Electronic Supplementary Material (ESI)

γ-Hydroxy-*γ*-butyrolactams as 1,2-*bis*-electrophiles in a Brønsted/Lewis acid-free synthesis of condensed nitrogen heterocycles

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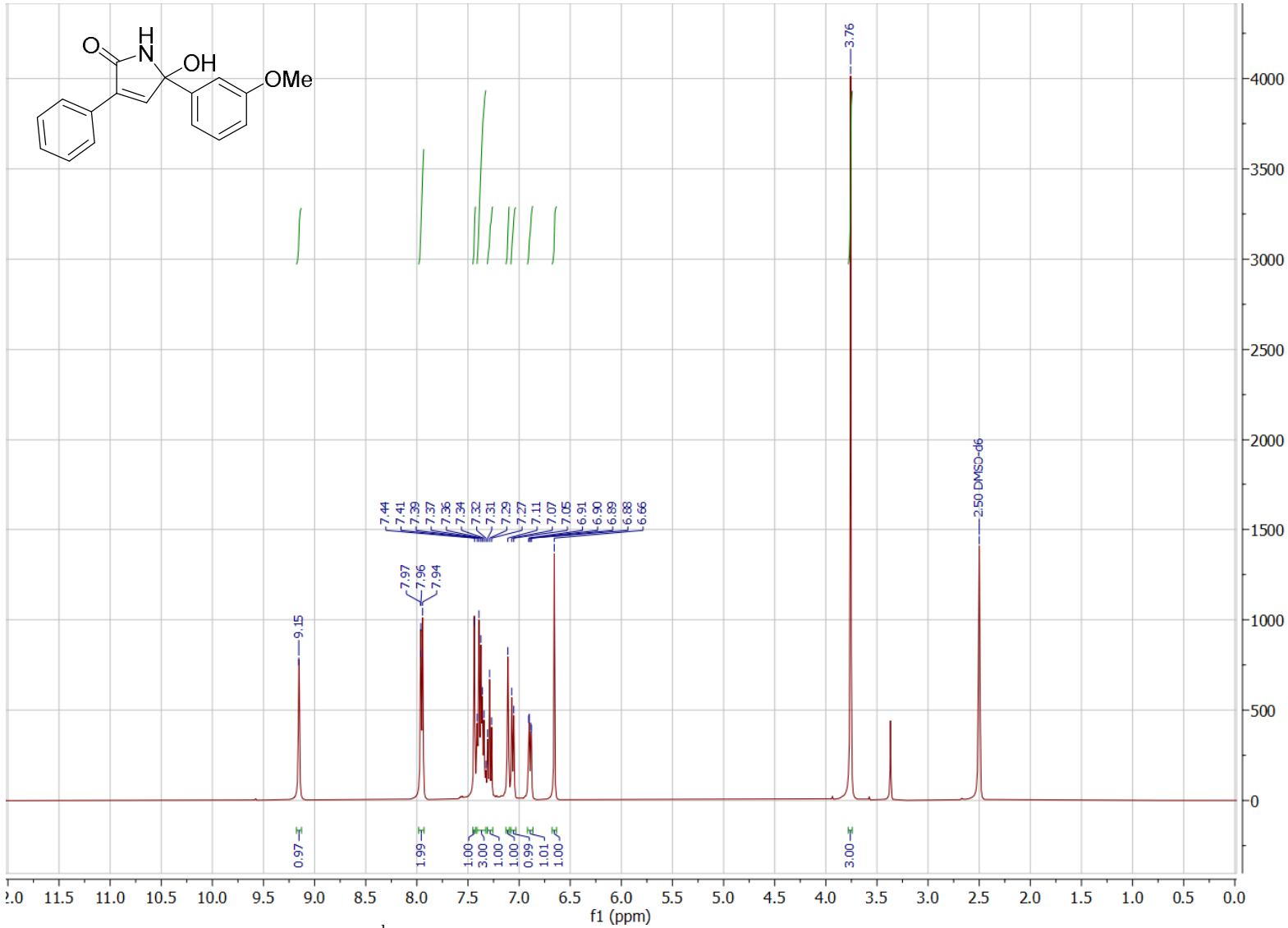

Figure S1. ^{1}H NMR spectrum of hydroxylactam **1ca** in DMSO-d_6 (400 MHz)

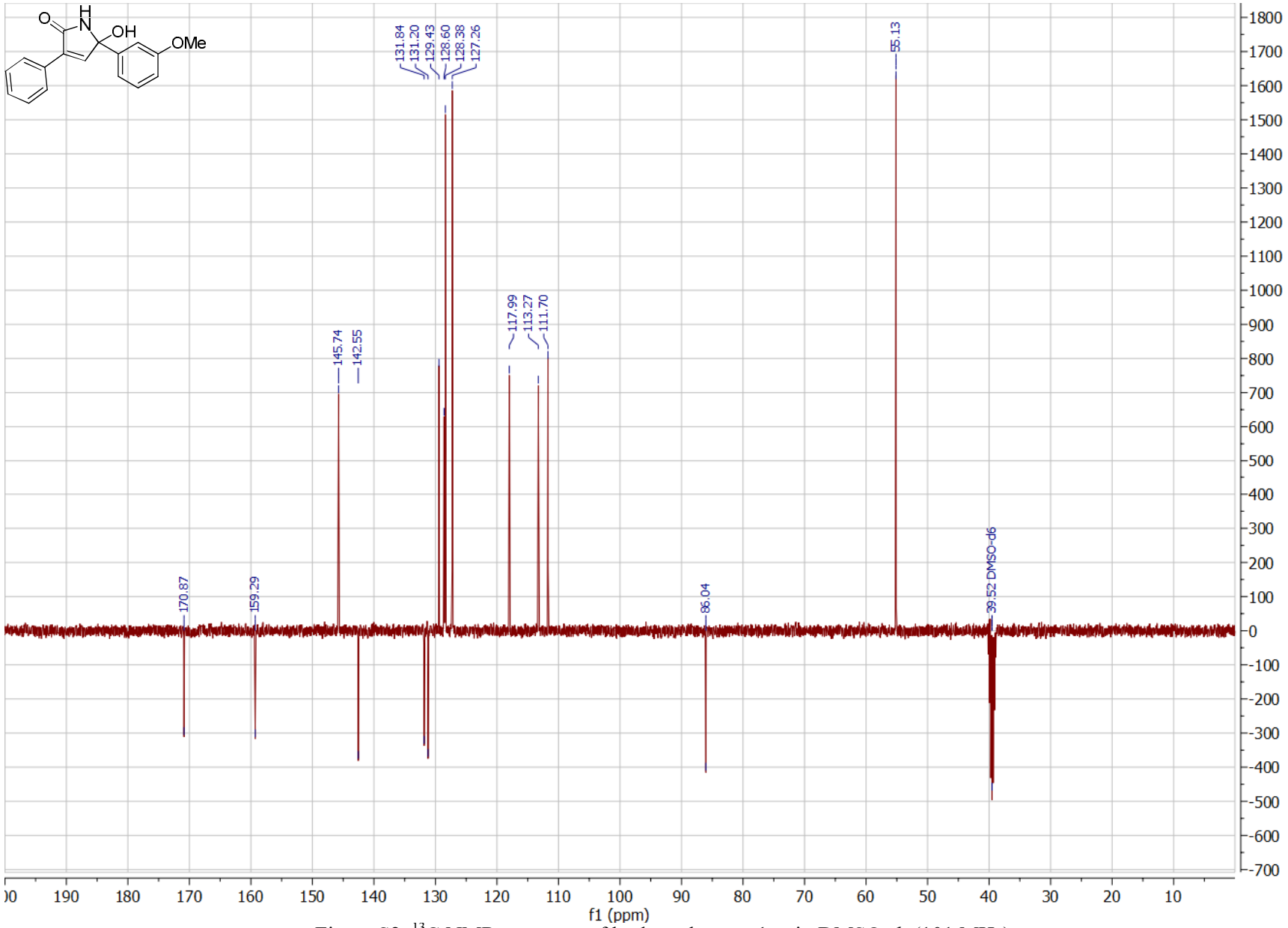

Figure S2. ^{13}C NMR spectrum of hydroxylactam **1ca** in DMSO-d_6 (101 MHz)

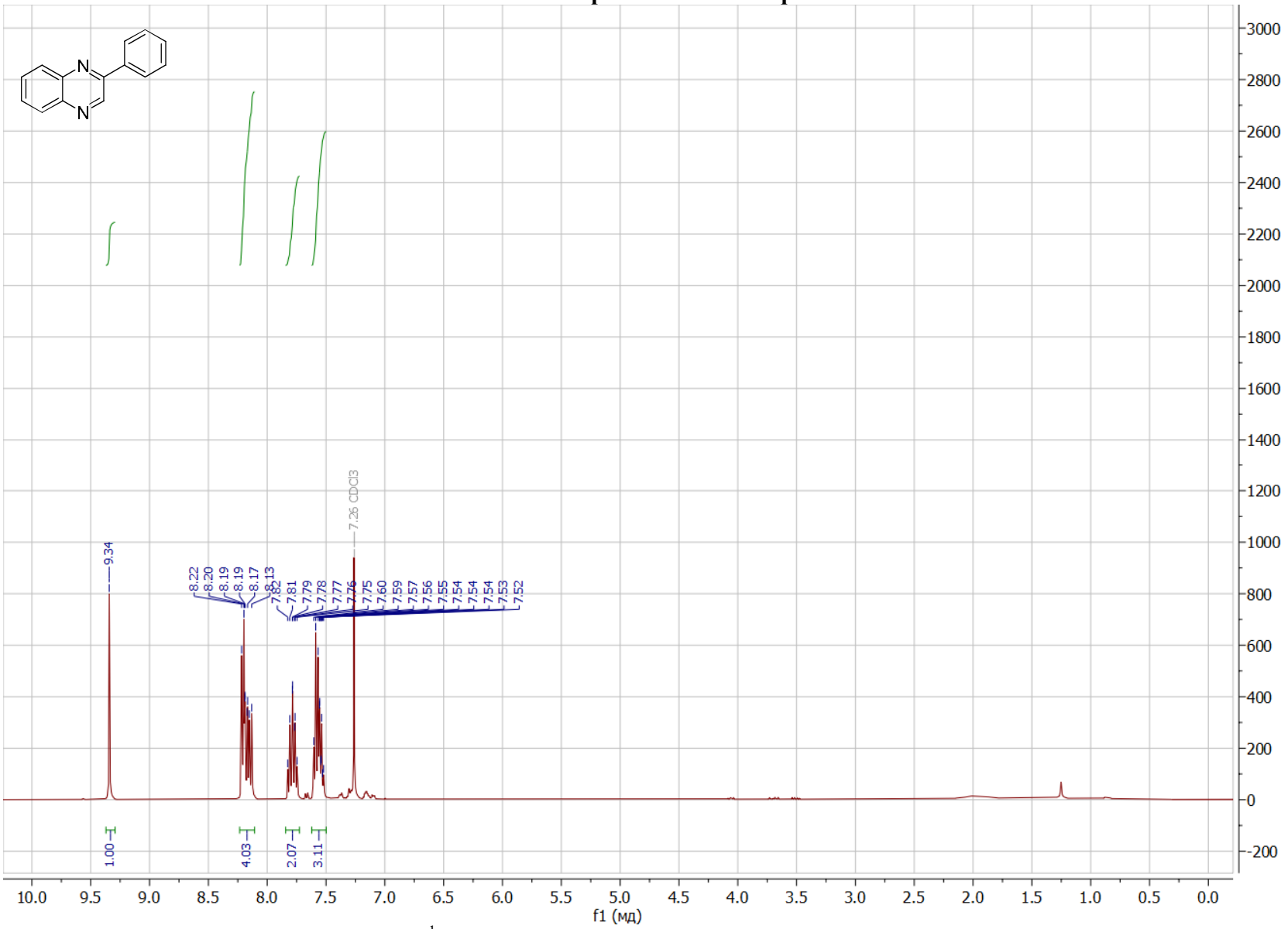

Figure S3. ^{1}H NMR spectrum of quinoxaline **8aa** in $CDCl_3$ (400 MHz)

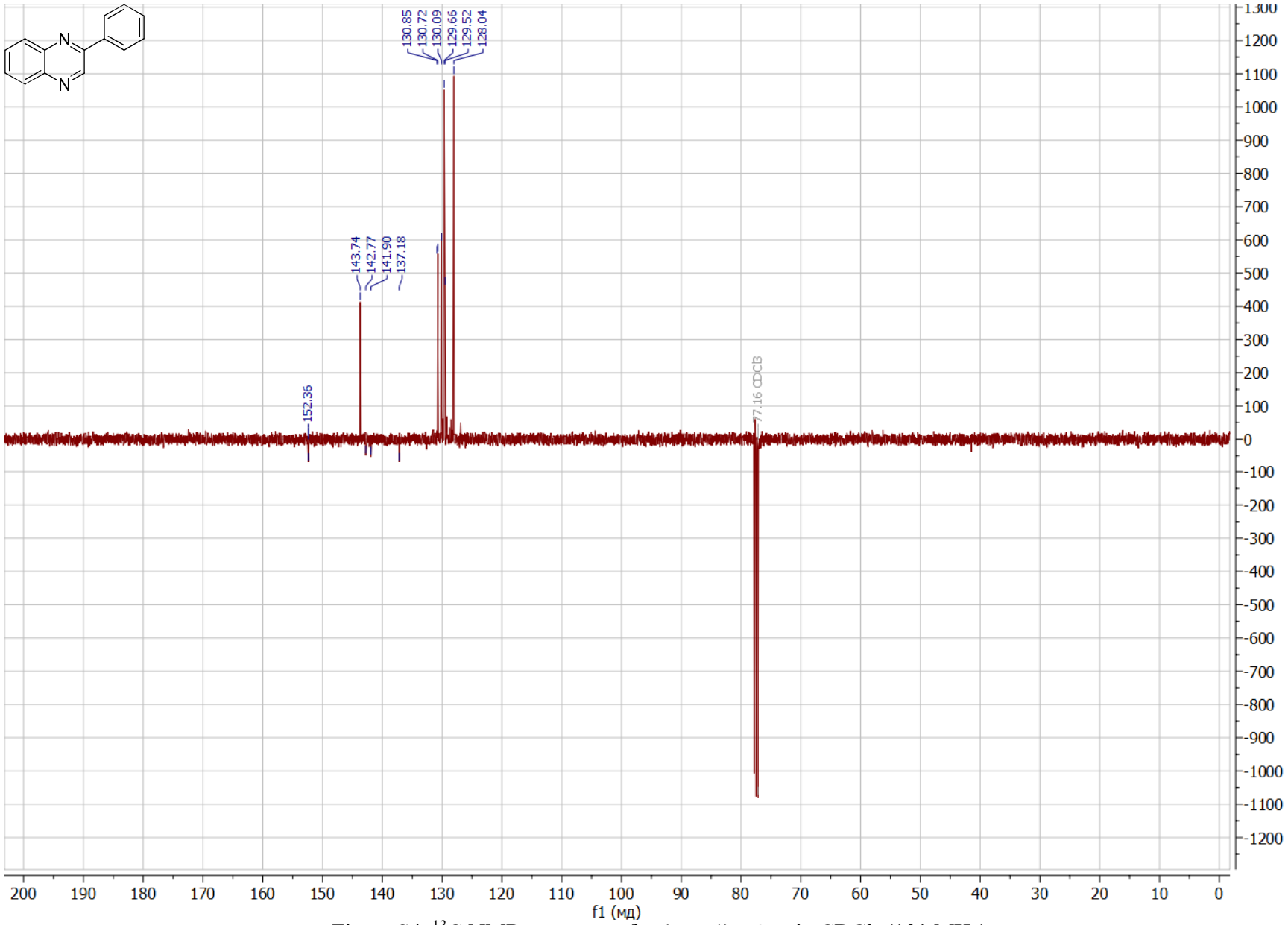

Figure S4. ^{13}C NMR spectrum of quinoxaline **8aa** in $CDCl_3$ (101 MHz)

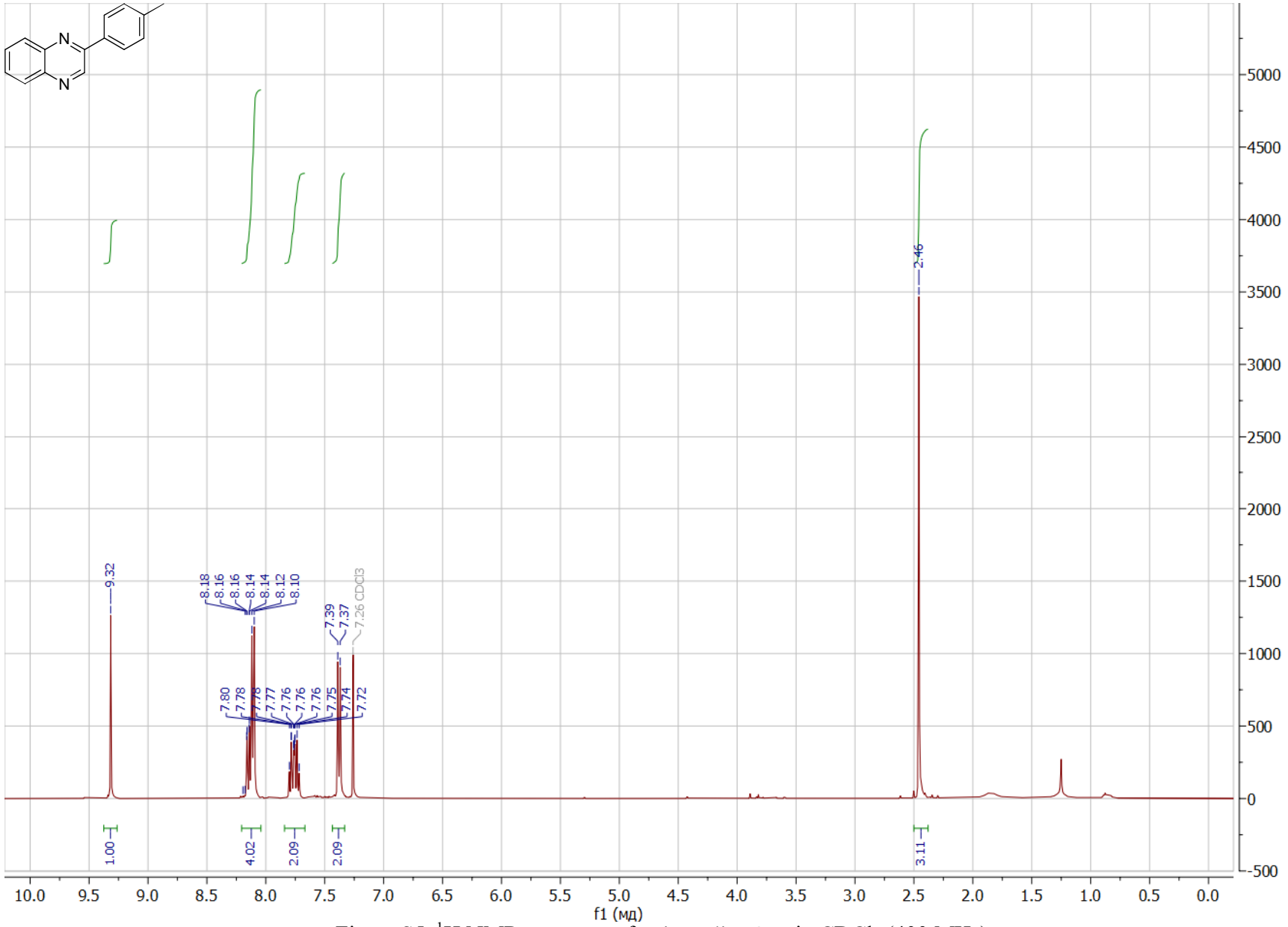

Figure S5. ^{1}H NMR spectrum of quinoxaline **8ba** in $CDCl_3$ (400 MHz)

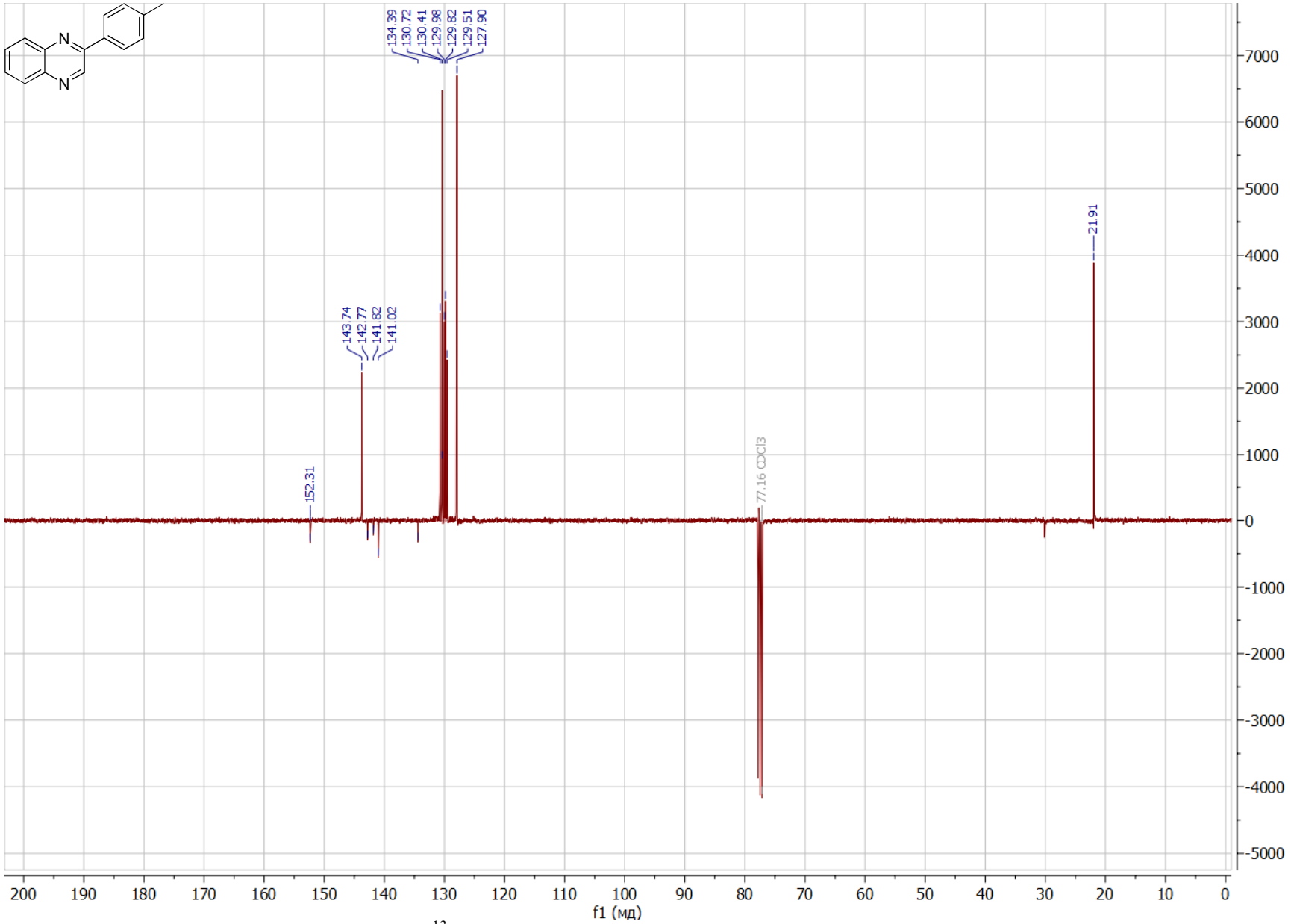

Figure S6. ^{13}C NMR spectrum of quinoxaline **8ba** in $CDCl_3$ (101 MHz)

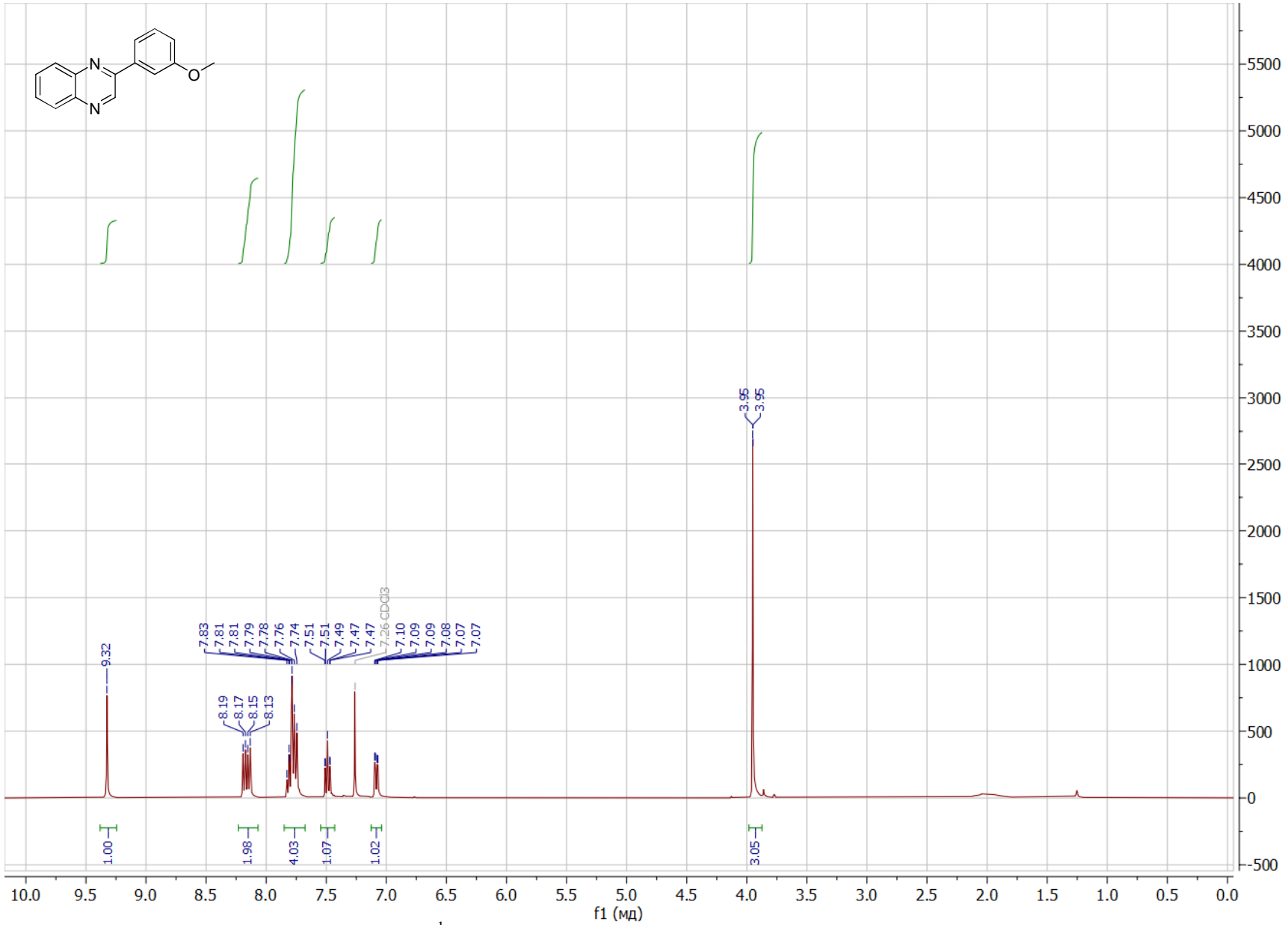

Figure S7. ^{1}H NMR spectrum of quinoxaline **8ca** in $CDCl_3$ (400 MHz)

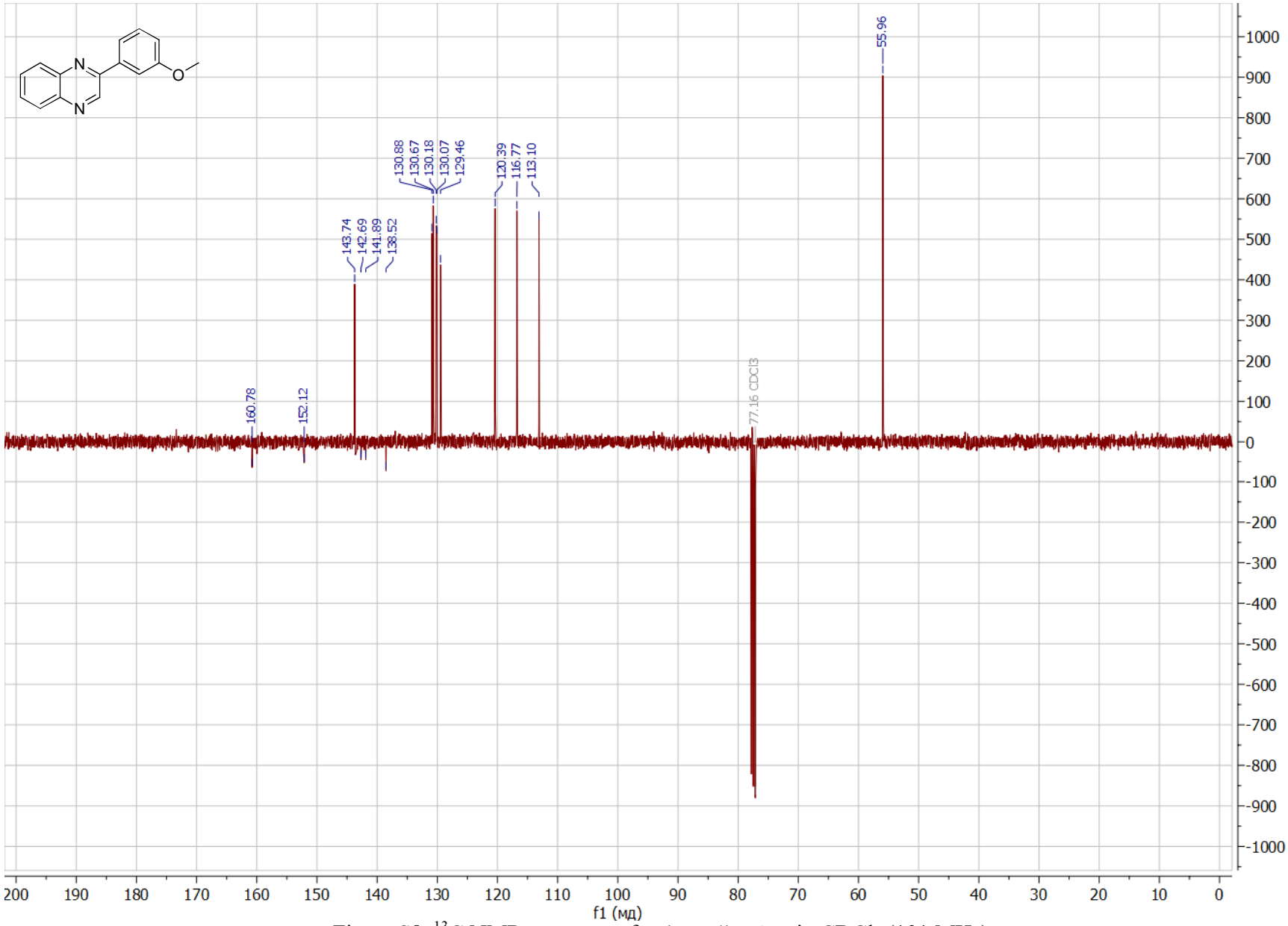

Figure S8. ^{13}C NMR spectrum of quinoxaline **8ca** in $CDCl_3$ (101 MHz)

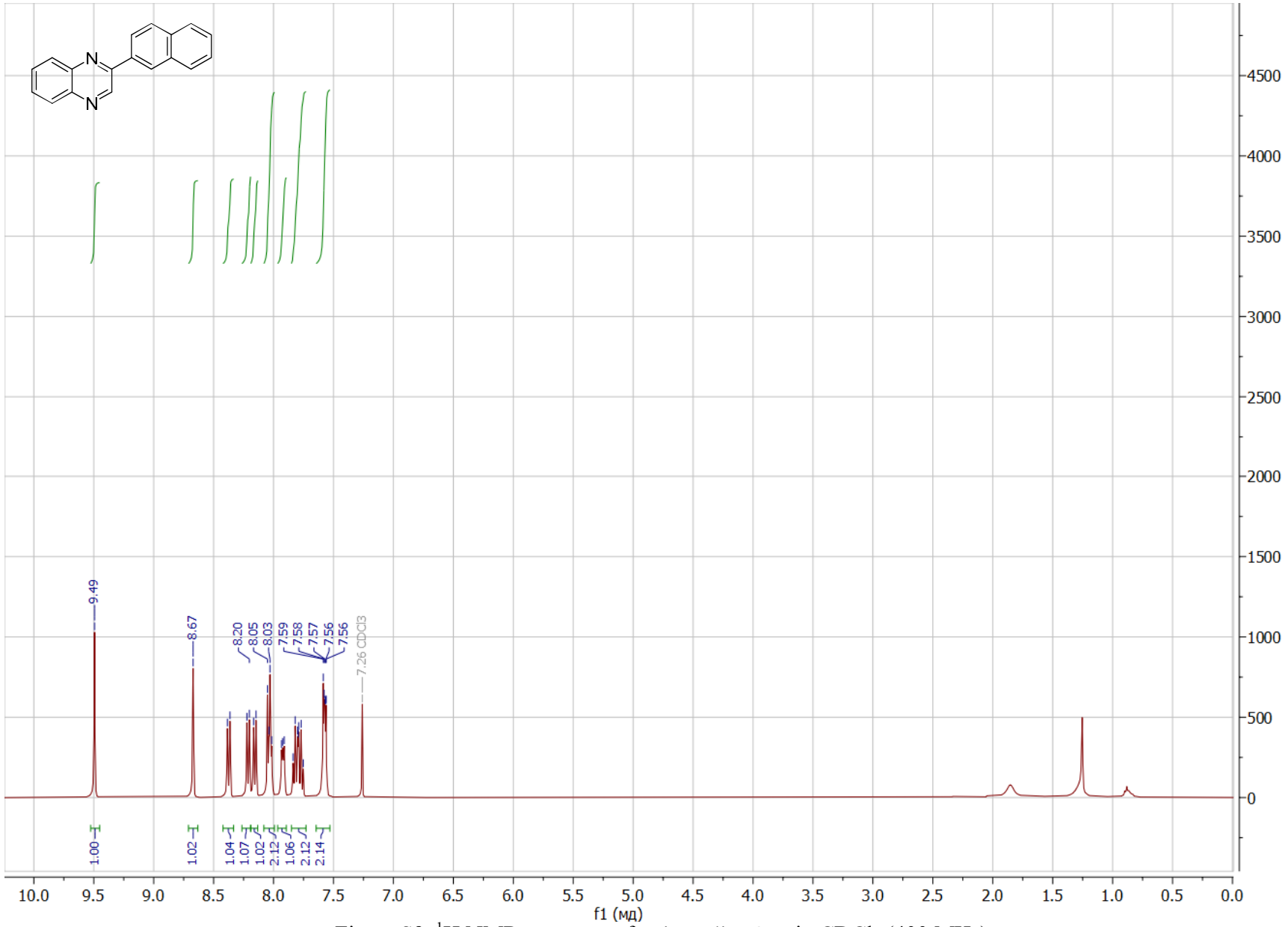

Figure S9. ^{1}H NMR spectrum of quinoxaline **8da** in $CDCl_3$ (400 MHz)

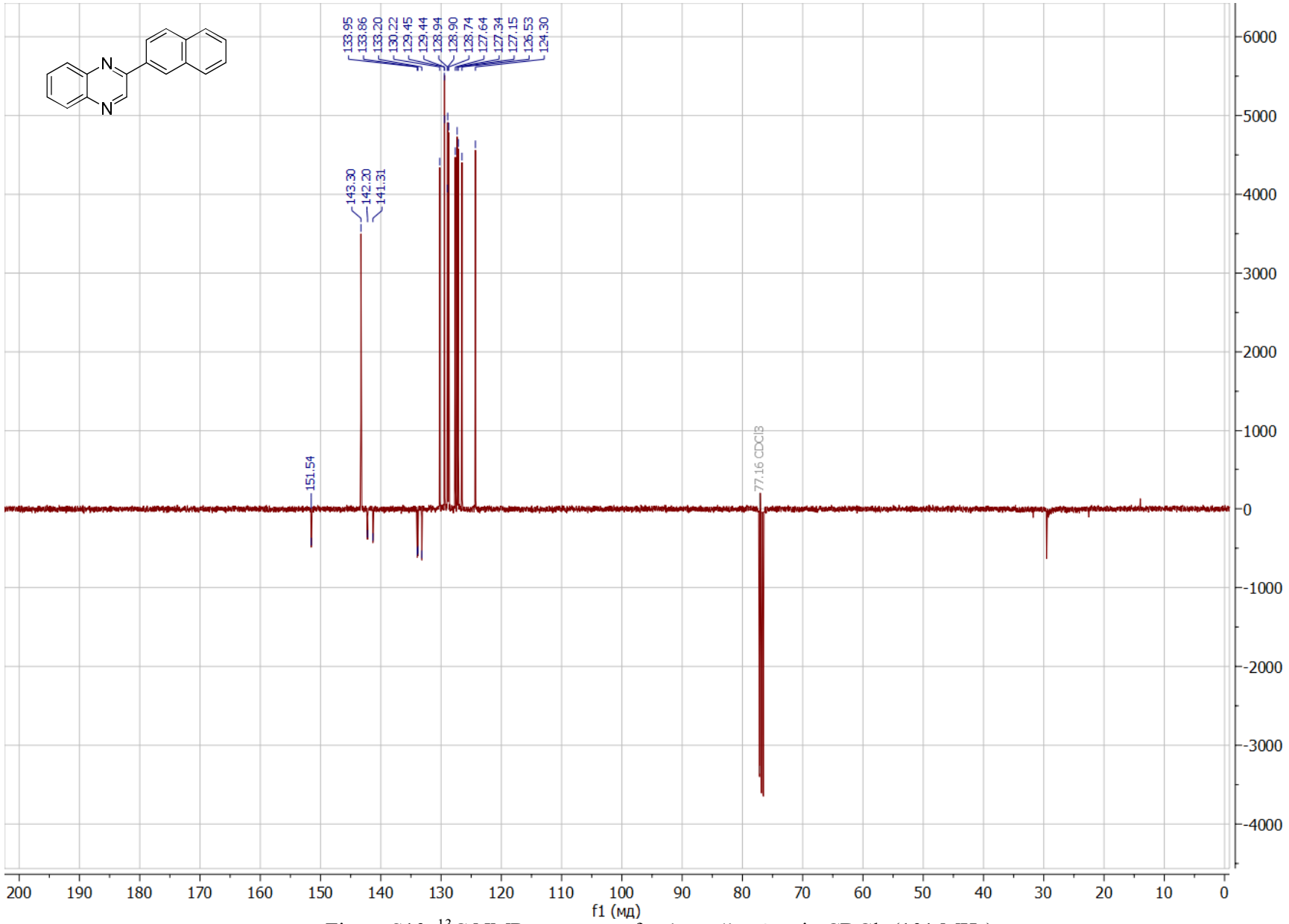

Figure S10. ^{13}C NMR spectrum of quinoxaline **8da** in $CDCl_3$ (101 MHz)

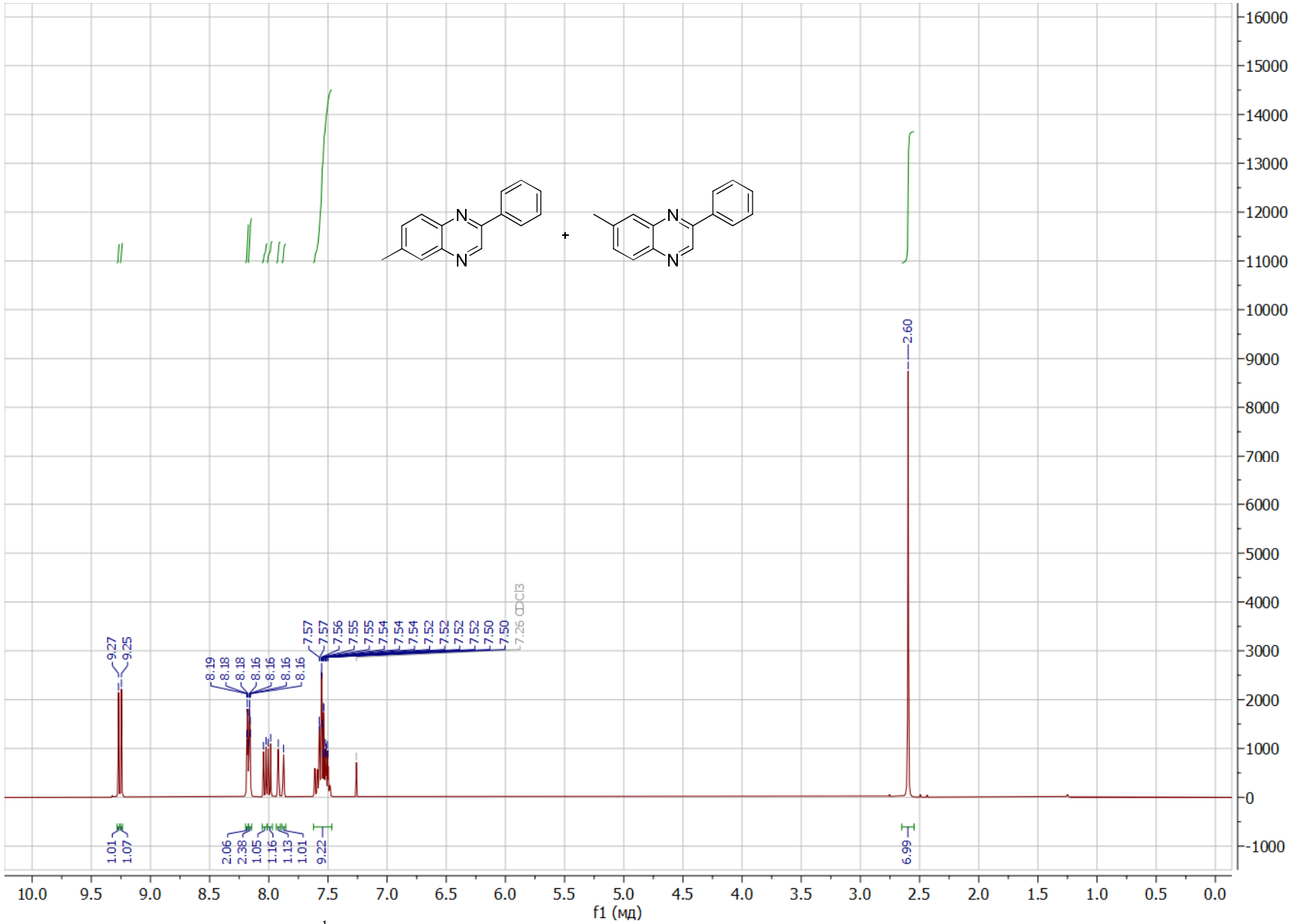

Figure S11. ^{1}H NMR spectrum of 1:1 mixture of quinoxalines **8ab'** and **8ab** in $CDCl_3$ (400 MHz)

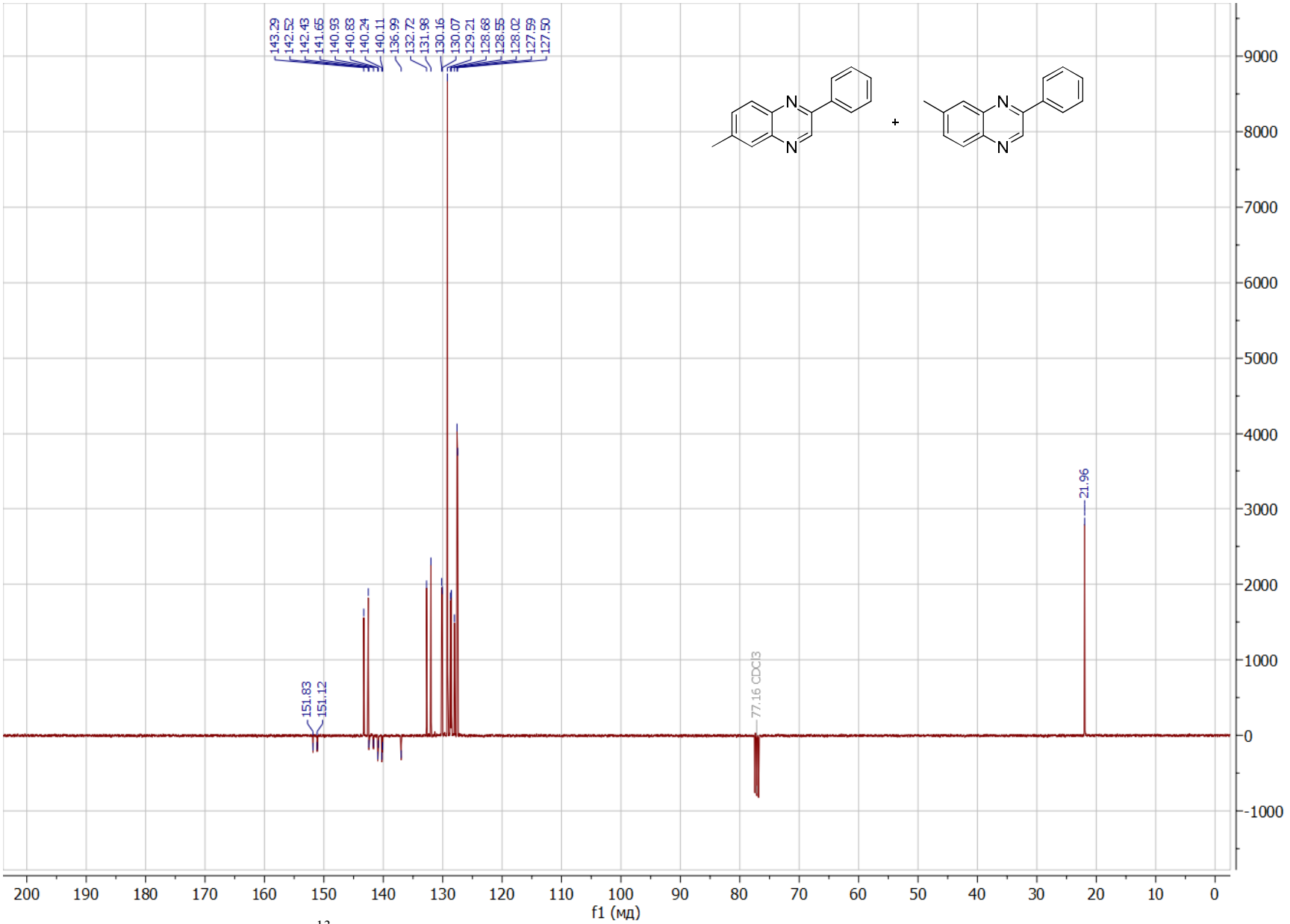

Figure S12. ^{13}C NMR spectrum of 1:1 mixture of quinoxalines **8ab'** and **8ab** in $CDCl_3$ (101 MHz)

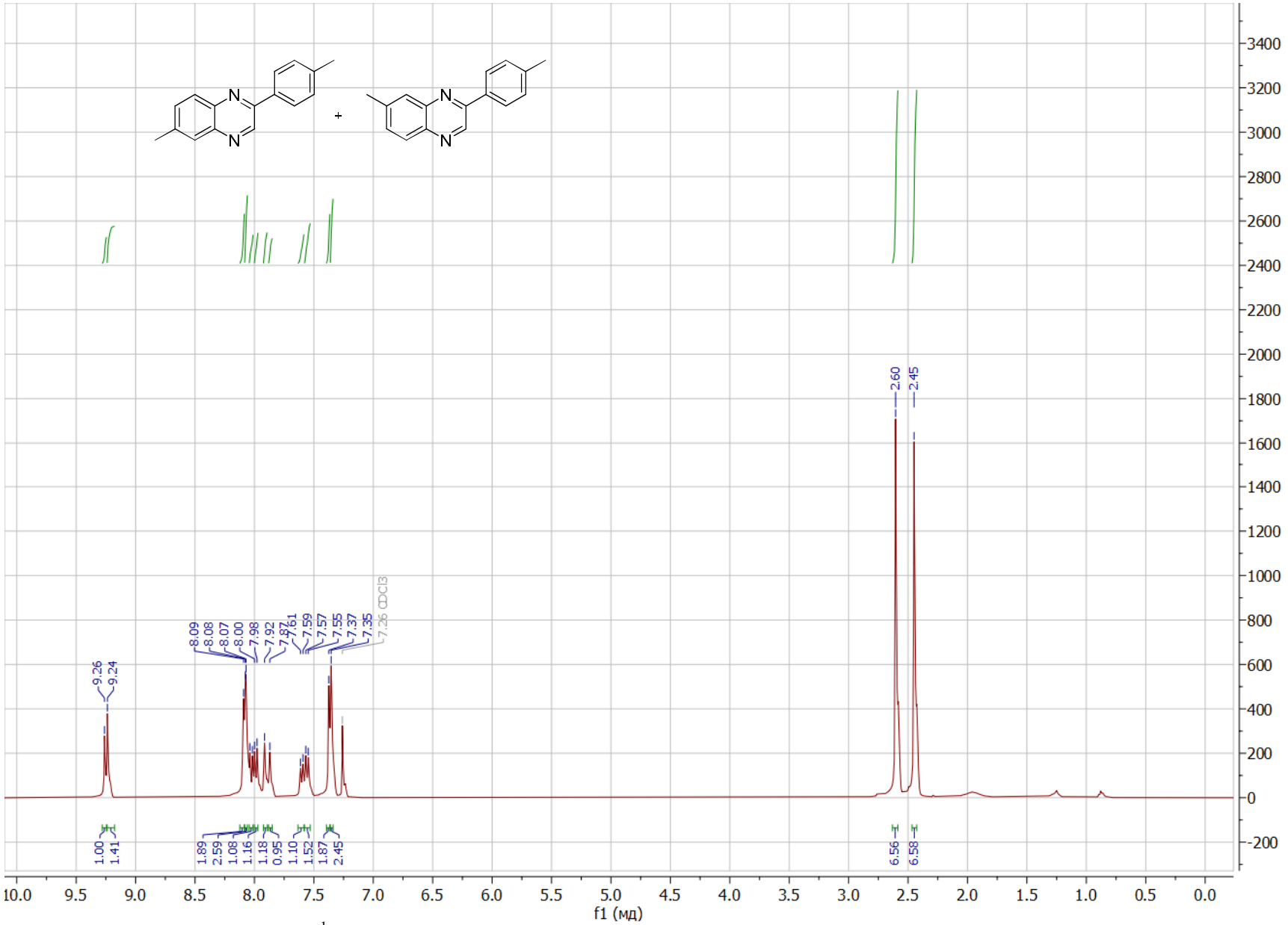

Figure S13. ^{1}H NMR spectrum of 1:1 mixture of quinoxalines **8bb'** and **8bb** in $CDCl_3$ (400 MHz)

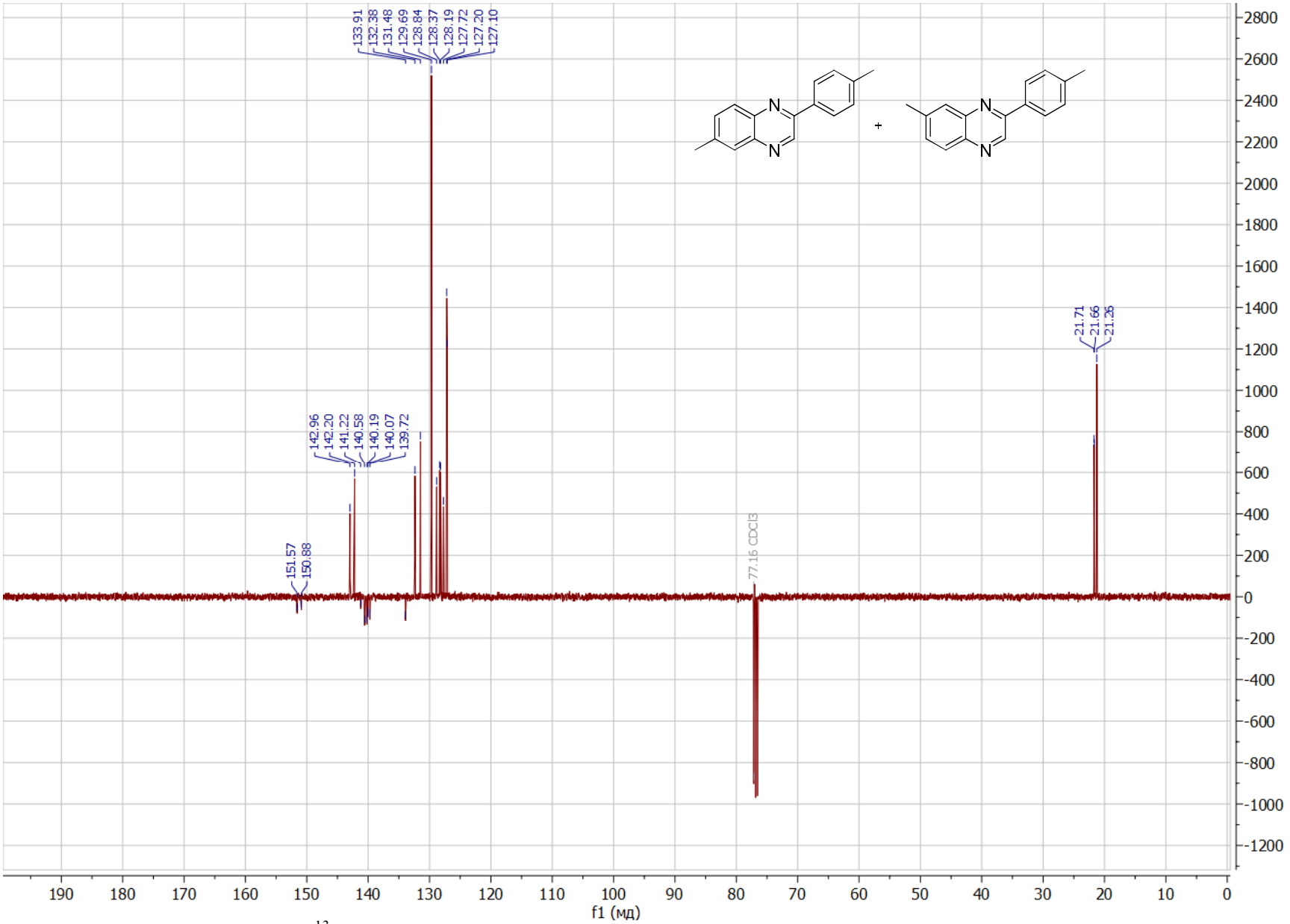

Figure S14. ^{13}C NMR spectrum of 1:1 mixture of quinoxalines **8bb'** and **8bb** in $CDCl_3$ (101 MHz)

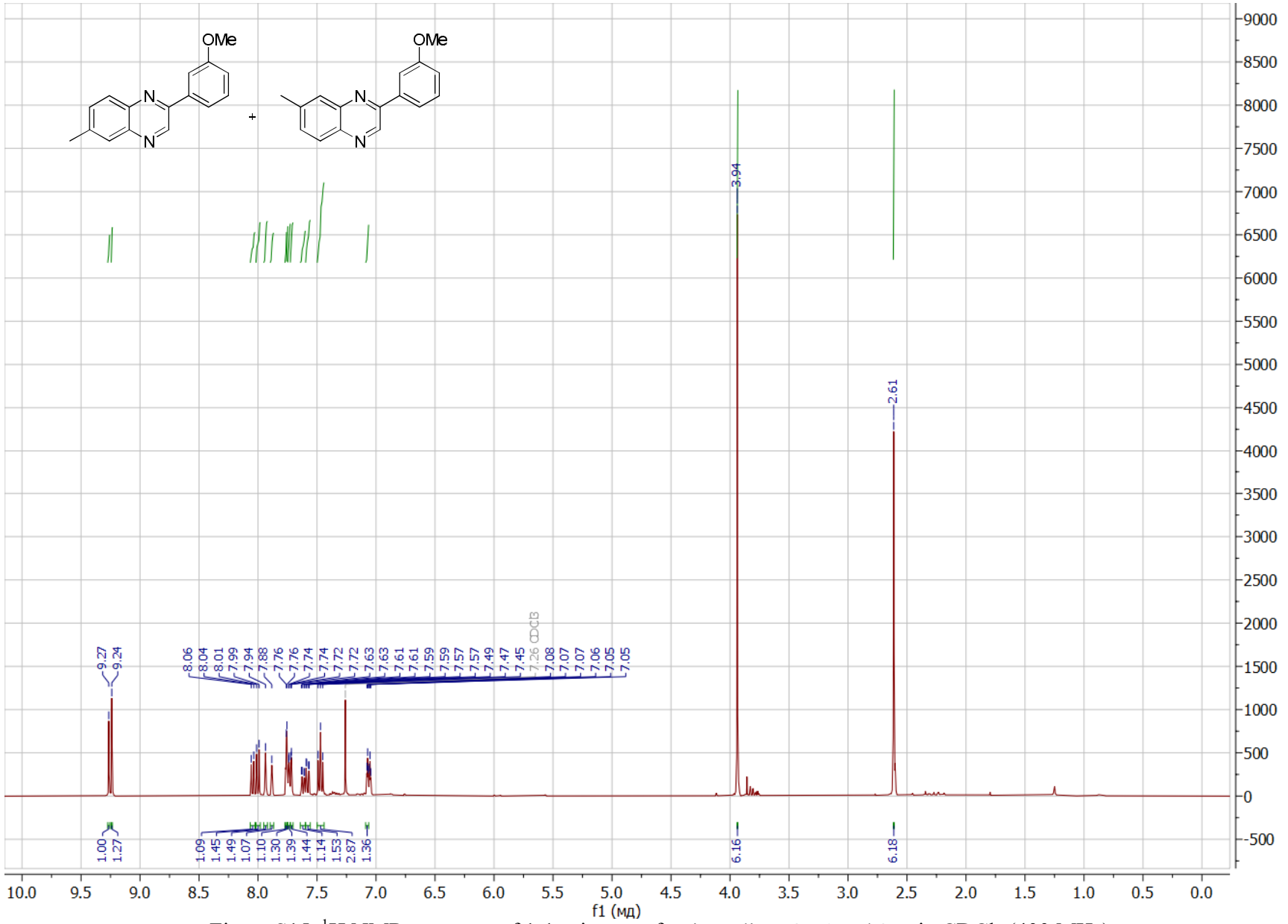

Figure S15. ^{1}H NMR spectrum of 1:1 mixture of quinoxalines **8cb'** and **8cb** in $CDCl_3$ (400 MHz)

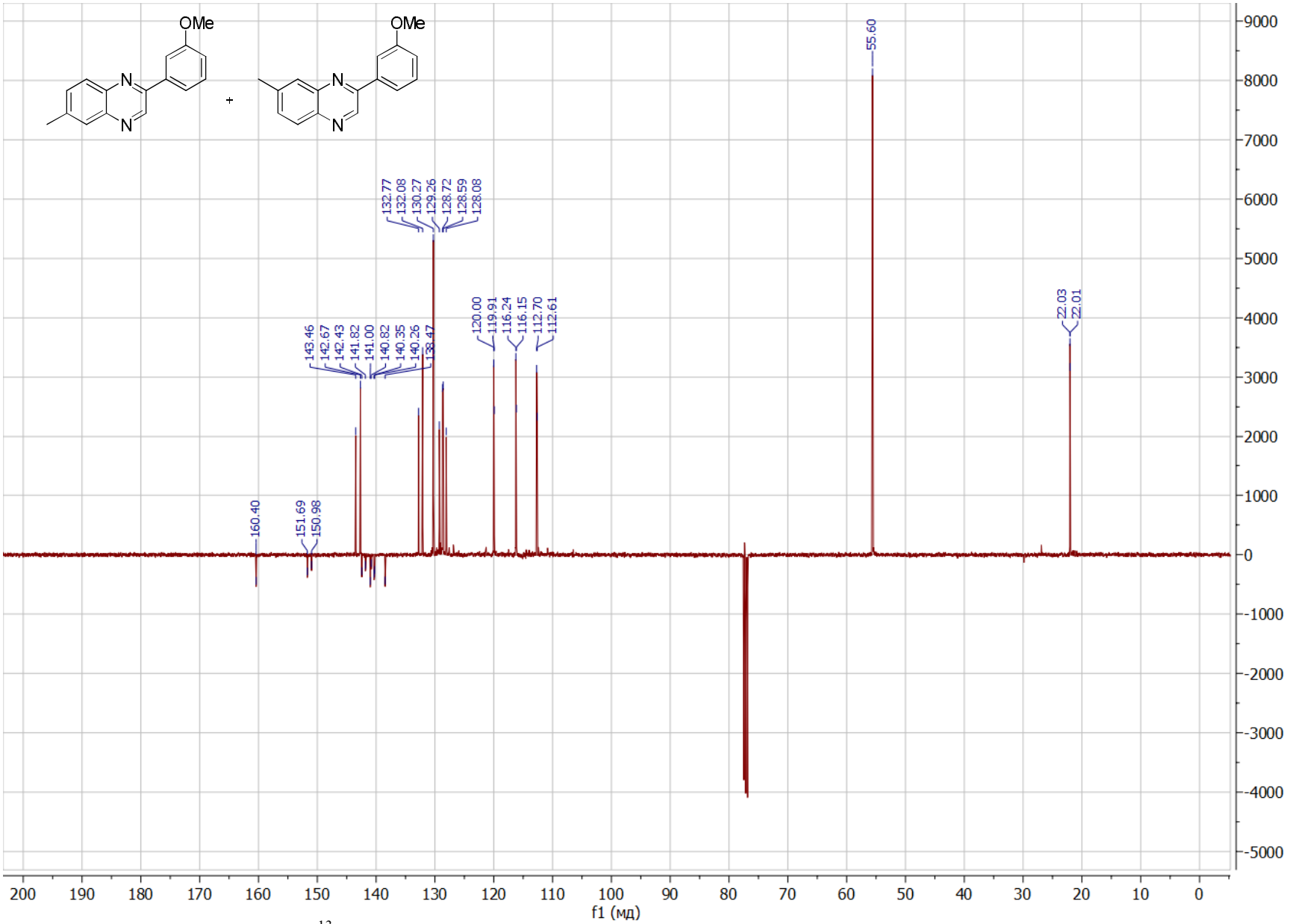

Figure S16. ^{13}C NMR spectrum of 1:1 mixture of quinoxalines **8cb'** and **8cb** in $CDCl_3$ (101 MHz)

^{1}H and ^{13}C NMR spectral charts for imidazopyridines 10

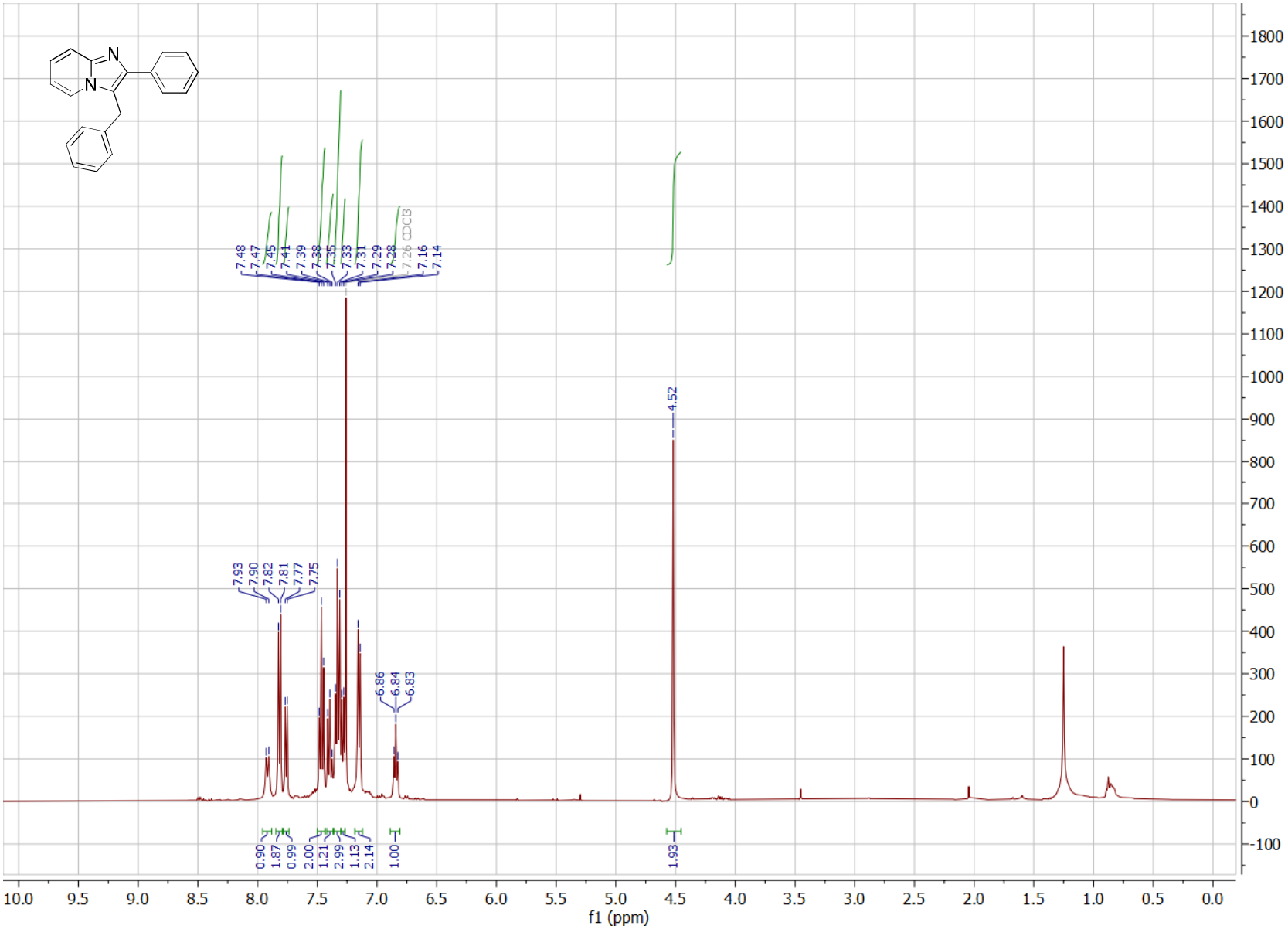

Figure S17. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10aaa** in $CDCl_3$ (400 MHz)

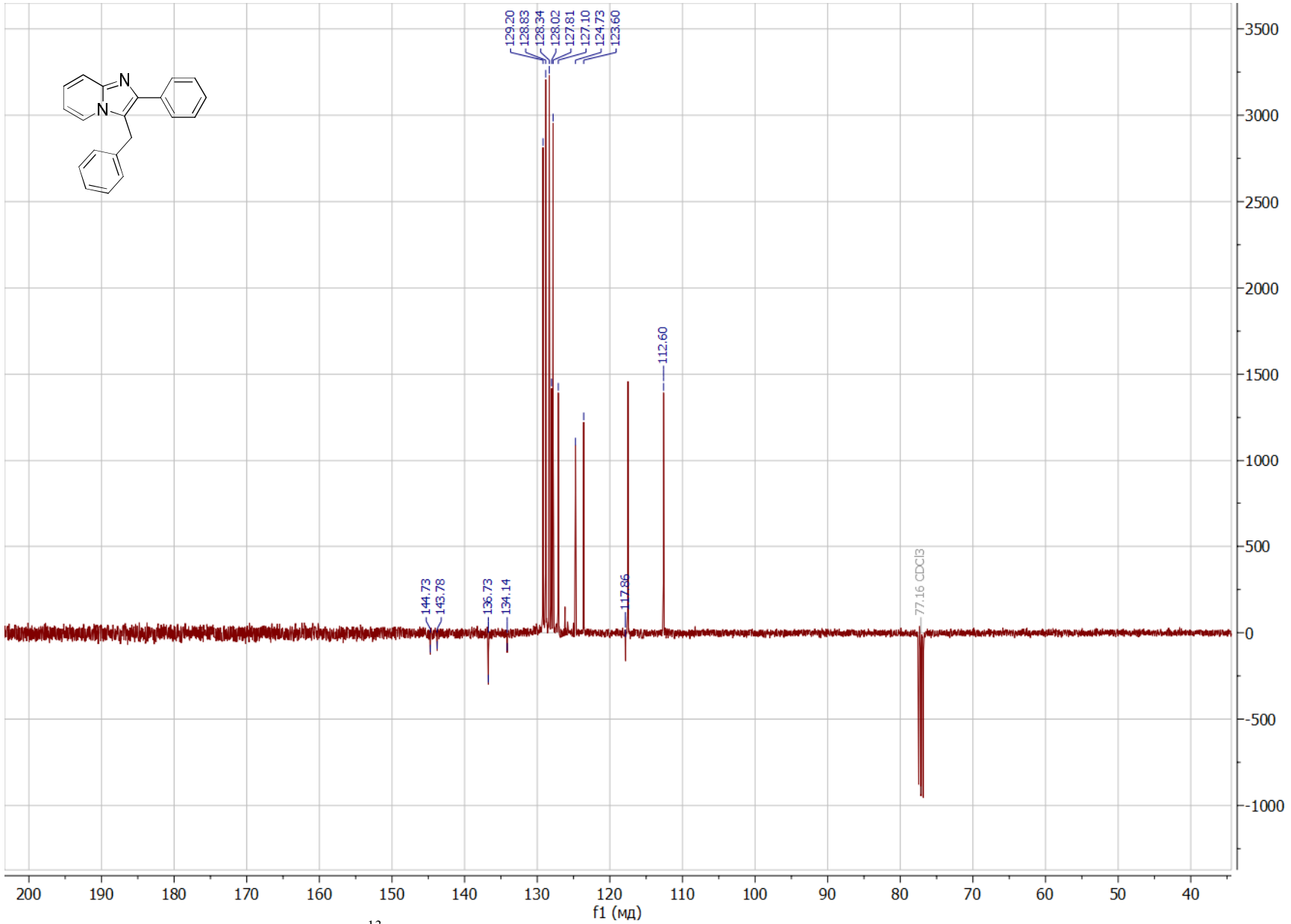

Figure S18. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10aaa** in $CDCl_3$ (101 MHz)

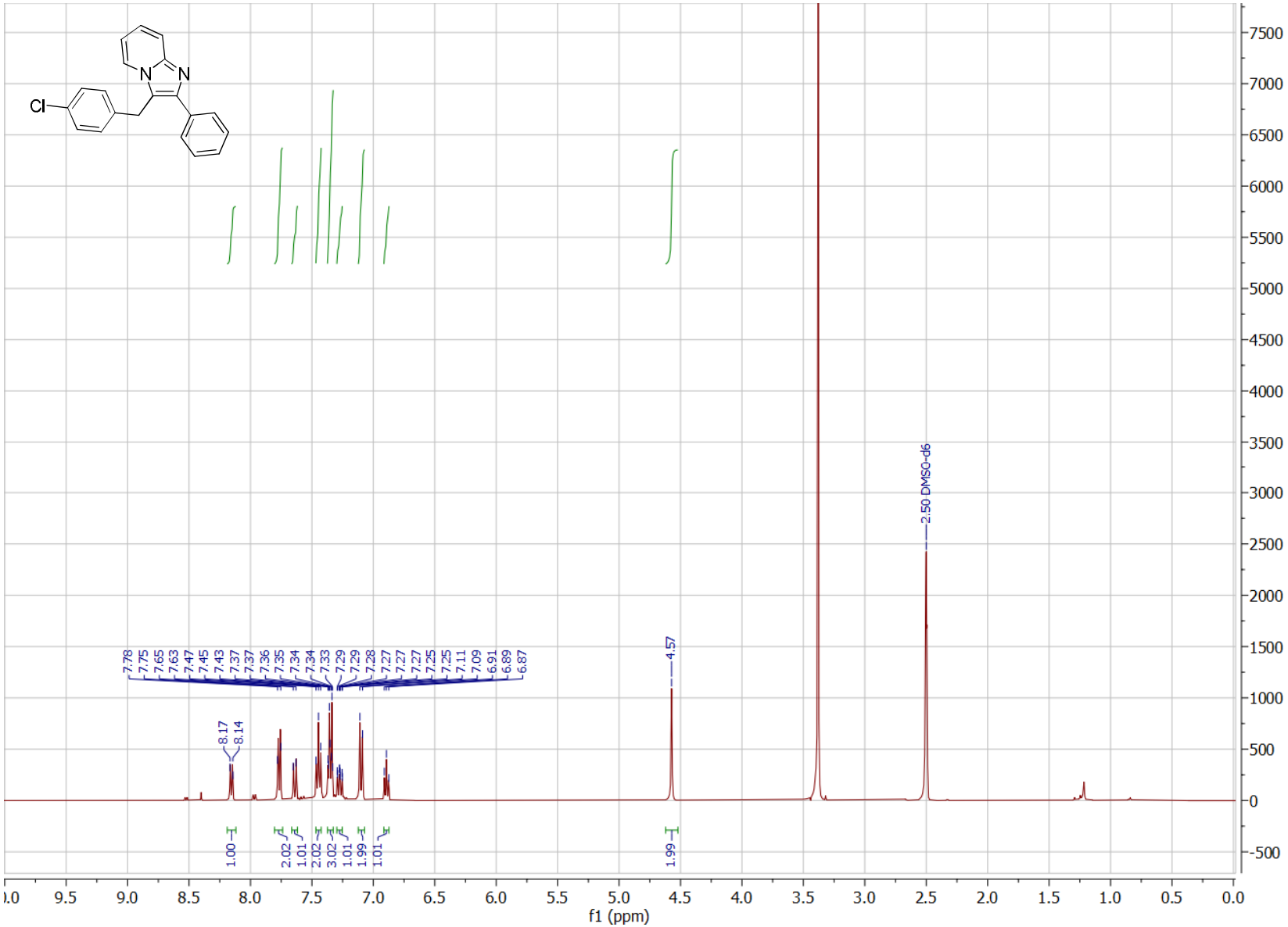

Figure S19. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10aba** in DMSO-d_6 (400 MHz)

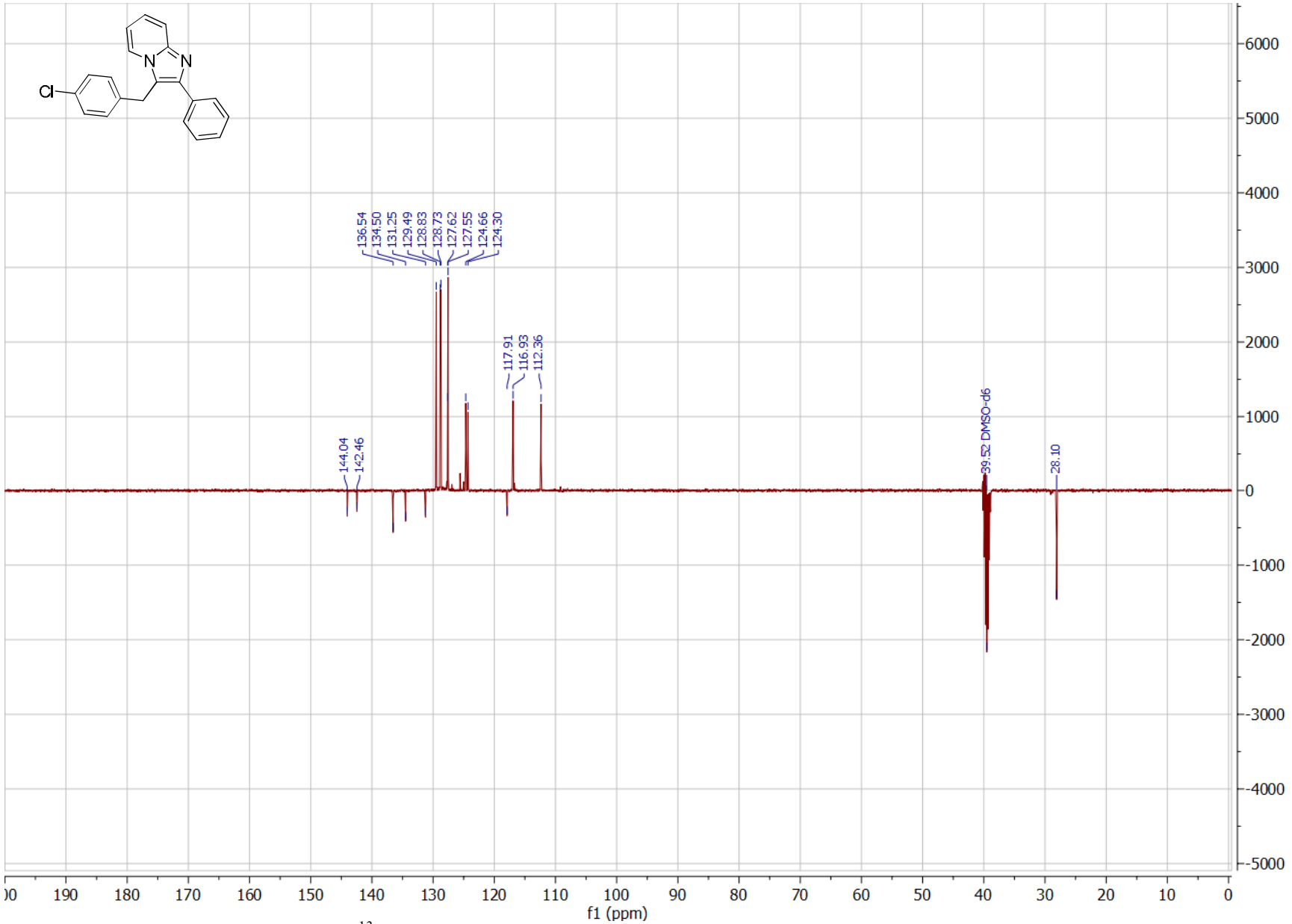

Figure S20. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10aba** in DMSO-d_6 (101 MHz)

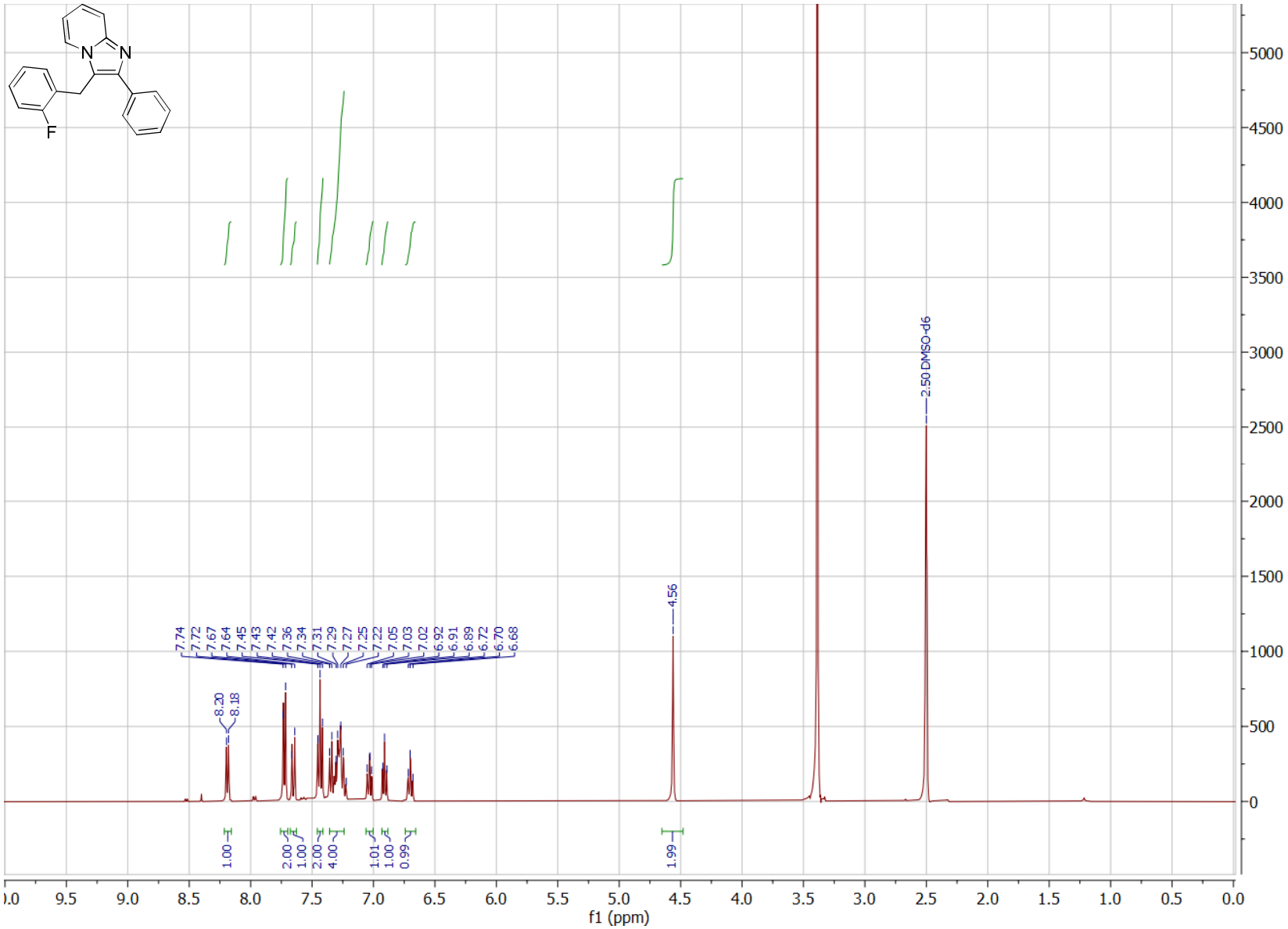

Figure S21. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10aca** in DMSO-d_6 (400 MHz)

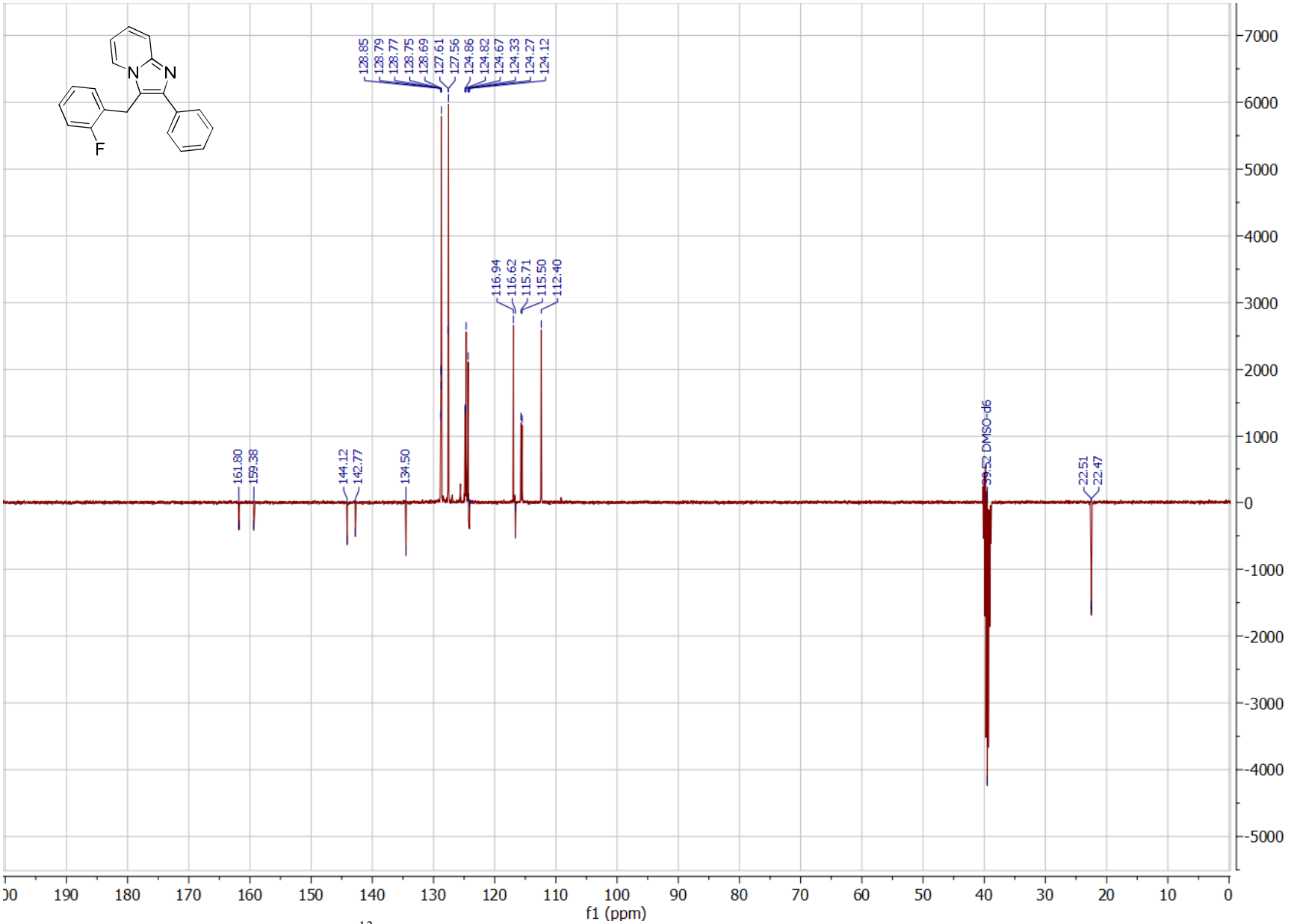

Figure S22. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10aca** in DMSO-d_6 (101 MHz)

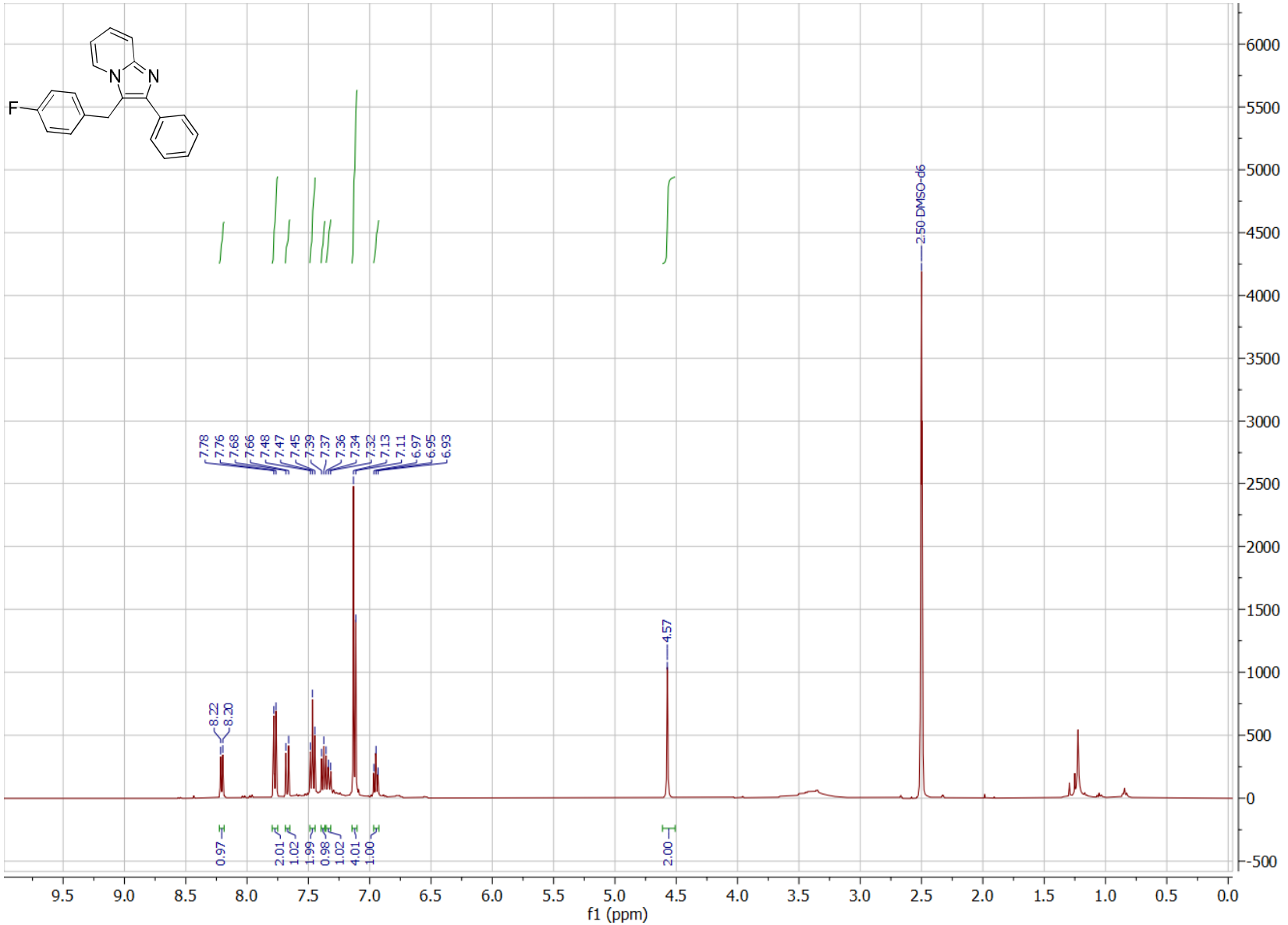

Figure S23. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10ada** in DMSO-d_6 (400 MHz)

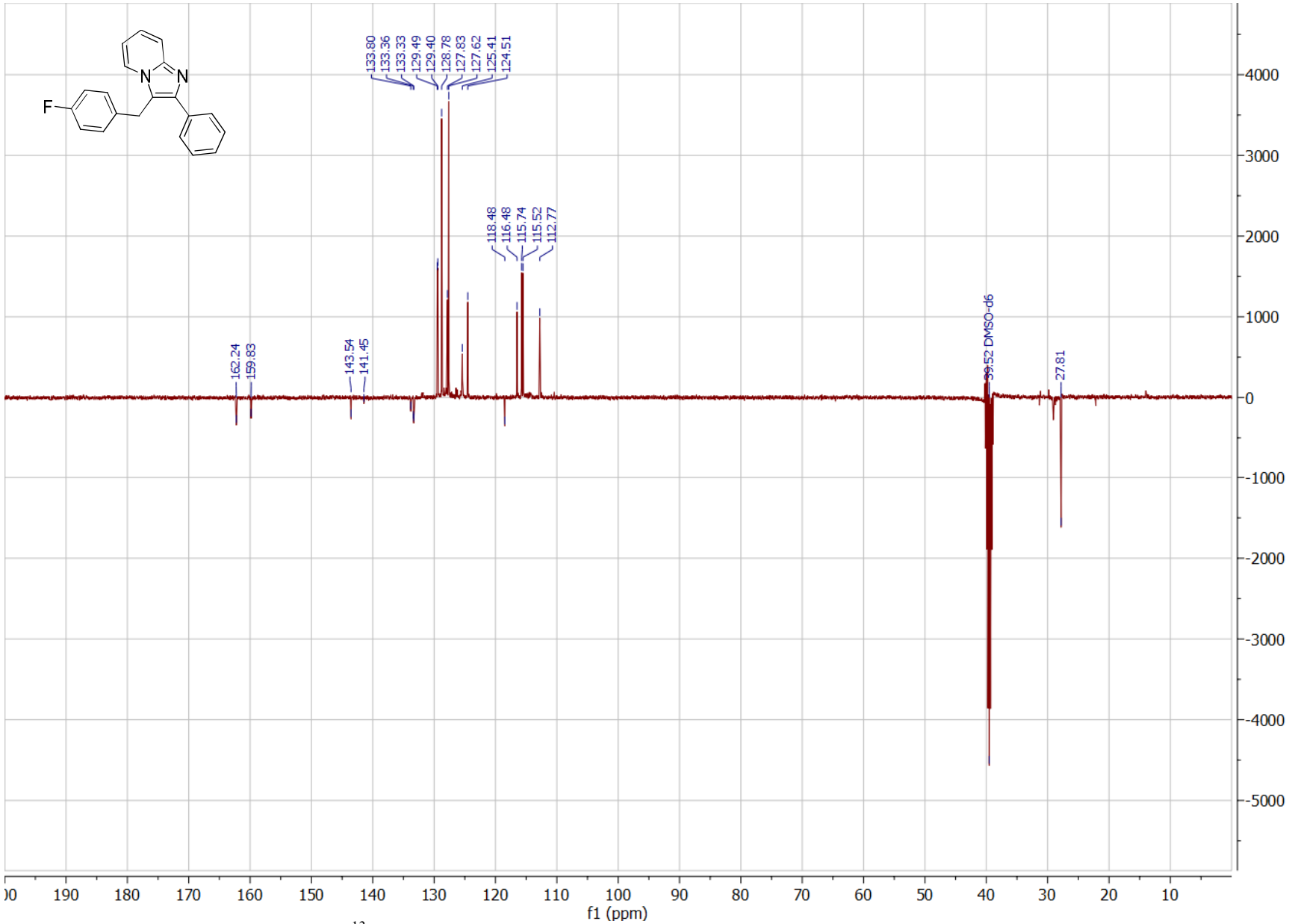

Figure S24. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10ada** in DMSO-d_6 (101 MHz)

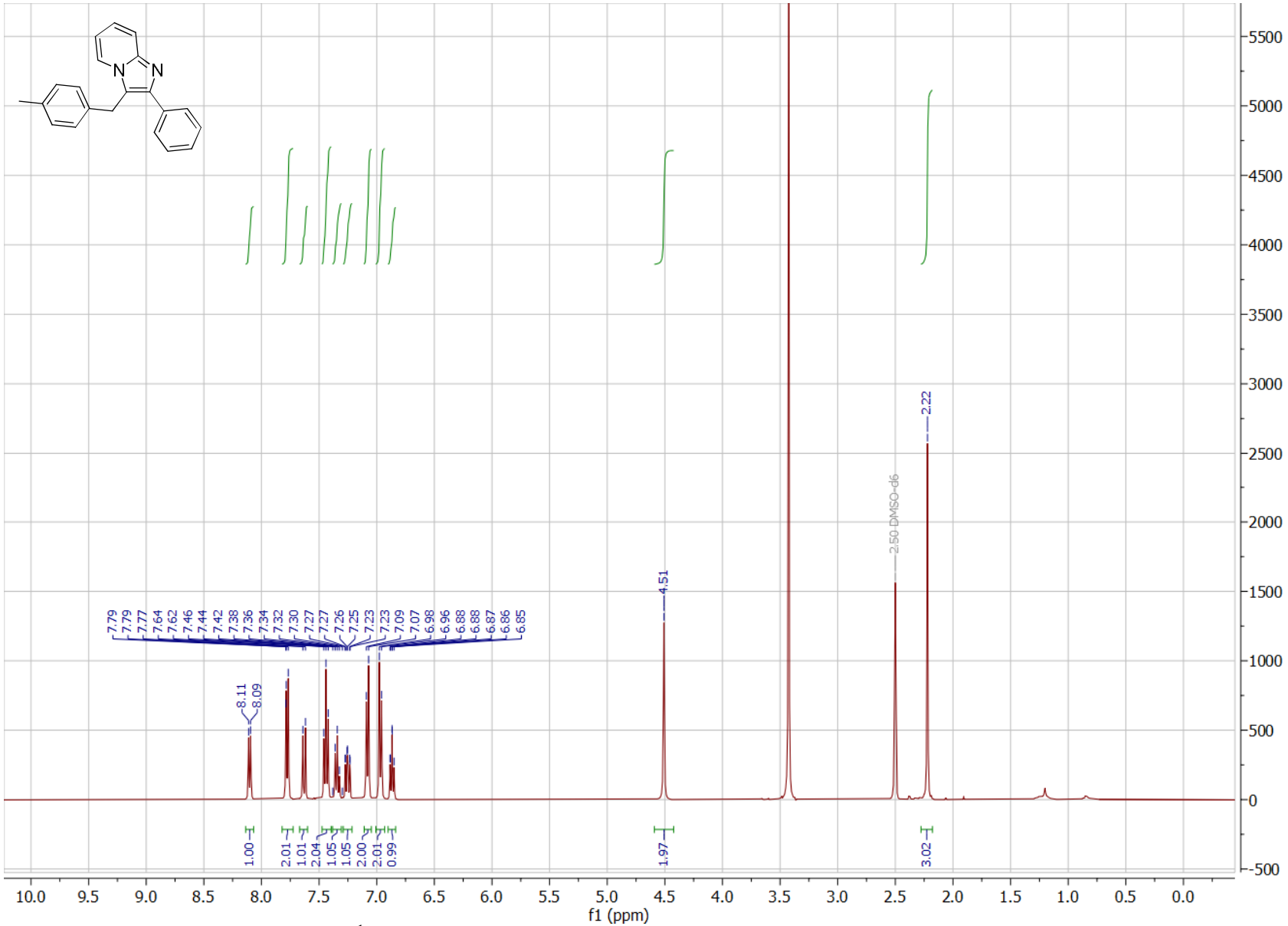

Figure S25. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10aea** in DMSO-d_6 (400 MHz)

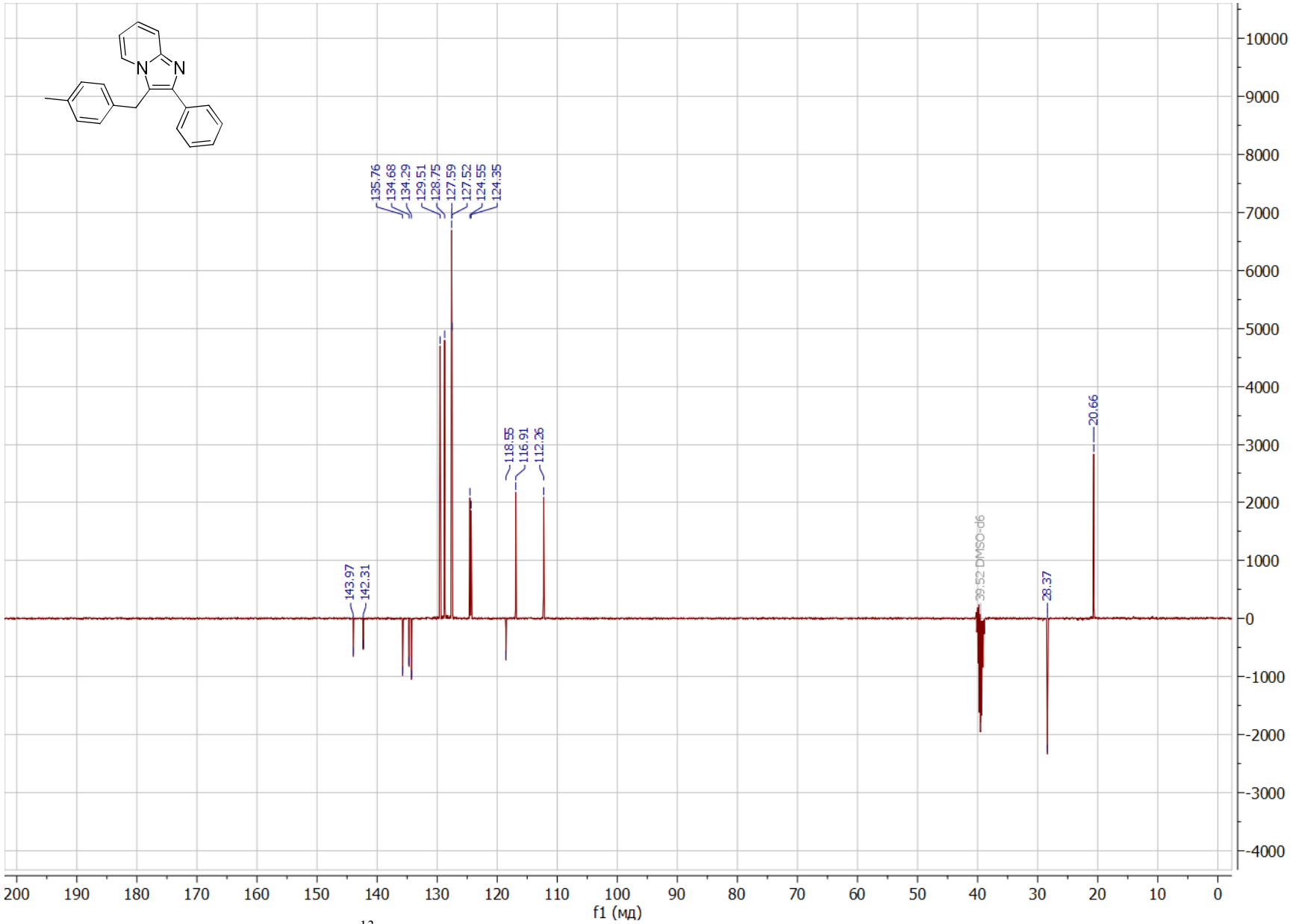

Figure S26. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10aea** in DMSO-d_6 (101 MHz)

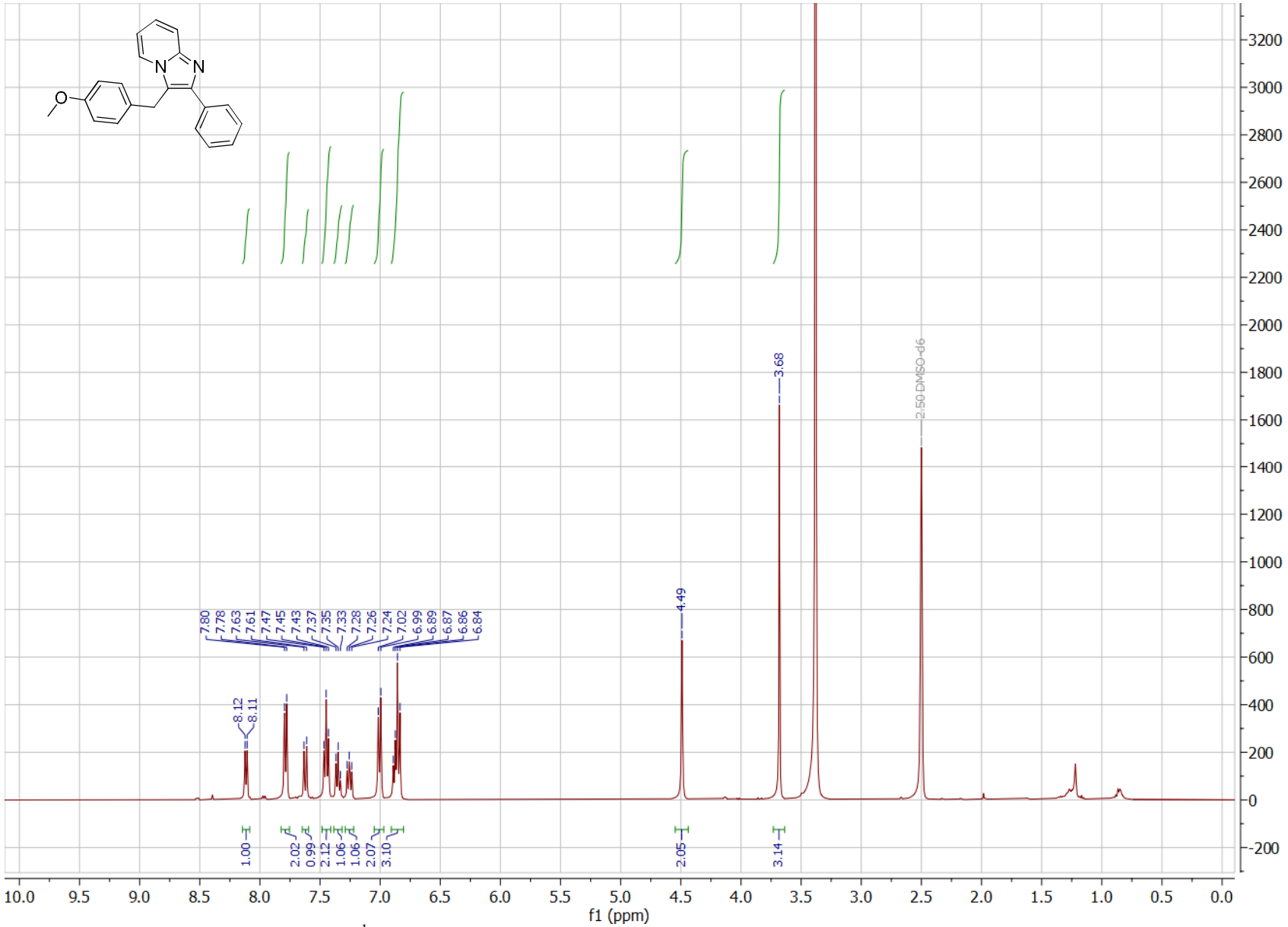

Figure S27. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10afa** in DMSO-d_6 (400 MHz)

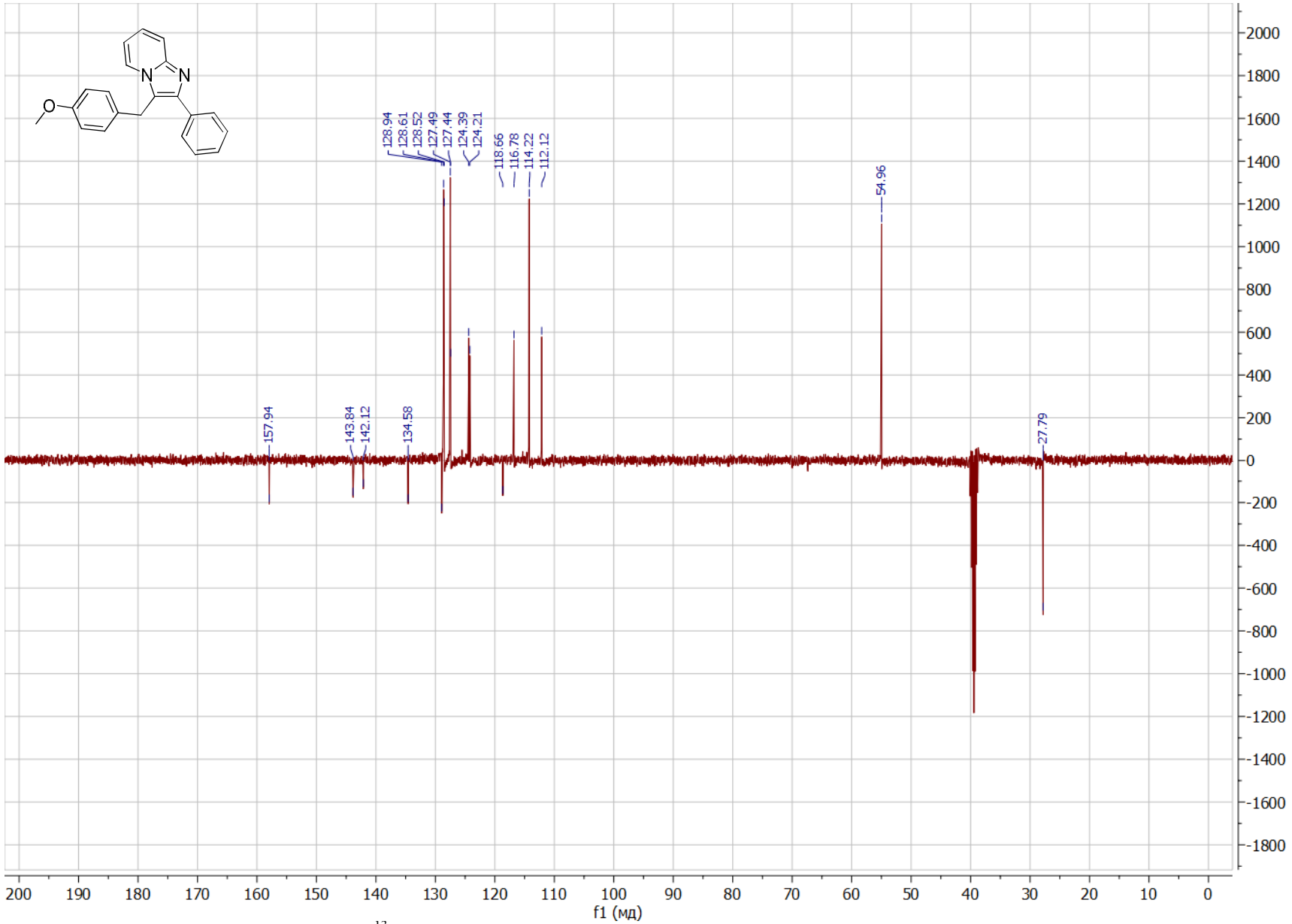

Figure S28. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10afa** in DMSO-d_6 (101 MHz)

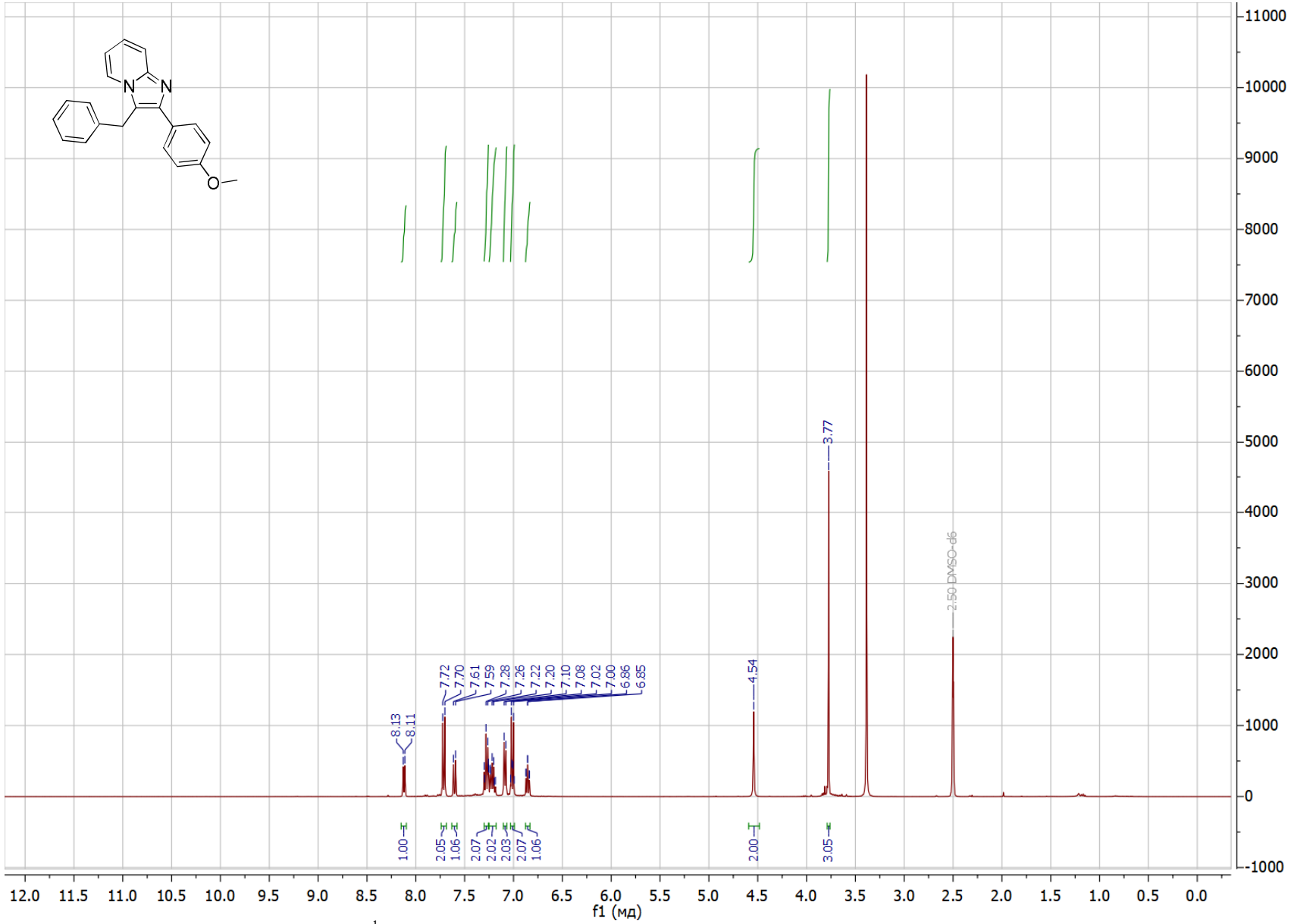

Figure S29. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10caa** in DMSO-d_6 (400 MHz)

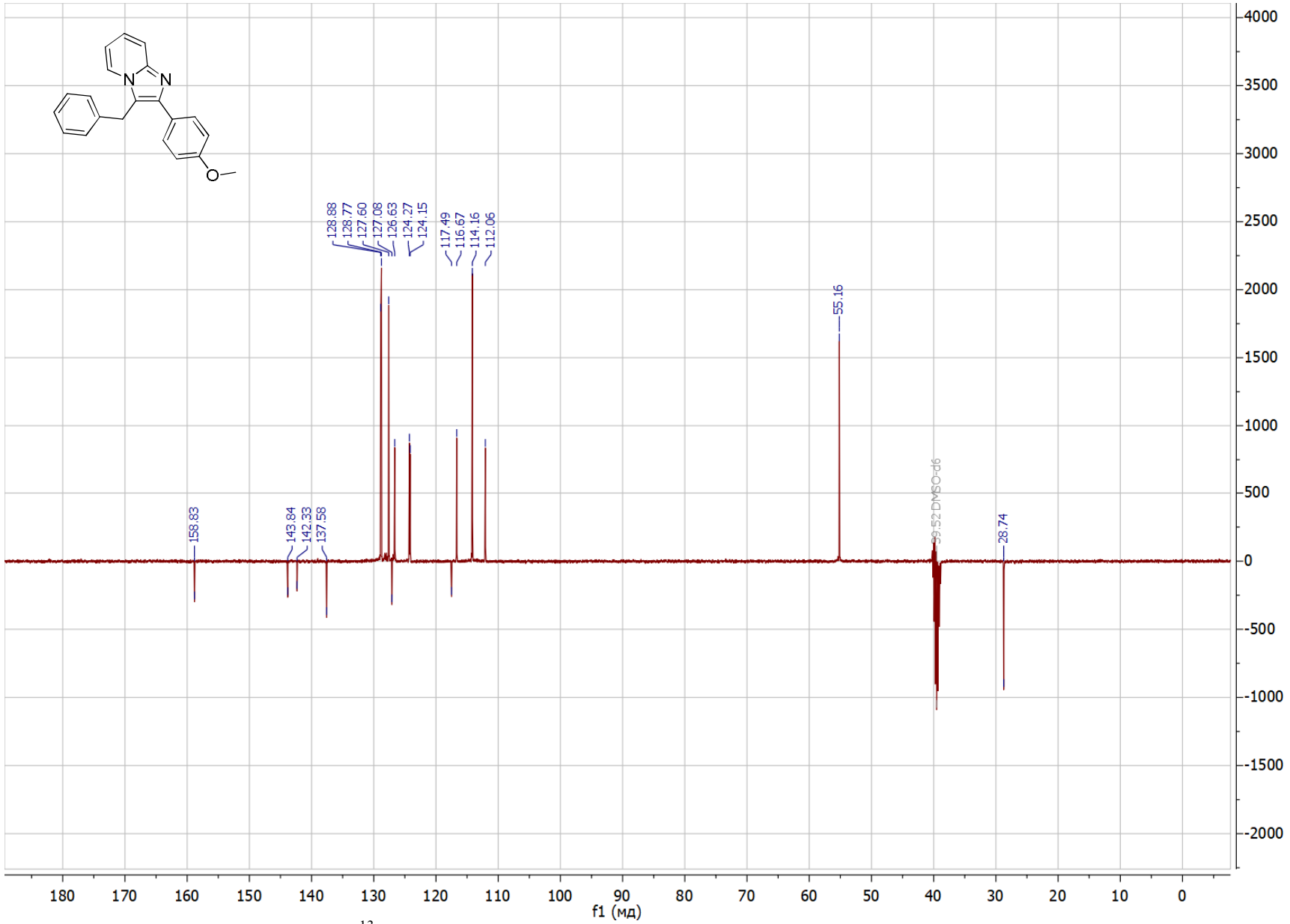

Figure S30. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10caa** in DMSO-d_6 (101 MHz)

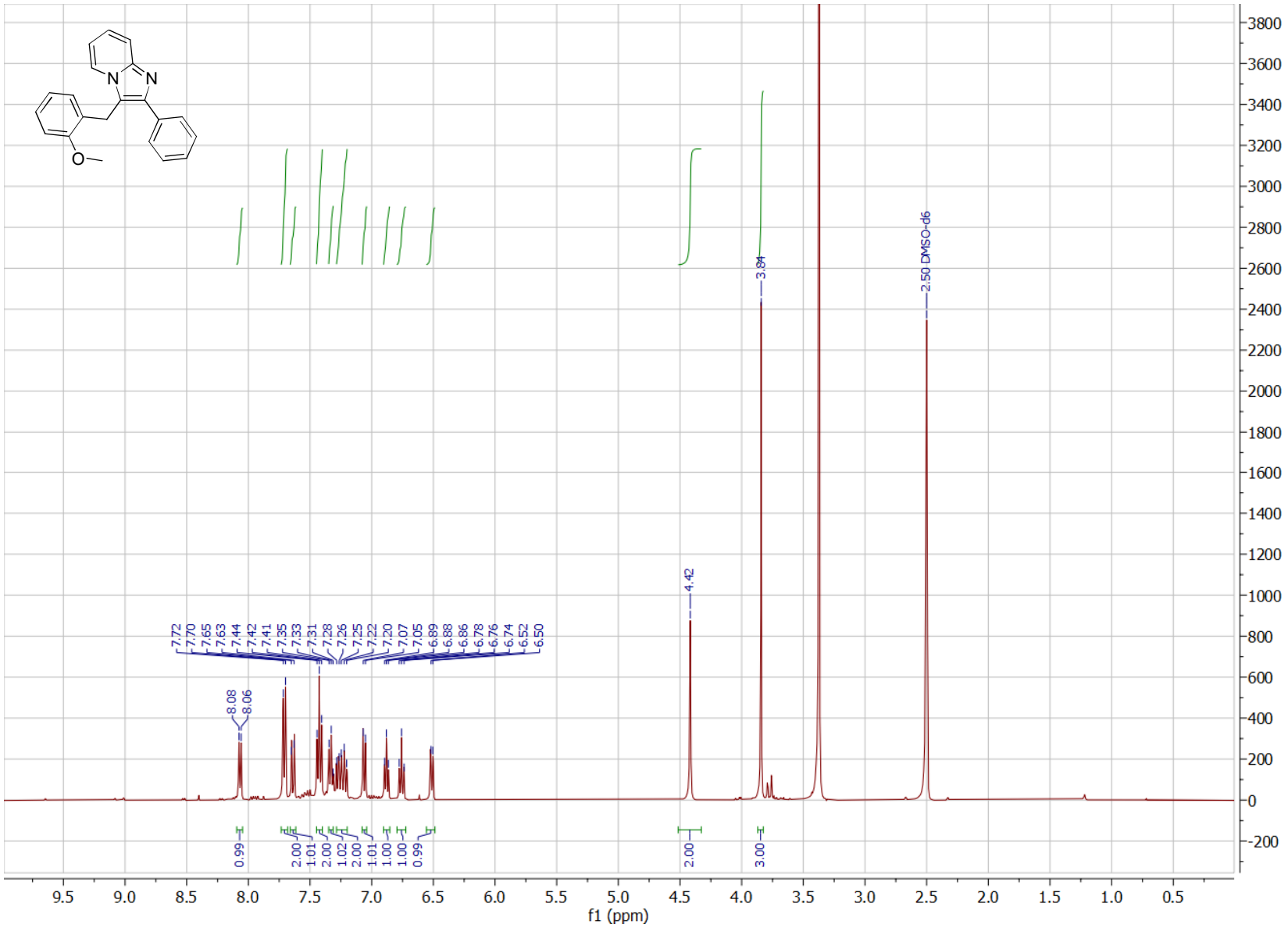

Figure S31. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10aga** in DMSO-d_6 (400 MHz)

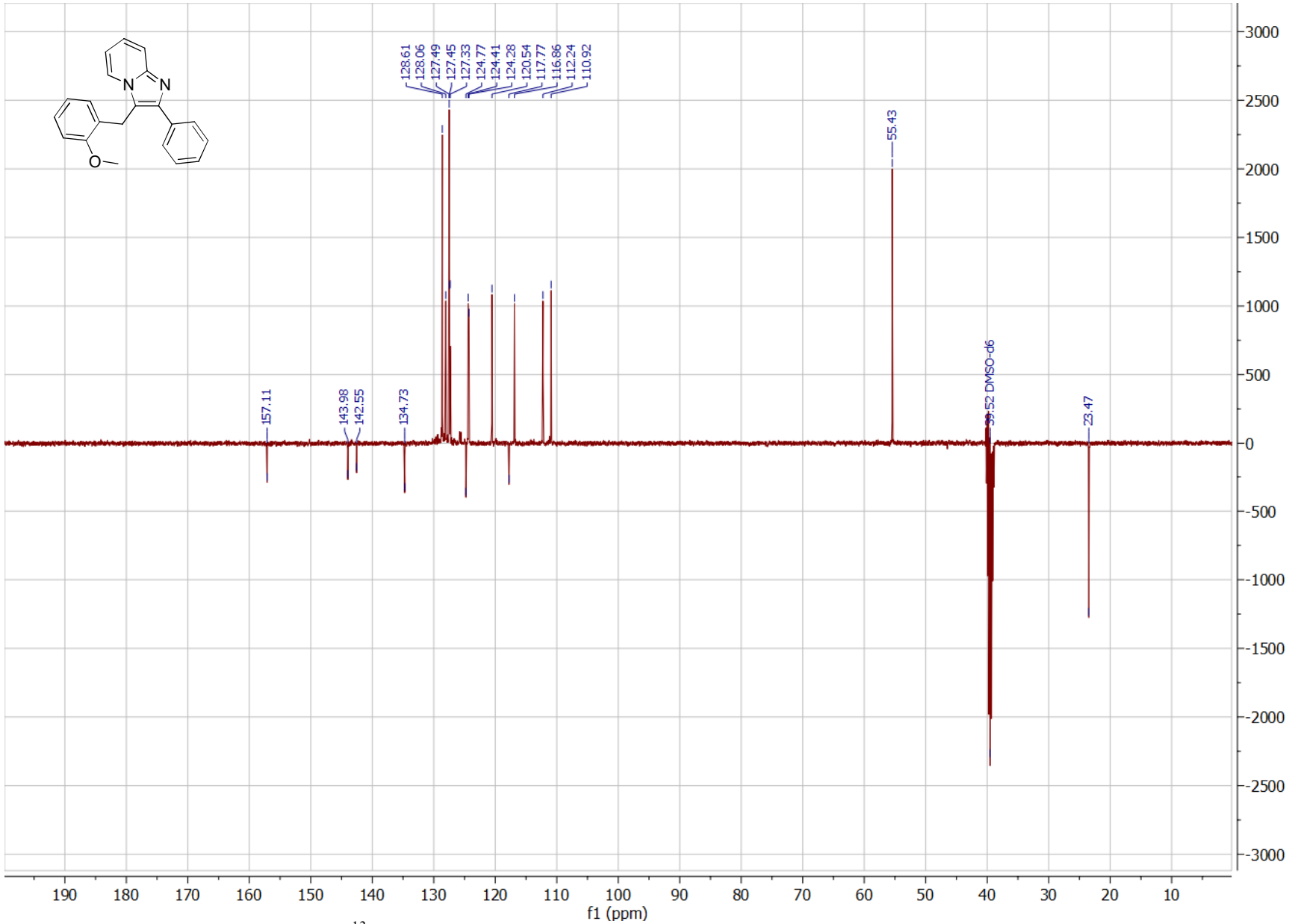

Figure S32. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10aga** in DMSO-d_6 (101 MHz)

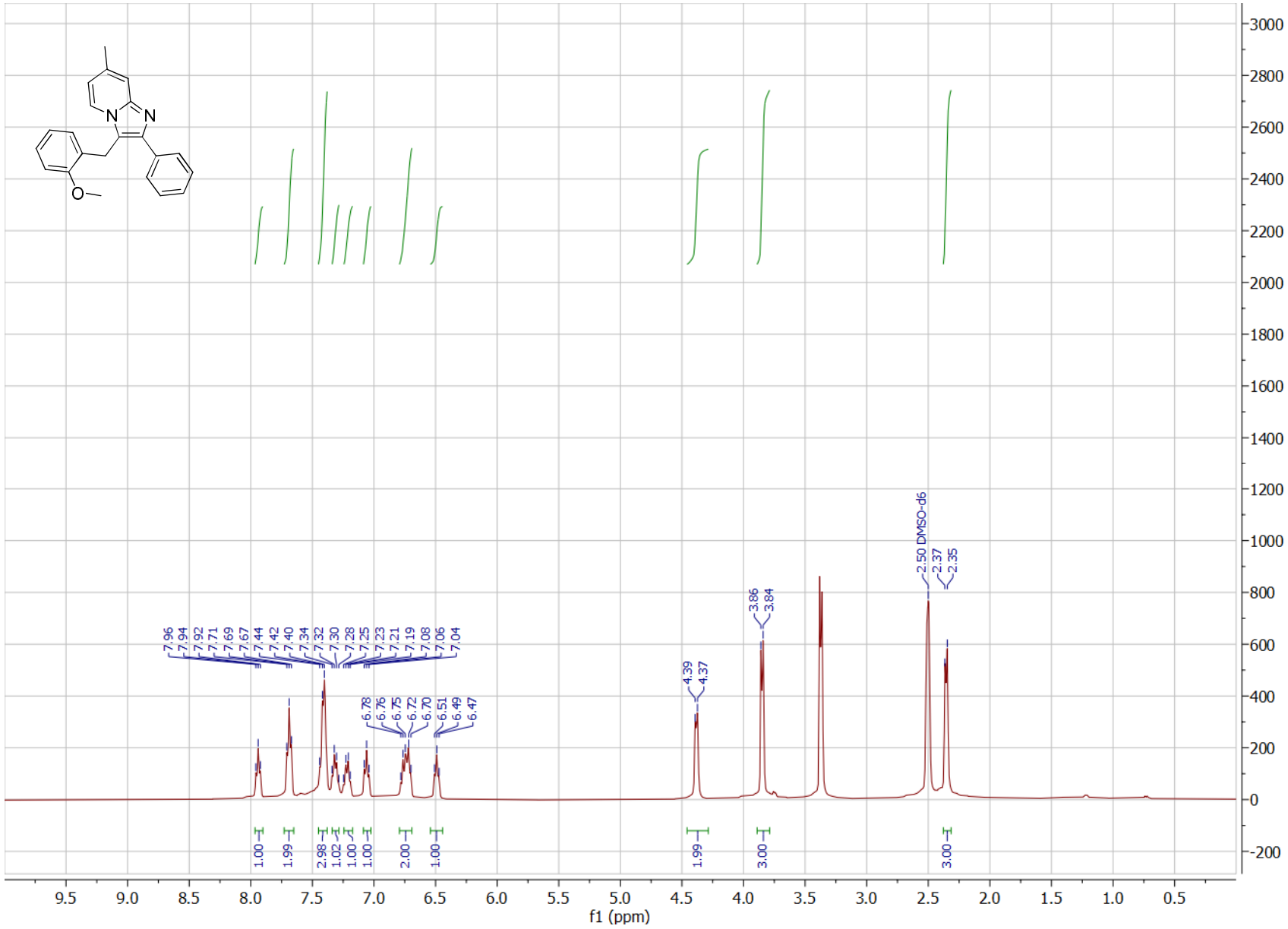

Figure S33. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10agb** in DMSO-d_6 (400 MHz)

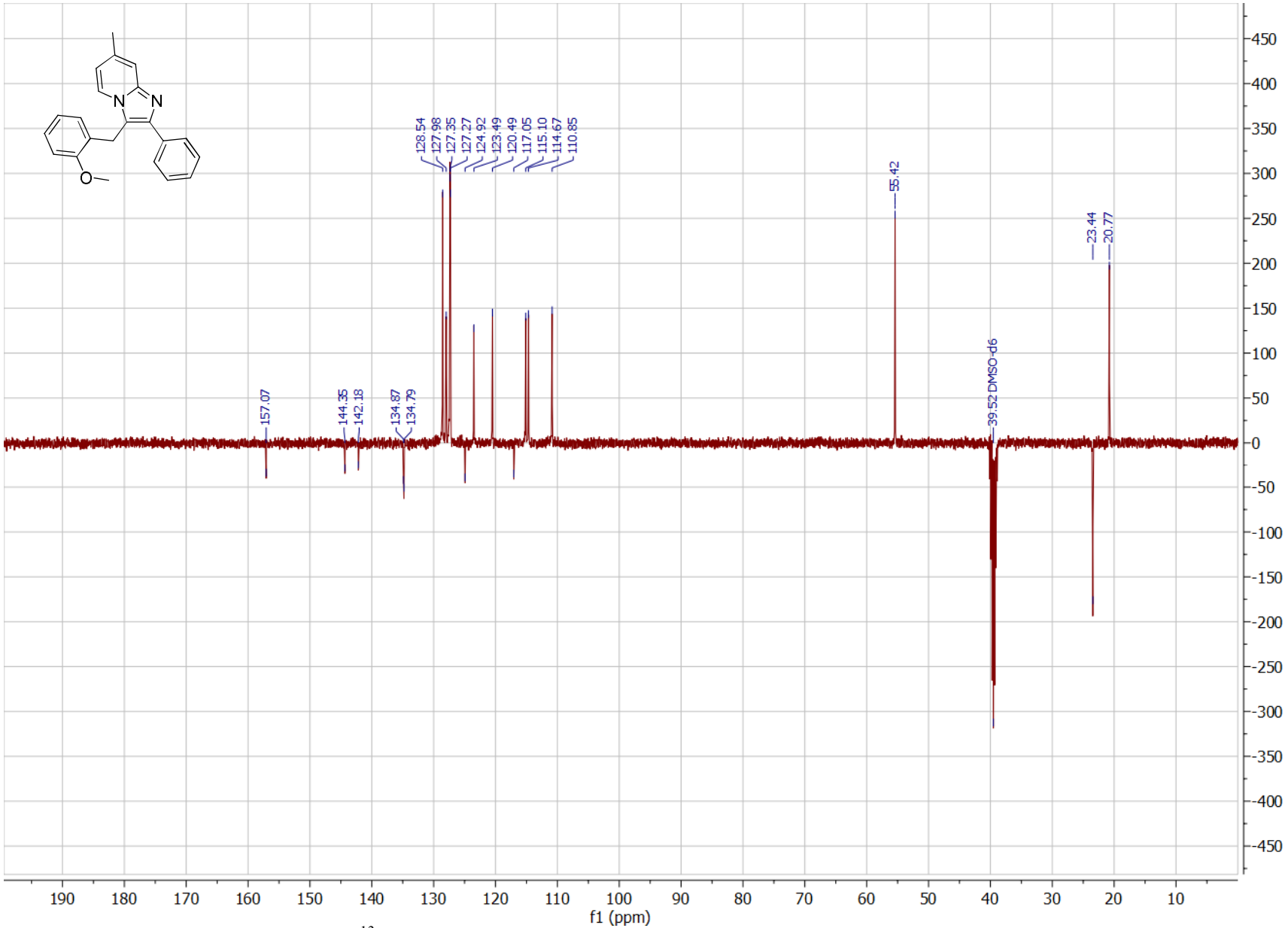

Figure S34. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10agb** in DMSO-d_6 (101 MHz)

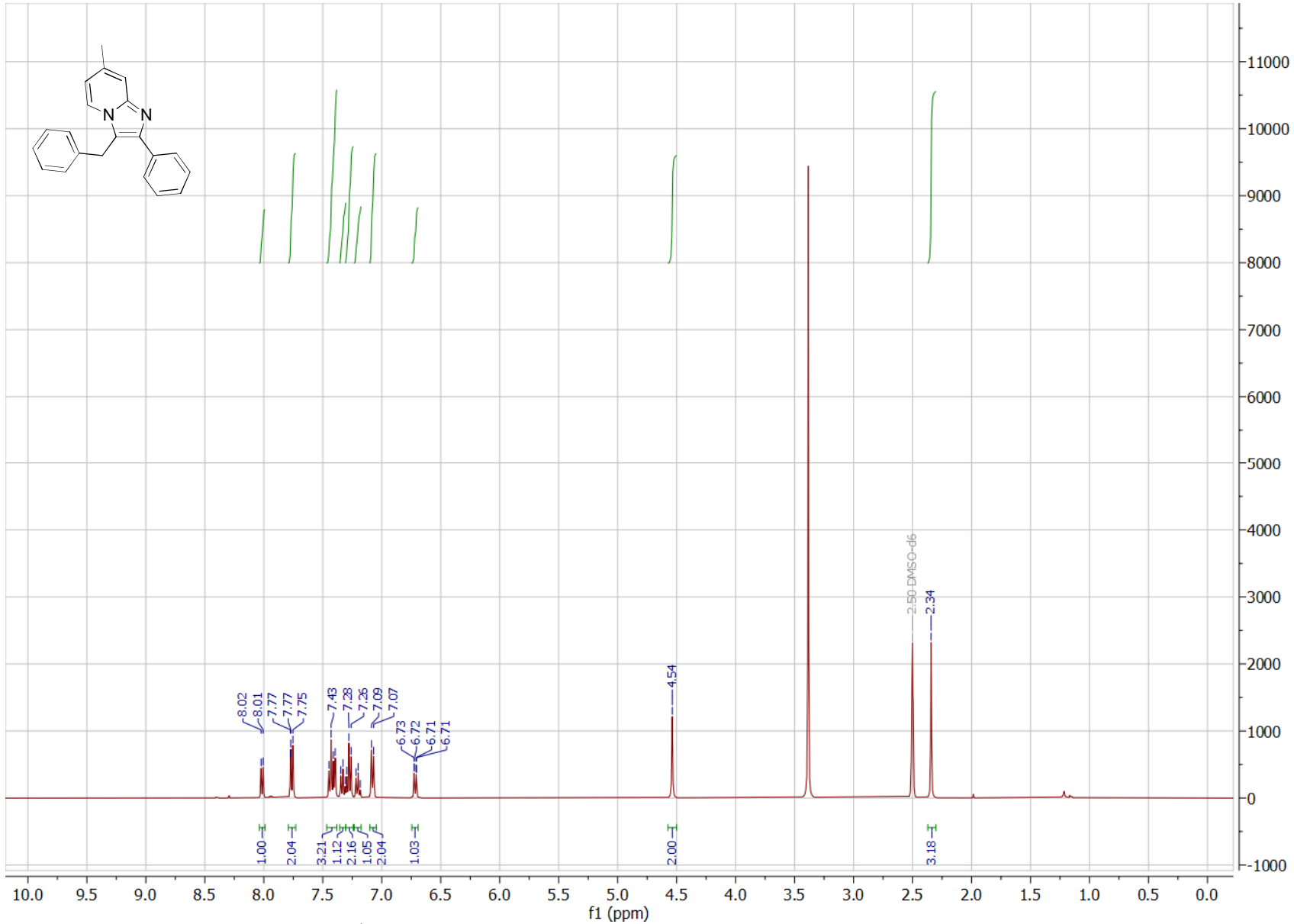

Figure S35. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10aab** in DMSO-d_6 (400 MHz)

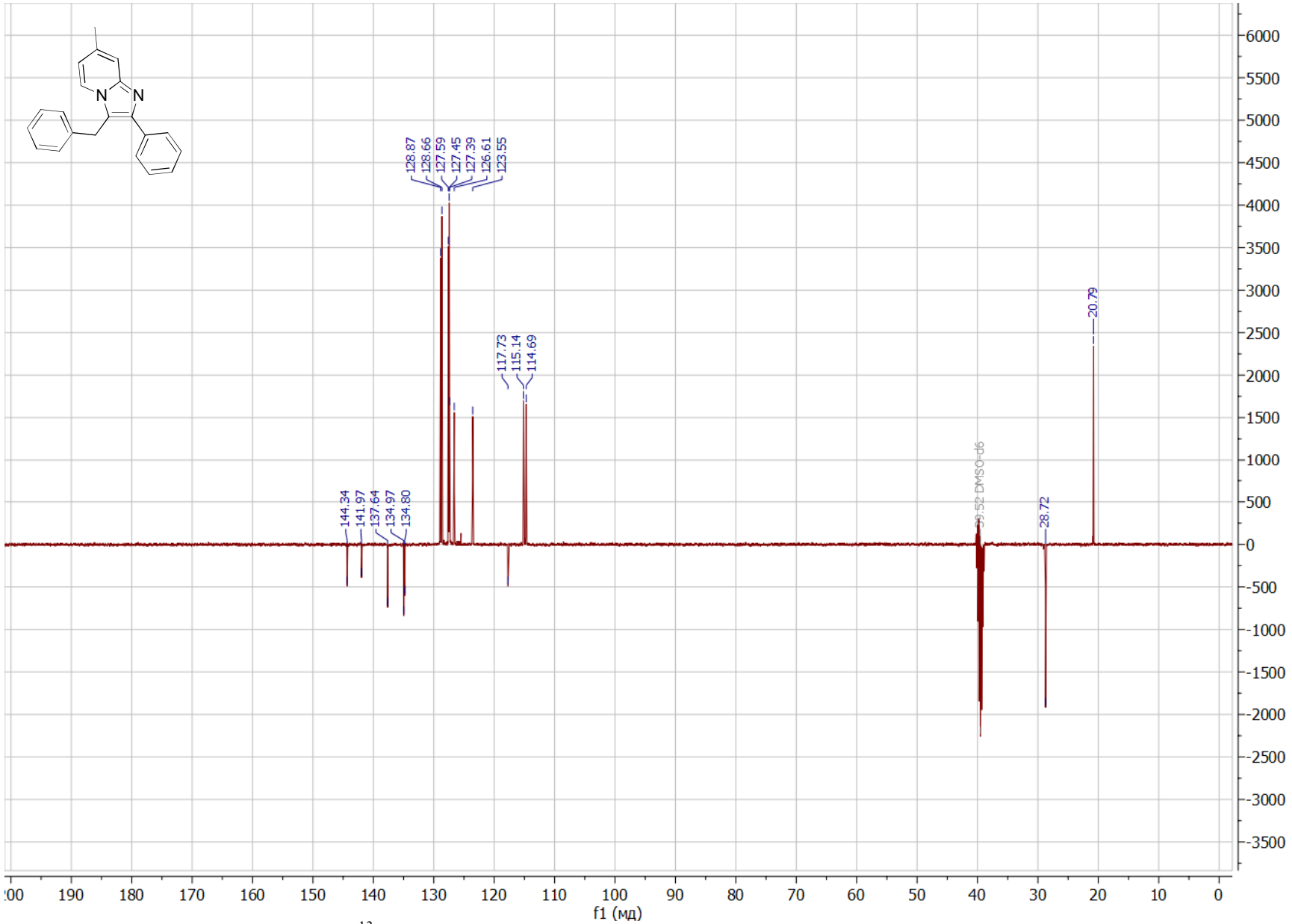

Figure S36. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10aab** in DMSO-d_6 (101 MHz)

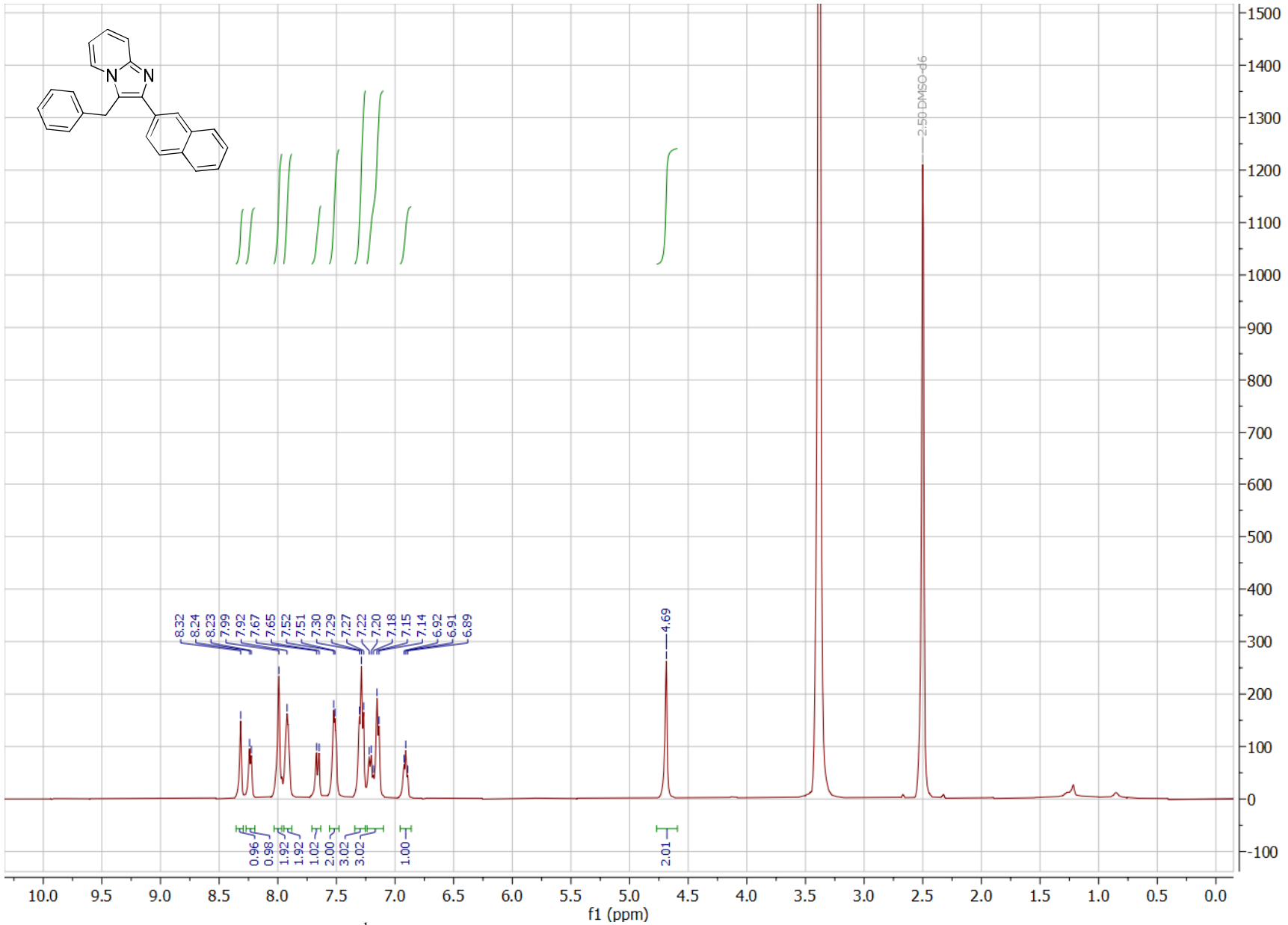

Figure S37. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10daa** in DMSO-d_6 (400 MHz)

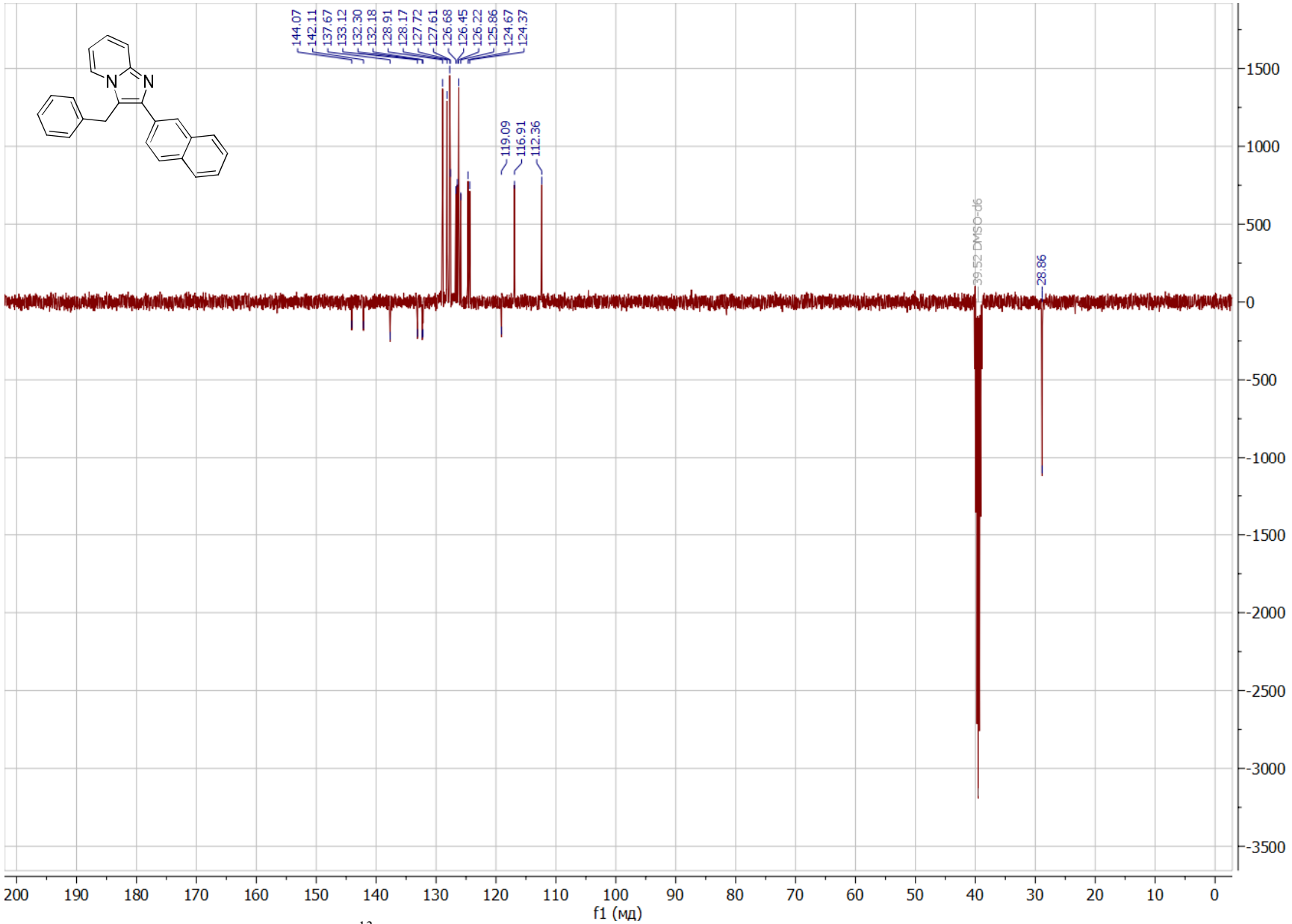

Figure S38. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10daa** in DMSO-d_6 (101 MHz)

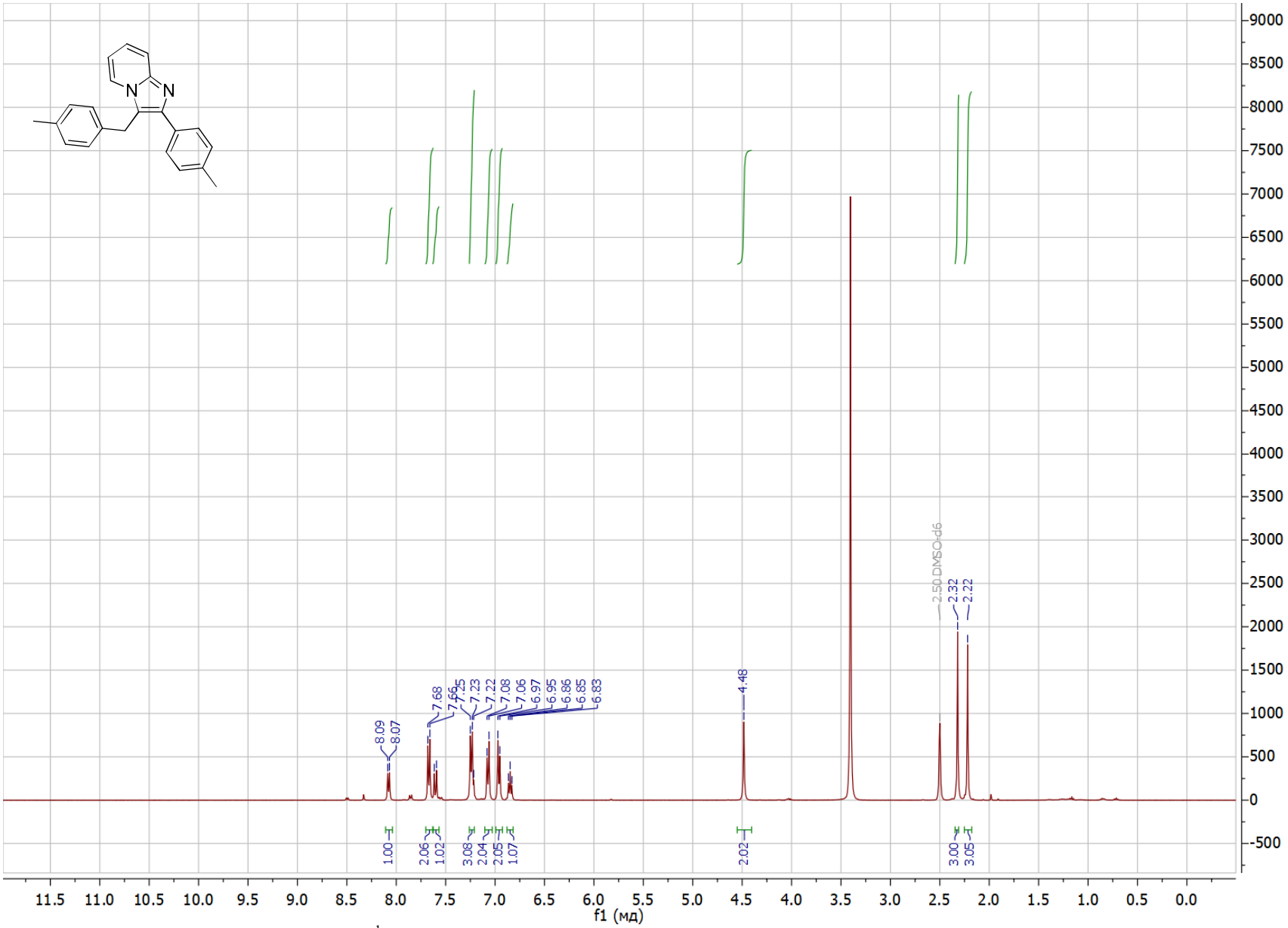

Figure S39. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10bea** in DMSO-d_6 (400 MHz)

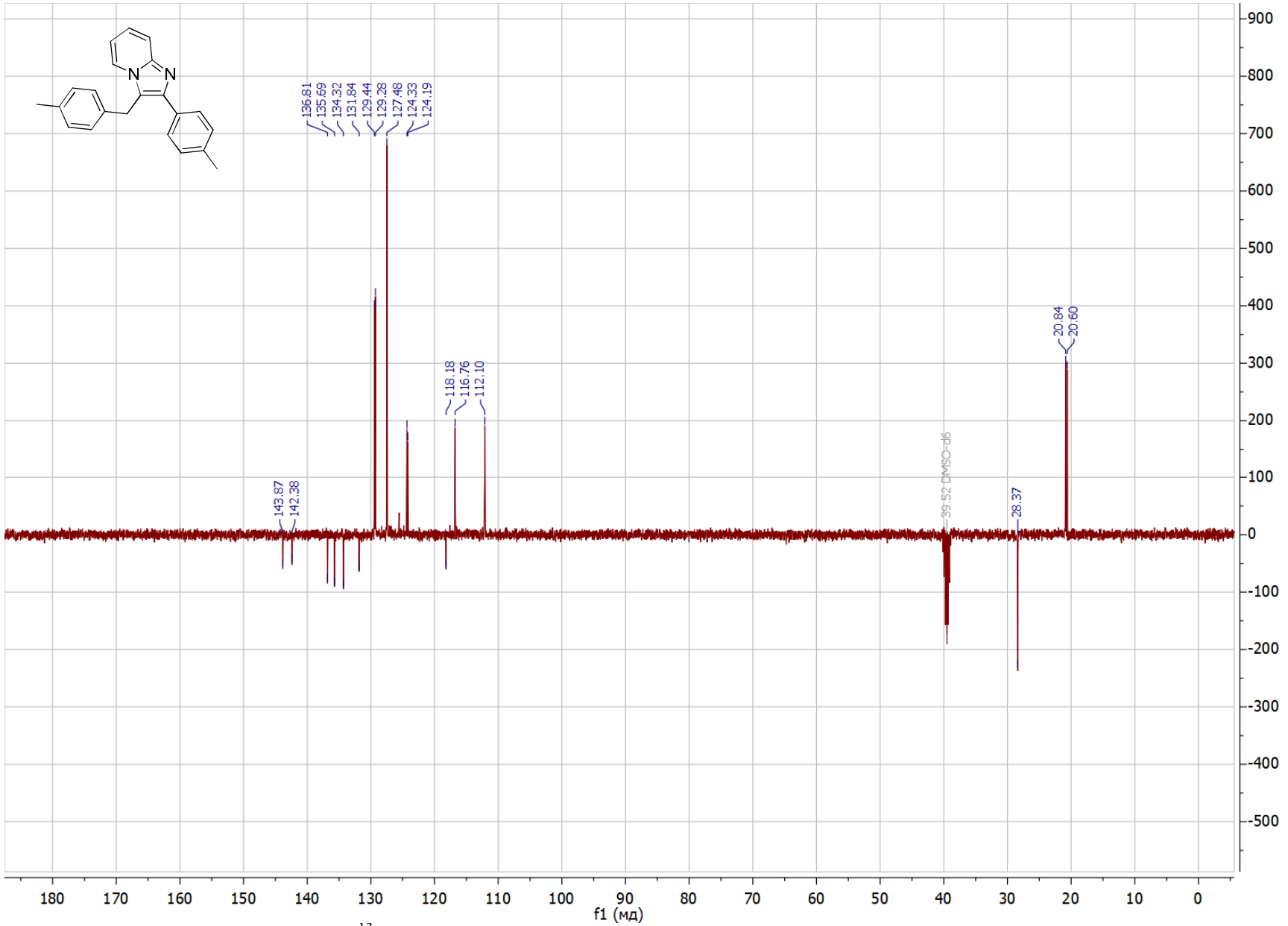

Figure S40. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10bea** in DMSO-d_6 (101 MHz)

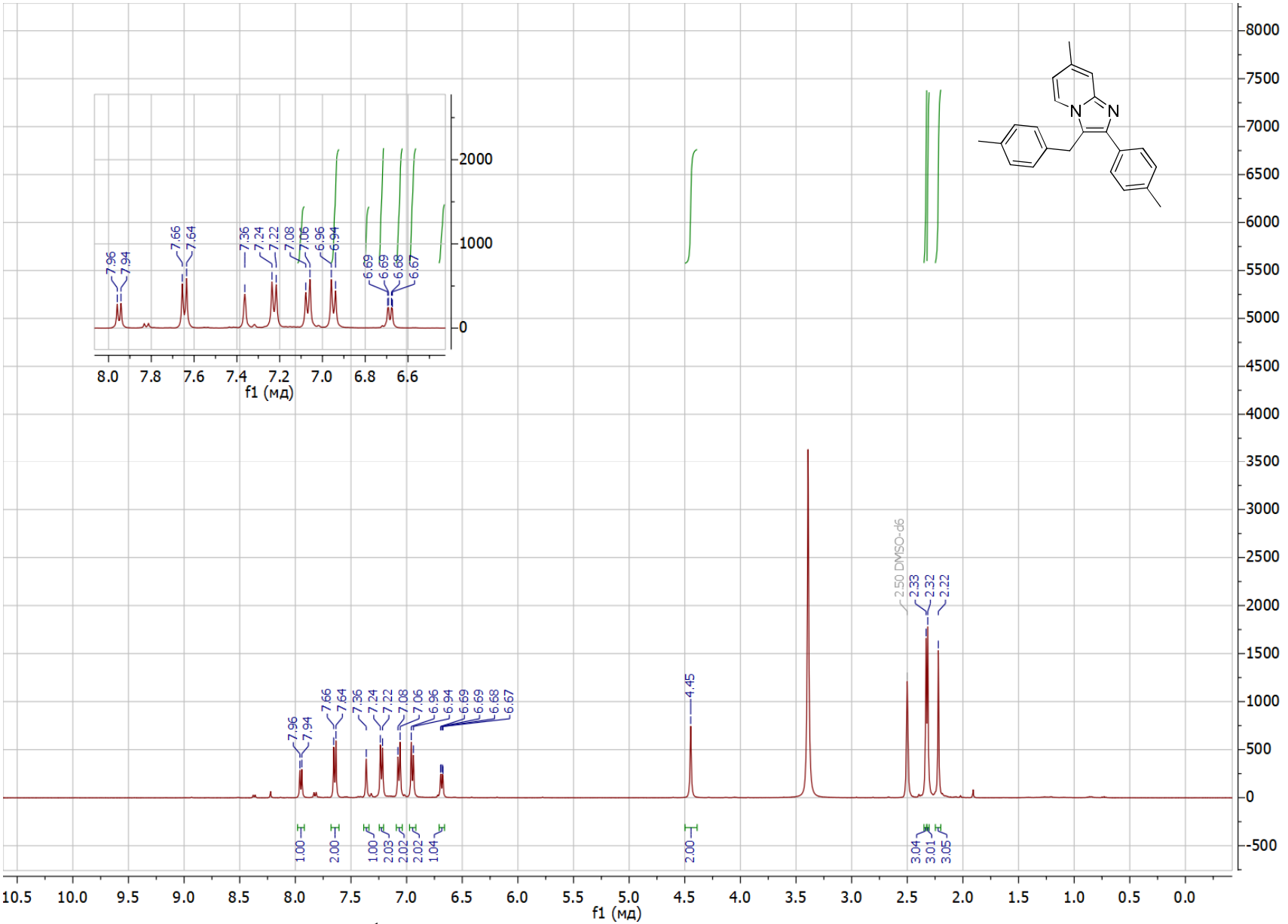

Figure S41. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10beb** in DMSO-d_6 (400 MHz)

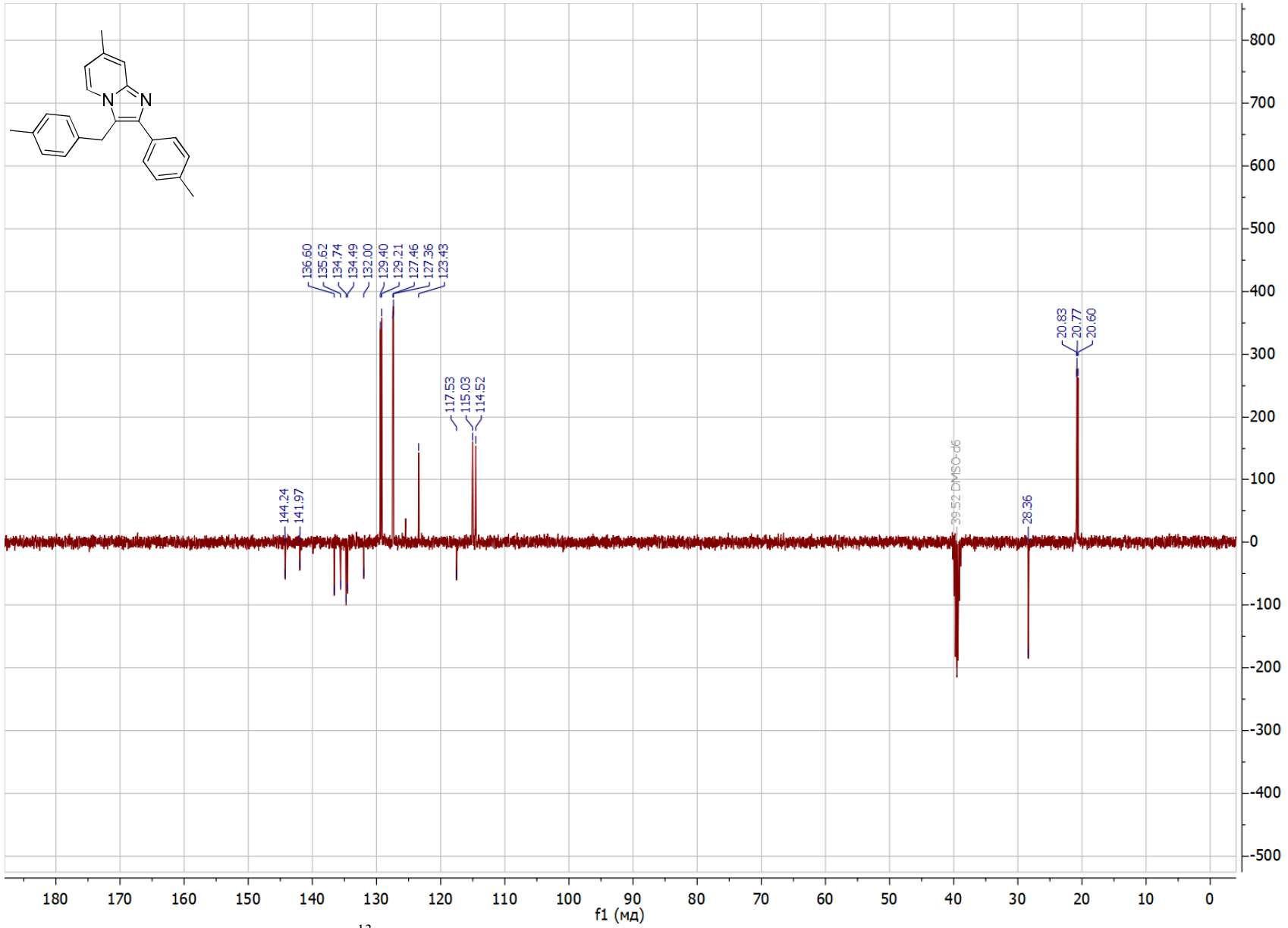

Figure S42. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10beb** in DMSO-d_6 (101 MHz)

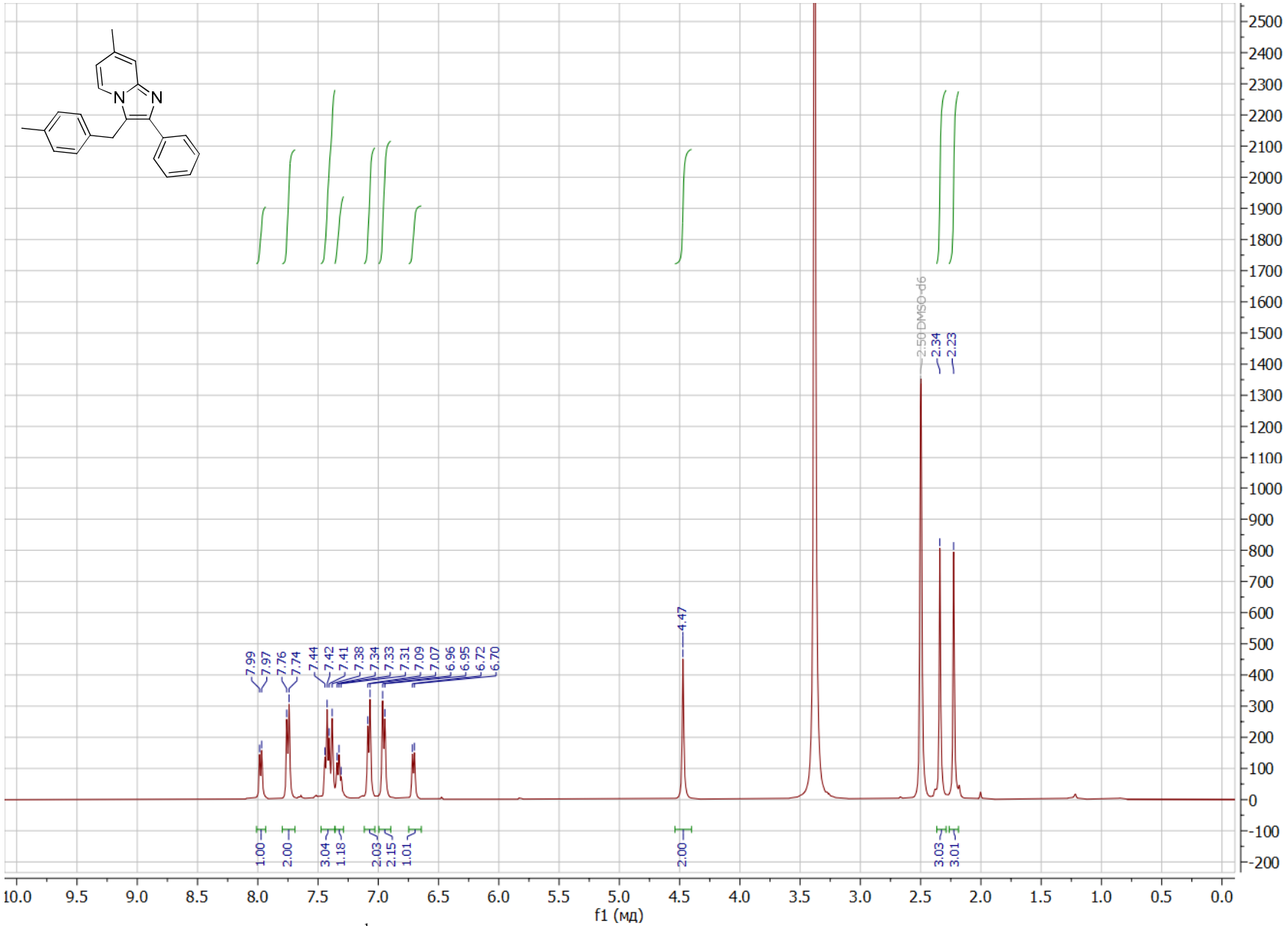

Figure S43. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10aeb** in DMSO-d_6 (400 MHz)

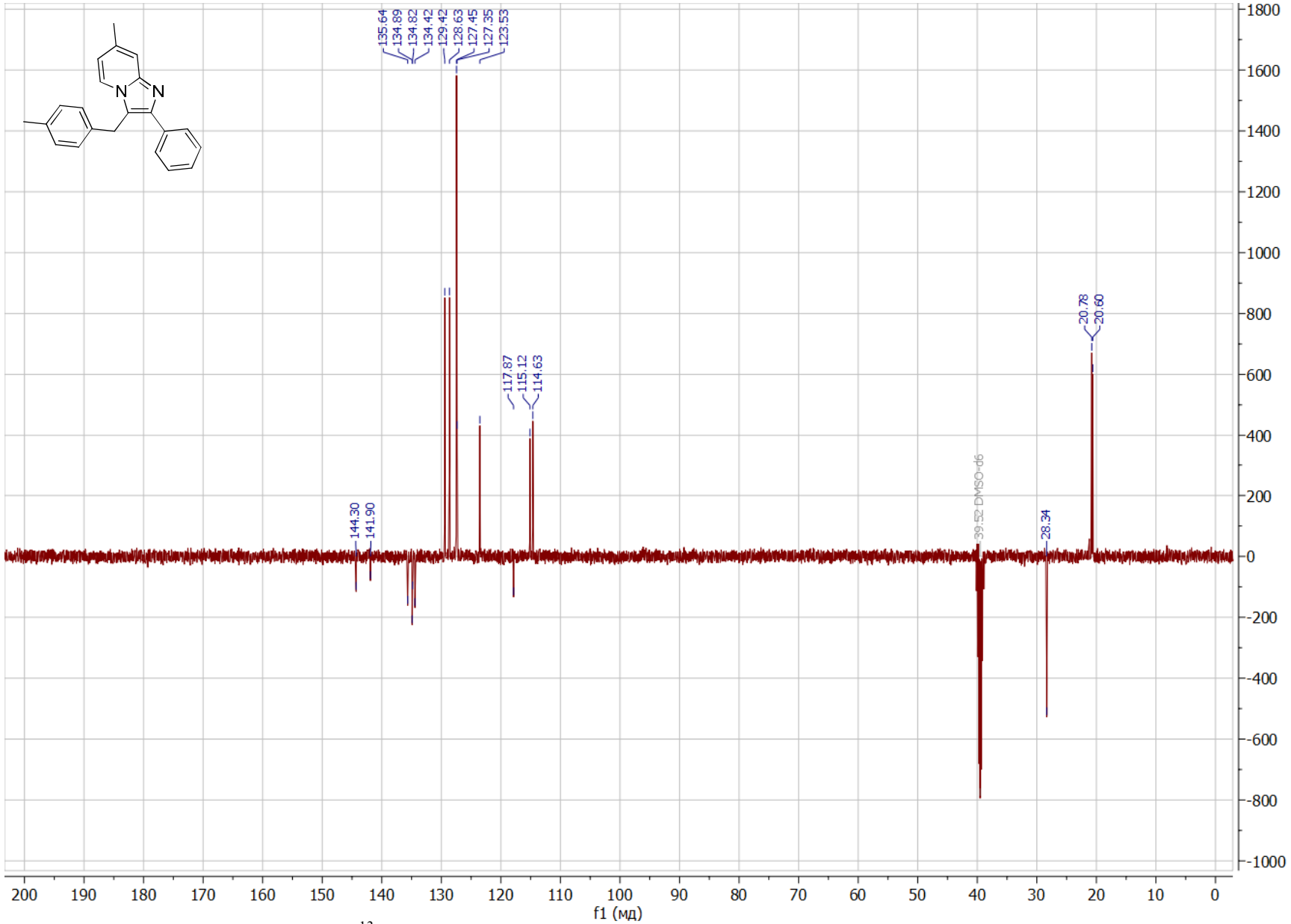

Figure S44. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10aeb** in DMSO-d_6 (101 MHz)

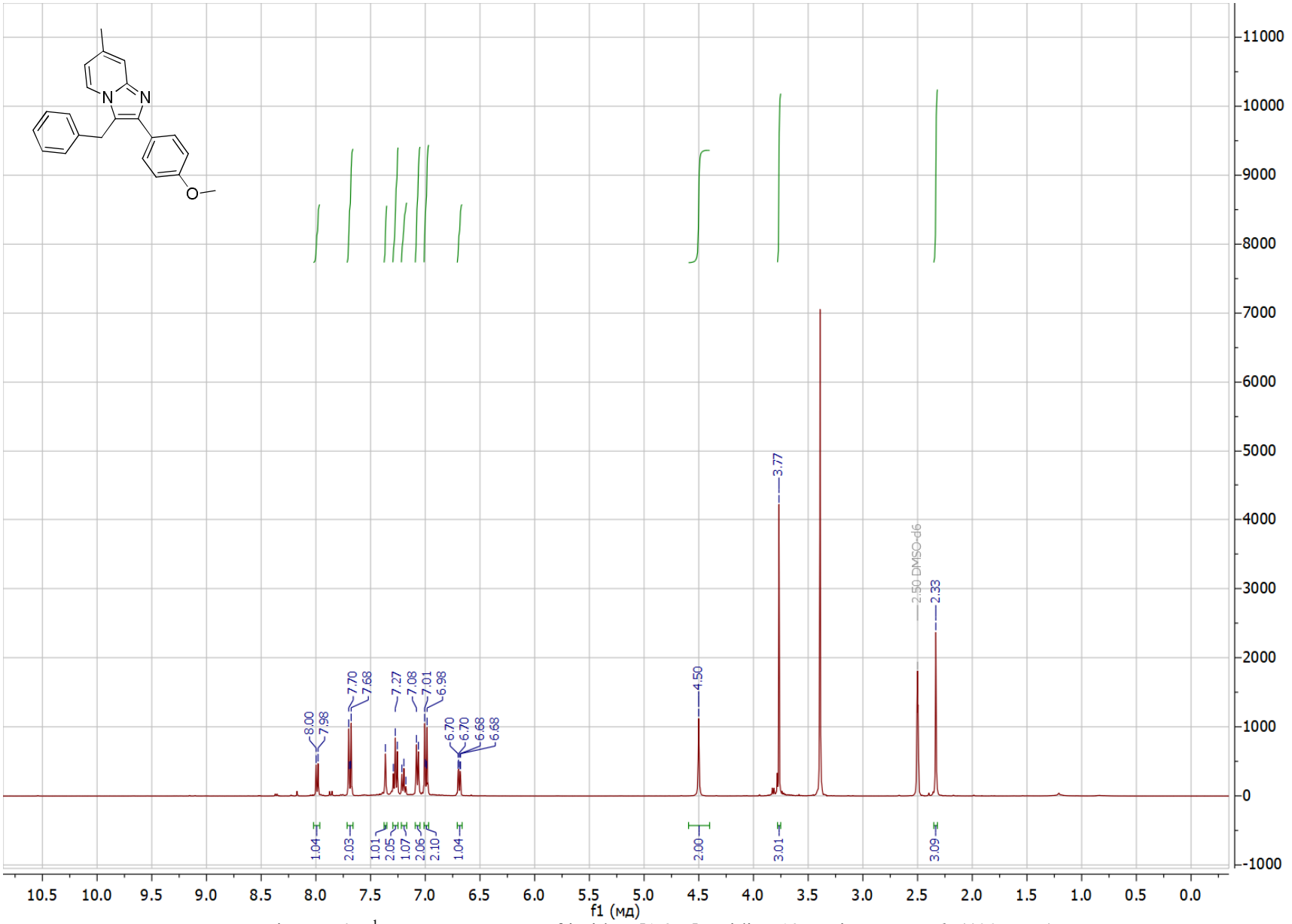

Figure S45. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10cab** in DMSO-d_6 (400 MHz)

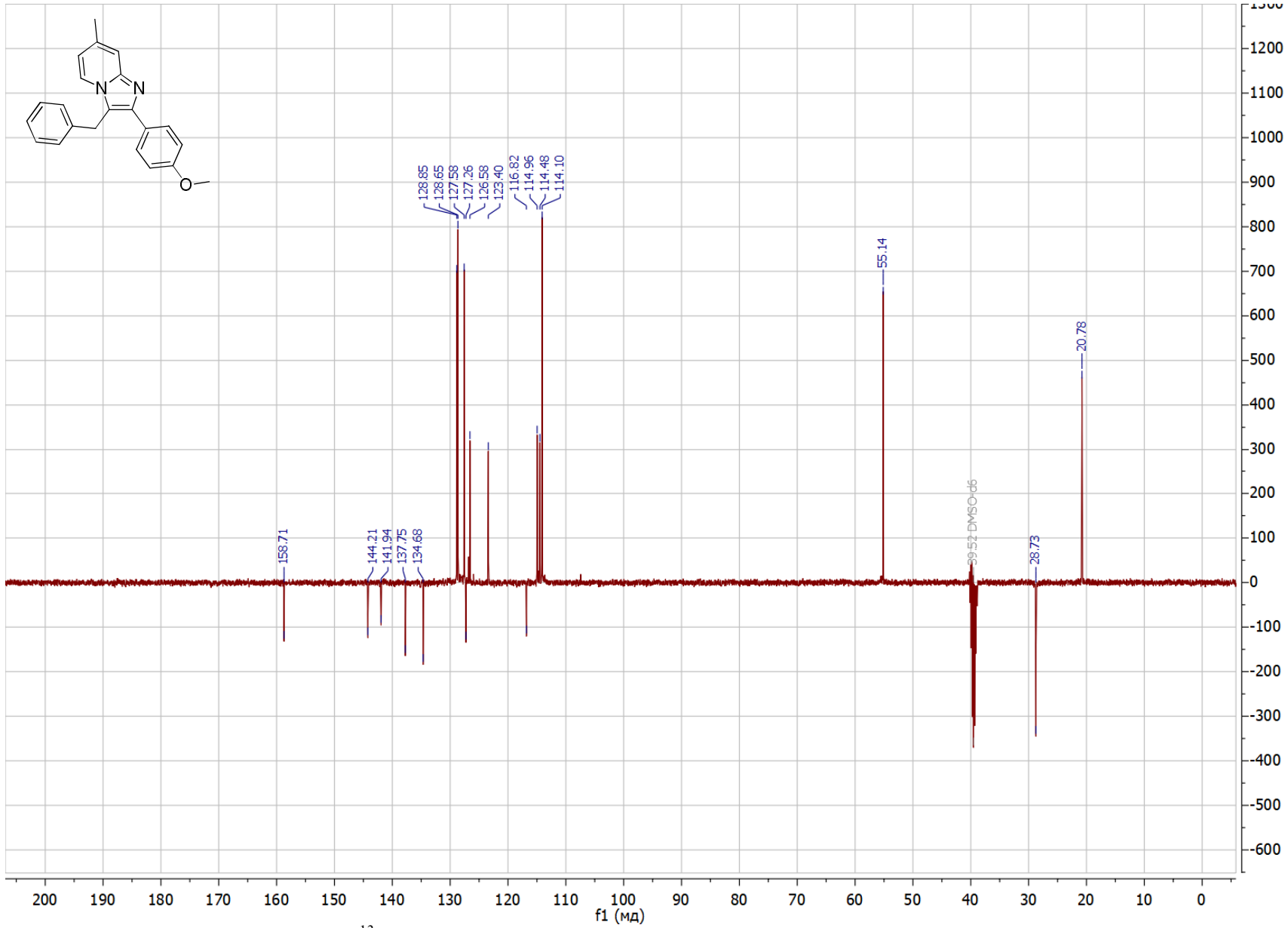

Figure S46. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10cab** in DMSO-d_6 (101 MHz)

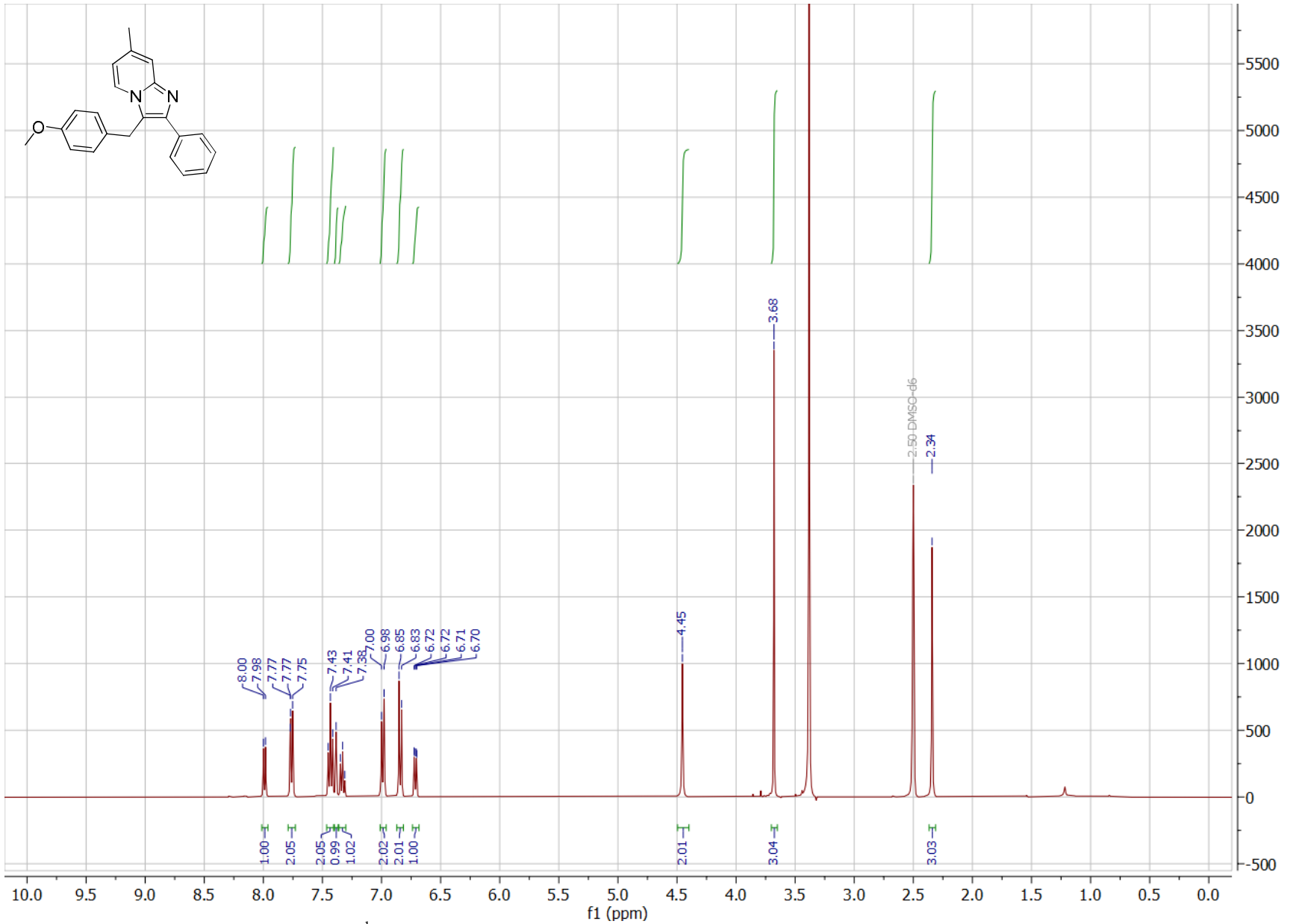

Figure S47. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10afb** in DMSO-d_6 (400 MHz)

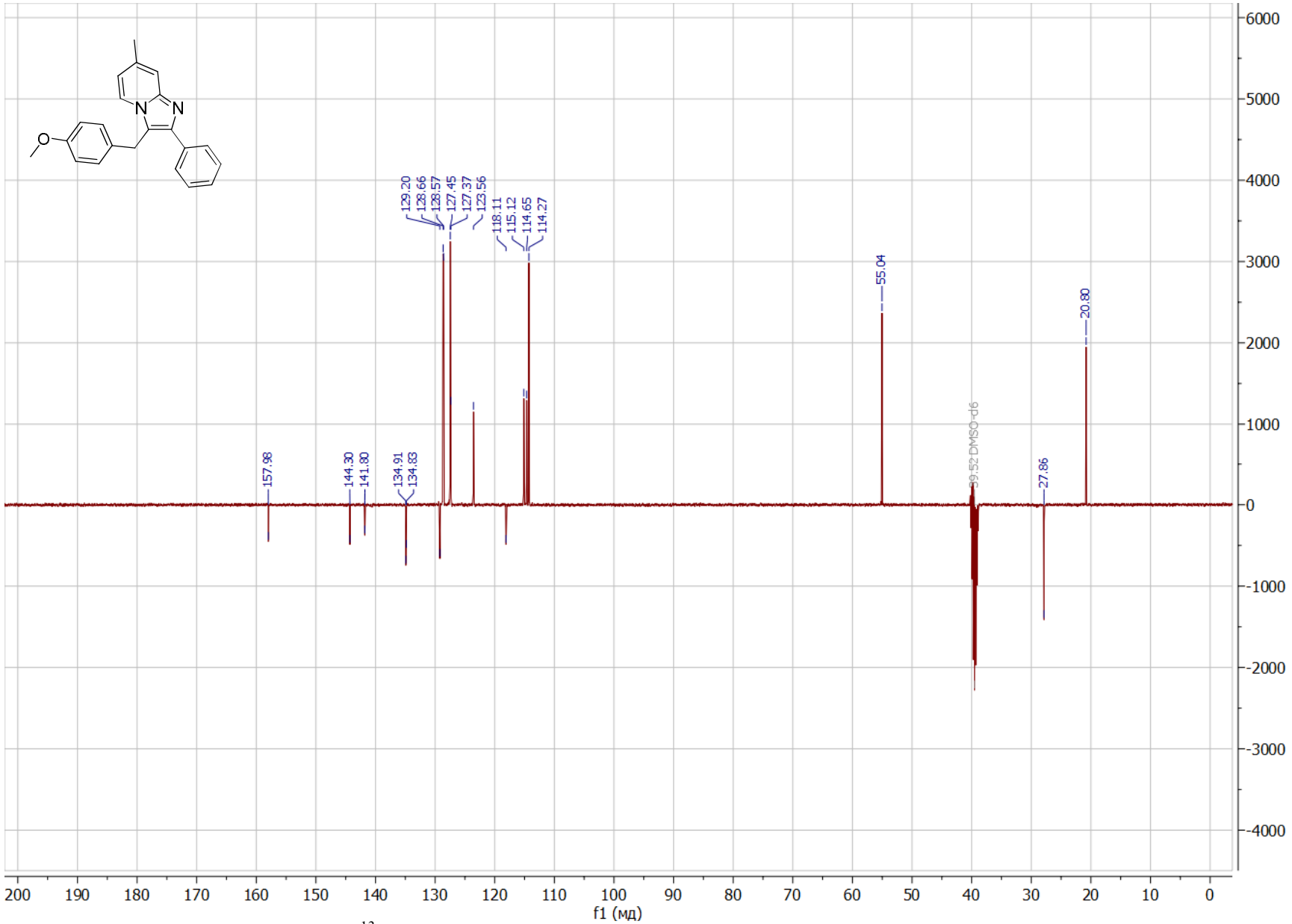

Figure S48. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10afb** in DMSO-d_6 (101 MHz)

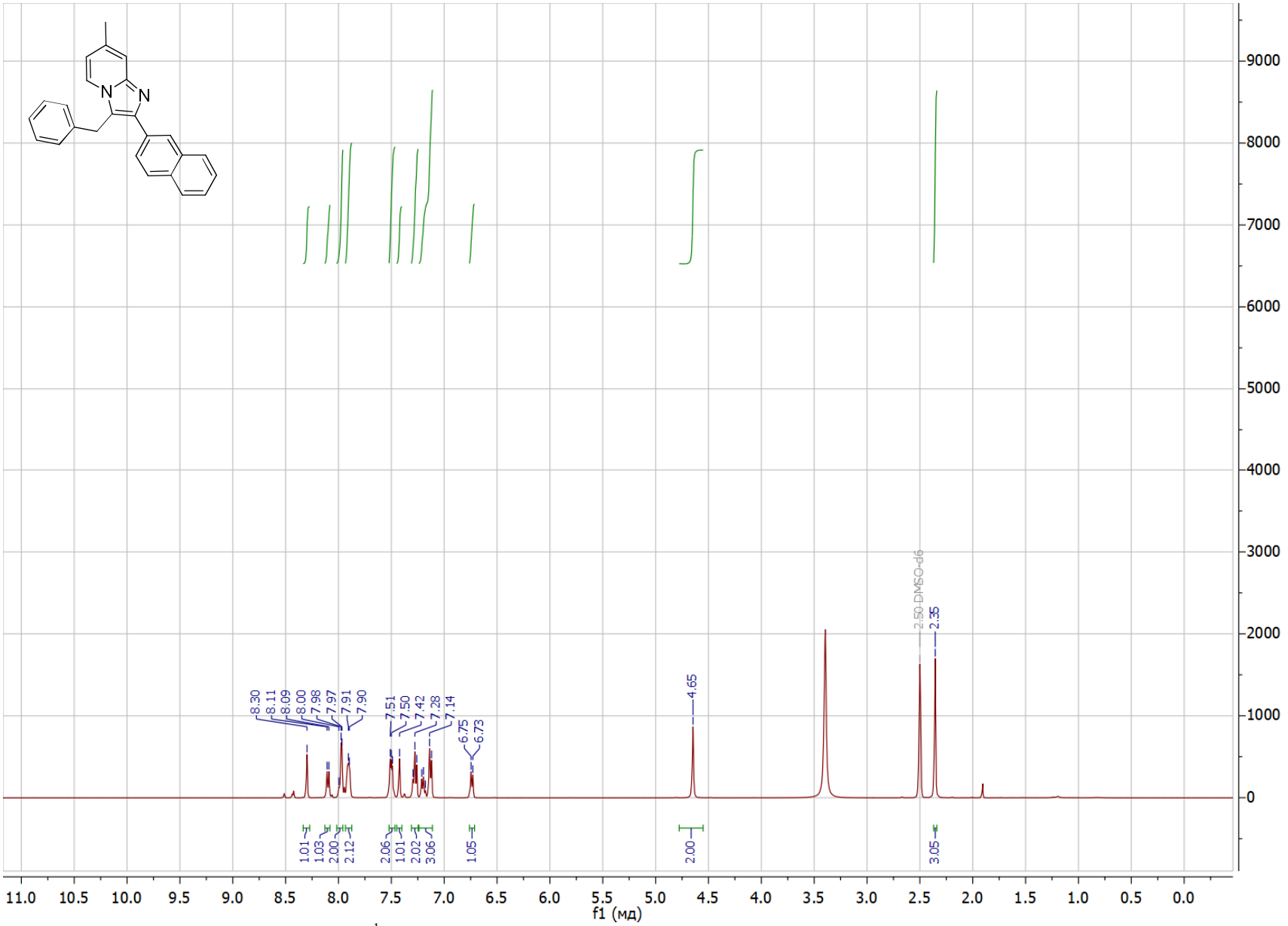

Figure S49. ^{1}H NMR spectrum of imidazo[1,2-*a*]pyridine **10dab** in DMSO-d_6 (400 MHz)

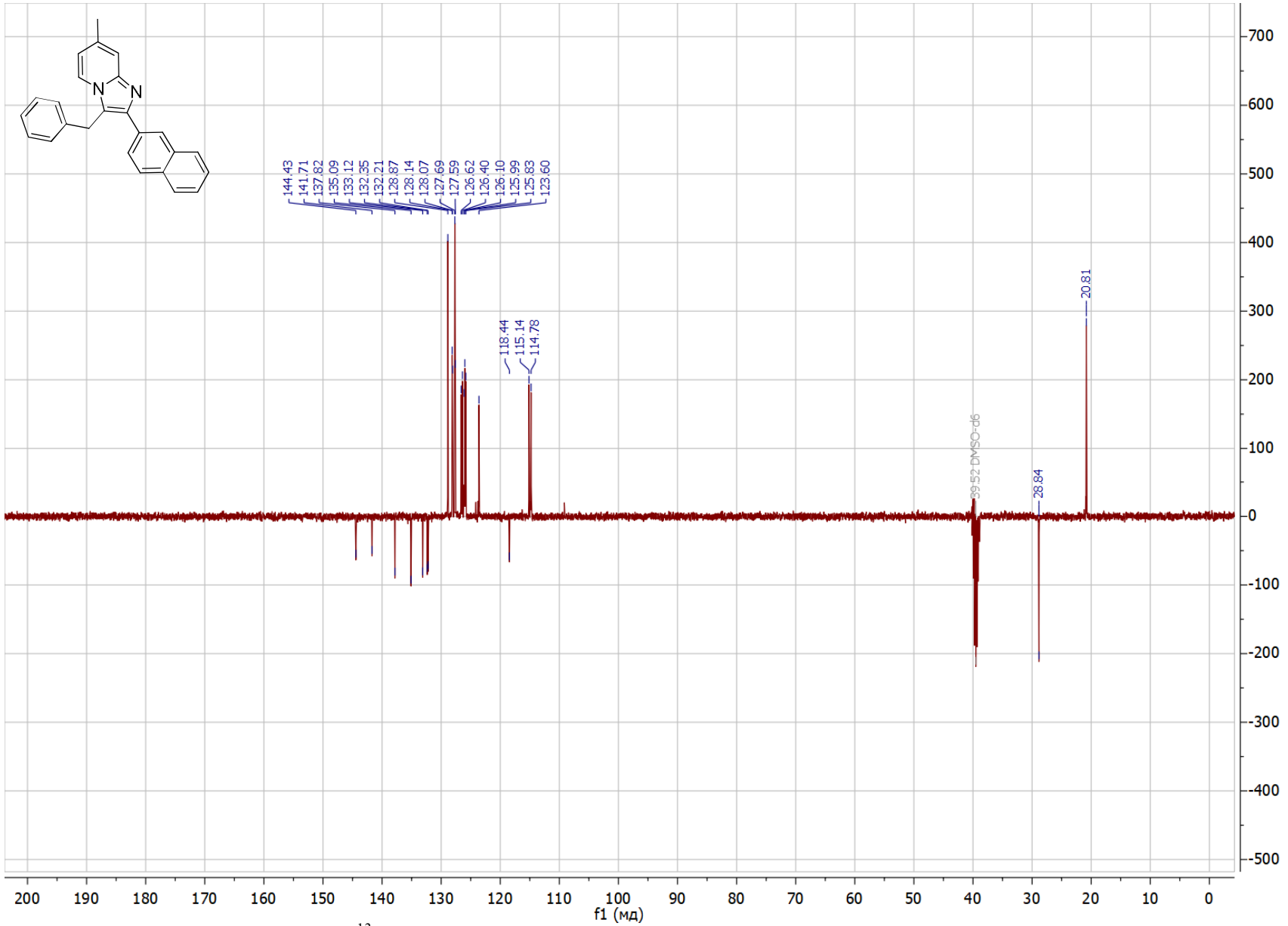

Figure S50. ^{13}C NMR spectrum of imidazo[1,2-*a*]pyridine **10dab** in DMSO-d_6 (101 MHz)

^{1}H and ^{13}C NMR spectral charts for 3,5-diphenyl-3H-pyrrol-2-one 15aa

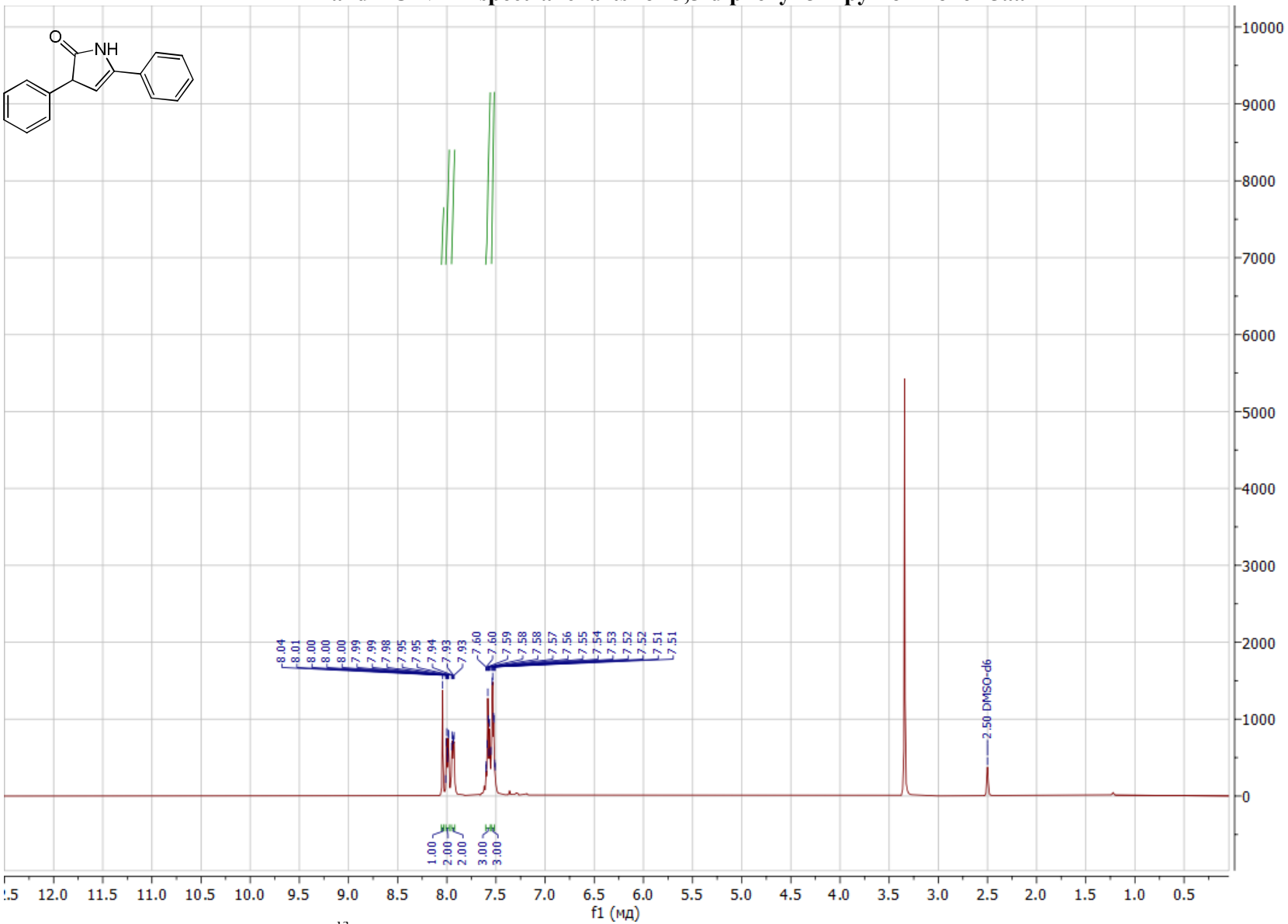

Figure S51. ^{13}C NMR spectrum of 3,5-diphenyl-3H-pyrrol-2-one **15aa** in DMSO-d_6 (101 MHz)

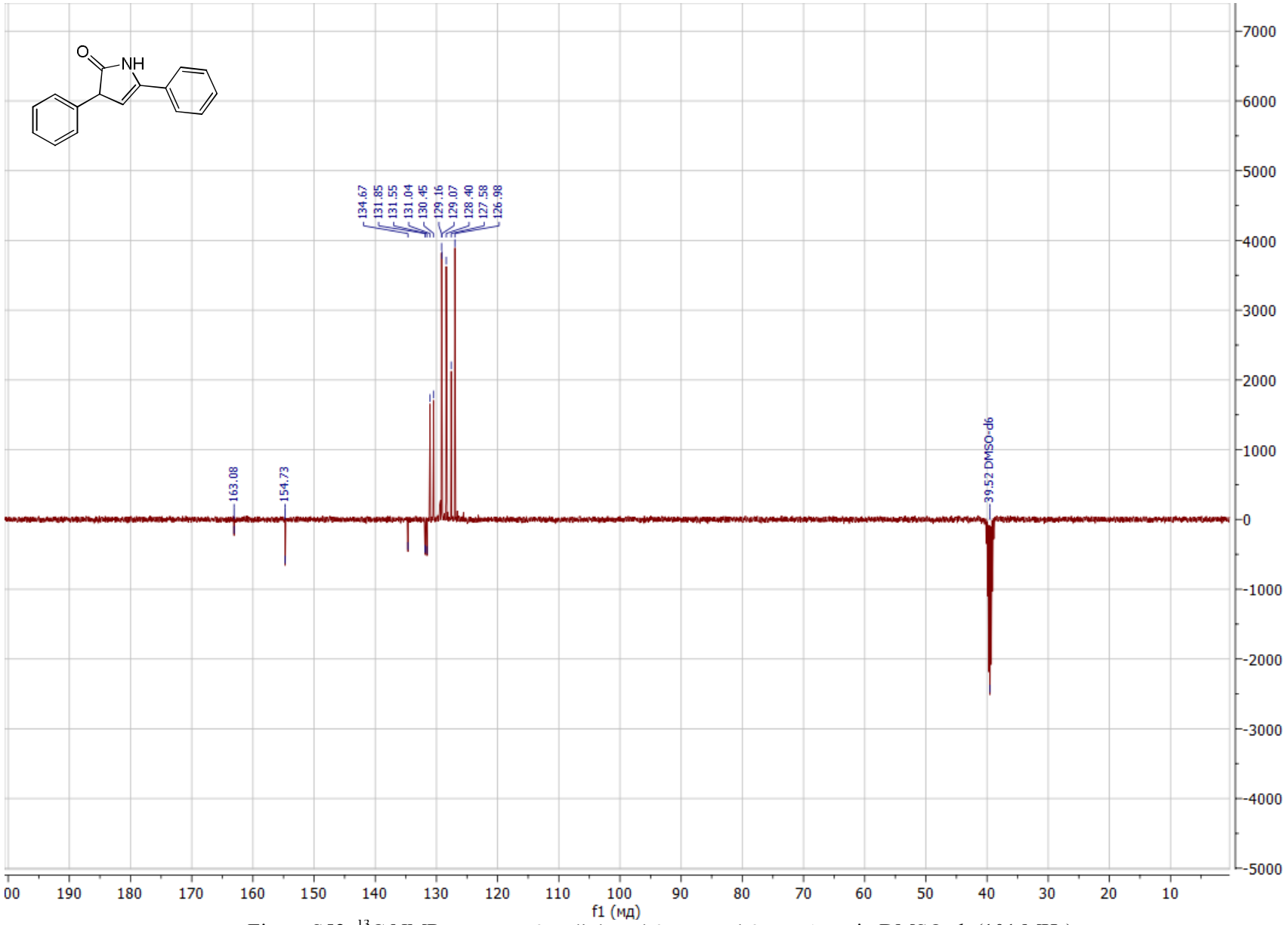

Figure S52. ^{13}C NMR spectrum 3,5-diphenyl-3H-pyrrol-2-one **15aa** in DMSO-d_6 (101 MHz)

^{1}H and ^{13}C NMR spectral charts for *N*-(2-aminophenyl)-2-phenylacetamide 16aa

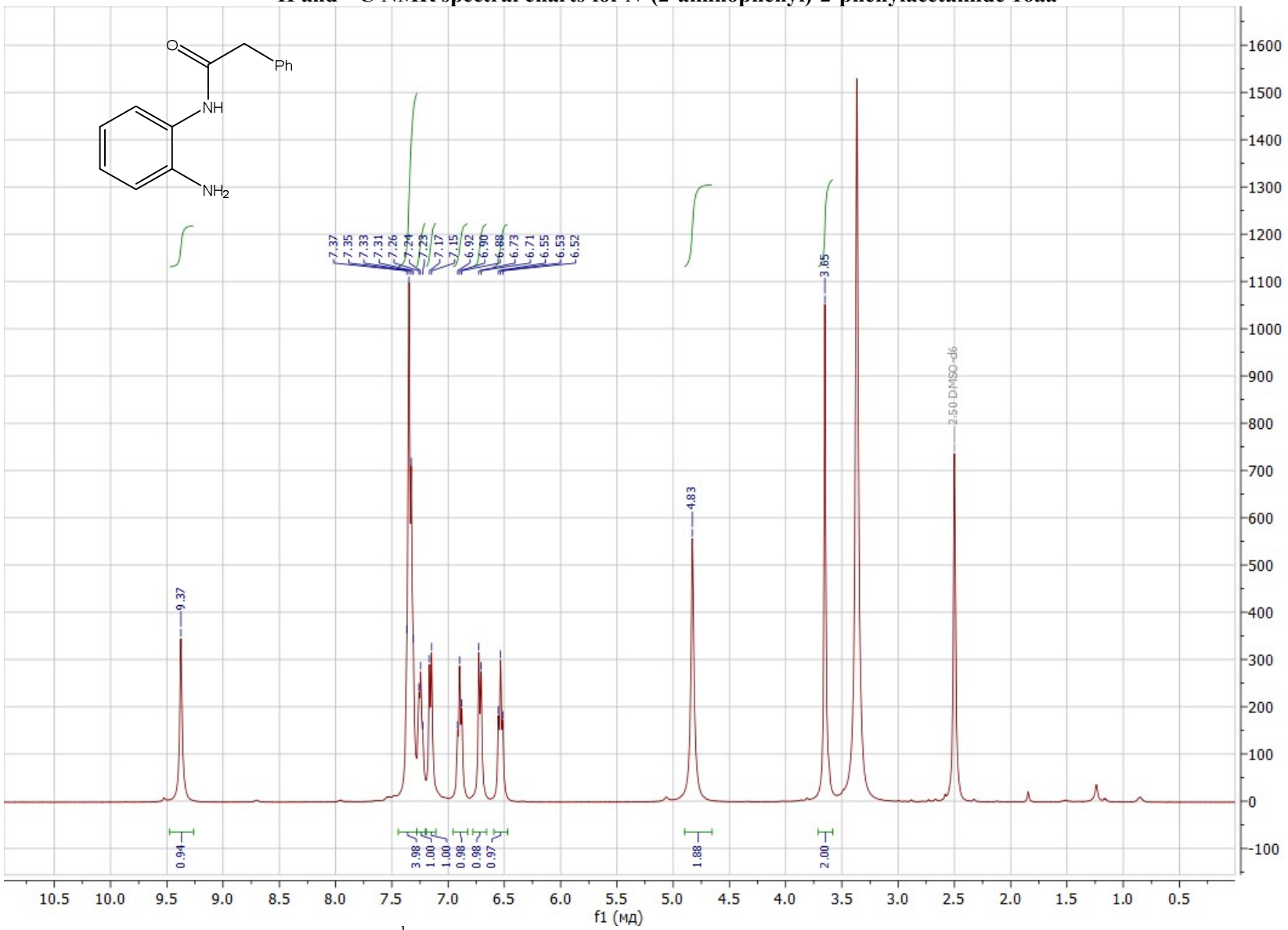

Figure S53. ^{1}H NMR spectrum of phenylacetamide **16aa** in DMSO-d_6 (400 MHz)

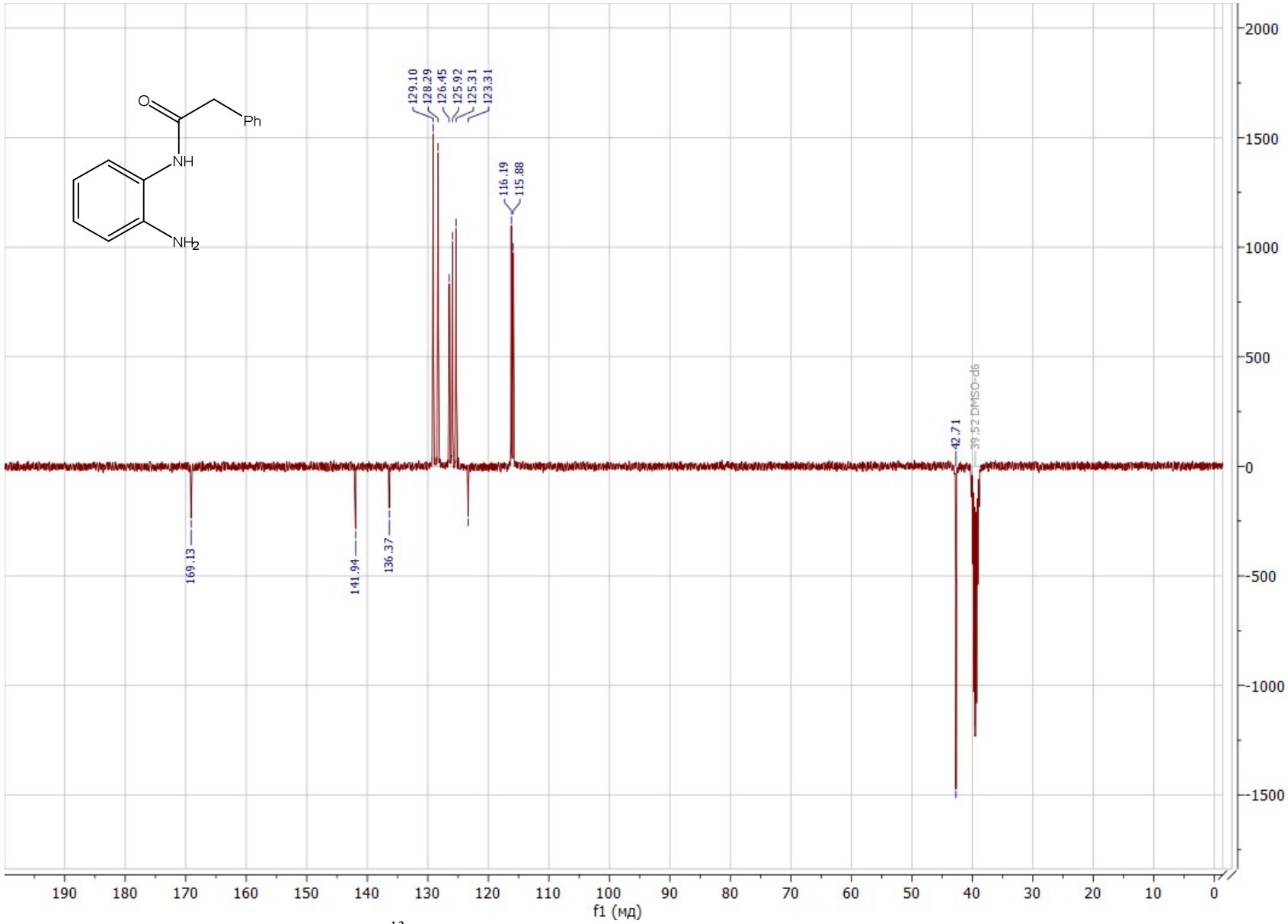

Figure S54. ^{13}C NMR spectrum of phenylacetamide **16aa** in DMSO-d_6 (101 MHz)

^{1}H and ^{13}C NMR spectral charts for 2-Benzyl-1*H*-benzo[*d*]imidazole 17aa

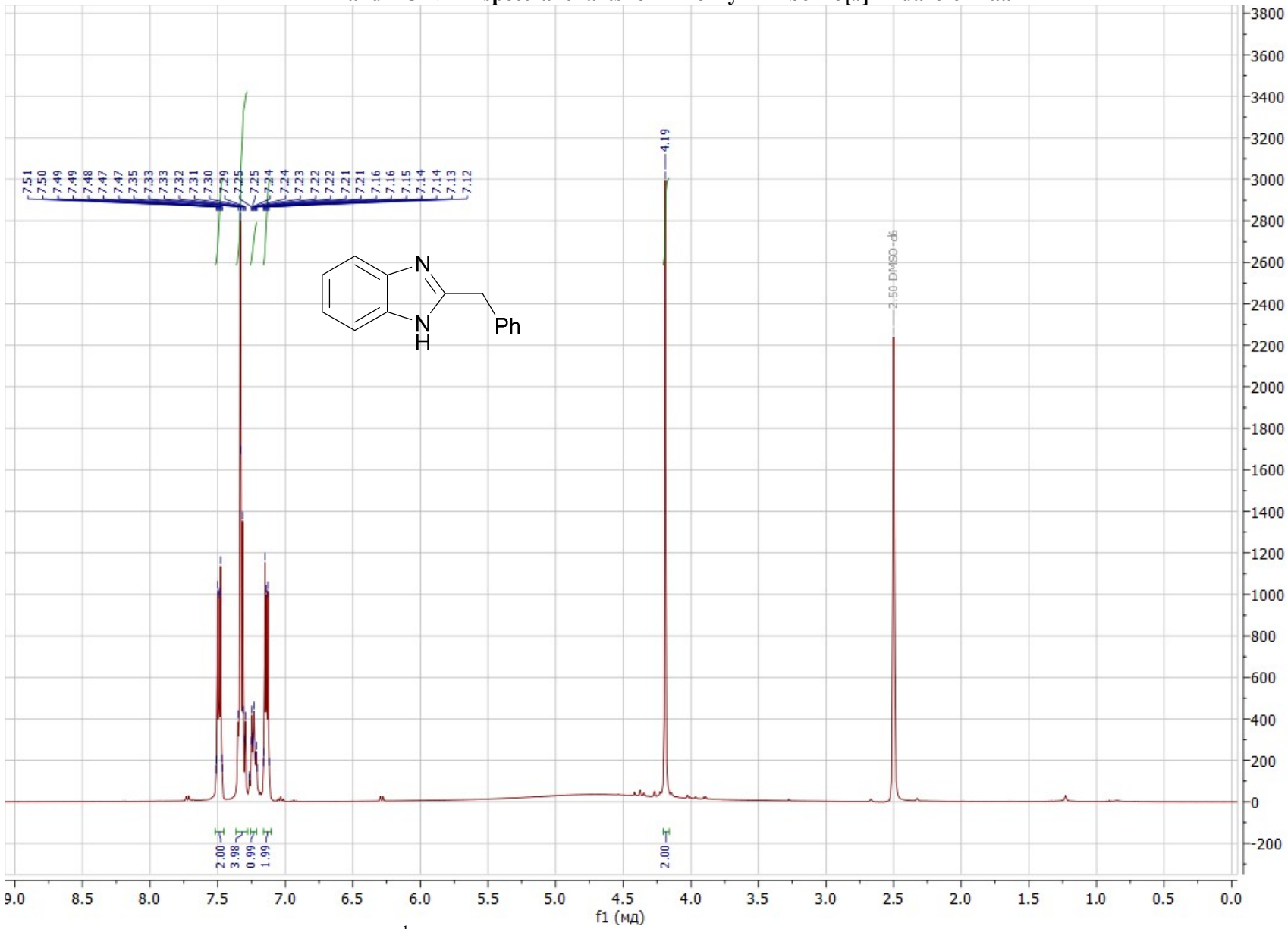

Figure S55. ^{1}H NMR spectrum of benzoimidazole **17aa** in DMSO-d_6 (400 MHz)

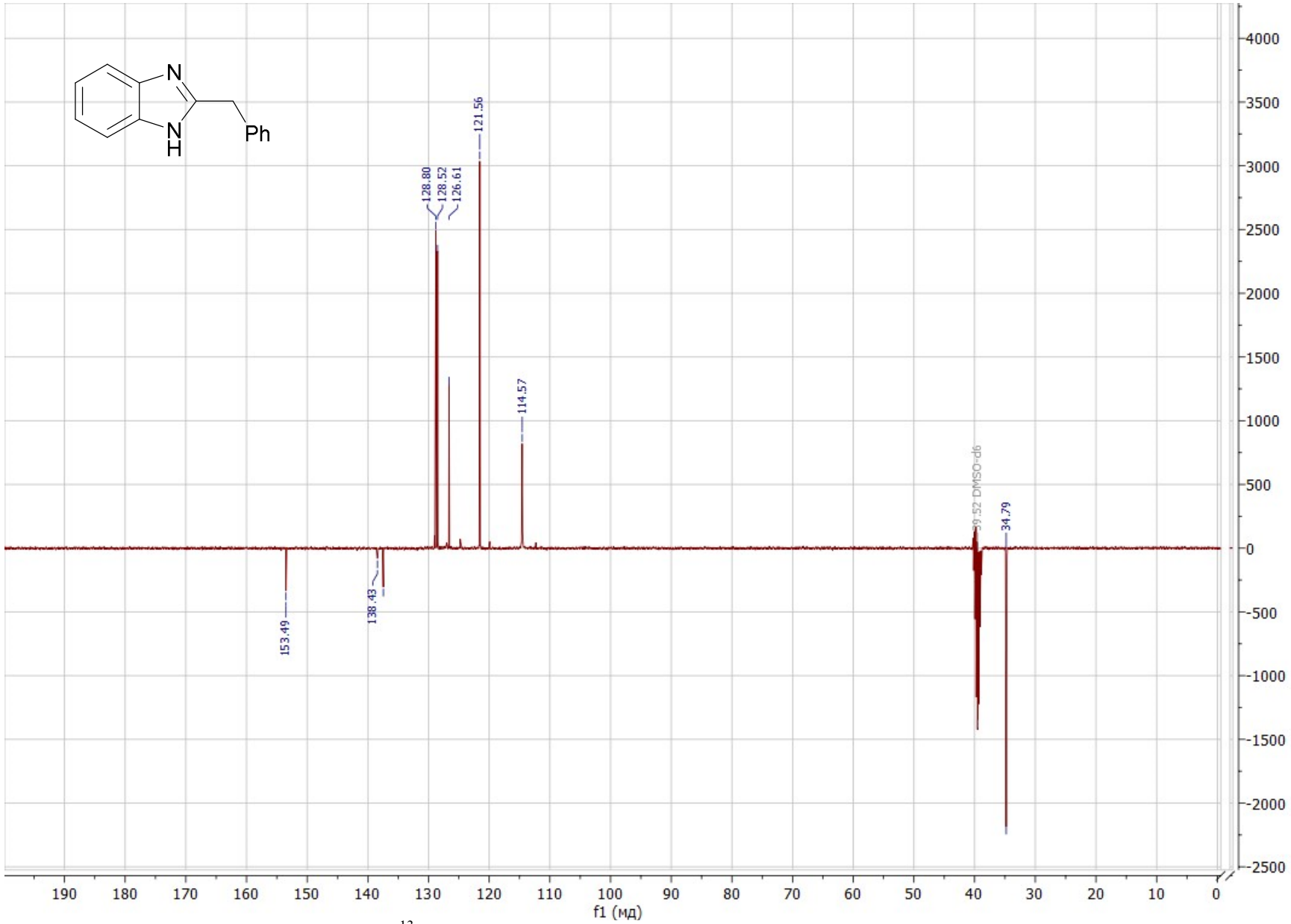

Figure S56. ^{13}C NMR spectrum of benzoimidazole **17aa** in DMSO-d_6 (400 MHz)

HRMS spectral chart for 5-hydroxy-5-(3-methoxyphenyl)-3-phenyl-1,5-dihydro-2H-pyrrol-2-one 1ca

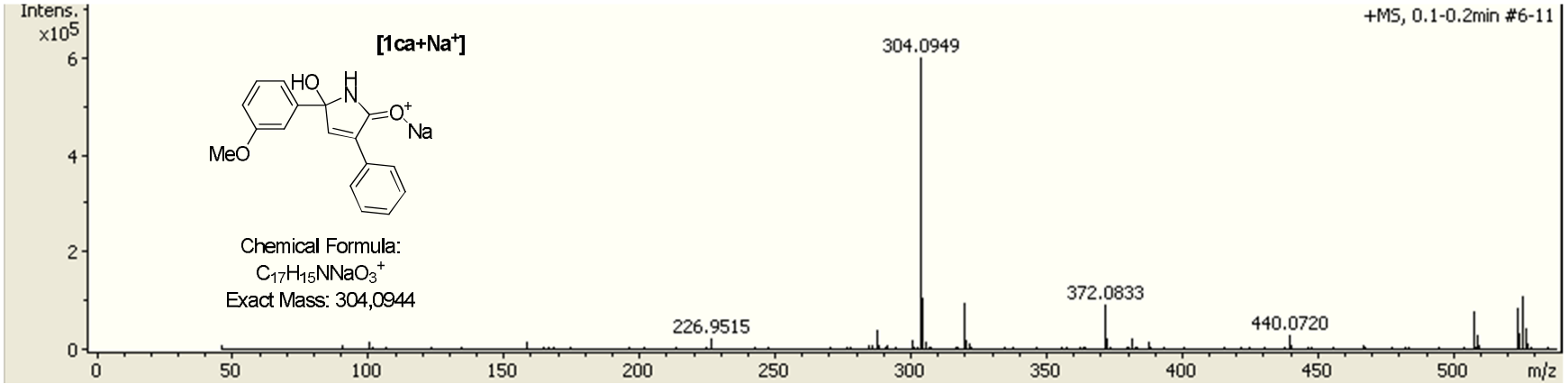

Figure S57. HRMS Chart for 5-hydroxy-5-(3-methoxyphenyl)-3-phenyl-1,5-dihydro-2*H*-pyrrol-2-one (**1ca**)

HRMS spectral charts for quinoxalines 8

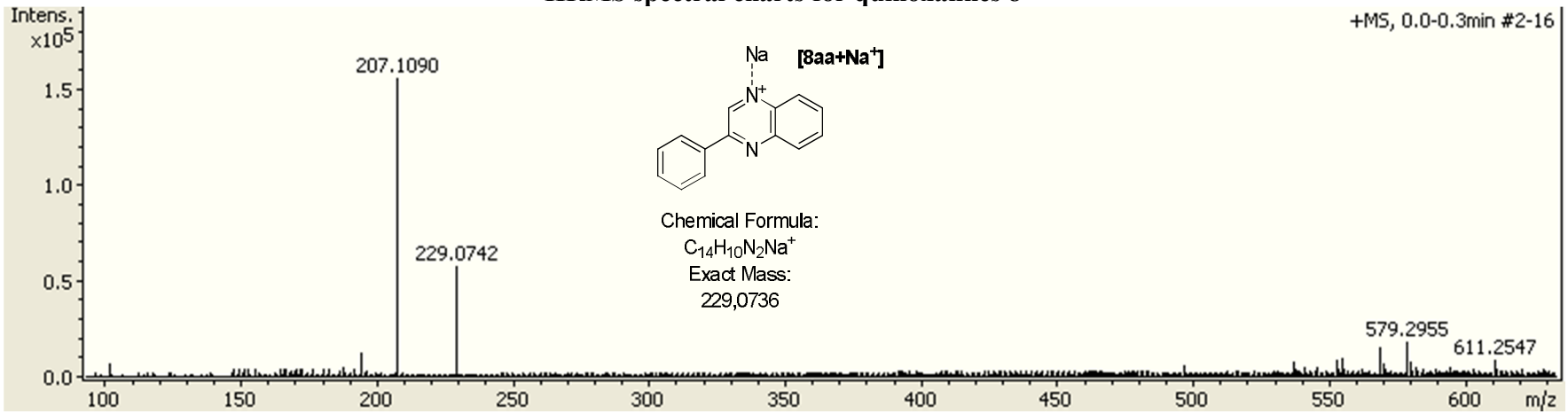

Figure S58. HRMS Chart for 2-Phenylquinoxaline **(8aa)**

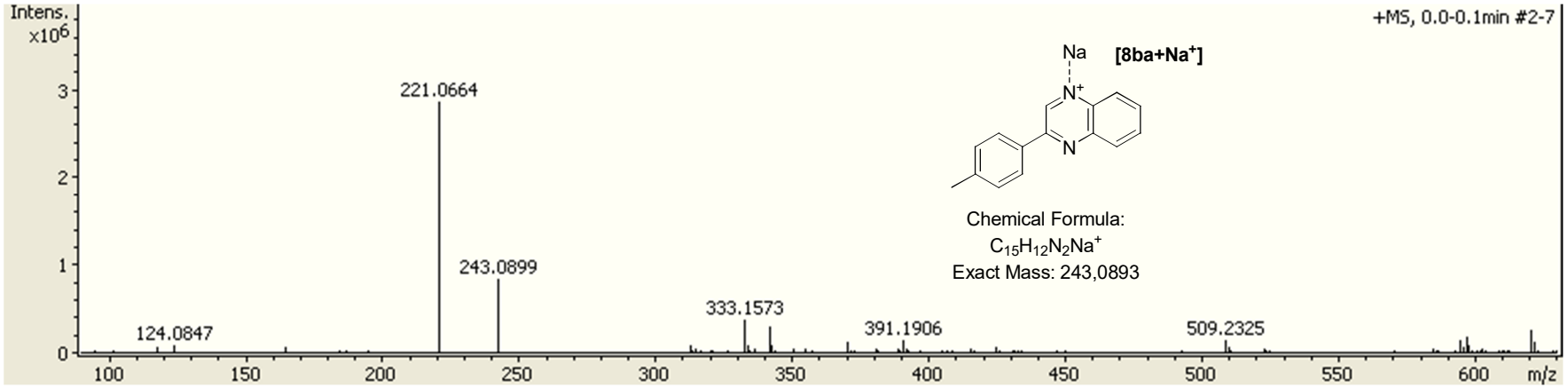

Figure S59. HRMS Chart for 2-(*p*-Tolyl)quinoxaline **(8ba)**

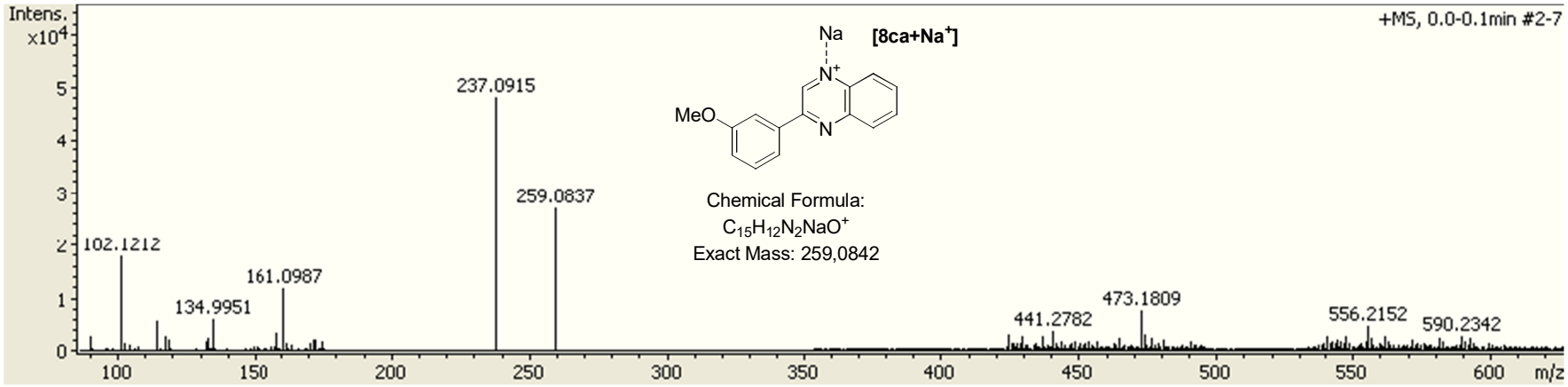

Figure S60. HRMS Chart for 2-(3-Methoxyphenyl)quinoxaline **(8ca):**

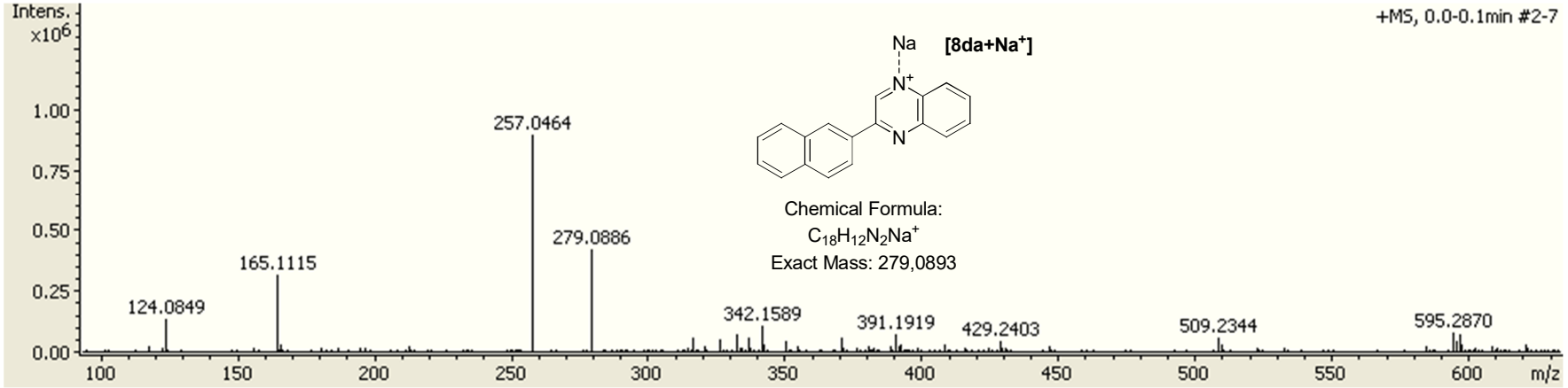

Figure S61. HRMS Chart for 2-(Naphthalen-2-yl)quinoxaline **(8da)**

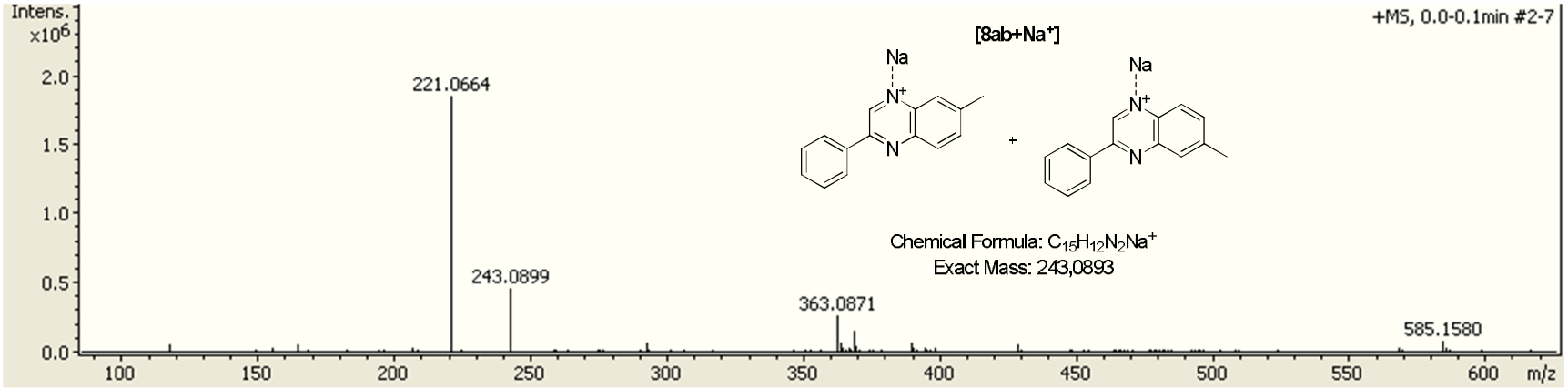

Figure S62. HRMS Chart for7-Methyl-2-phenylquinoxaline (8ab) and 6-Methyl-2-phenylquinoxaline **(8ab')**

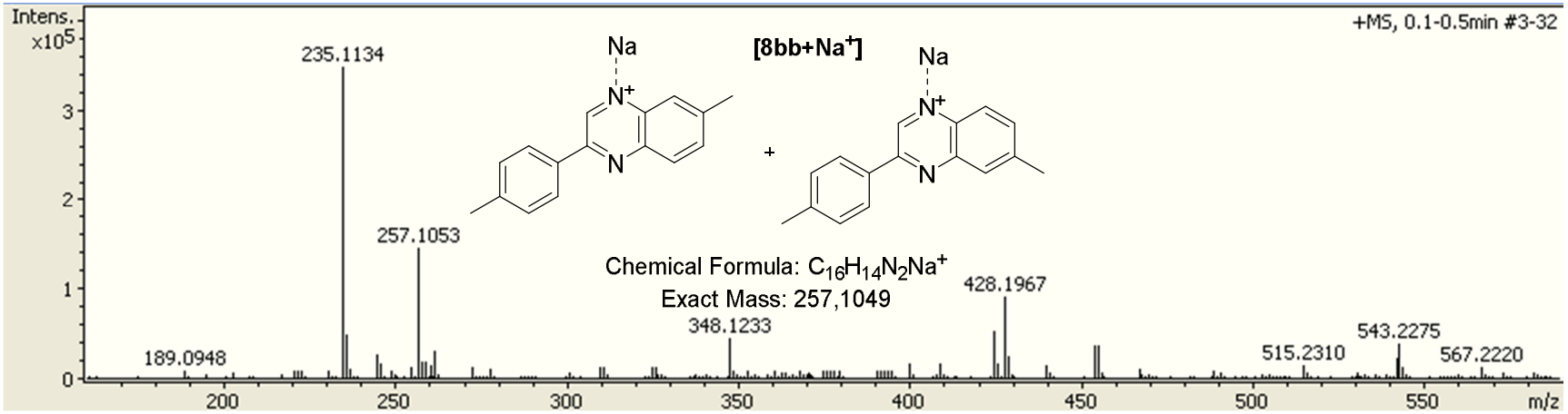

Figure S63. HRMS Chart for 7-Methyl-2-(*p*-tolyl)quinoxaline **(8bb)** and 6-Methyl-2-(*p*-tolyl)quinoxaline **(8bb')**

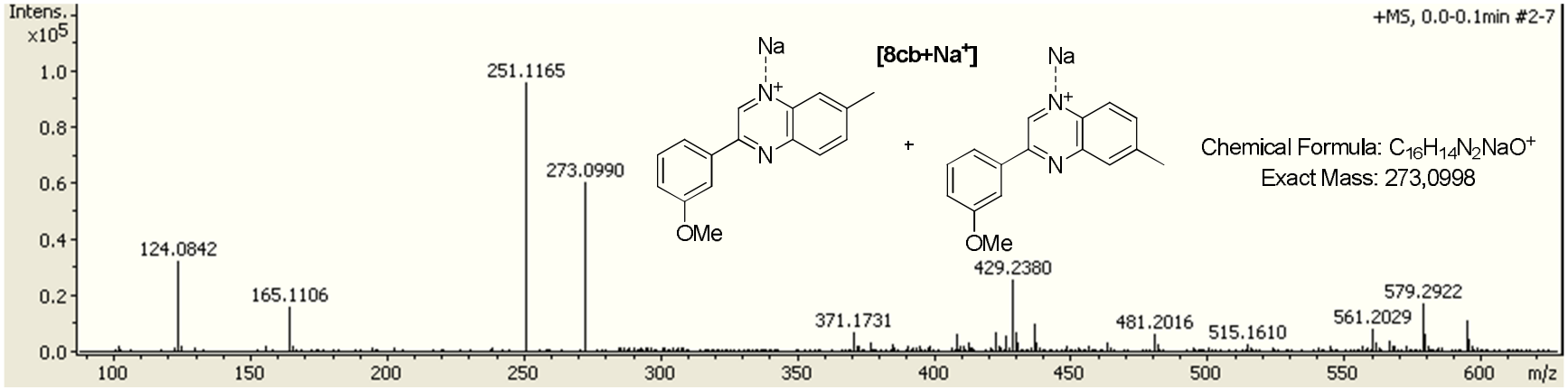

Figure S64. HRMS Chart for 2-(3-Methoxyphenyl)-7-methylquinoxaline (8cb) and 2-(3-Methoxyphenyl)-6-methylquinoxaline **(8cb')**

HRMS spectral charts for 2-aryl-3-benzylimidazo[1,2-*a*]pyridines 10

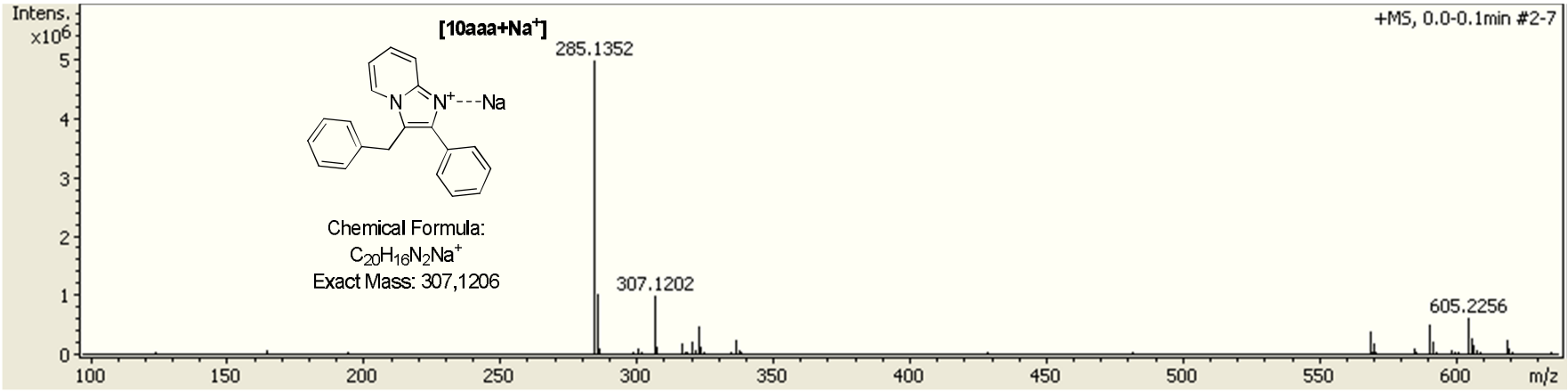

Figure S65. HRMS Chart for 3-Benzyl-2-phenylimidazo[1,2-*a*]pyridine **(10aaa)**

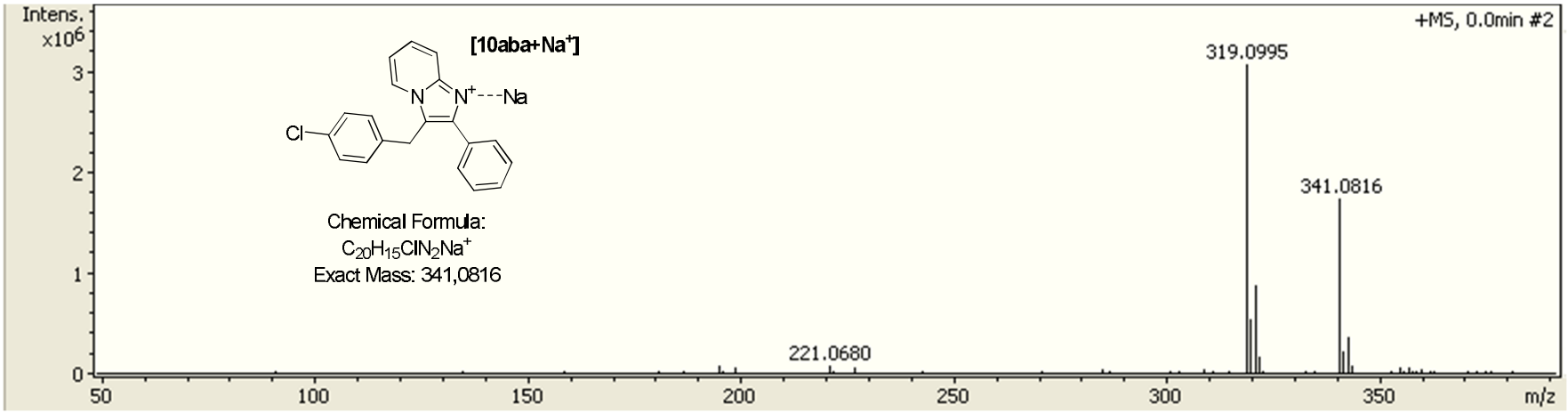

Figure S66. HRMS Chart for 3-(4-Chlorobenzyl)-2-phenylimidazo[1,2-*a*]pyridine **(10aba)**

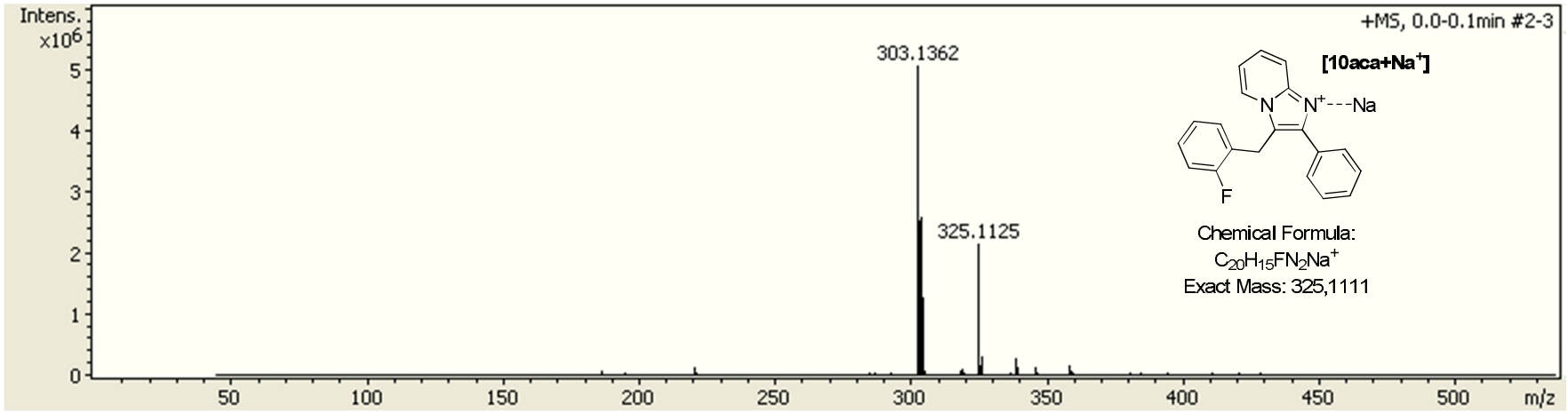

Figure S67. HRMS Chart for 3-(2-Fluorobenzyl)-2-phenylimidazo[1,*2-a*]pyridine **(10aca)**

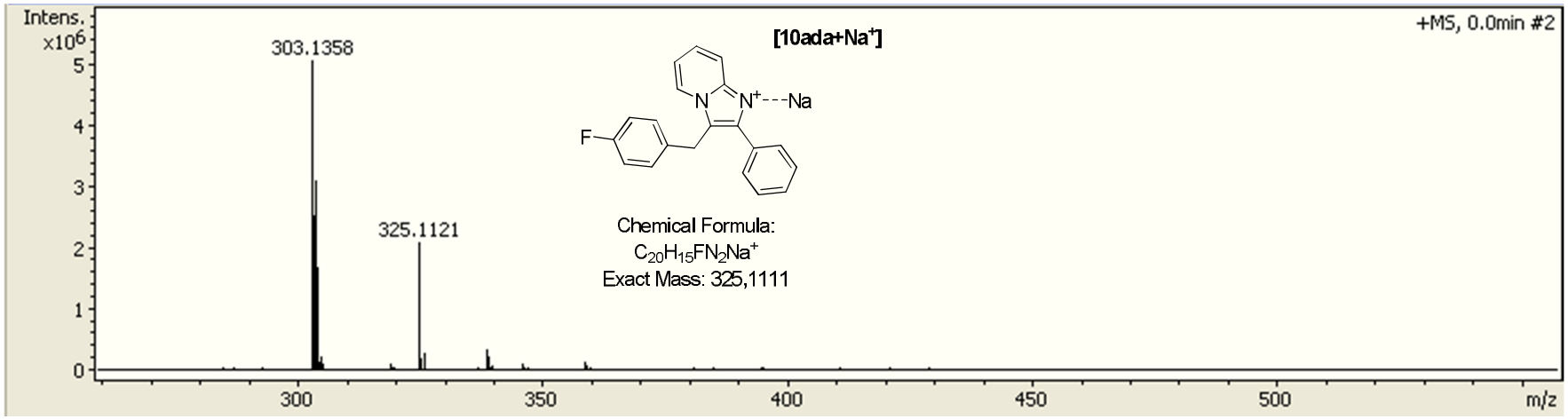

Figure S68. HRMS Chart for 3-(4-Fluorobenzyl)-2-phenylimidazo[1,2-*a*]pyridine **(10ada)**

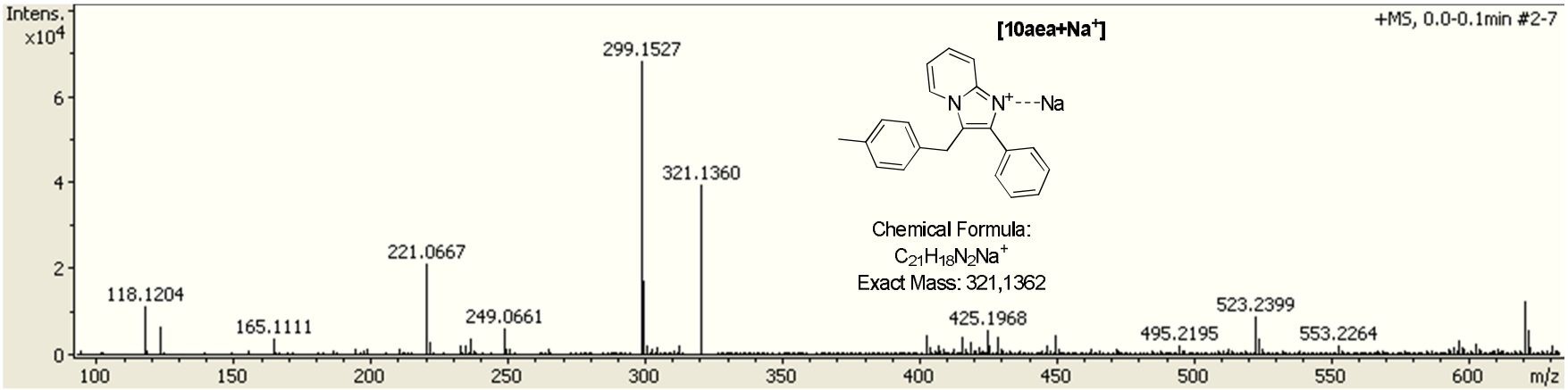

Figure S69. HRMS Chart for 3-(4-Methylbenzyl)-2-phenylimidazo[1,2-*a*]pyridine **(10aea)**

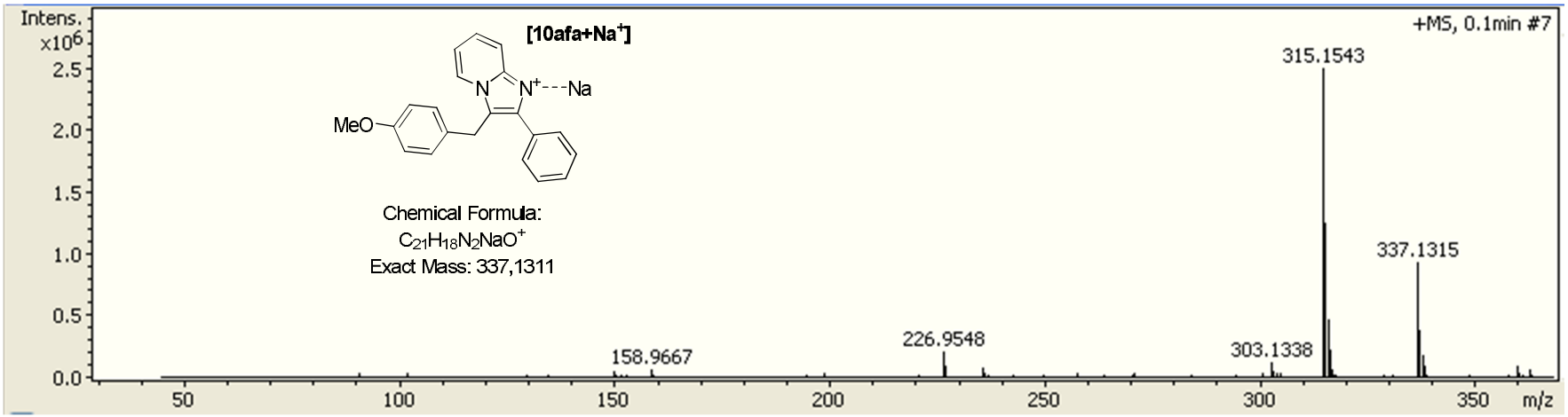

Figure S70. HRMS Chart 3-(4-Methoxybenzyl)-2-phenylimidazo[1,2-*a*]pyridine **(10afa)**

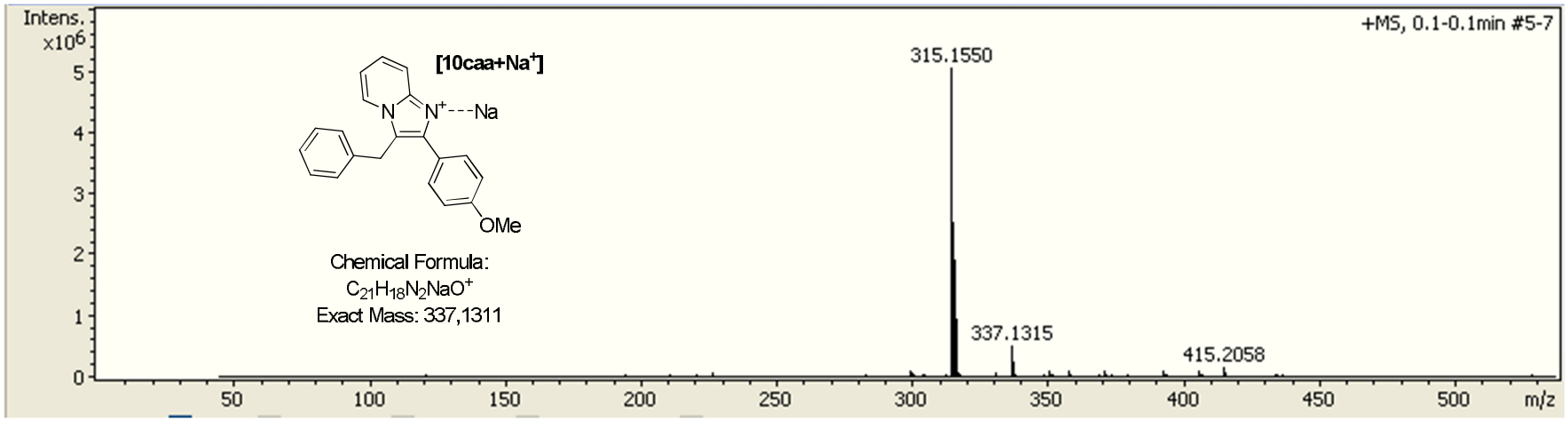

Figure S71. HRMS Chart for 3-Benzyl-2-(4-methoxyphenyl)imidazo[1,2-*a*]pyridine **(10caa)**

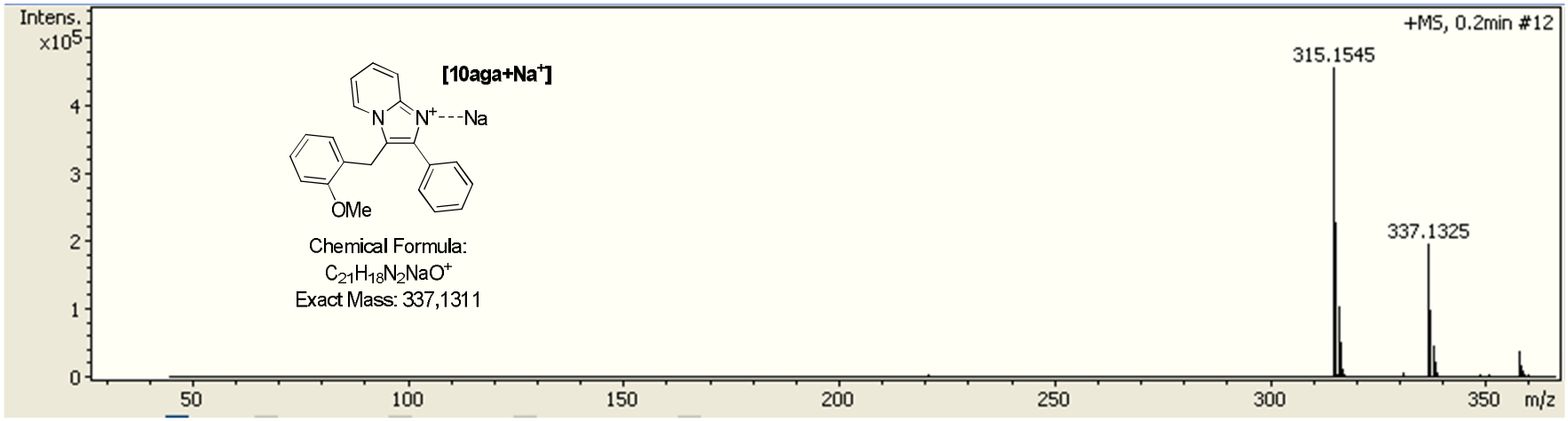

Figure S72. HRMS Chart for 3-(2-Methoxybenzyl)-2-phenylimidazo[1,2-*a*]pyridine **(10aga)**

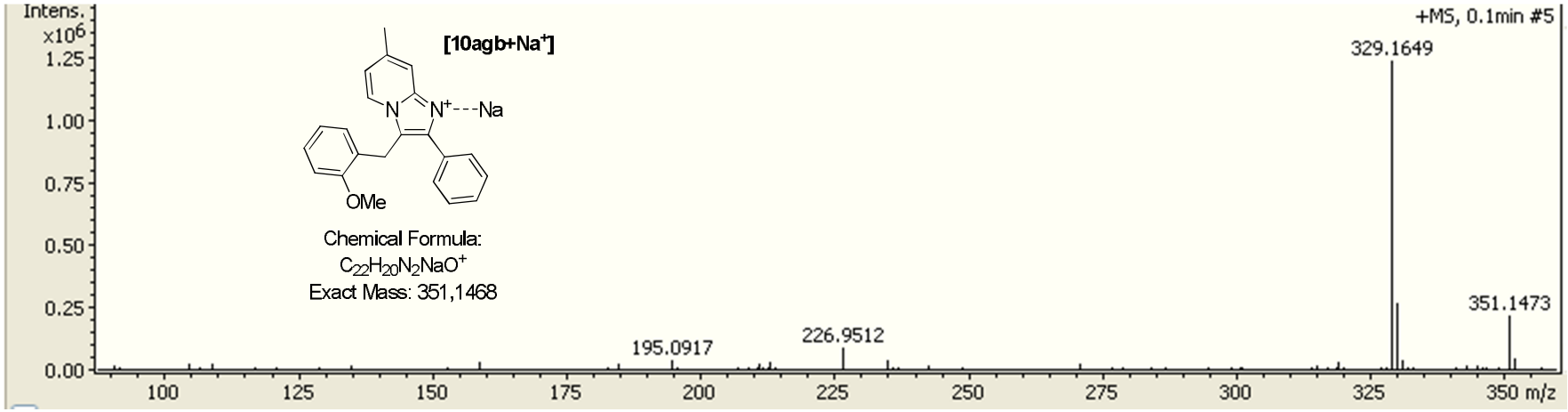

Figure S73. HRMS Chart for3-(2-Methoxybenzyl)-7-methyl-2-phenylimidazo[1,2-*a*]pyridine **(10agb)**

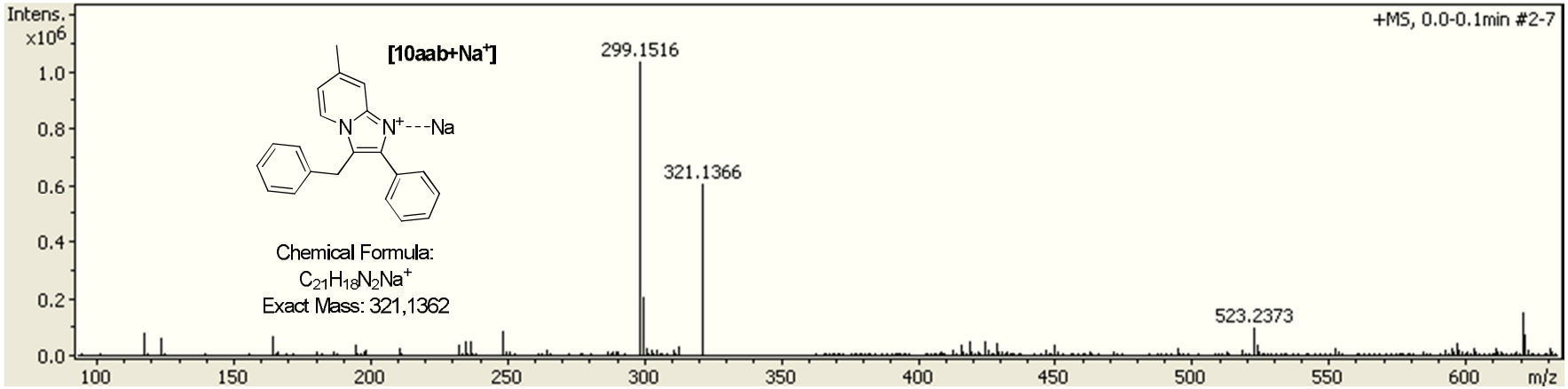

Figure S74. HRMS Chart for 3-Benzyl-7-methyl-2-phenylimidazo[1,2-*a*]pyridine **(10aab)**

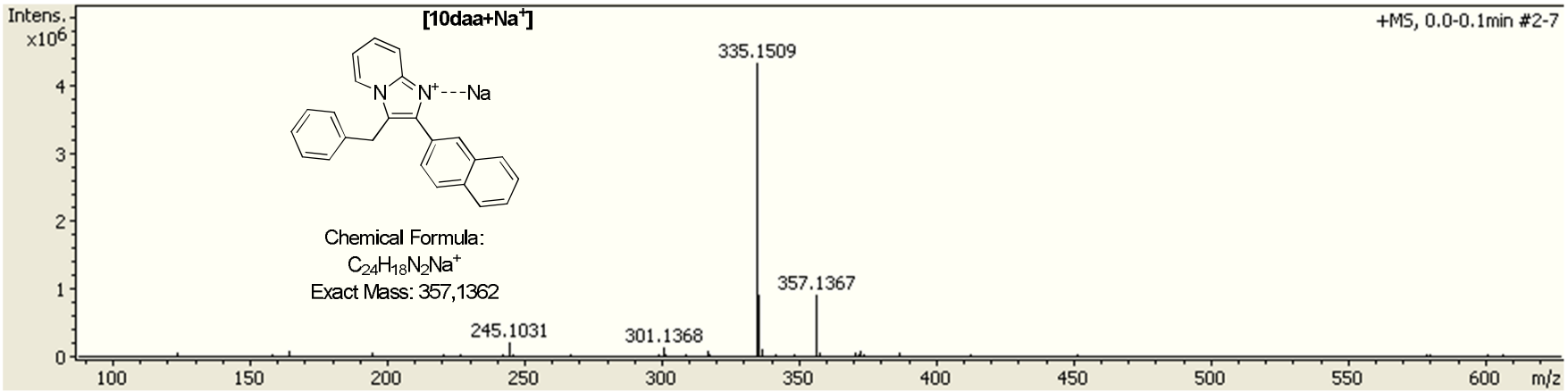

Figure S75. HRMS Chart for 3-Benzyl-2-(naphthalen-2-yl)imidazo[1,2-*a*]pyridine **(10daa)**

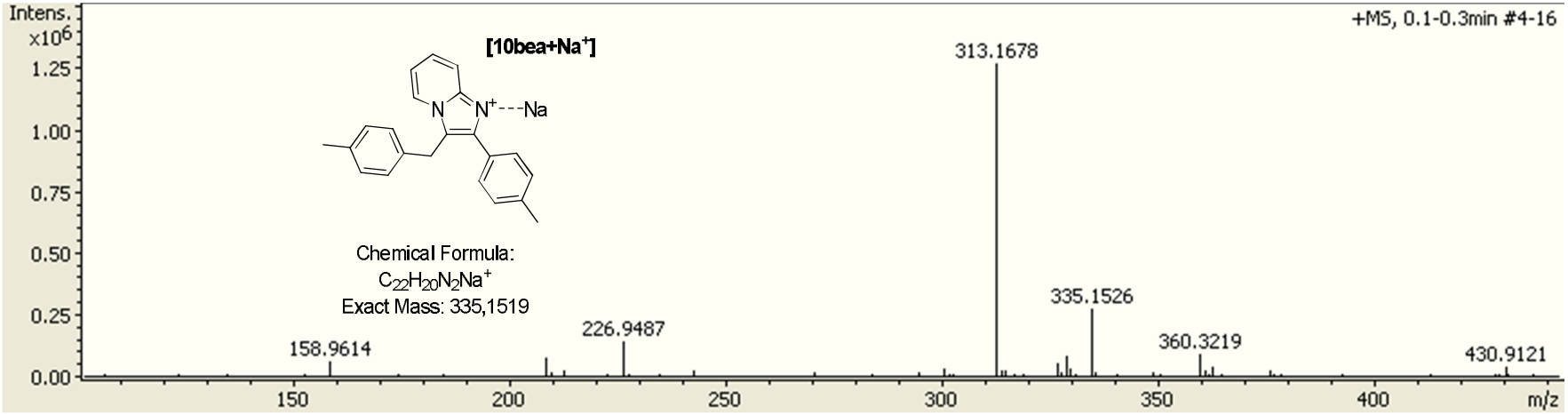

Figure S76. HRMS Chart for 3-(4-Methylbenzyl)-2-(*p*-tolyl)imidazo[1,2-*a*]pyridine **(10bea)**

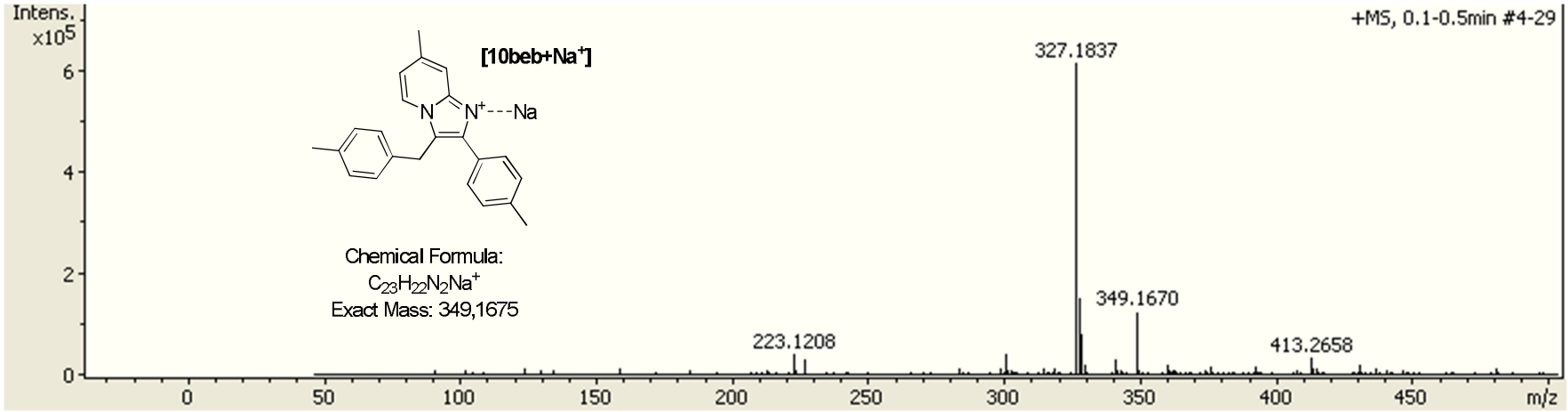

Figure S77. HRMS Chart for 7-Methyl-3-(4-methylbenzyl)-2-(*p*-tolyl)imidazo[1,2-*a*]pyridine **(10beb)**

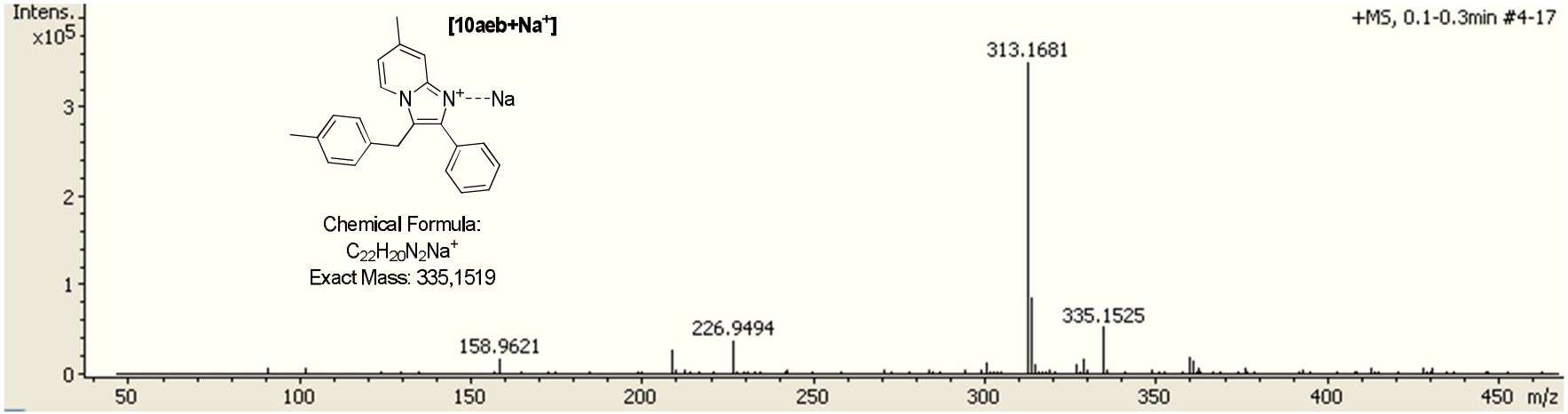

Figure S78. HRMS Chart for 7-Methyl-3-(4-methylbenzyl)-2-phenylimidazo[1,2-*a*]pyridine **(10aeb)**

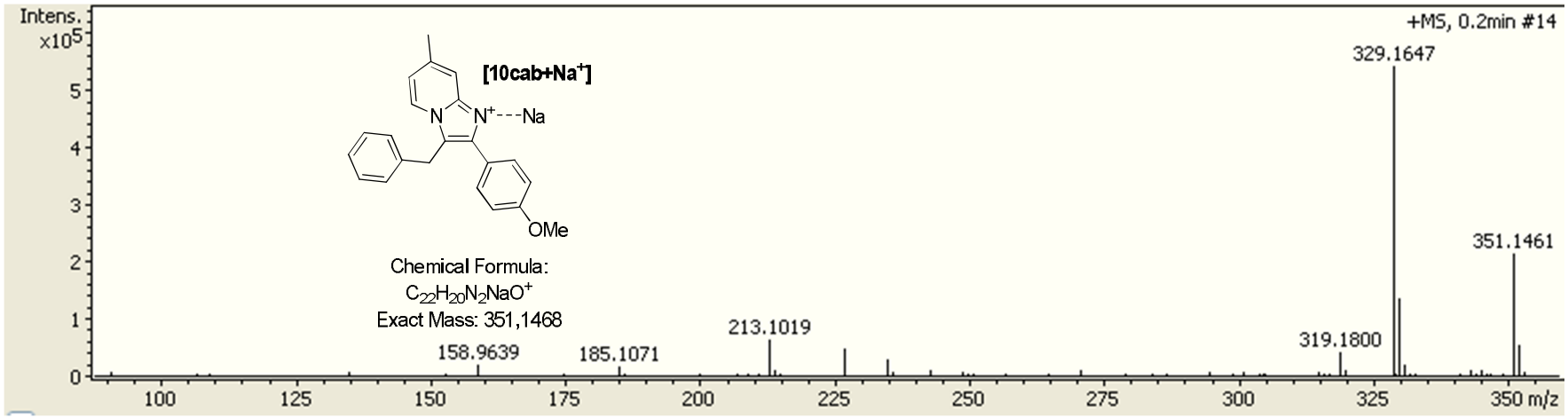

Figure S79. HRMS Chart for 3-Benzyl-2-(4-methoxyphenyl)-7-methylimidazo[1,2-*a*]pyridine **(10cab)**

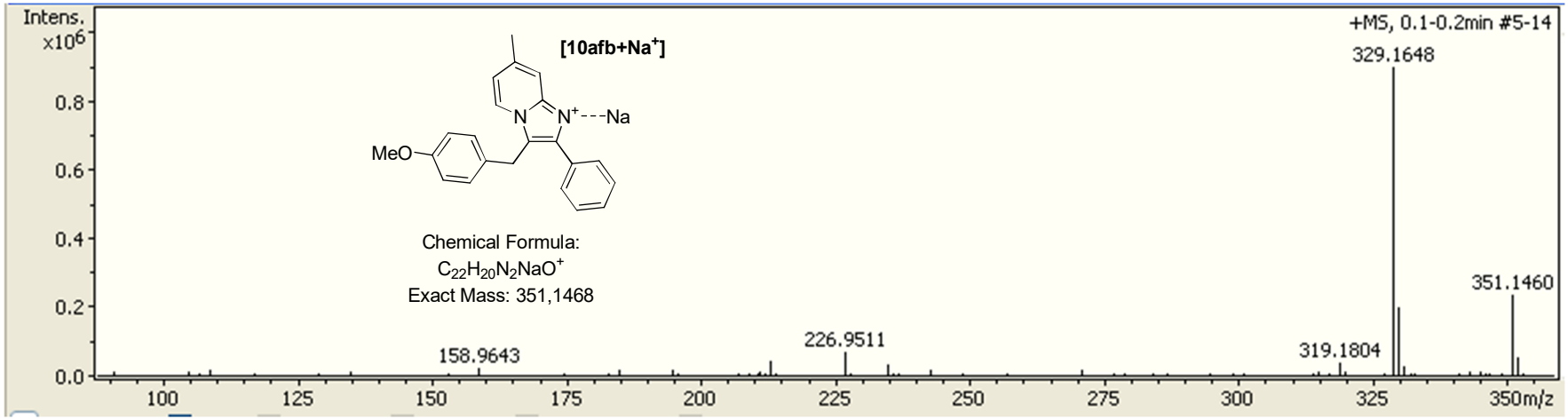

Figure S80. HRMS Chart for 3-(4-Methoxybenzyl)-7-methyl-2-phenylimidazo[1,2-*a*]pyridine **(10afb)**

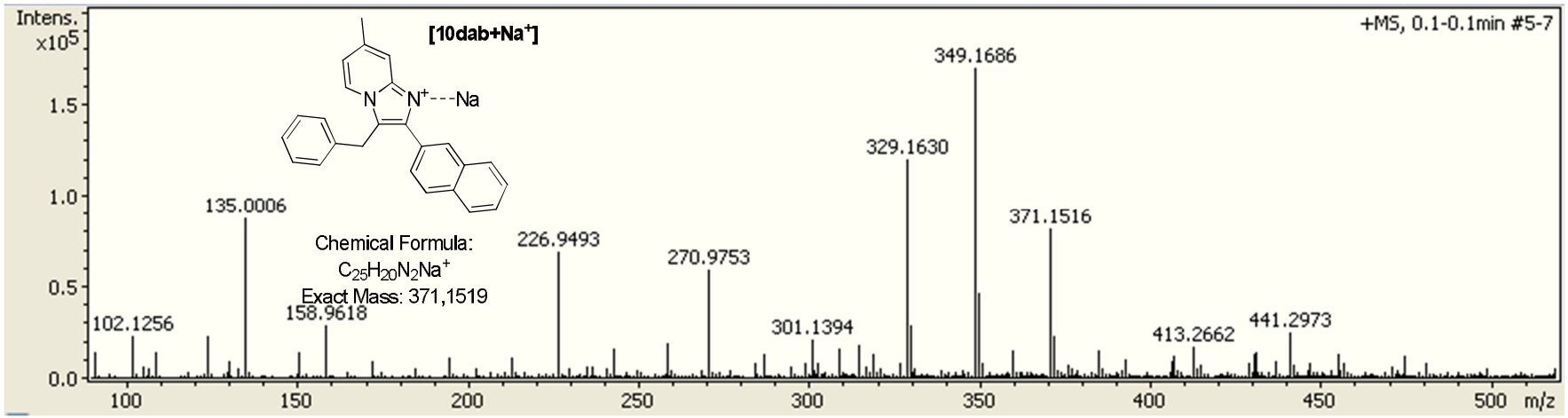

Figure S81. HRMS Chart for 3-Benzyl-2-(4-methoxyphenyl)-7-methylimidazo[1,2-*a*]pyridine **(10dab)**

HRMS spectral chart for 3,5-diphenyl-3H-pyrrol-2-one 15aa

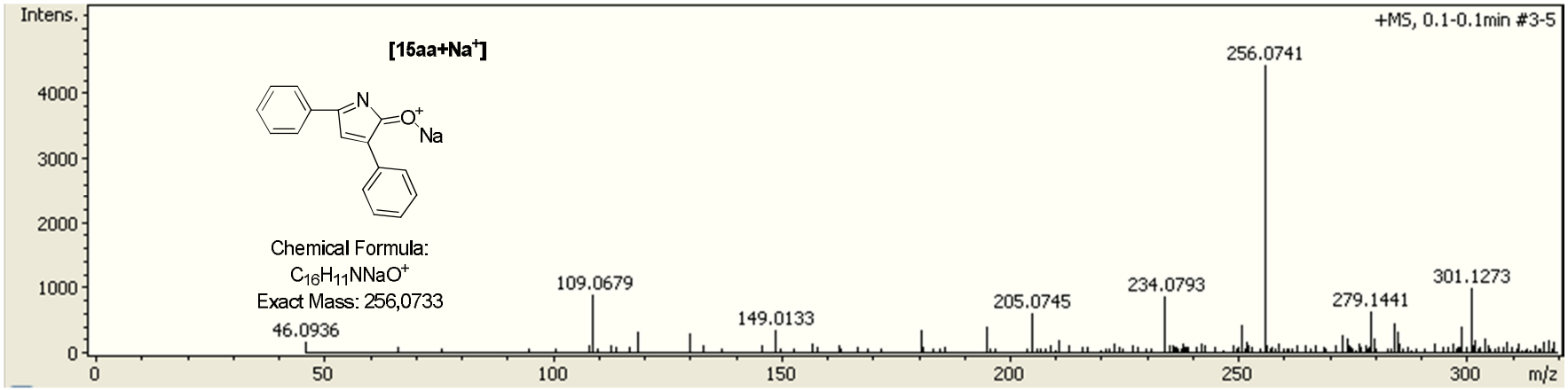

Figure S82. HRMS Chart for 3,5-diphenyl-3*H*-pyrrol-2-one **(15aa)**

HRMS spectral chart for *N*-(2-aminophenyl)-2-phenylacetamide 16aa

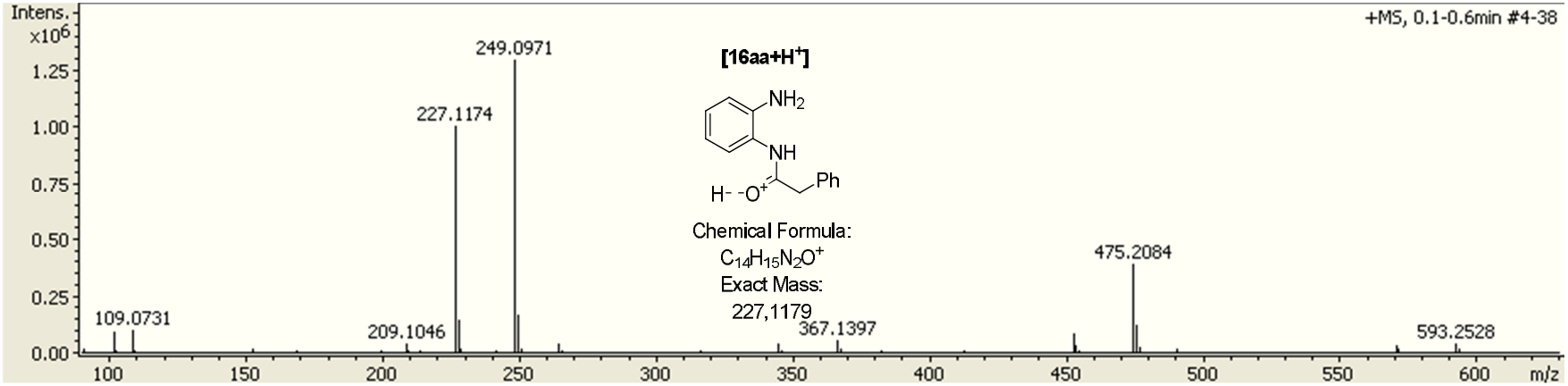

Figure S83. HRMS Chart for *N*-(2-aminophenyl)-2-phenylacetamide **(16aa)**

HRMS spectral chart for 2-Benzyl-1*H*-benzo[*d*]imidazole 17aa

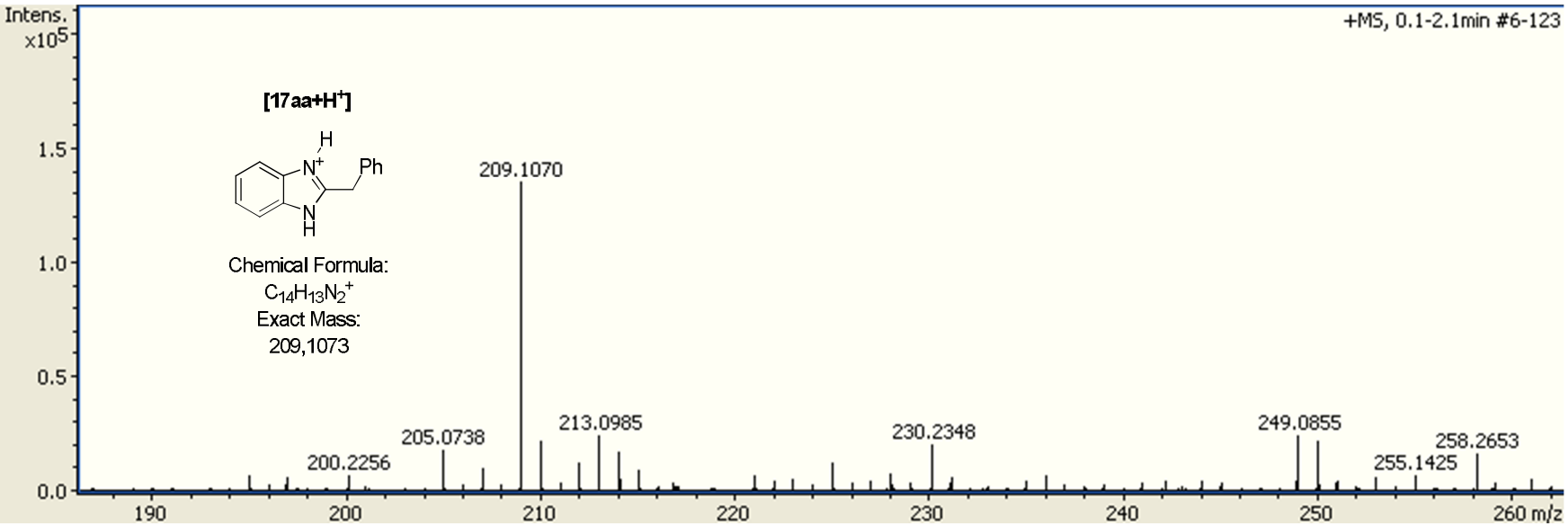

Figure S84. HRMS Chart for 2-Benzyl-1*H*-benzo[*d*]imidazole **(17aa)**

HRMS spectral chart of aqueous phase of the reaction between hydroxylactam 1aa and phenylenediamine 6a

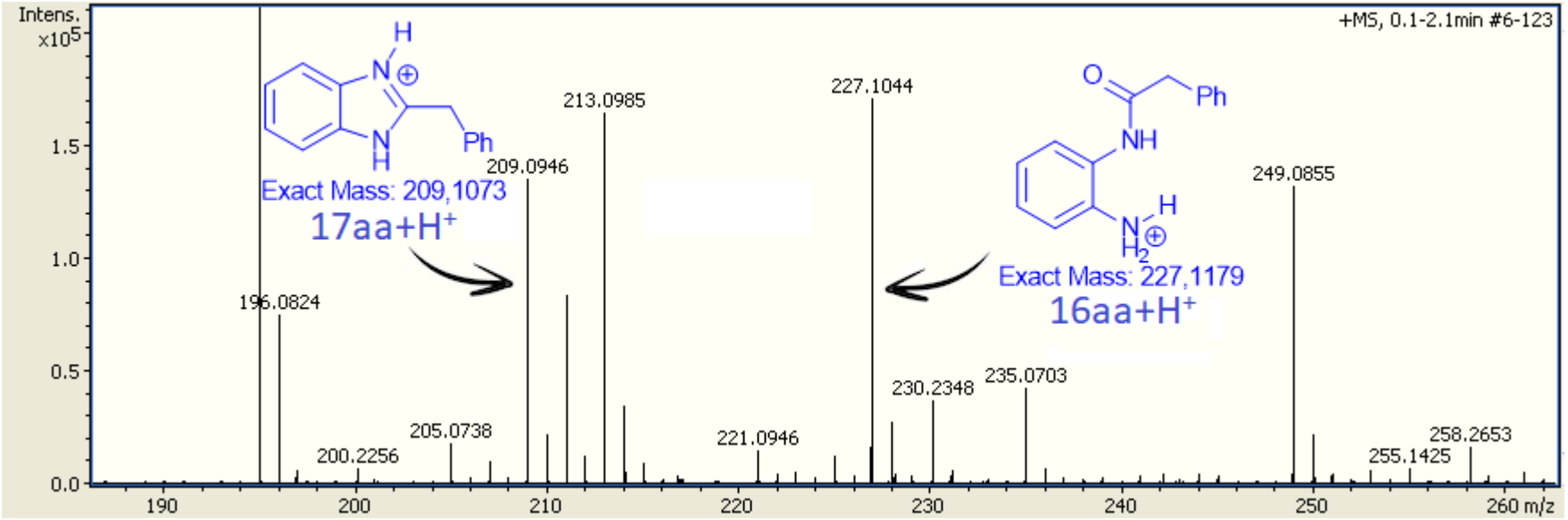

Figure S85. Mass spectrum of aqueous phase of the reaction between hydroxylactam **1aa** and phenylenediamine **6a**