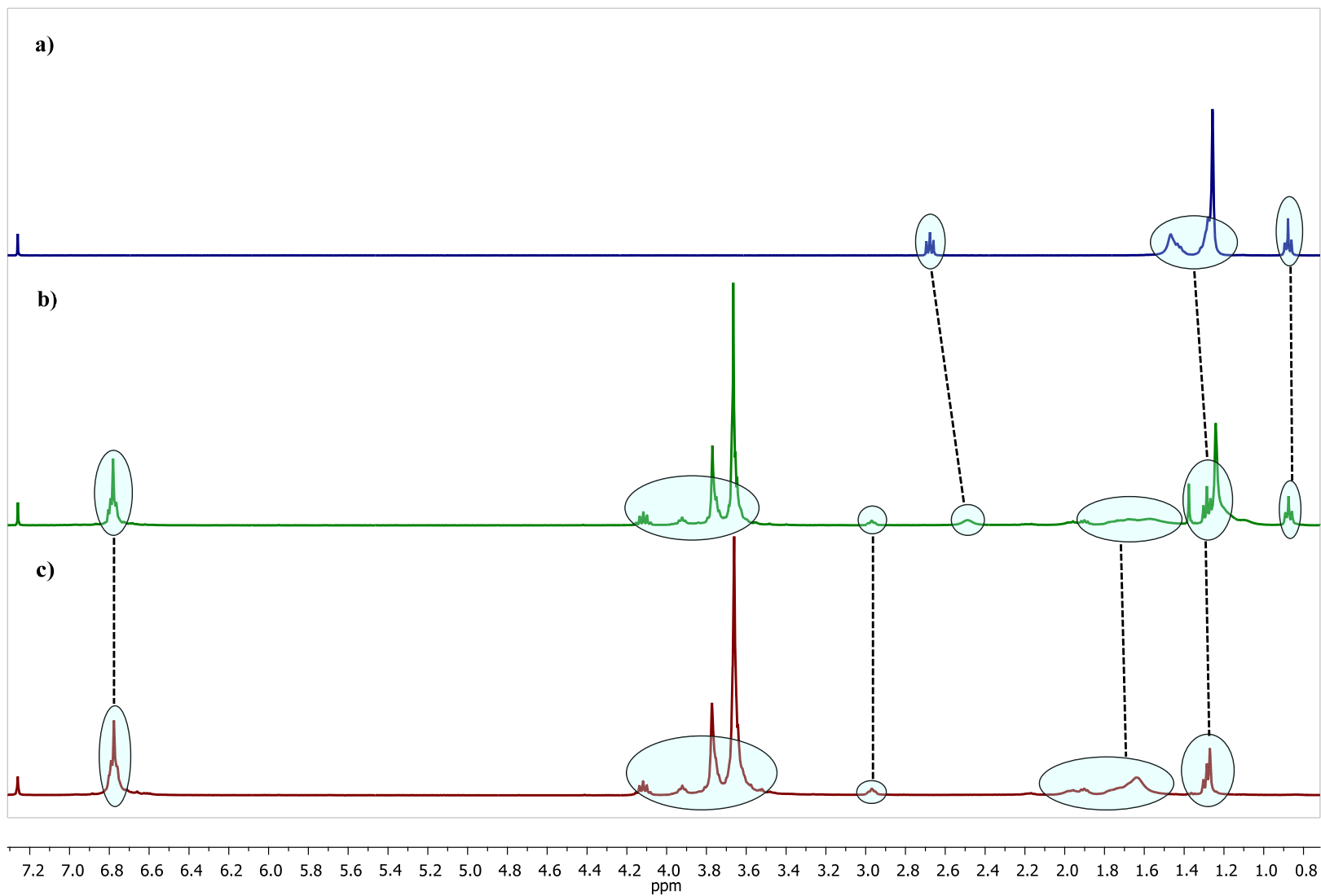


Fig. S40. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) octadecylamine (G5) (0.01 M); b) octadecylamine (G5) (0.01 M) + **6** (0.01 M); c) **6** (0.01 M).

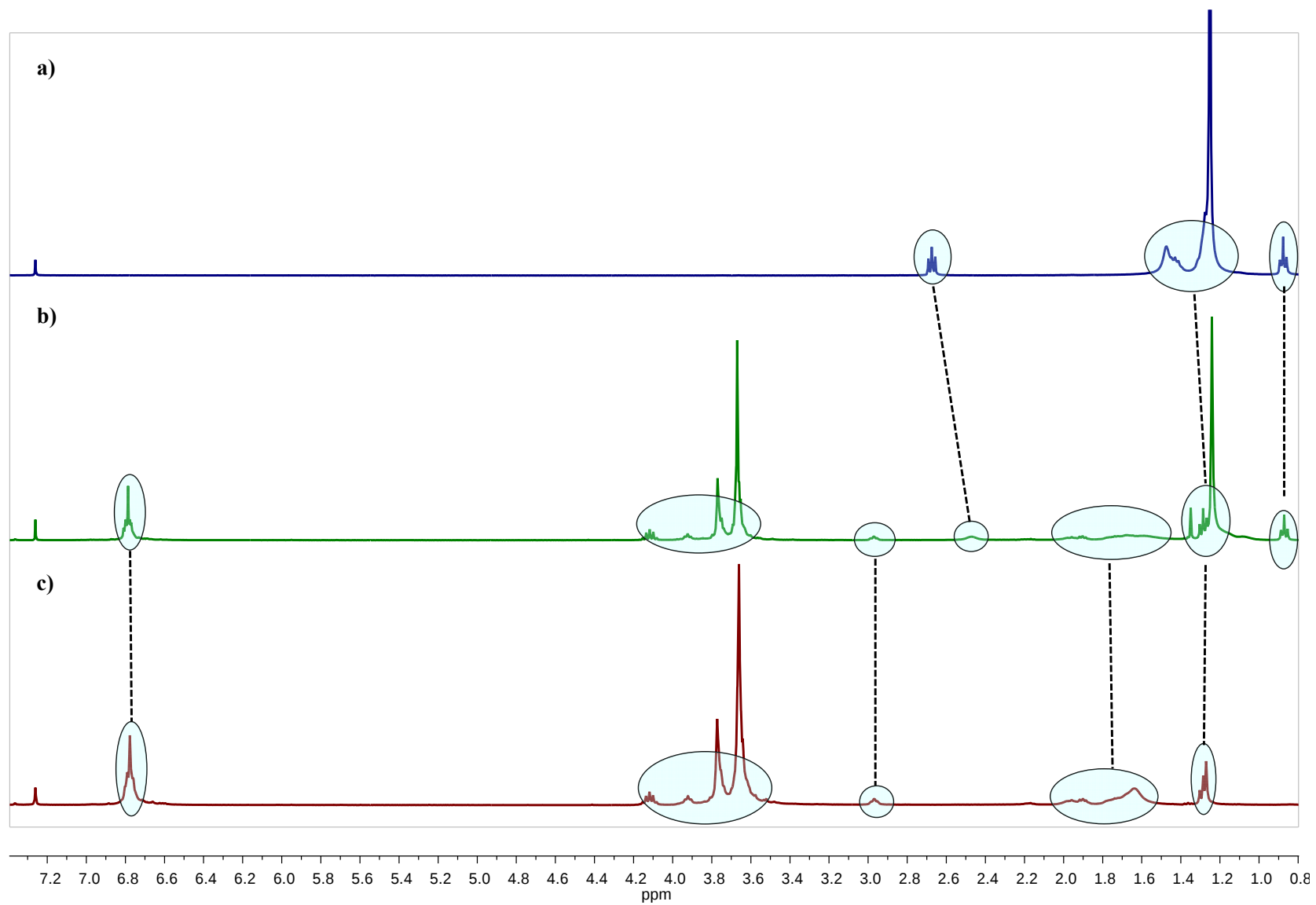


Fig. S41. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) isopropylamine (G1) (0.01 M); b) isopropylamine (G1) (0.01 M) + 7 (0.01 M); c) 7 (0.01 M).

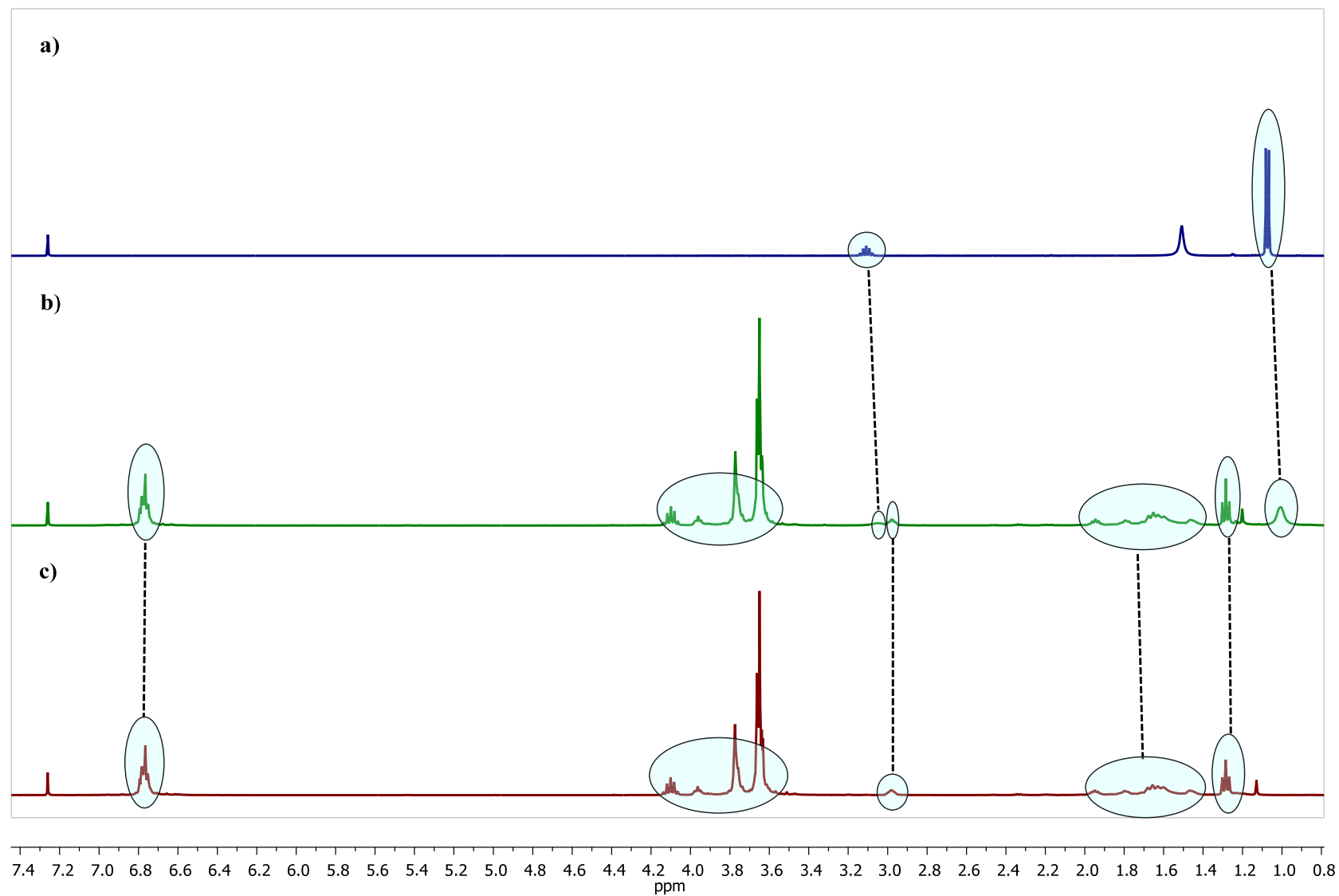


Fig. S42. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) benzylamine (G2) (0.01 M); b) benzylamine (G2) (0.01 M) + 7 (0.01 M); c) 7 (0.01 M).

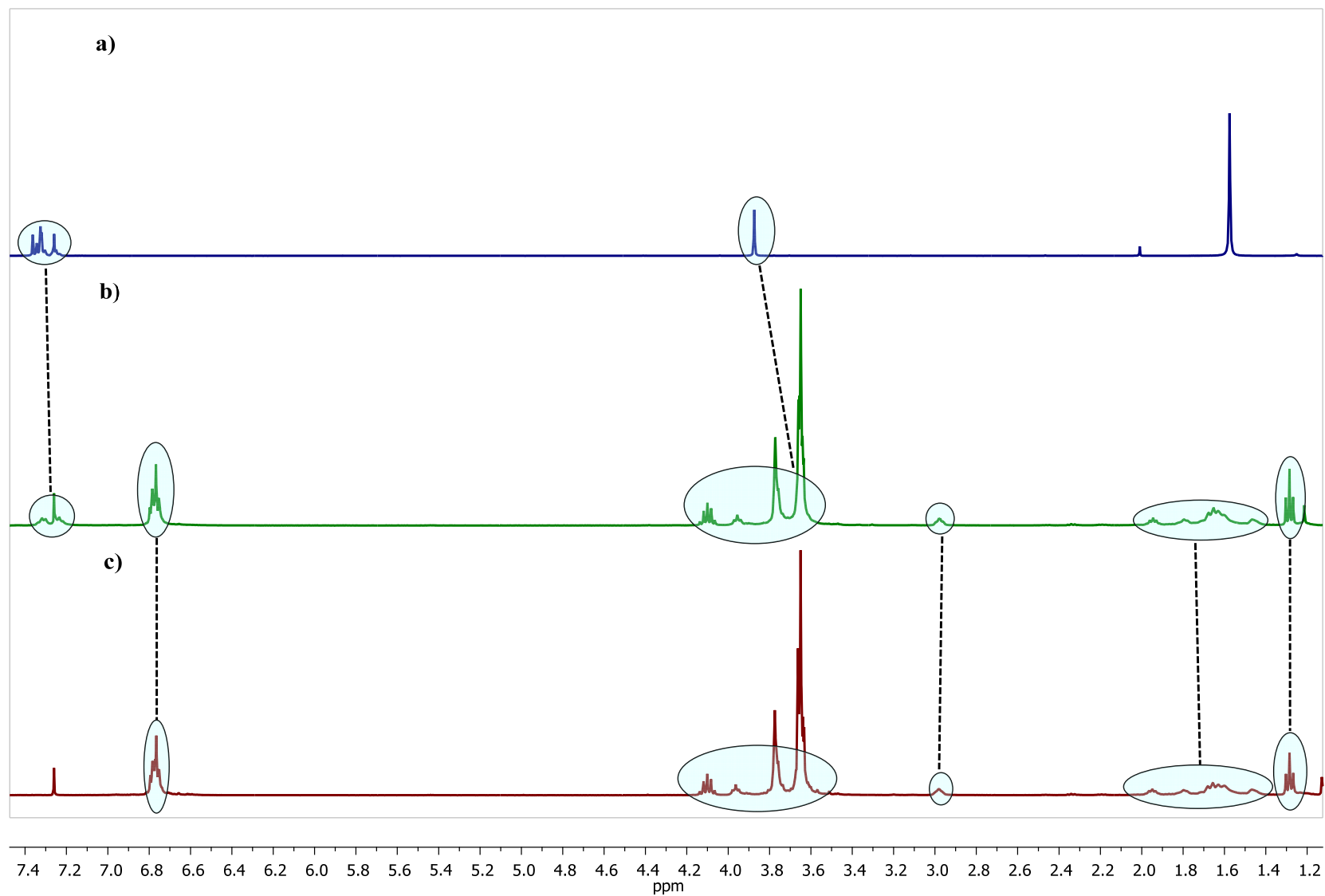


Fig. S43. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) octylamine (G3) (0.01 M); b) octylamine (G3) (0.01 M) + **7** (0.01 M); c) **7** (0.01 M).

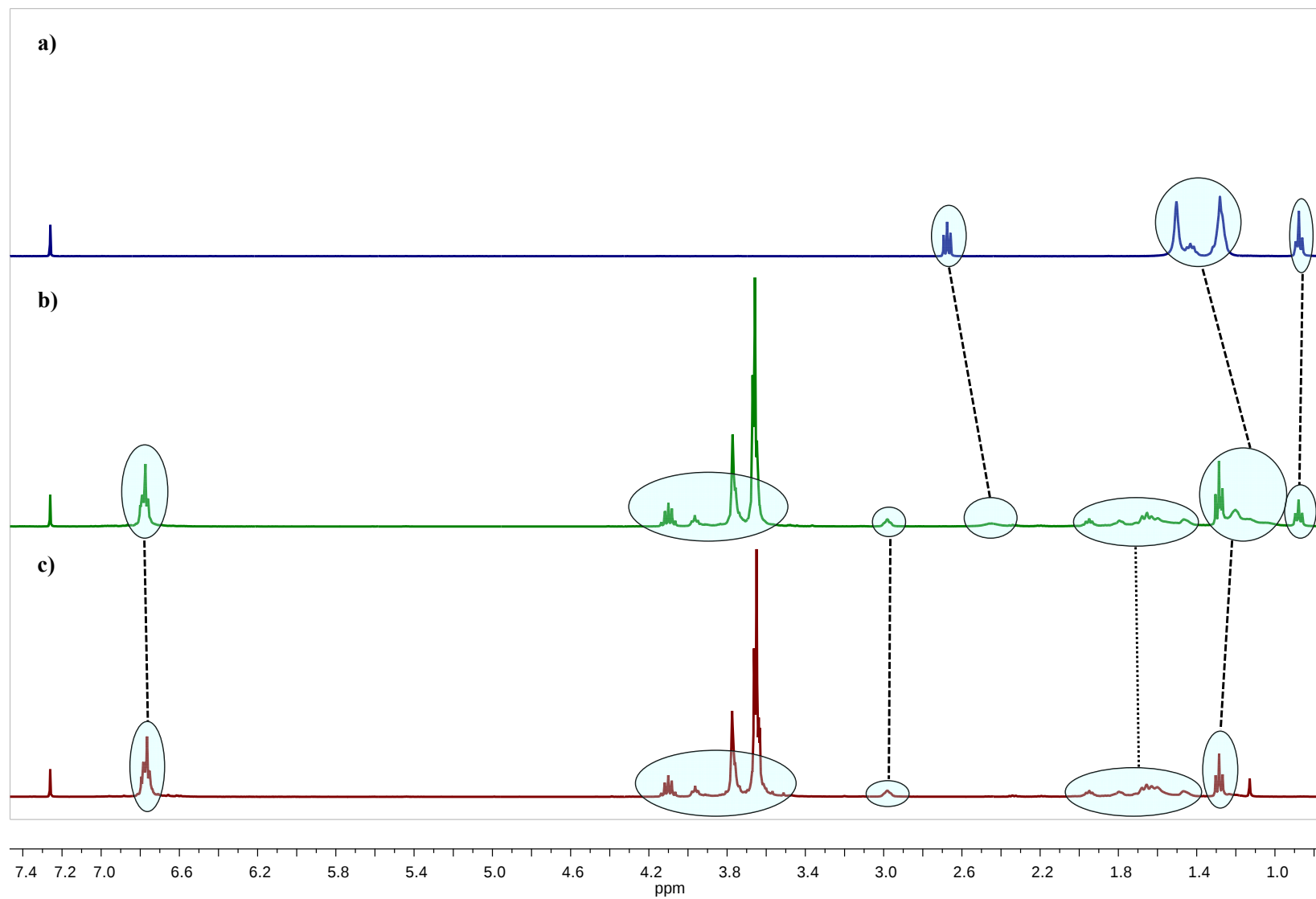


Fig. S44. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) dodecylamine (G4) (0.01 M); b) dodecylamine (G4) (0.01 M) + **7** (0.01 M); c) **7** (0.01 M).

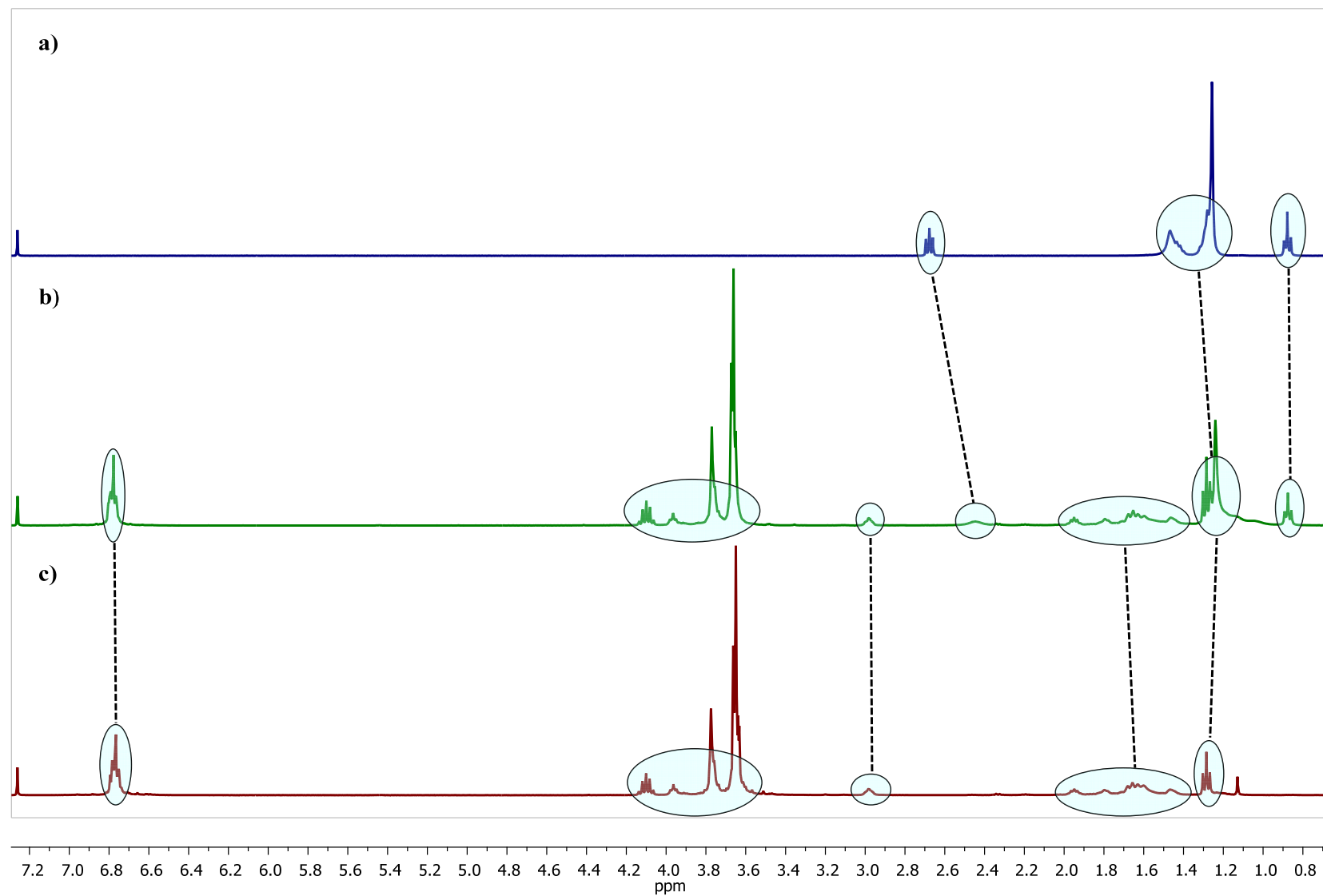


Fig. S45. ^1H NMR spectra (CDCl_3 , 293 K, 400 MHz): a) octadecylamine (G5) (0.01 M); b) octadecylamine (G5) (0.01 M) + 7 (0.01 M); c) 7 (0.01 M).

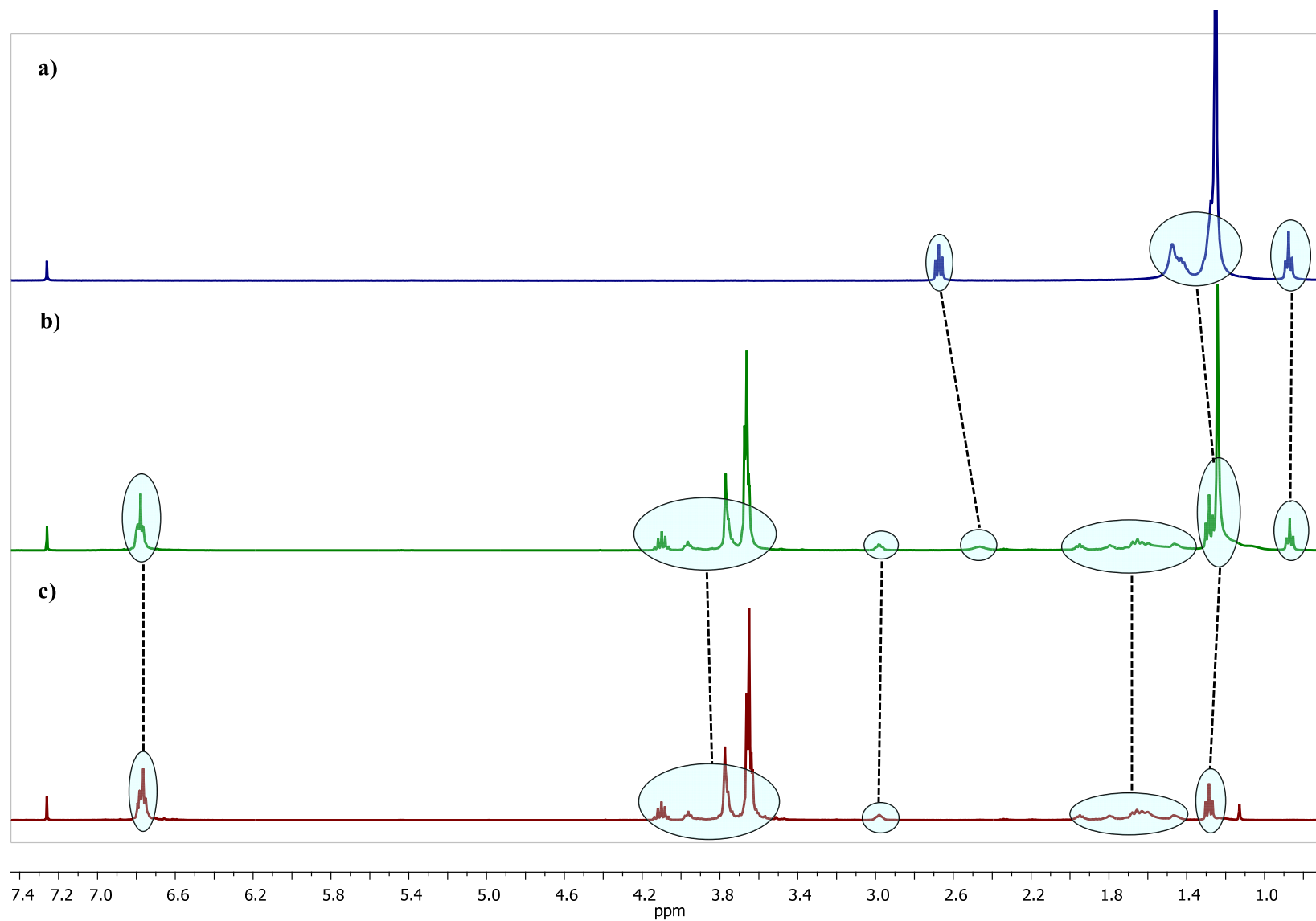


Fig. S46. 2D NMR NOESY ^1H - ^1H spectra for (4), CDCl_3 , 293 K, 400 MHz.

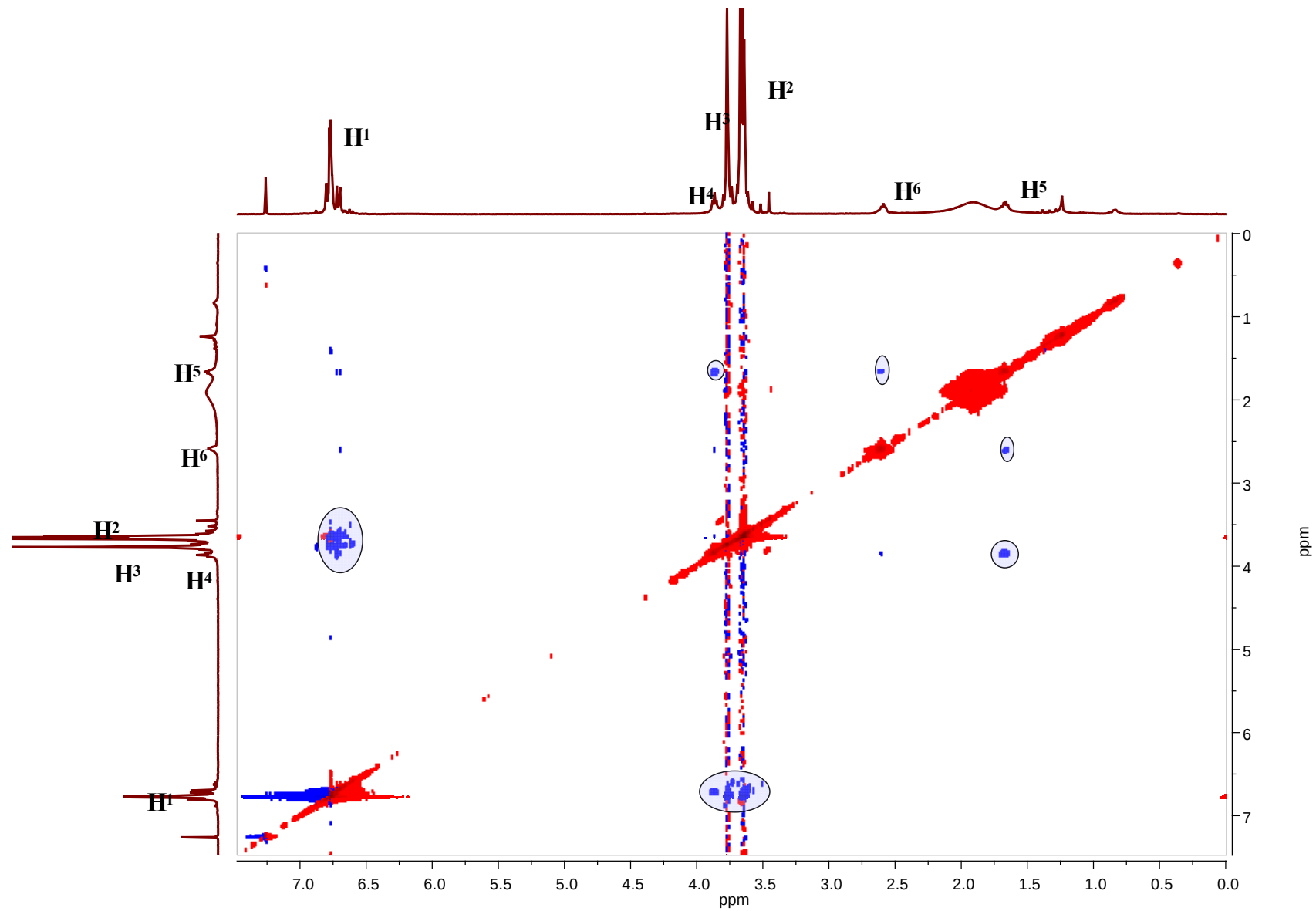


Fig. S47. 2D NMR NOESY ^1H - ^1H spectra for (5), CDCl_3 , 293 K, 400 MHz.

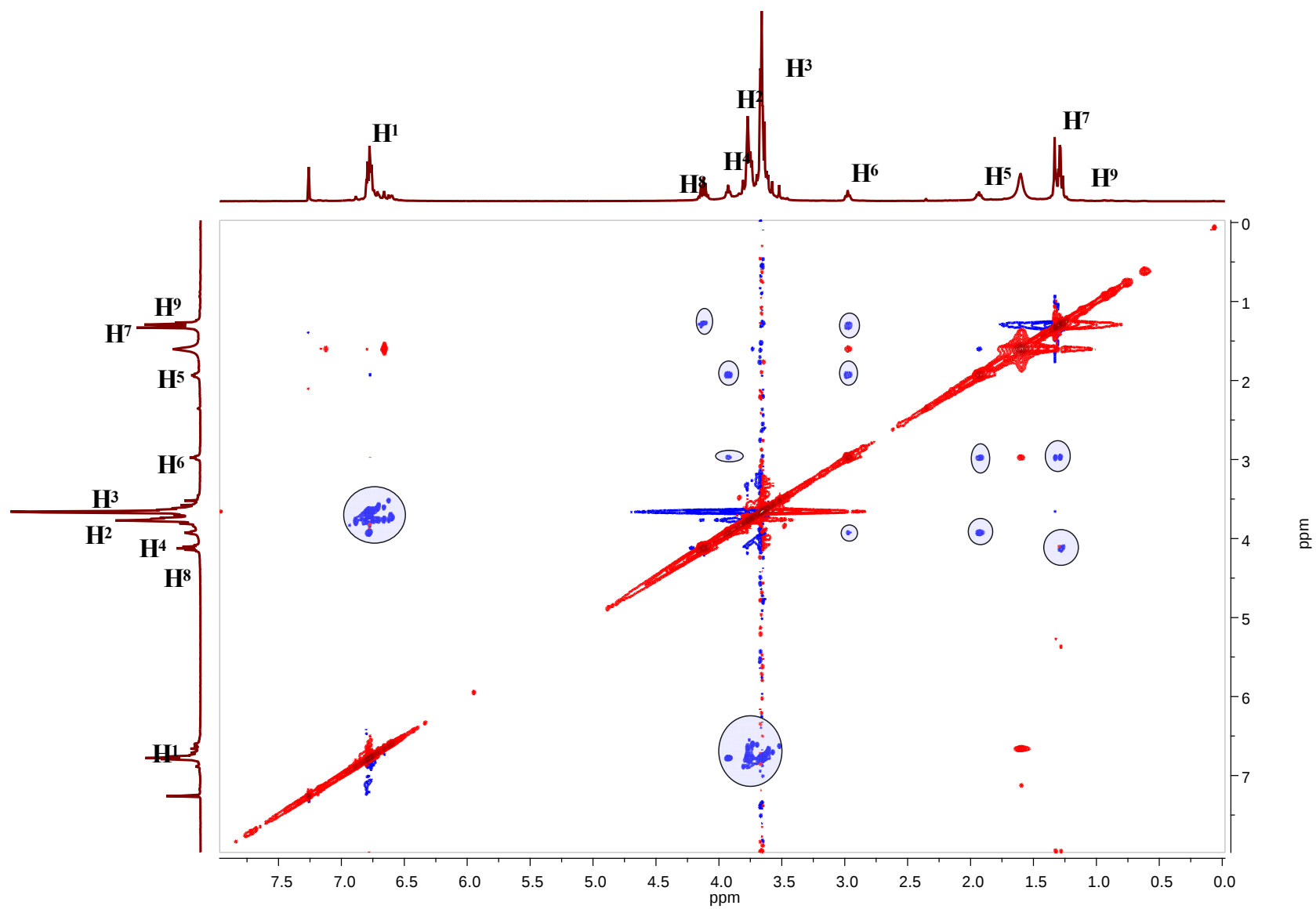


Fig. S48. 2D NMR NOESY ^1H - ^1H spectra for (6), CDCl_3 , 293 K, 400 MHz.

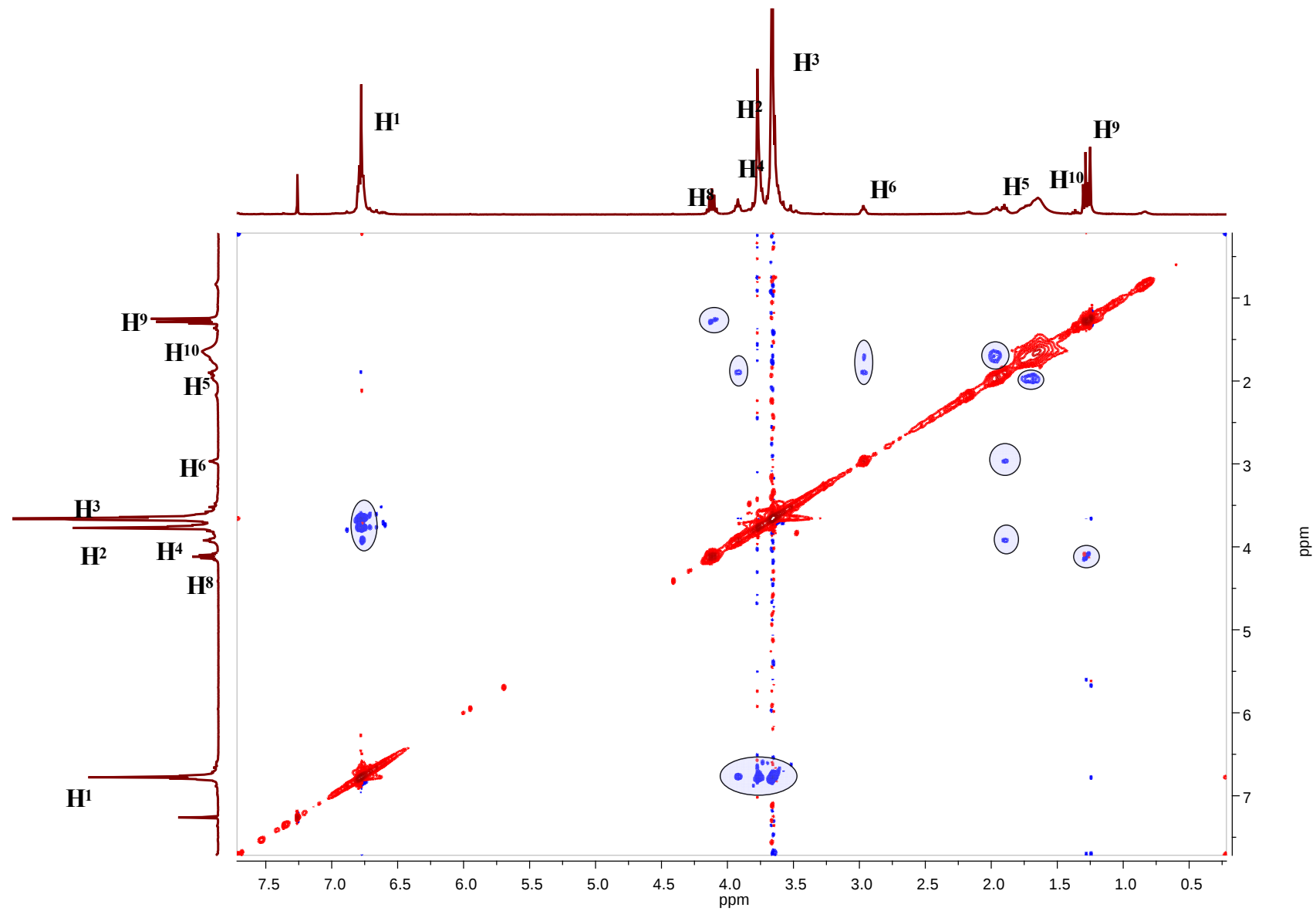


Fig. S49. 2D NMR NOESY ^1H - ^1H spectra for (7), CDCl_3 , 293 K, 400 MHz.

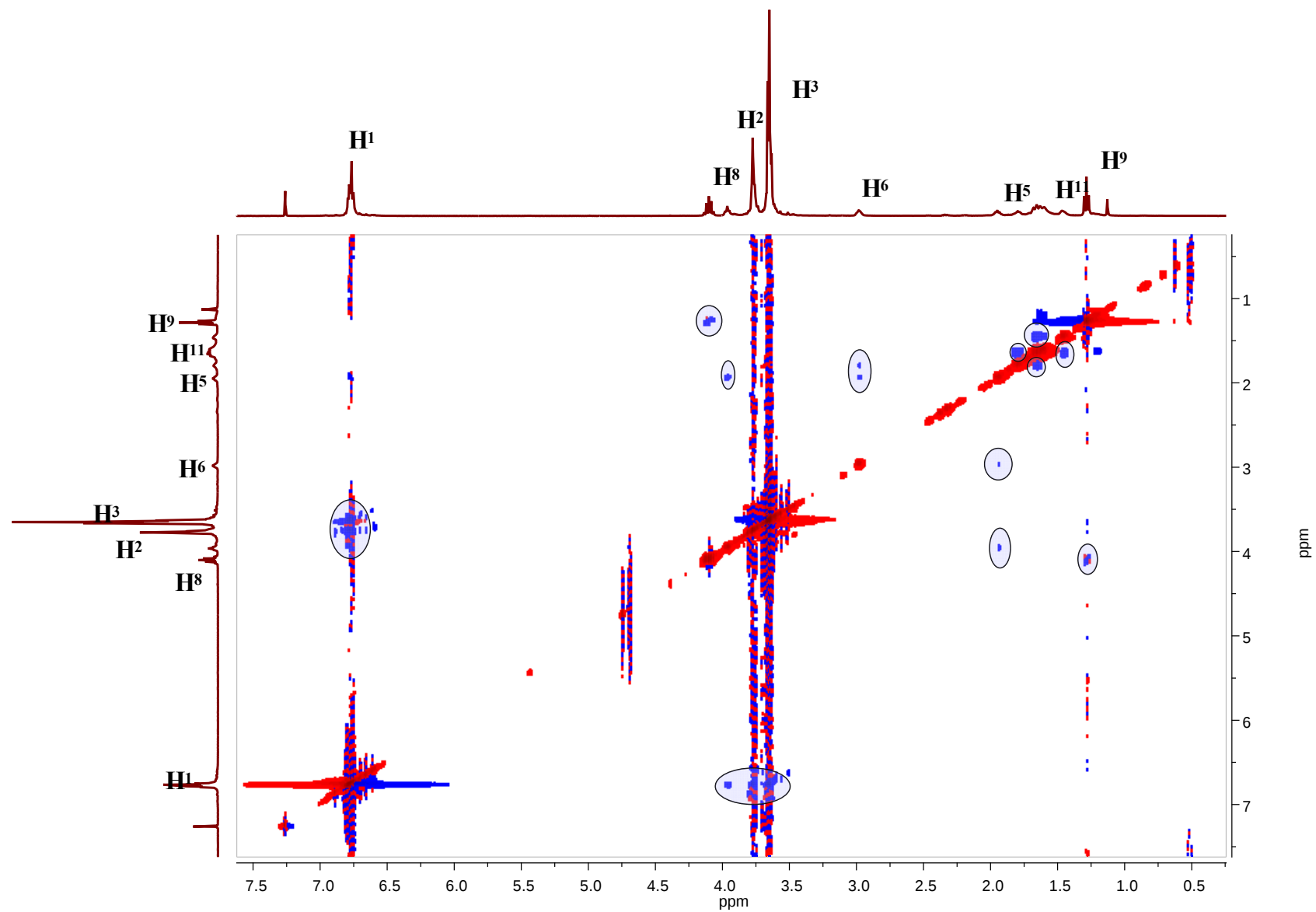


Fig. S50. 2D NMR NOESY ^1H - ^1H spectra for isopropylamine (G1) (0.01 M) + 5 (0.01 M), CDCl_3 , 293 K, 400 MHz.

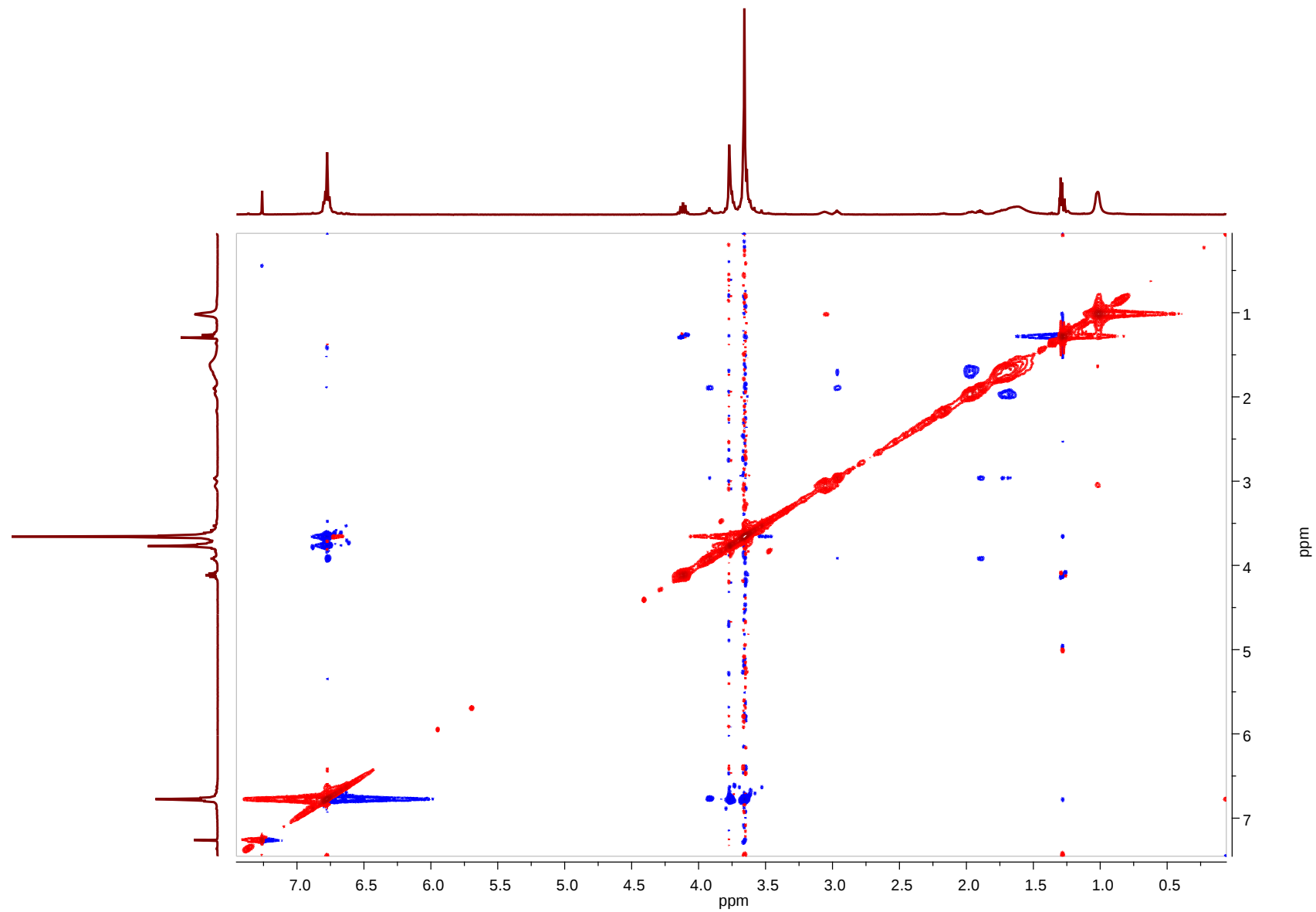


Fig. S51. 2D NMR NOESY ^1H - ^1H spectra for benzylamine (G2) (0.01 M) + 5 (0.01 M), CDCl_3 , 293 K, 400 MHz.

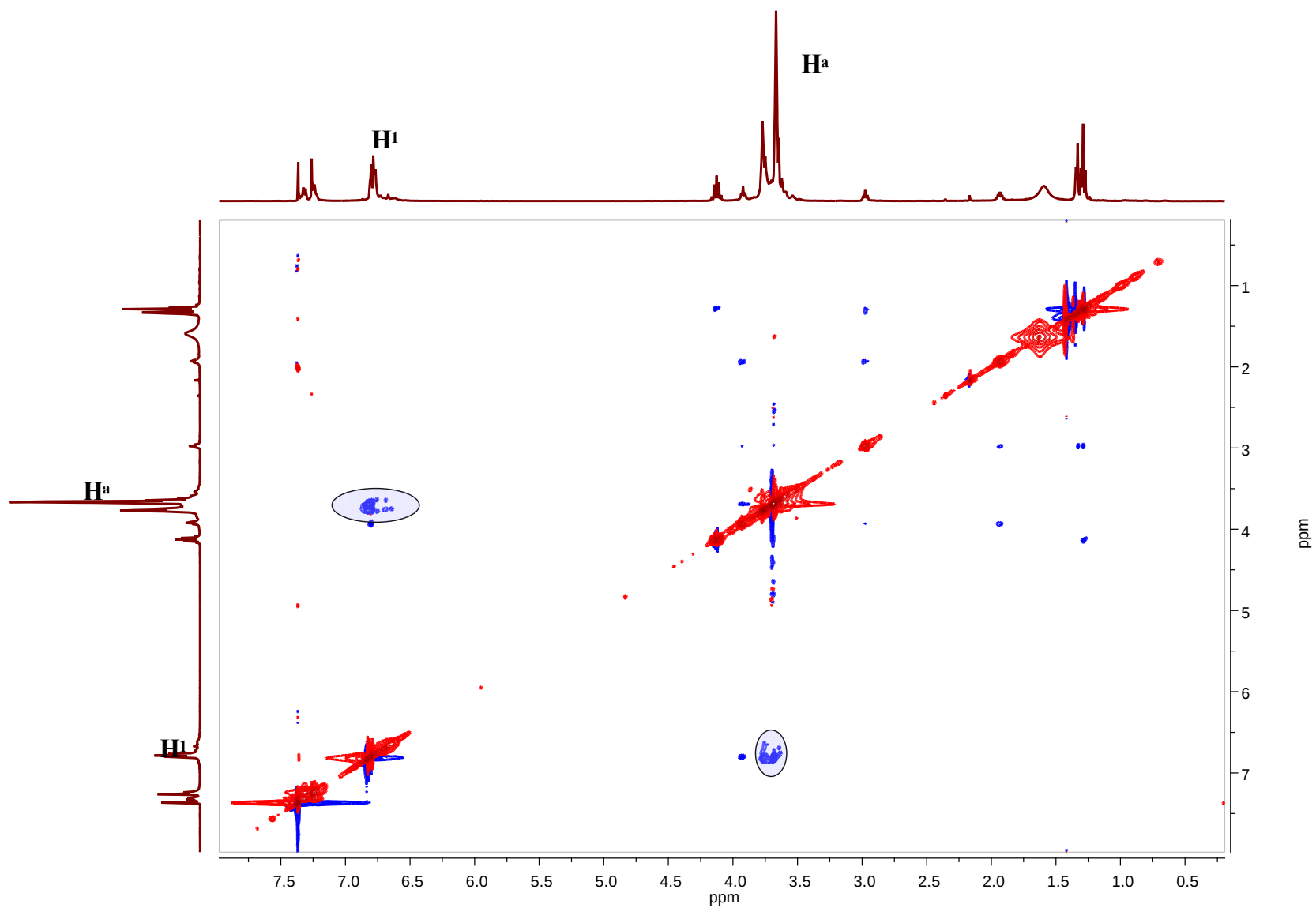


Fig. S52. 2D NMR NOESY ^1H - ^1H spectra for octylamine (G3) (0.01 M) + 5 (0.01 M), CDCl_3 , 293 K, 400 MHz.

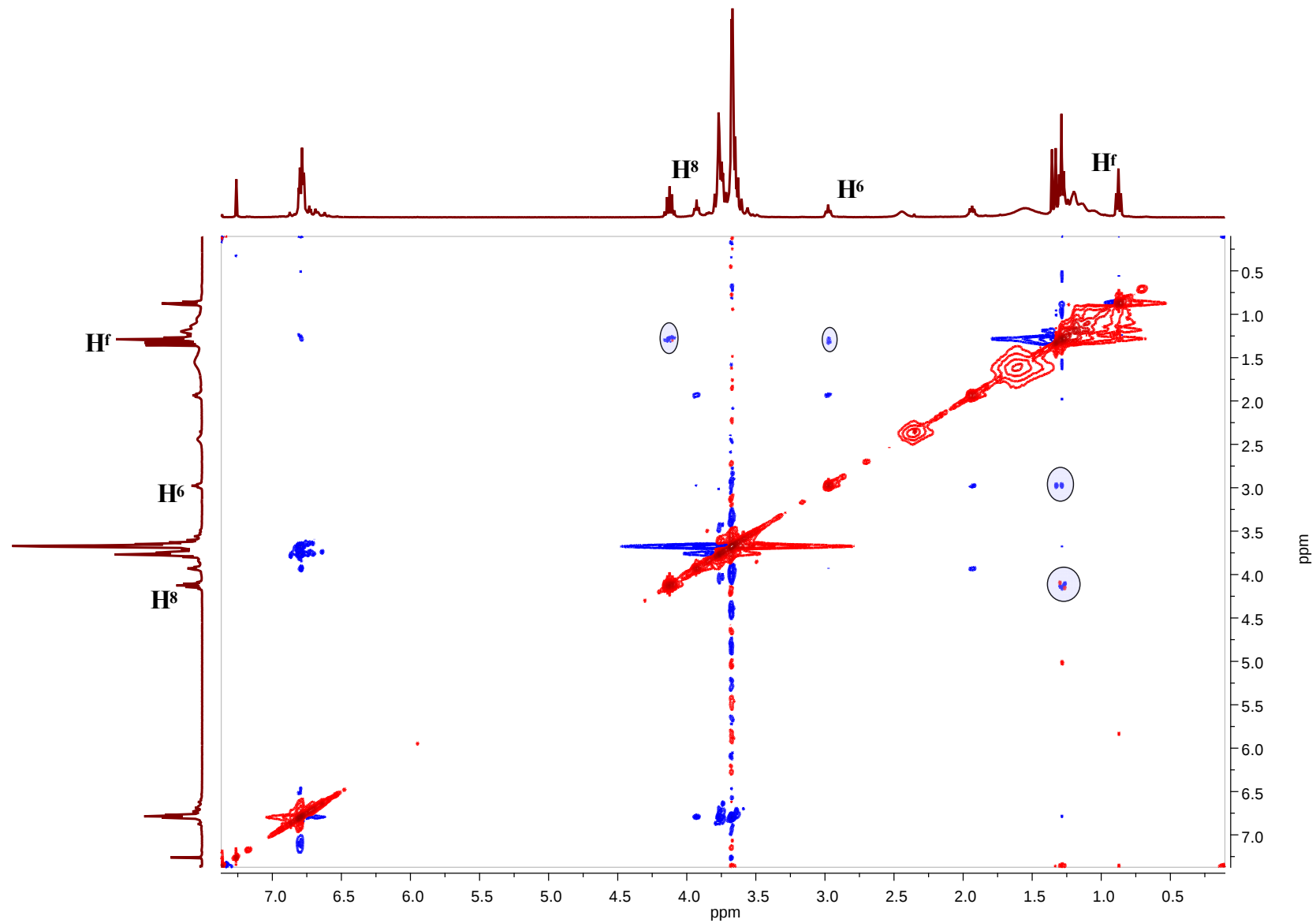


Fig. S53. 2D NMR NOESY ^1H - ^1H spectra for dodecylamine (G4) (0.01 M) + 5 (0.01 M), CDCl_3 , 293 K, 400 MHz.

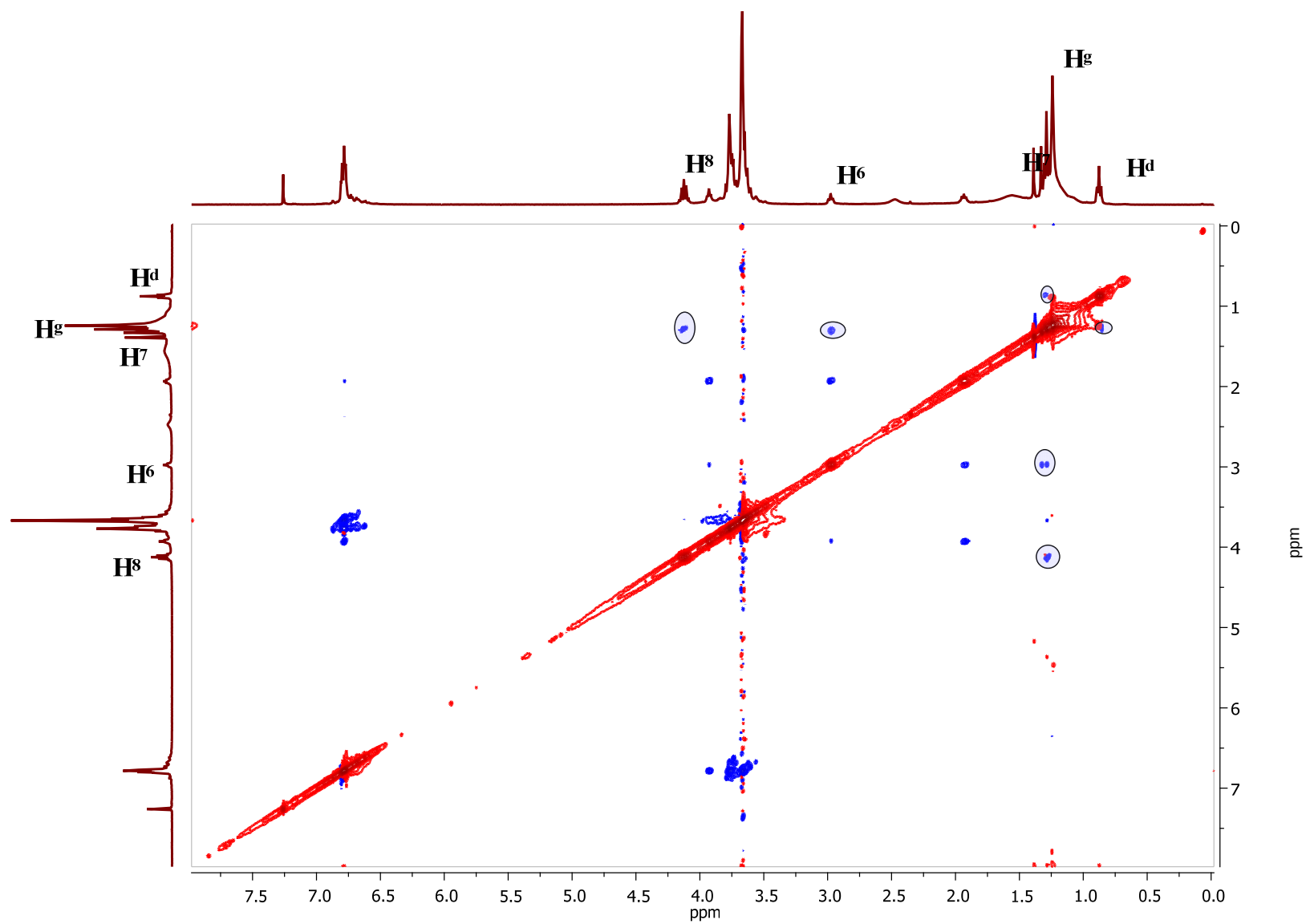


Fig. S54. 2D NMR NOESY ^1H - ^1H spectra for octadecylamine (G5) (0.01 M) + **5** (0.01 M), CDCl_3 , 293 K, 400 MHz.

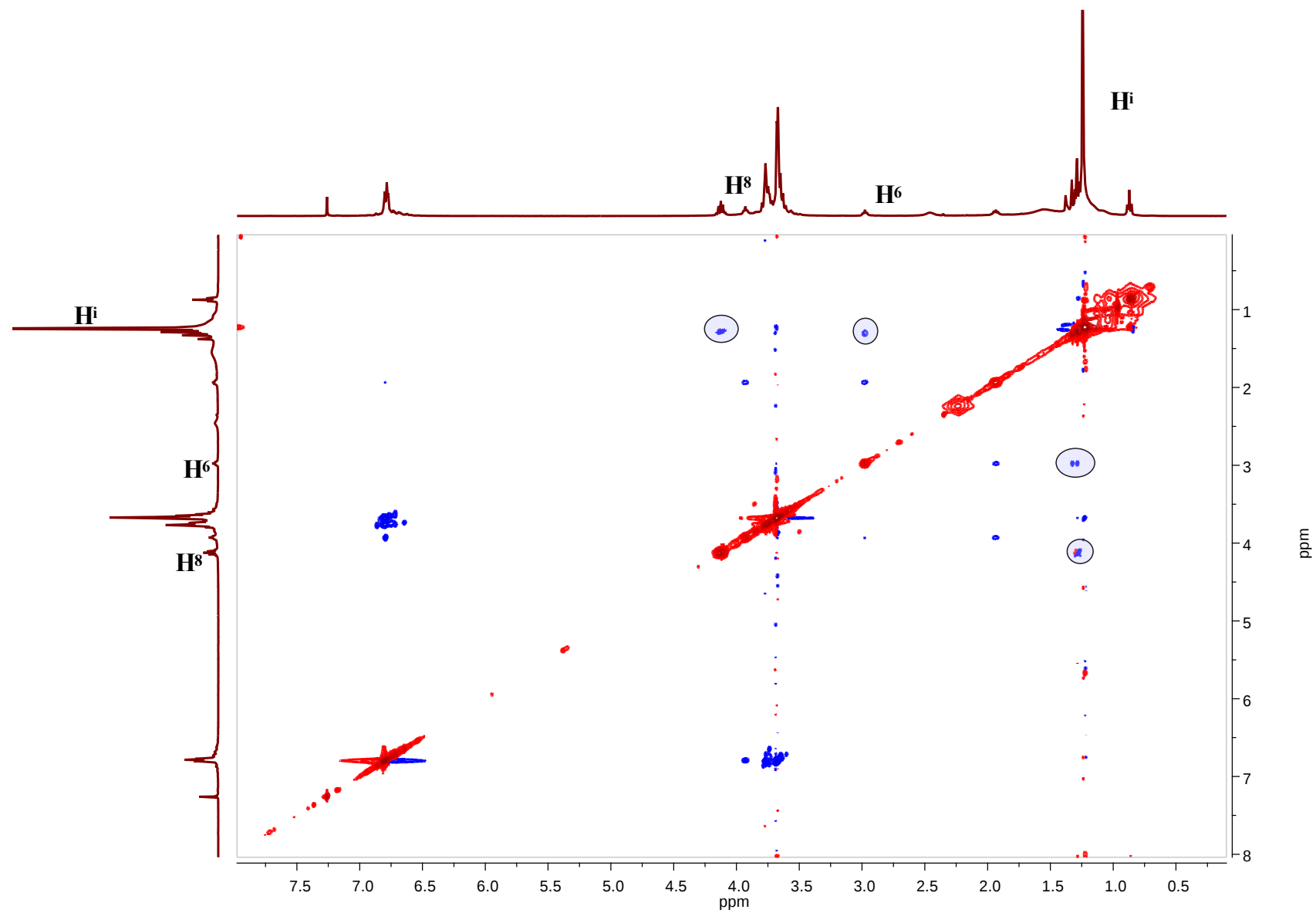


Fig. S55. 2D NMR NOESY ^1H - ^1H spectra for isopropylamine (G1) (0.01 M) + 6 (0.01 M), CDCl_3 , 293 K, 400 MHz.

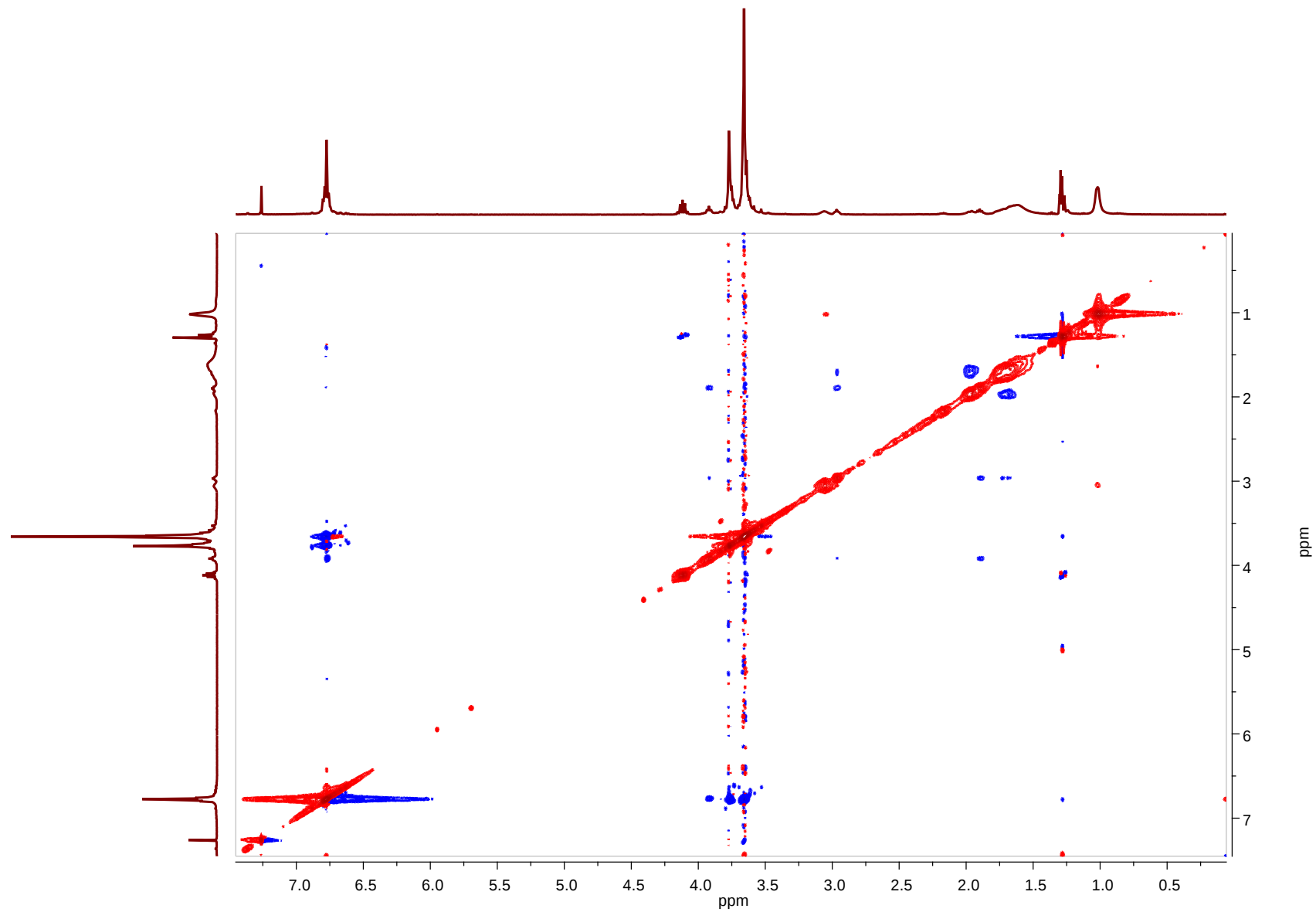


Fig. S56. 2D NMR NOESY ^1H - ^1H spectra for benzylamine (G2) (0.01 M) + **6** (0.01 M), CDCl_3 , 293 K, 400 MHz.

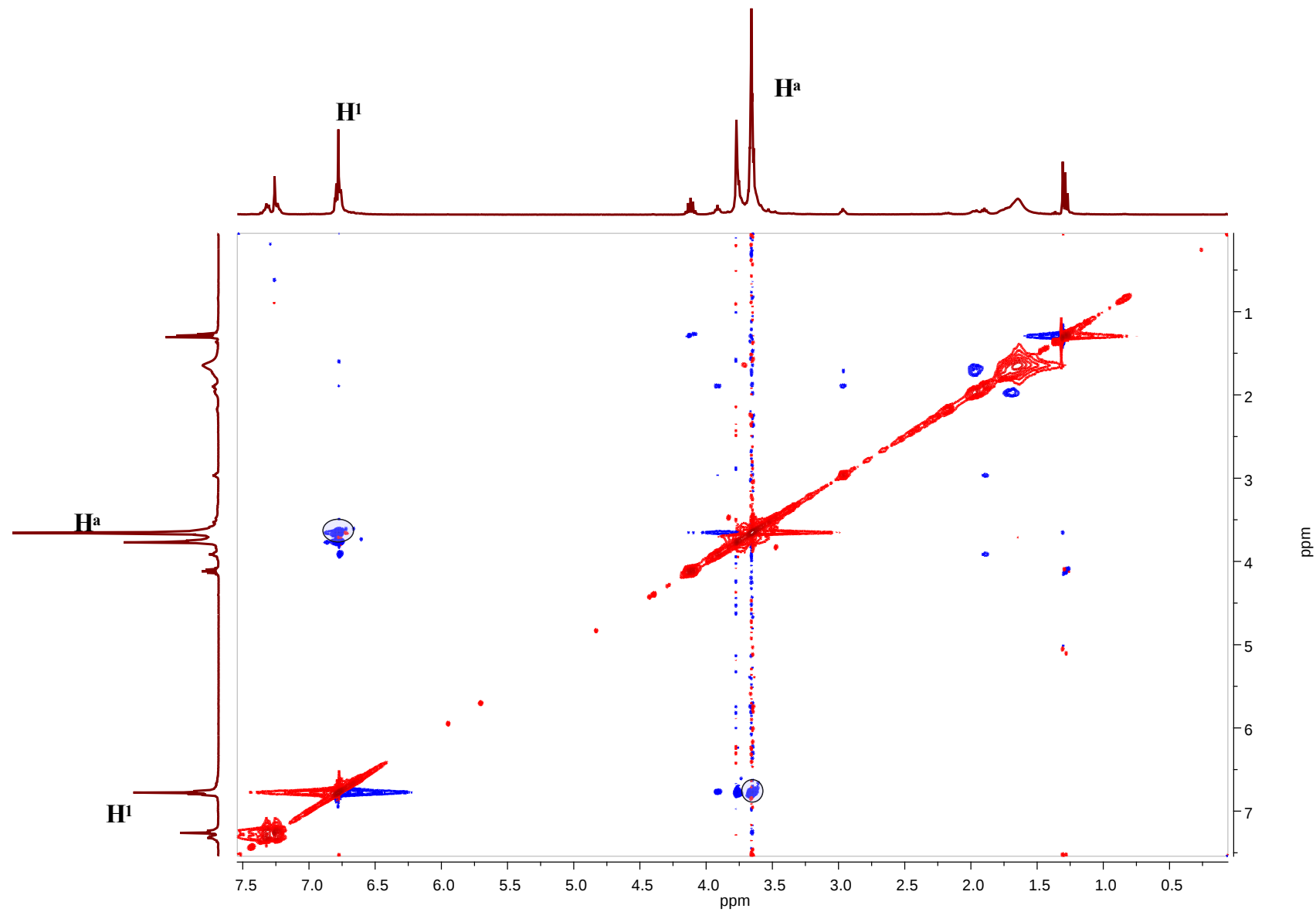


Fig. S57. 2D NMR NOESY ^1H - ^1H spectra for octylamine (G3) (0.01 M) + 6 (0.01 M), CDCl_3 , 293 K, 400 MHz.

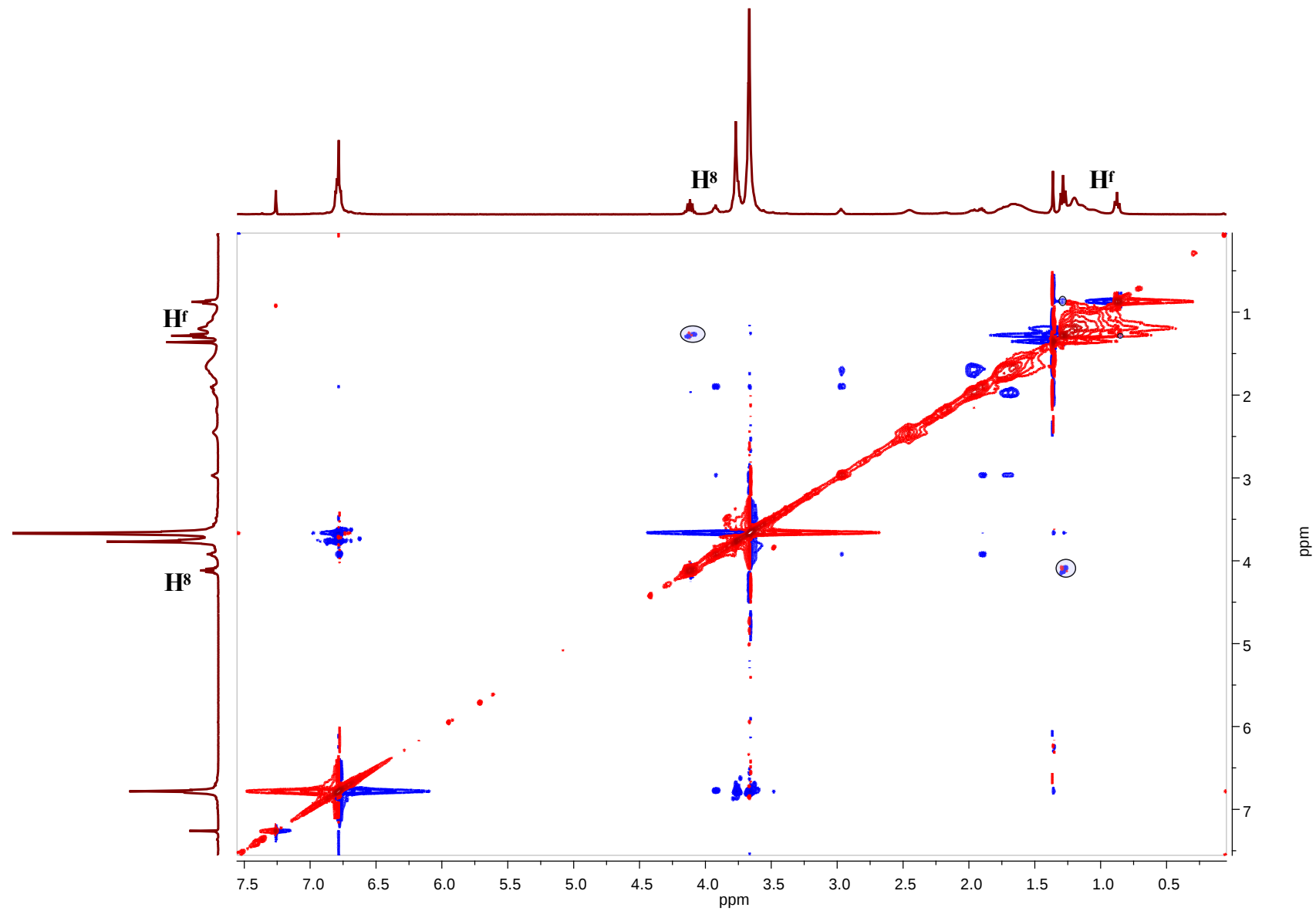


Fig. S58. 2D NMR NOESY ^1H - ^1H spectra for dodecylamine (G4) (0.01 M) + 6 (0.01 M), CDCl_3 , 293 K, 400 MHz.

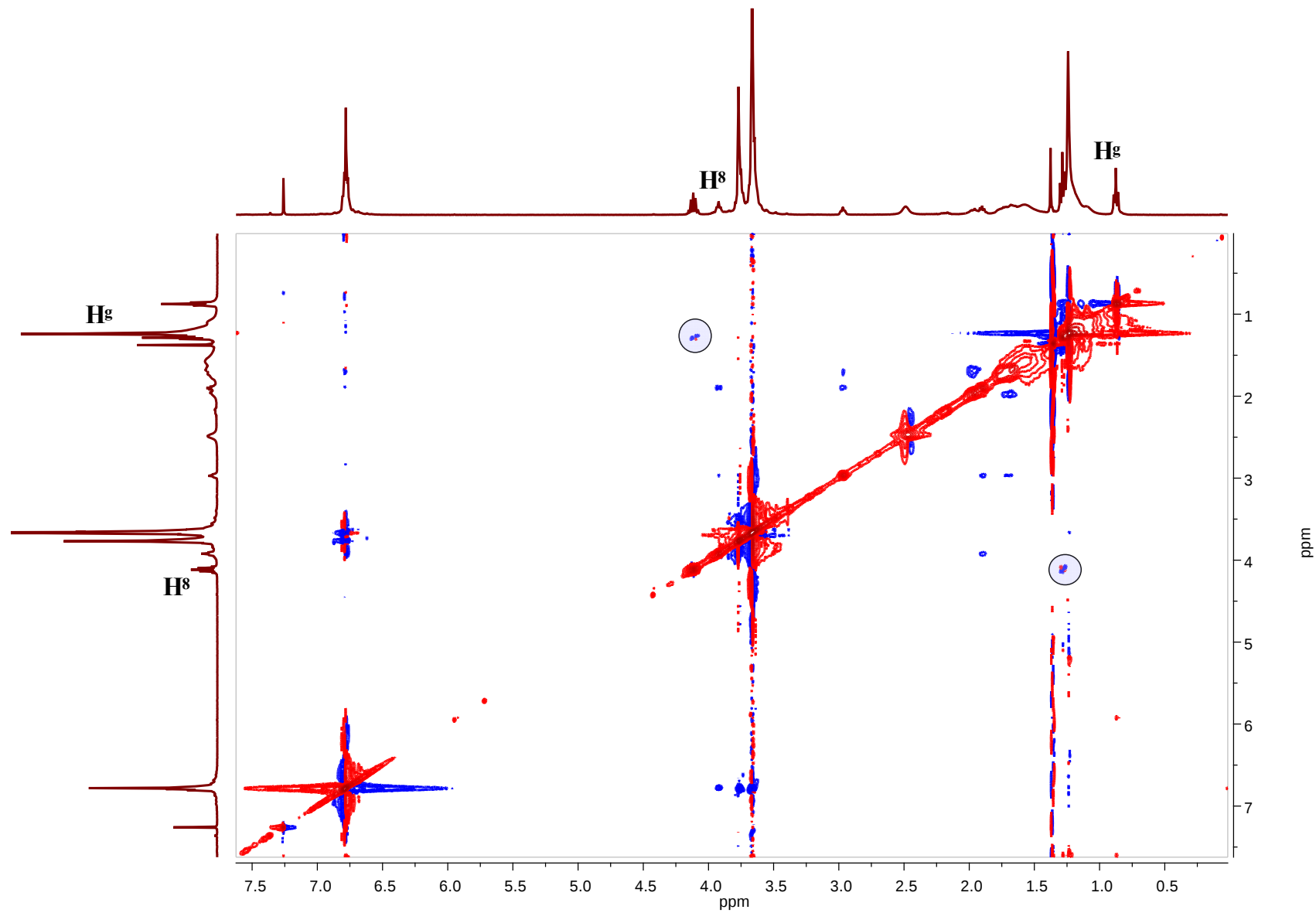


Fig. S59. 2D NMR NOESY ^1H - ^1H spectra for octadecylamine (G5) (0.01 M) + 6 (0.01 M), CDCl_3 , 293 K, 400 MHz.

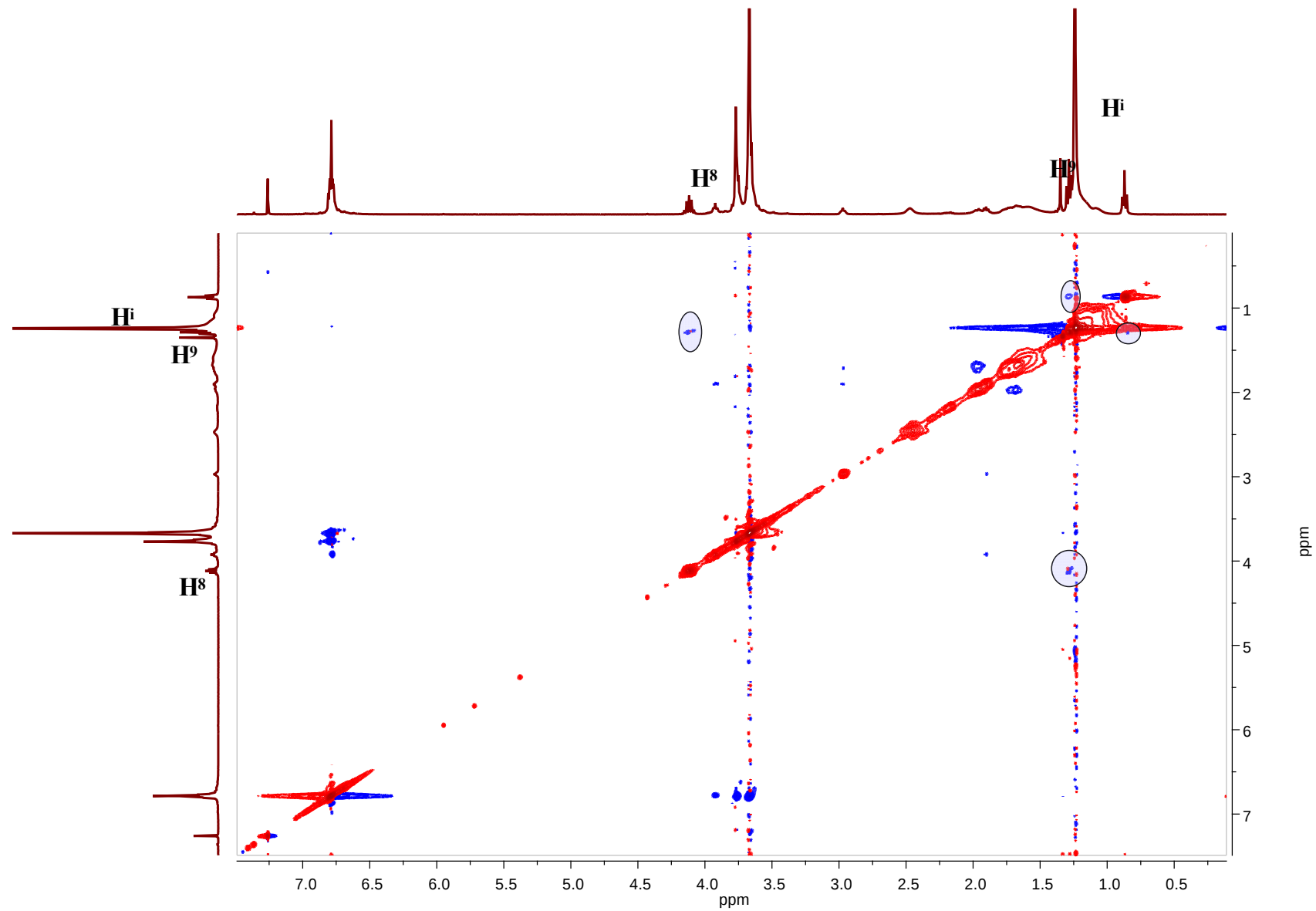


Fig. S60. 2D NMR NOESY ^1H - ^1H spectra for isopropylamine (G1) (0.01 M) + 7 (0.01 M), CDCl_3 , 293 K, 400 MHz.

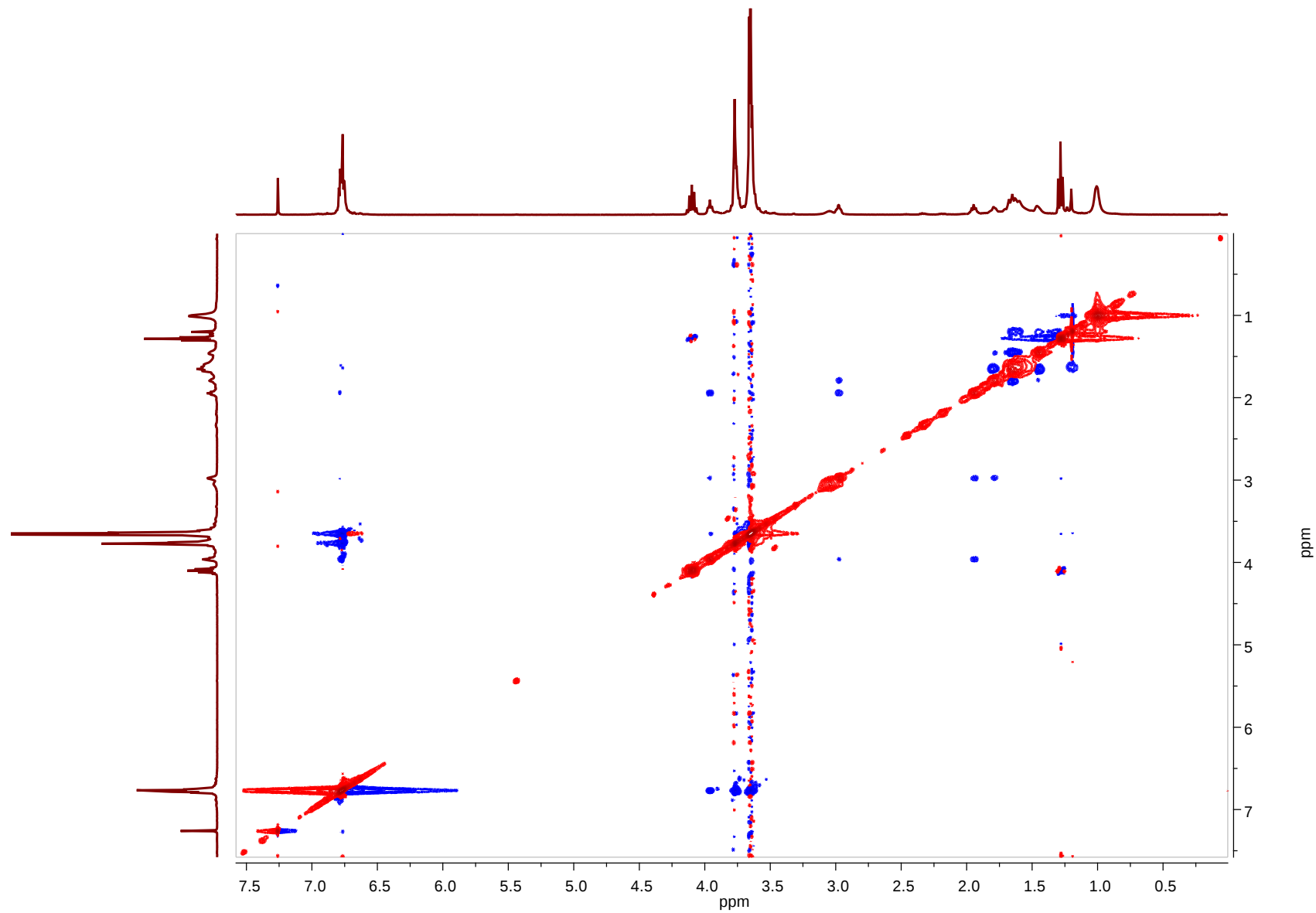


Fig. S61. 2D NMR NOESY ^1H - ^1H spectra for benzylamine (G2) (0.01 M) + 7 (0.01 M), CDCl_3 , 293 K, 400 MHz.

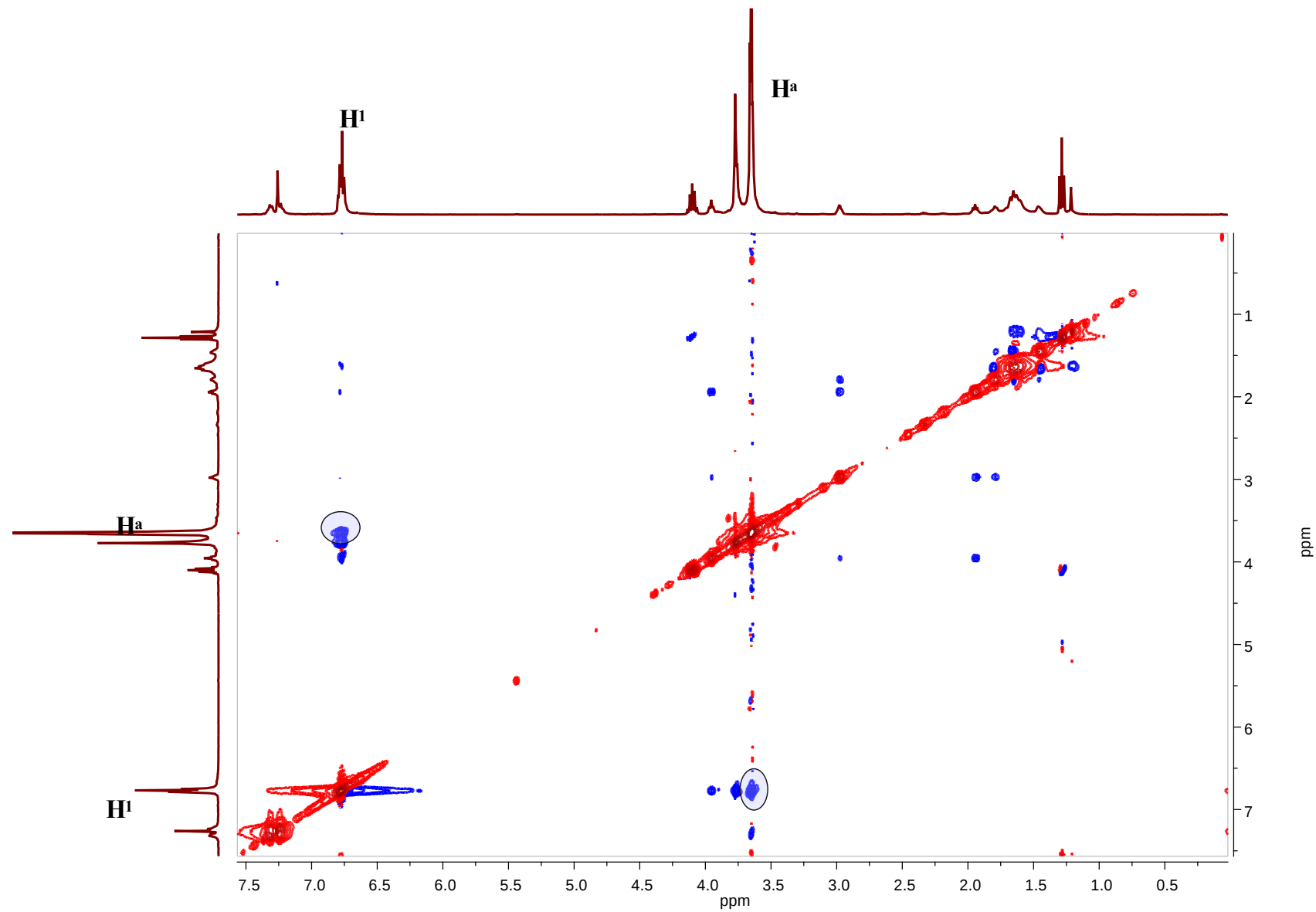


Fig. S62. 2D NMR NOESY ^1H - ^1H spectra for octylamine (G3) (0.01 M) + 7 (0.01 M), CDCl_3 , 293 K, 400 MHz.

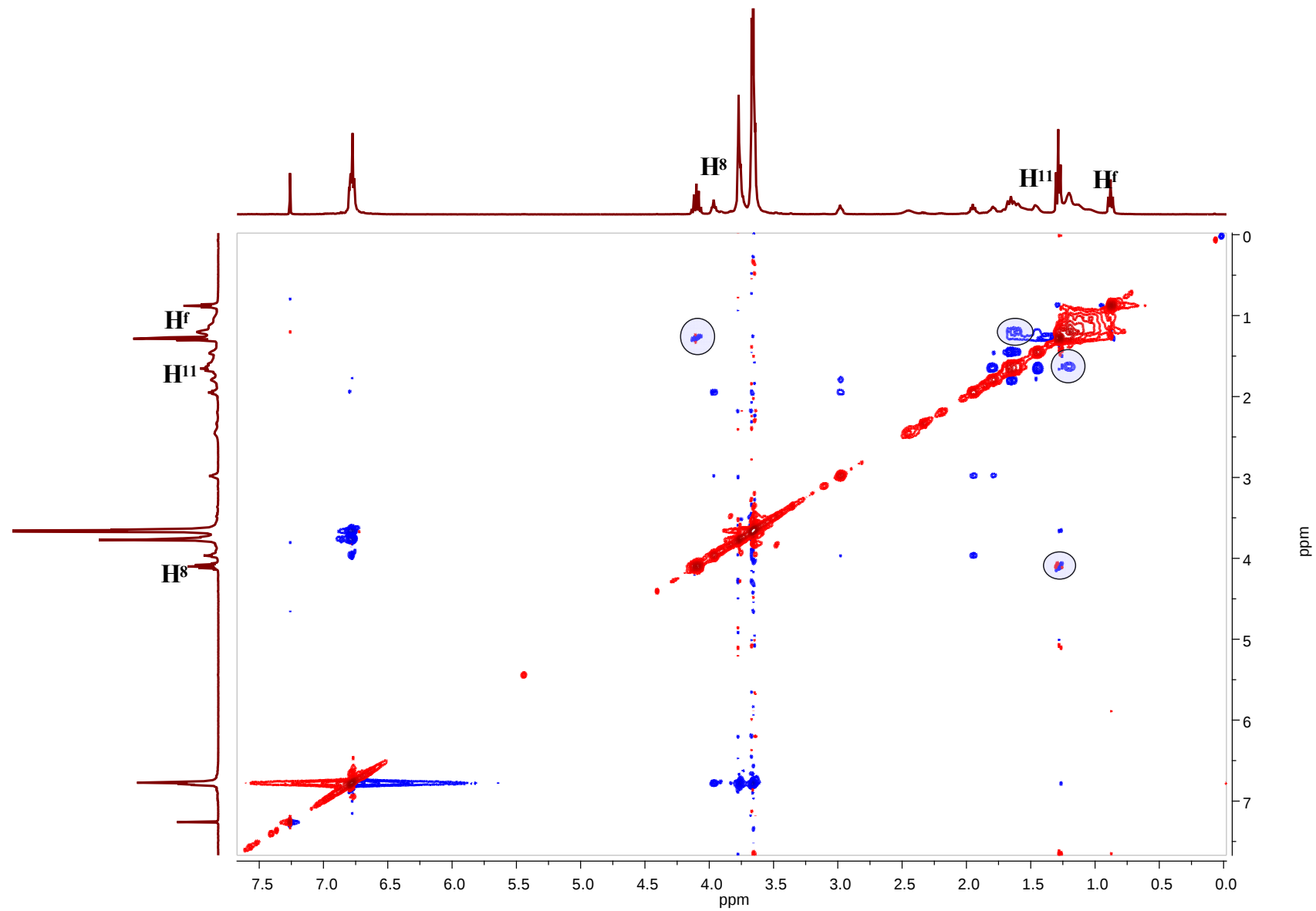


Fig. S63. 2D NMR NOESY ^1H - ^1H spectra for dodecylamine (G4) (0.01 M) + 7 (0.01 M), CDCl_3 , 293 K, 400 MHz.

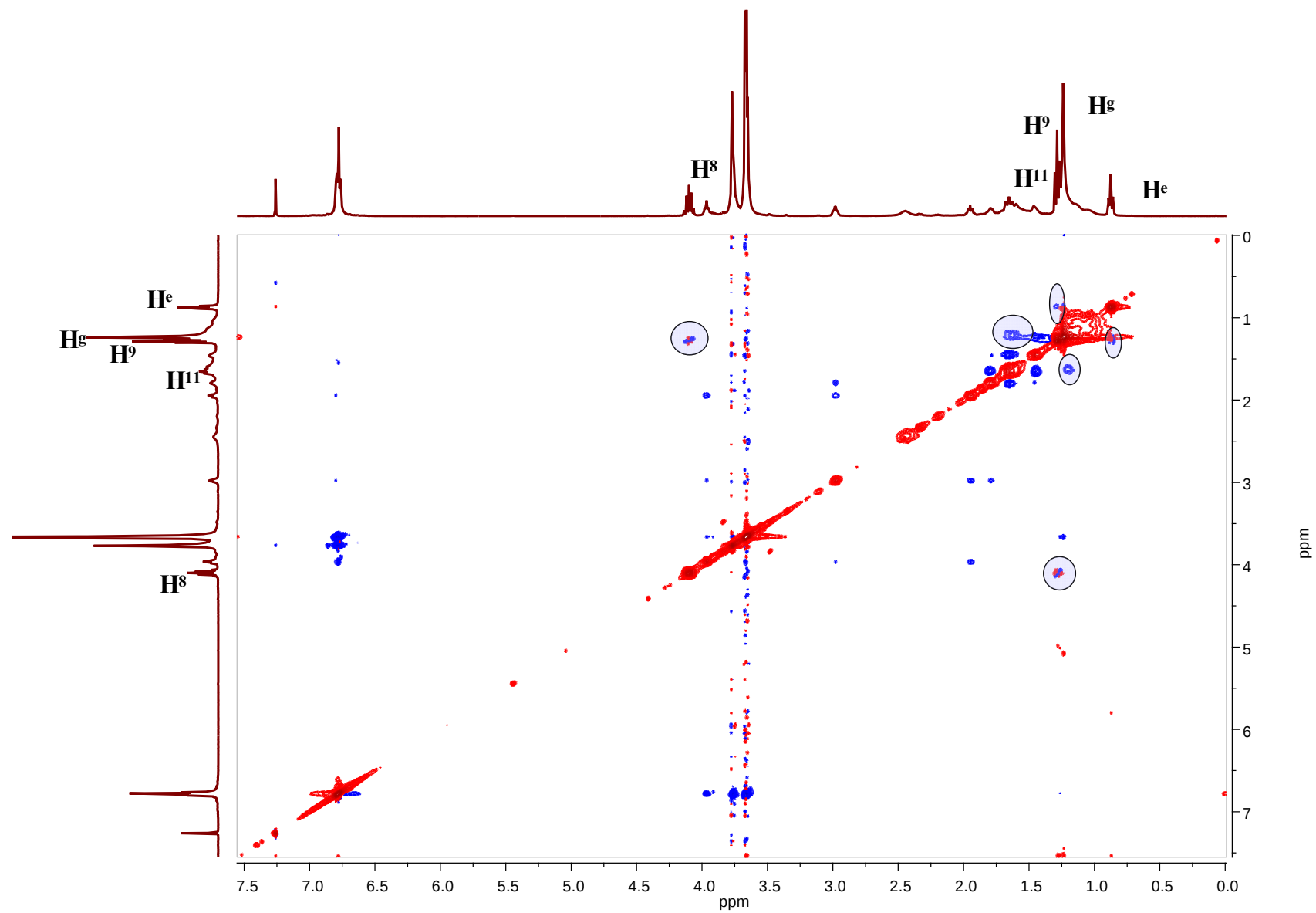


Fig. S64. 2D NMR NOESY ^1H - ^1H spectra for octadecylamine (G5) (0.01 M) + 7 (0.01 M), CDCl_3 , 293 K, 400 MHz.

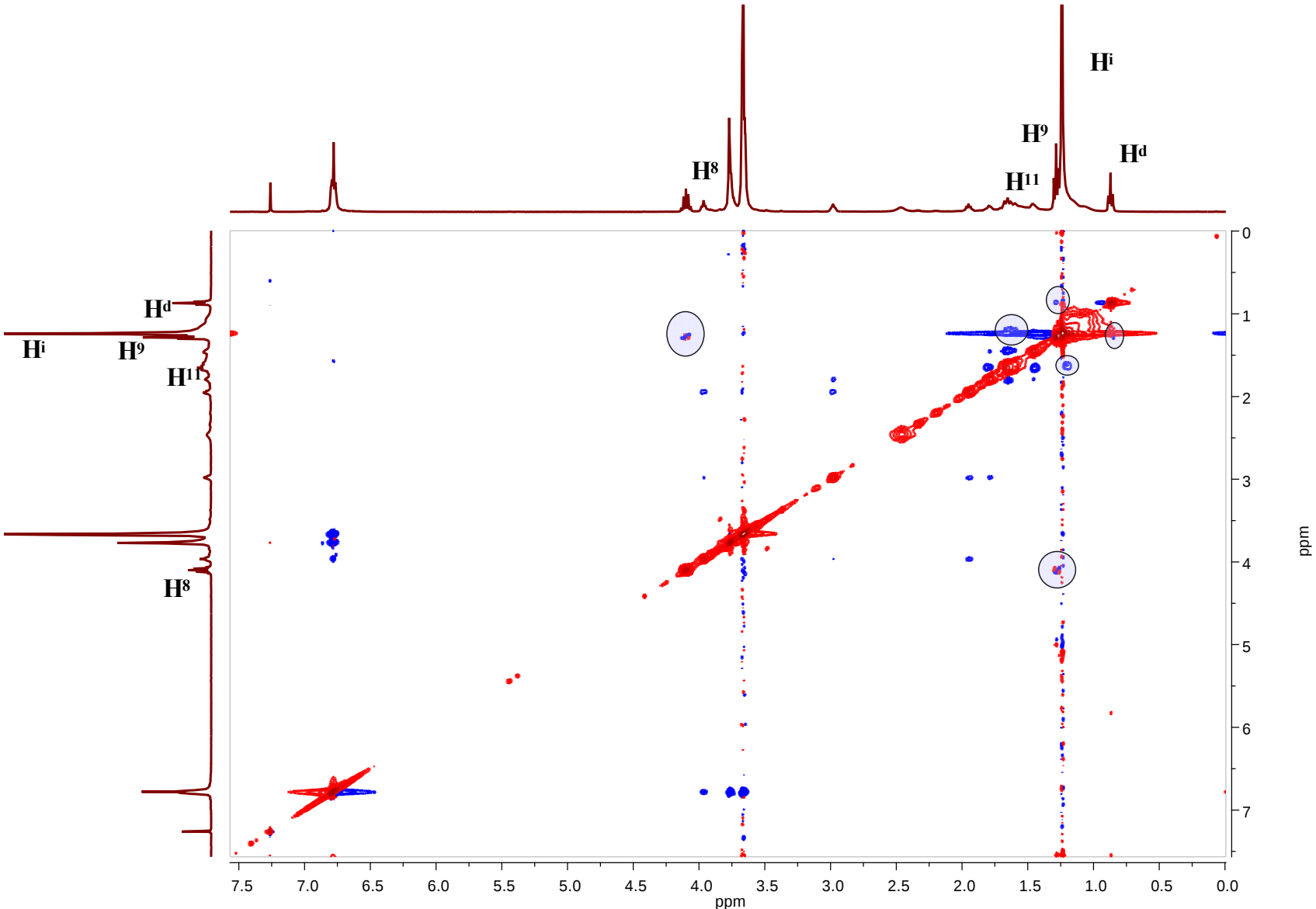


Fig. S65. Size distribution of self-assemblies of macrocycle 4 in chloroform ($3 \cdot 10^{-4} \text{M}$).

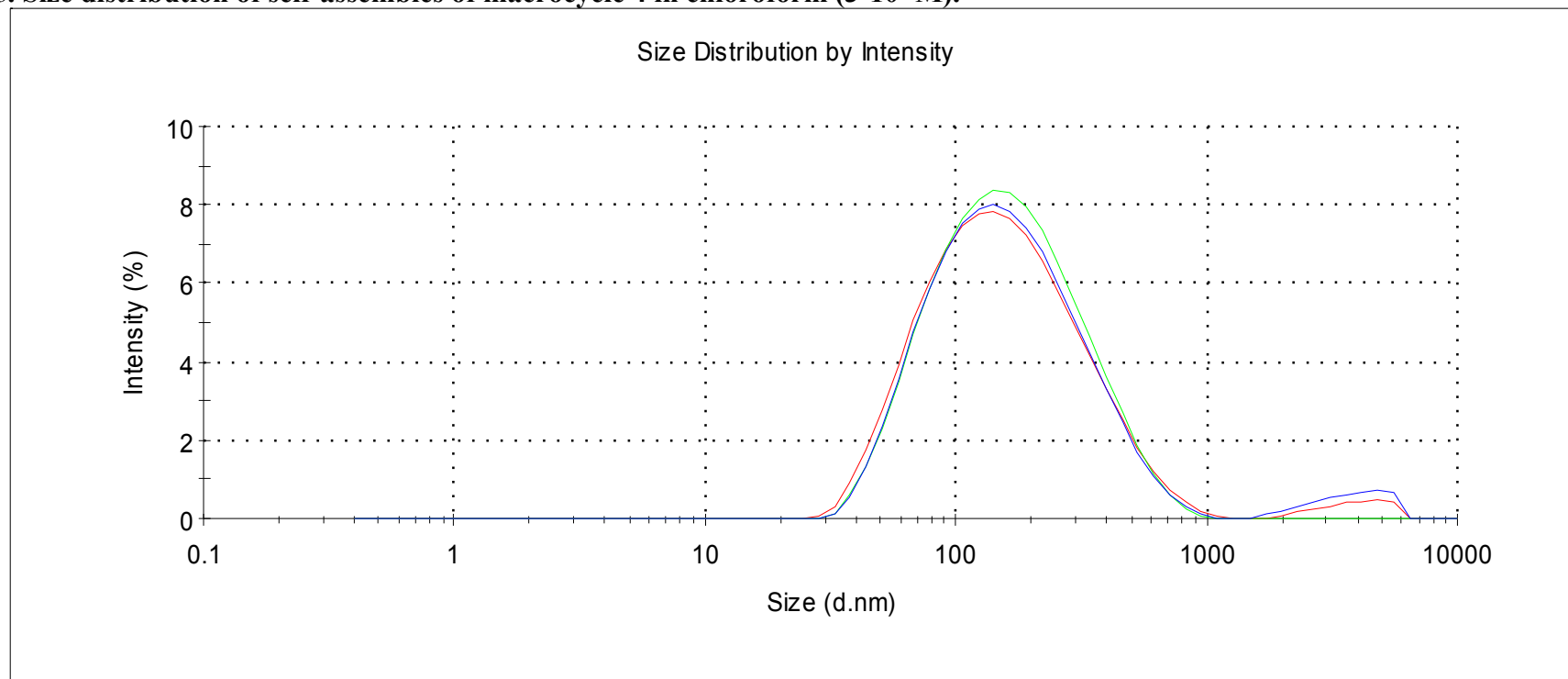


Fig. S66. UV spectra of mixtures of the macrocycle **5** with the aliphatic amines, taken in molar ratio 1:30 and spectra of individual components in the concentration studied.

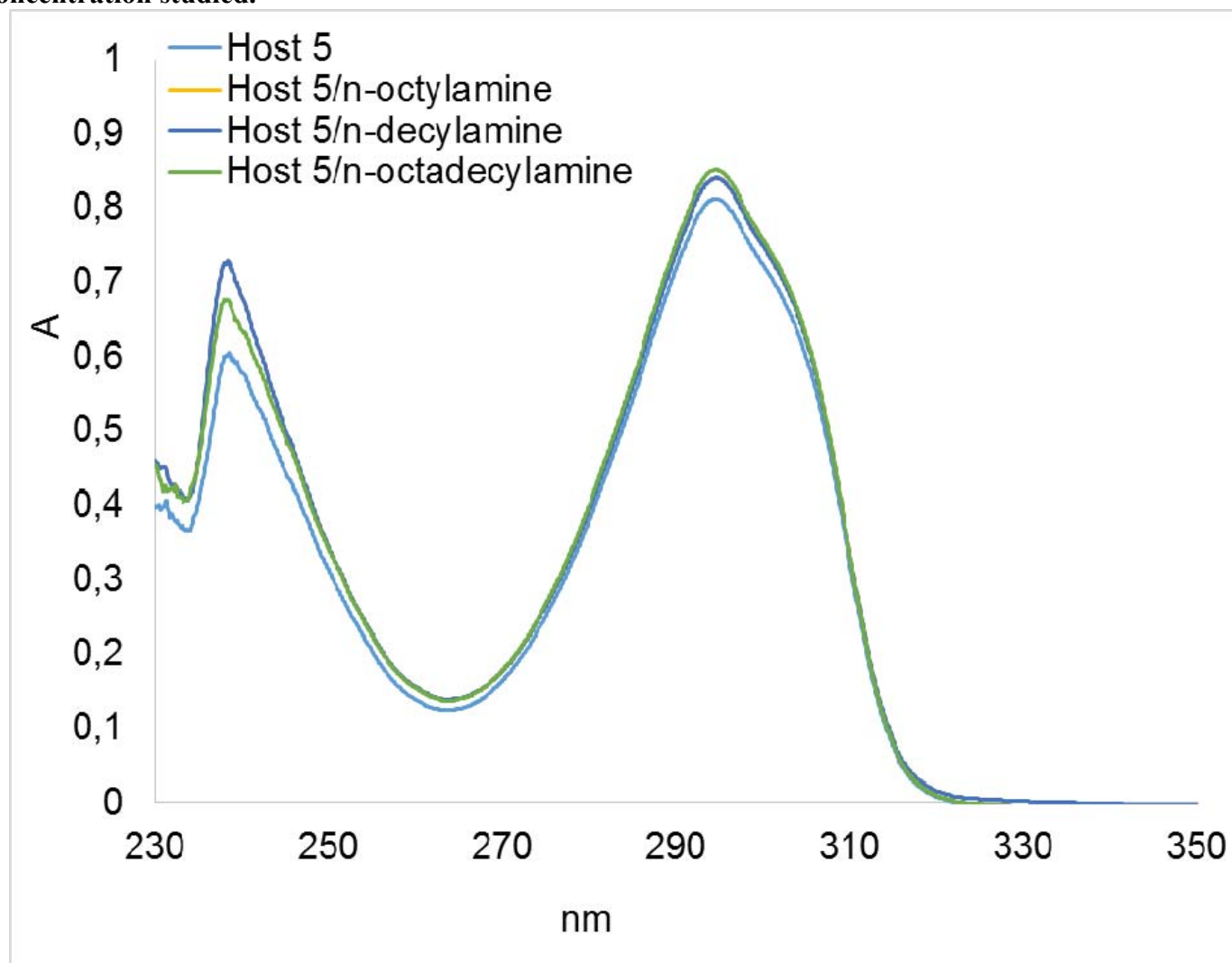


Fig. S67. UV spectra of mixtures of the macrocycle 5 with the benzylamine, taken in molar ratio 1:30 and spectra of individual components in the concentration studied.

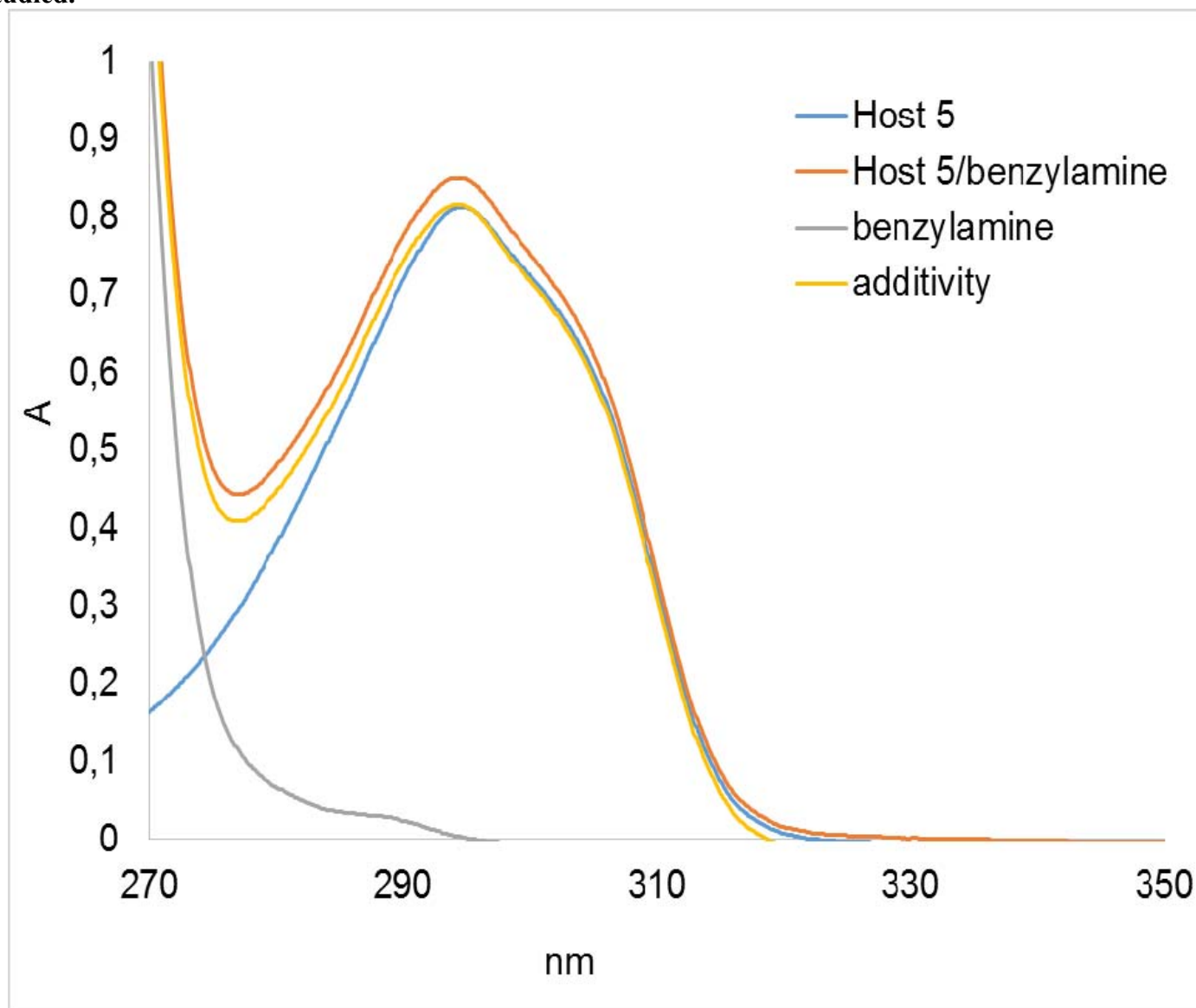


Fig. S68. UV spectra of mixtures of the macrocycle 6 with the aliphatic amines, taken in molar ratio 1:30 and spectra of individual components in the concentration studied.

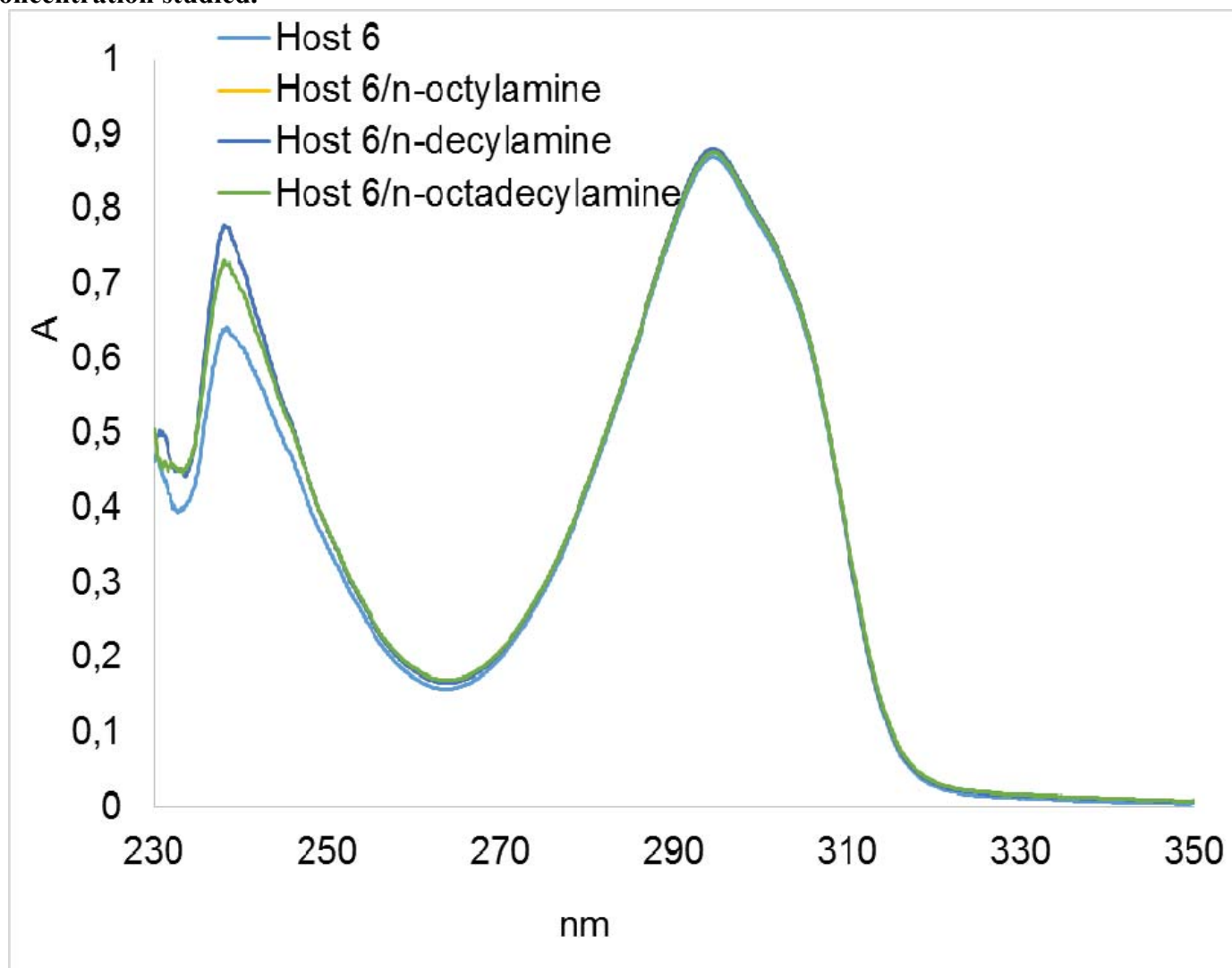


Fig. S69. UV spectra of mixtures of the macrocycle 6 with the benzylamine, taken in molar ratio 1:30 and spectra of individual components in the concentration studied.

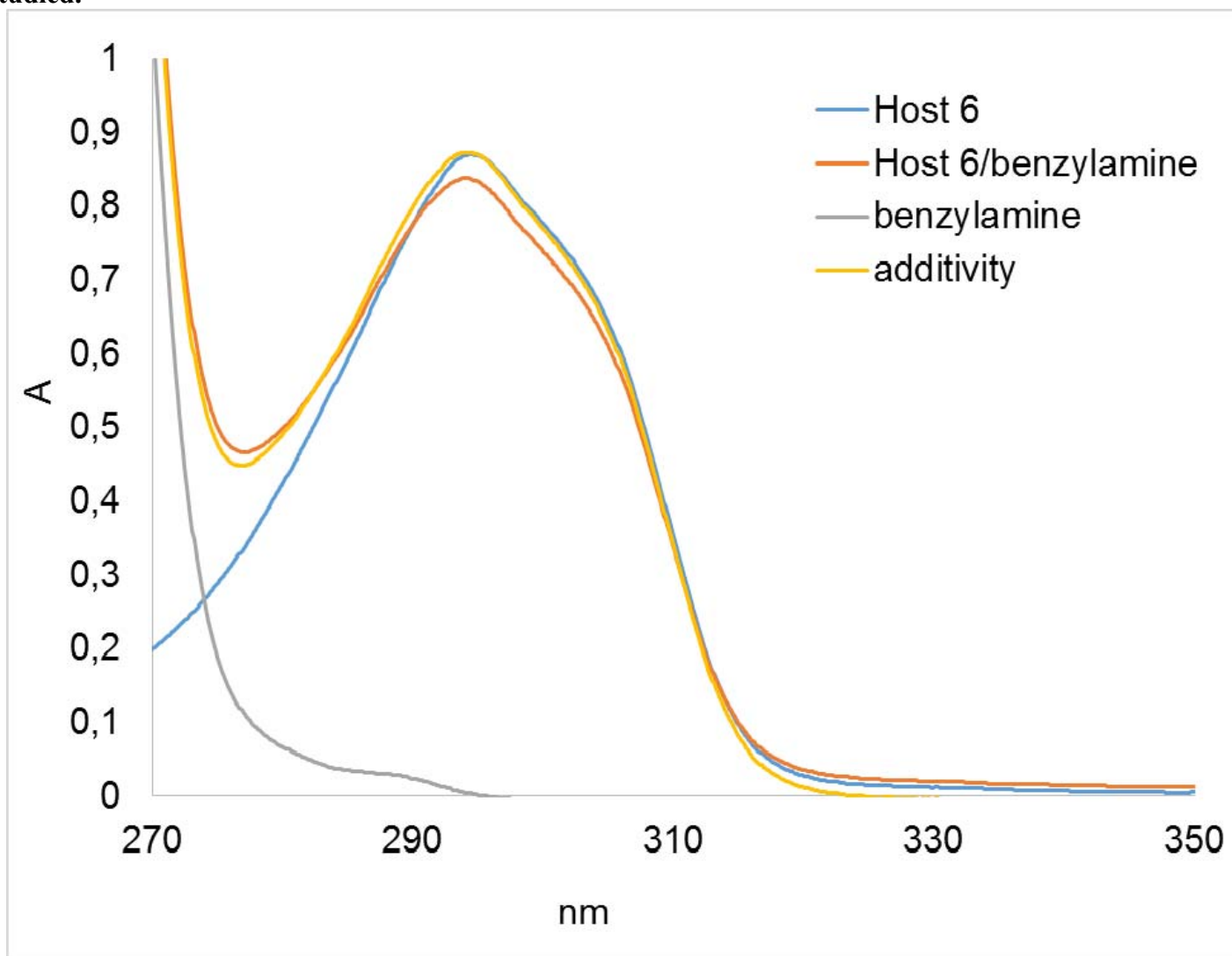


Fig. S70. UV spectra of mixtures of the macrocycle 7 with the aliphatic amines, taken in molar ratio 1:30 and spectra of individual components in the concentration studied.

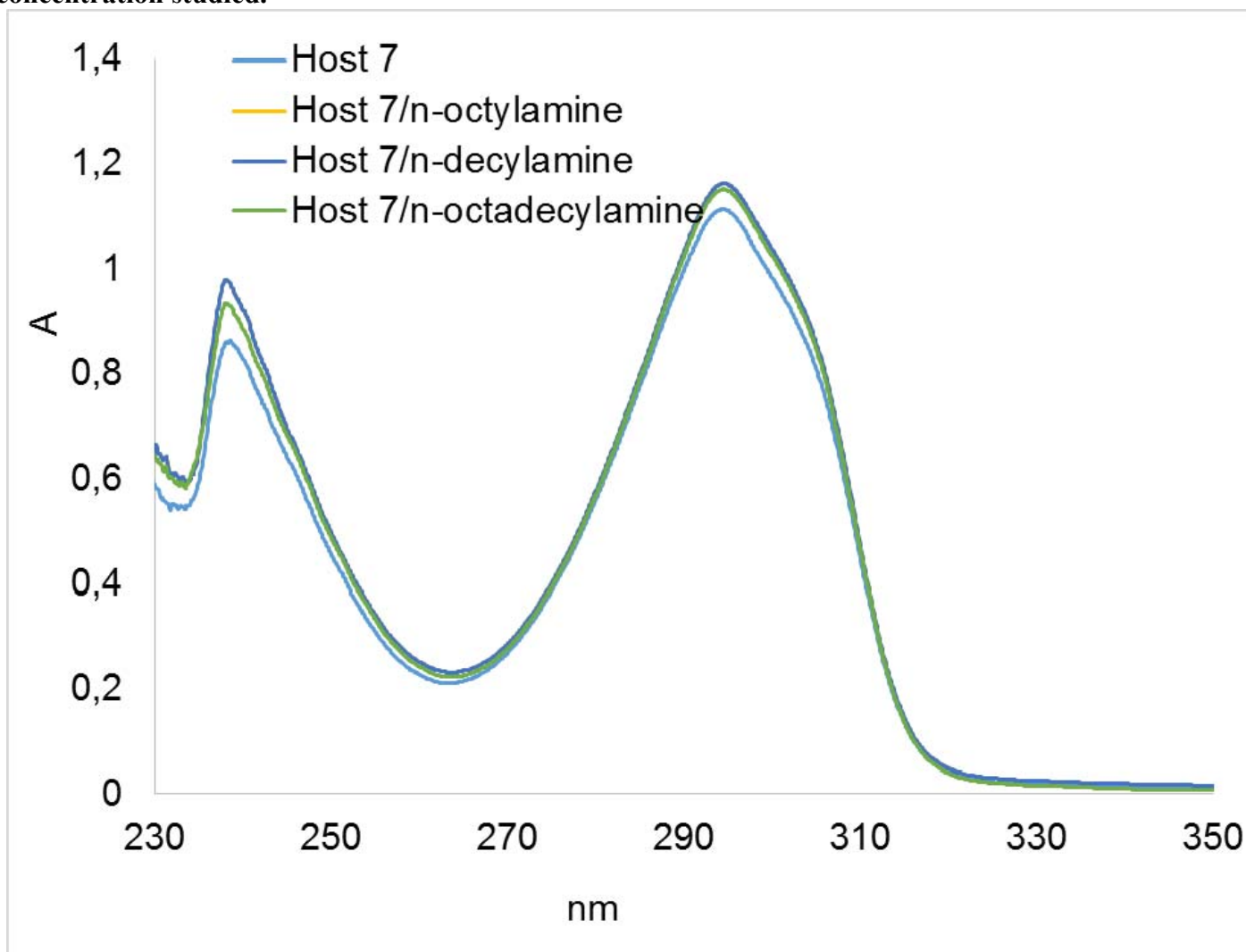
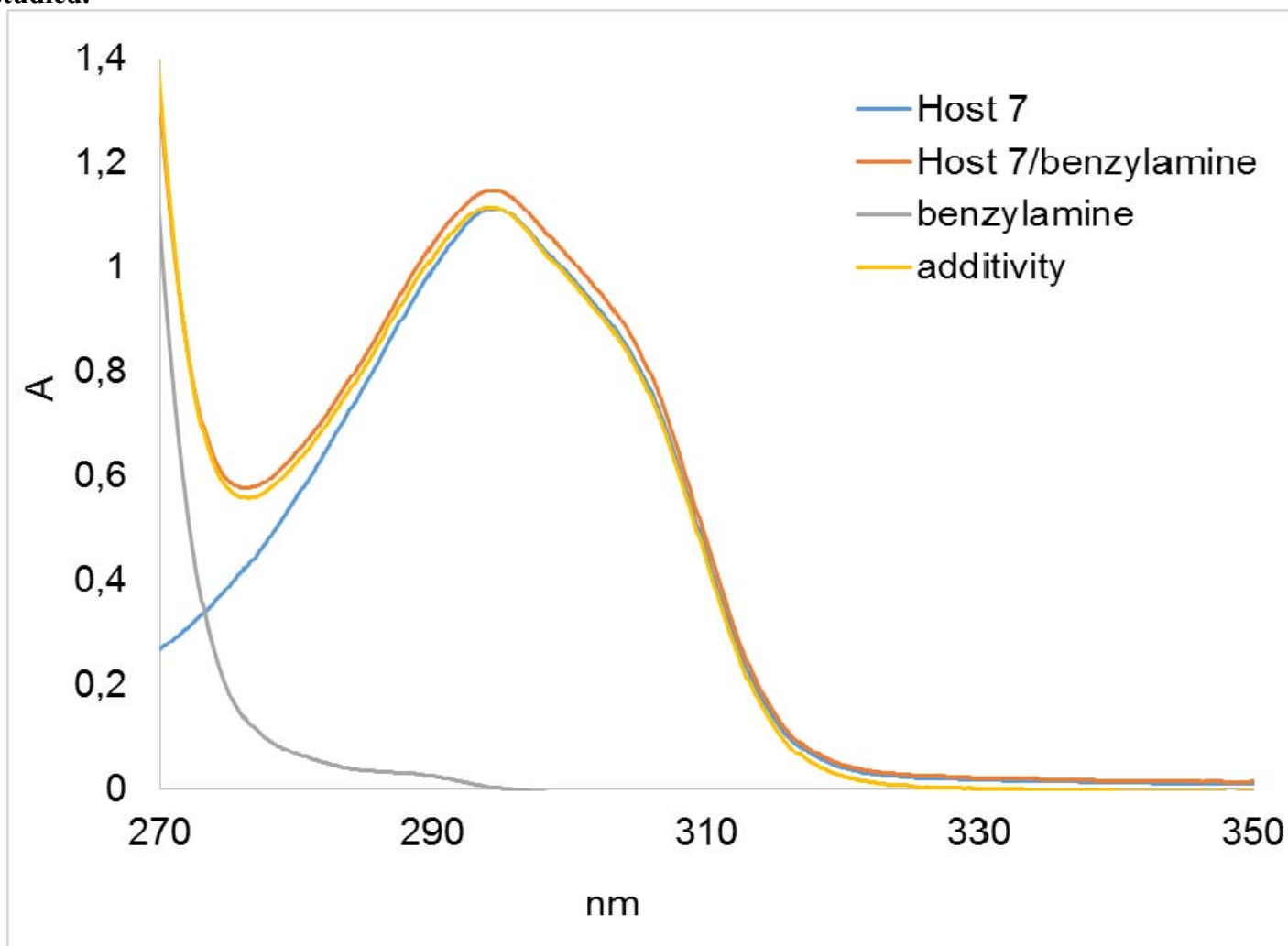


Fig. S71. UV spectra of mixtures of the macrocycle 7 with the benzylamine, taken in molar ratio 1:30 and spectra of individual components in the concentration studied.



Determination of the stability constant and stoichiometry of the complex by the UV titration

$1 \cdot 10^{-3}$ M solution of amines **G1**, **G3-G5** (120, 150, 200, 250, 300, 350, 400, 450, 500, and 550 μL) in CHCl_3 was added to 0.1 ml of the solution of receptors **5-7** ($3 \cdot 10^{-4}$ M) in CHCl_3 and diluted to final volume of 3 mL with CHCl_3 . The UV spectra of the solutions were recorded. Three independent experiments were carried out for each series. Student's *t*-test was applied in statistical data processing.

The system equilibrium is described by Eq. (1), where H, G, G_nH denote the macrocycles **5-7**, guests **G1**, **G3-G5**, complex with guests, respectively, *n* – number of the guest is bound with one macrocycle.



The association constant, K_{ass} , is defined by Eq. (2).

$$K_{\text{ass}} = [\text{G}_n\text{H}] / [\text{G}]^n [\text{H}] \quad (2)$$

To determine the stoichiometry coefficient *n* of the complexes forming in the water Eq. (2) was converted into Eq. (3).

$$\lg K_{\text{ass}} = \lg [\text{G}_n\text{H}] - n \lg [\text{G}] - \lg [\text{H}] \quad (3)$$

The solution absorbance *A*, is a sum of those related to complex, host and guest (A_{GnH} , A_{H} and A_{G} , respectively) is equal to:

$$A = A_{\text{GnH}} + A_{\text{H}} + A_{\text{G}} \quad (4)$$

Assuming that the Beer-lambert law is obeyed for all the components considered Eq. 5, the absorbance *A* is expressed as:

$$A_i = c_i \varepsilon_i l \quad (5)$$

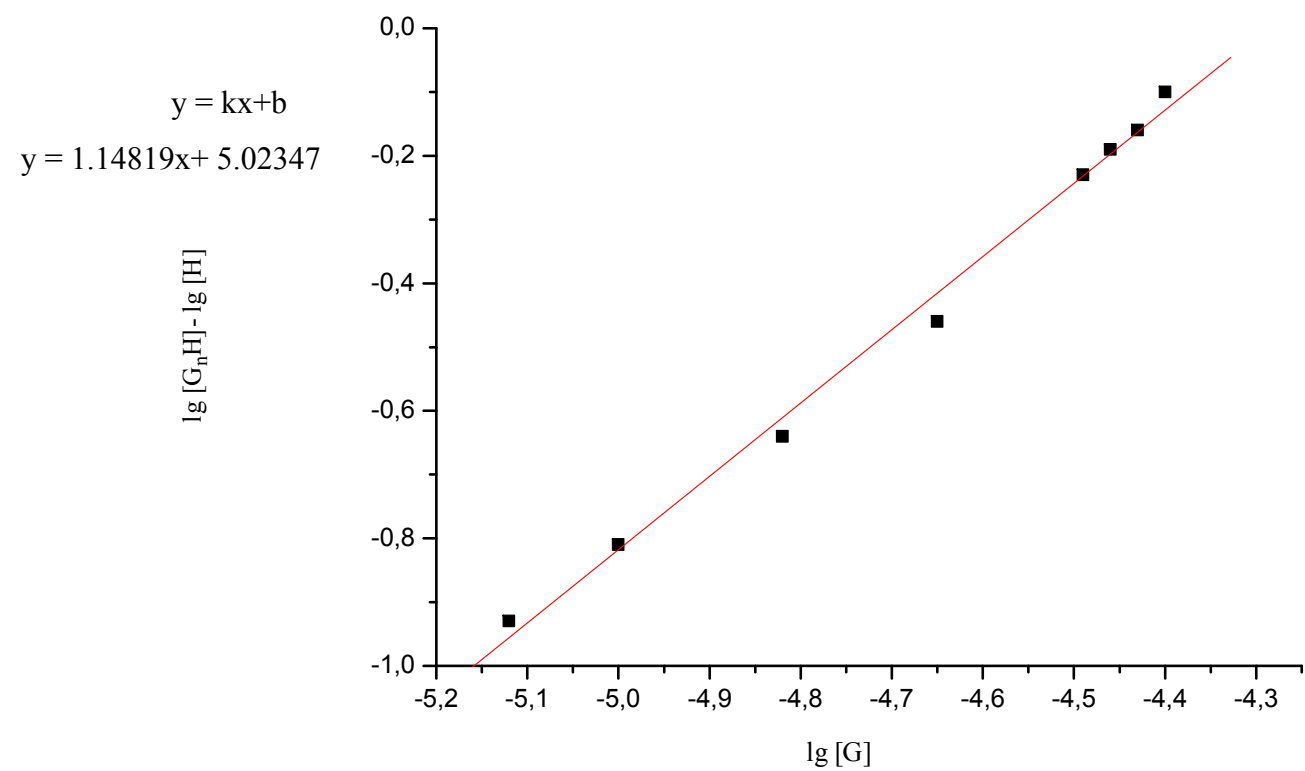
where c_i is a molar concentration of *i*-species, ε_i is the molar absorptivity, and *l* is the cell thickness. For complexation between the host and guest the absorbance measurement is commonly conducted at the wavelength of absorbance maximum in the charge-transfer region where $A_{\text{G}}=0$. This gives Eq. 6.

$$A = A_{\text{GnH}} + A_{\text{H}} \quad (6)$$

Concentration of the complex $[\text{G}_n\text{H}]$ in the system is calculated according to equations (5) and (6).

The plot of $\lg [\text{G}_n\text{H}] - \lg [\text{H}]$ versus $\lg [\text{G}]$ (Fig. S15) presents a straight line, slope of which equals to *n*. Association constants K_{ass} are calculated using the intercept values (b).

Fig. S72. Plot of $\lg [\text{GnH}] - \lg [\text{H}]$ versus $\lg [\text{G}]$ host/guest system.



$$b = \lg K_a \quad (7)$$

Fig. S73. The spectrophotometric titration of the system pillar[5]arene **5** and guest G1 in CHCl₃.

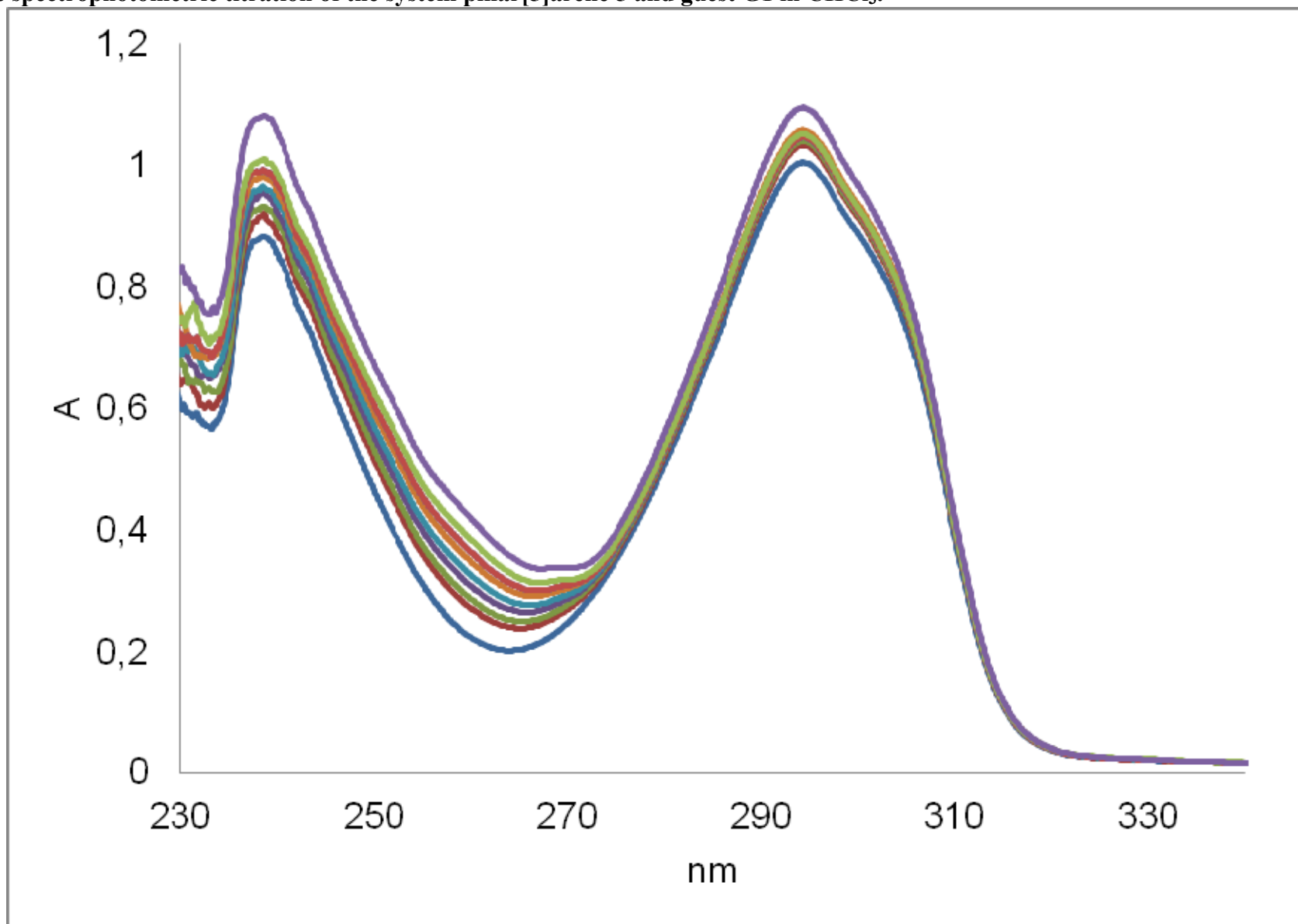


Fig. S74. The spectrophotometric titration of the system pillar[5]arene 6 and guest G1 in CHCl_3 .

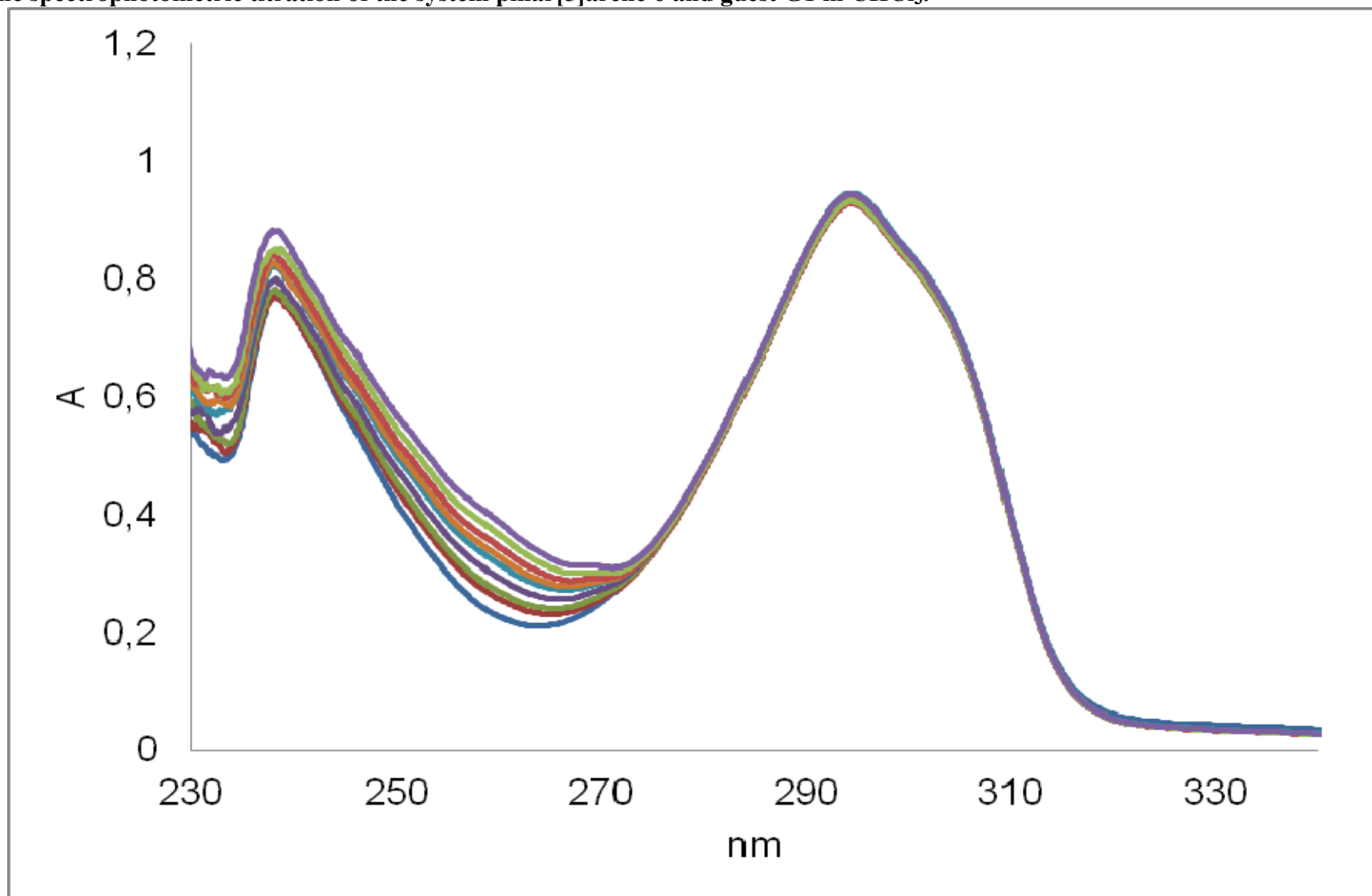


Fig. S75. The spectrophotometric titration of the system pillar[5]arene **7** and guest G1 in CHCl₃.

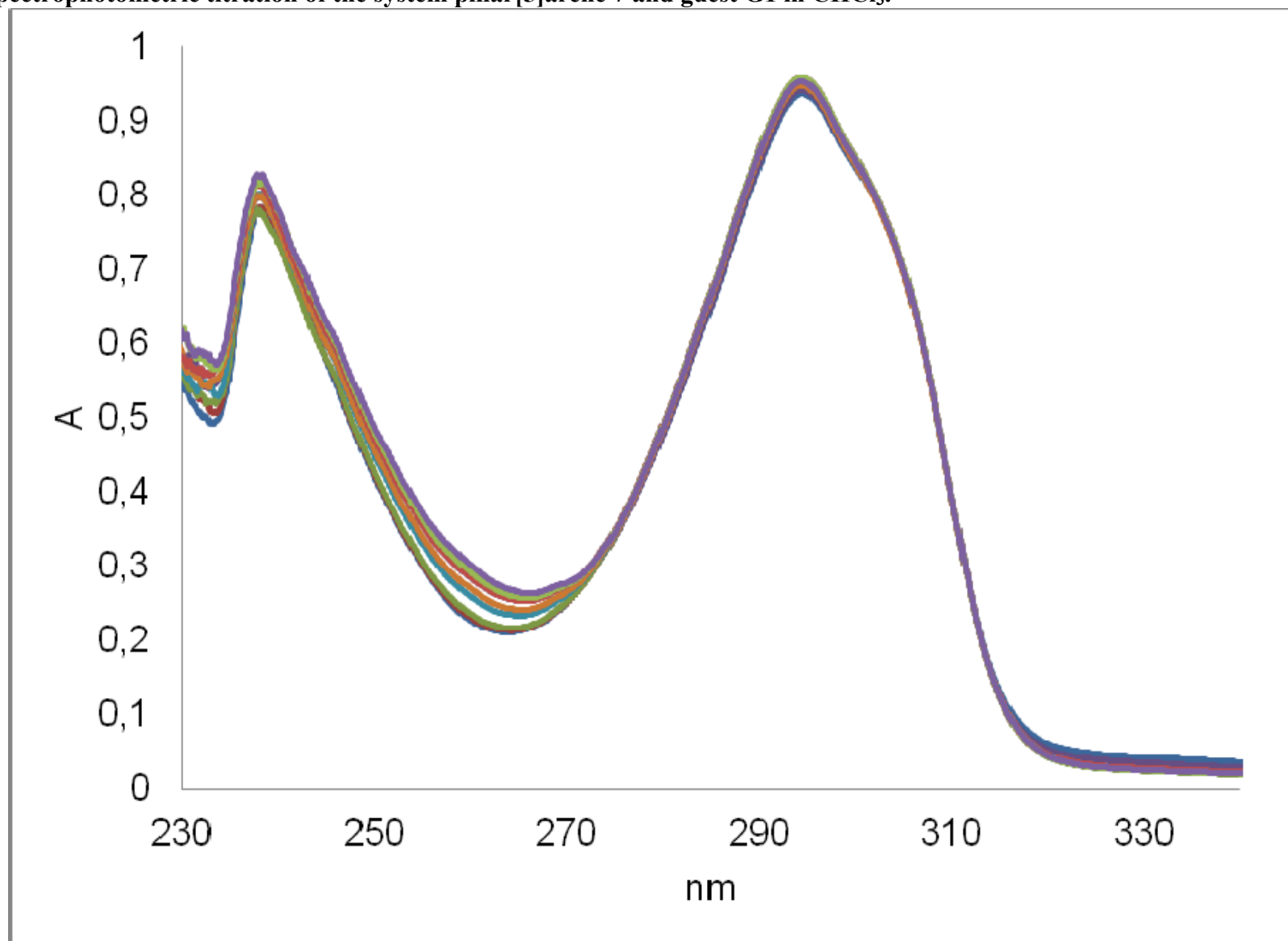


Fig. S76. The spectrophotometric titration of the system pillar[5]arene **5** and guest G3 in CHCl₃.

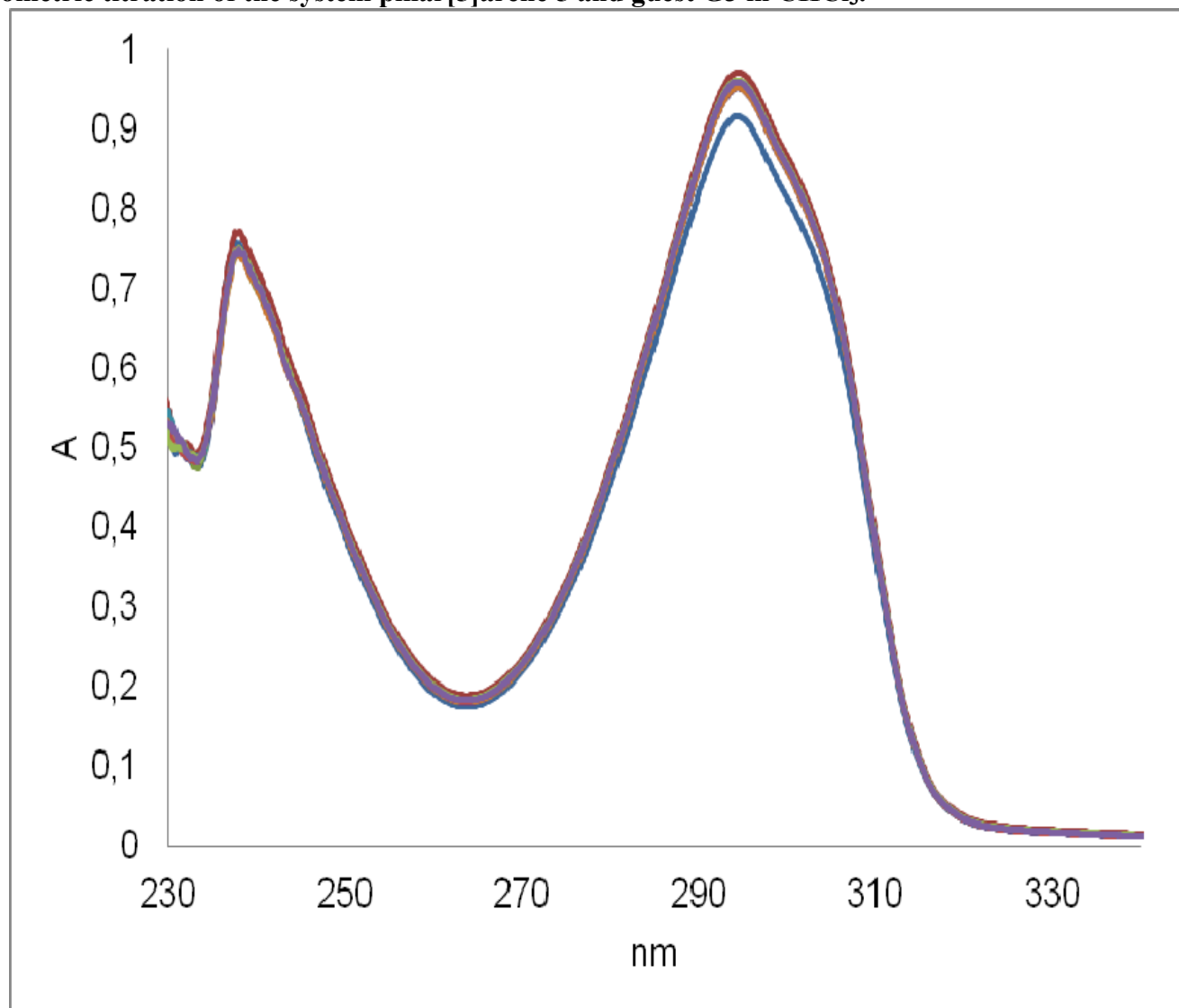


Fig. S77. The spectrophotometric titration of the system pillar[5]arene 6 and guest G3 in CHCl_3 .

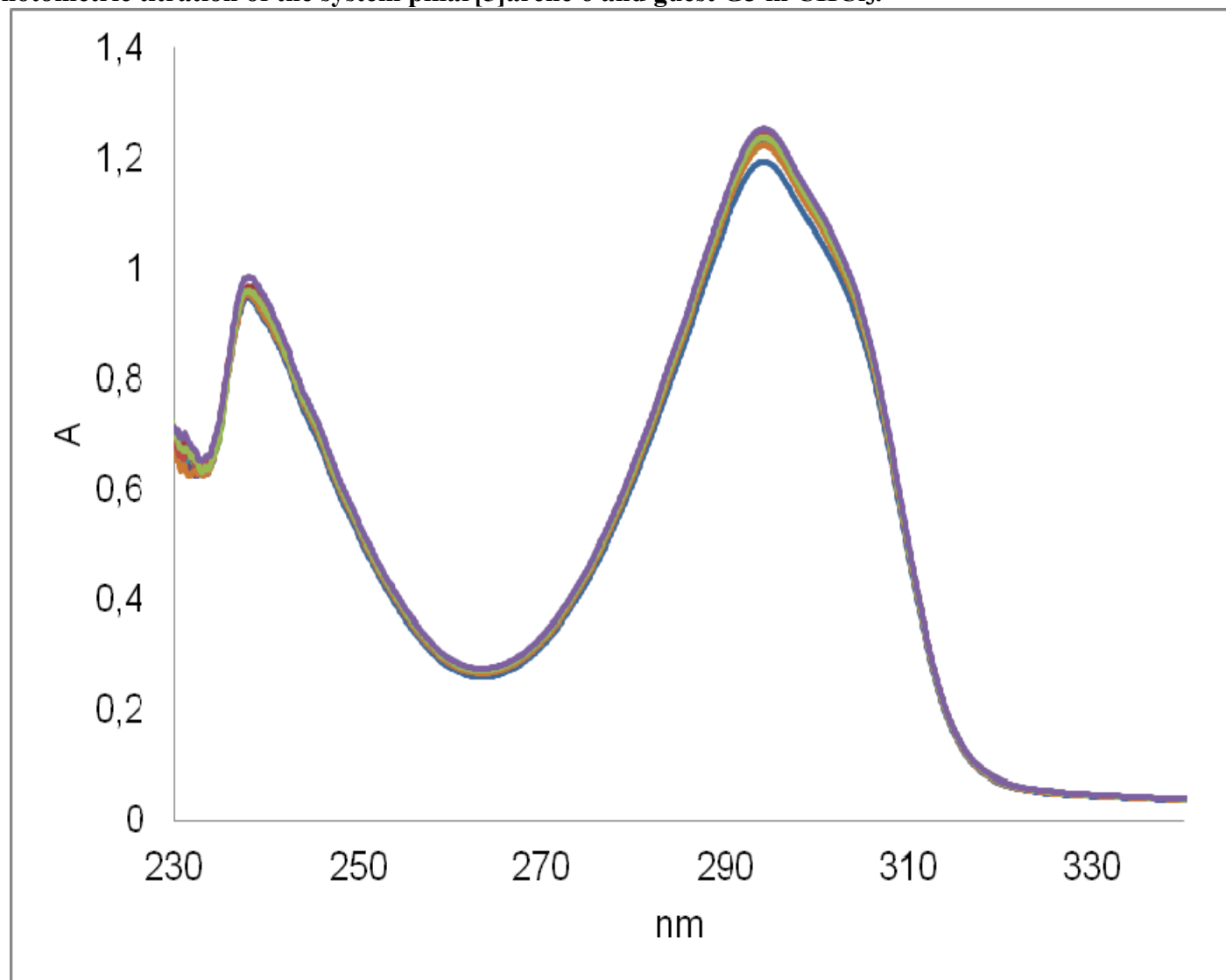


Fig. S78. The spectrophotometric titration of the system pillar[5]arene **7** and guest G3 in CHCl₃.

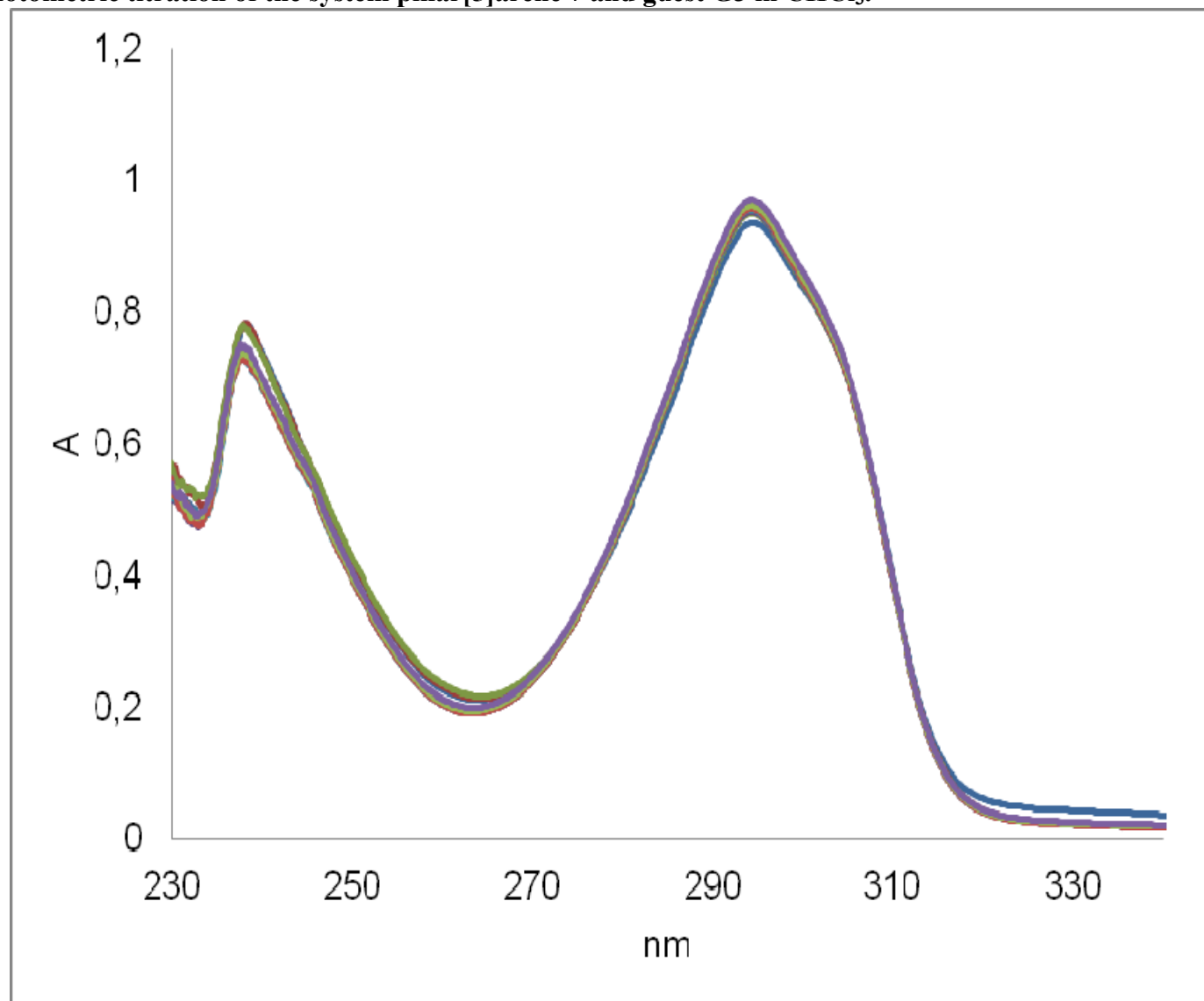


Fig. S79. The spectrophotometric titration of the system pillar[5]arene **5** and guest G4 in CHCl₃.

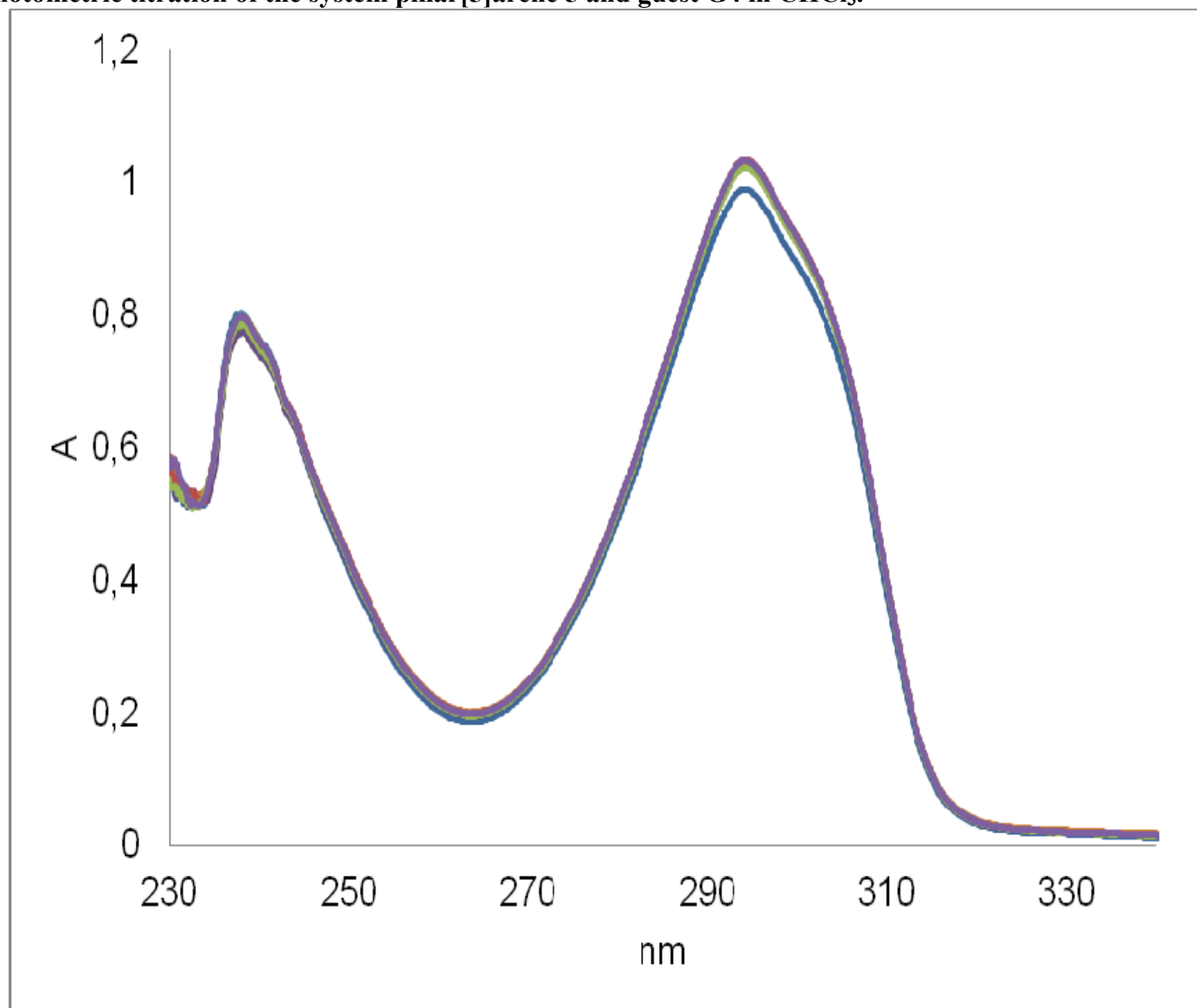


Fig. S80. The spectrophotometric titration of the system pillar[5]arene 6 and guest G4 in CHCl_3 .

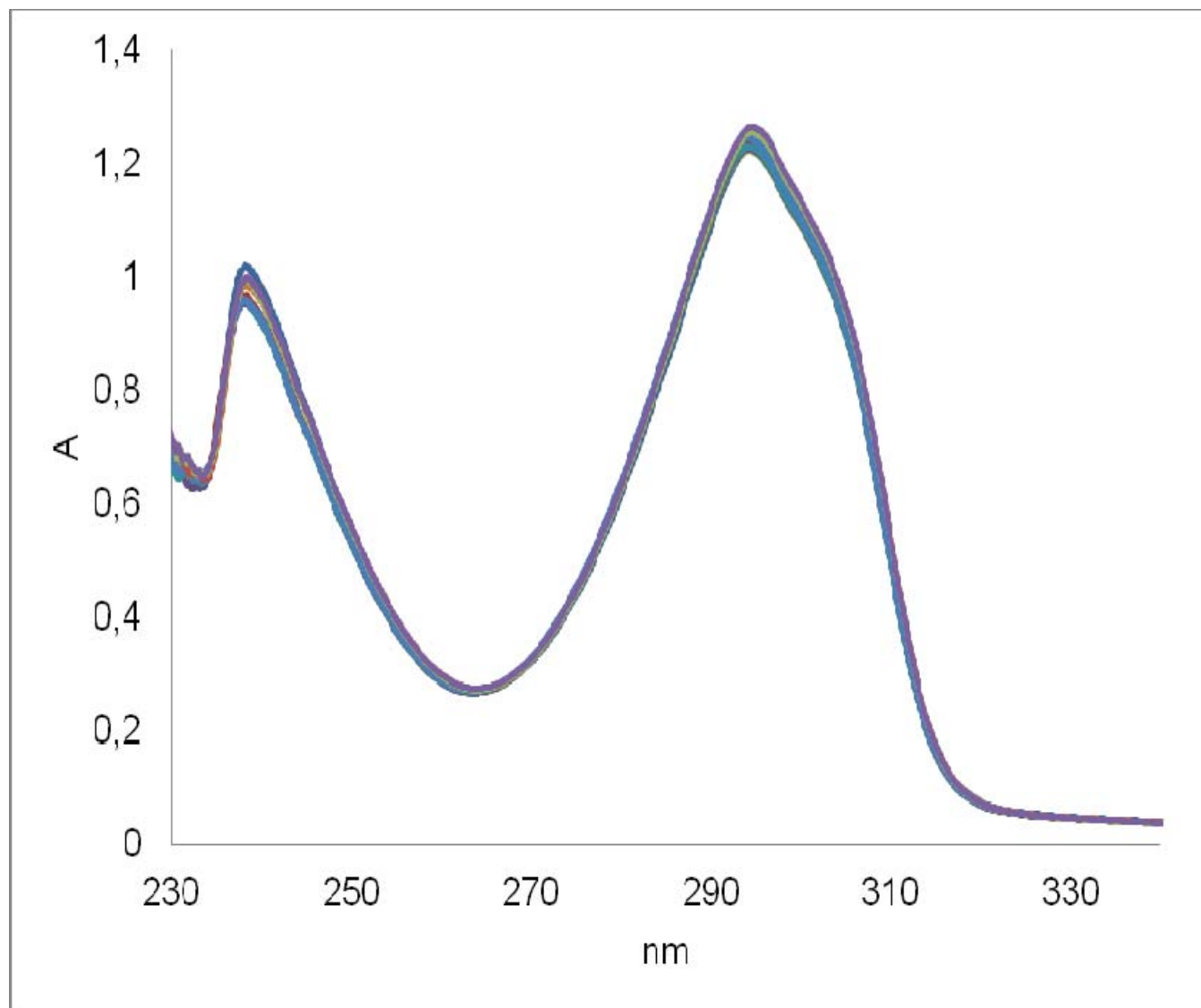


Fig. S81. The spectrophotometric titration of the system pillar[5]arene **7** and guest G4 in CHCl₃.

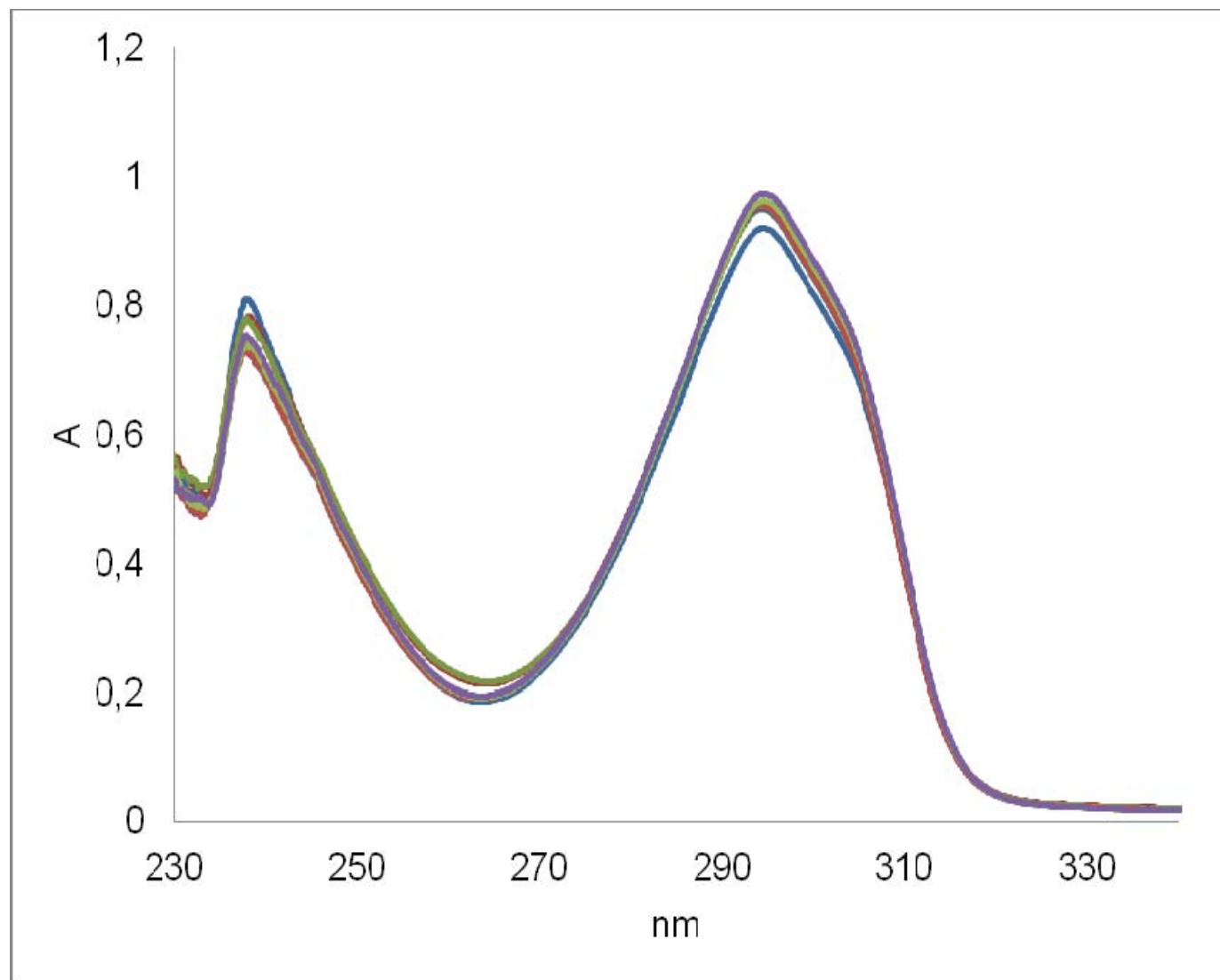


Fig. S82. The spectrophotometric titration of the system pillar[5]arene **5** and guest G5 in CHCl₃.

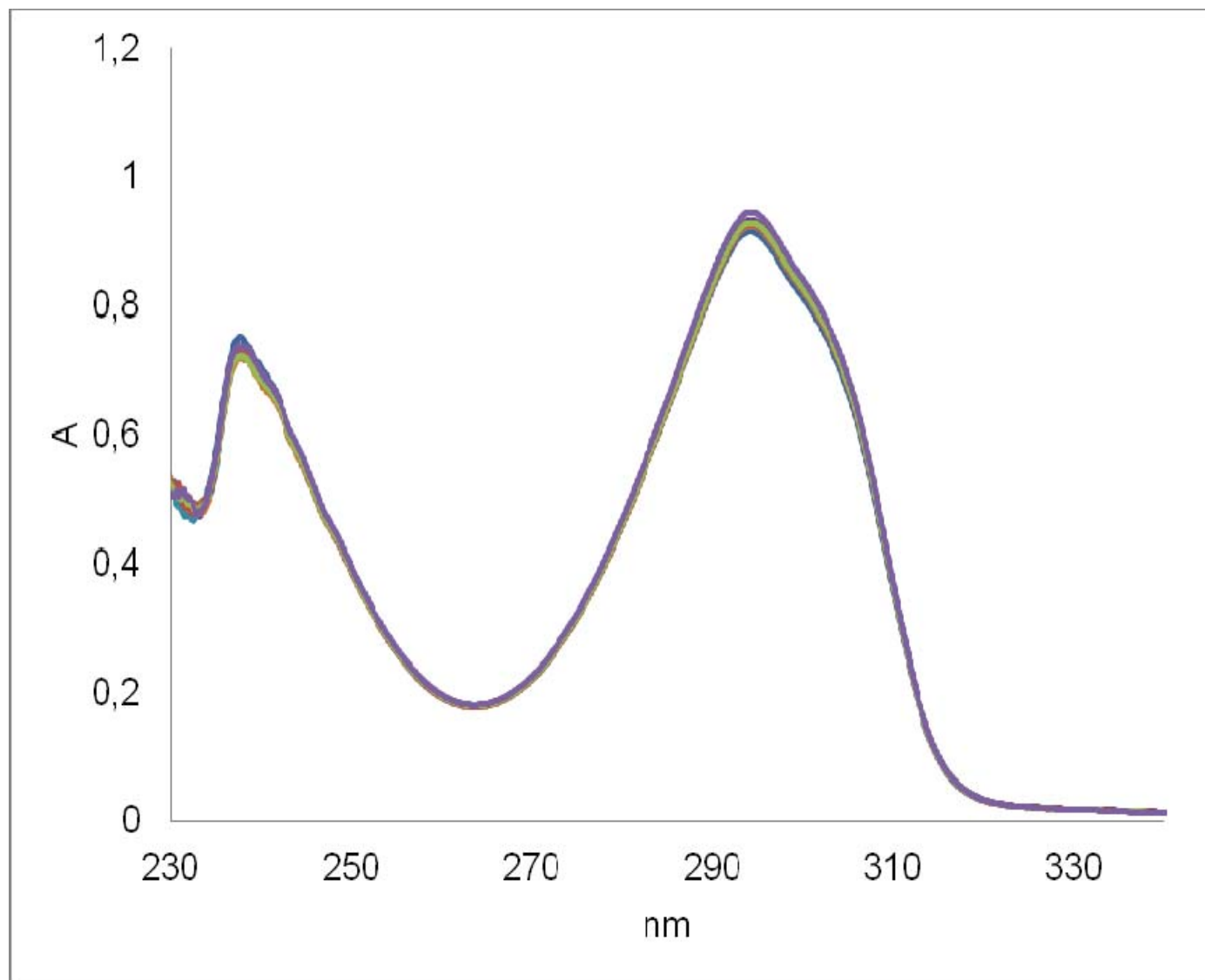


Fig. S83. The spectrophotometric titration of the system pillar[5]arene **6** and guest **G5** in CHCl_3 .

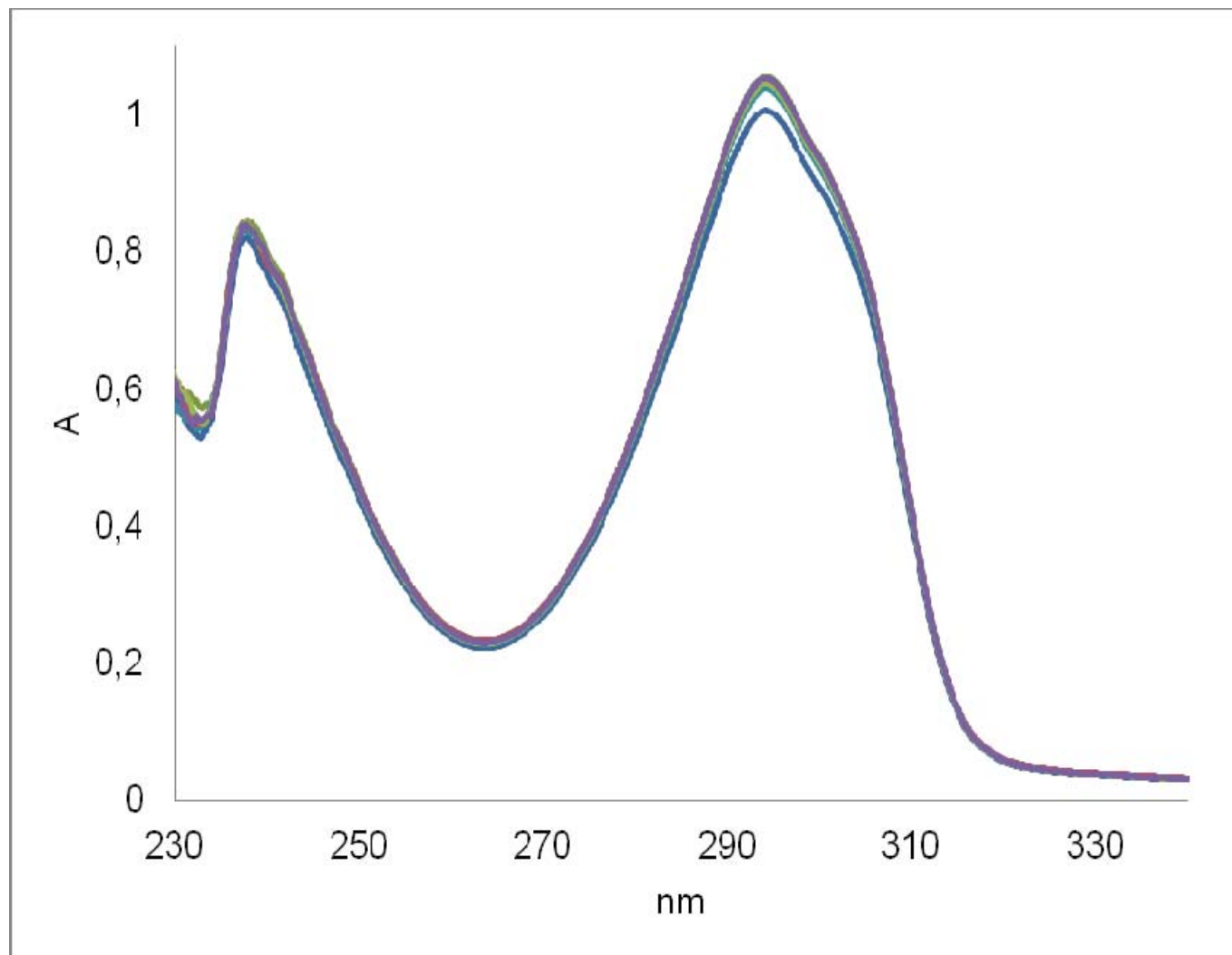


Fig. S84. The spectrophotometric titration of the system pillar[5]arene **7** and guest G5 in CHCl₃.

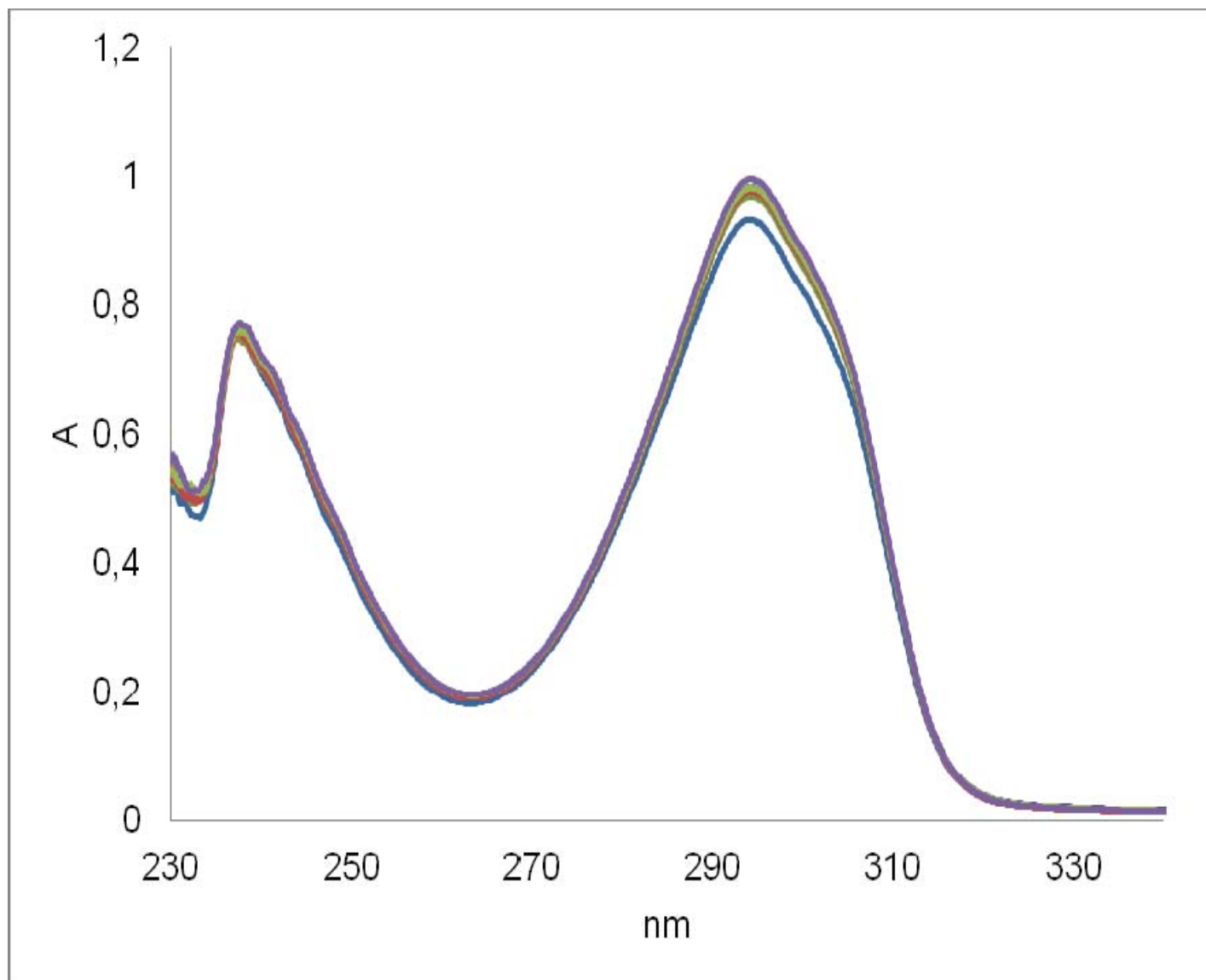


Fig. S85. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 5 and G1 in CHCl_3 .

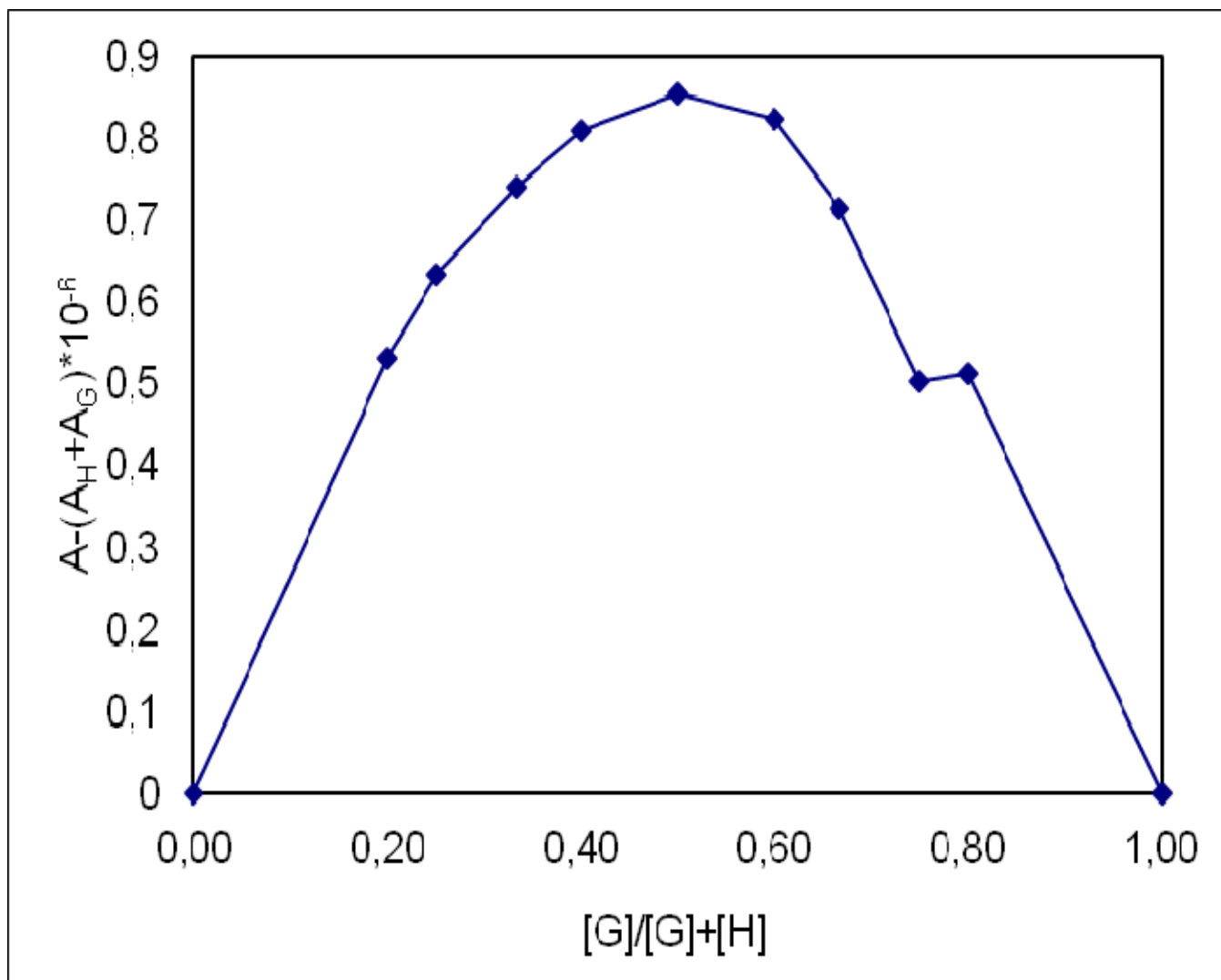


Fig. S86. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 5 and G3 in CHCl₃.

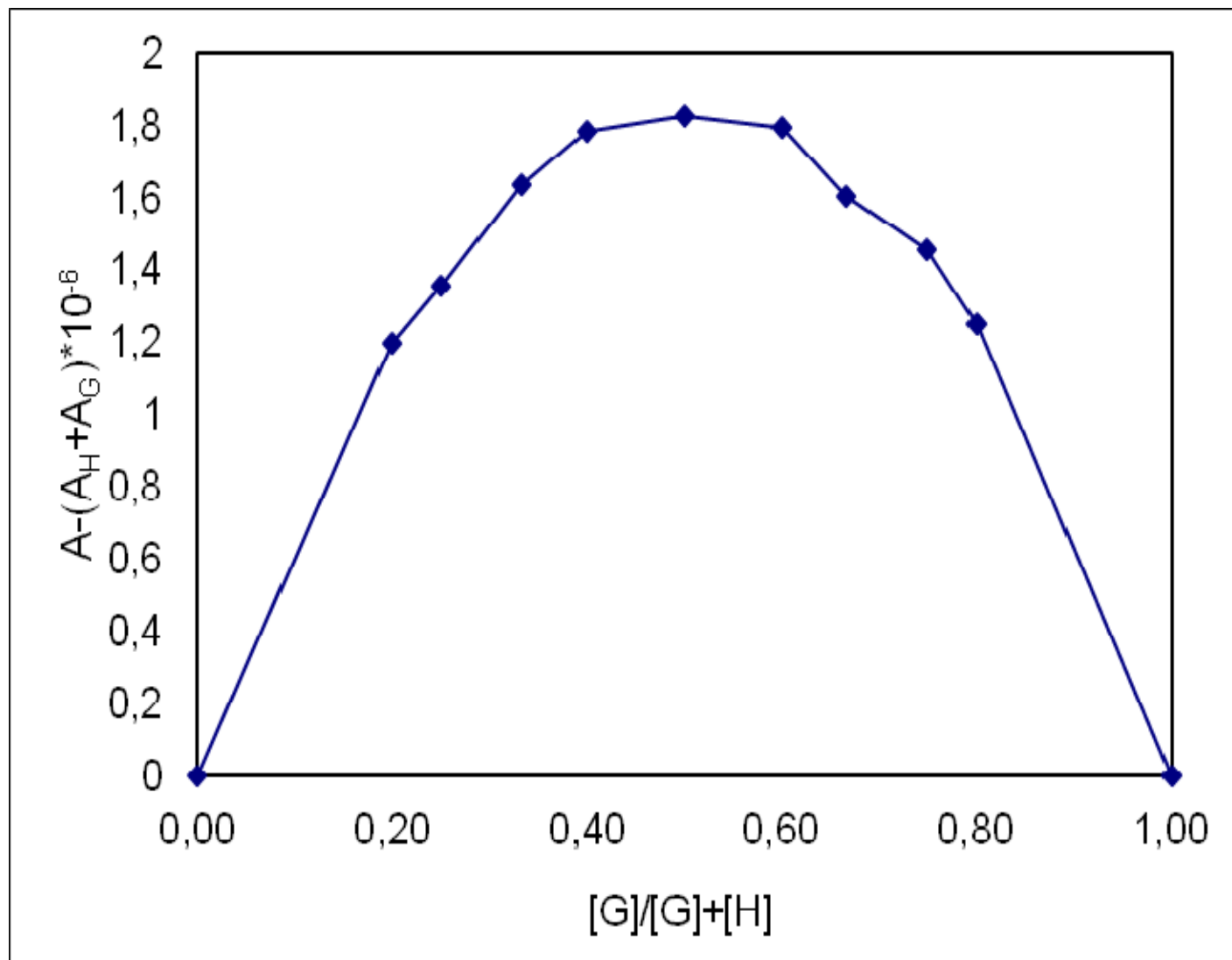


Fig. S87. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 5 and G4 in CHCl_3 .

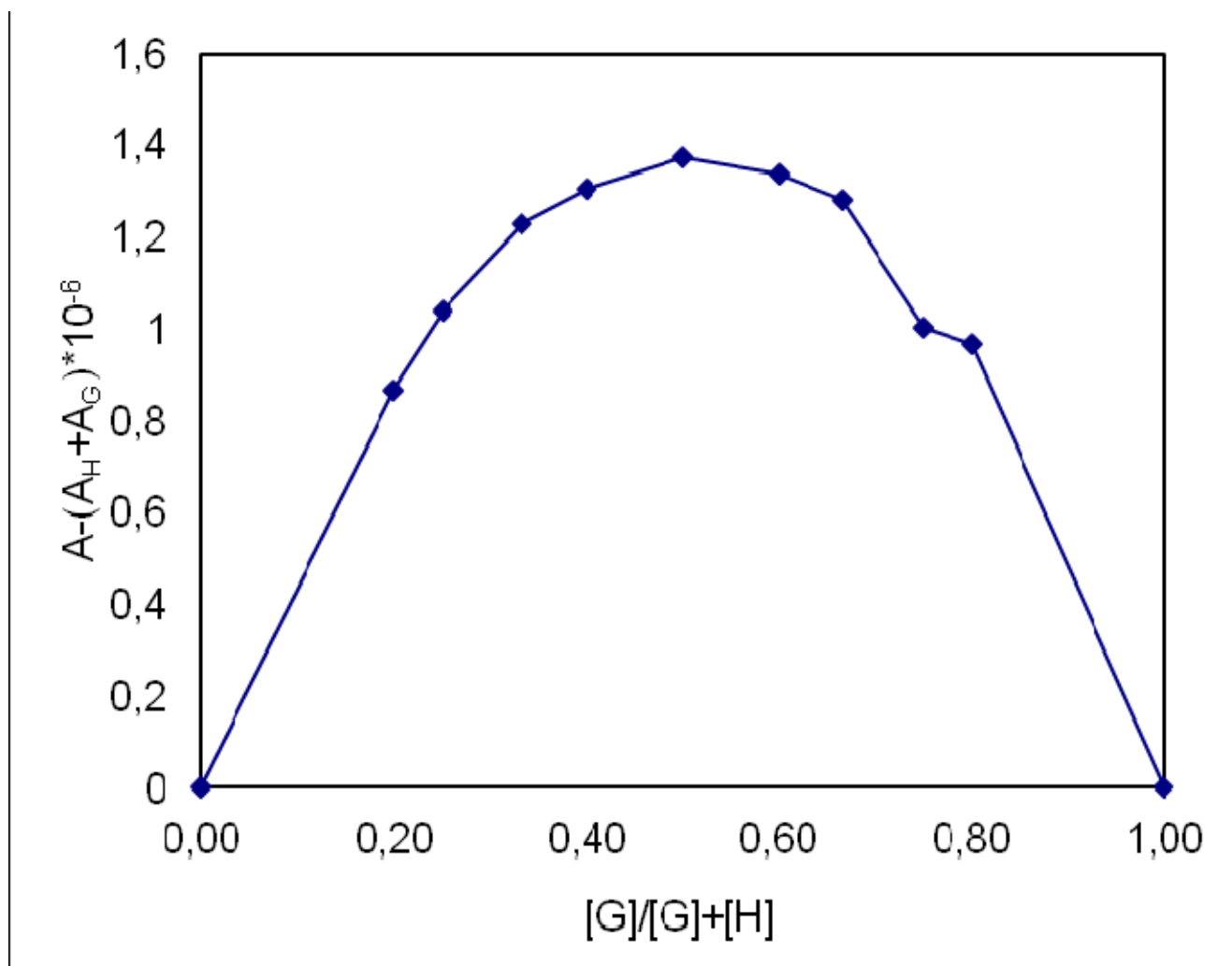


Fig. S88. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 5 and G5 in CHCl_3 .

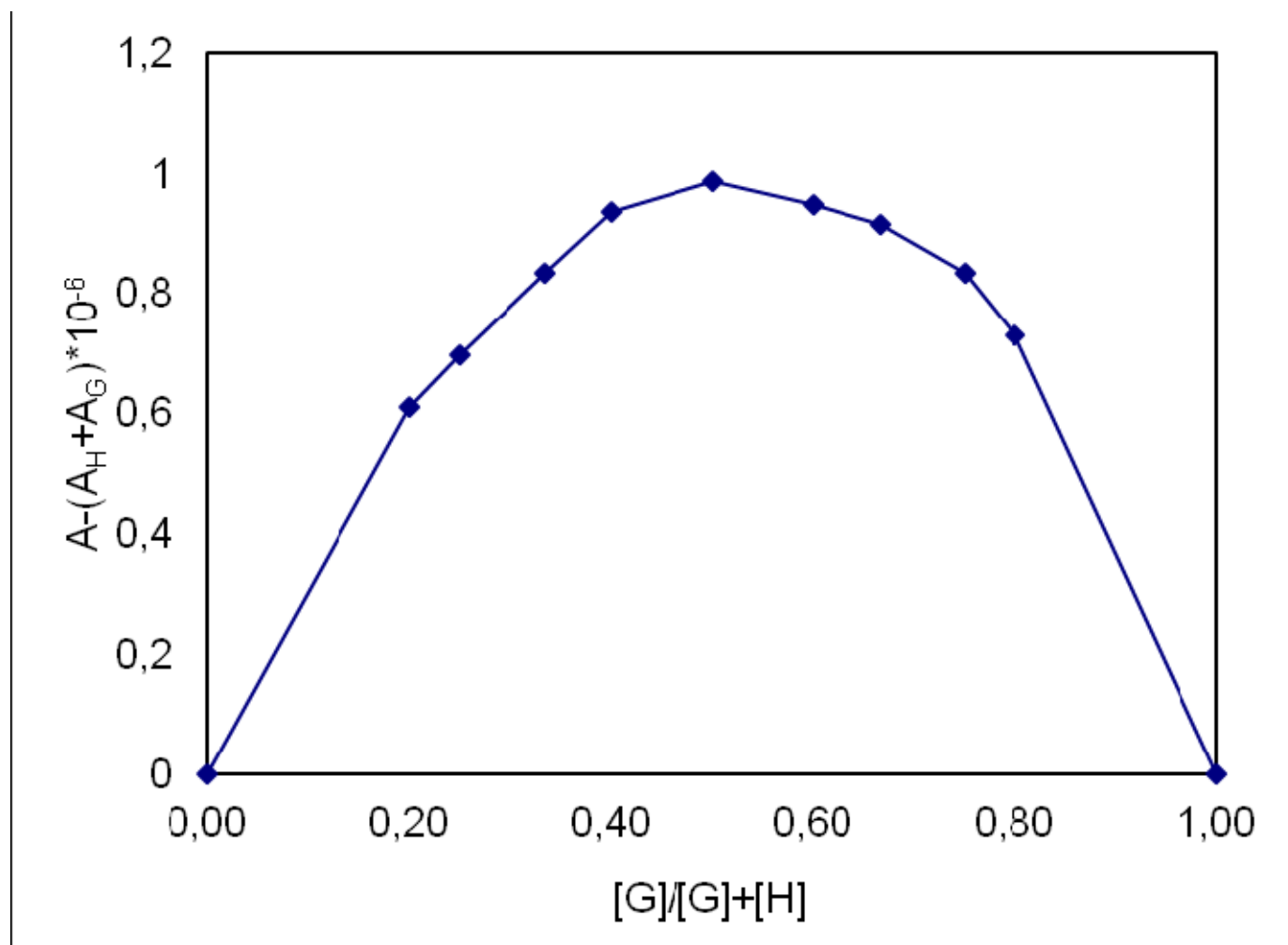


Fig. S89. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 6 and G1 in CHCl_3 .

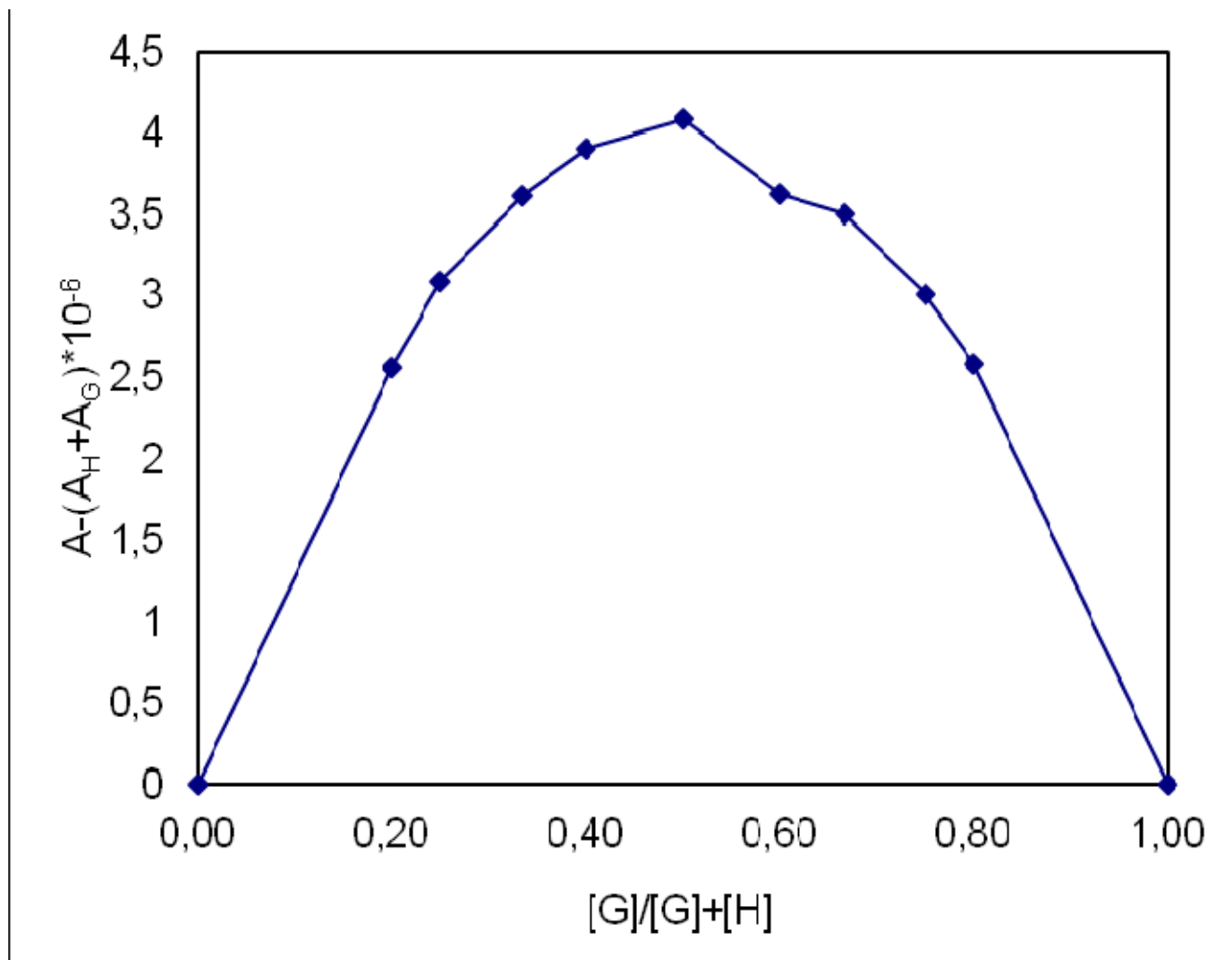


Fig. S90. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 6 and G3 in CHCl_3 .

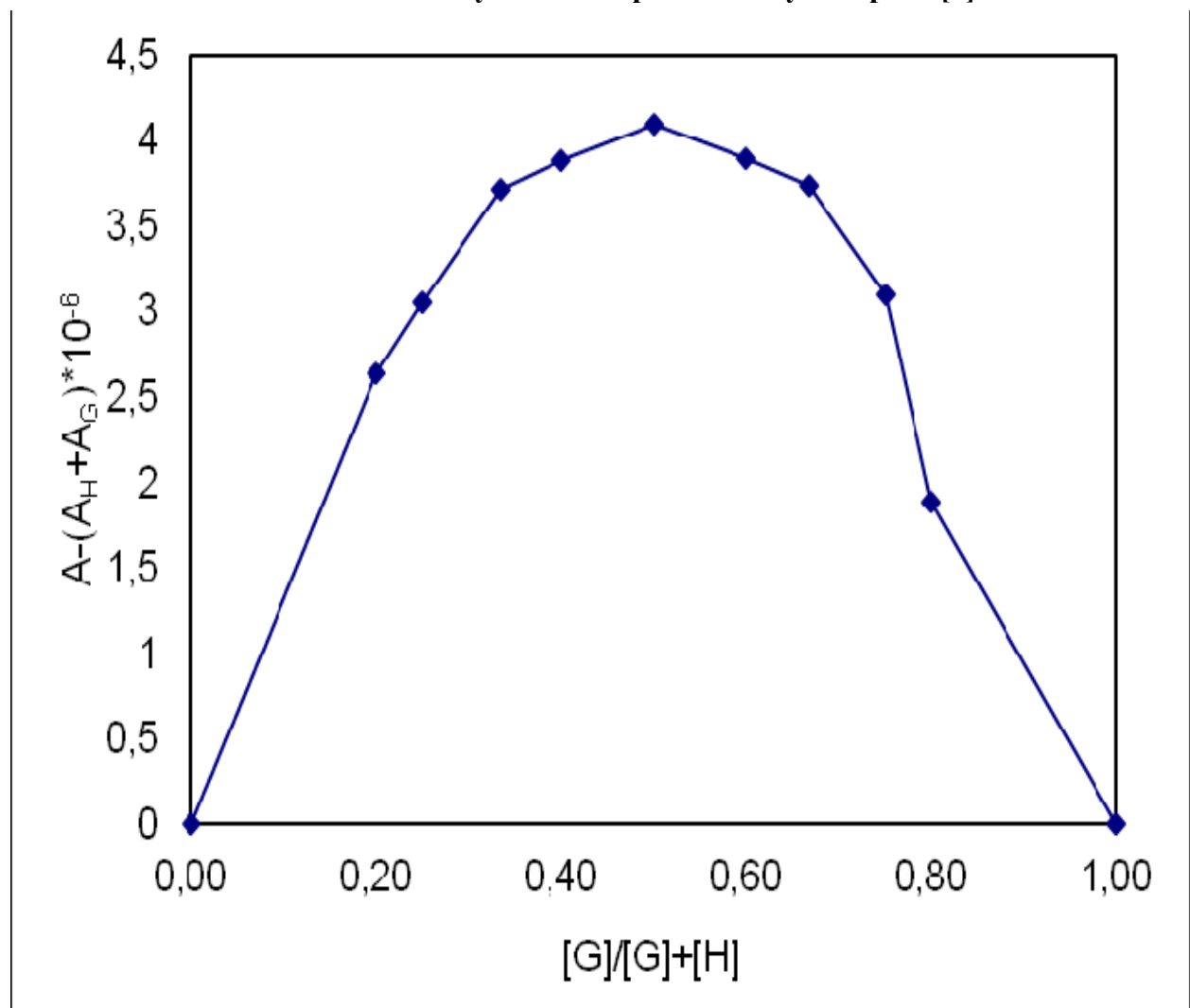


Fig. S91. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 6 and G4 in CHCl_3 .

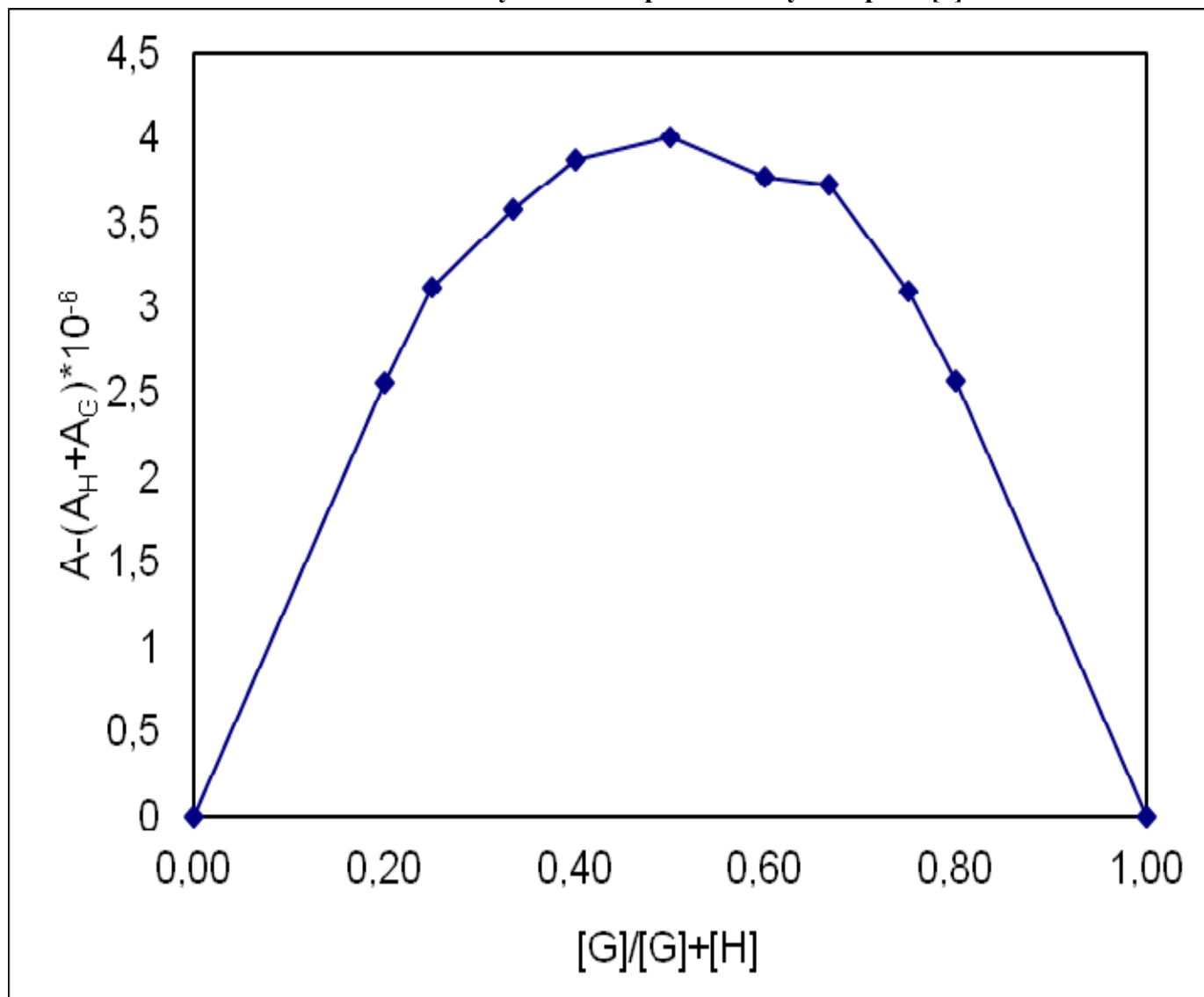


Fig. S92. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 6 and G5 in CHCl_3 .

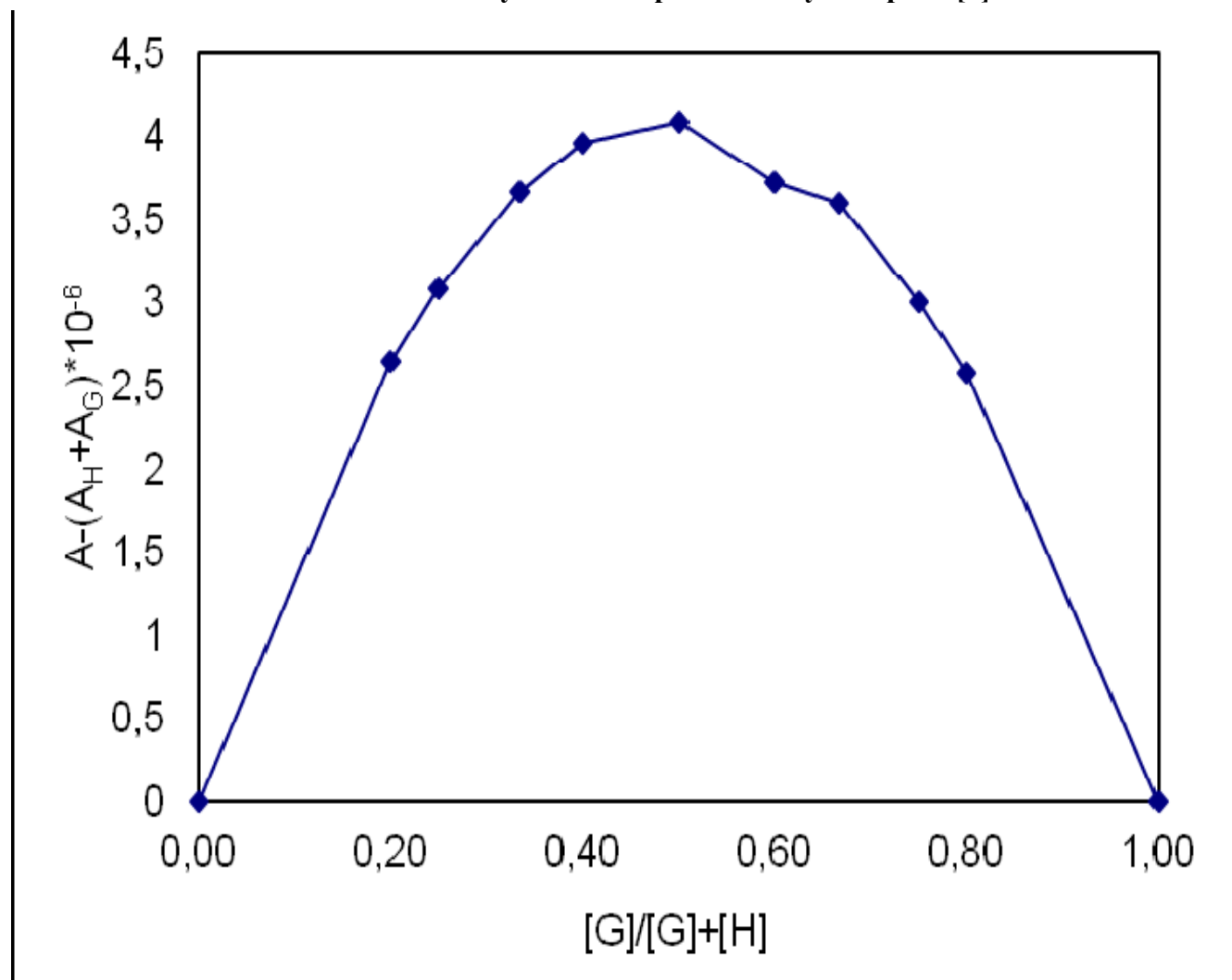


Fig. S93. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 7 and G1 in CHCl_3 .

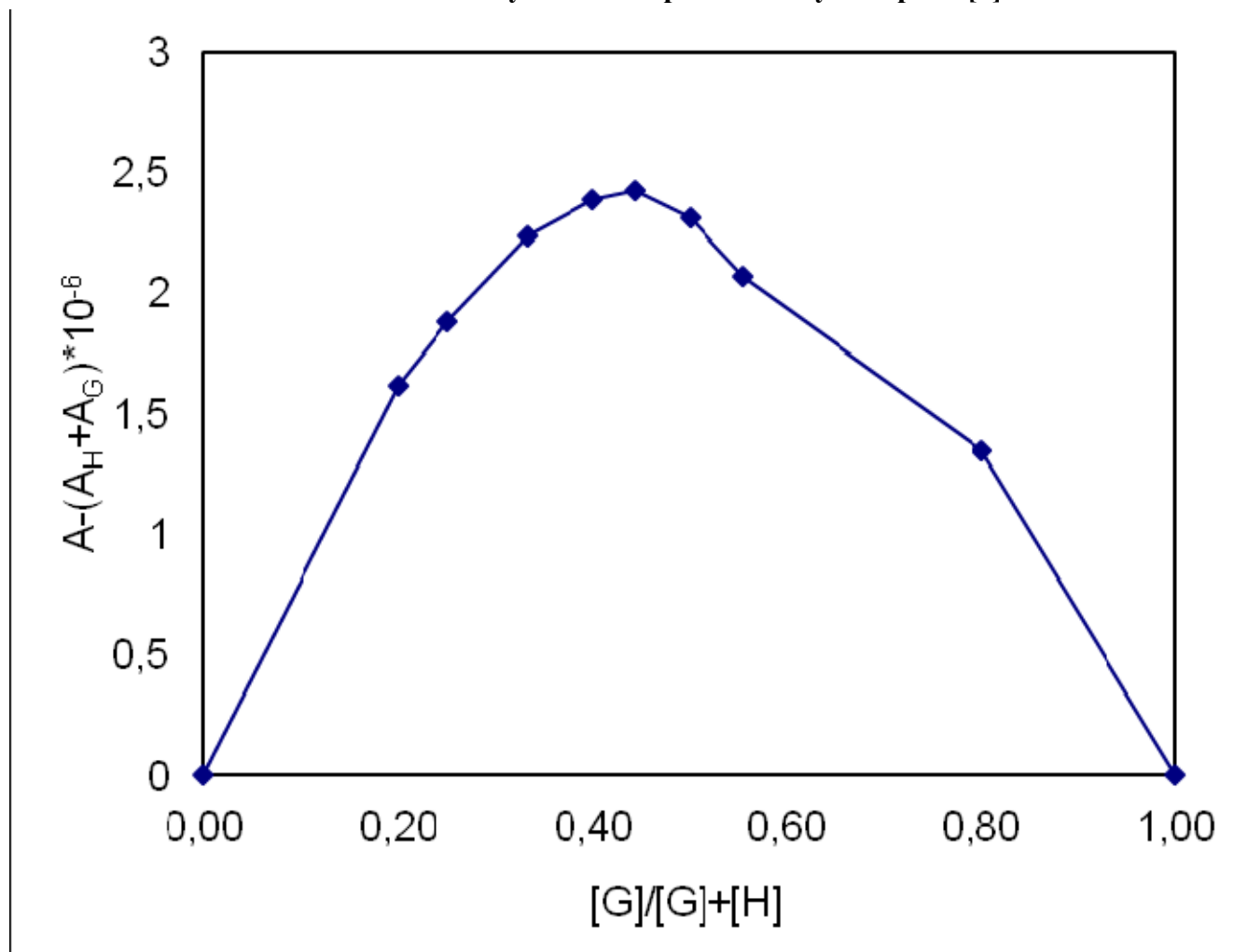


Fig. S94. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 7 and G3 in CHCl_3 .

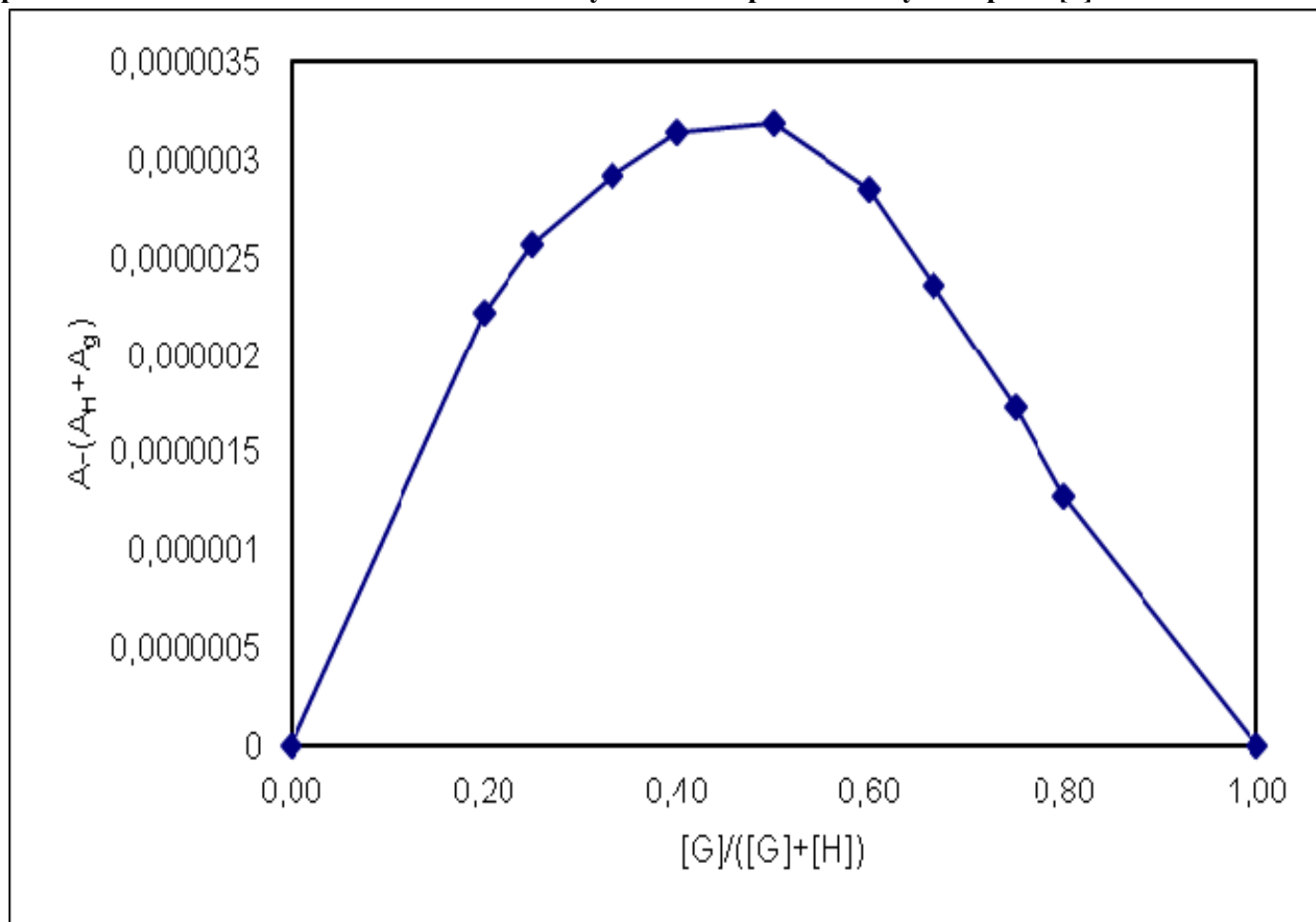


Fig. S95. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 7 and G4 in CHCl_3 .

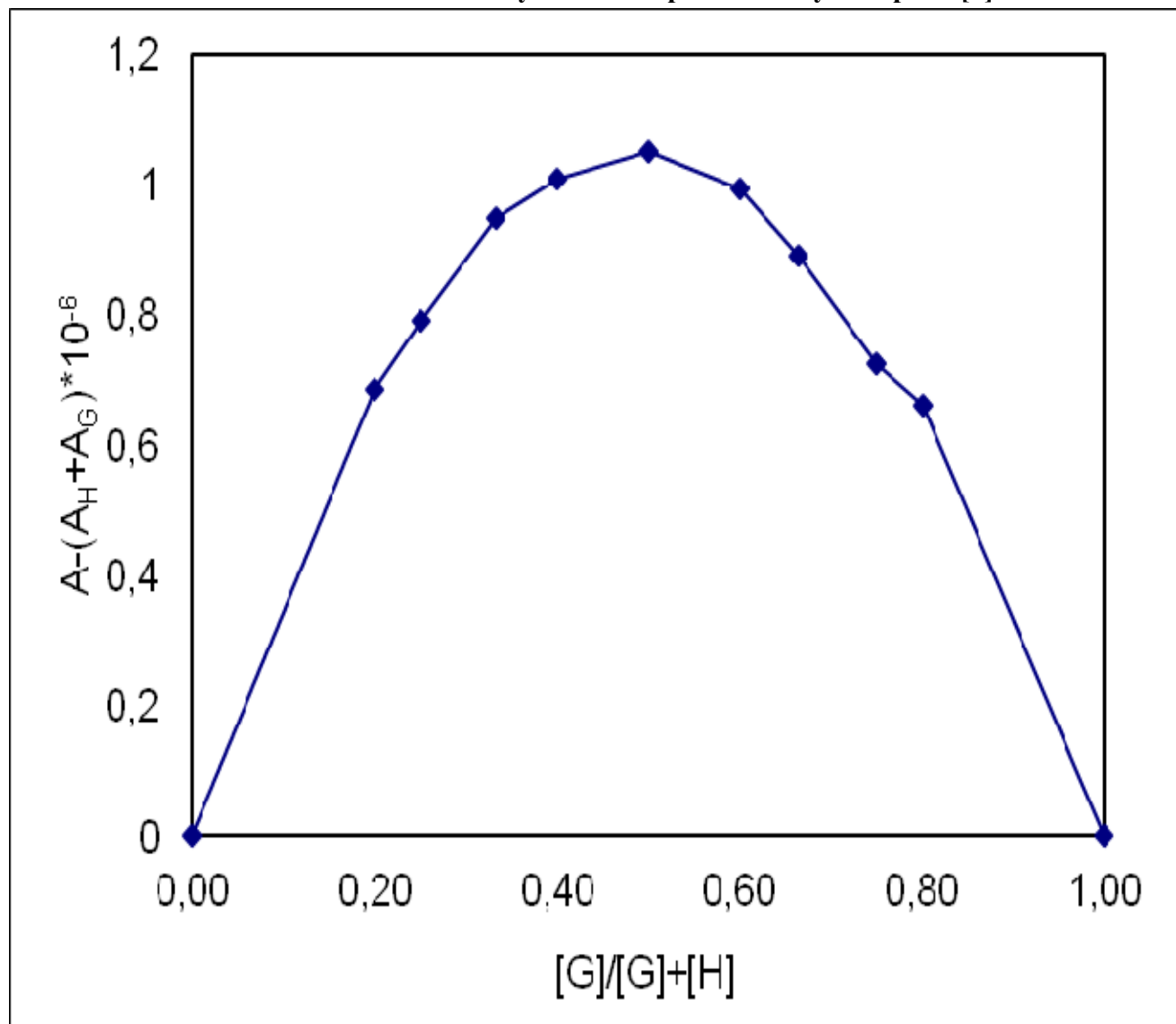


Fig. S96. The Job's plot for the determination of the stoichiometry in the complex of the system pillar[5]arene 7 and G5 in CHCl_3 .

