

APPENDIX 3

Spectra Relevant to Chapter 4:

Ni-Catalyzed Enantioselective C-Acylation of α -Substituted Lactams

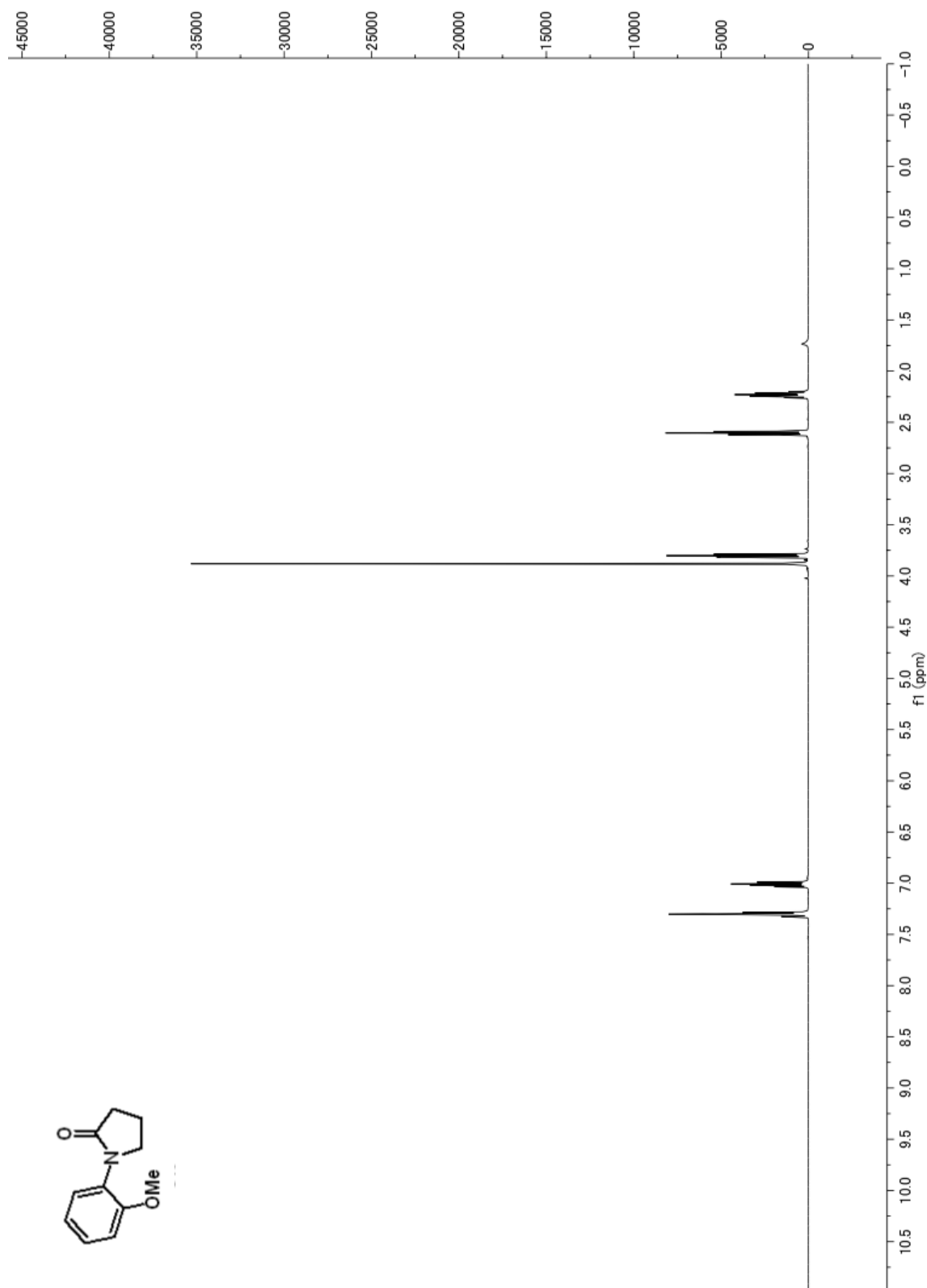
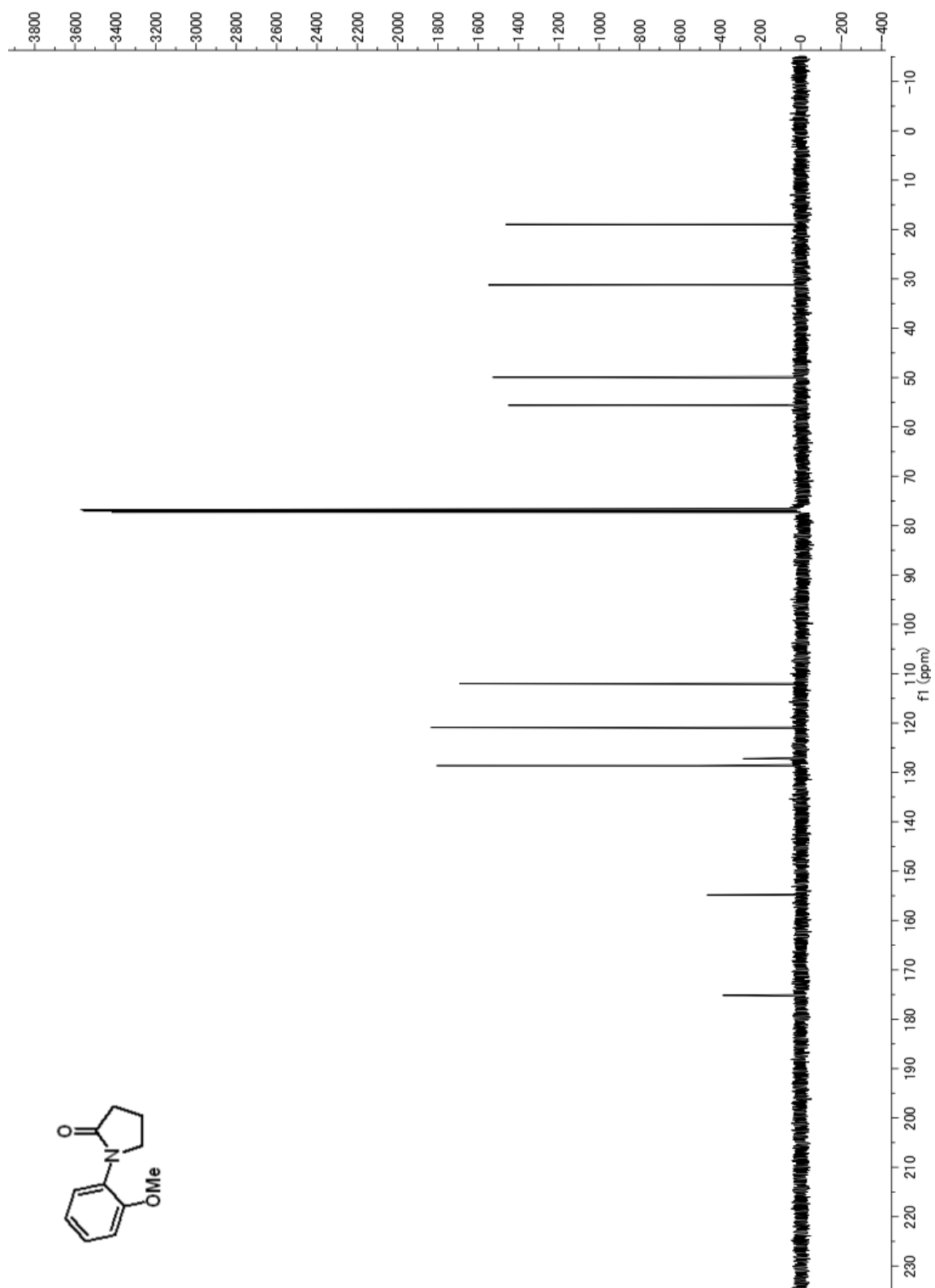
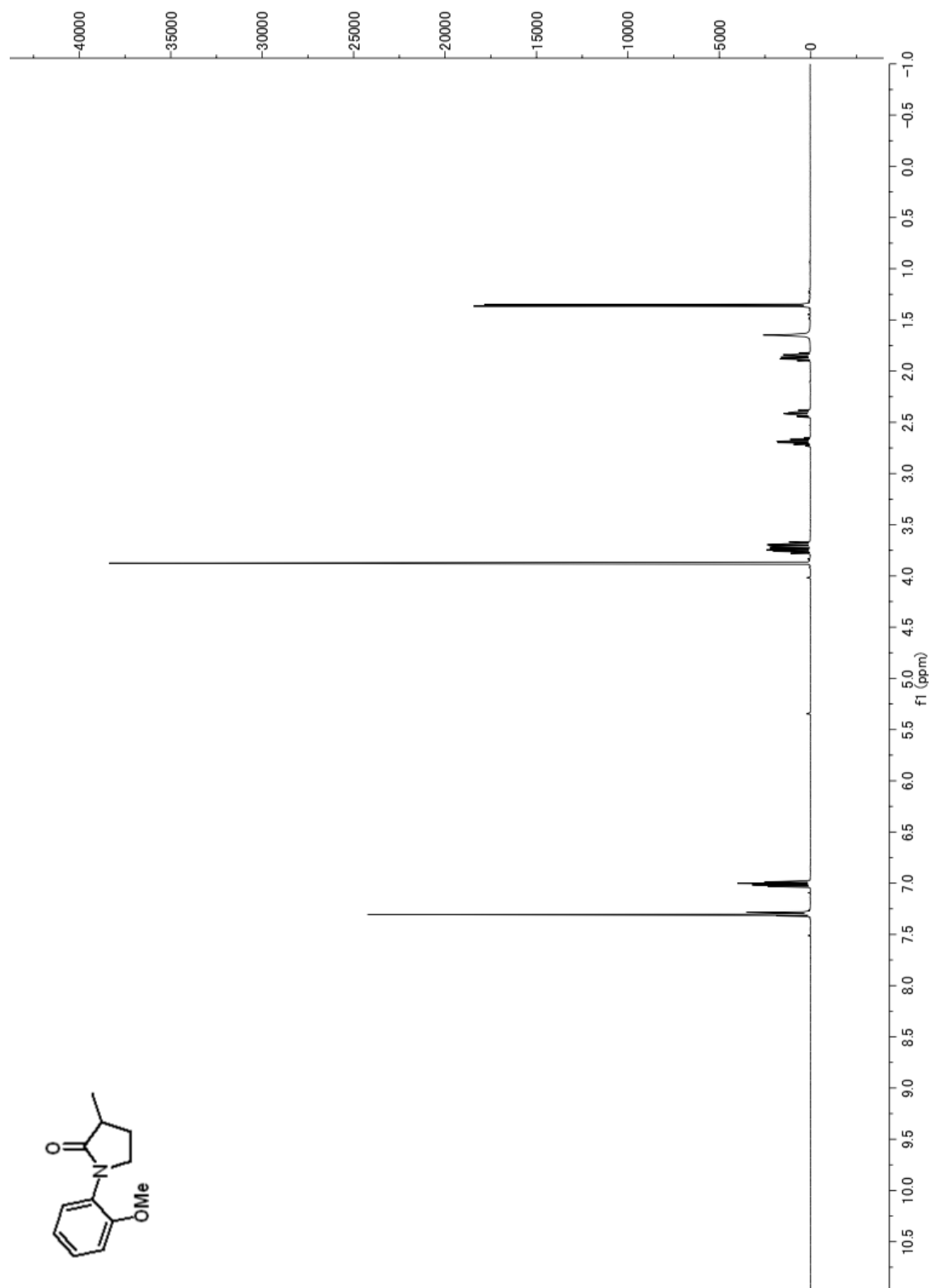
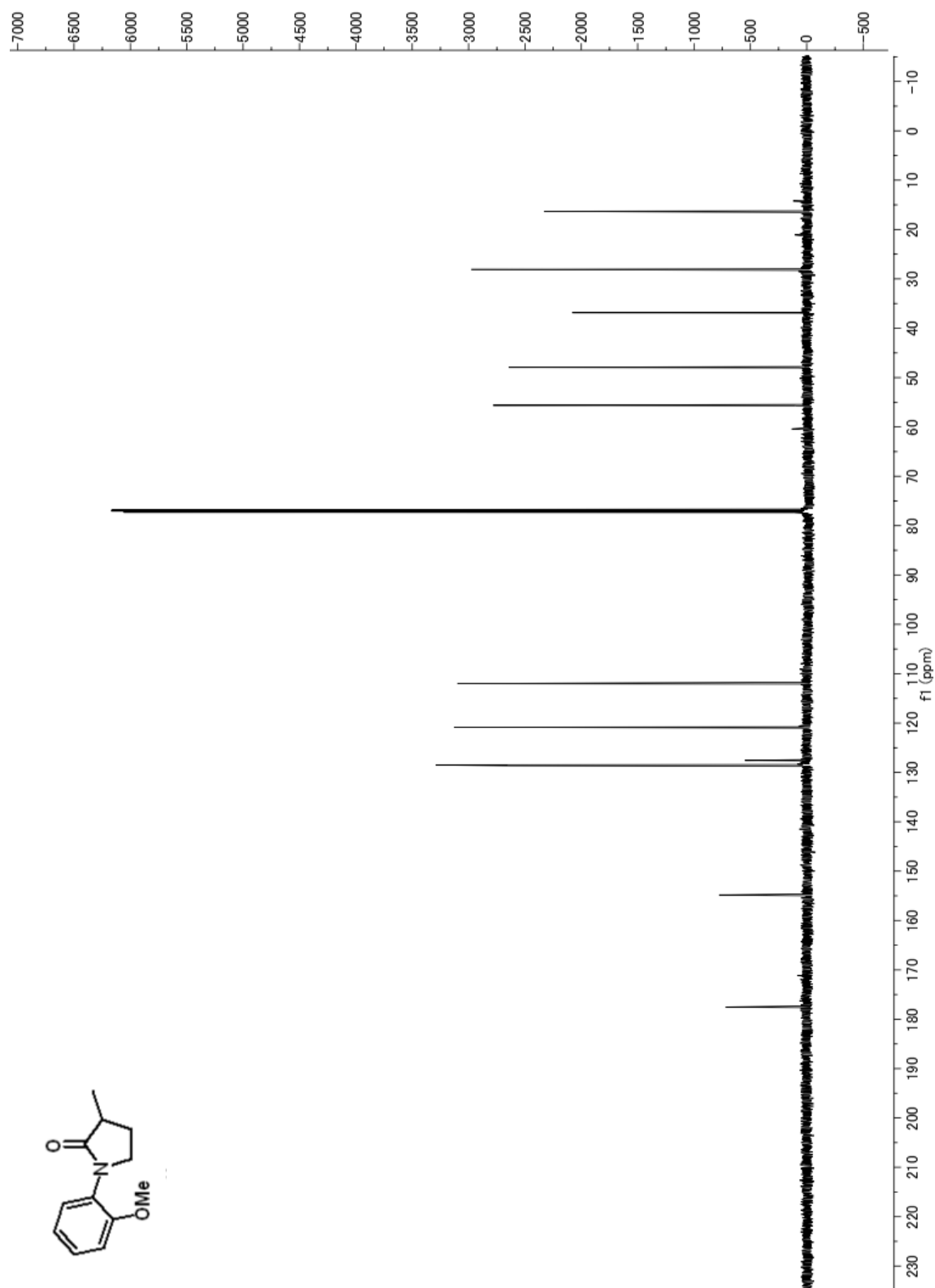
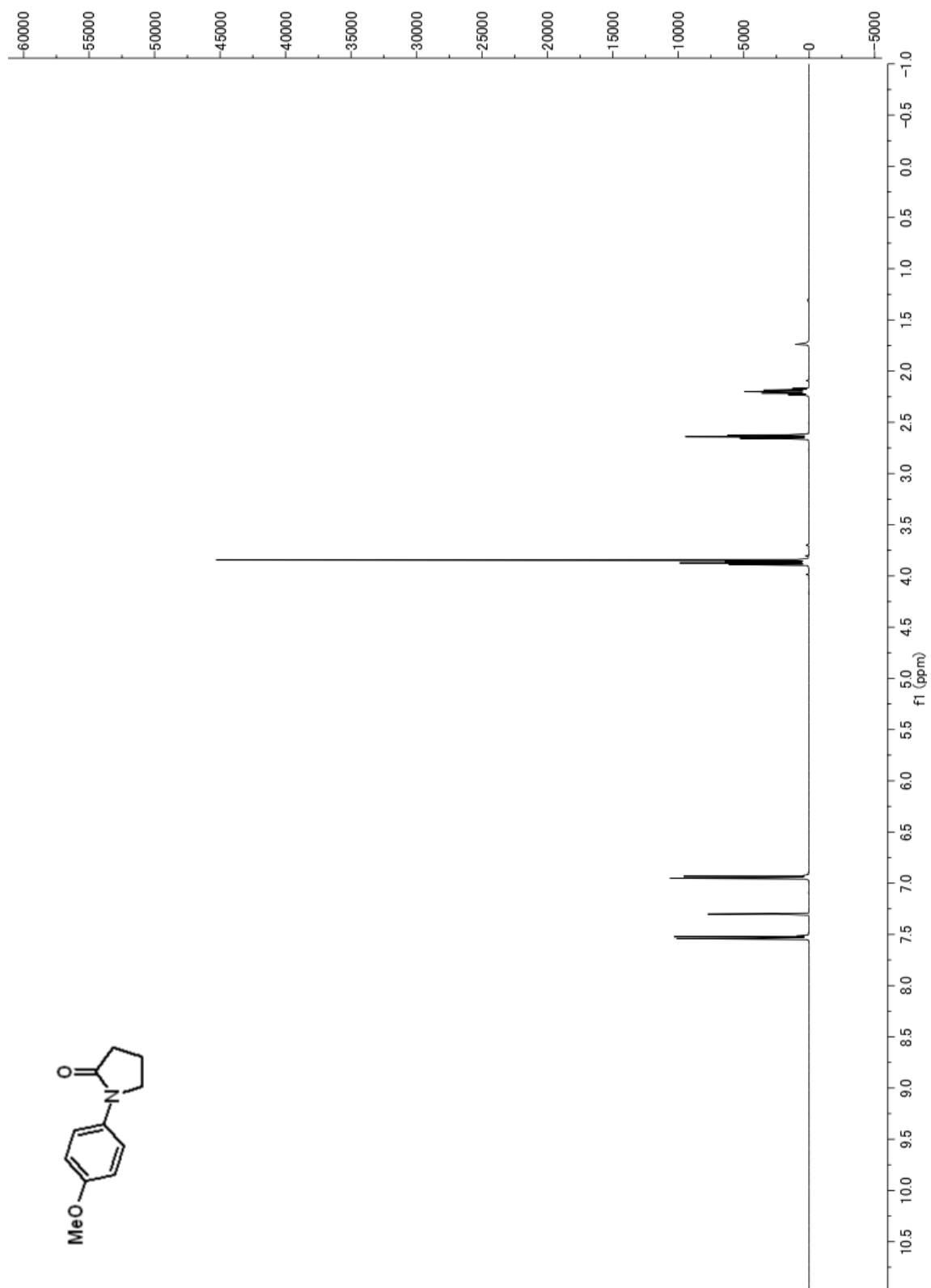


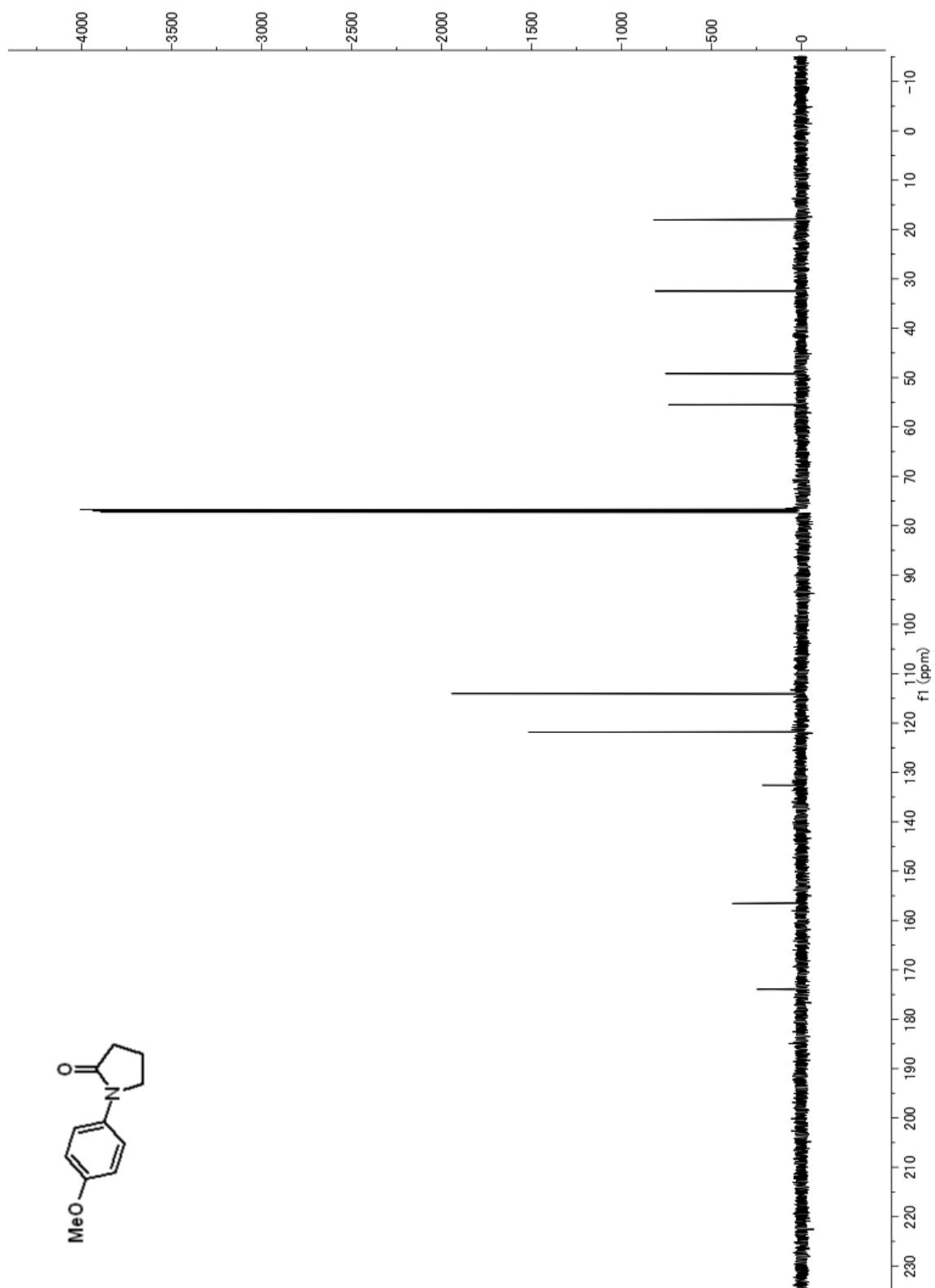
Figure A3.1. ^1H NMR (500 MHz, CDCl_3) of compound **512**.

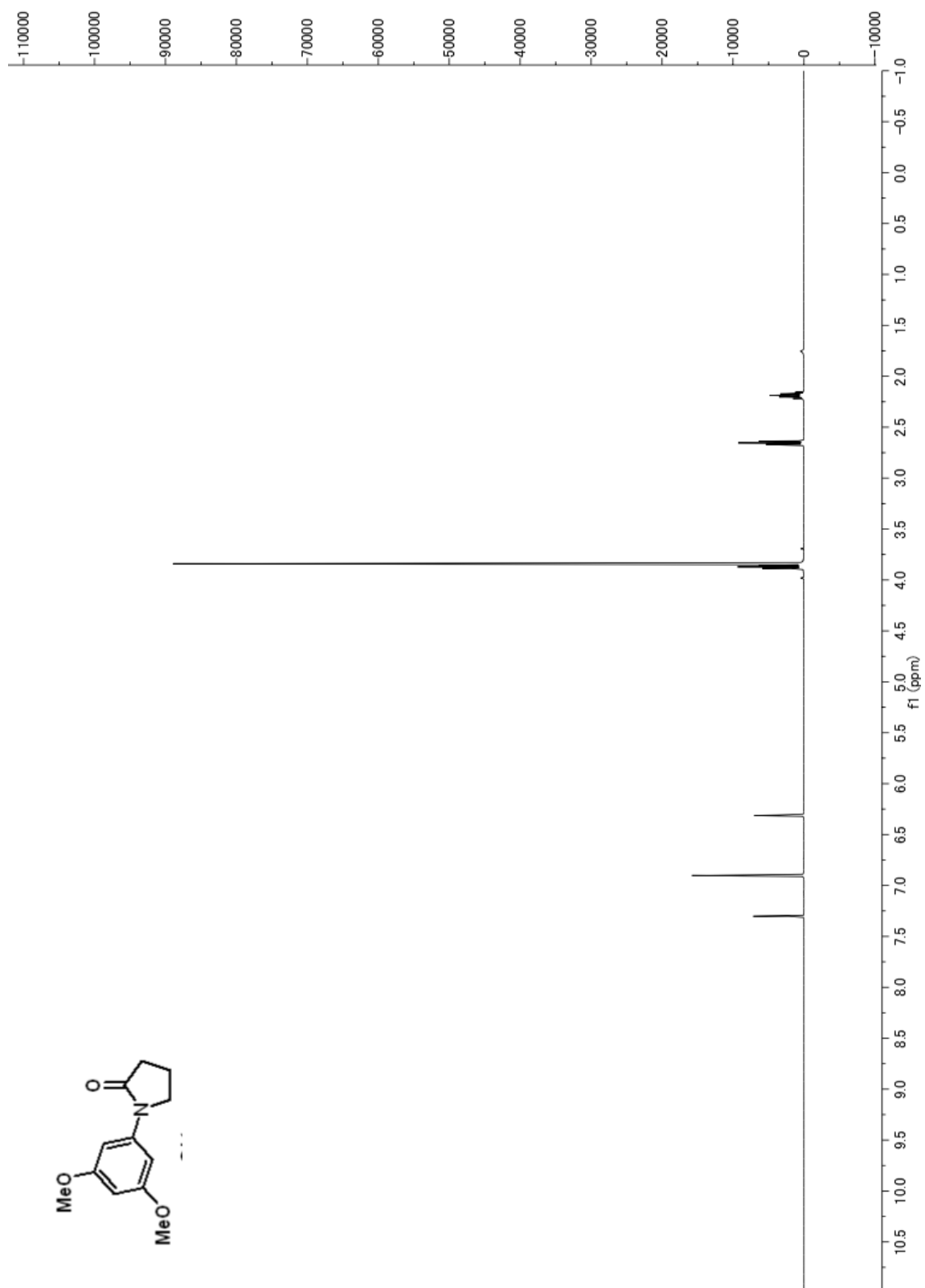
Figure A3.2. ¹³C NMR (126 MHz, CDCl₃) of compound SI2.

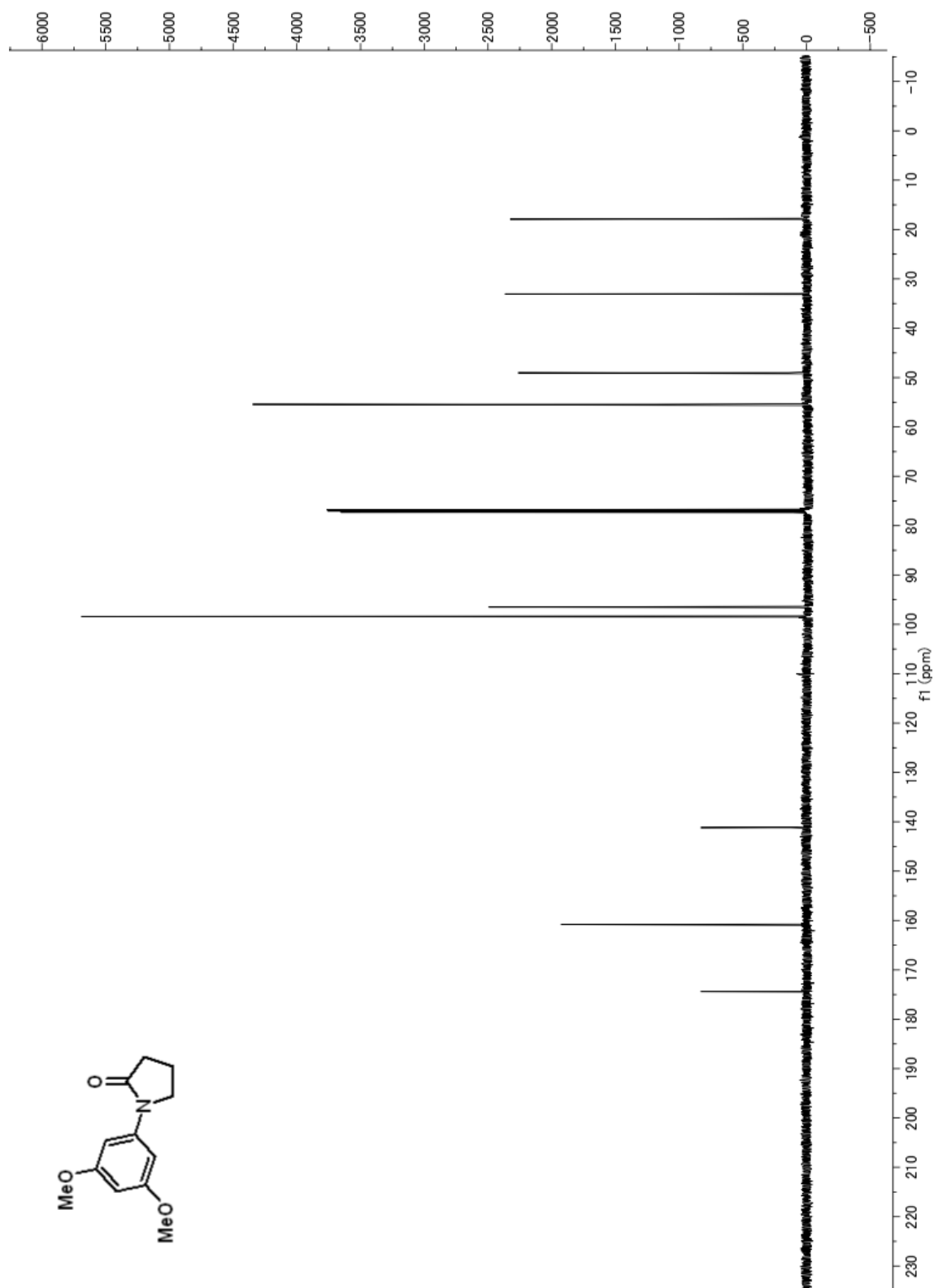
Figure A3.3. ^1H NMR (500 MHz, CDCl_3) of compound **57b**.

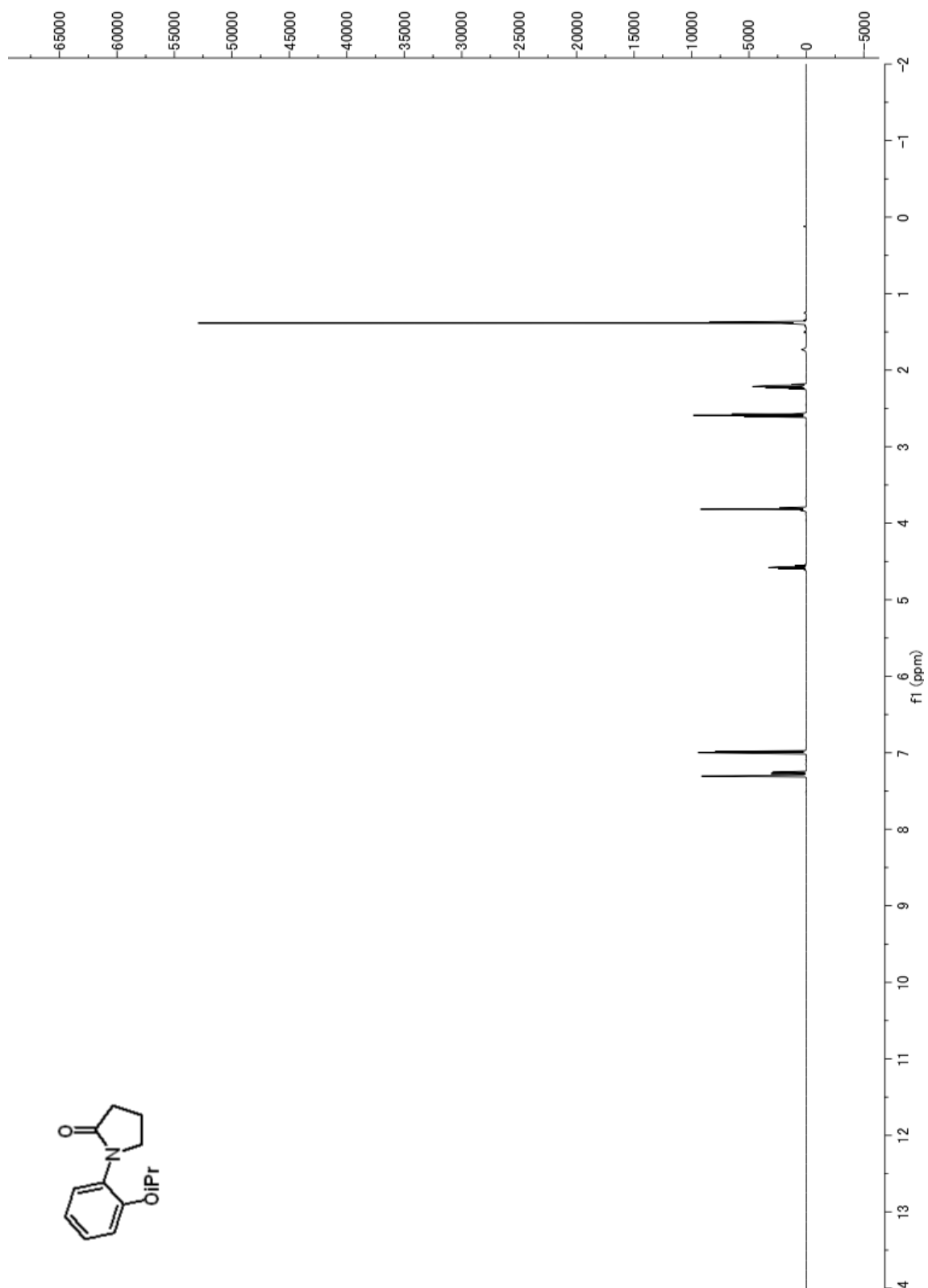
Figure A3.4. ¹³C NMR (126 MHz, CDCl₃) of compound 57b.

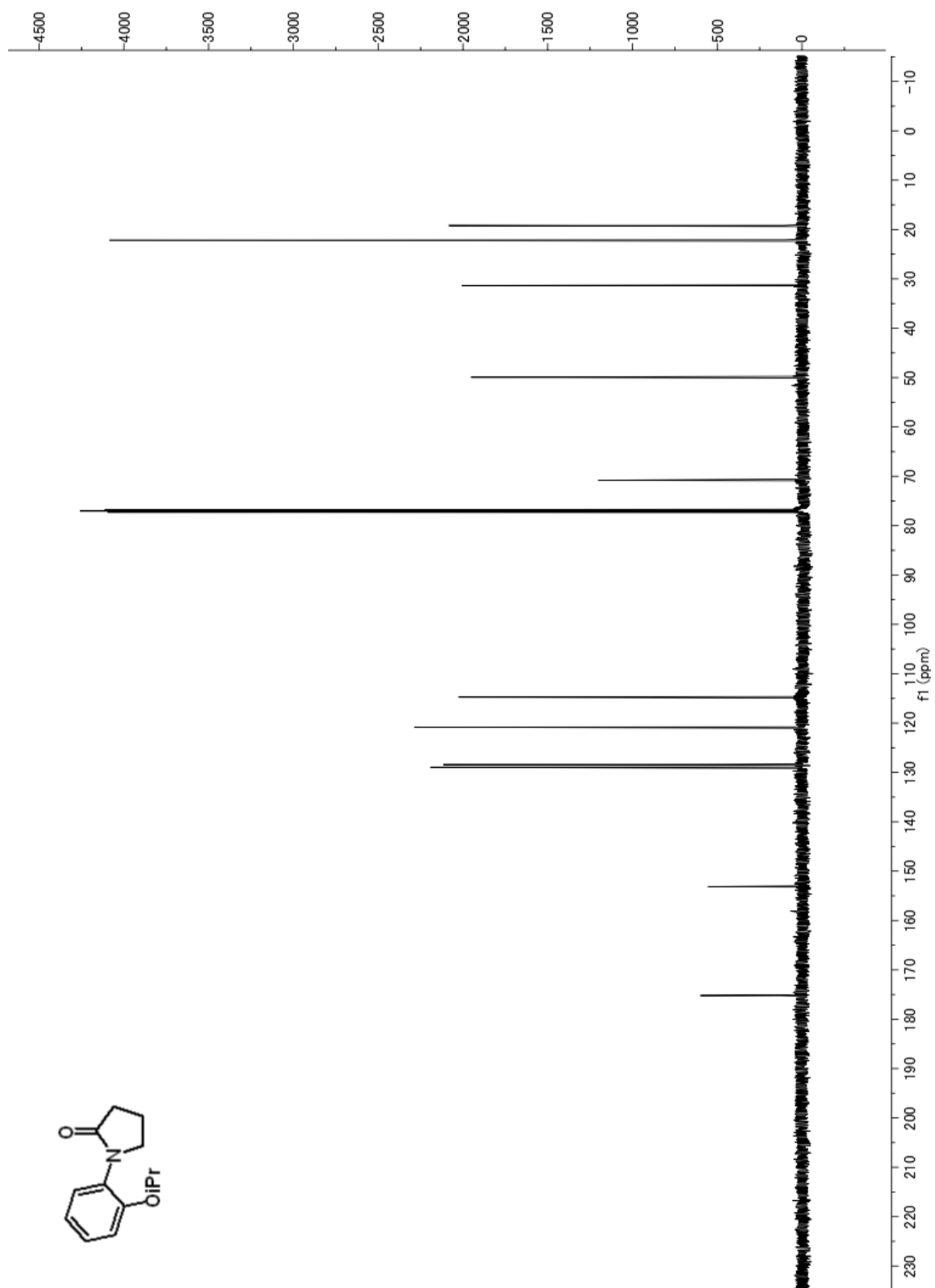
Figure A3.5. ¹H NMR (500 MHz, CDCl₃) of compound S13.

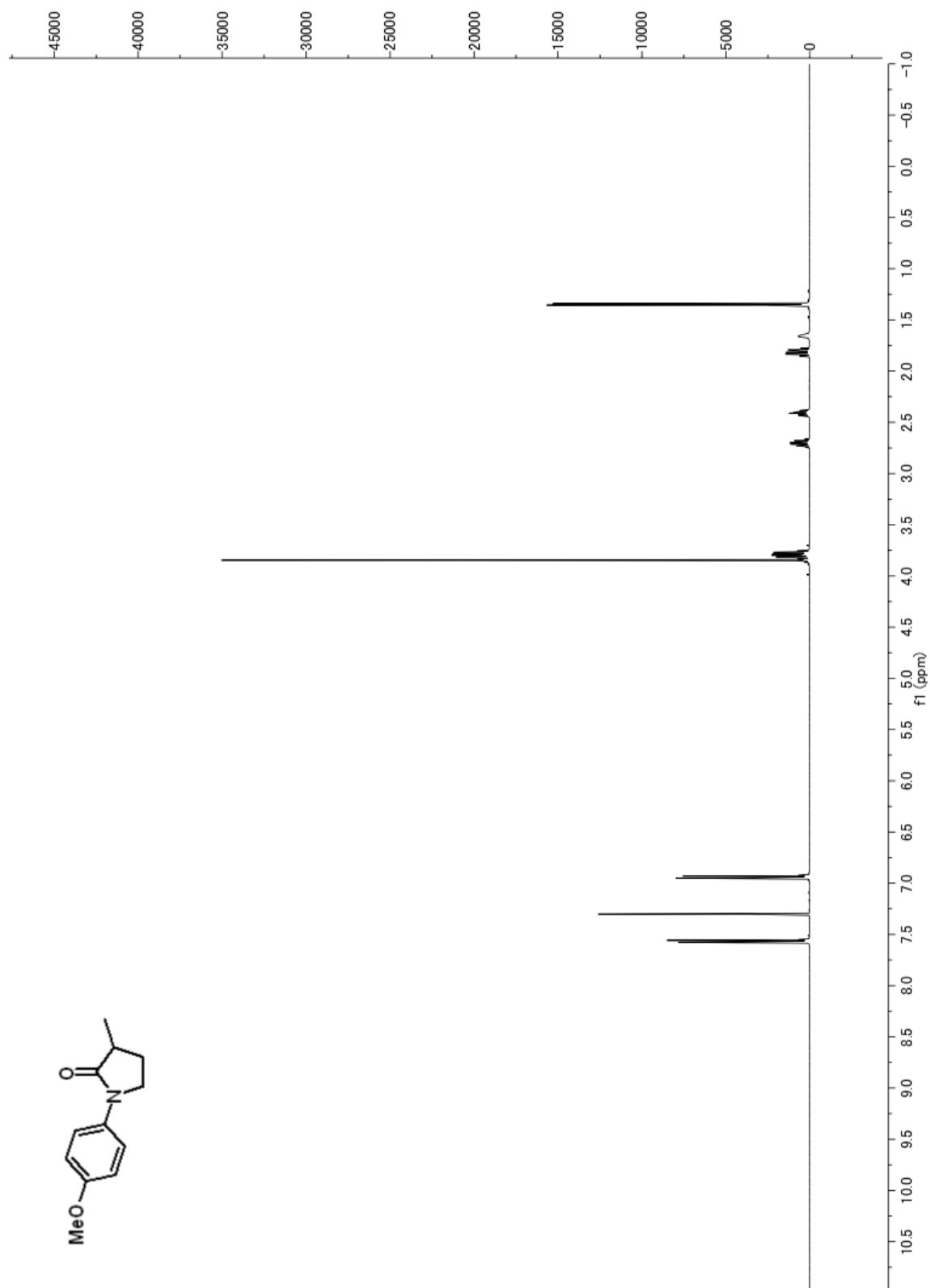
Figure A3.6. ^{13}C NMR (126 MHz, CDCl_3) of compound **SI3**.

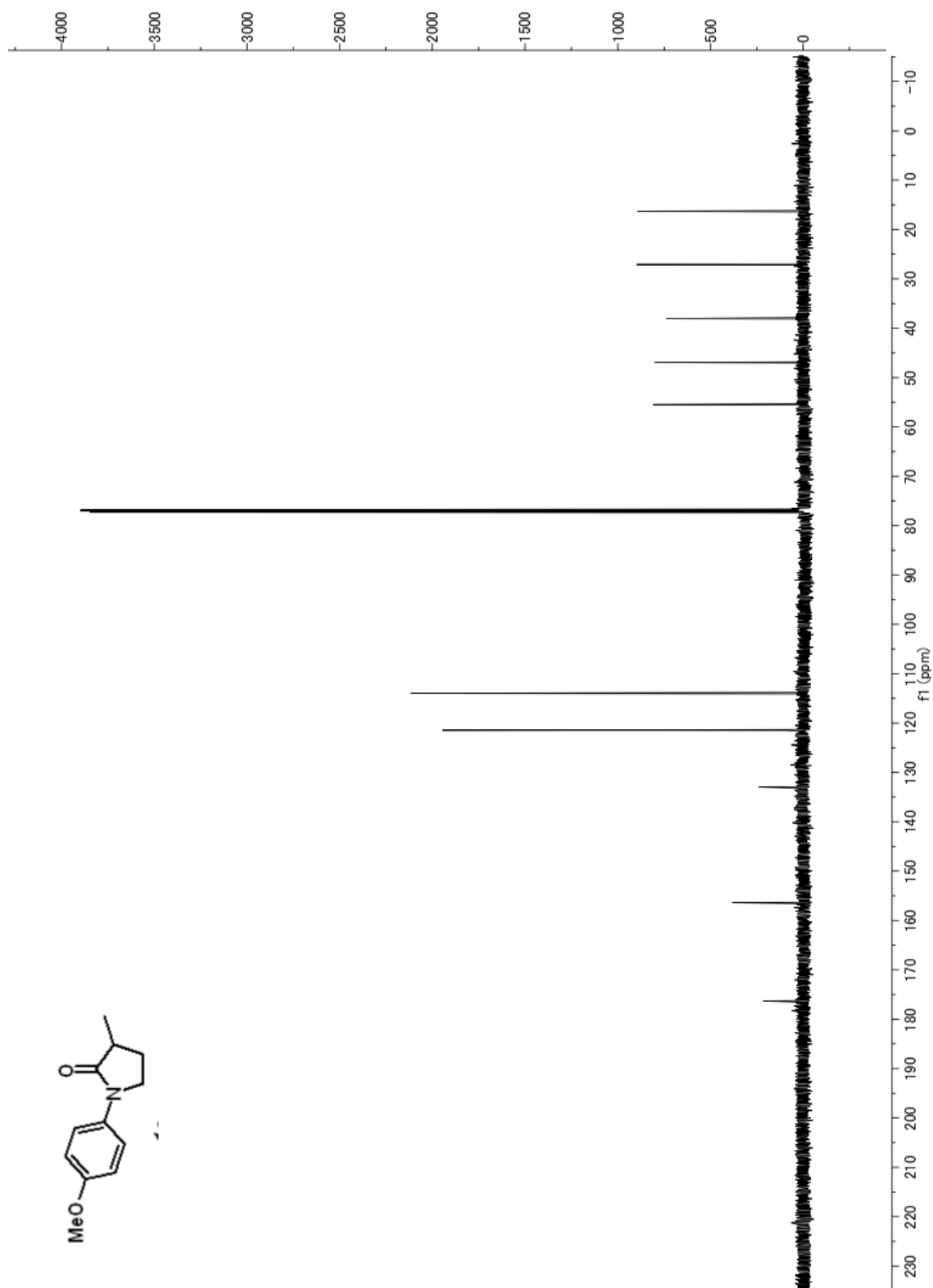
Figure A3.7. ¹H NMR (500 MHz, CDCl₃) of compound **SI4**.

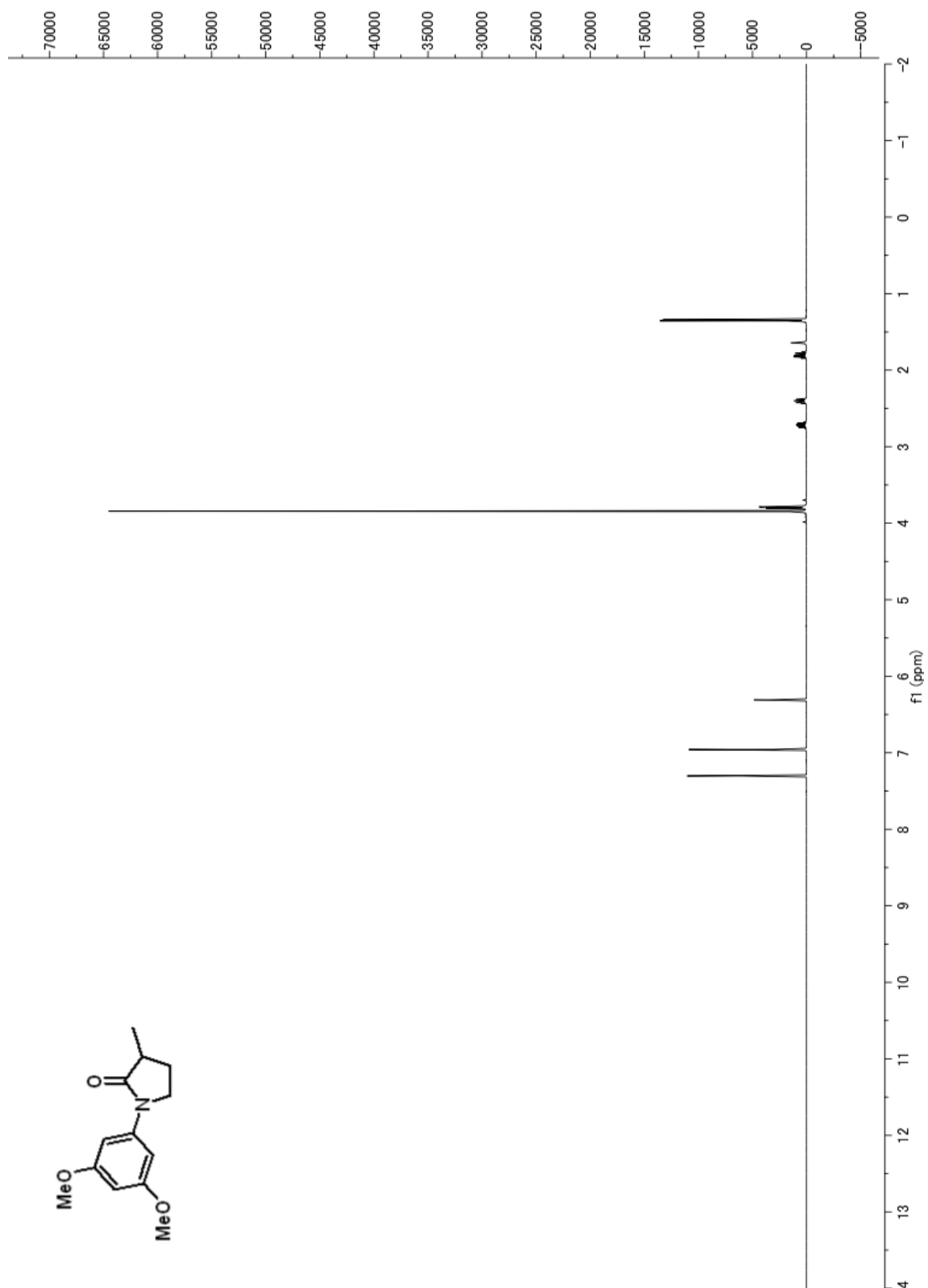
Figure A3.8. ¹³C NMR (126 MHz, CDCl₃) of compound **S14**.

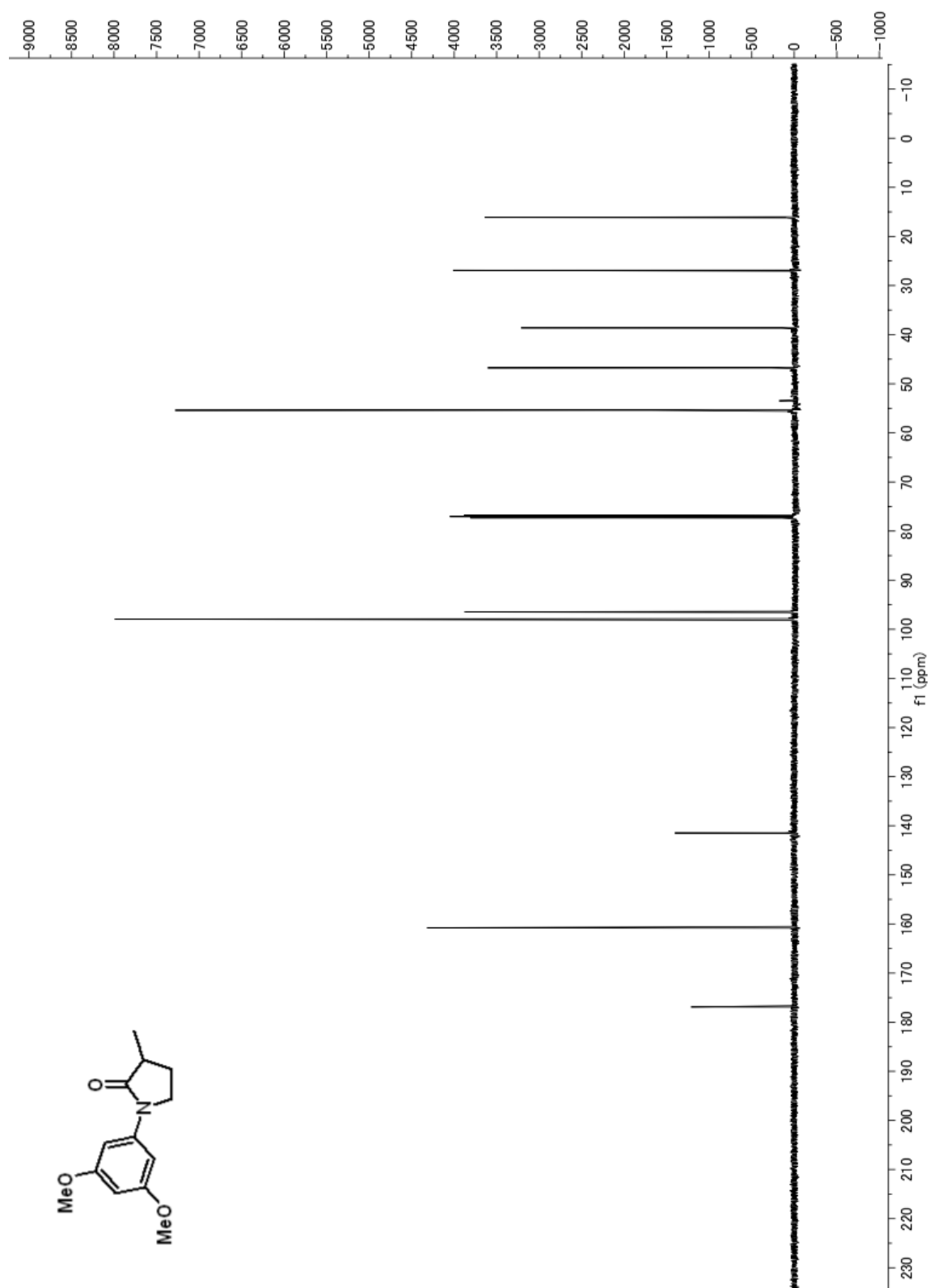
Figure A3.9. ^1H NMR (500 MHz, CDCl_3) of compound **S15**.

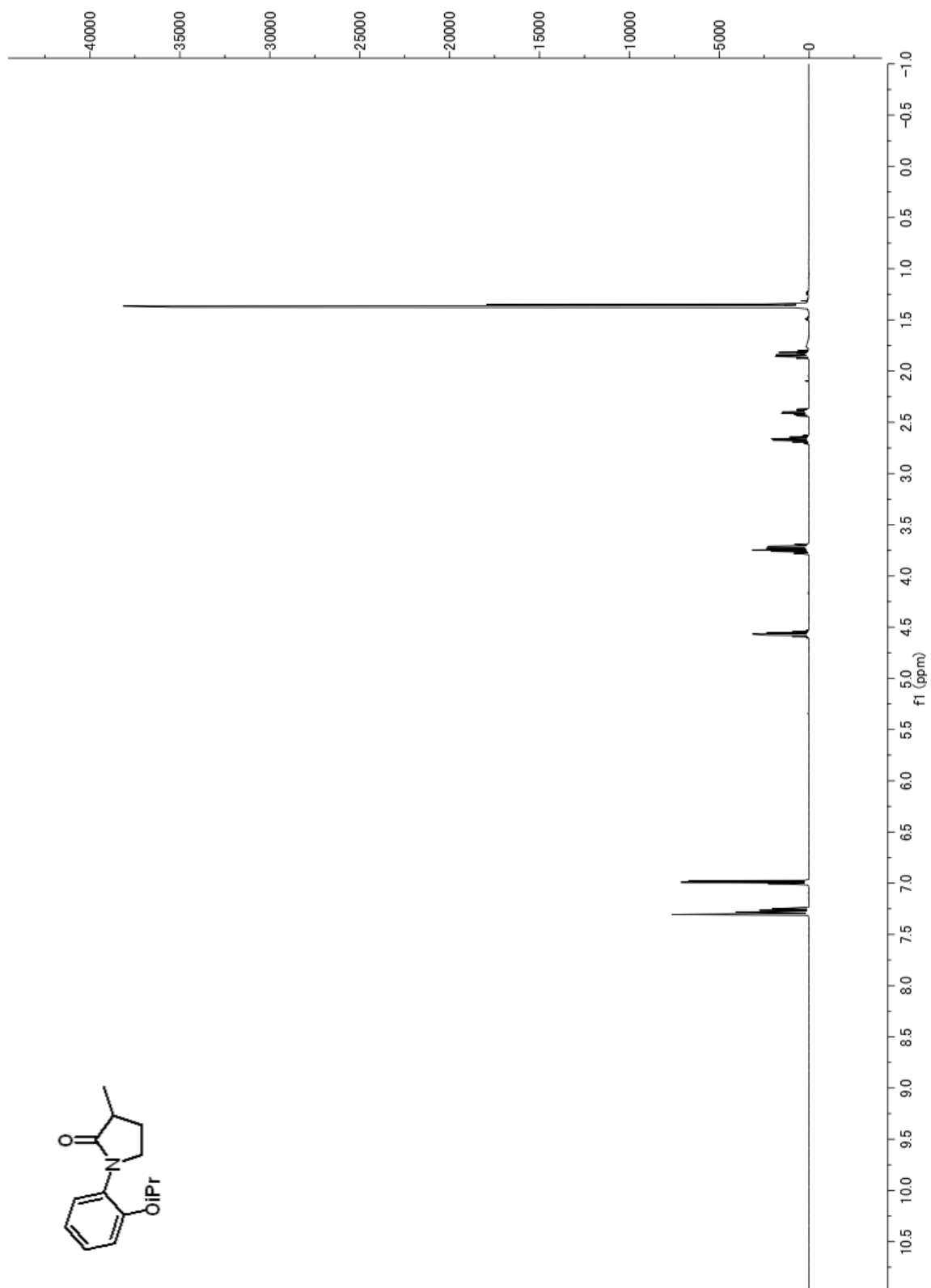
Figure A3.10. ¹³C NMR (126 MHz, CDCl₃) of compound **S15**.

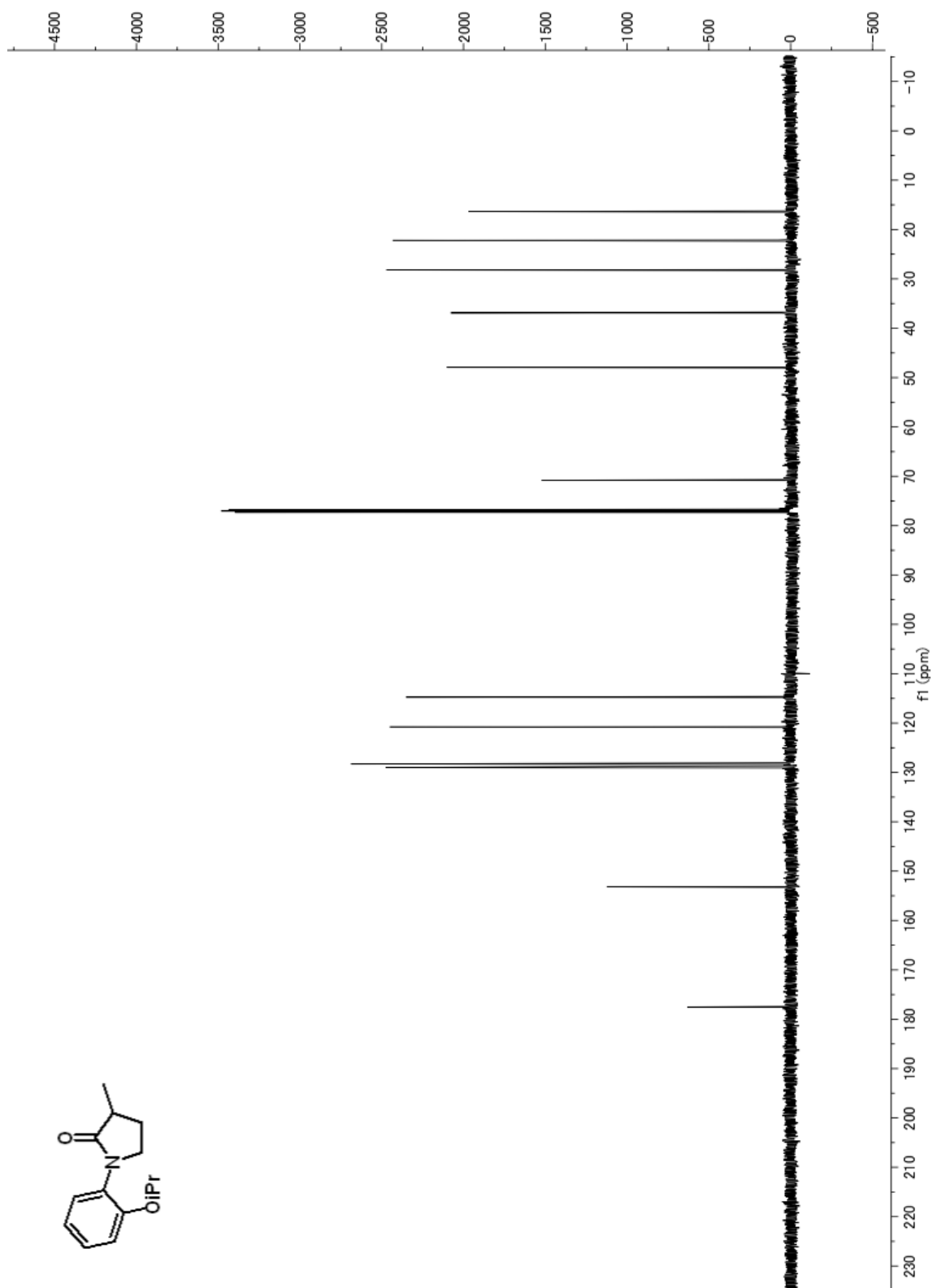
Figure A3.11. ¹H NMR (500 MHz, CDCl₃) of compound 57a.

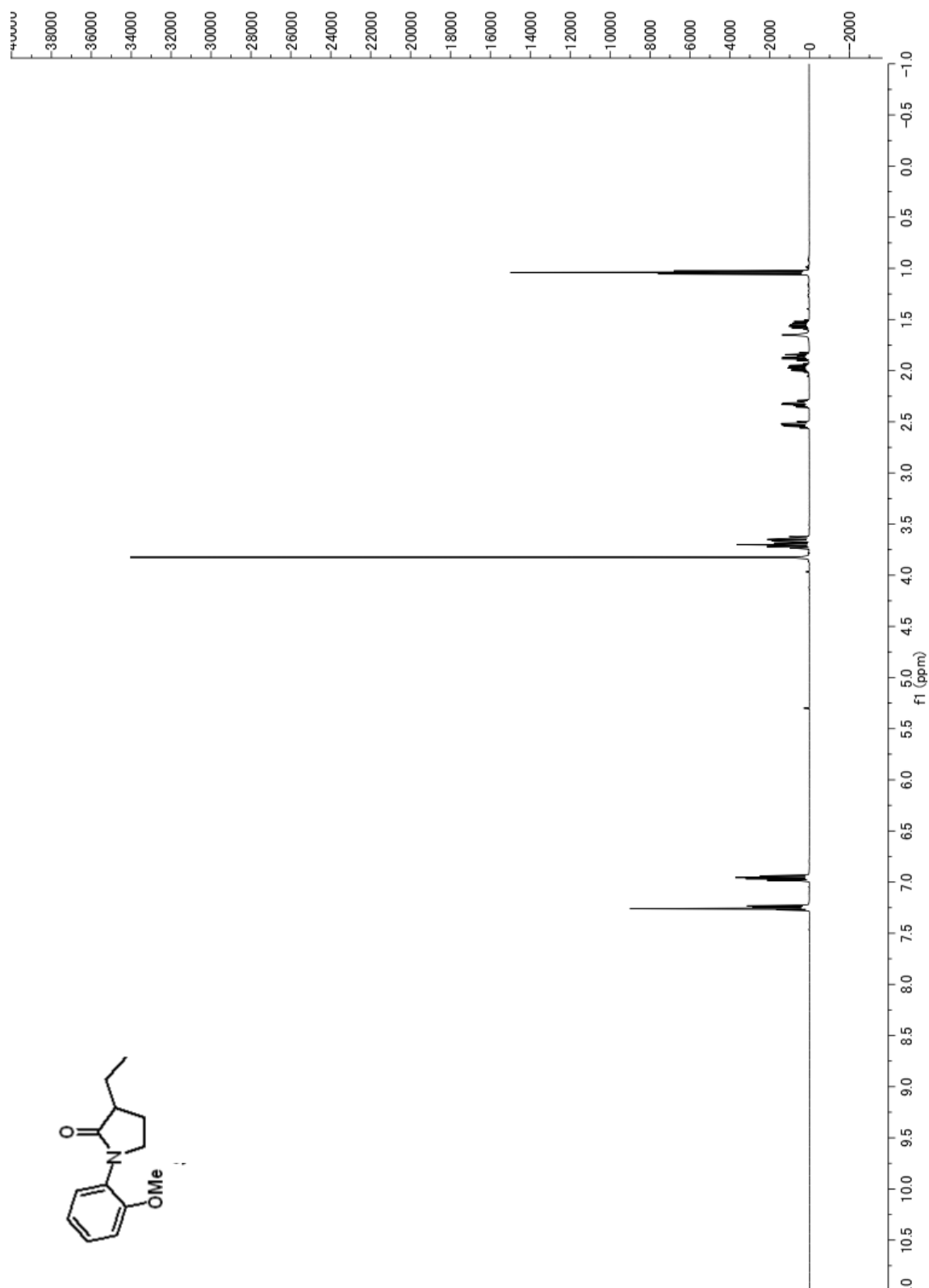
Figure A3.12. ¹³C NMR (126 MHz, CDCl₃) of compound 57a.

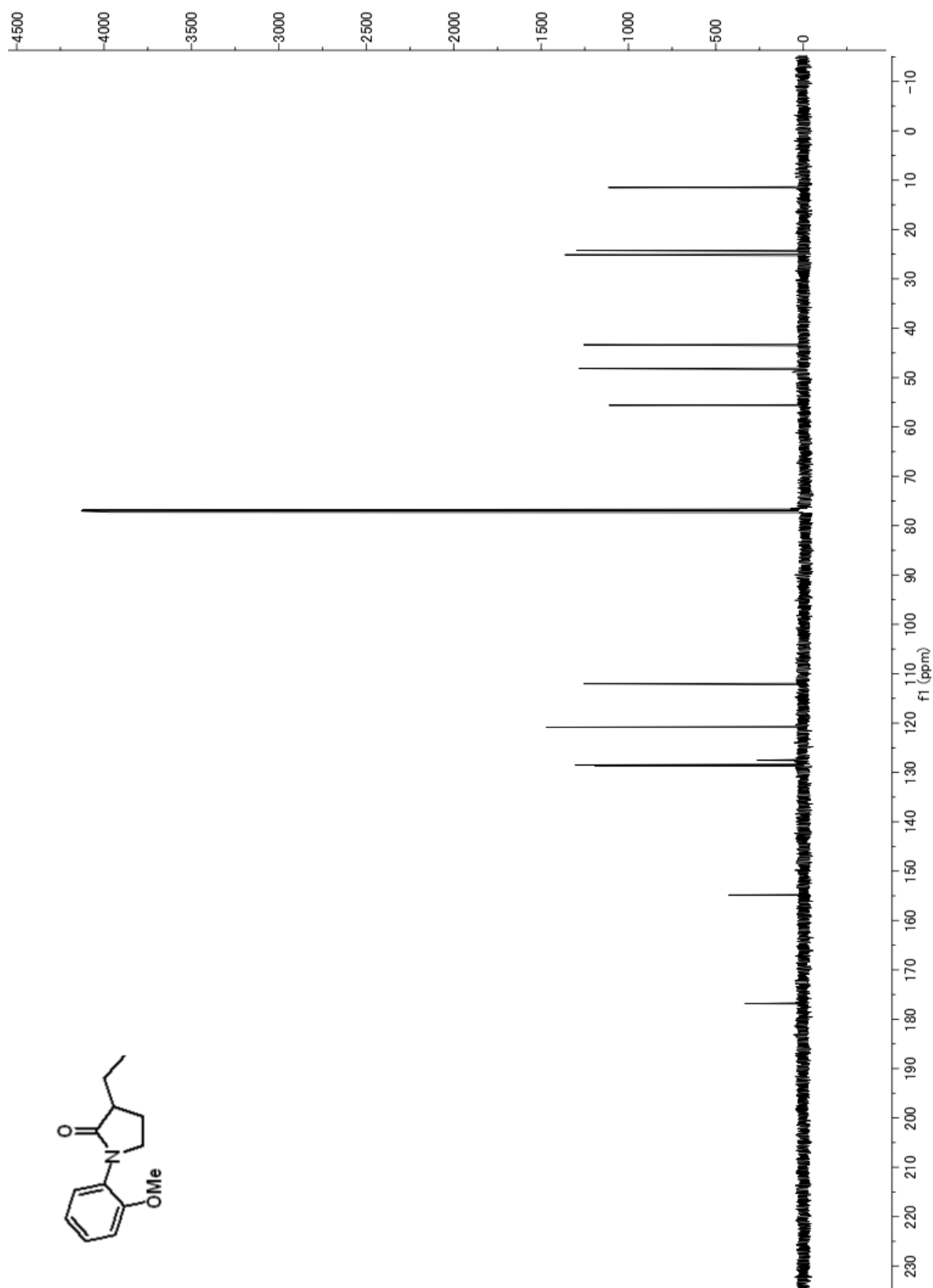
Figure A3.13. ^1H NMR (500 MHz, CDCl_3) of compound **57c**.

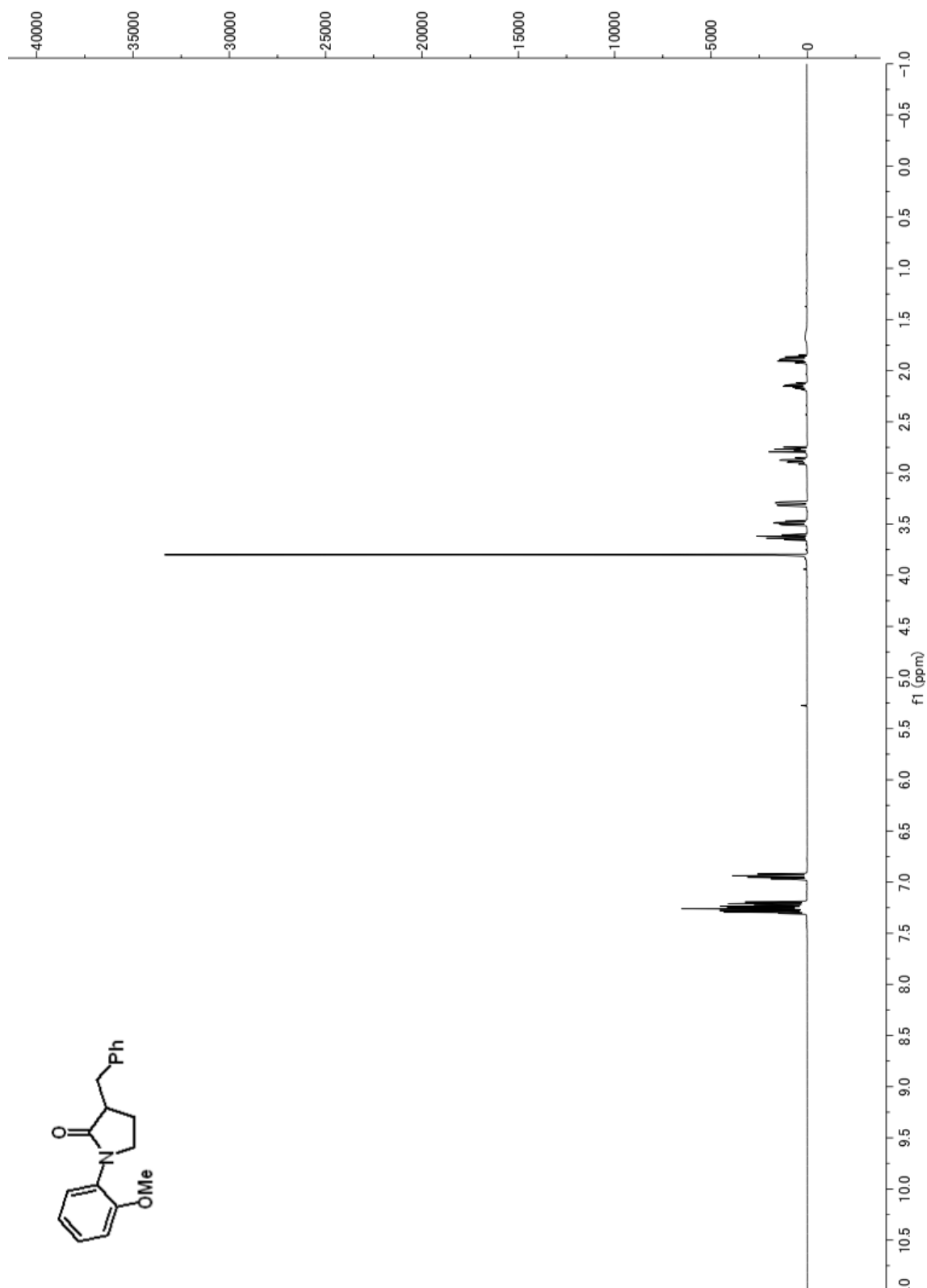
Figure A3.14. ¹³C NMR (126 MHz, CDCl₃) of compound 57c.

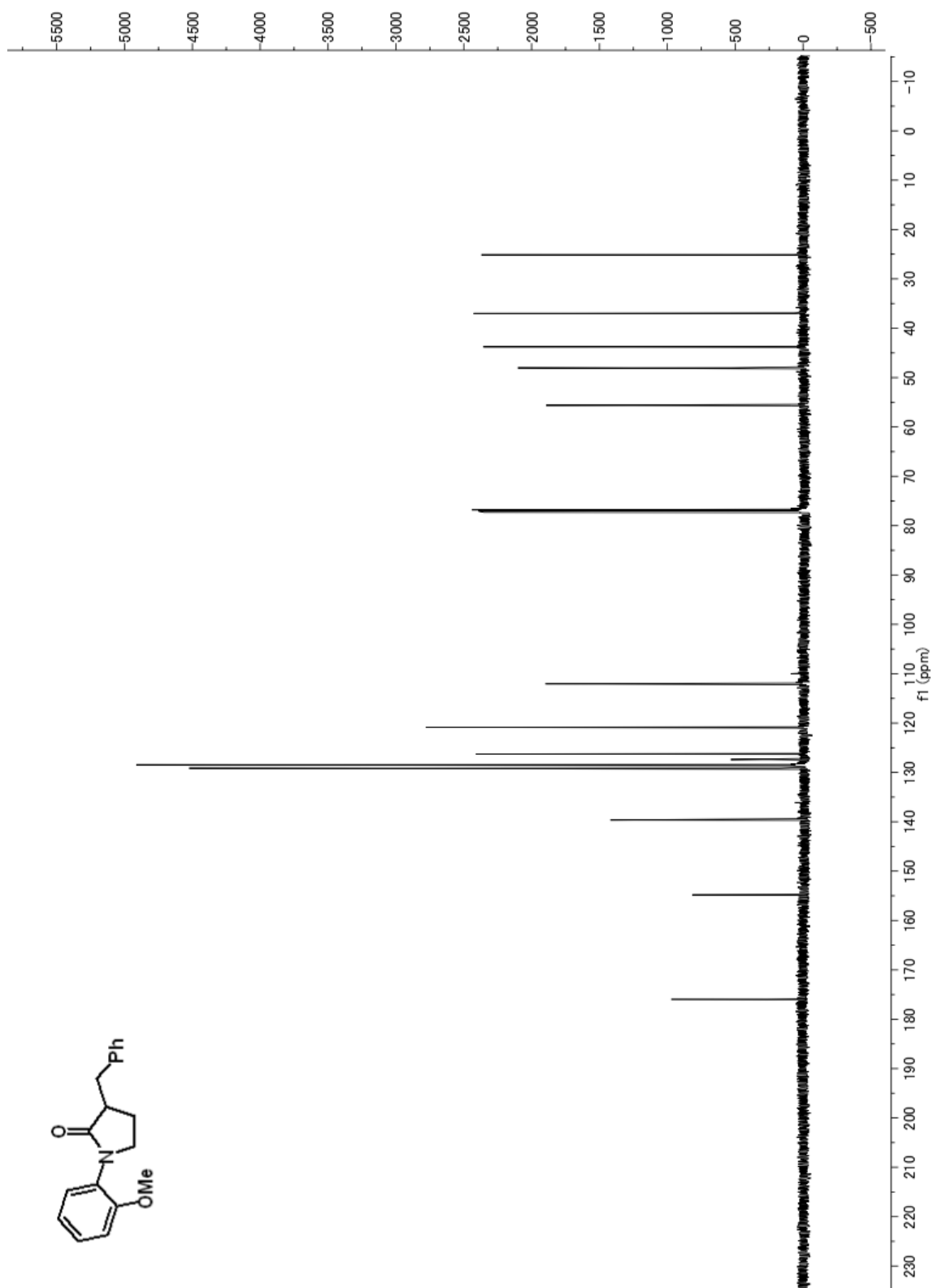
Figure A3.15. ^1H NMR (500 MHz, CDCl_3) of compound **57d**.

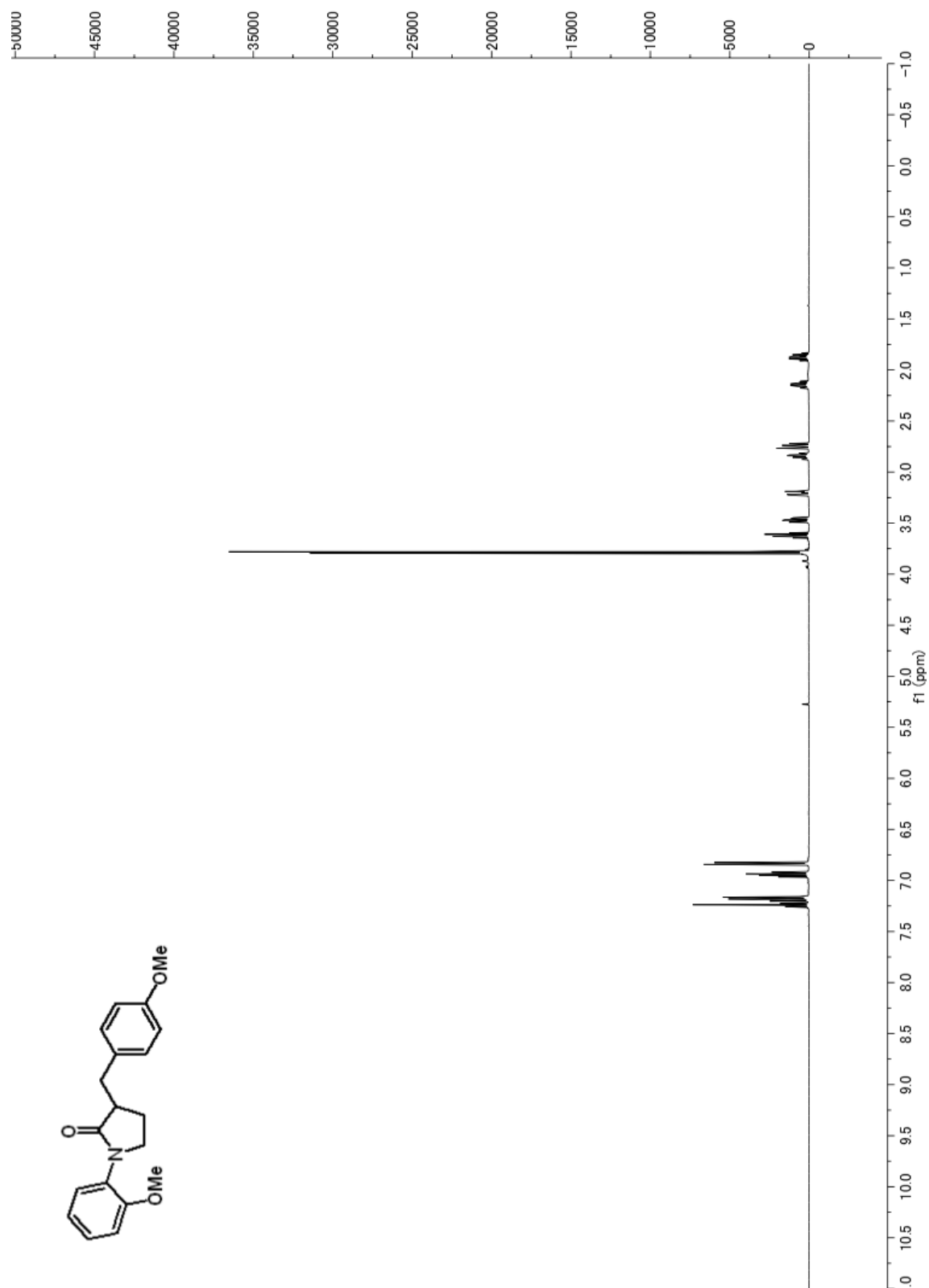
Figure A3.16. ¹³C NMR (126 MHz, CDCl₃) of compound 57d.

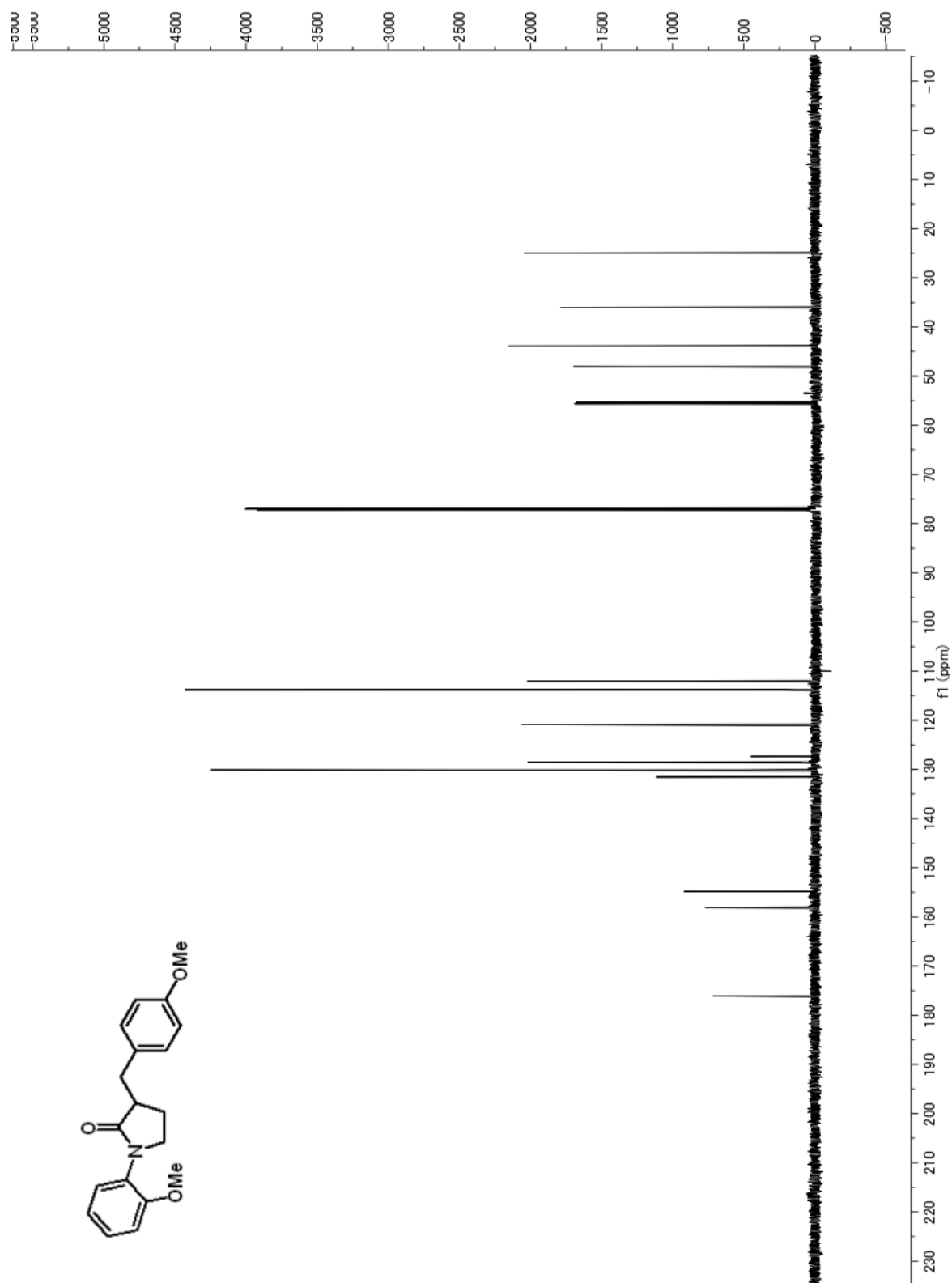
Figure A3.17. ¹H NMR (500 MHz, CDCl₃) of compound **63b**.

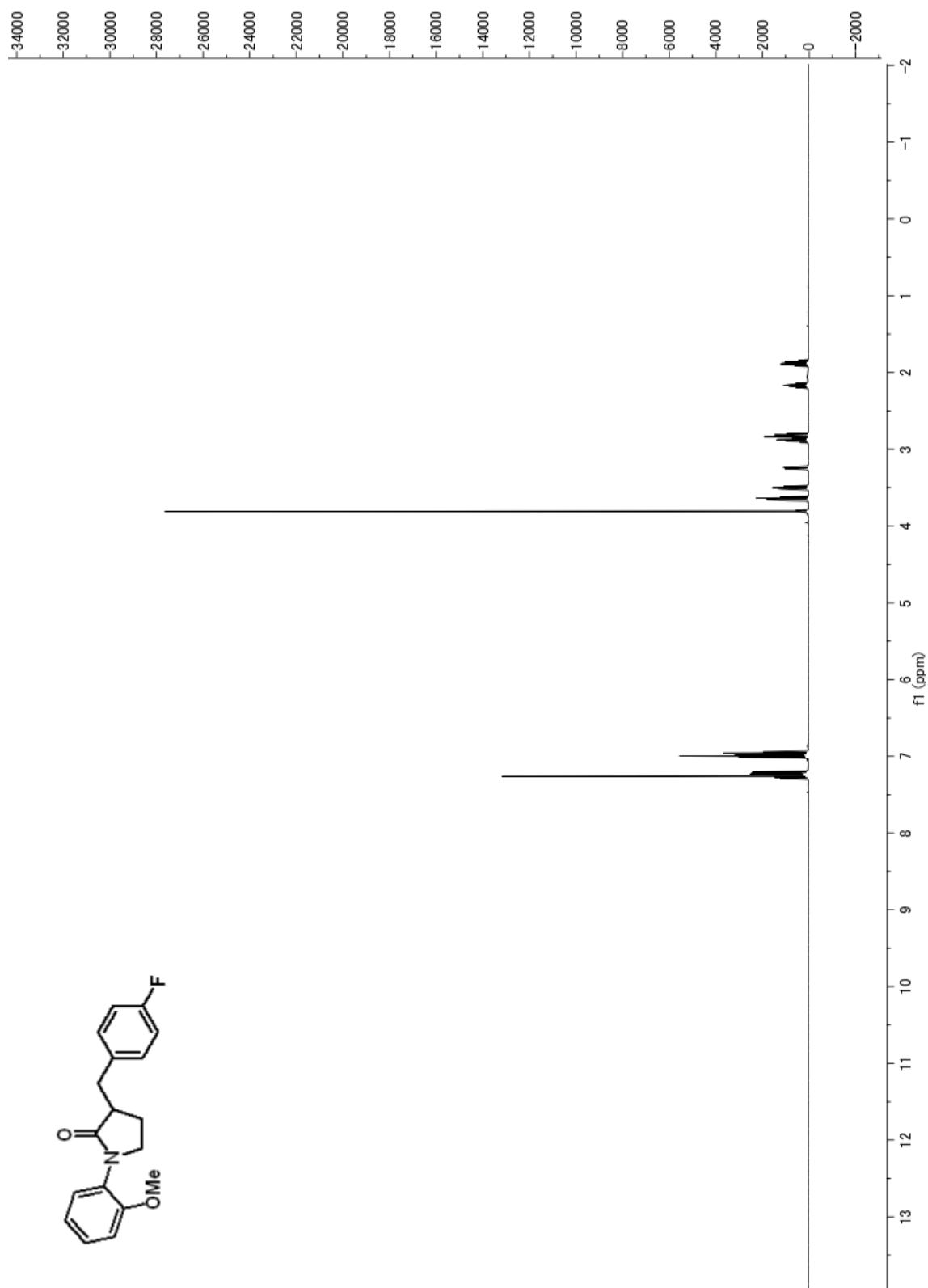
Figure A3.18. ¹³C NMR (126 MHz, CDCl₃) of compound **63b**.

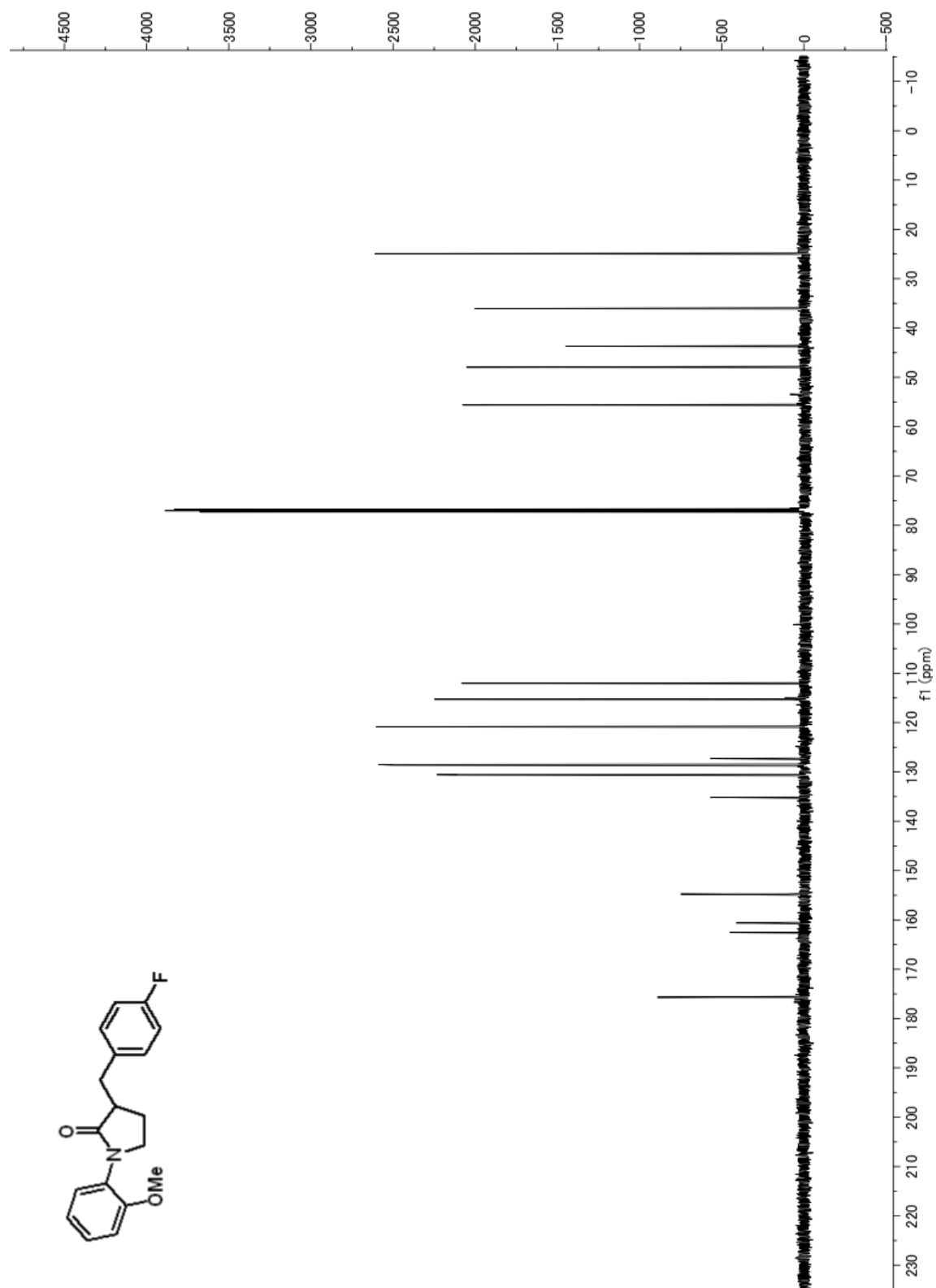
Figure A3.19. ¹H NMR (500 MHz, CDCl₃) of compound **63c**.

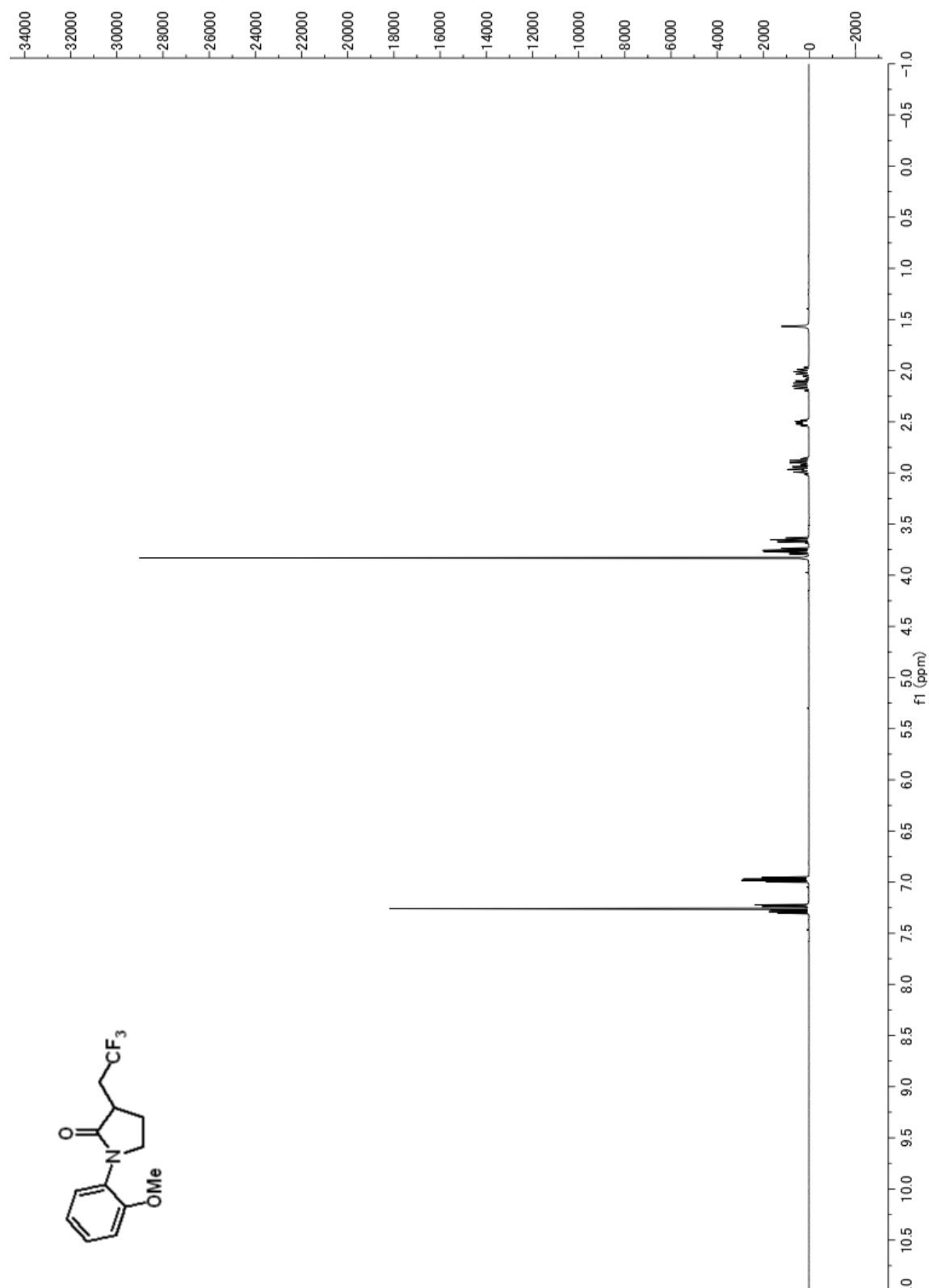
Figure A3.20. ¹³C NMR (126 MHz, CDCl₃) of compound **63c**.

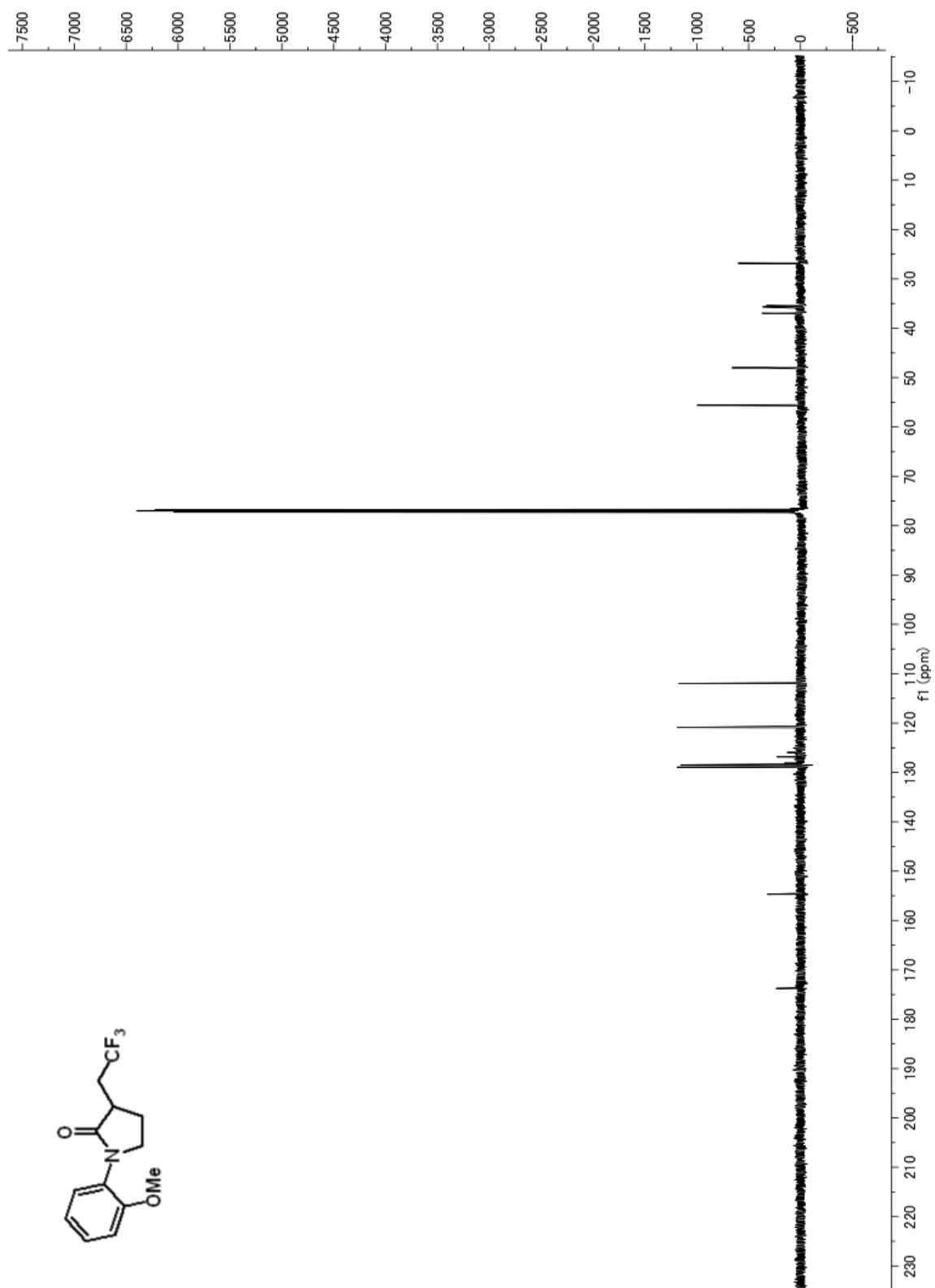
Figure A3.21. ^1H NMR (500 MHz, CDCl_3) of compound **63d**.

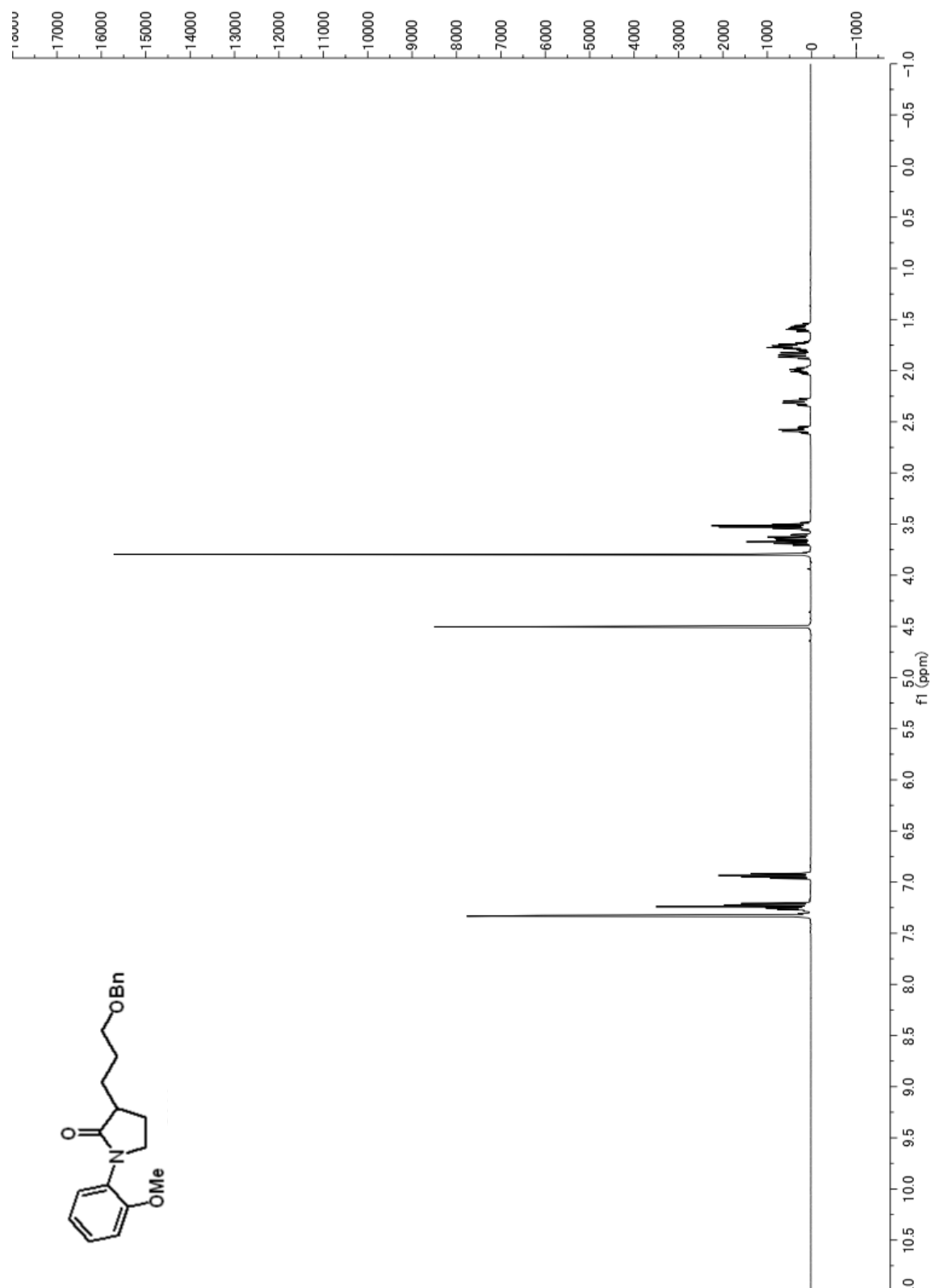
Figure A3.22. ¹³C NMR (126 MHz, CDCl₃) of compound **63d**.

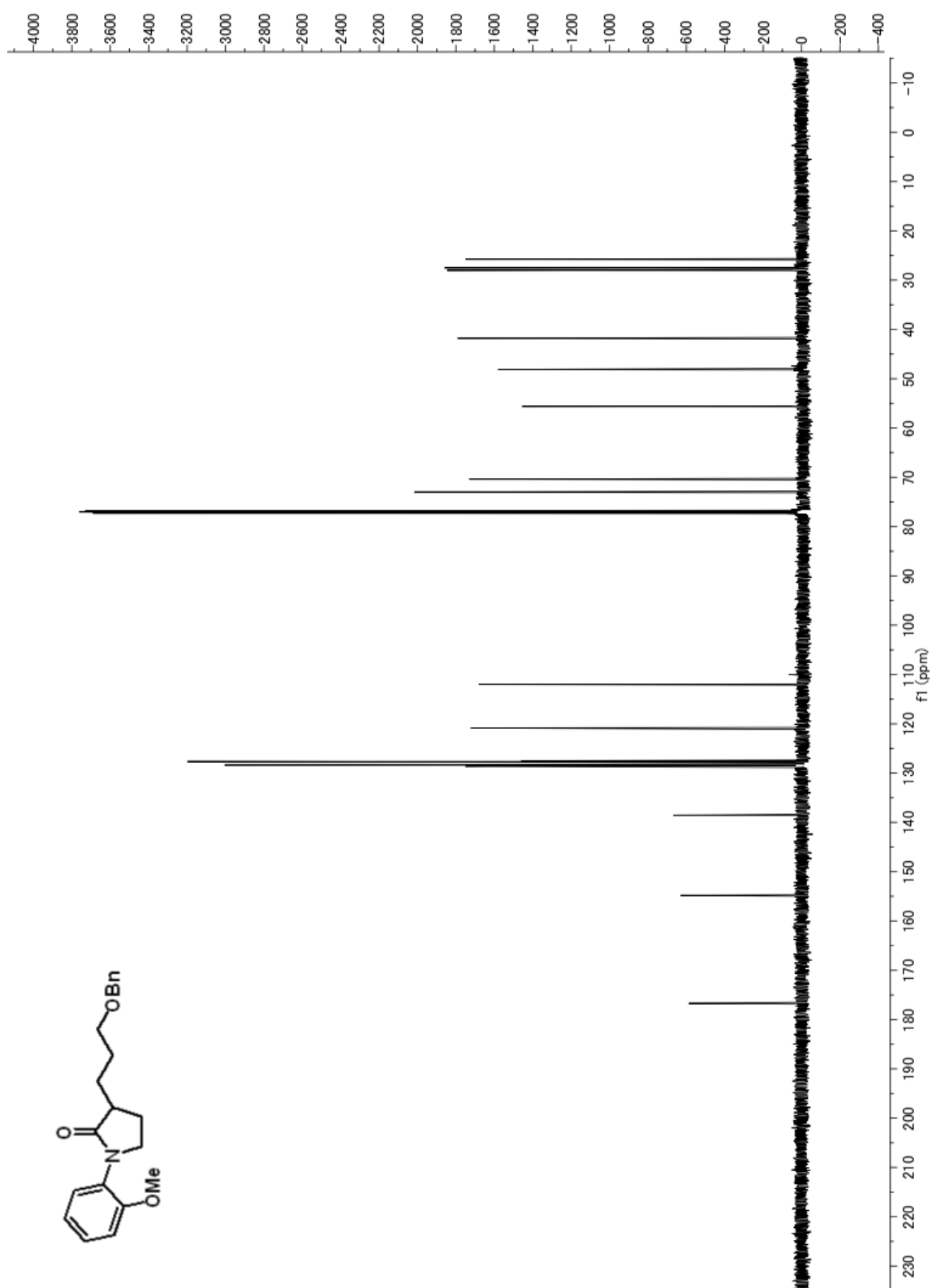
Figure A3.23. ¹H NMR (500 MHz, CDCl₃) of compound **63e**.

Figure A3.24. ^{13}C NMR (126 MHz, CDCl_3) of compound **63e**.

Figure A3.25. ¹H NMR (500 MHz, CDCl₃) of compound **63f**.

Figure A3.26. ¹³C NMR (126 MHz, CDCl₃) of compound **63f**.

Figure A3.27. ¹H NMR (500 MHz, CDCl₃) of compound **63g**.

Figure A3.28. ^{13}C NMR (126 MHz, CDCl_3) of compound **63g**.

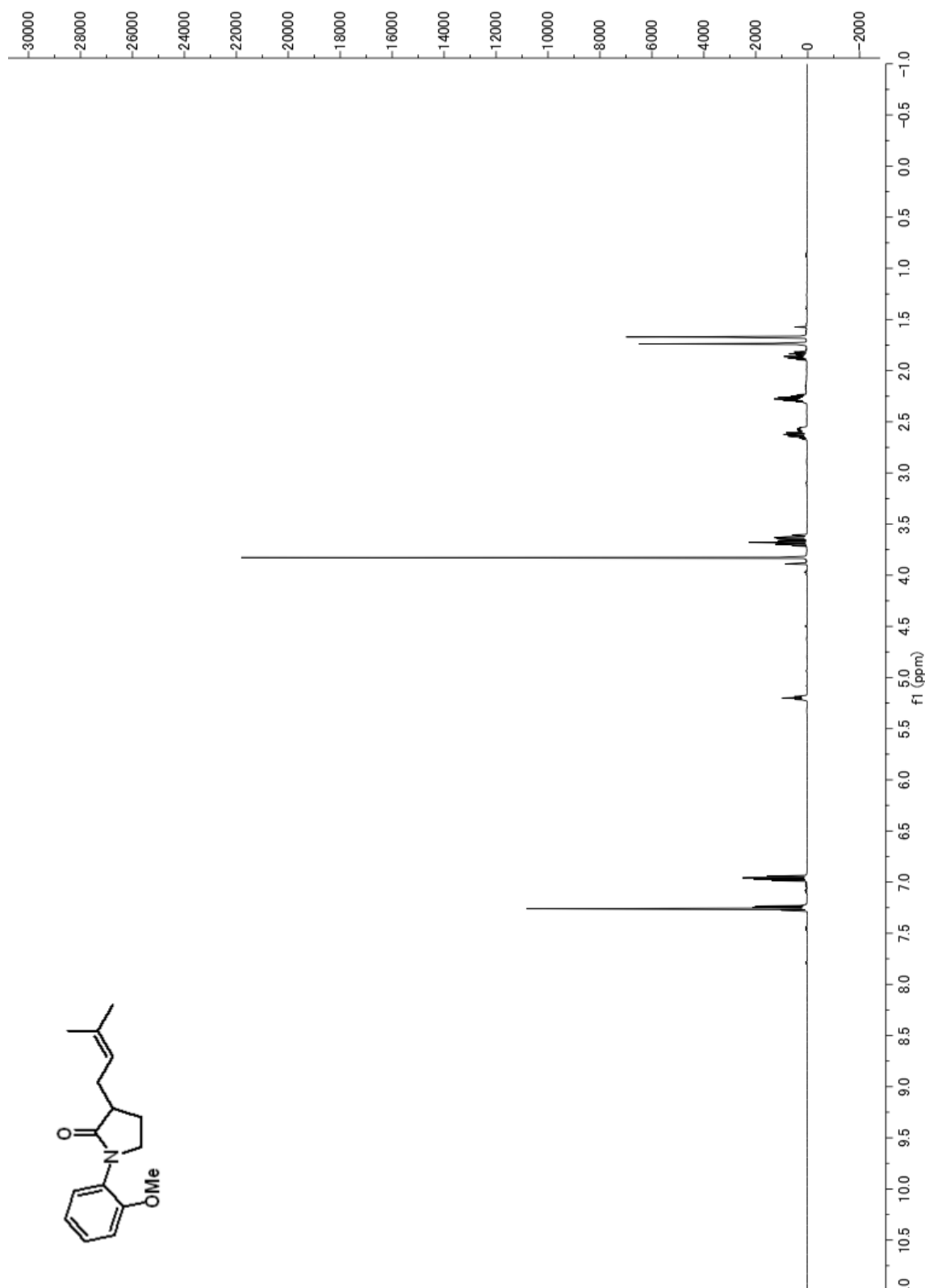


Figure A3.29. ¹H NMR (500 MHz, CDCl₃) of compound **63h**.

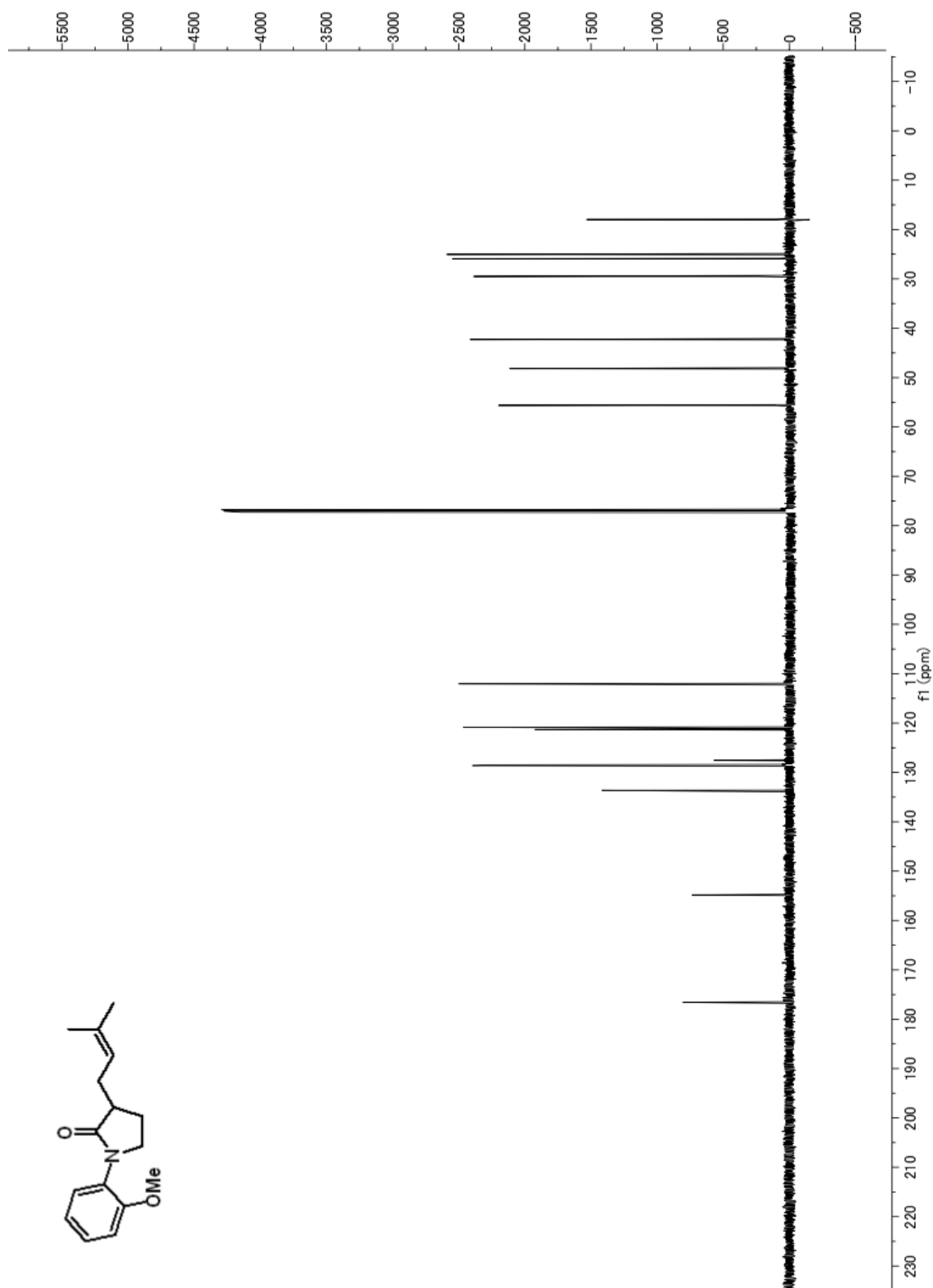
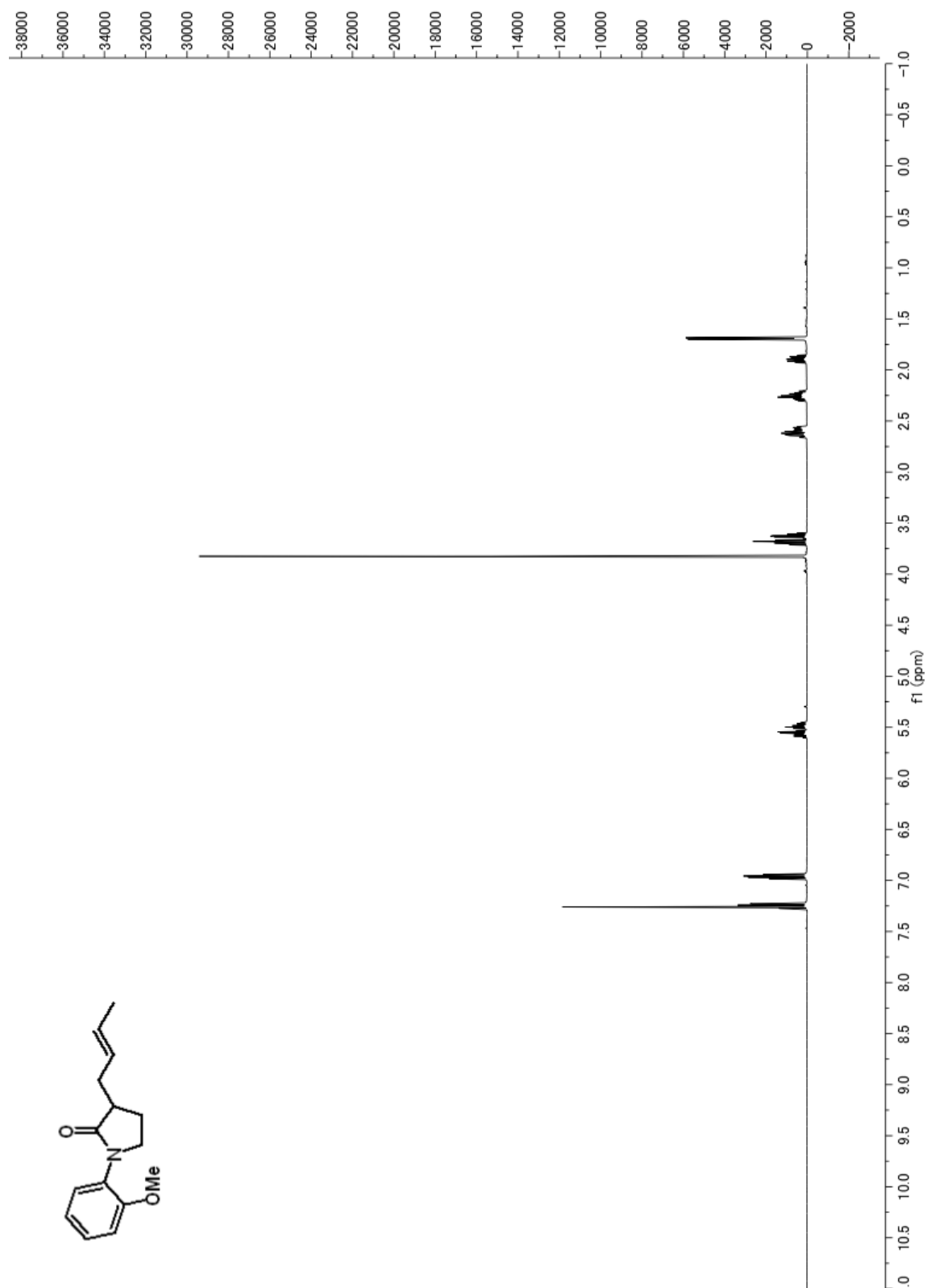
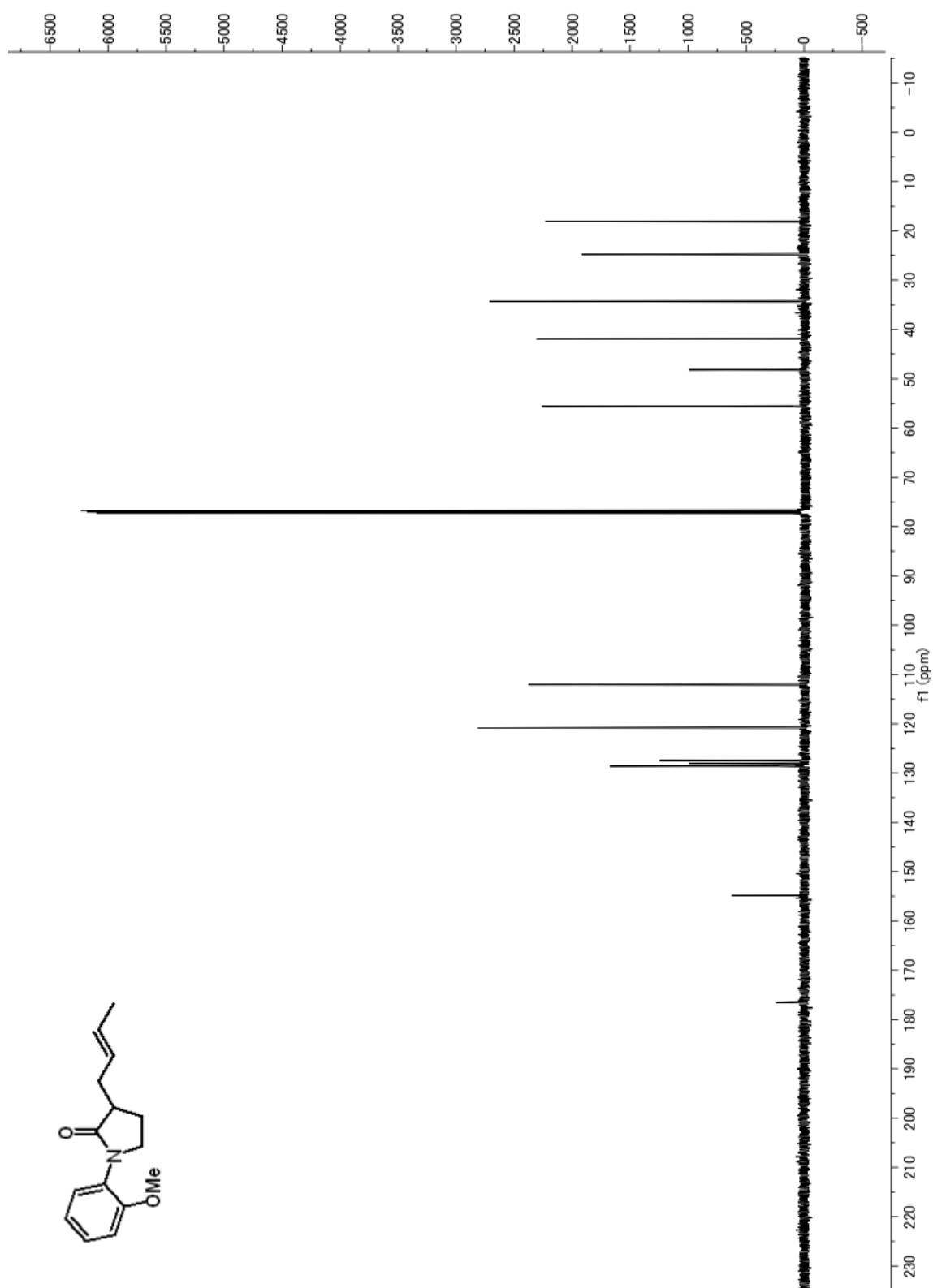
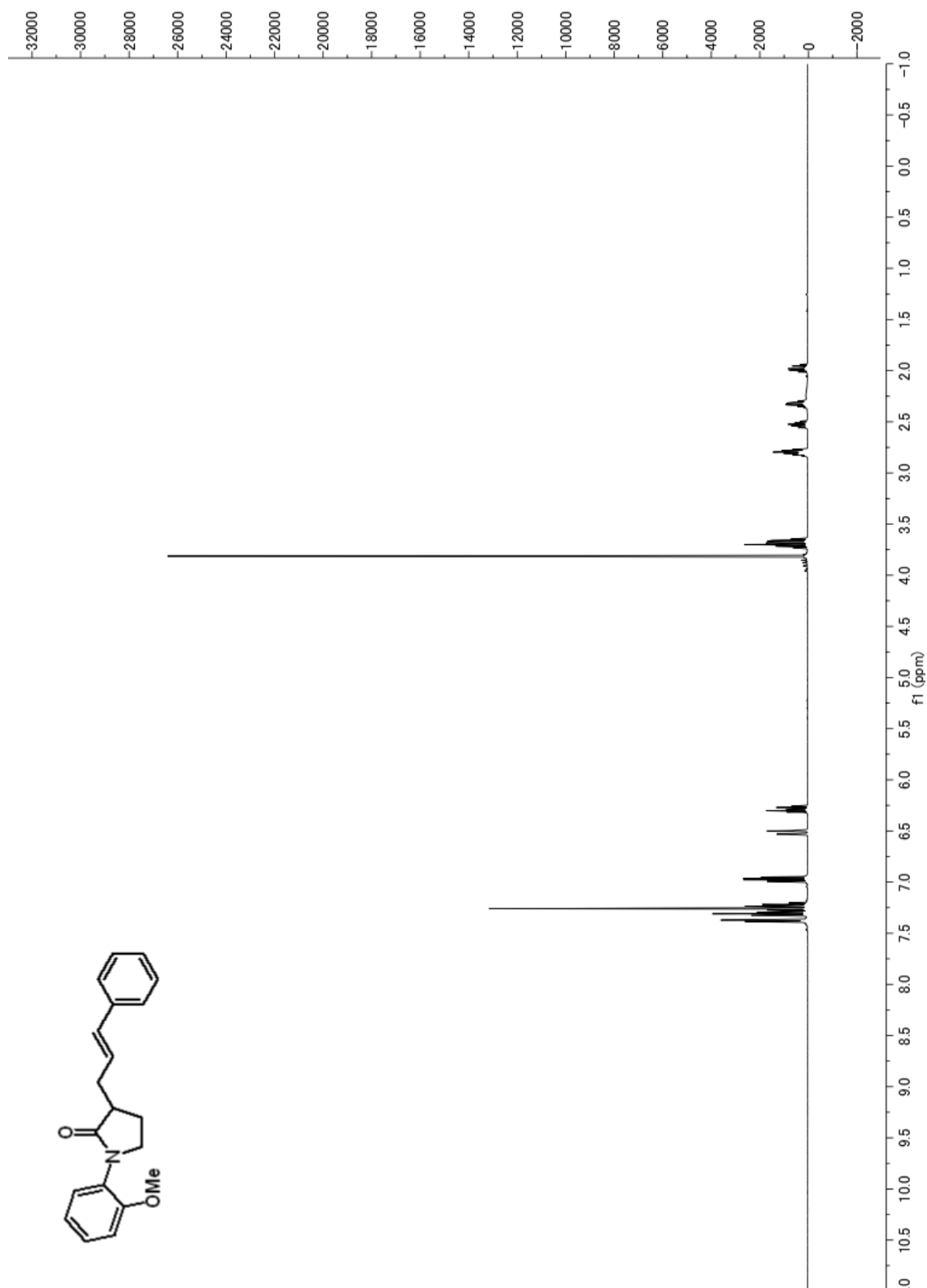
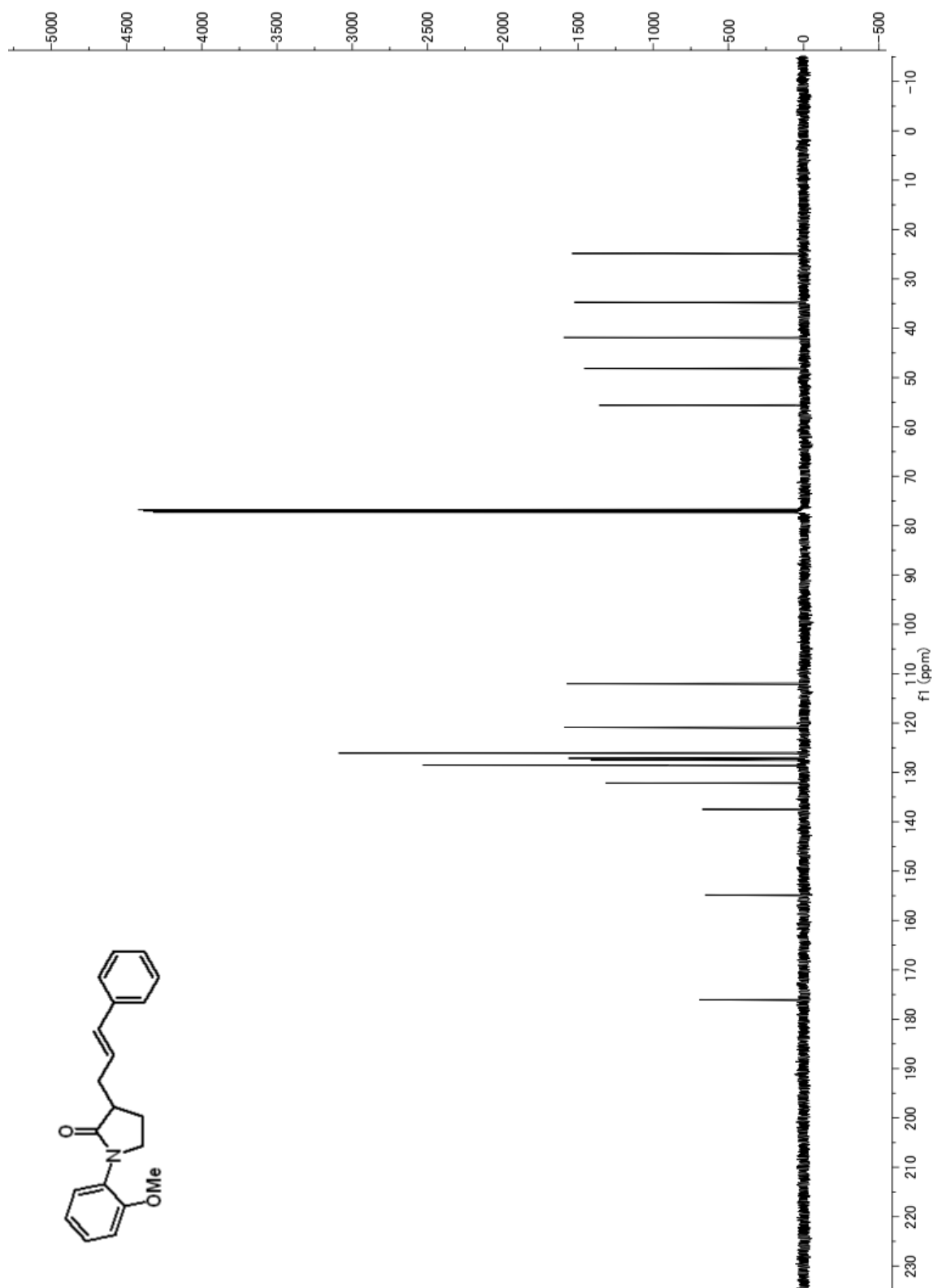


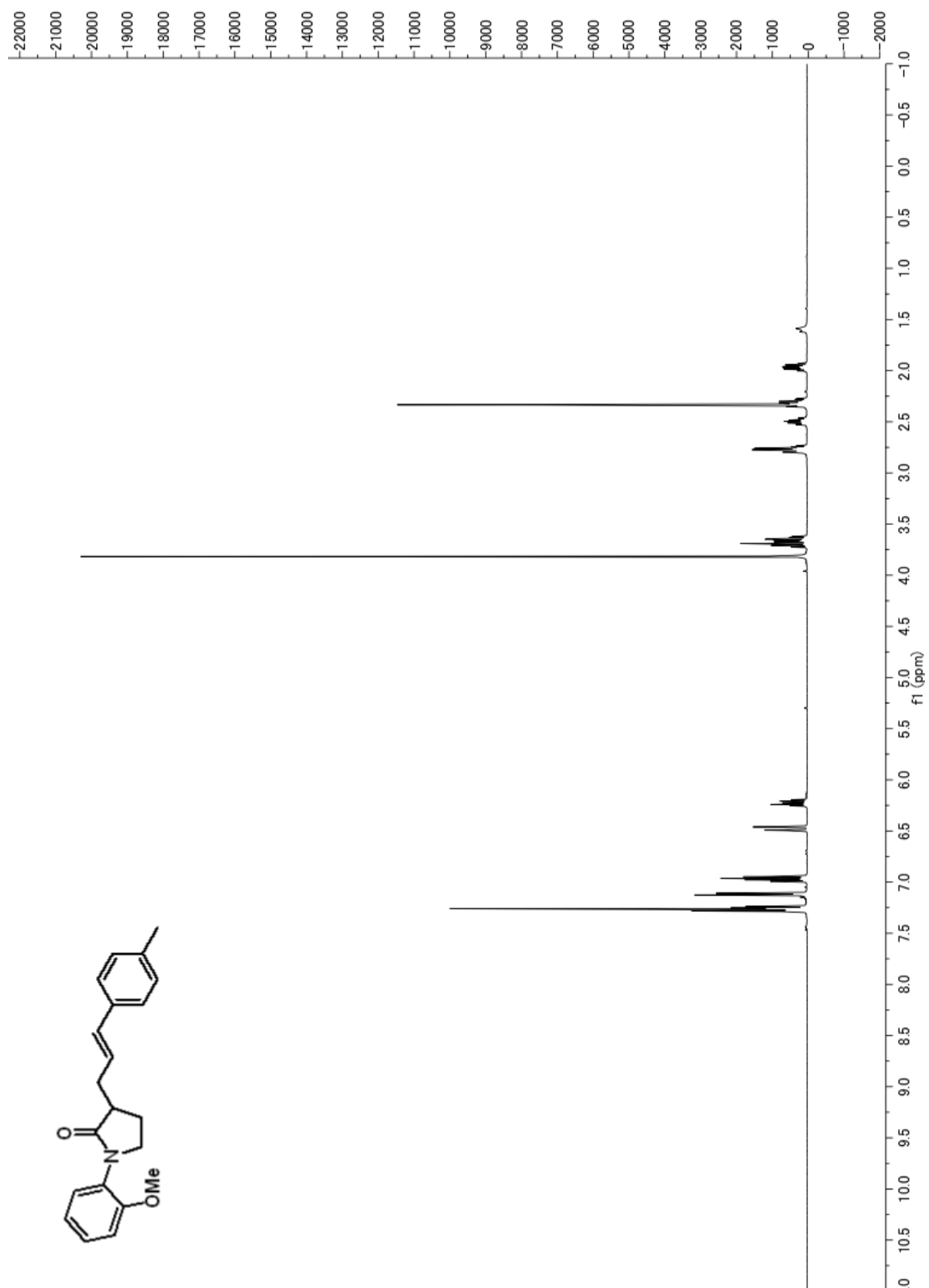
Figure A3.30. ^{13}C NMR (126 MHz, CDCl_3) of compound **63h**.

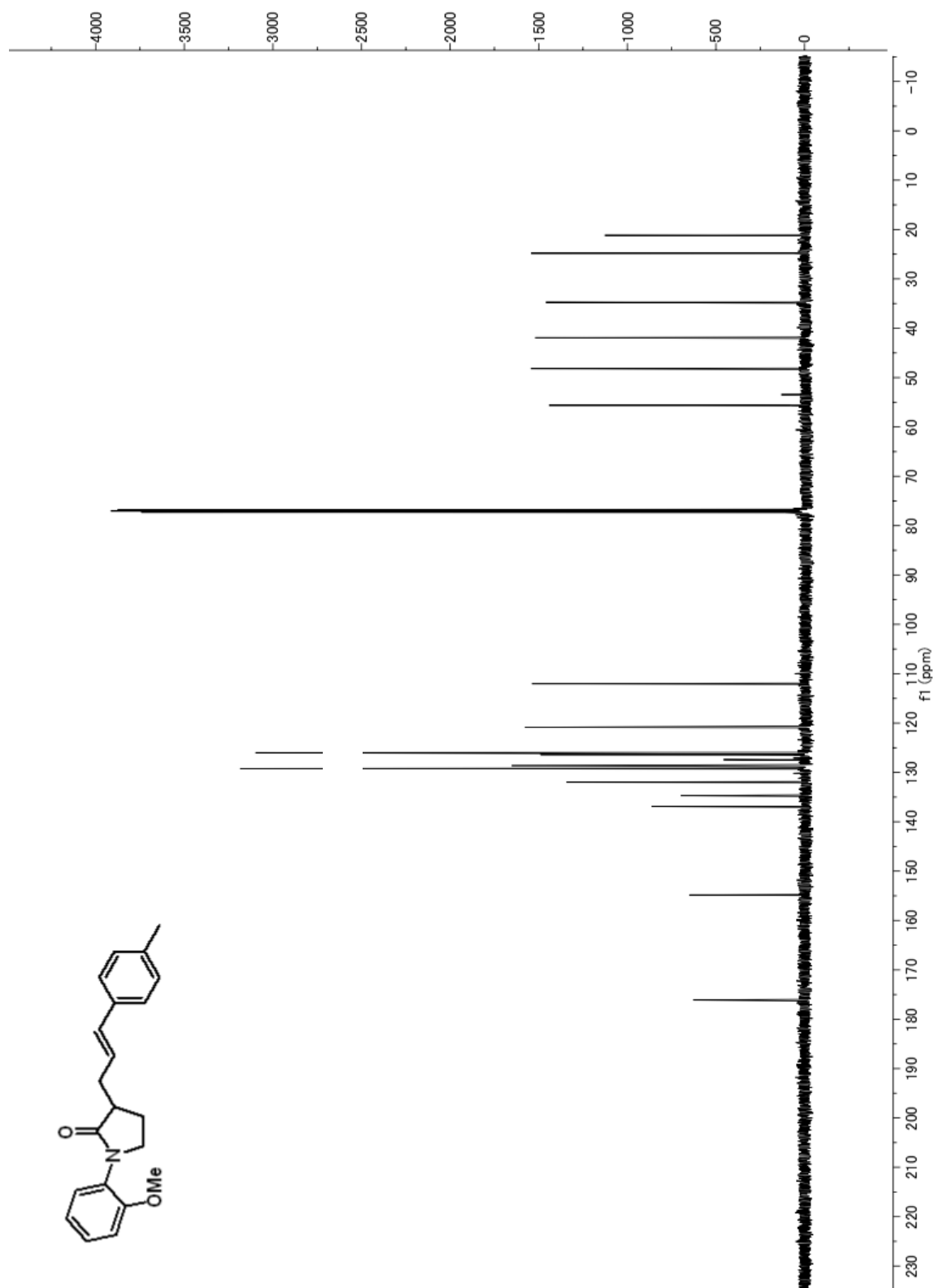
Figure A3.31. ¹H NMR (500 MHz, CDCl₃) of compound **63i**.

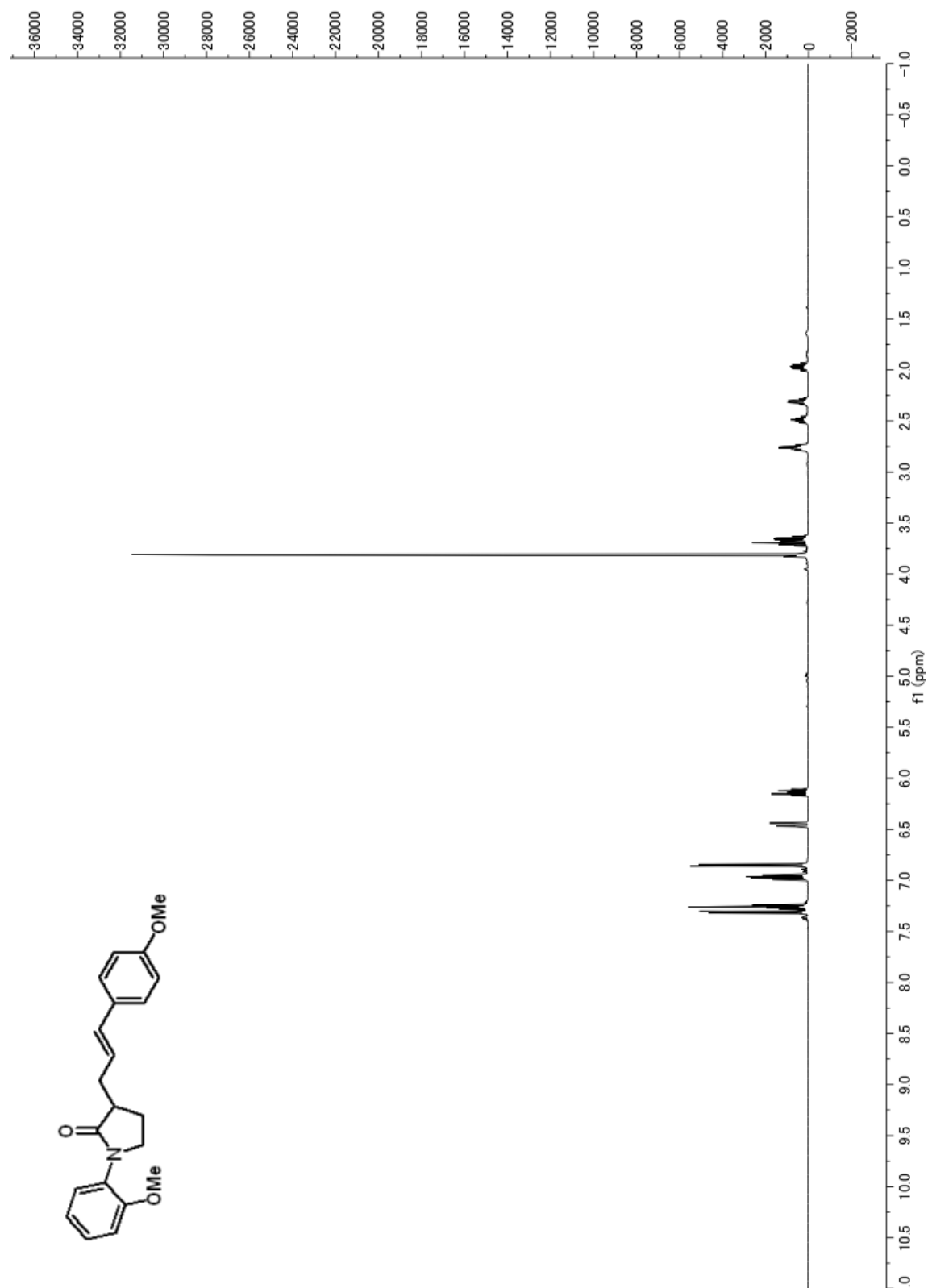
Figure A3.32. ¹³C NMR (126 MHz, CDCl₃) of compound **63i**.

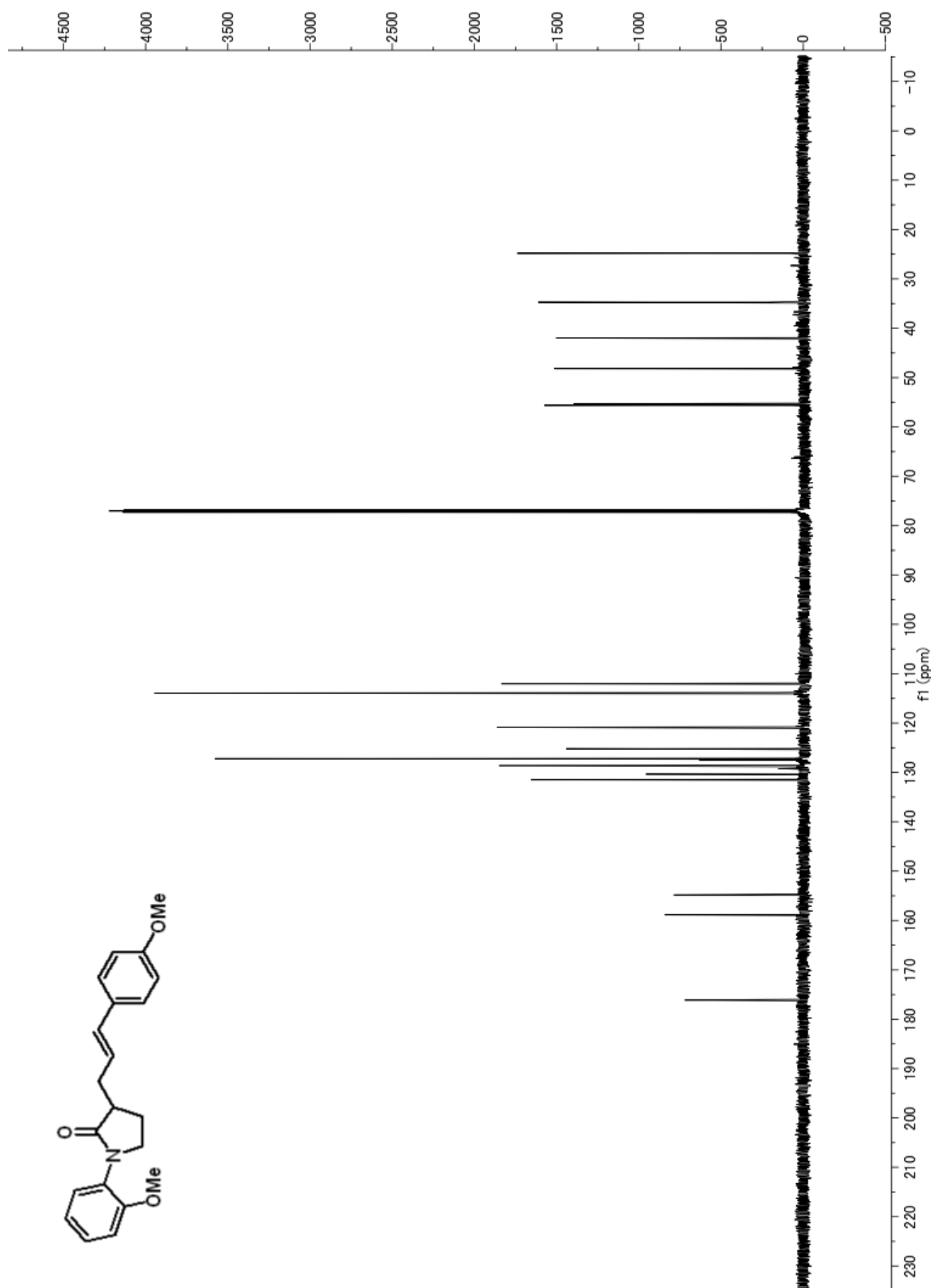
Figure A3.33. ¹H NMR (500 MHz, CDCl₃) of compound **63j**.

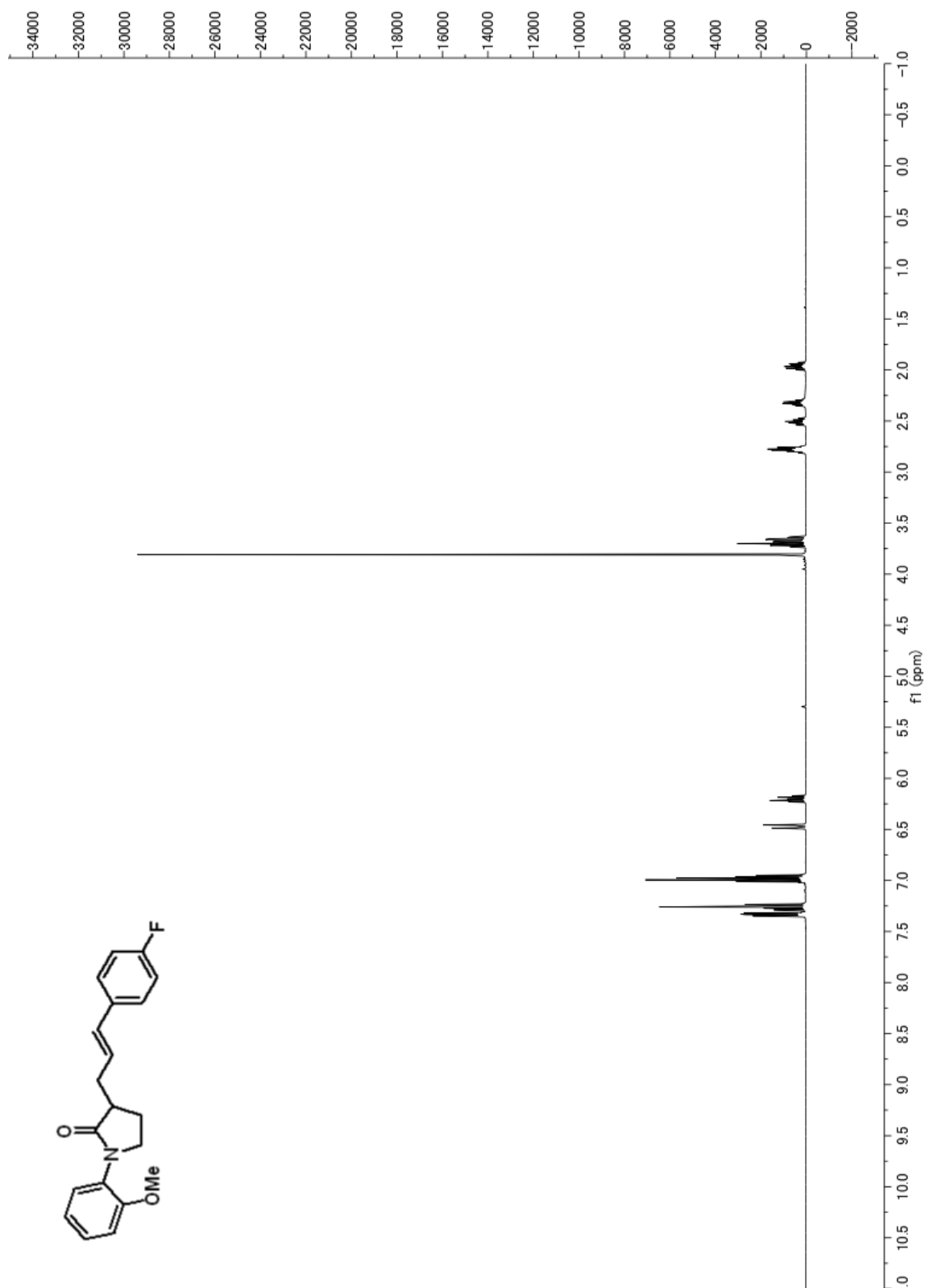
Figure A3.34. ^{13}C NMR (126 MHz, CDCl_3) of compound **63j**.

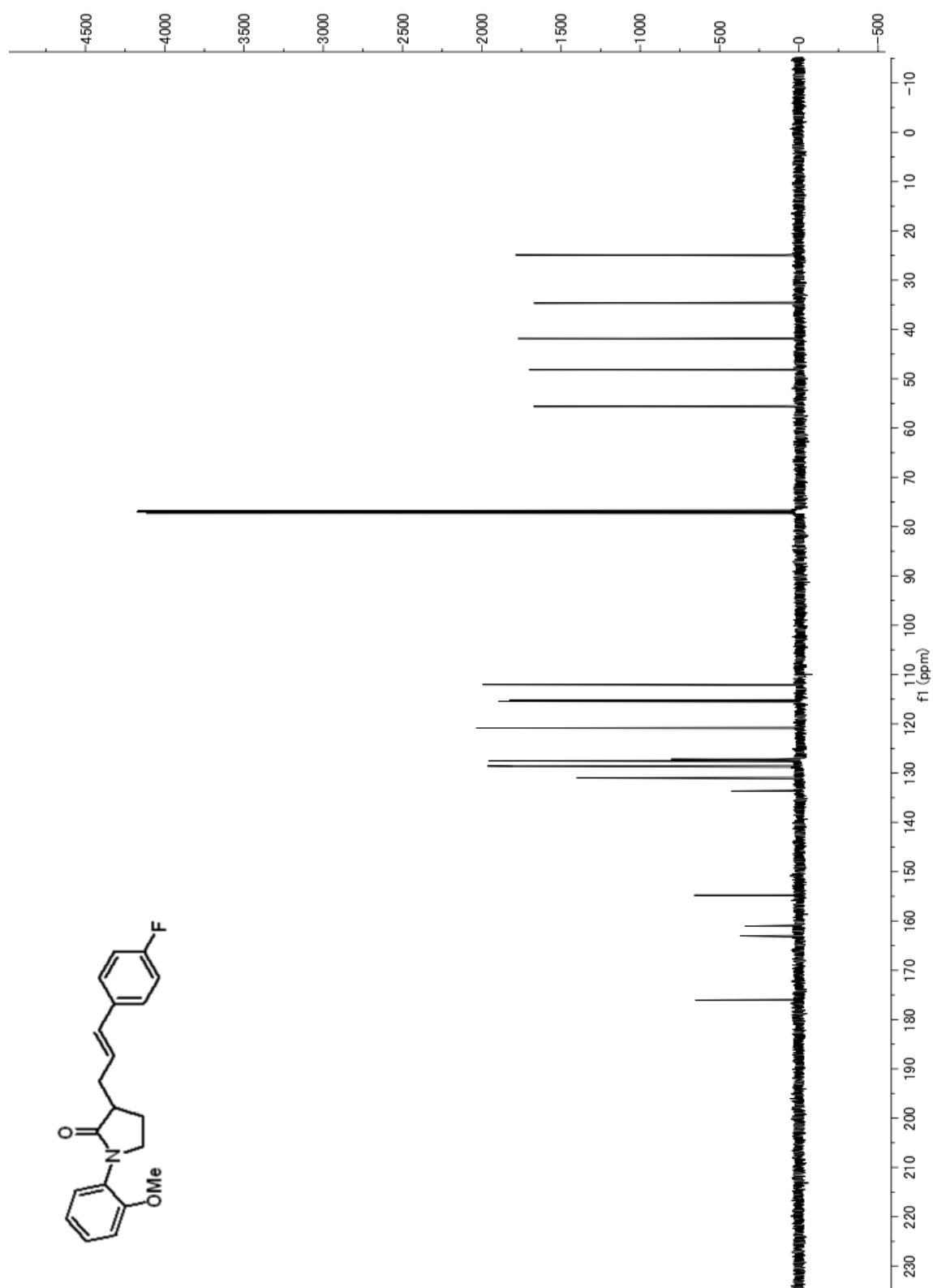
Figure A3.35. ¹H NMR (500 MHz, CDCl₃) of compound **63k**.

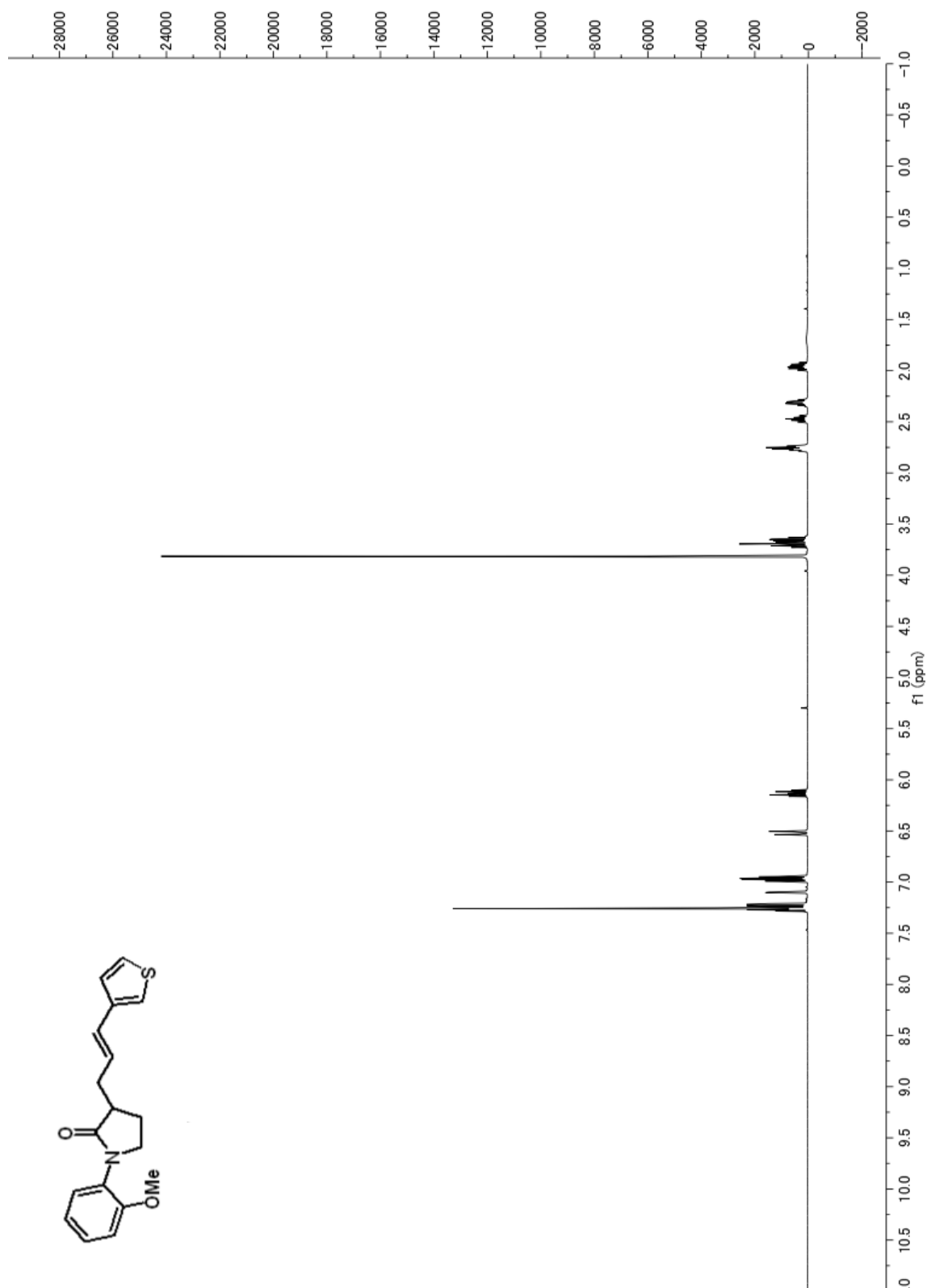
Figure A3.36. ¹³C NMR (126 MHz, CDCl₃) of compound **63k**.

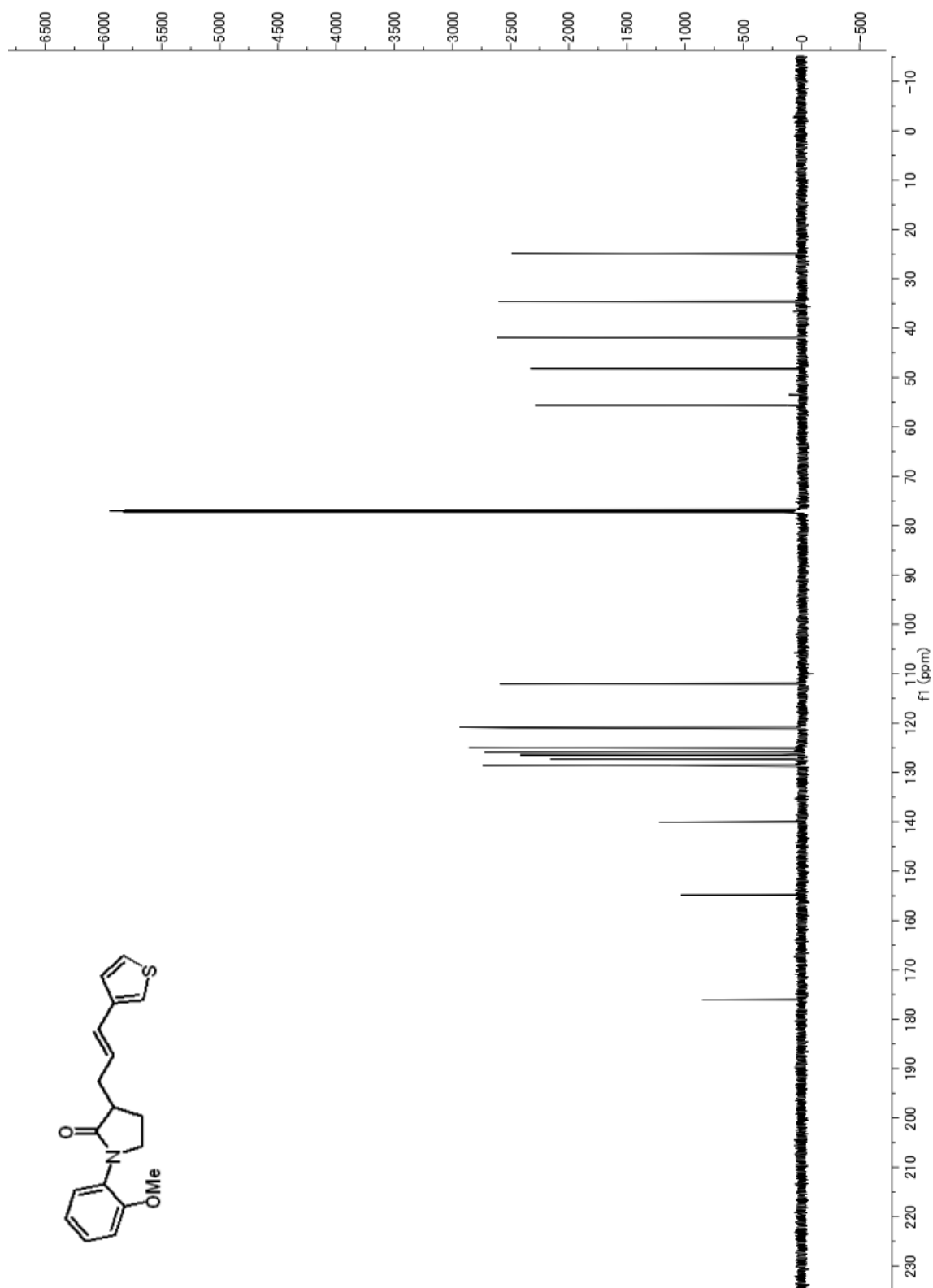
Figure A3.37. ¹H NMR (500 MHz, CDCl₃) of compound **63l**.

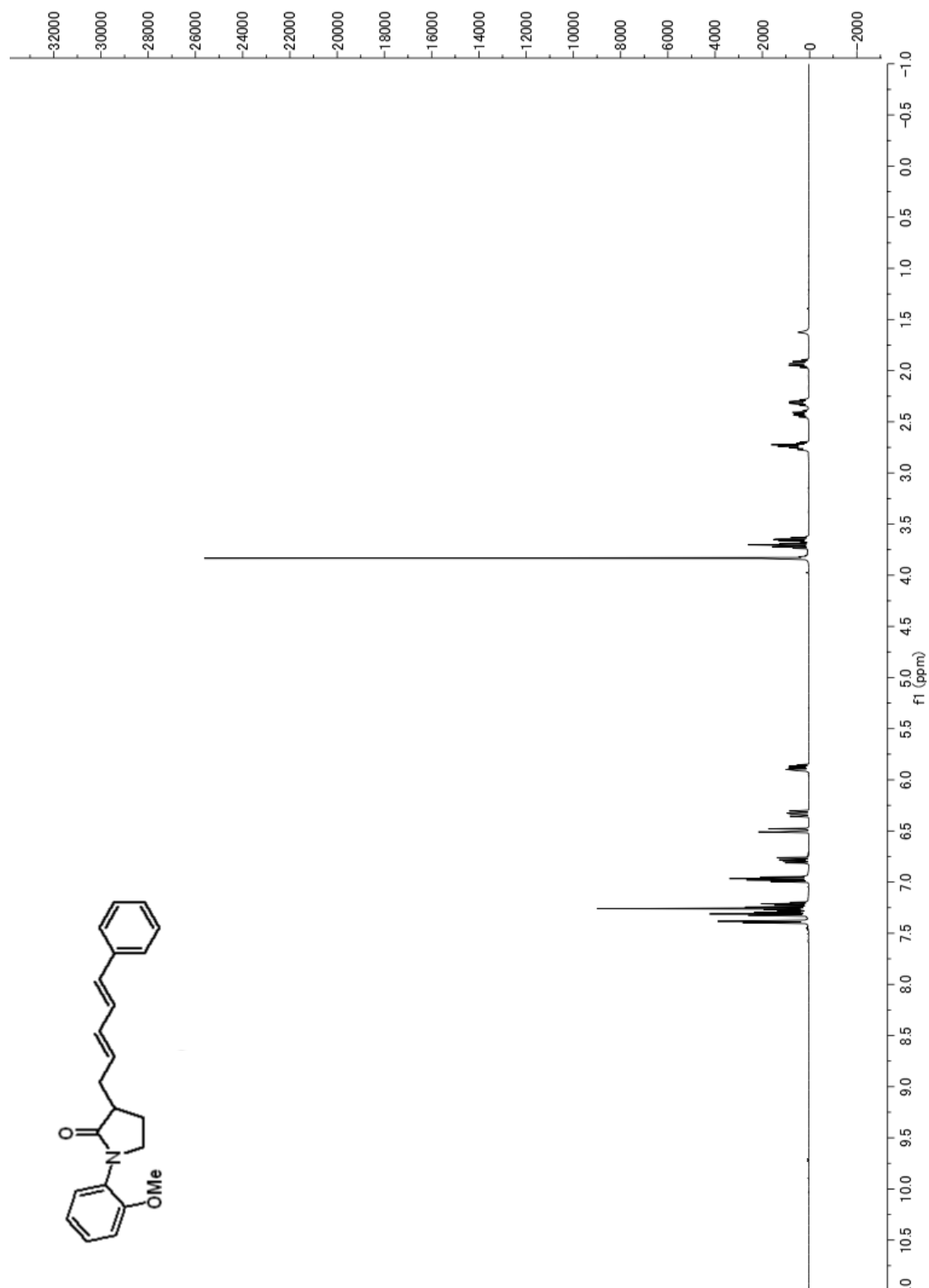
Figure A3.38. ¹³C NMR (126 MHz, CDCl₃) of compound **63l**.

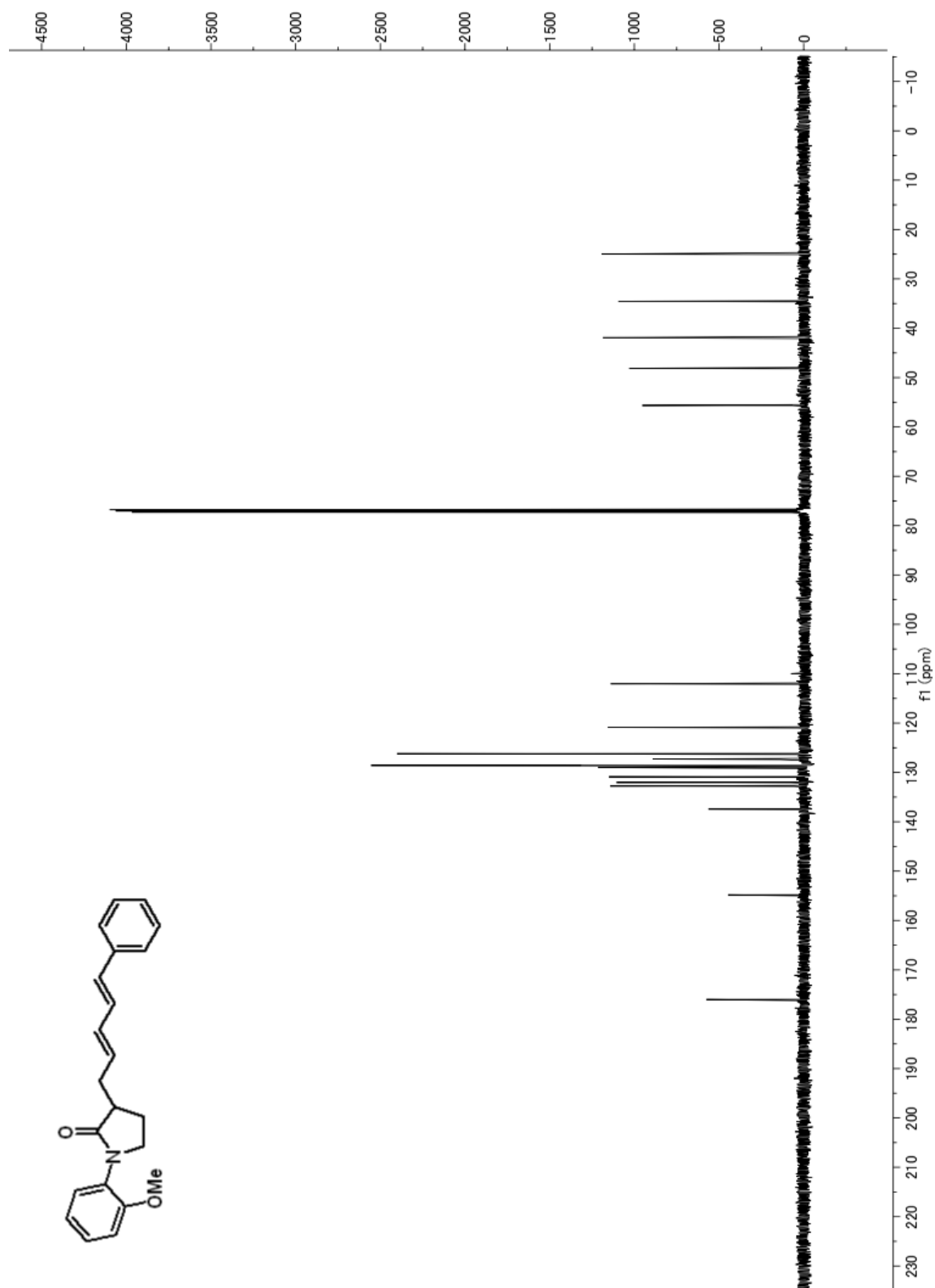
Figure A3.39. ¹H NMR (500 MHz, CDCl₃) of compound **63m**.

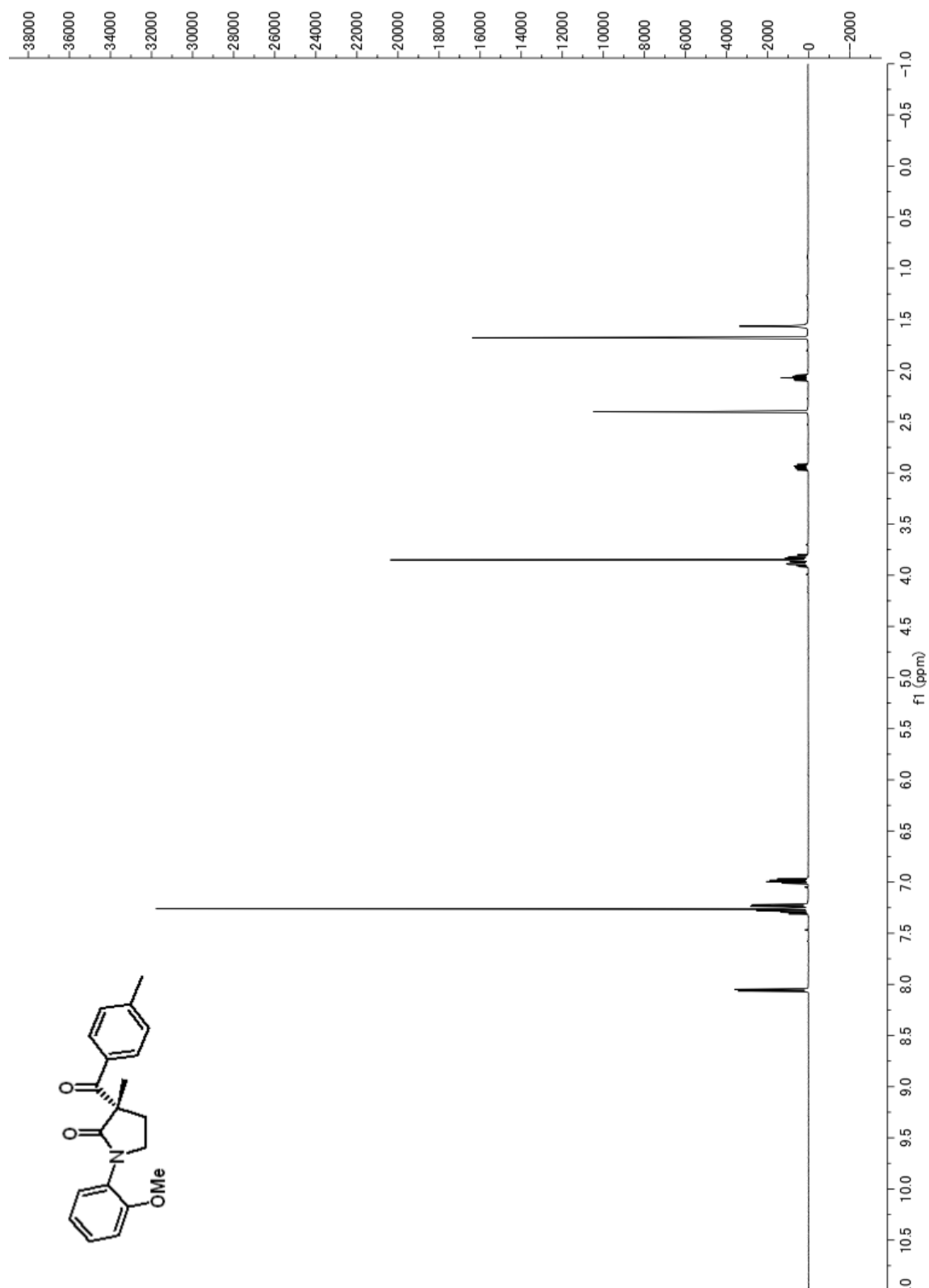
Figure A3.40. ¹³C NMR (126 MHz, CDCl₃) of compound **63m**.

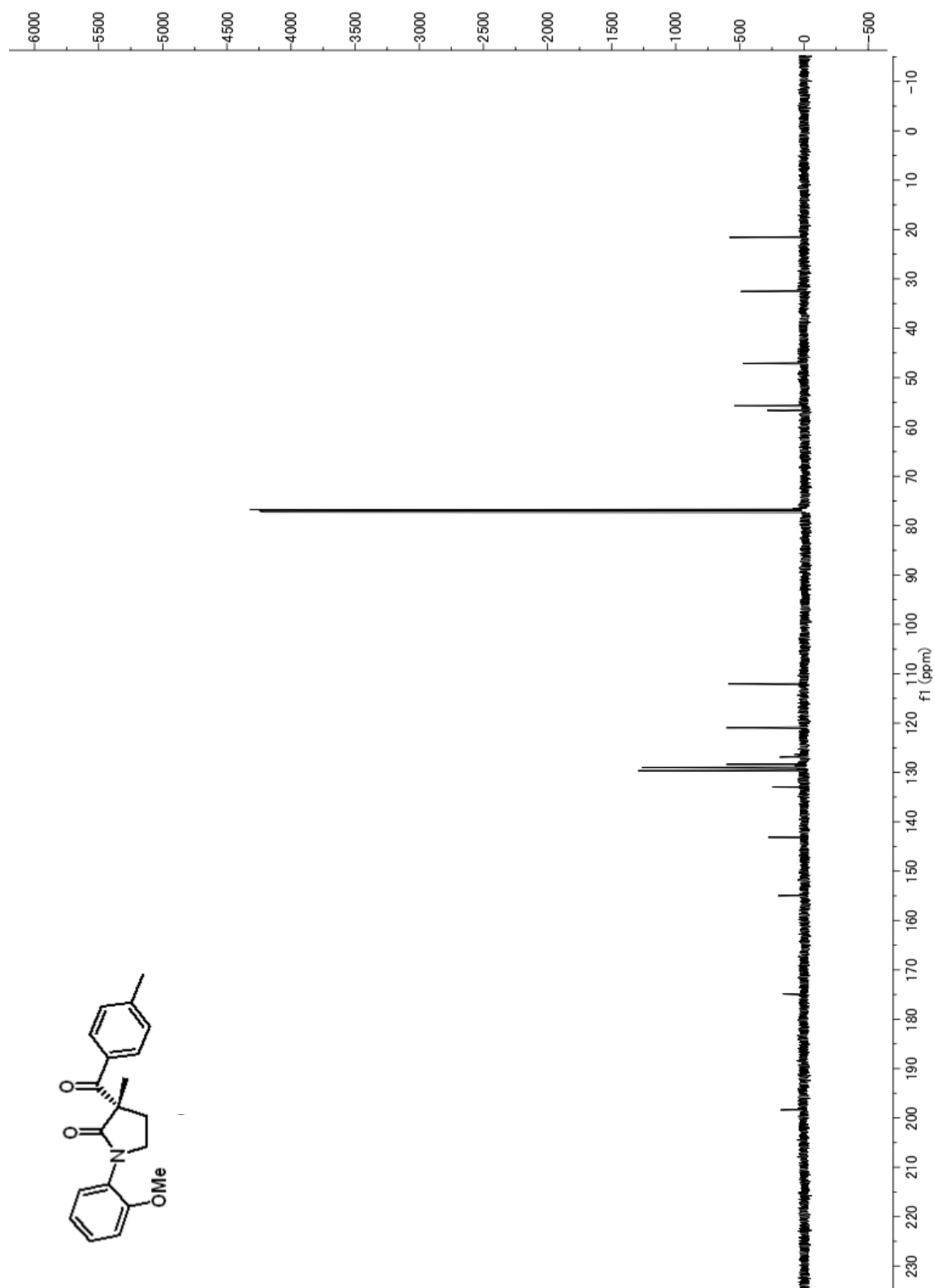
Figure A3.41. ¹H NMR (500 MHz, CDCl₃) of compound **63n**.

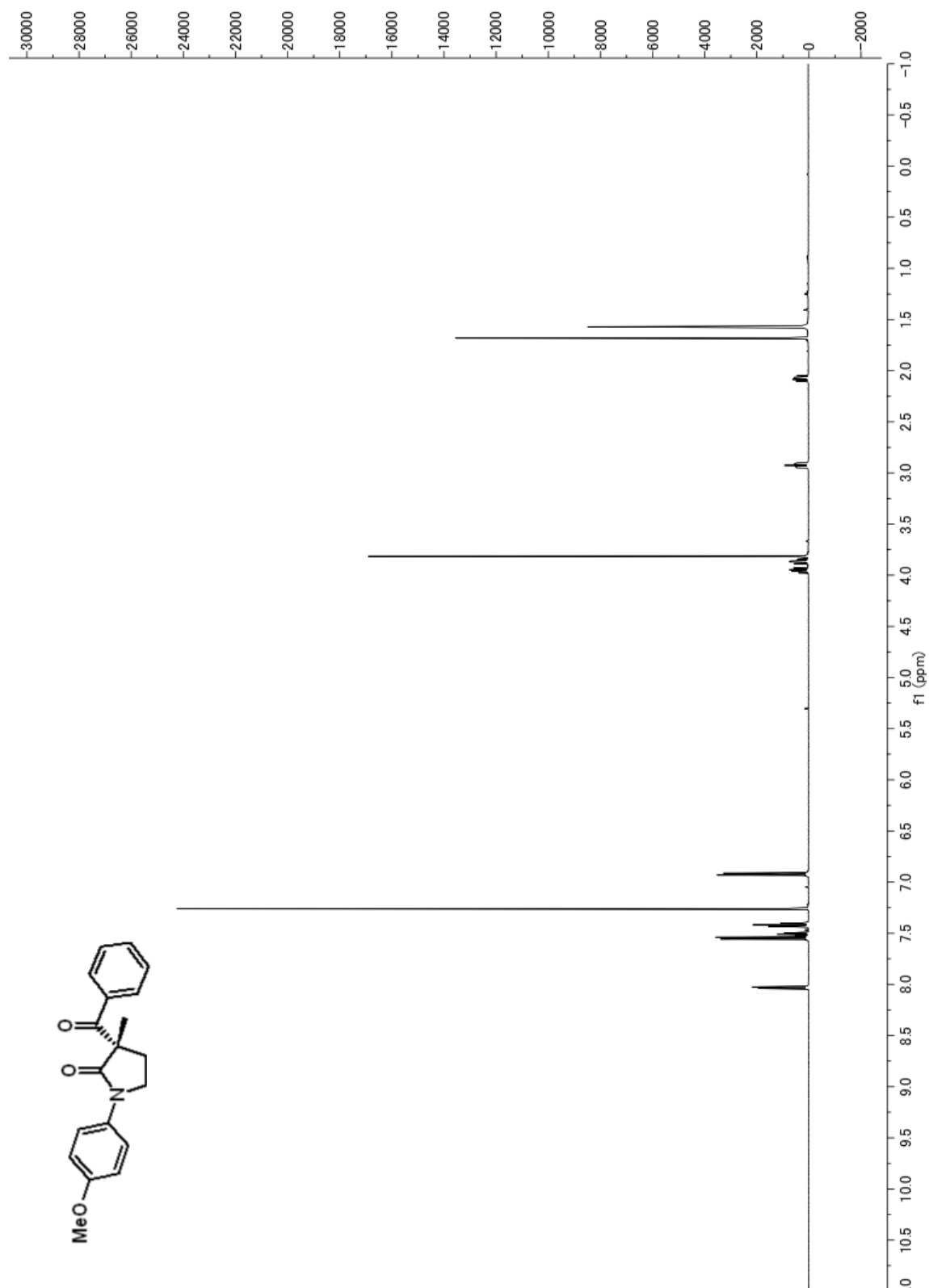
Figure A3.42. ¹³C NMR (126 MHz, CDCl₃) of compound **63n**.

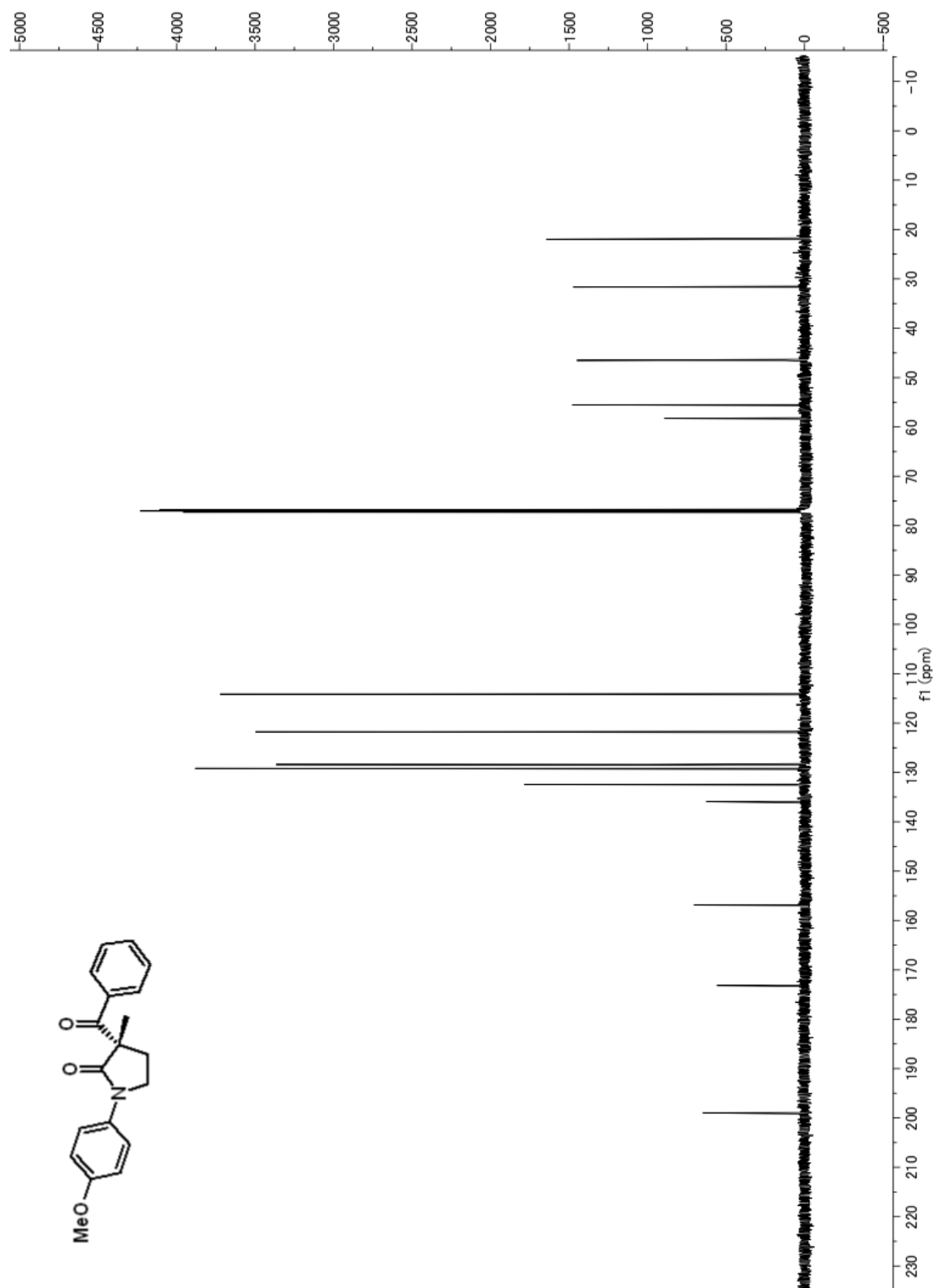
d Figure A3.43. ¹H NMR (500 MHz, CDCl₃) of compound **63o**.

Figure A3.44. ¹³C NMR (126 MHz, CDCl₃) of compound **63o**.

Figure A3.45. ^1H NMR (500 MHz, CDCl_3) of compound **62b**.

Figure A3.46. ^{13}C NMR (126 MHz, CDCl_3) of compound **62b**.

Figure A3.47. ^1H NMR (500 MHz, CDCl_3) of compound **60a**.

Figure A3.48. ¹³C NMR (126 MHz, CDCl₃) of compound 60a.

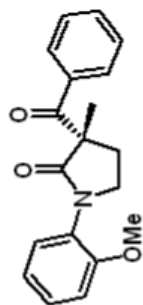
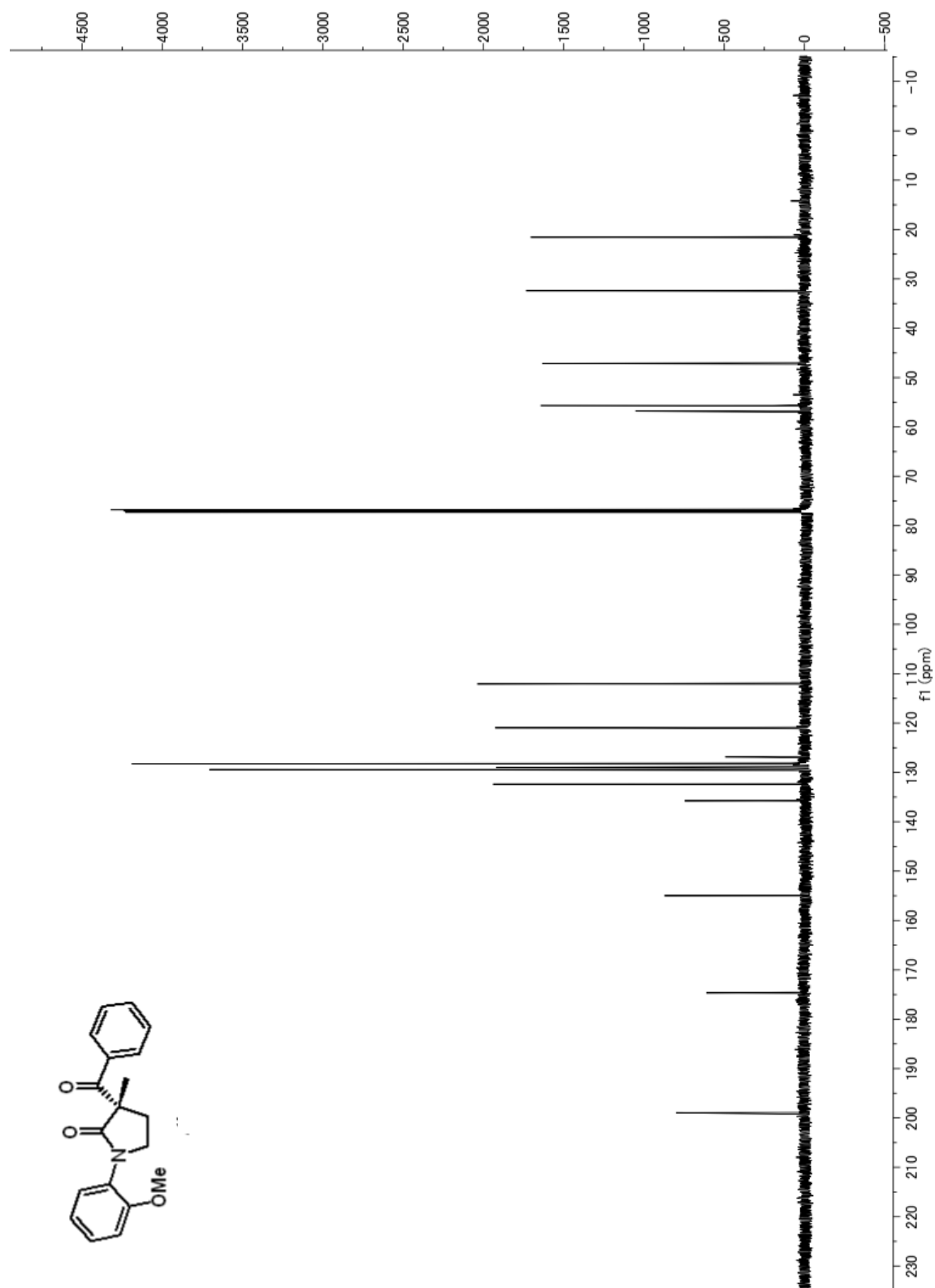
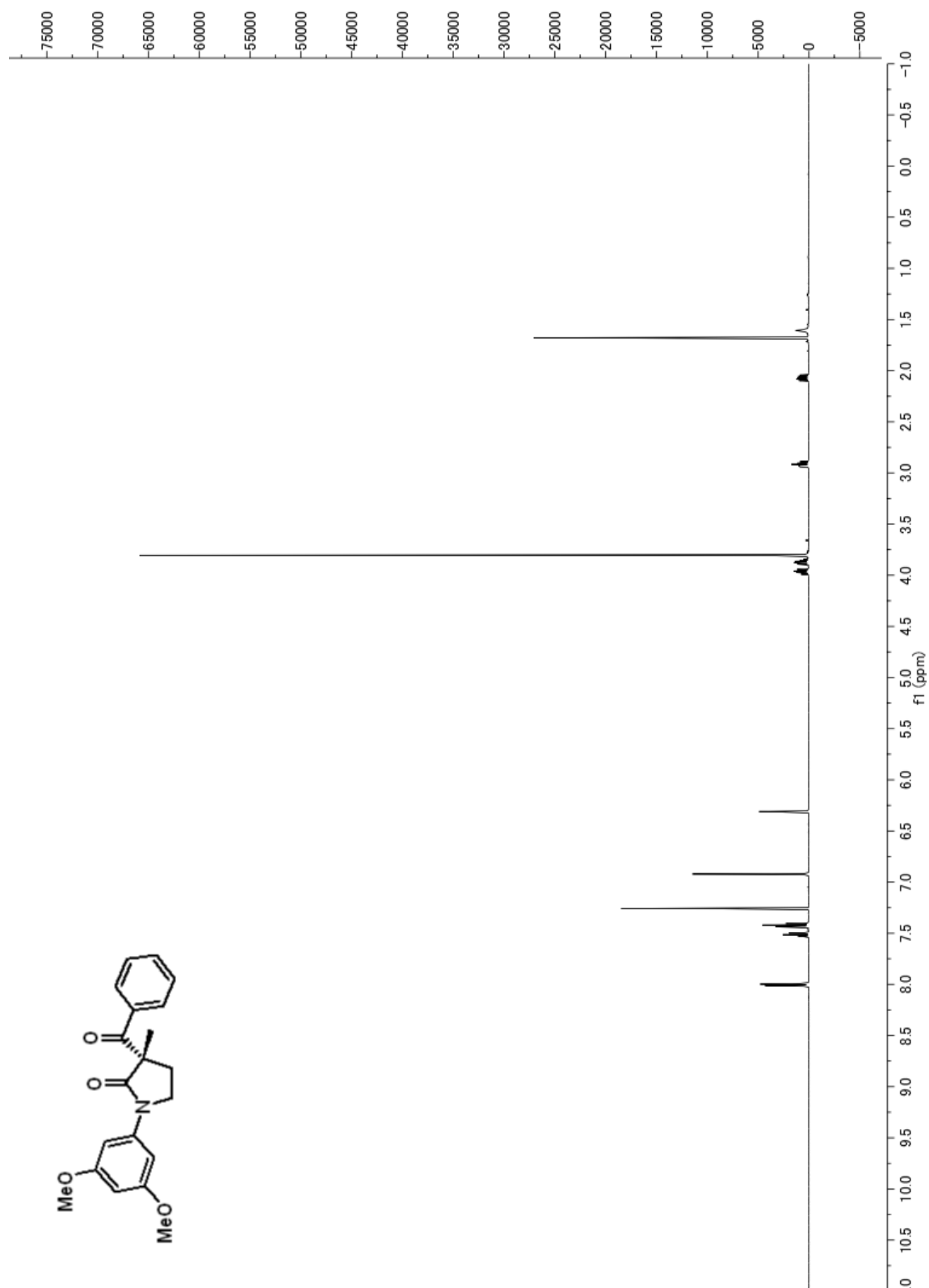
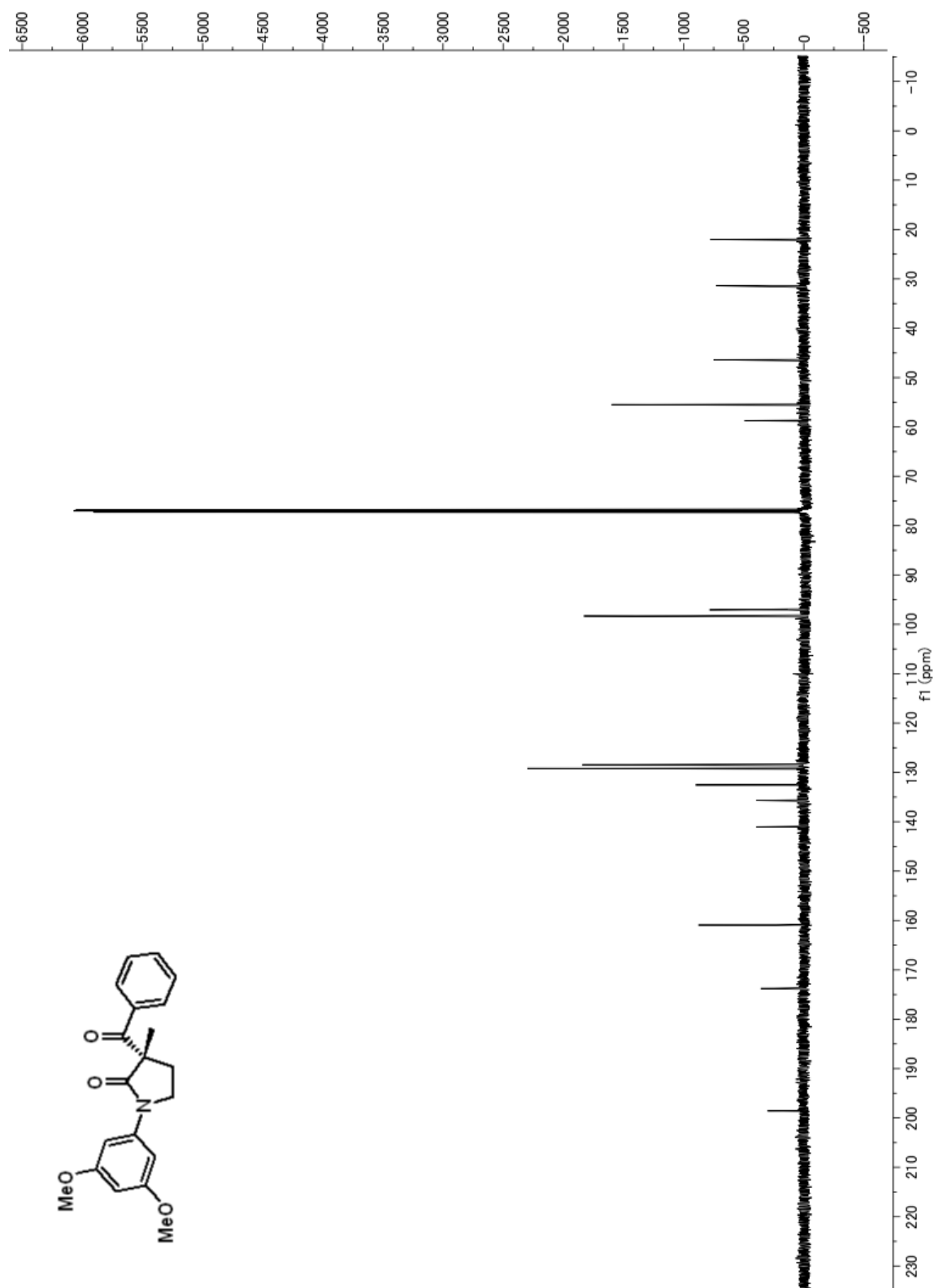


Figure A3.49. ^1H NMR (500 MHz, CDCl_3) of compound **60b**.

Figure A3.50. ^{13}C NMR (126 MHz, CDCl_3) of compound **60b**.

Figure A3.51. ¹H NMR (500 MHz, CDCl₃) of compound 60c.

Figure A3.52. ^{13}C NMR (126 MHz, CDCl_3) of compound **60c**.

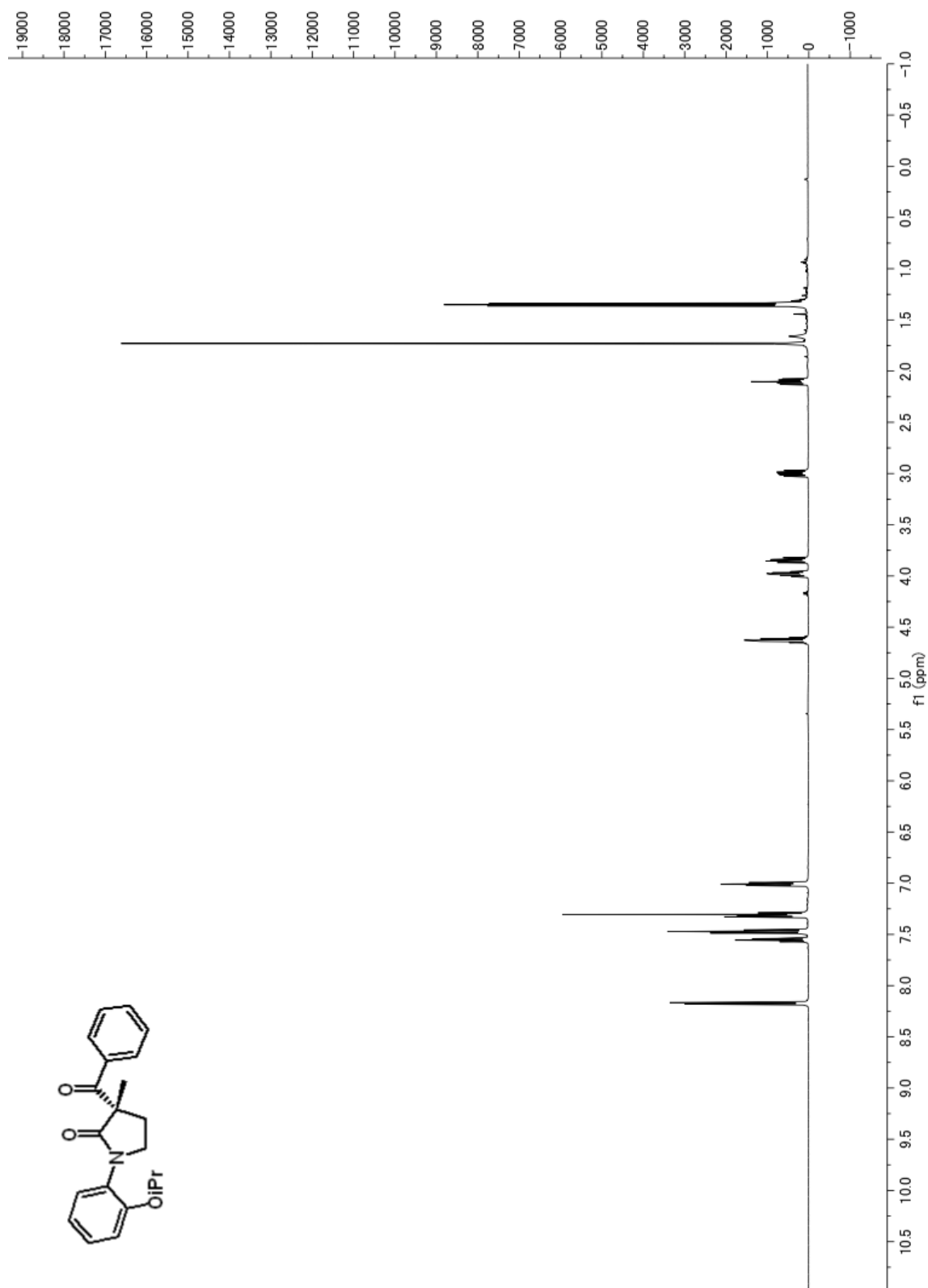
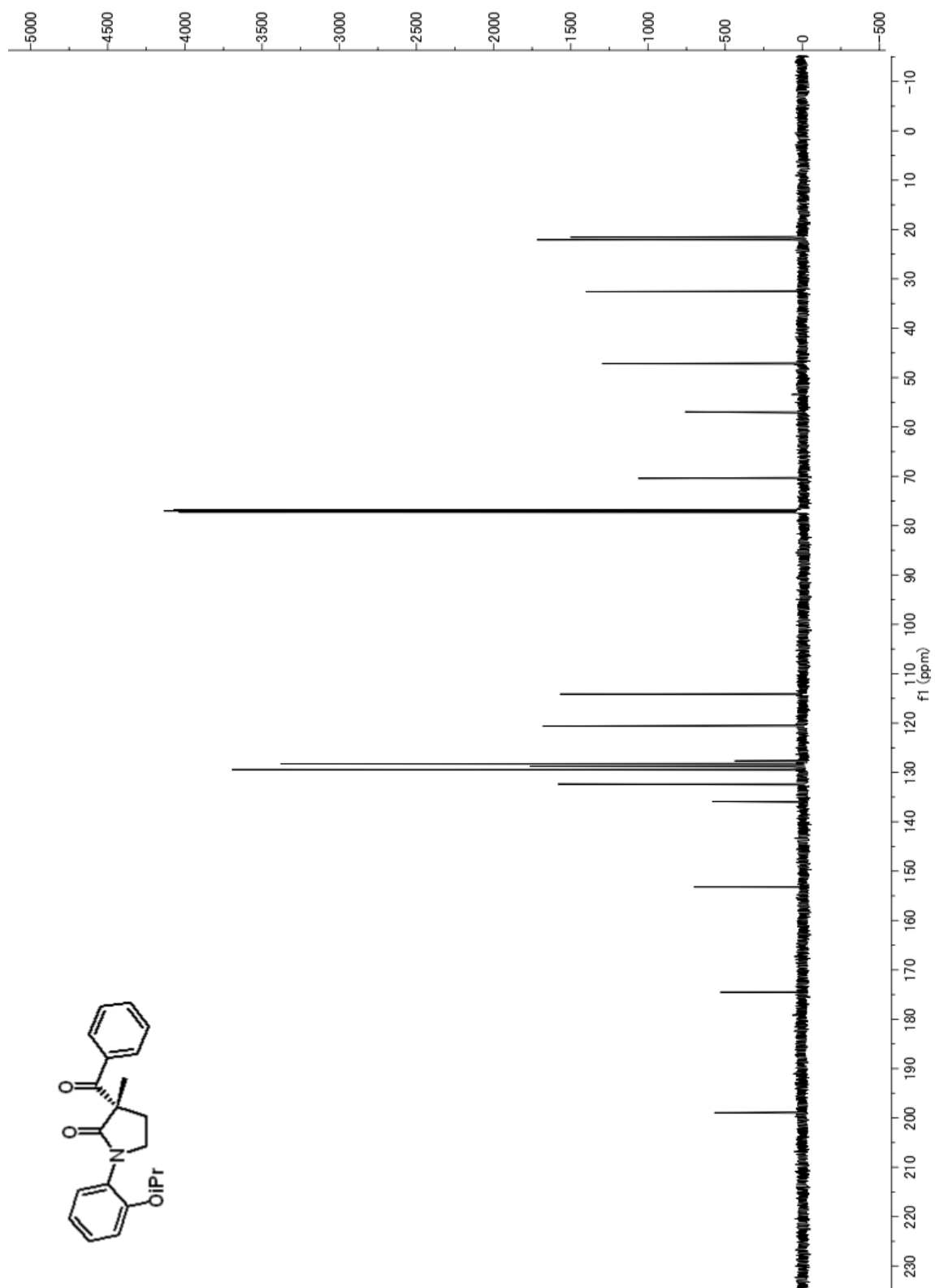
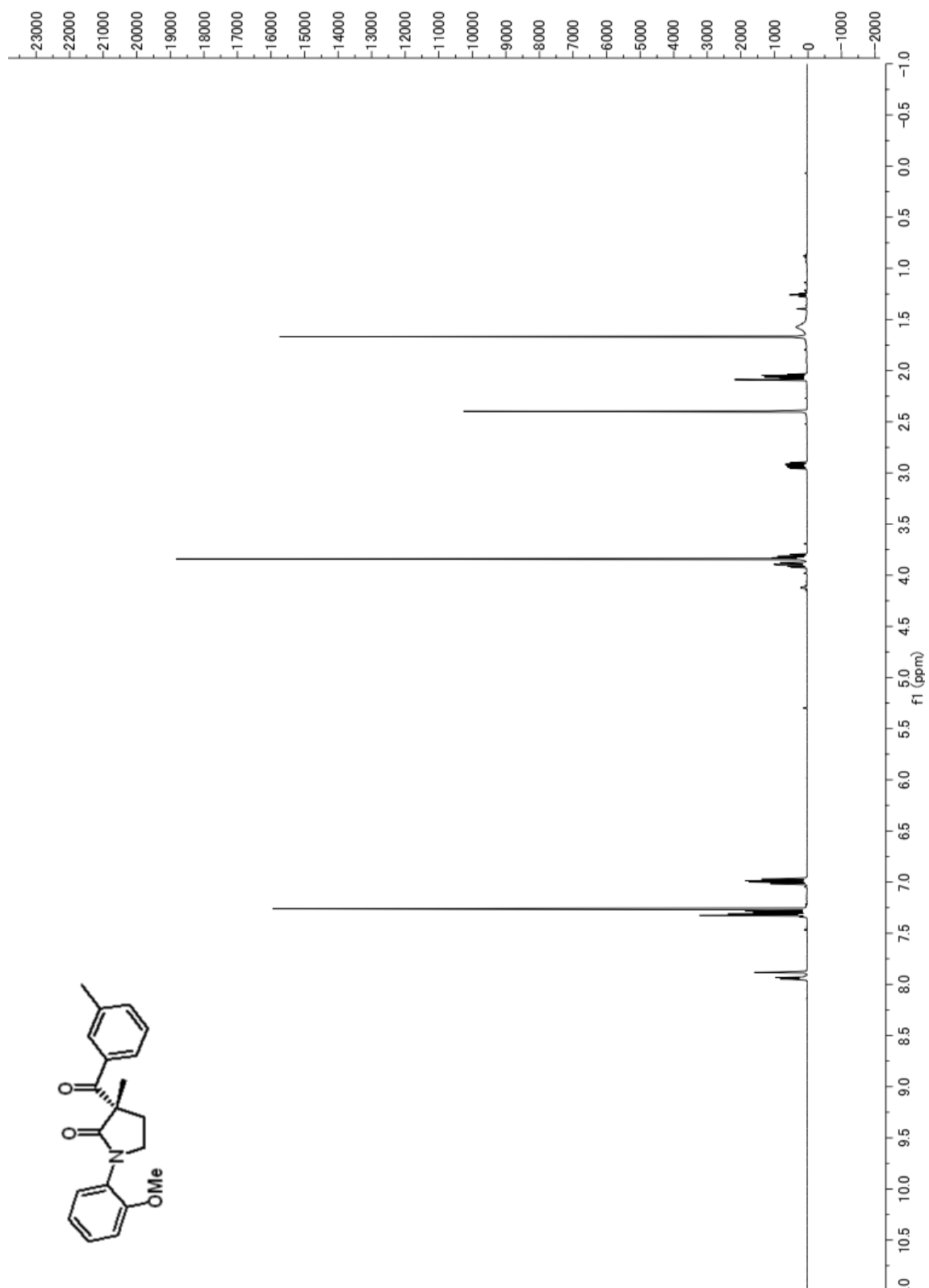
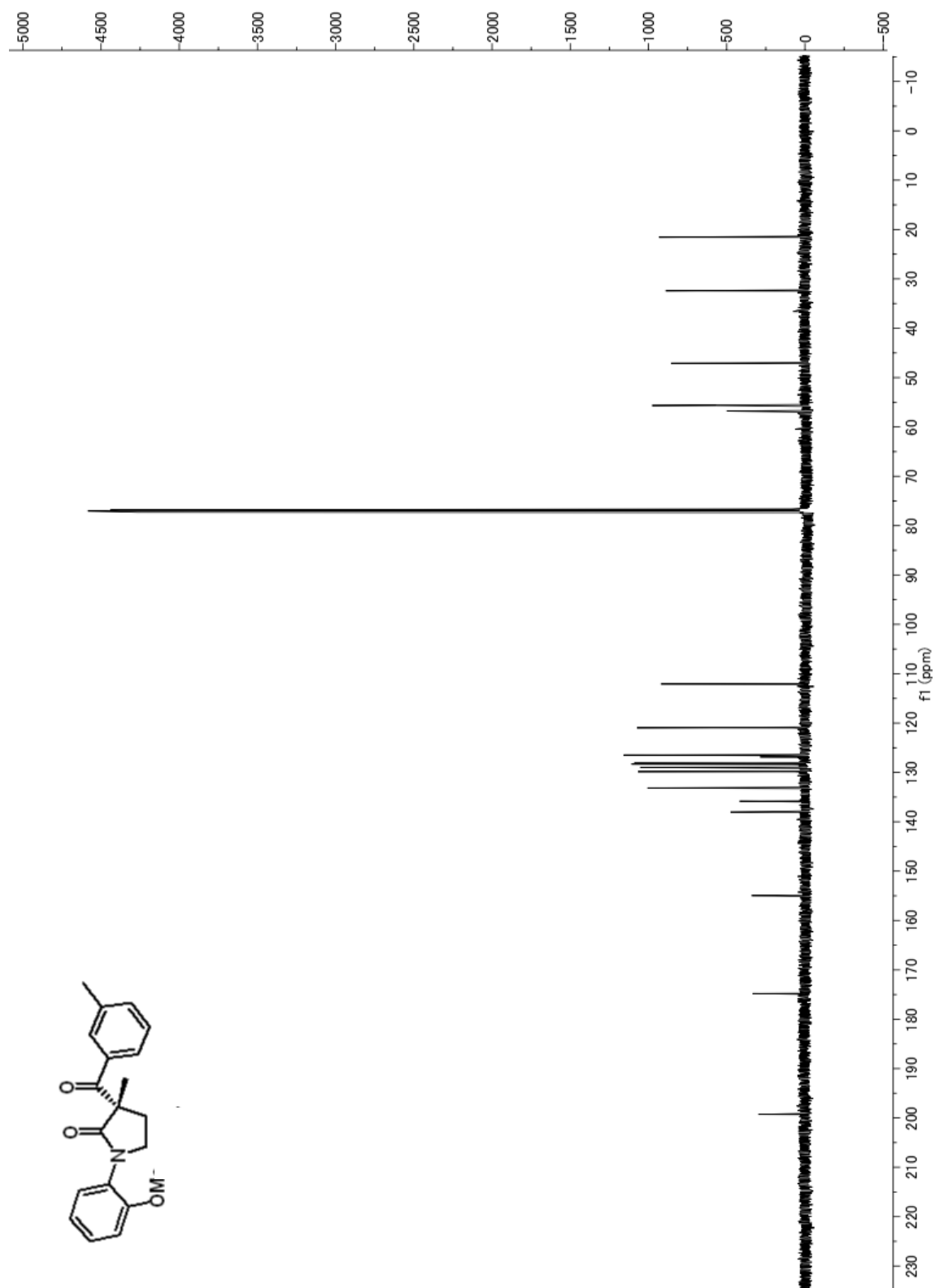
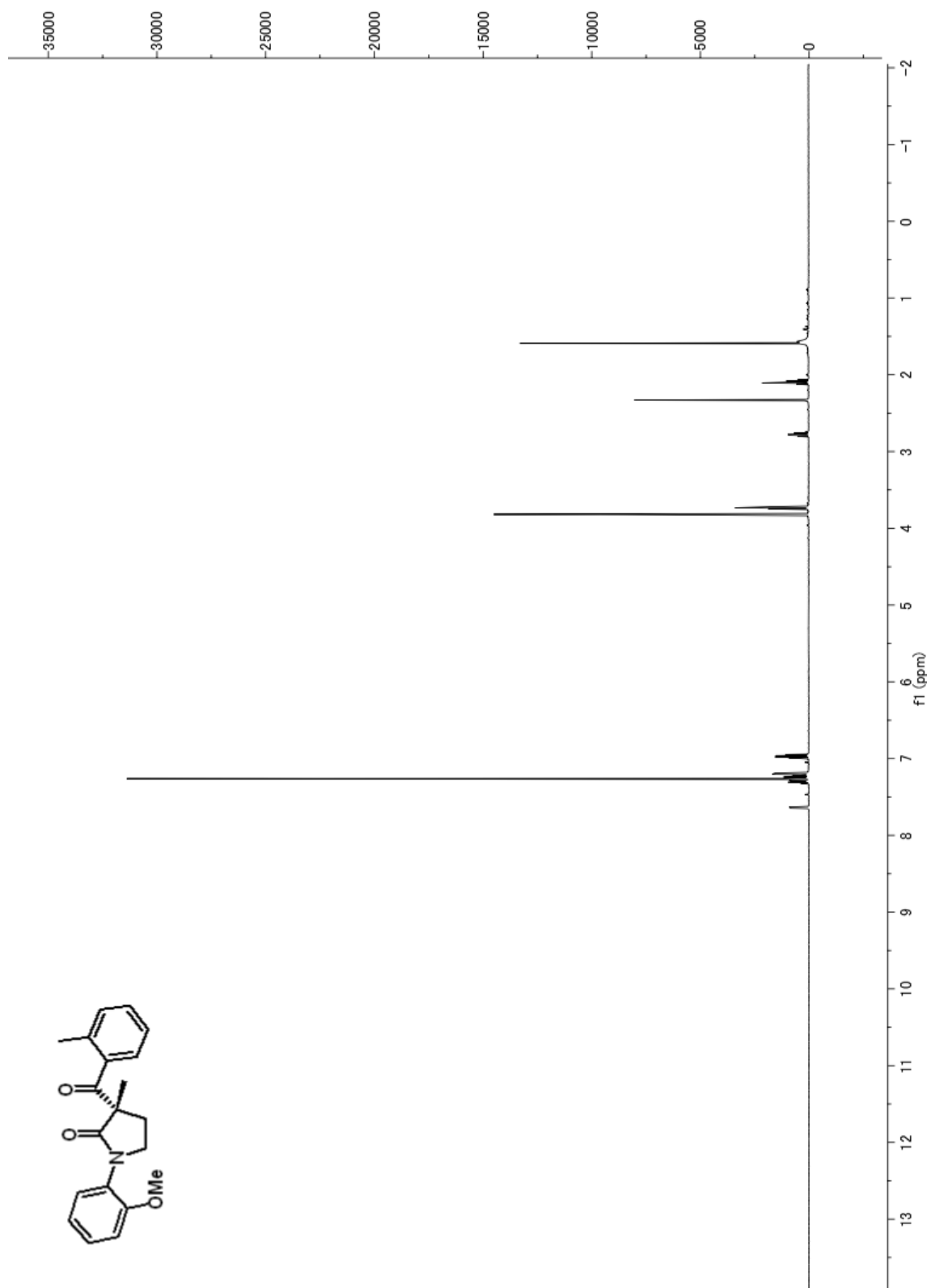


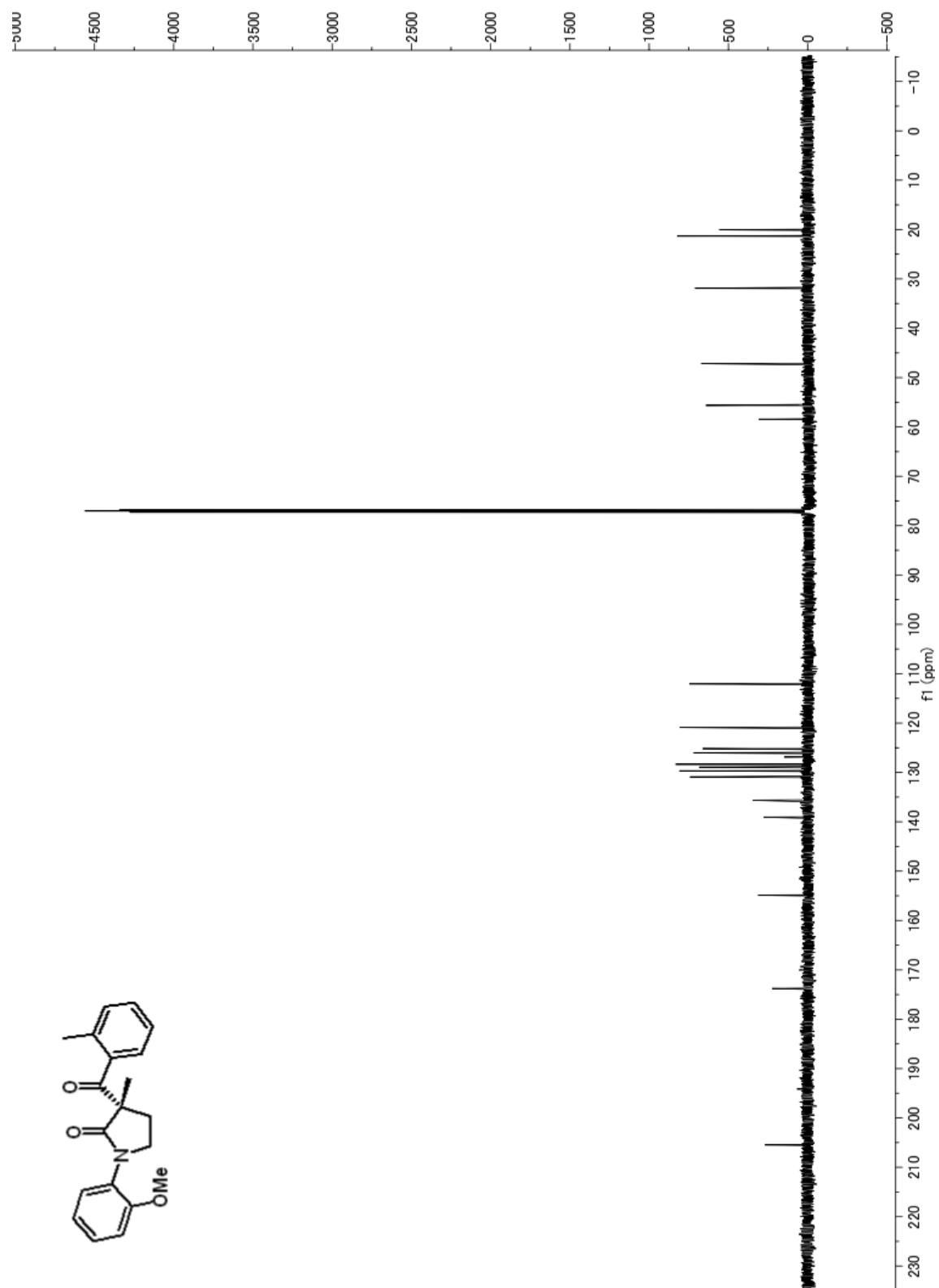
Figure A3.53. ^1H NMR (500 MHz, CDCl_3) of compound **60d**.

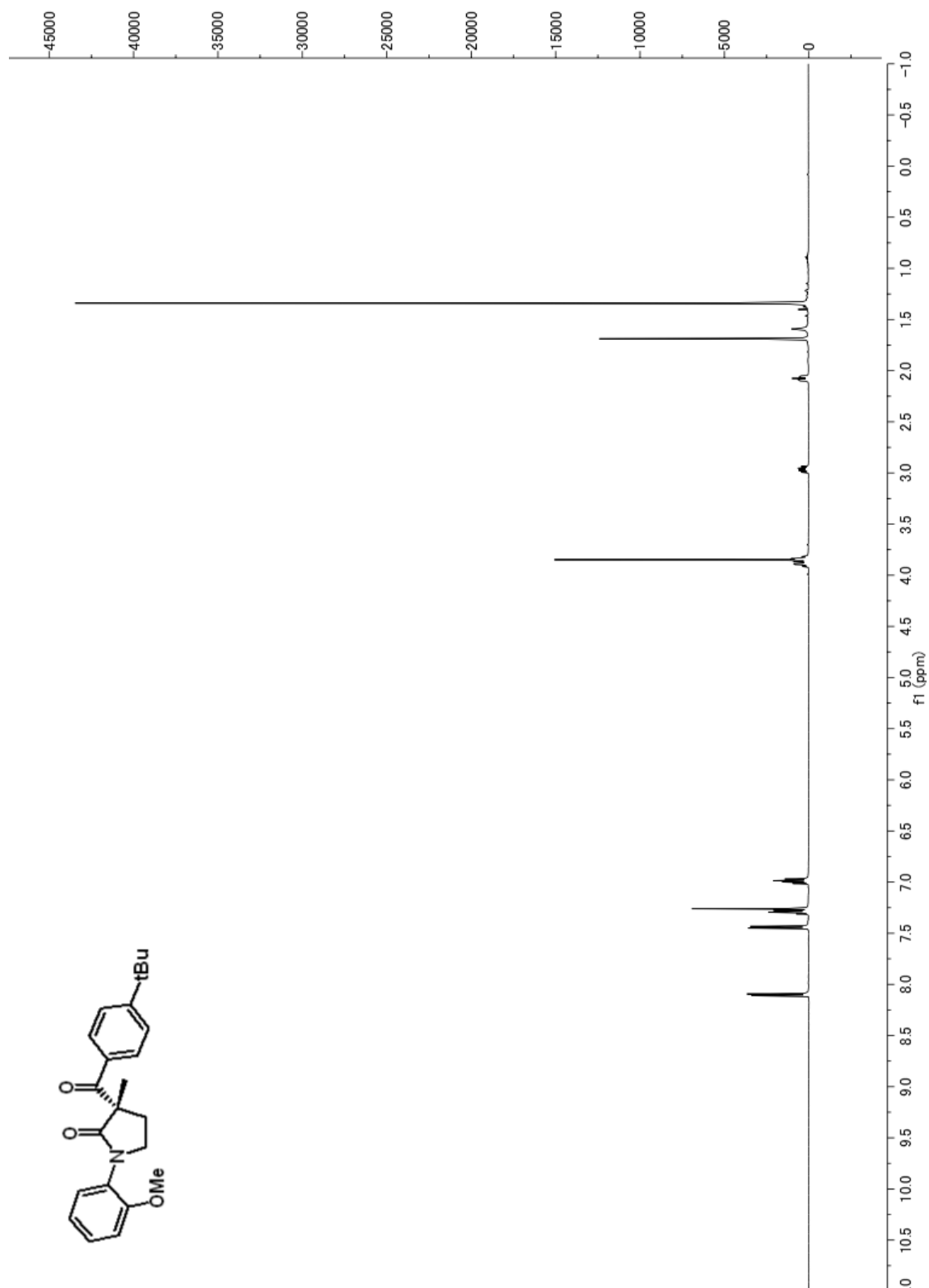
Figure A3.54. ^{13}C NMR (126 MHz, CDCl_3) of compound **60d**.

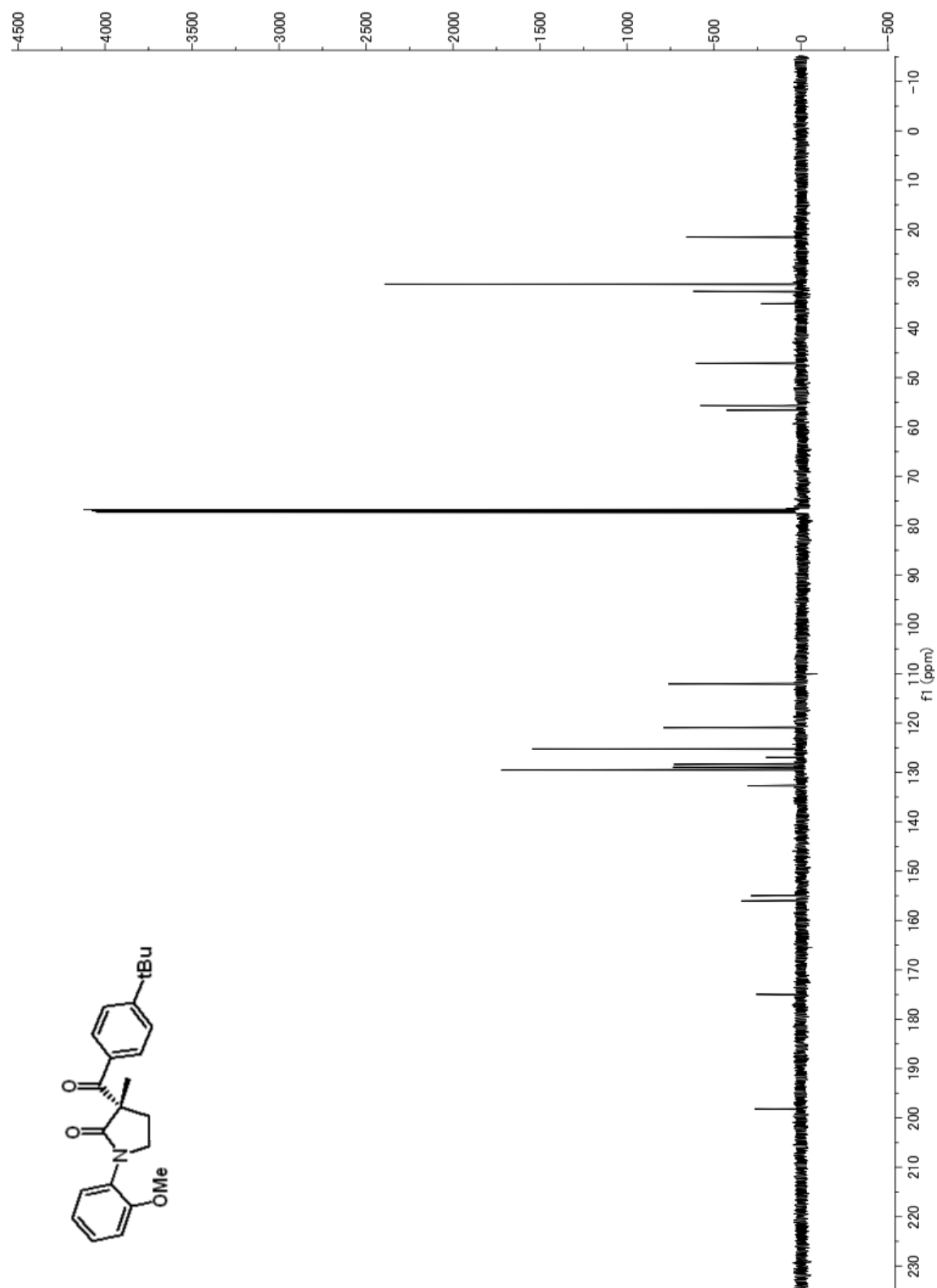
Figure A3.55. ^1H NMR (500 MHz, CDCl_3) of compound **62c**.

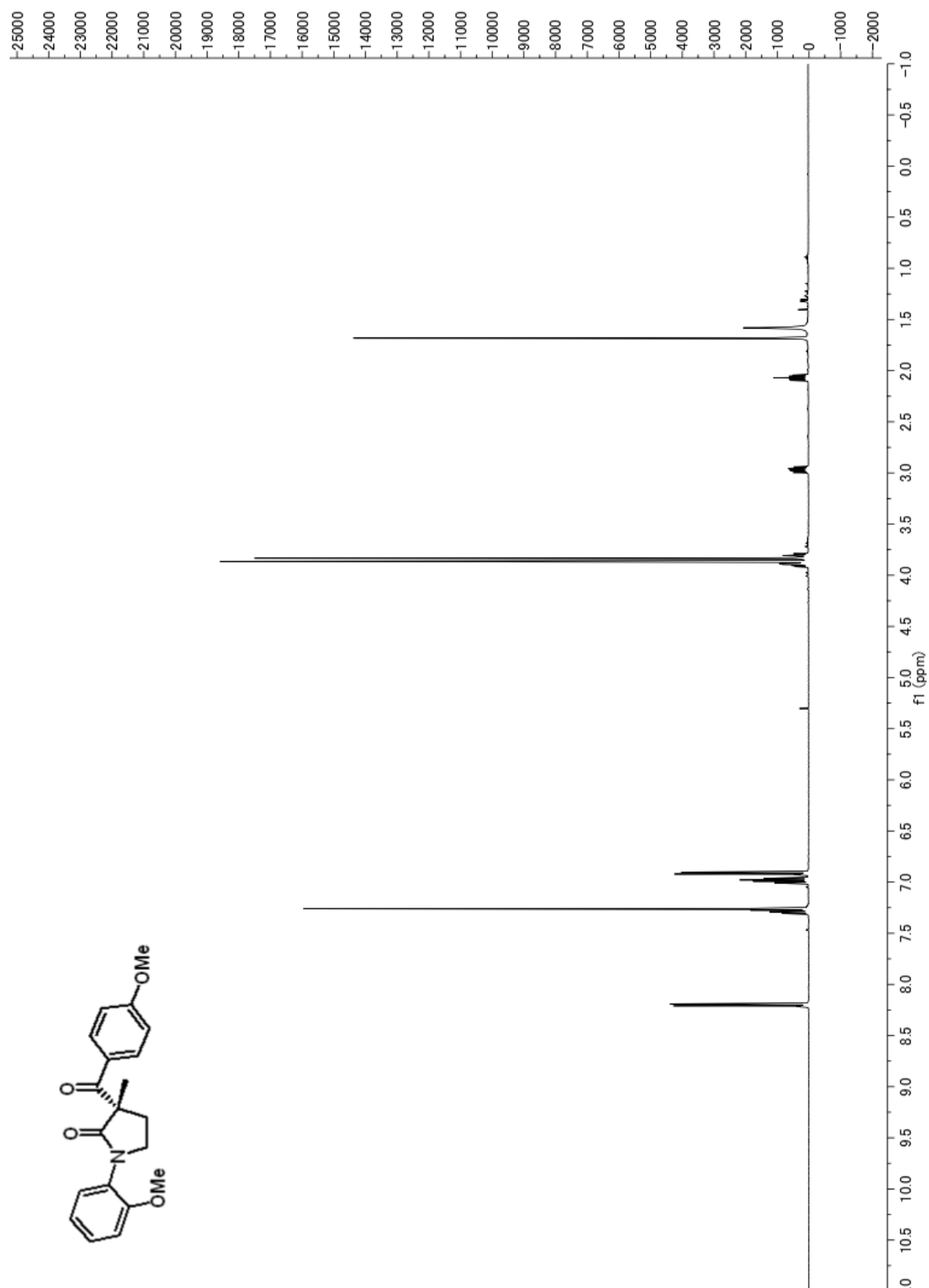
Figure A3.56. ^{13}C NMR (126 MHz, CDCl_3) of compound **62c**.

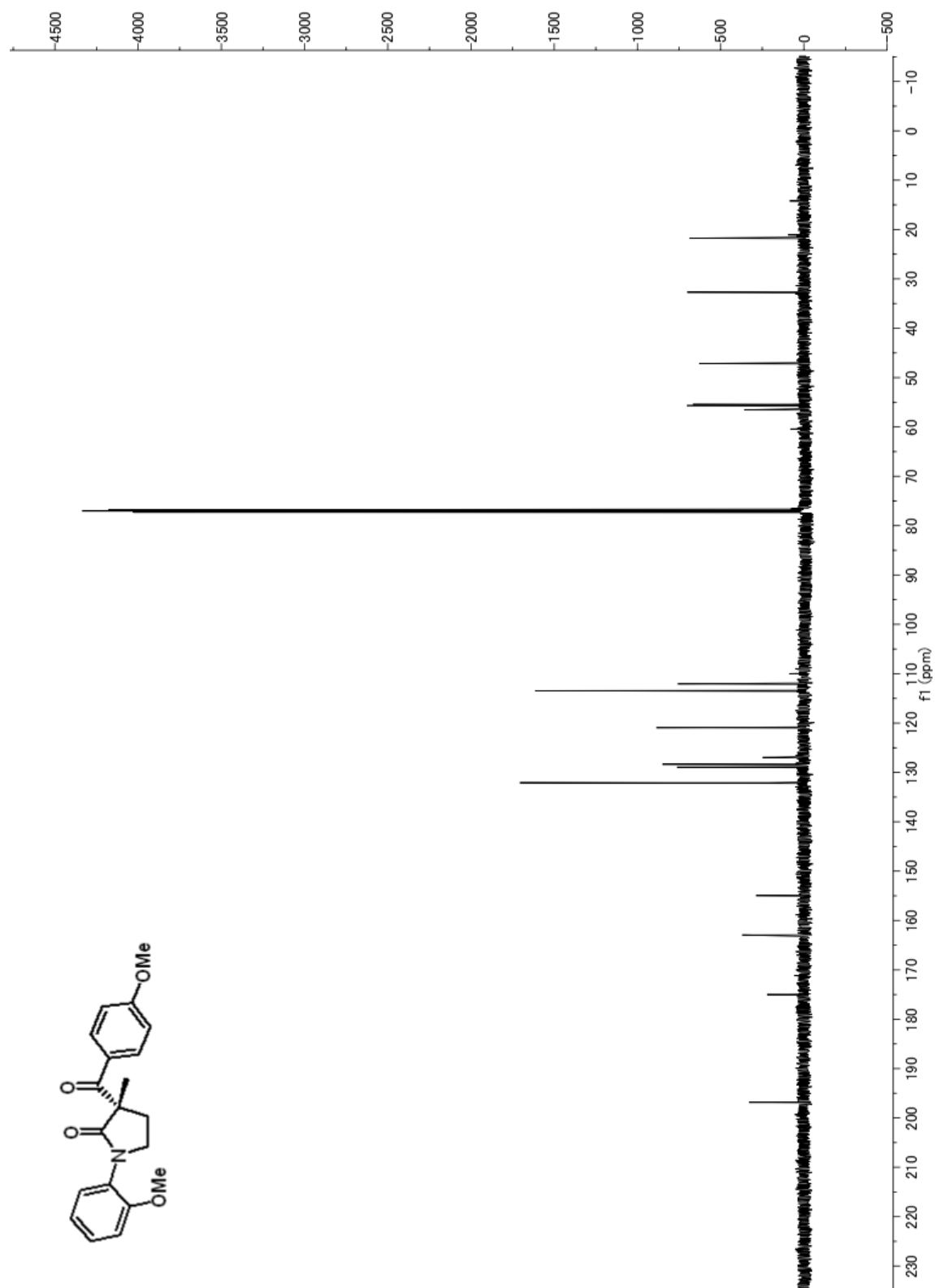
Figure A3.57. ^1H NMR (500 MHz, CDCl_3) of compound **62d**.

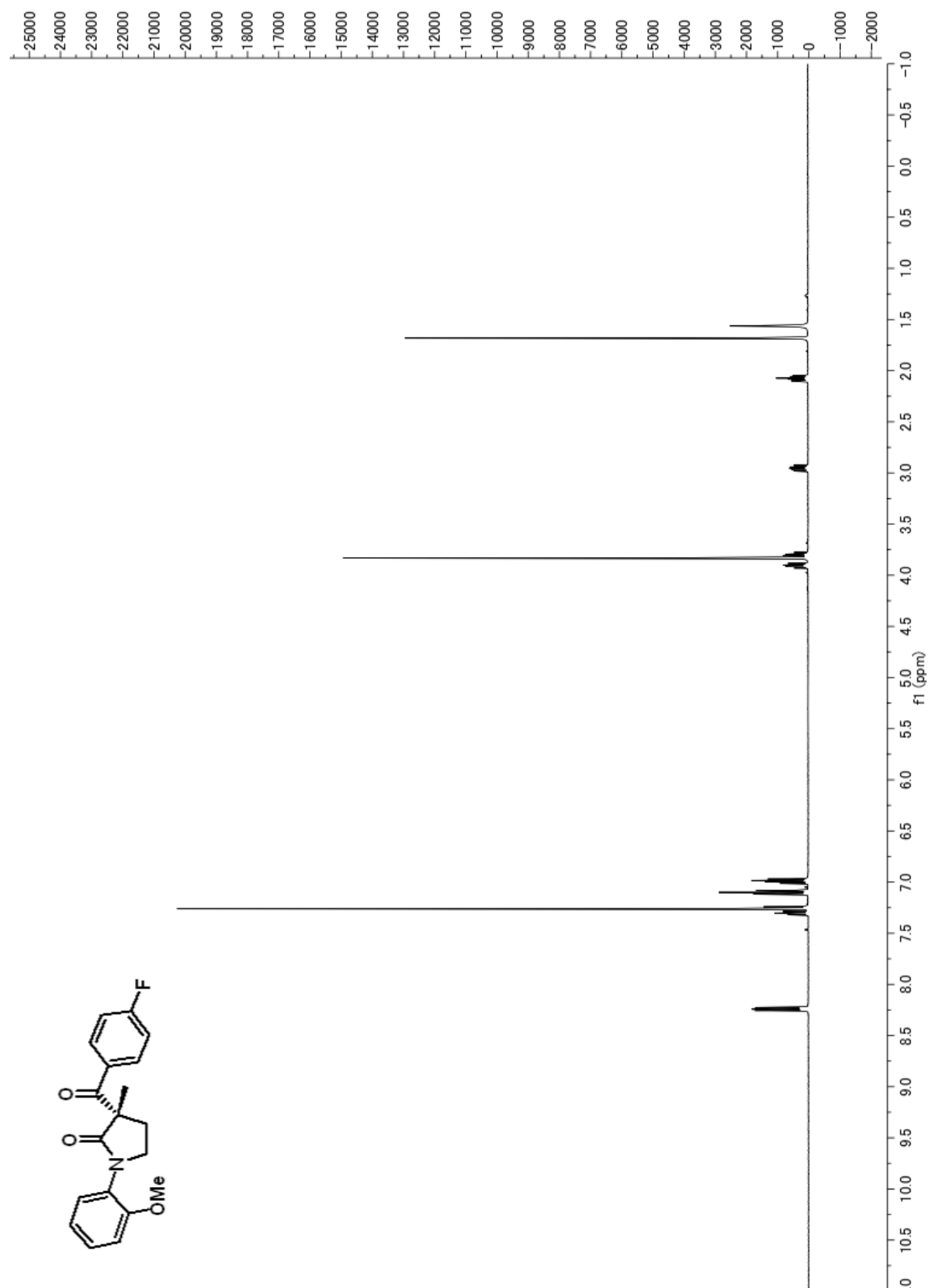
Figure A3.58. ^{13}C NMR (126 MHz, CDCl_3) of compound **62d**.

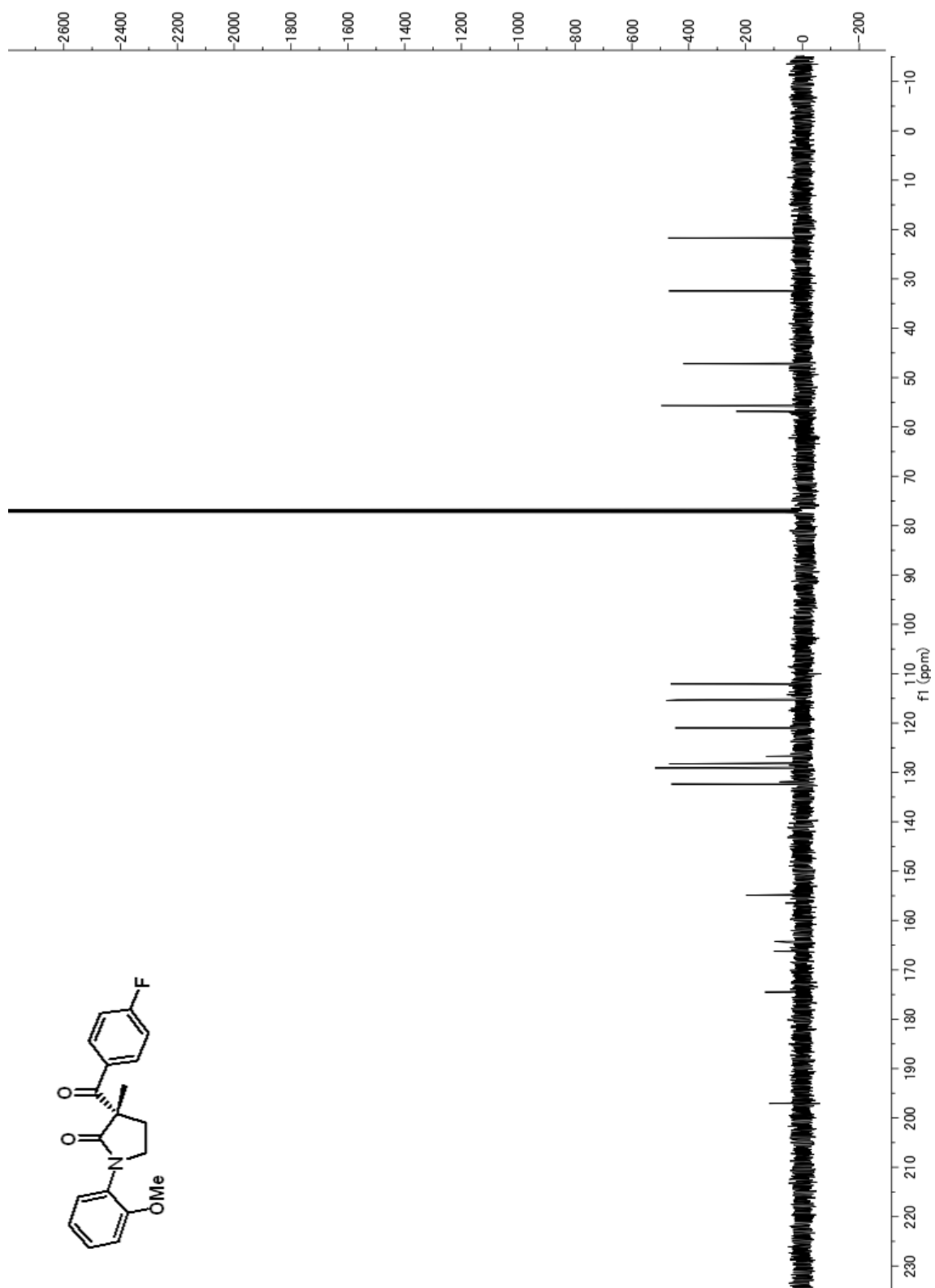
Figure A3.59. ^1H NMR (500 MHz, CDCl_3) of compound **62e**.

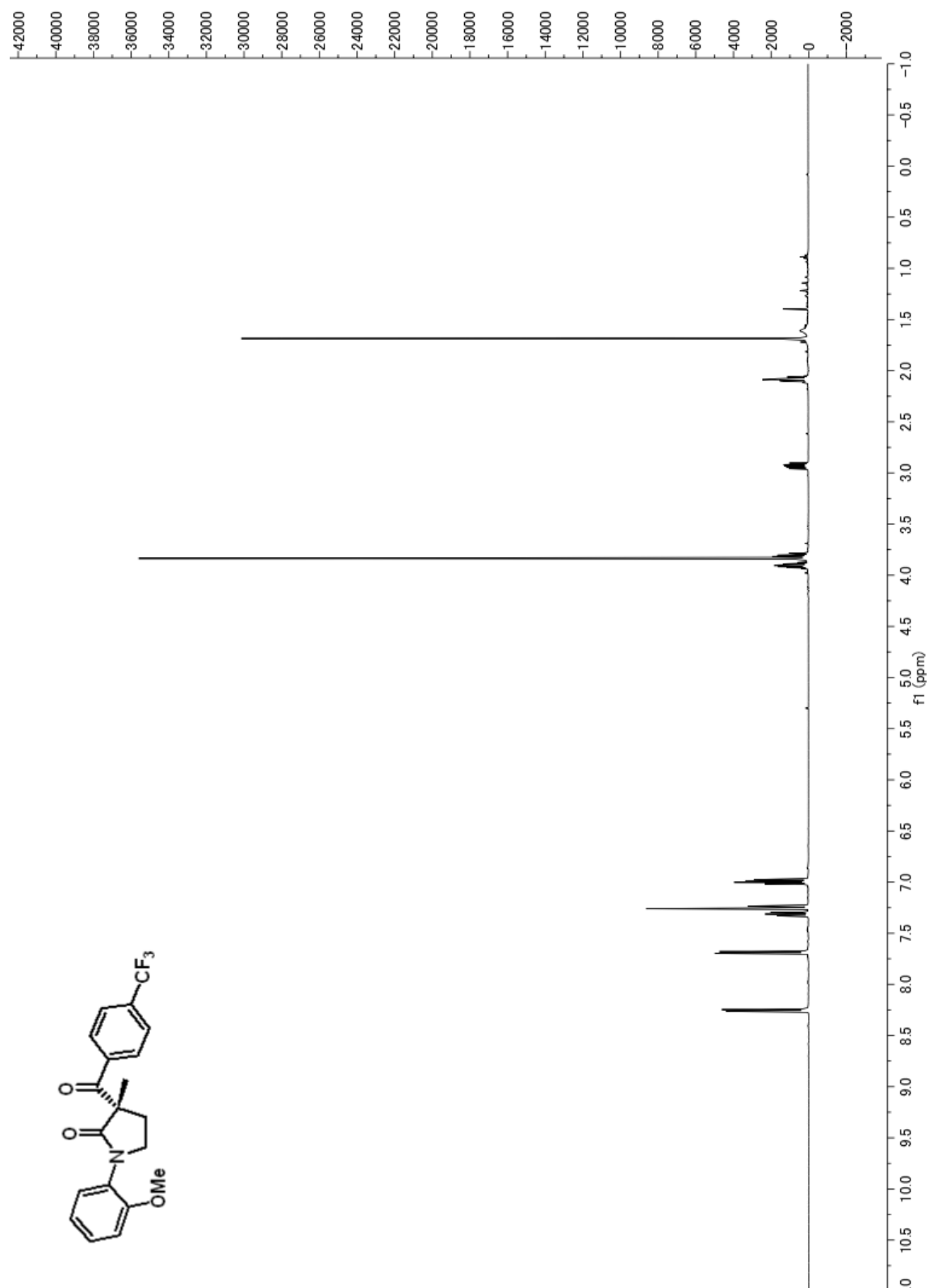
Figure A3.60. ¹³C NMR (126 MHz, CDCl₃) of compound **62f**.

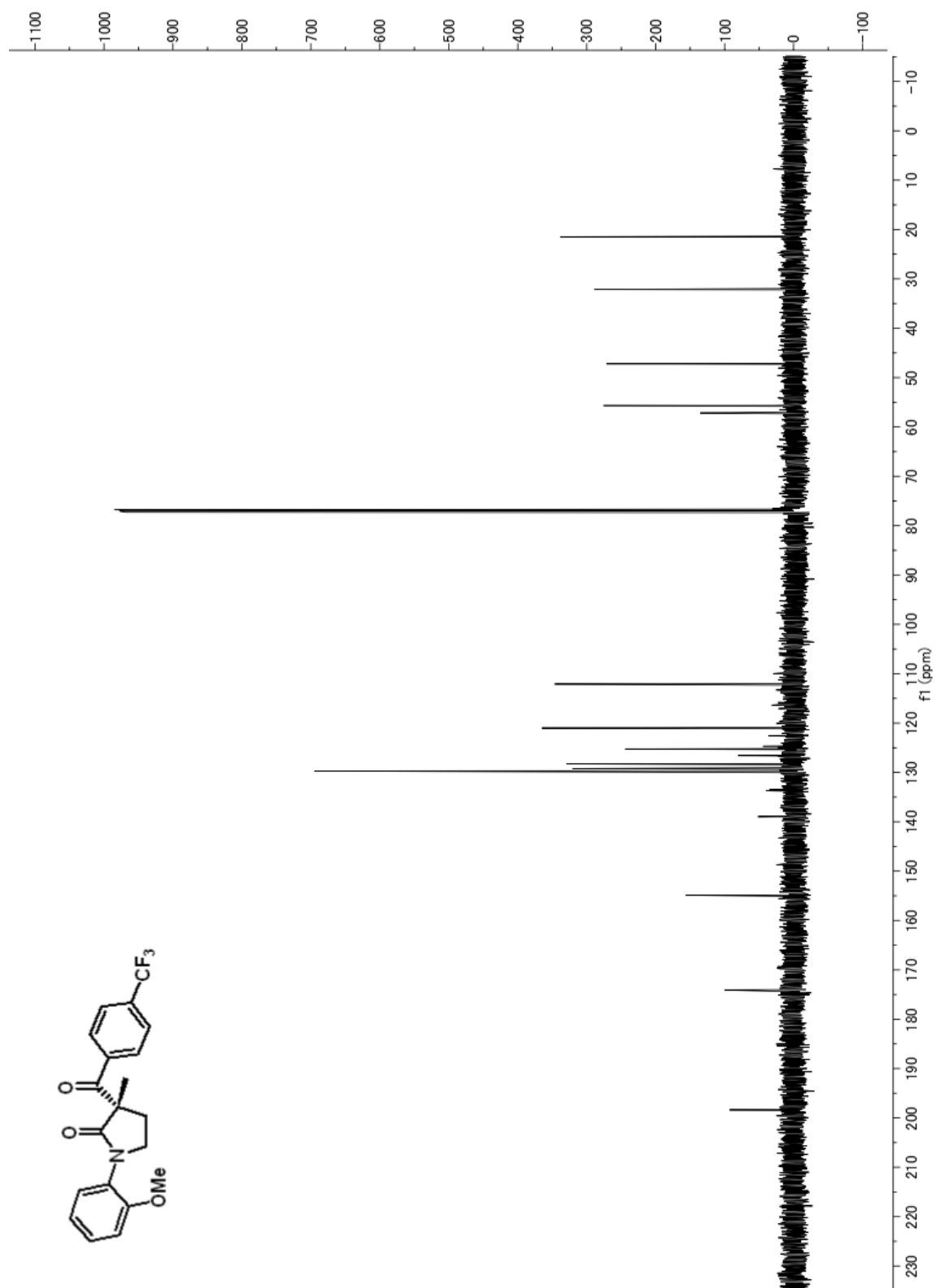
Figure A3.61. ^1H NMR (500 MHz, CDCl_3) of compound **62f**.

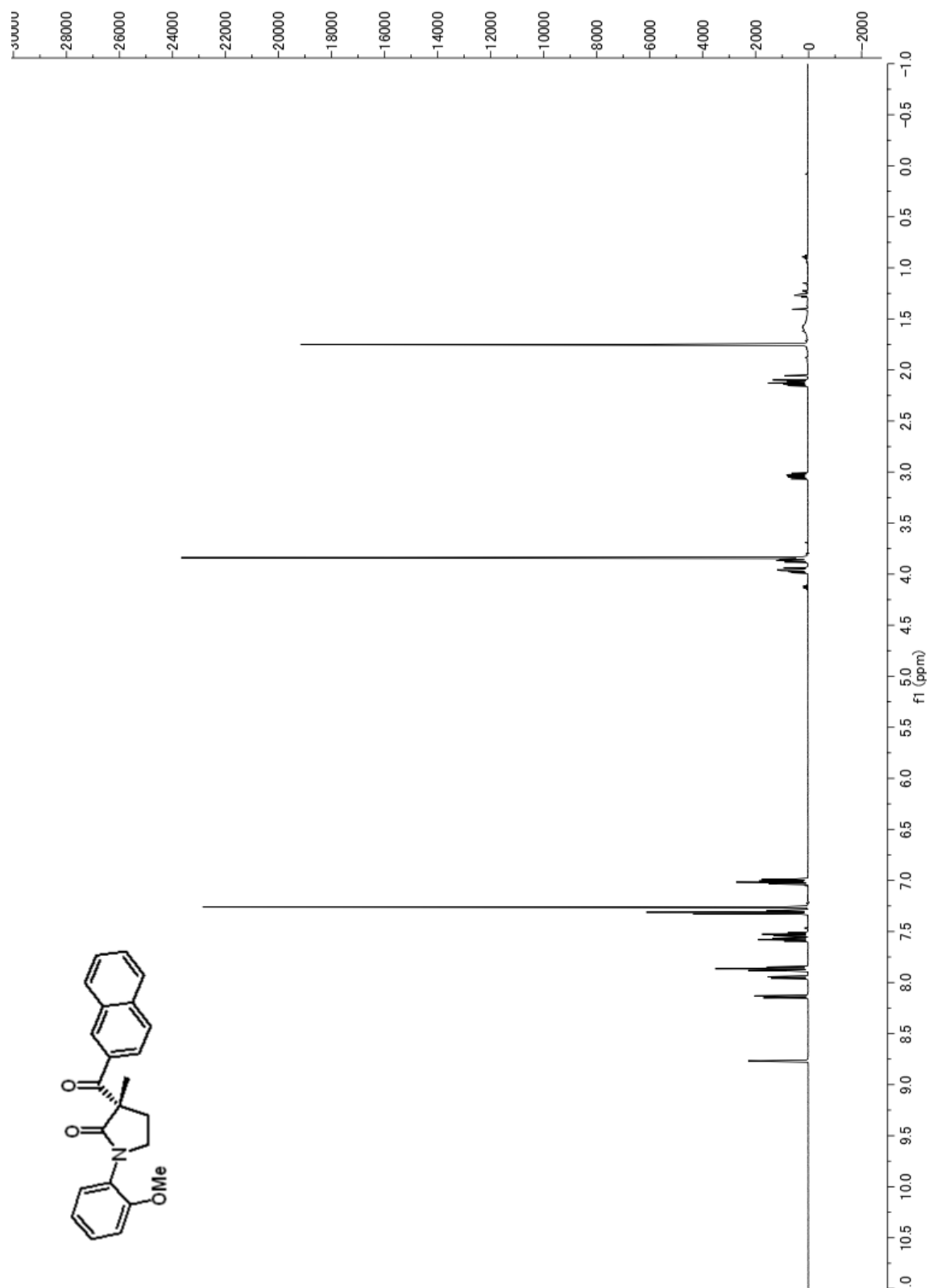
Figure A3.62. ^{13}C NMR (126 MHz, CDCl_3) of compound **62f**.

Figure A3.63. ^1H NMR (500 MHz, CDCl_3) of compound **62g**.

Figure A3.64. ^{13}C NMR (126 MHz, CDCl_3) of compound **62g**.

Figure A3.65. ^1H NMR (500 MHz, CDCl_3) of compound **62h**.

Figure A3.66. ^{13}C NMR (126 MHz, CDCl_3) of compound **62h**.

Figure A3.67. ^1H NMR (500 MHz, CDCl_3) of compound **62i**.

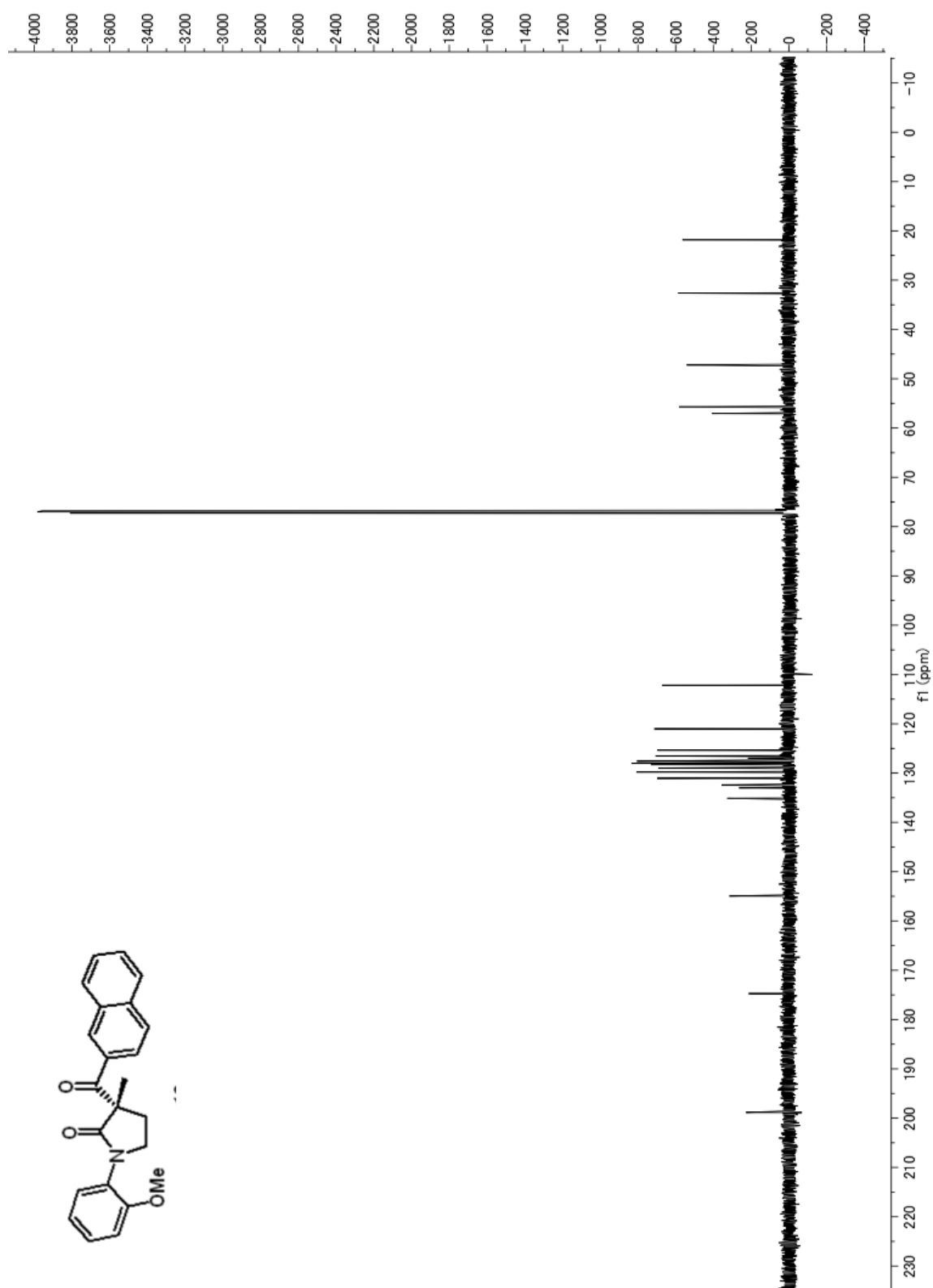
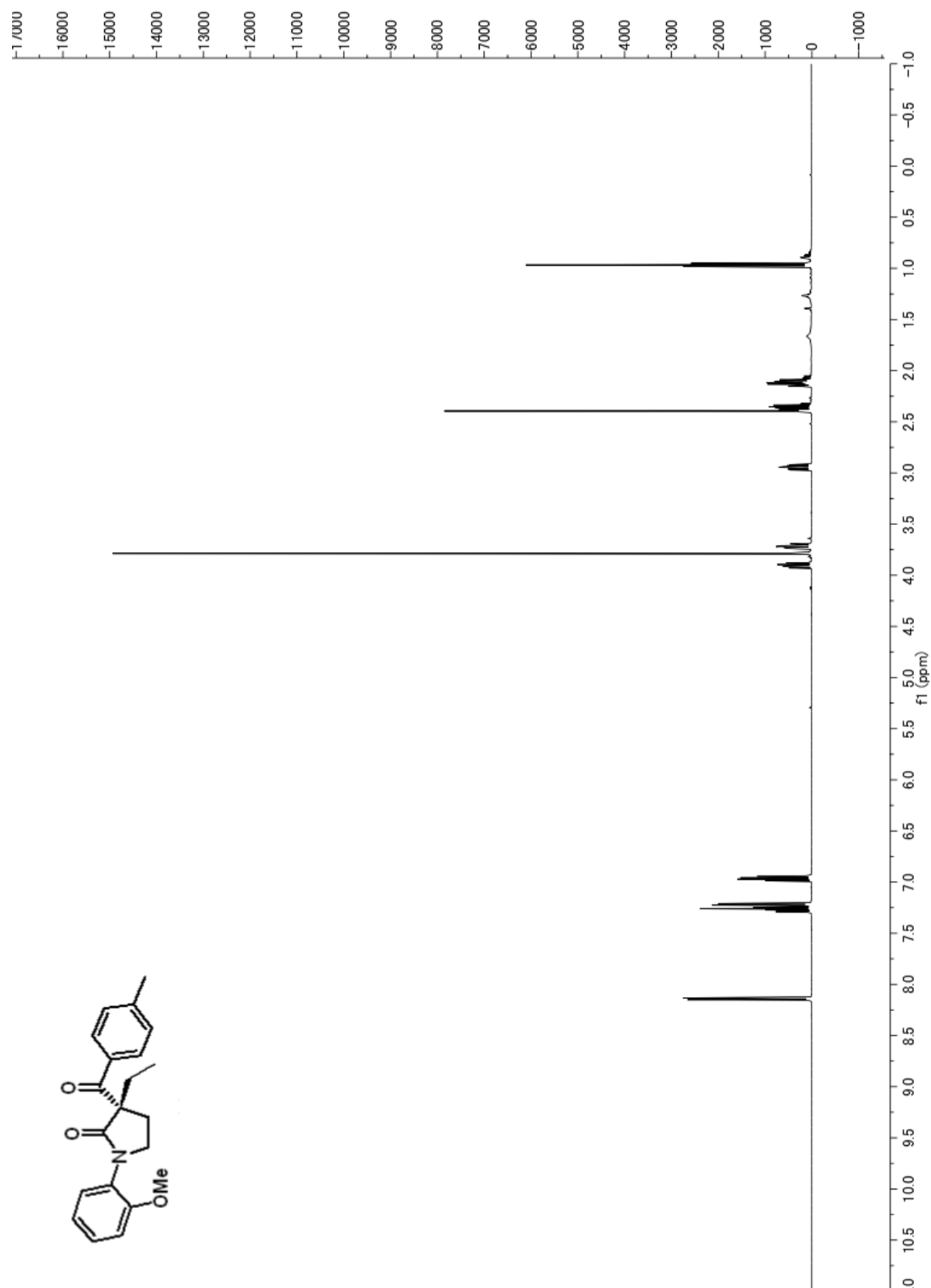
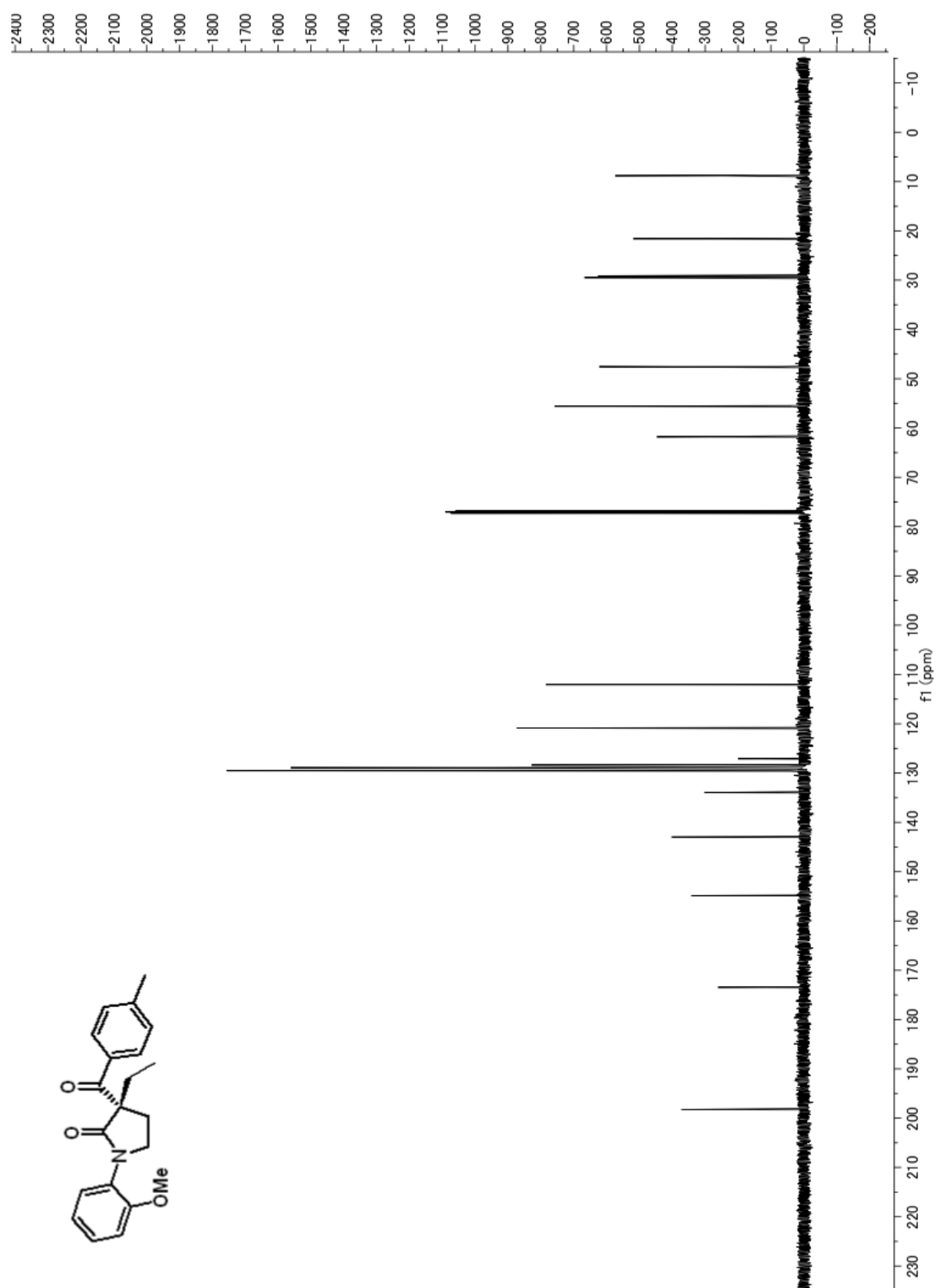
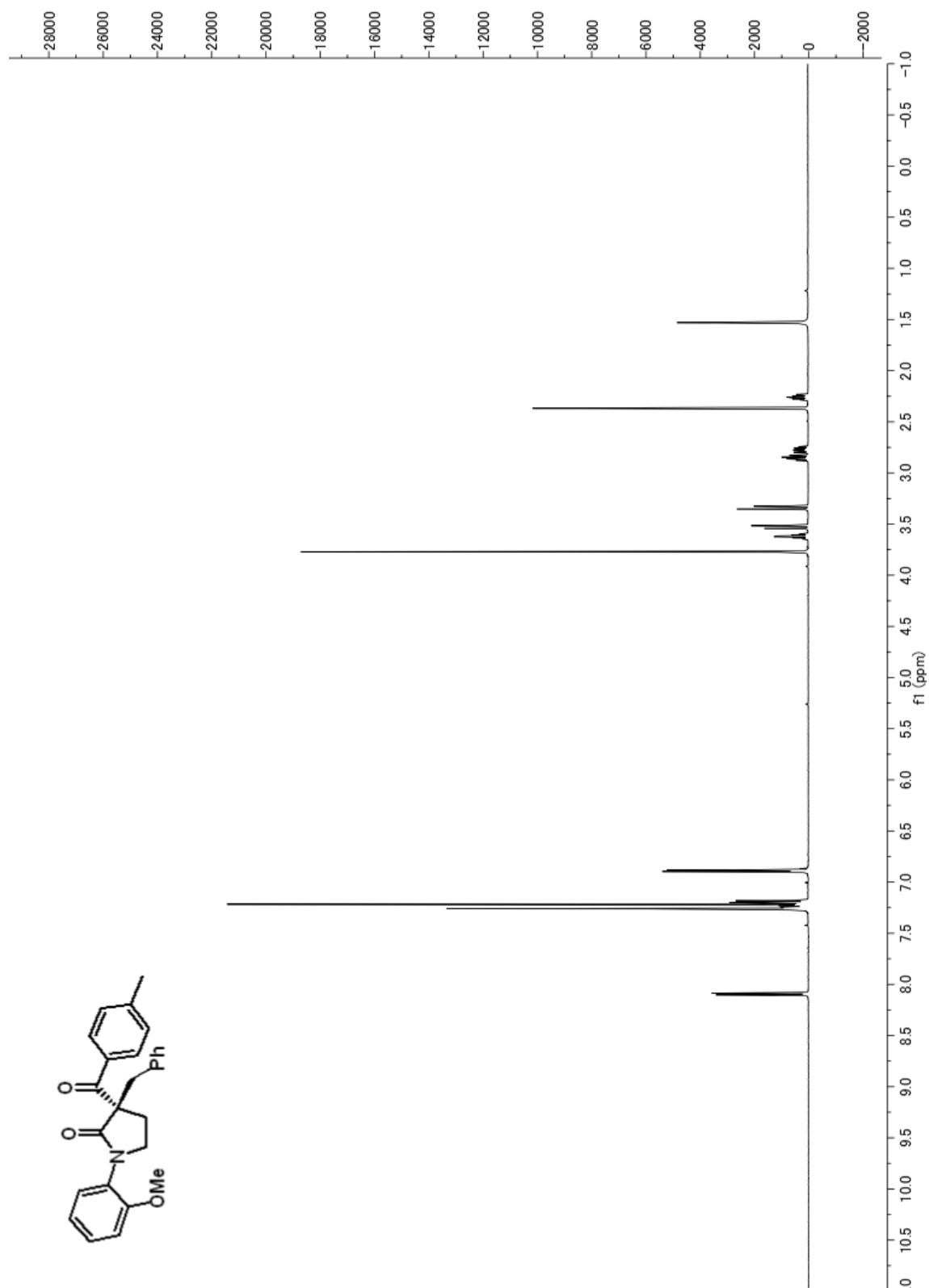
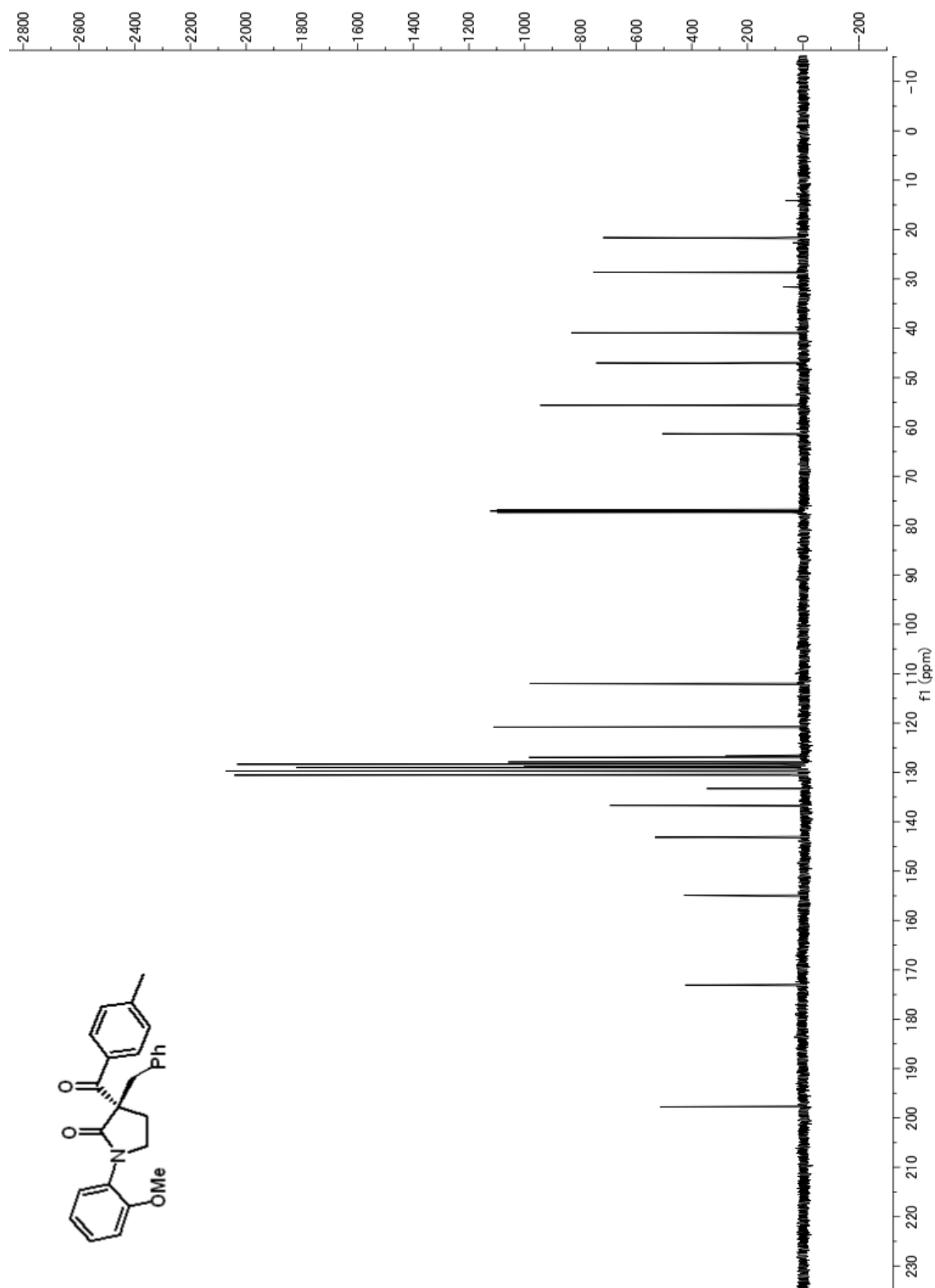


Figure A3.68. ^{13}C NMR (126 MHz, CDCl_3) of compound **62i**.

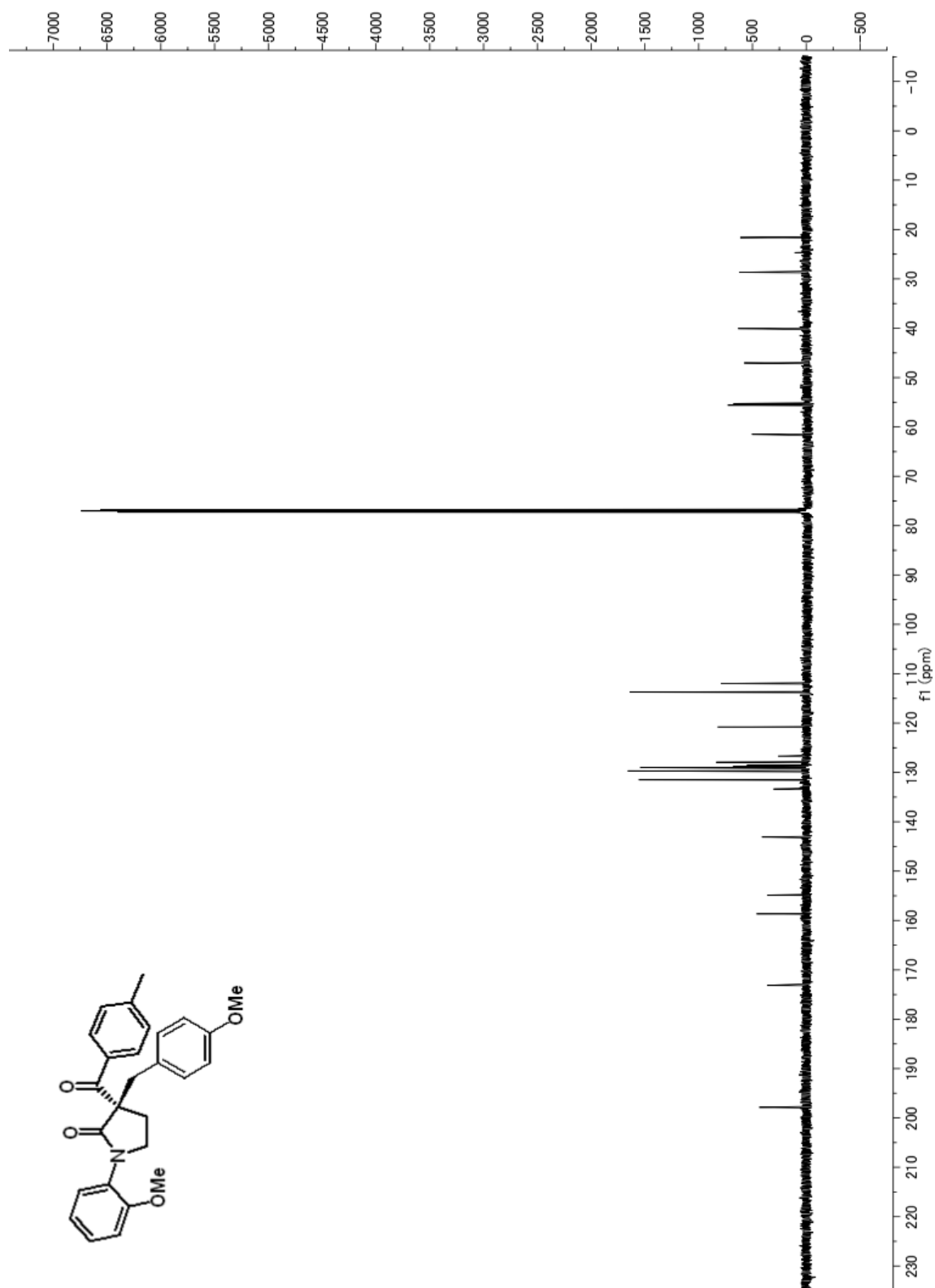
Figure A3.69. ¹H NMR (500 MHz, CDCl₃) of compound **64b**.

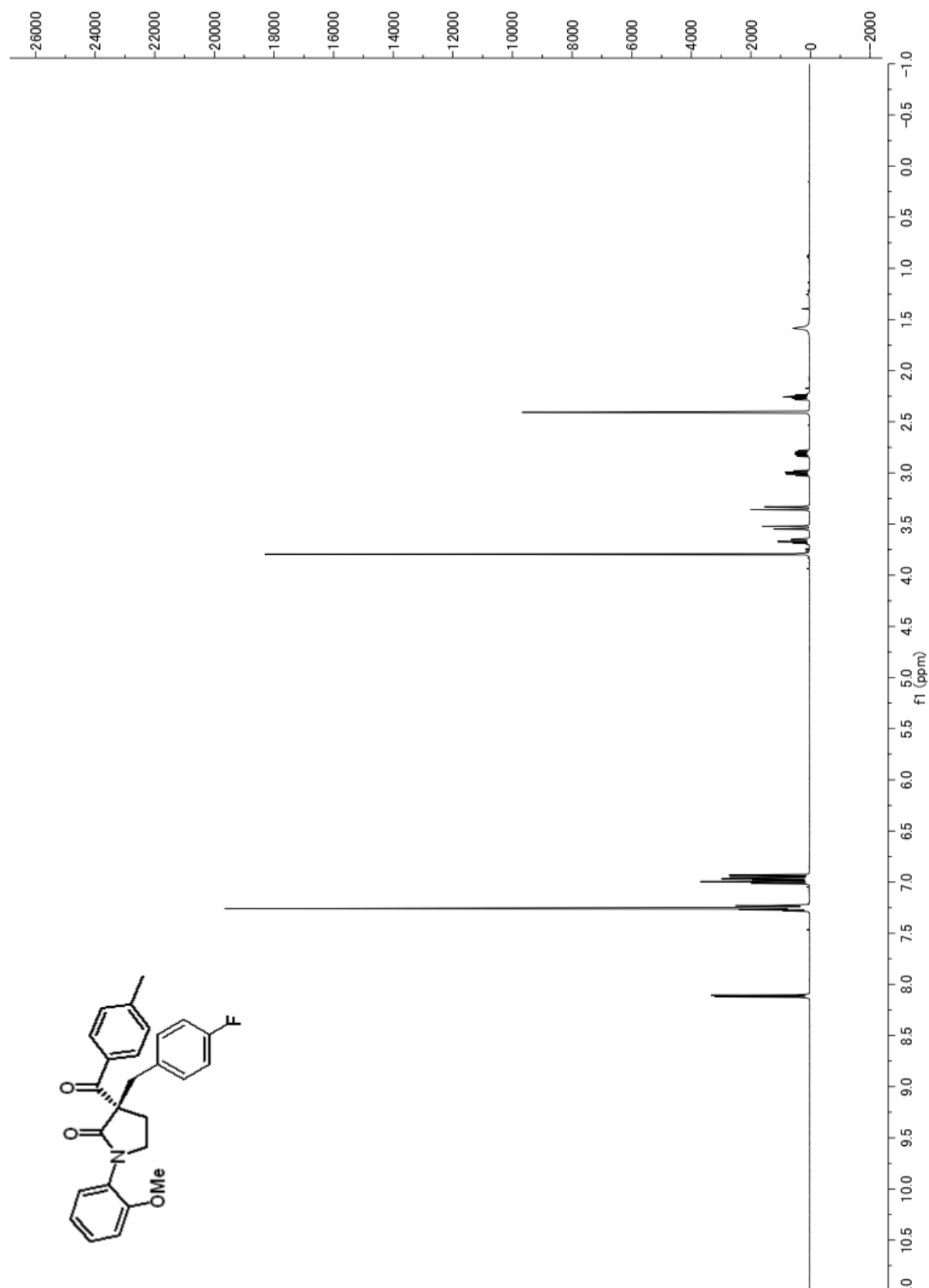
Figure A3.70. ^{13}C NMR (126 MHz, CDCl_3) of compound **64b**.

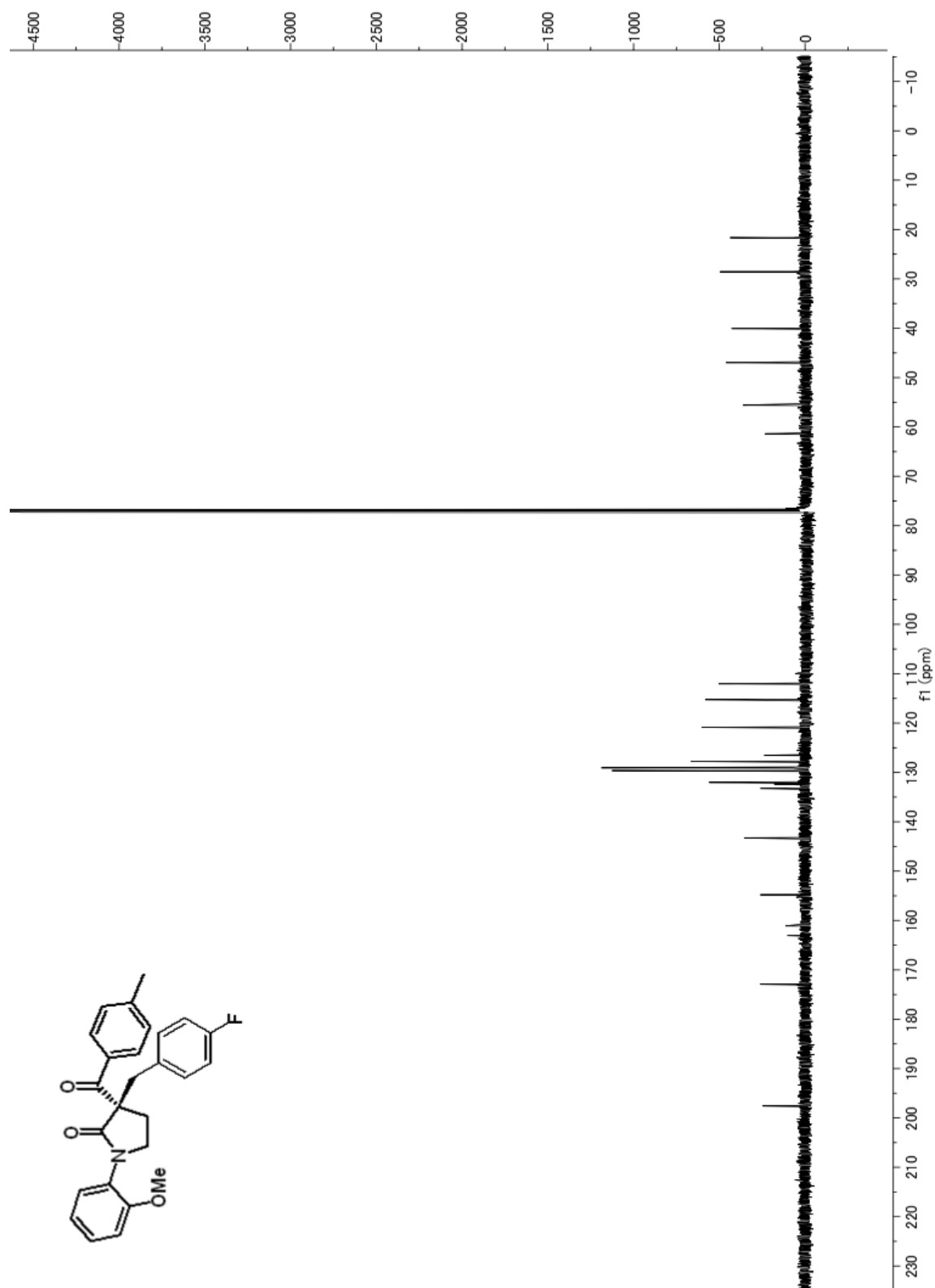
Figure A3.71. ^1H NMR (500 MHz, CDCl_3) of compound **64c**.

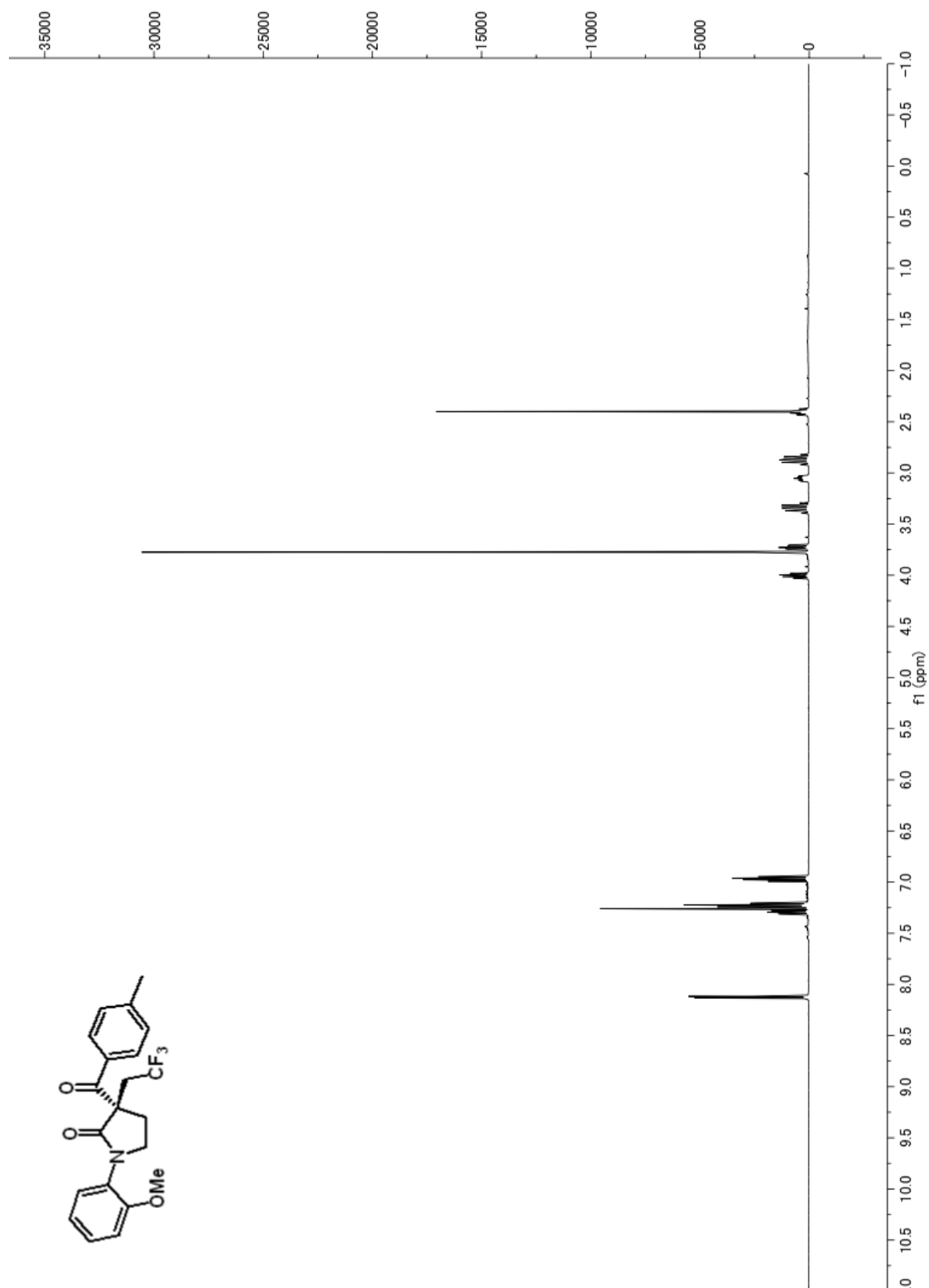
Figure A3.72. ^{13}C NMR (126 MHz, CDCl_3) of compound **64c**.

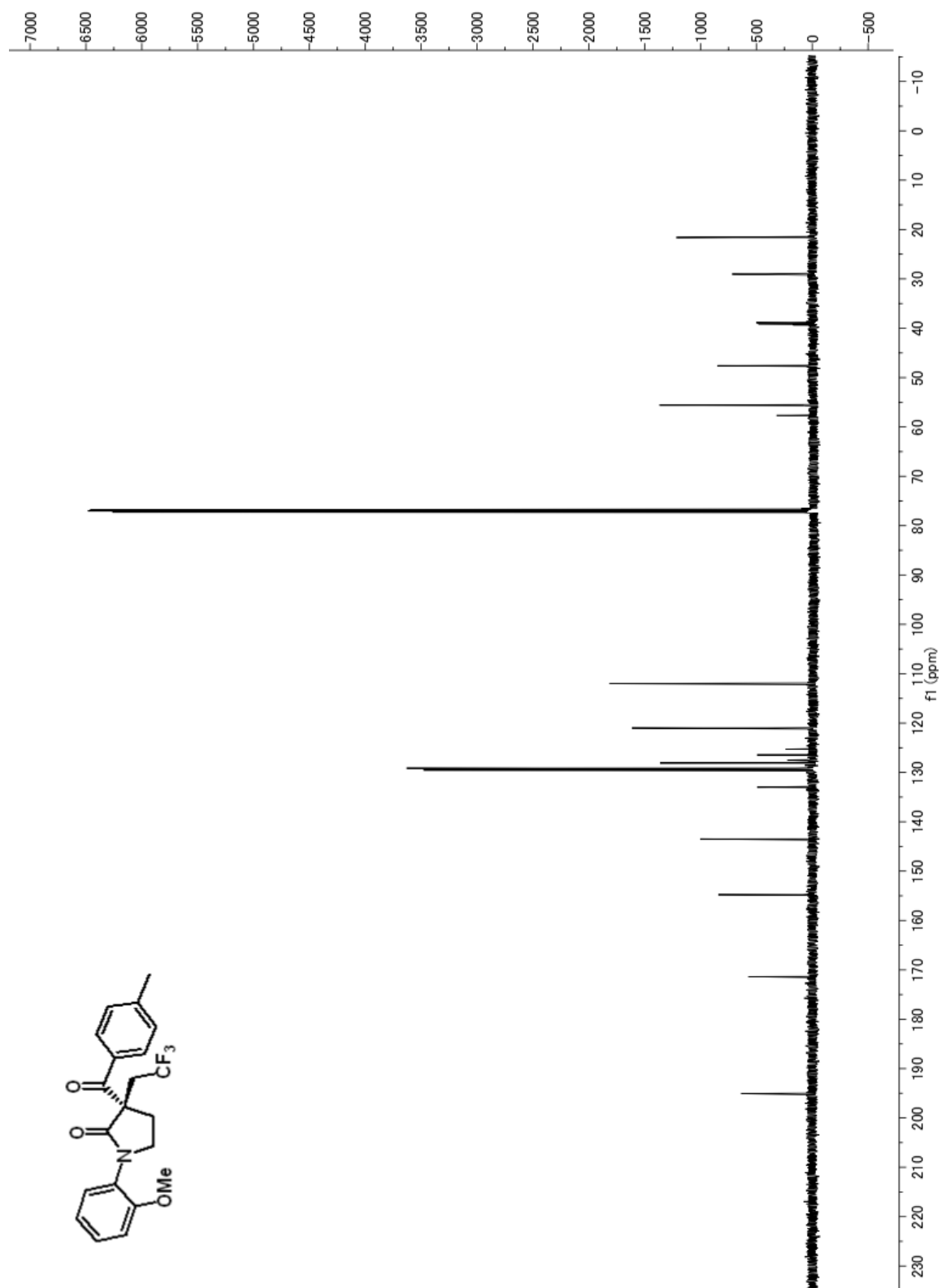


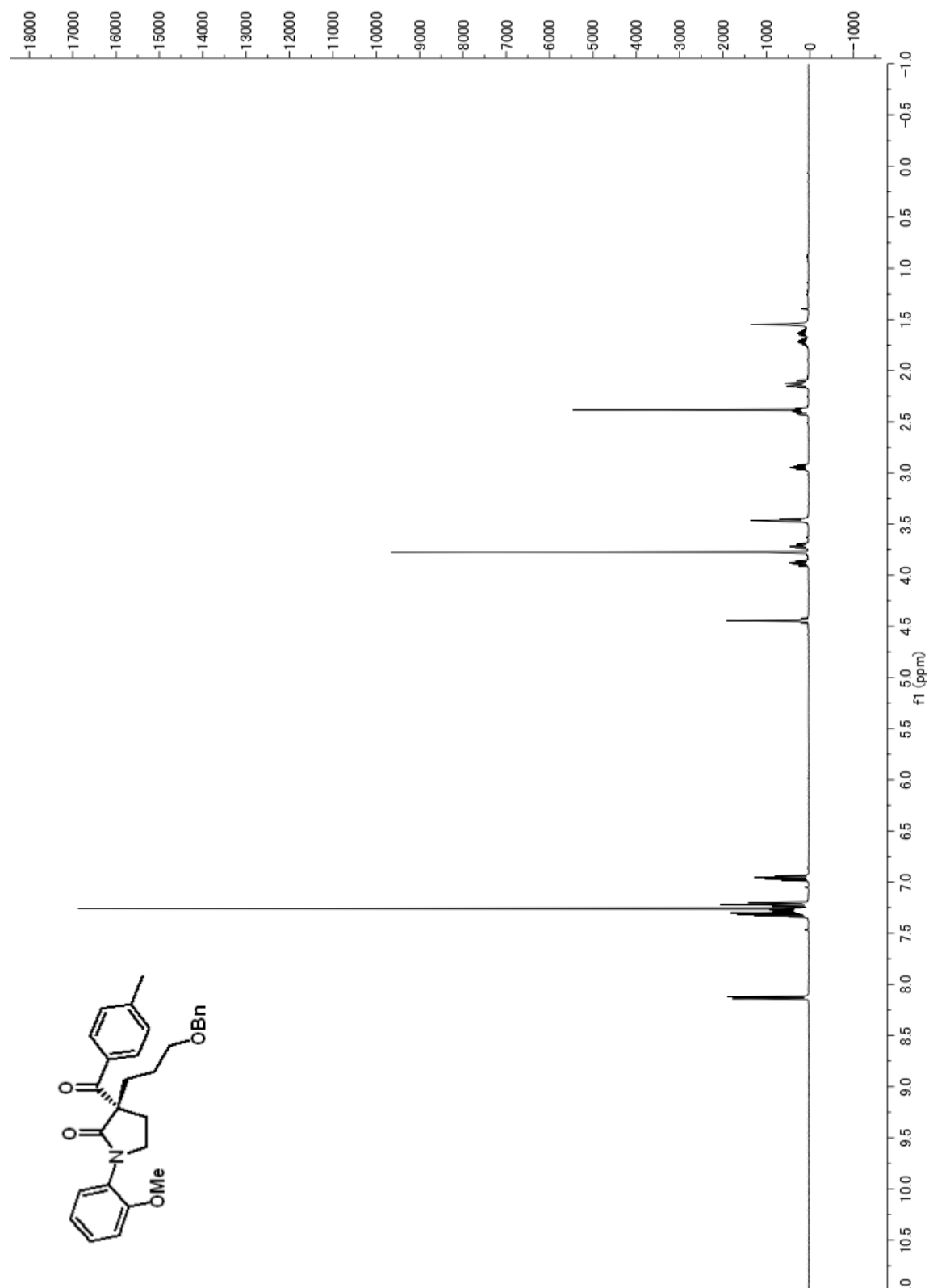
Figure A3.74. ^{13}C NMR (126 MHz, CDCl_3) of compound **64d**.

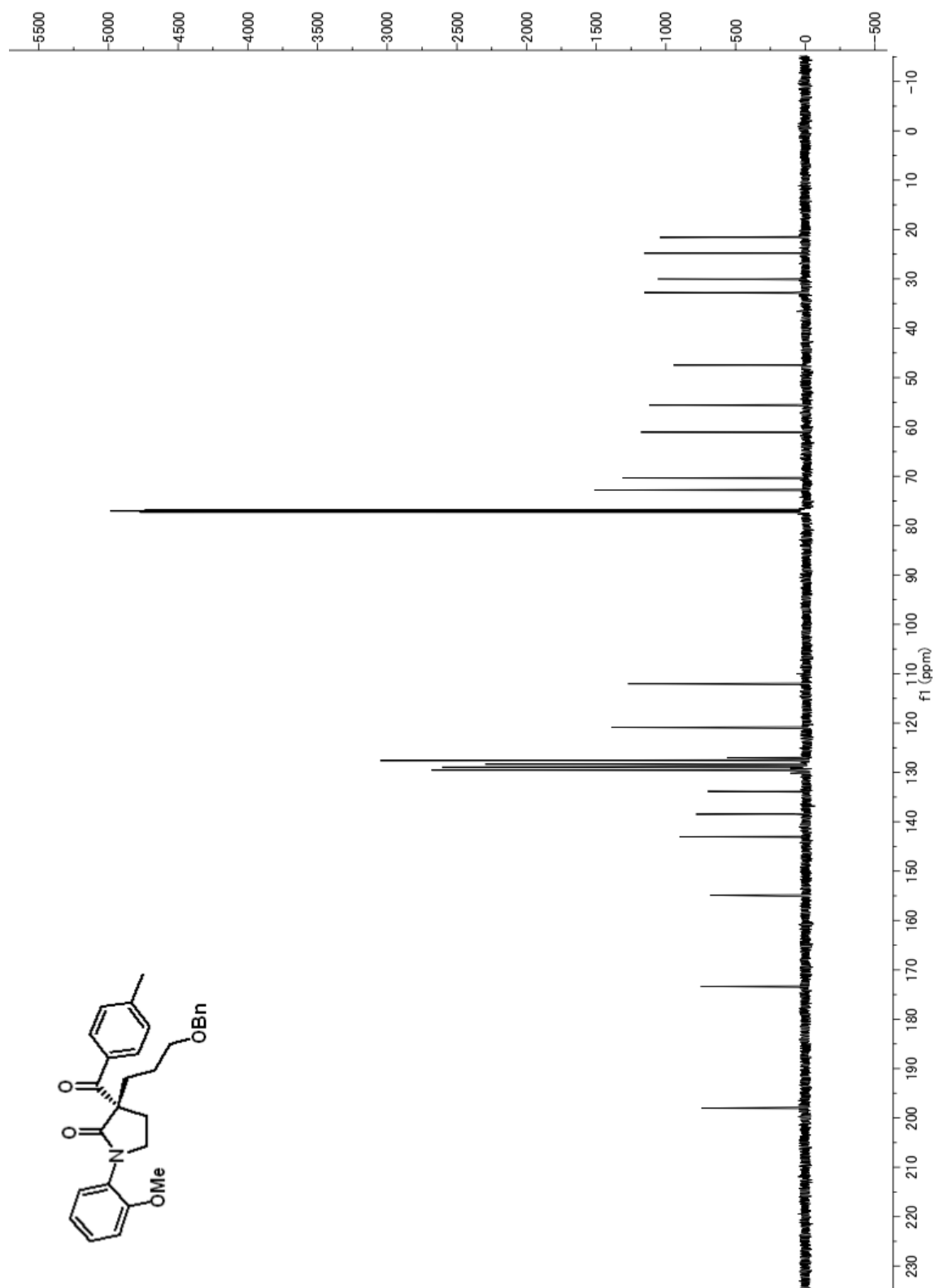
Figure A3.75. ¹H NMR (500 MHz, CDCl₃) of compound **64e**.

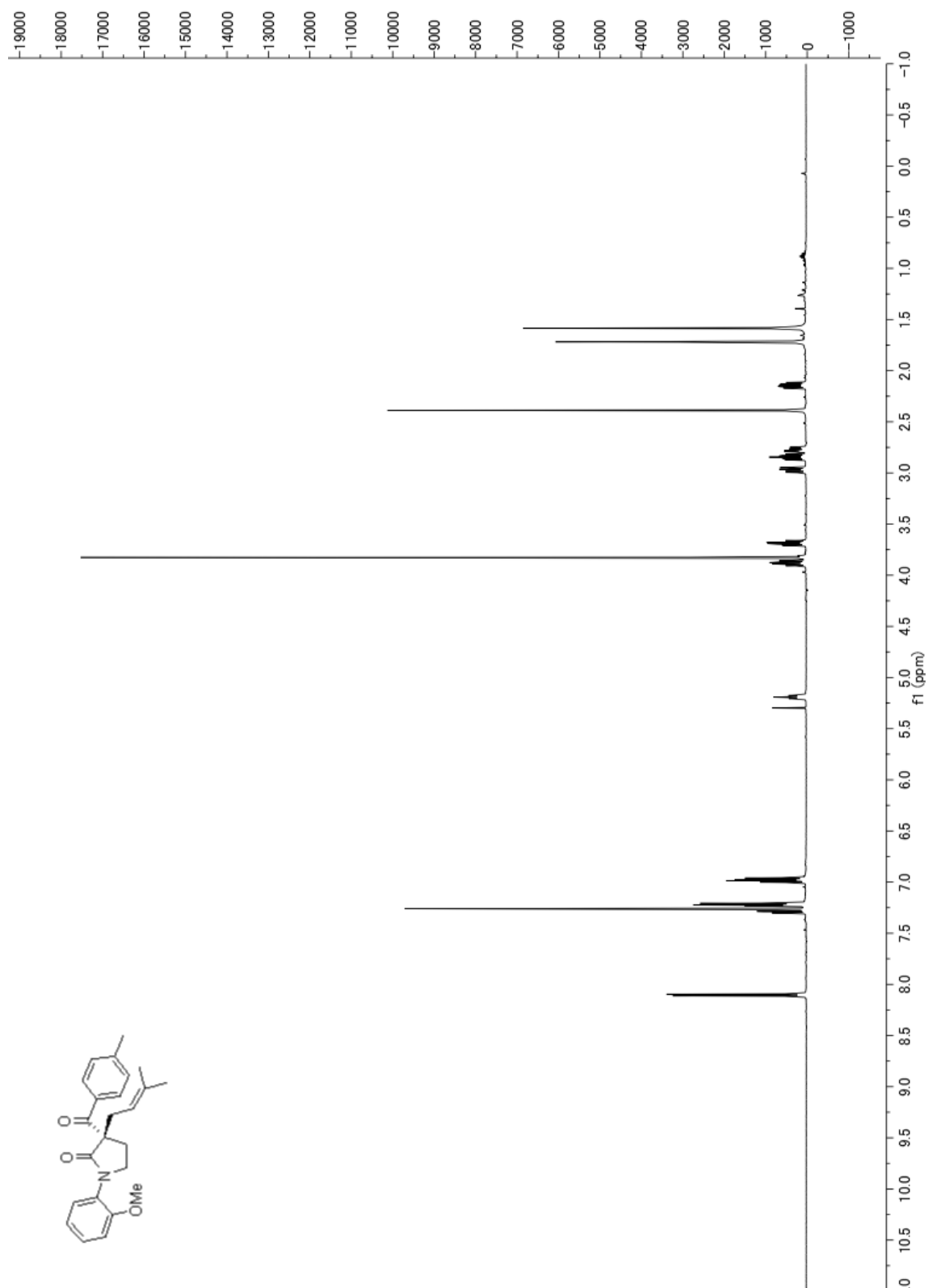
Figure A3.76. ^{13}C NMR (126 MHz, CDCl_3) of compound **64e**.

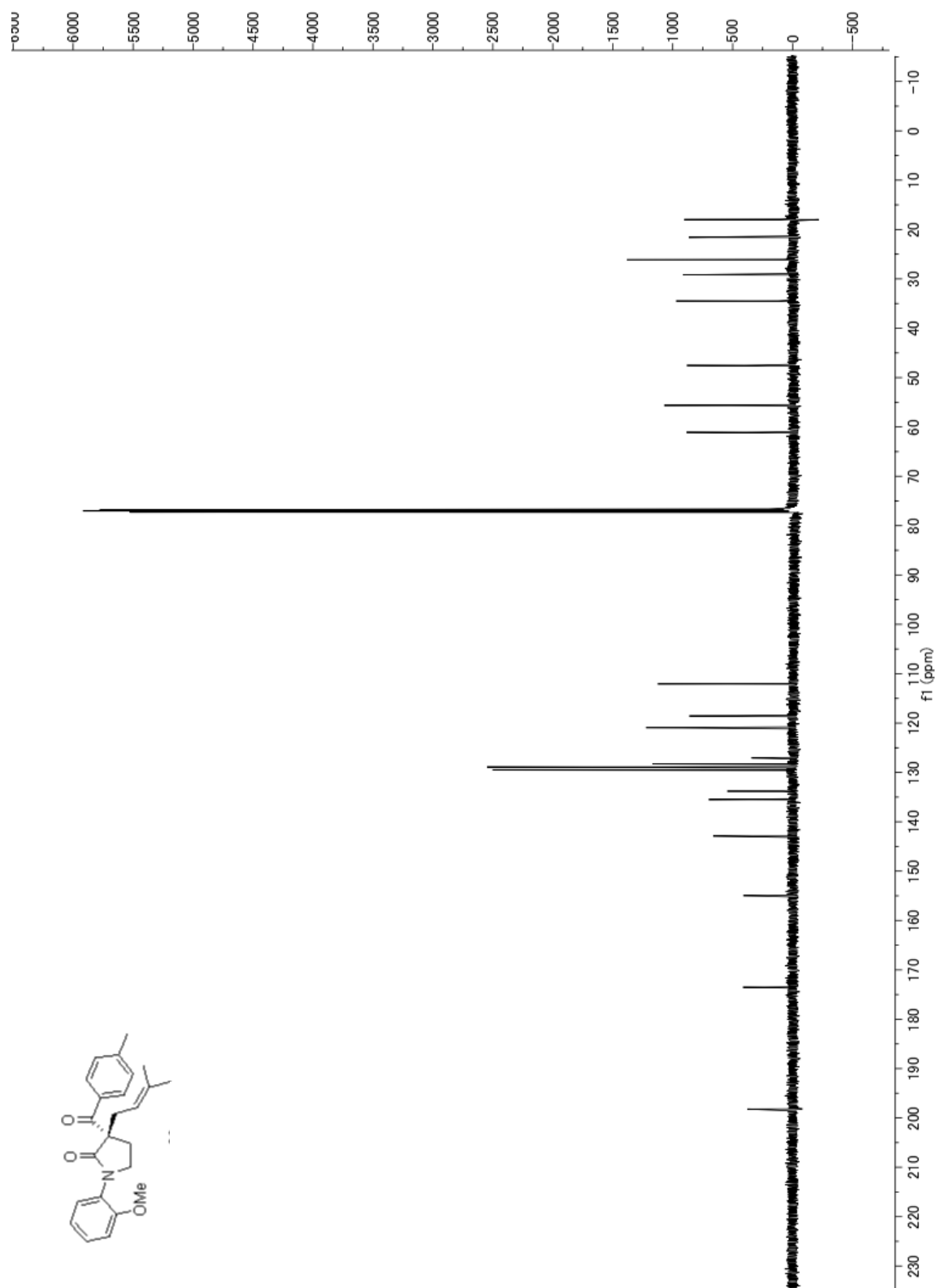
Figure A3.77. ^1H NMR (500 MHz, CDCl_3) of compound **64f**.

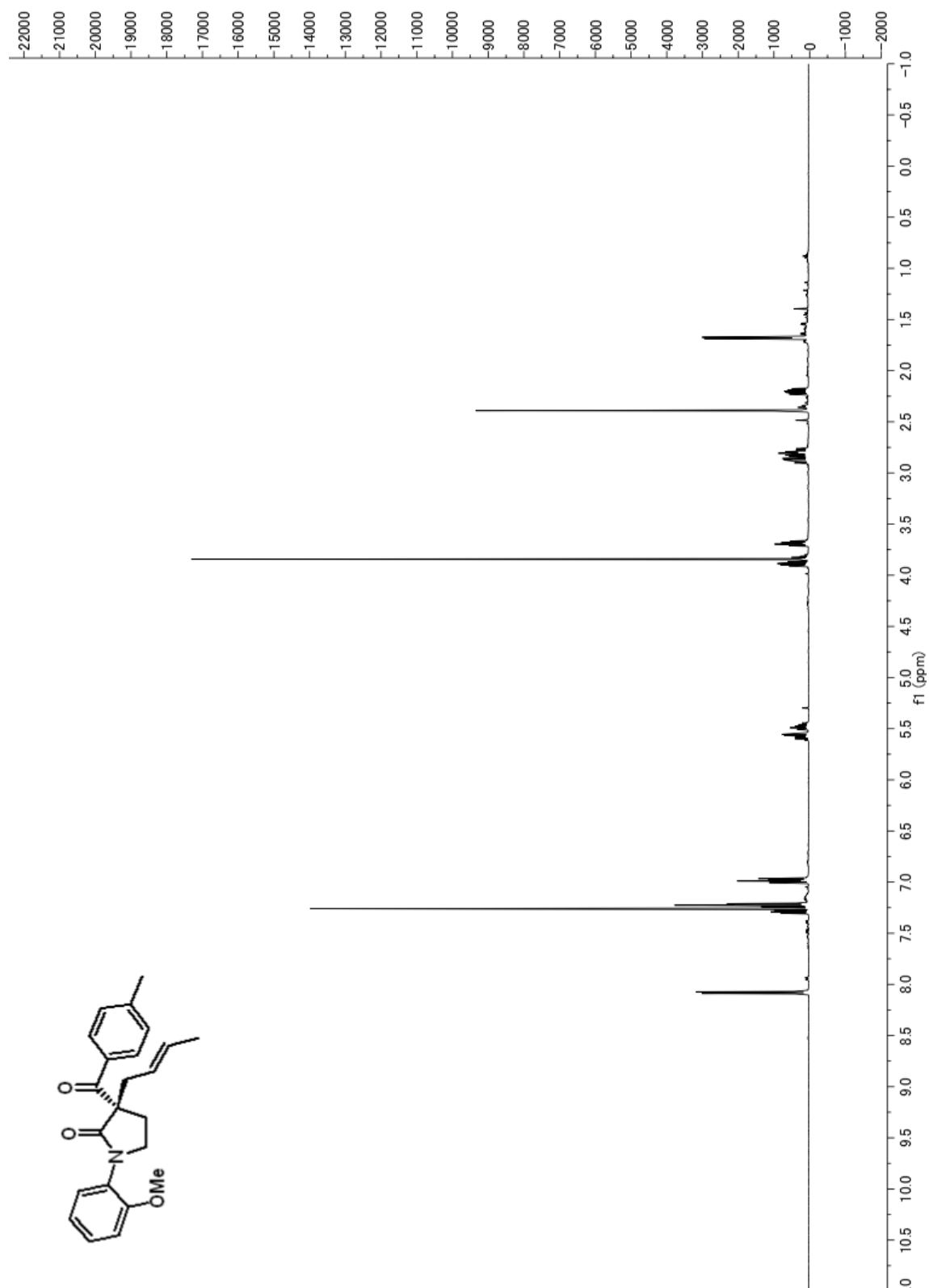
Figure A3.78. ^{13}C NMR (126 MHz, CDCl_3) of compound **64f**.

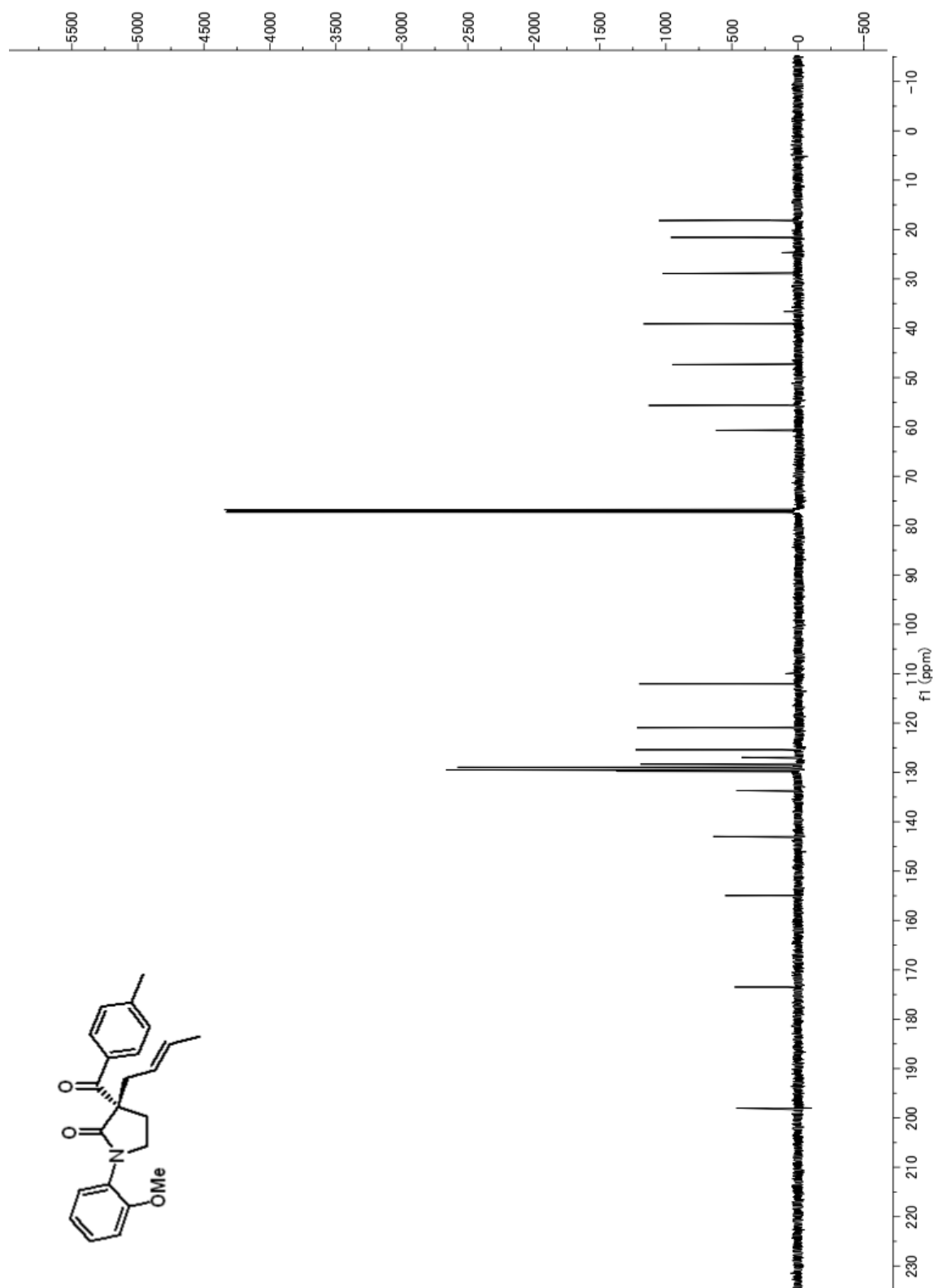
Figure A3.78. ^1H NMR (500 MHz, CDCl_3) of compound **64g**.

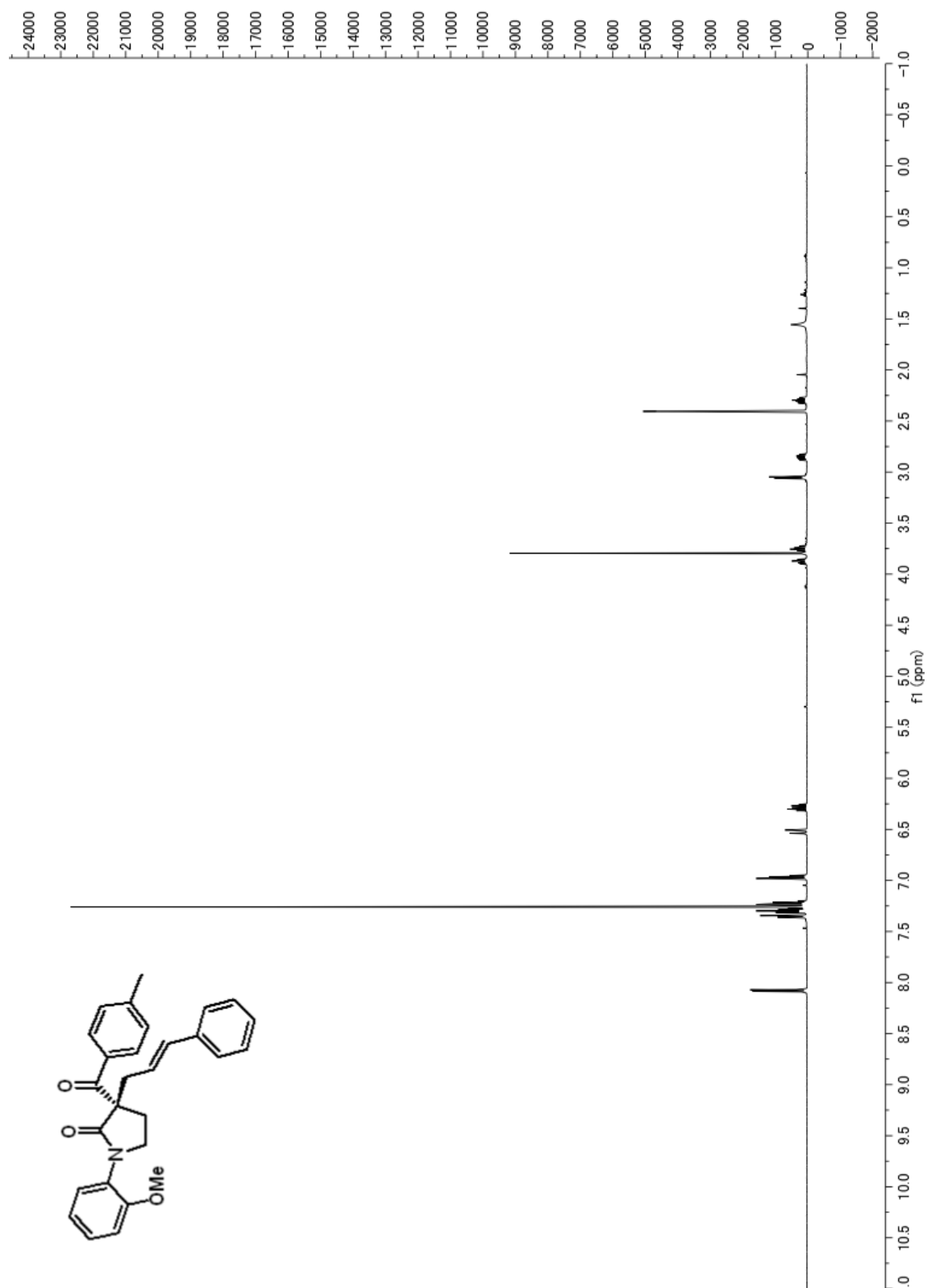
Figure A3.79. ¹³C NMR (126 MHz, CDCl₃) of compound **64g**.

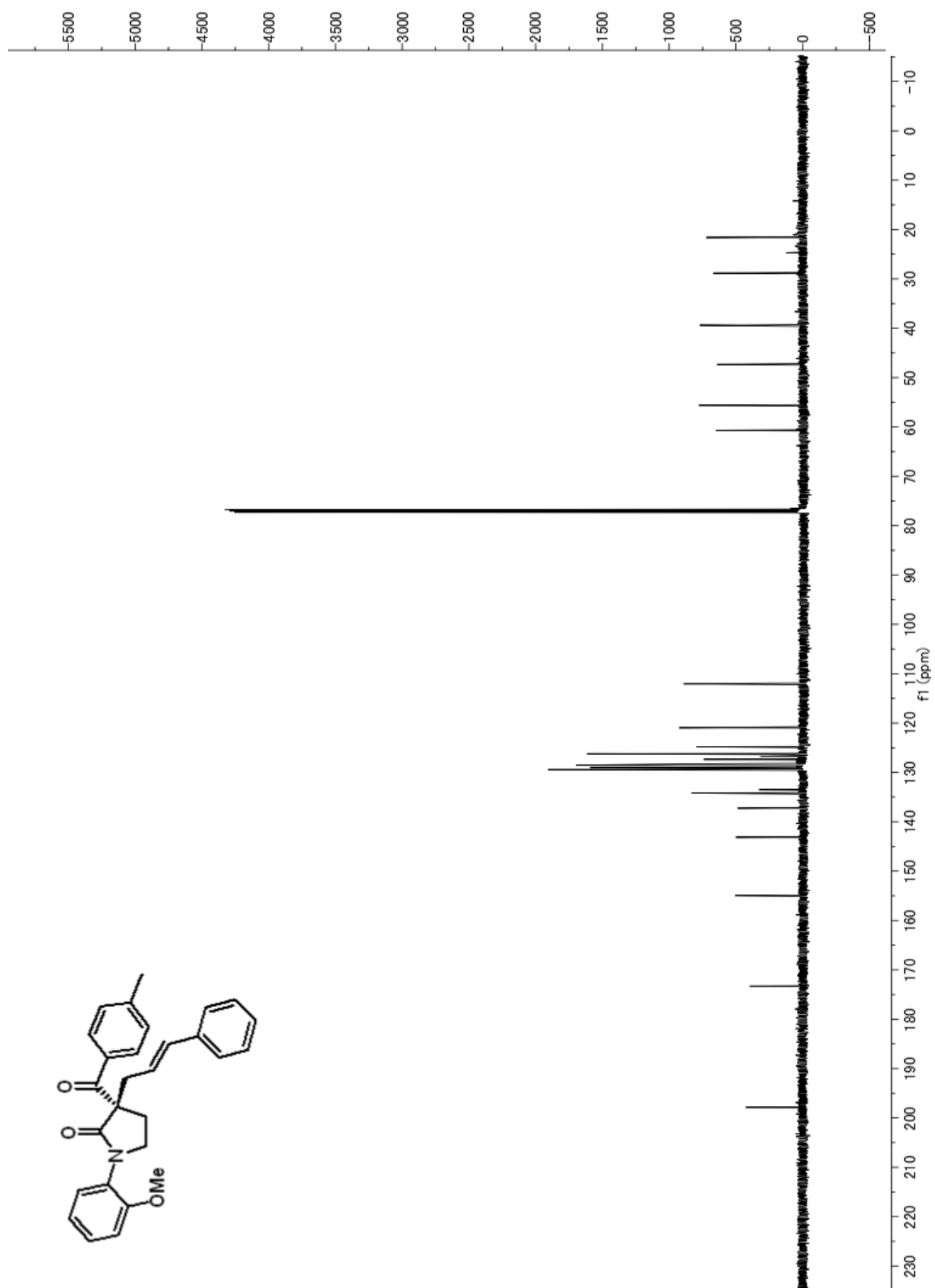
Figure A3.80. ^1H NMR (500 MHz, CDCl_3) of compound **64h**.

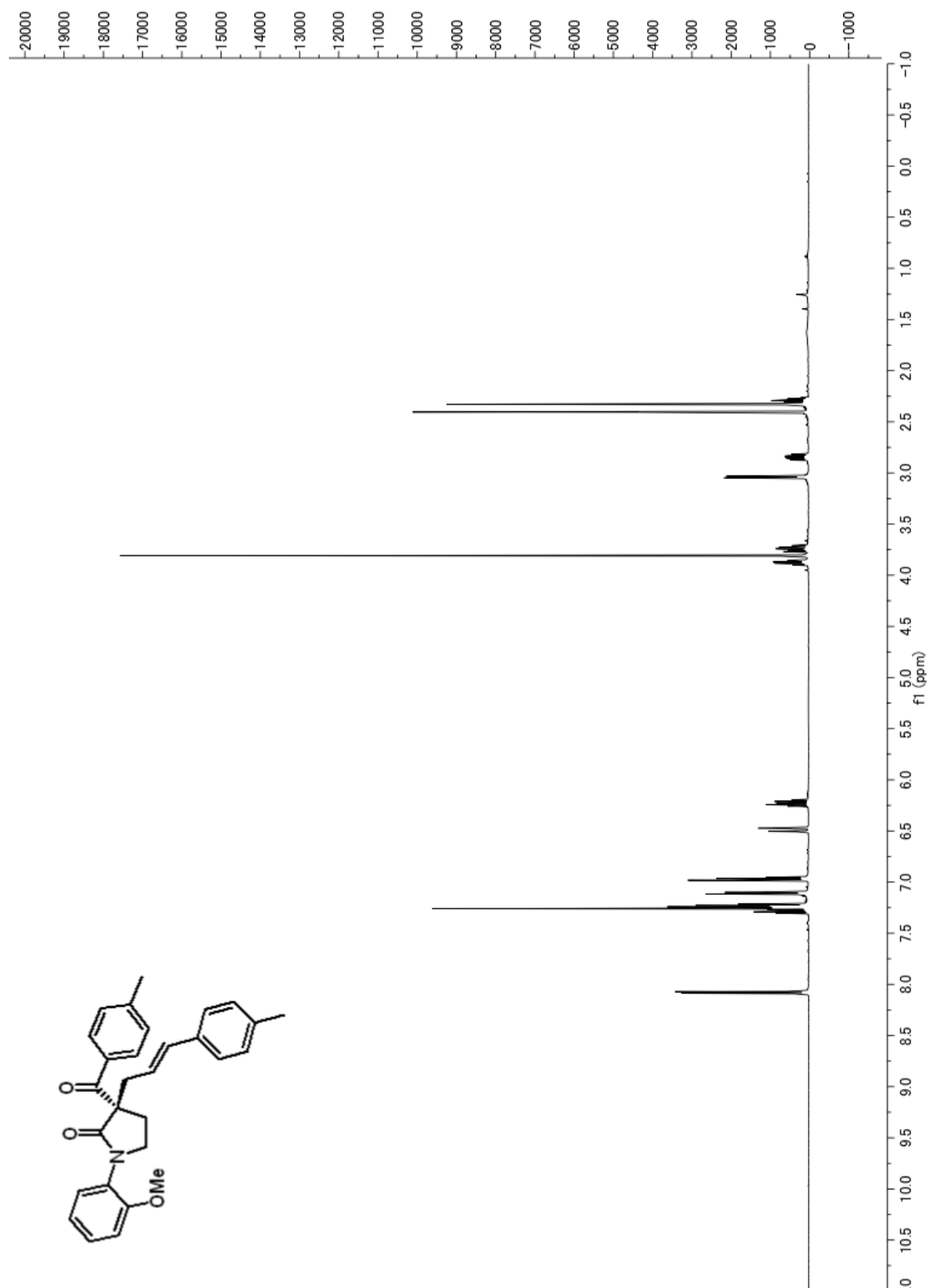
Figure A3.81. ^{13}C NMR (126 MHz, CDCl_3) of compound **64h**.

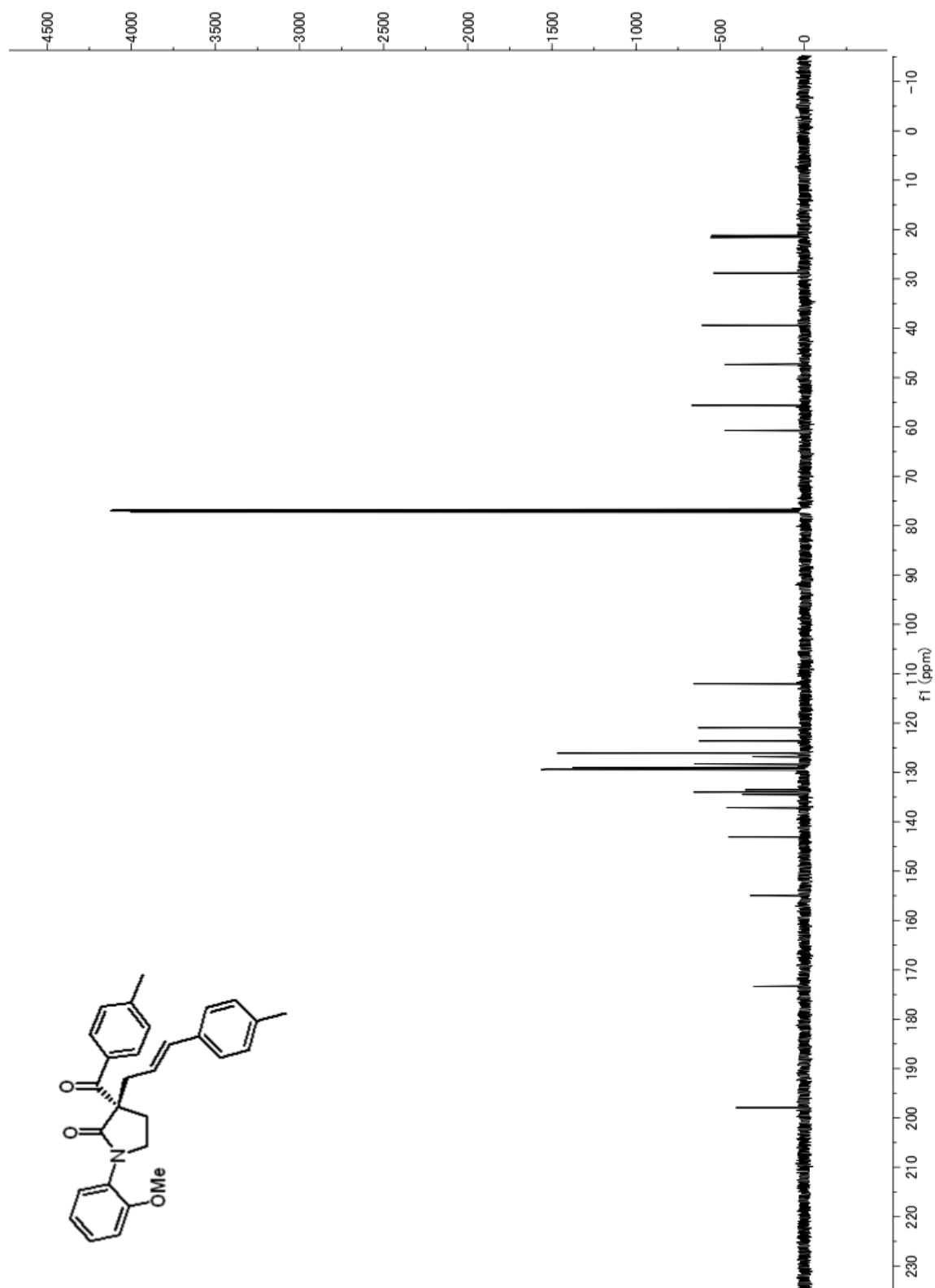
Figure A3.82. ^1H NMR (500 MHz, CDCl_3) of compound **64i**.

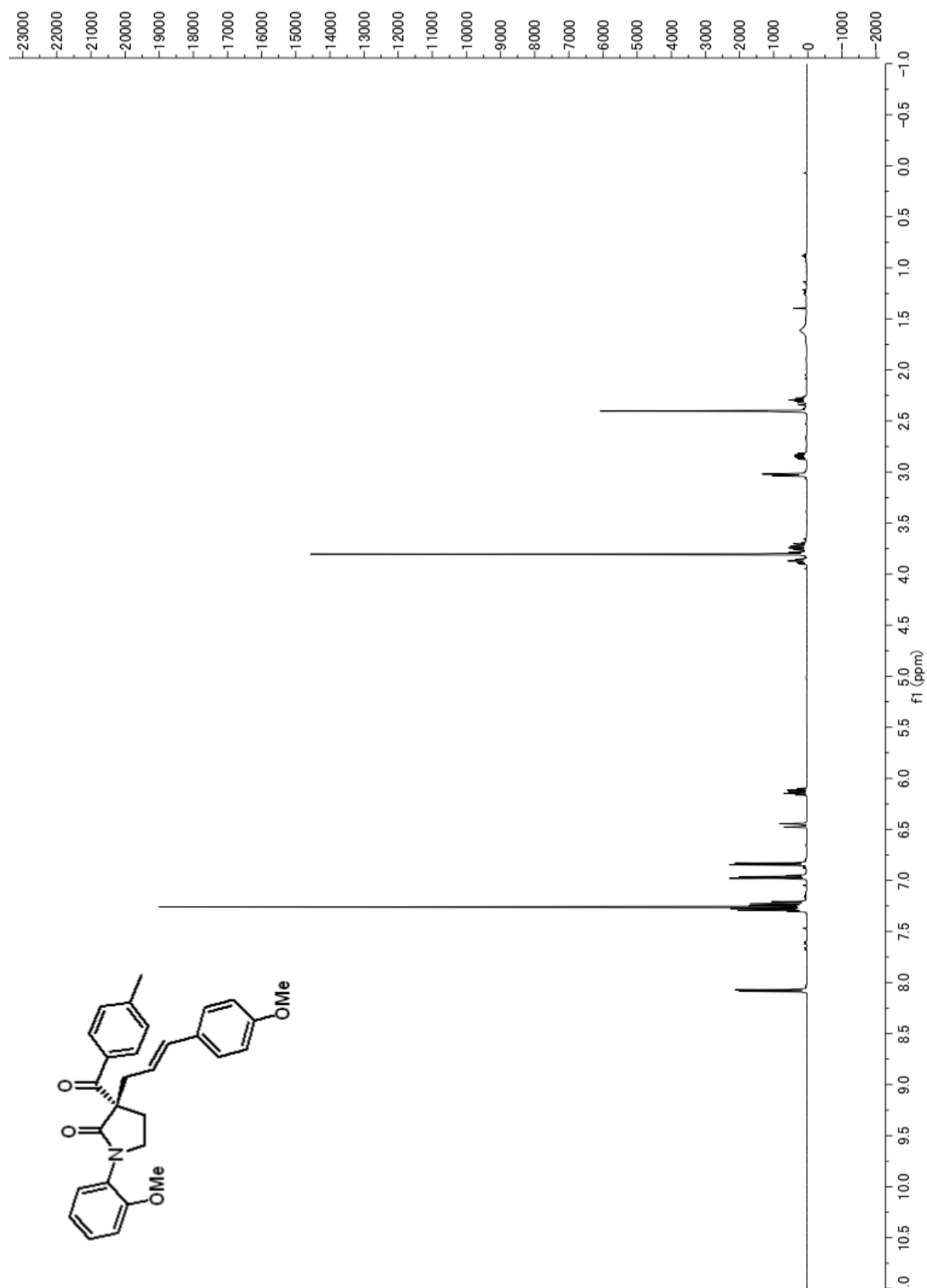
Figure A3.83. ^{13}C NMR (126 MHz, CDCl_3) of compound **64i**.

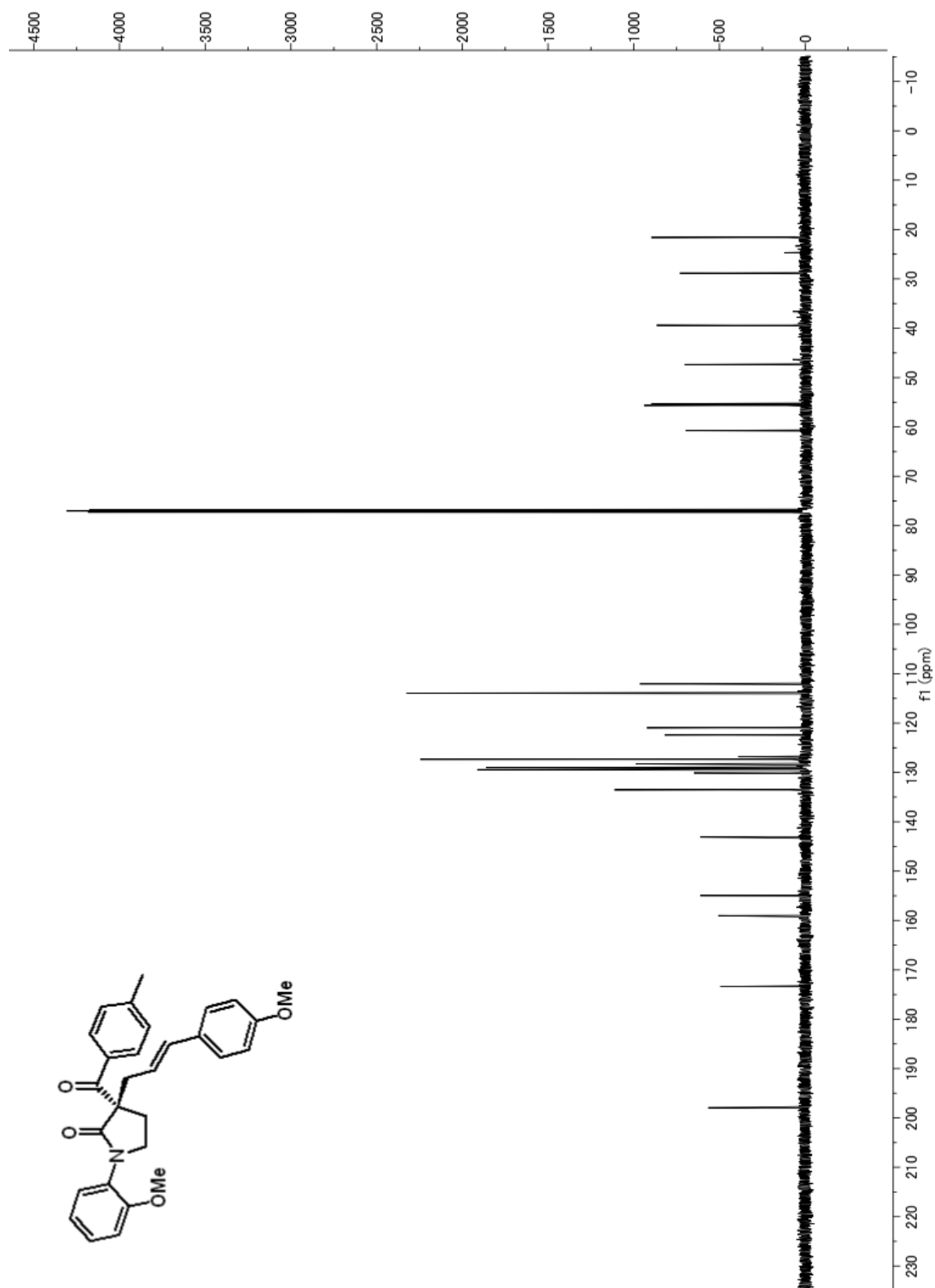
Figure A3.84. ^1H NMR (500 MHz, CDCl_3) of compound **64j**.

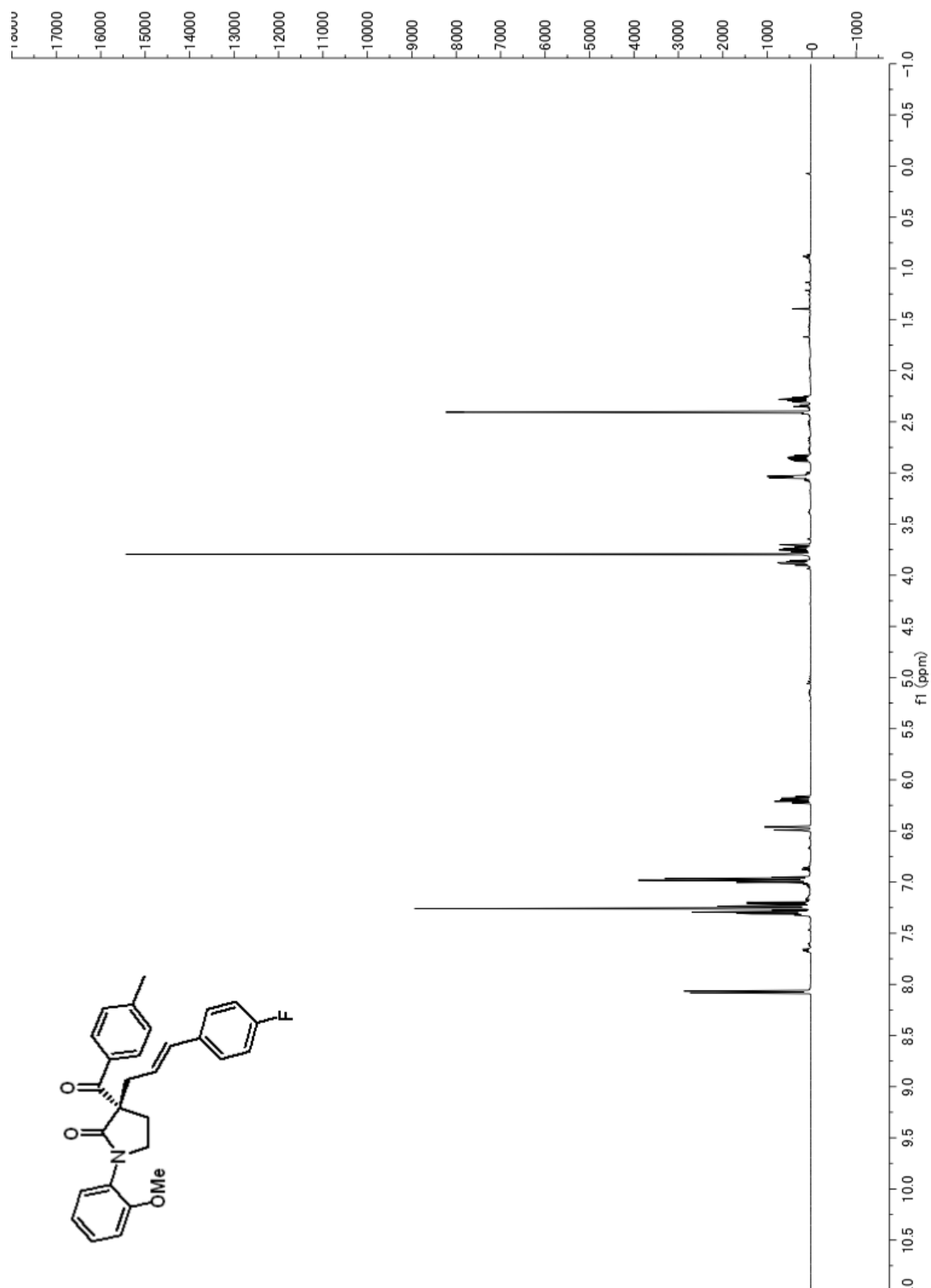
Figure A3.85. ^{13}C NMR (126 MHz, CDCl_3) of compound **64j**.

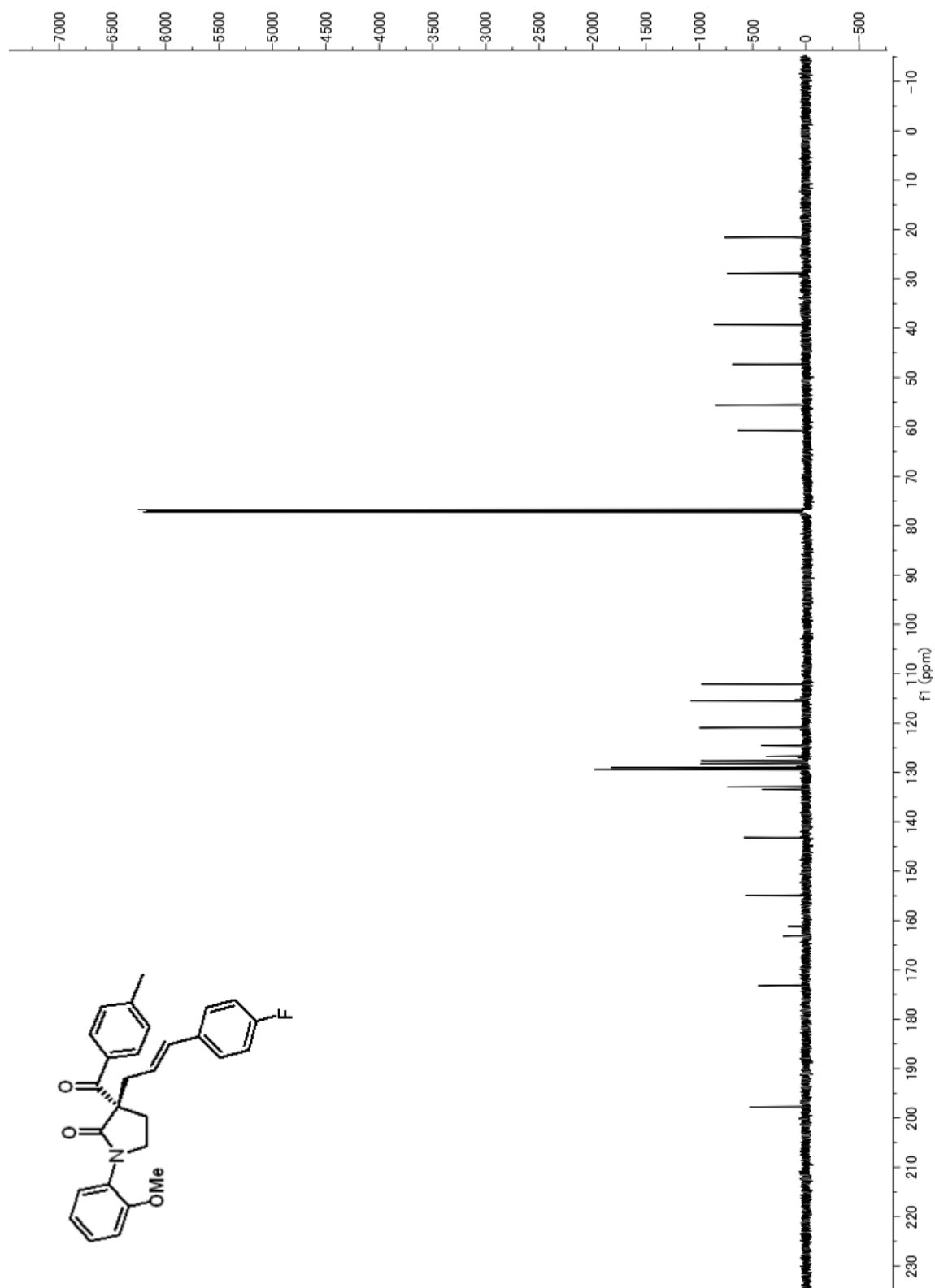
Figure A3.86. ¹H NMR (500 MHz, CDCl₃) of compound **64k**.

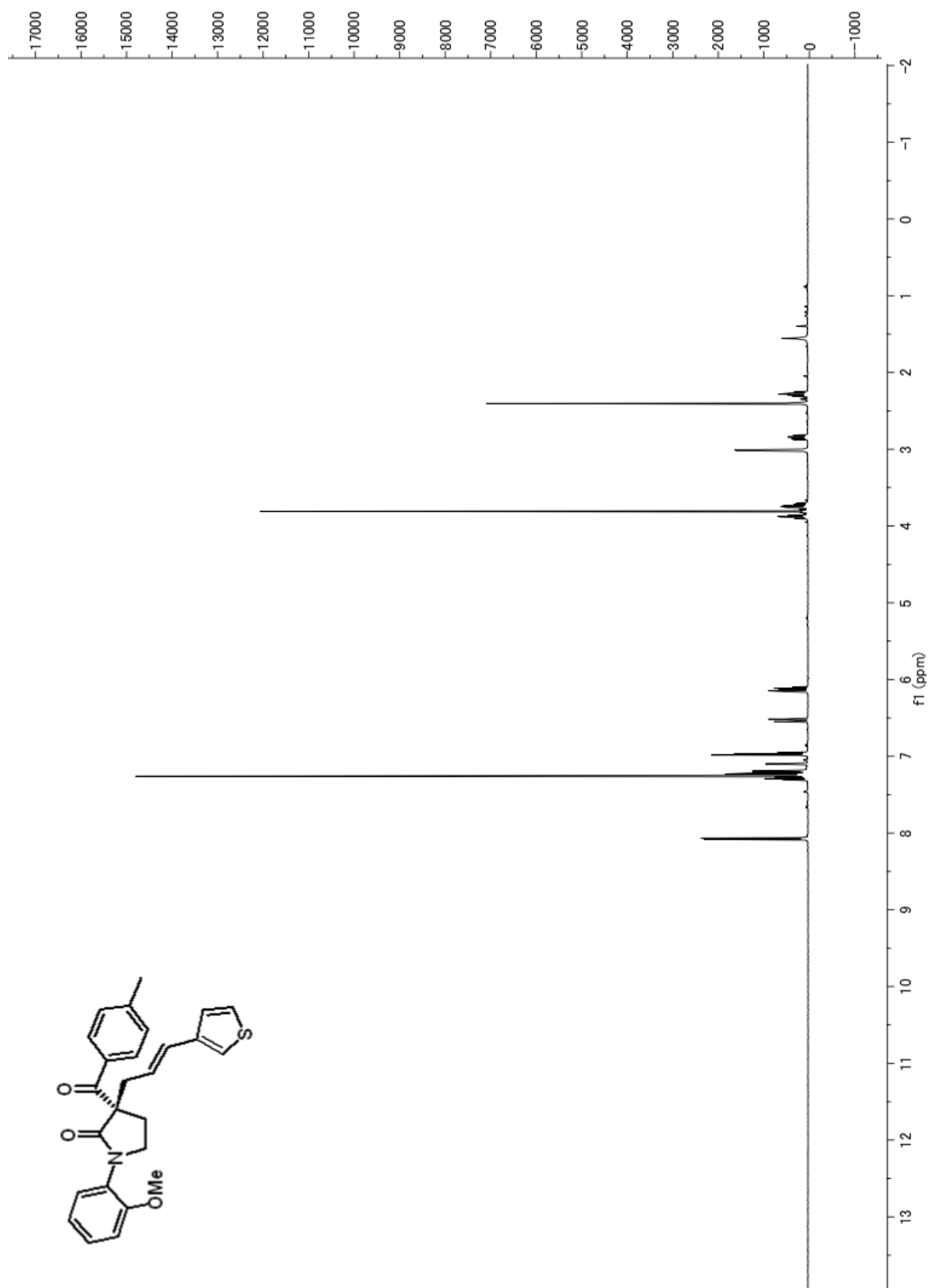
Figure A3.87. ^{13}C NMR (126 MHz, CDCl_3) of compound **64k**.

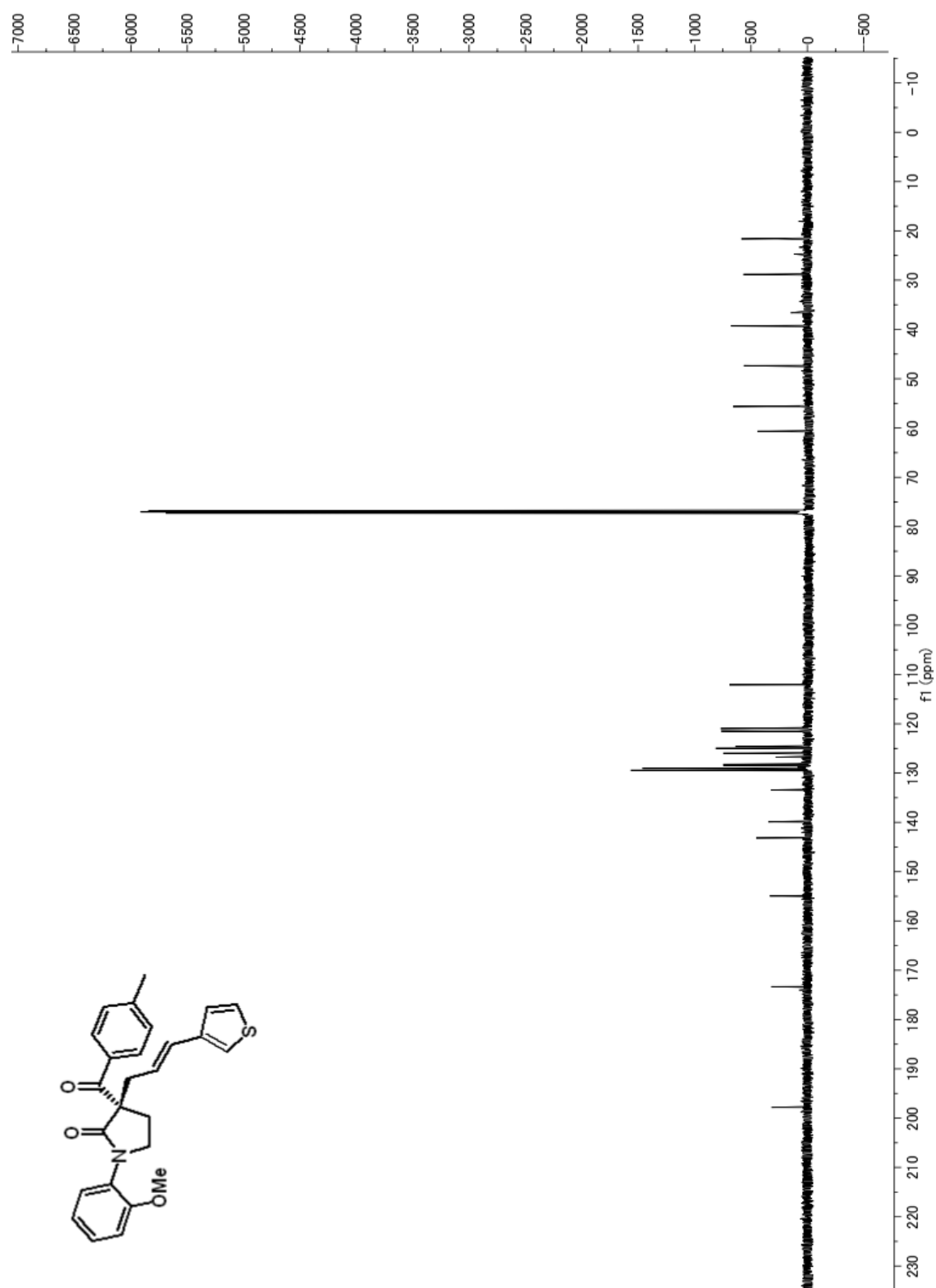
Figure A3.88. ^1H NMR (500 MHz, CDCl_3) of compound **64l**.

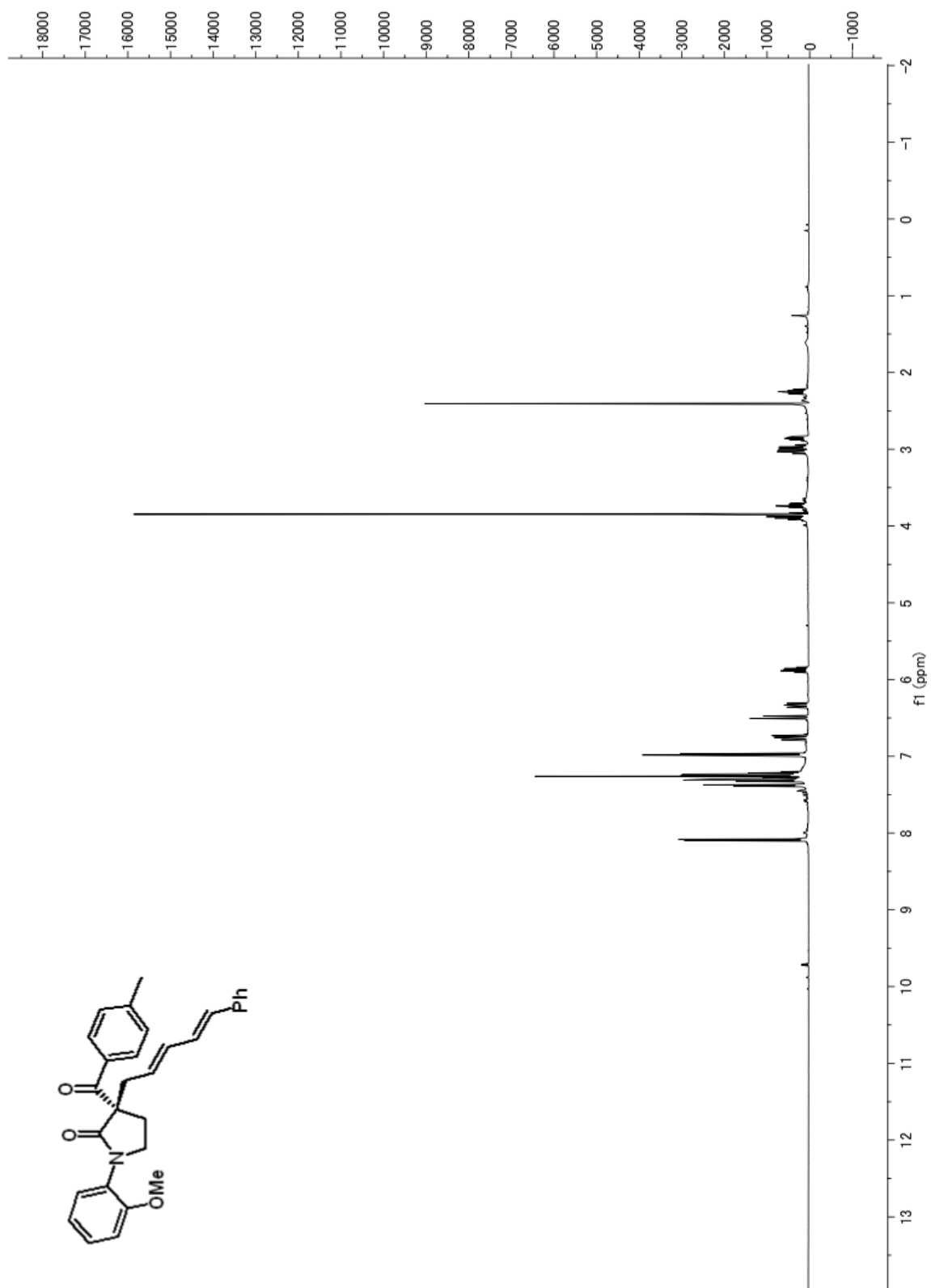
Figure A3.89. ¹³C NMR (126 MHz, CDCl₃) of compound **64l**.

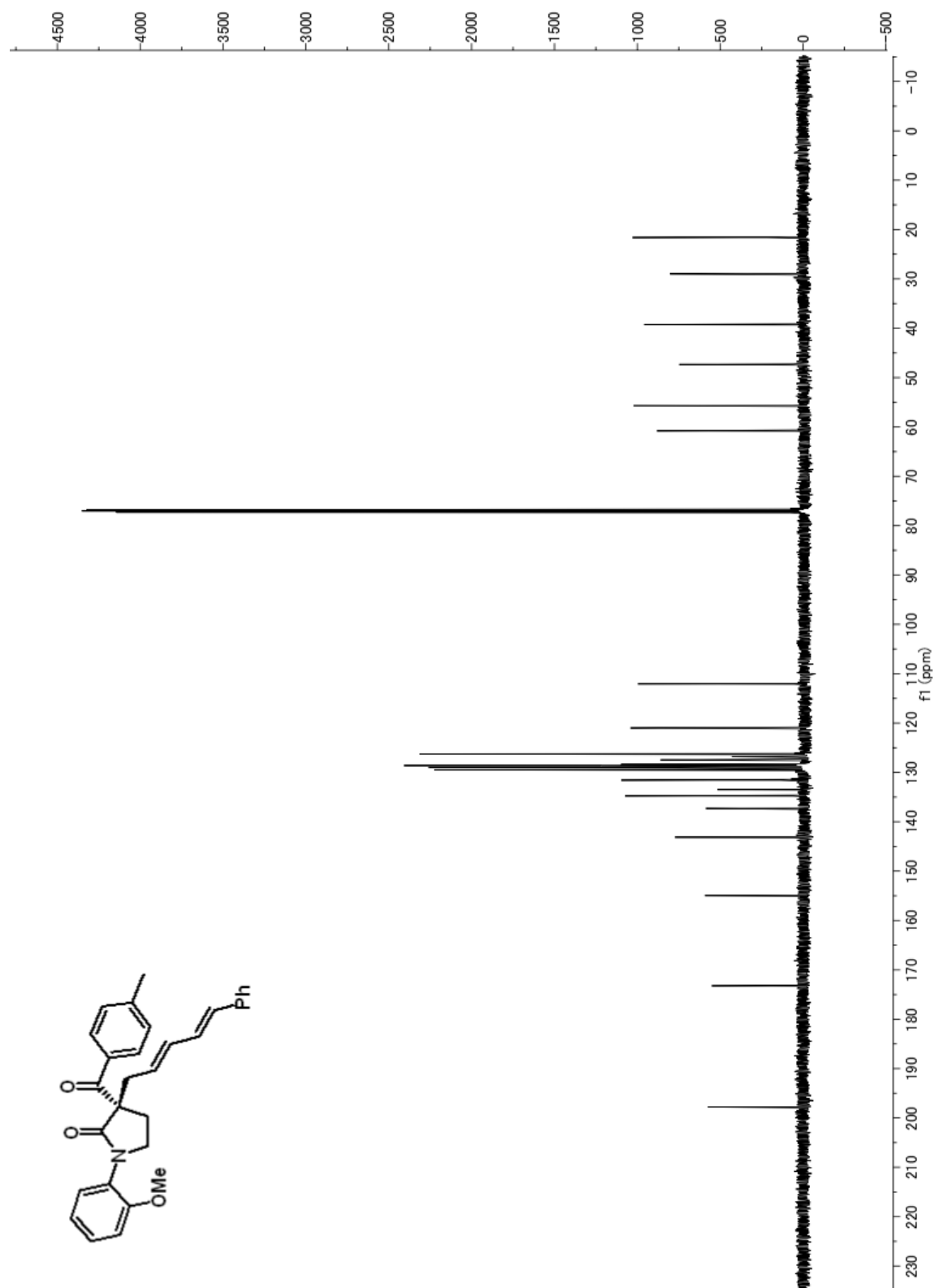
Figure A3.90. ^1H NMR (500 MHz, CDCl_3) of compound **64m**.

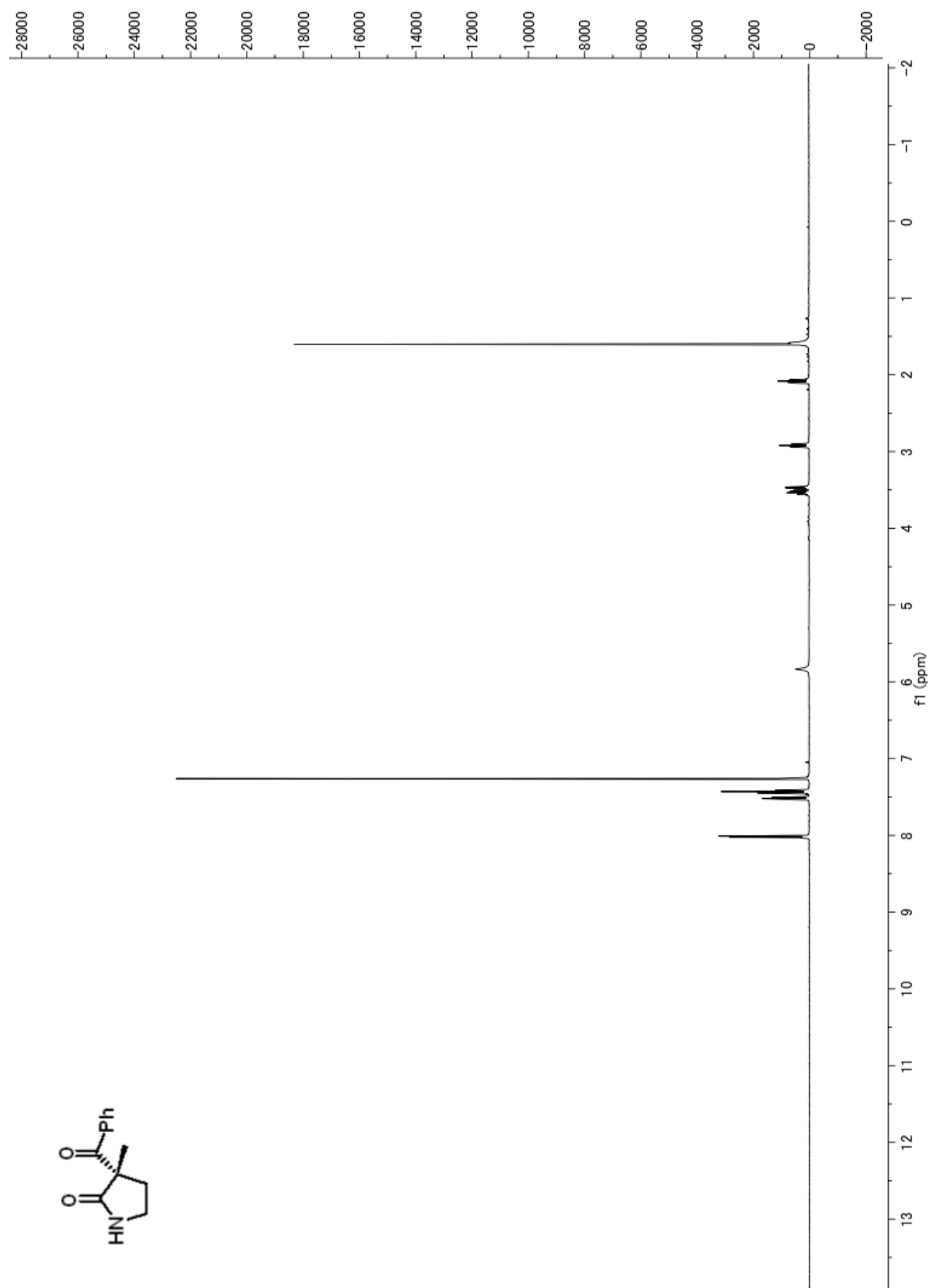
Figure A3.91. ^{13}C NMR (126 MHz, CDCl_3) of compound **64m**.

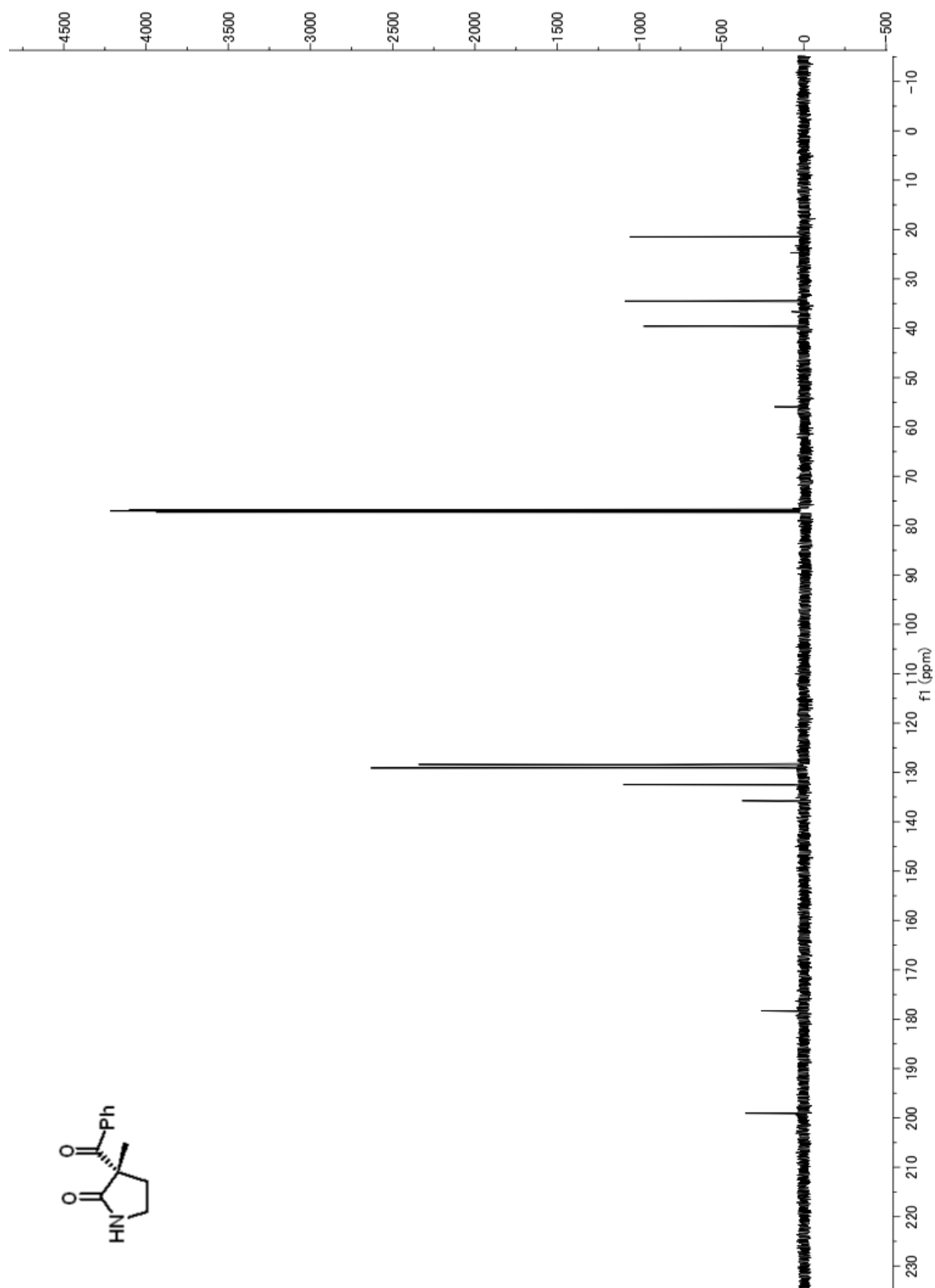
Figure A3.92. ¹H NMR (500 MHz, CDCl₃) of compound **64n**.

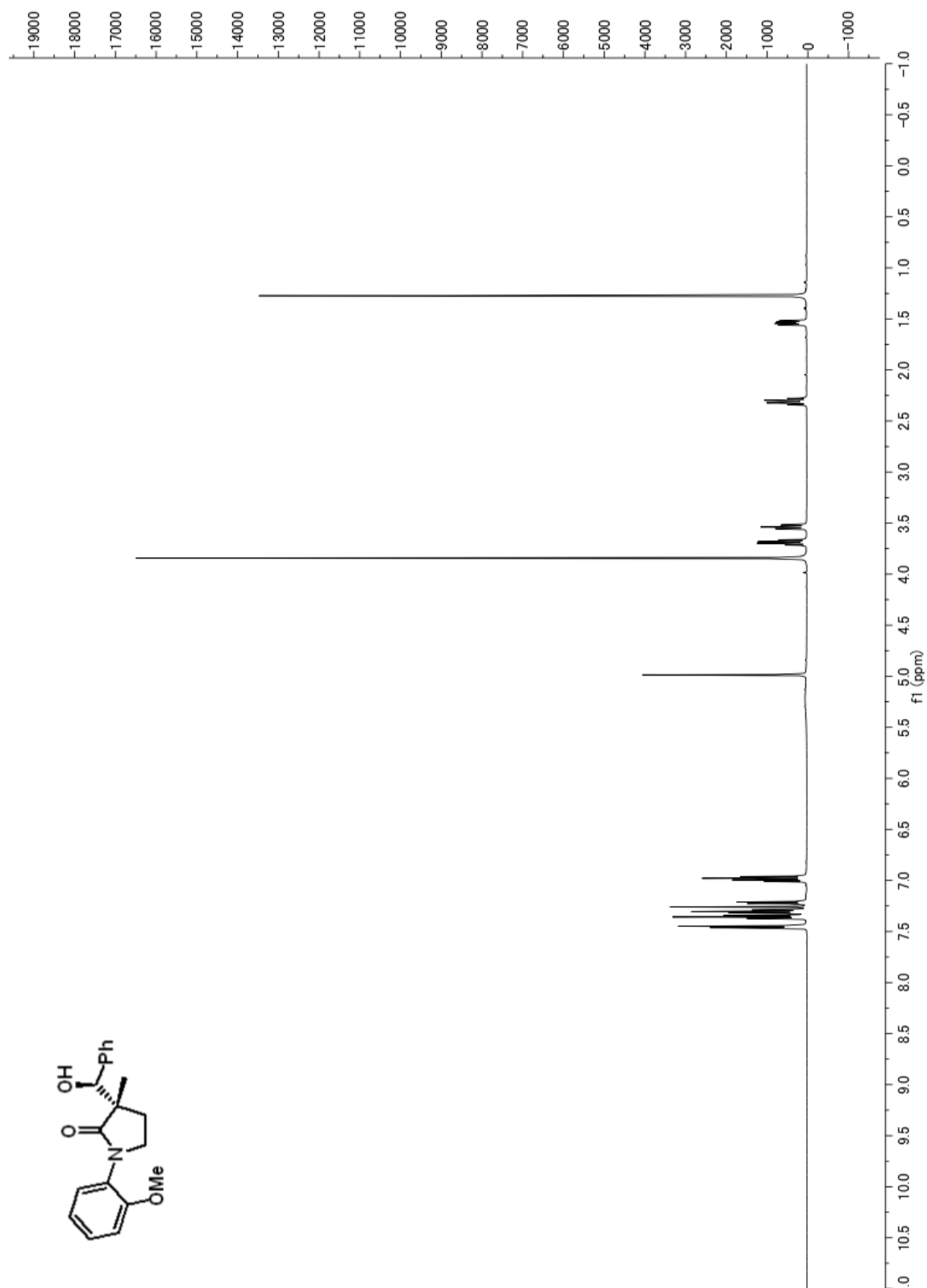
Figure A3.93. ^{13}C NMR (126 MHz, CDCl_3) of compound **64n**.

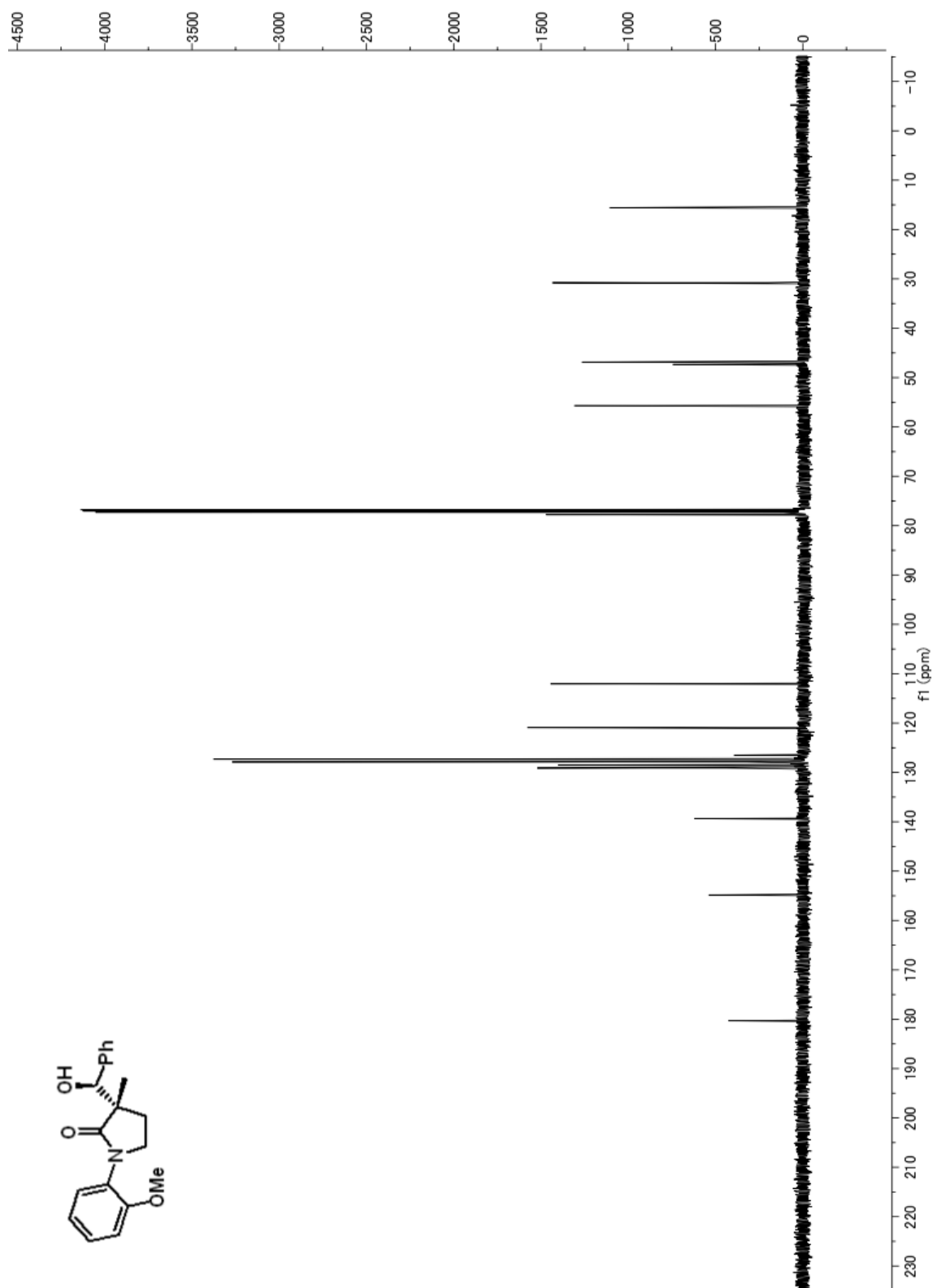
Figure A3.94. ¹H NMR (500 MHz, CDCl₃) of compound **64o**.

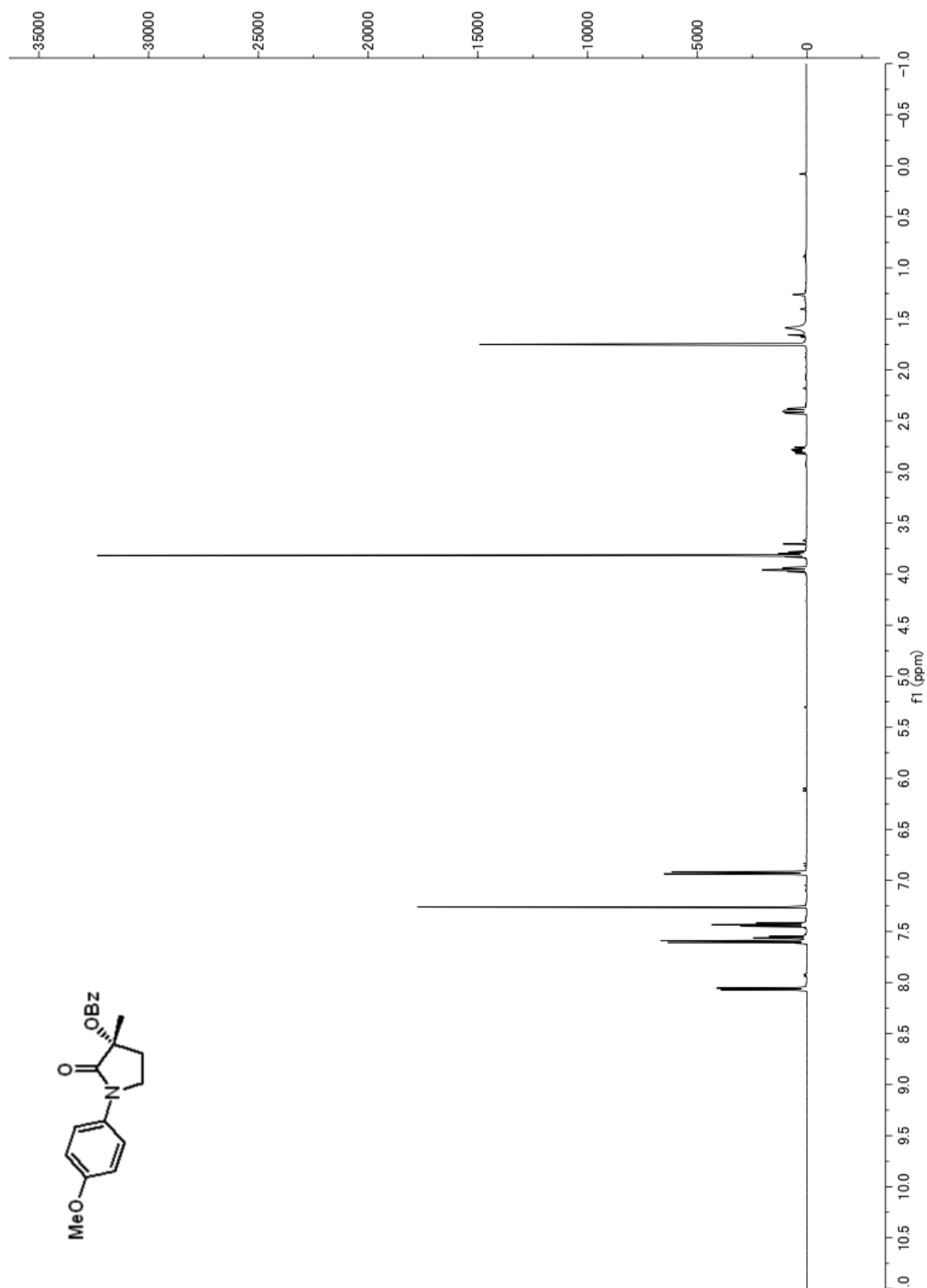
Figure A3.95. ^{13}C NMR (126 MHz, CDCl_3) of compound **64o**.

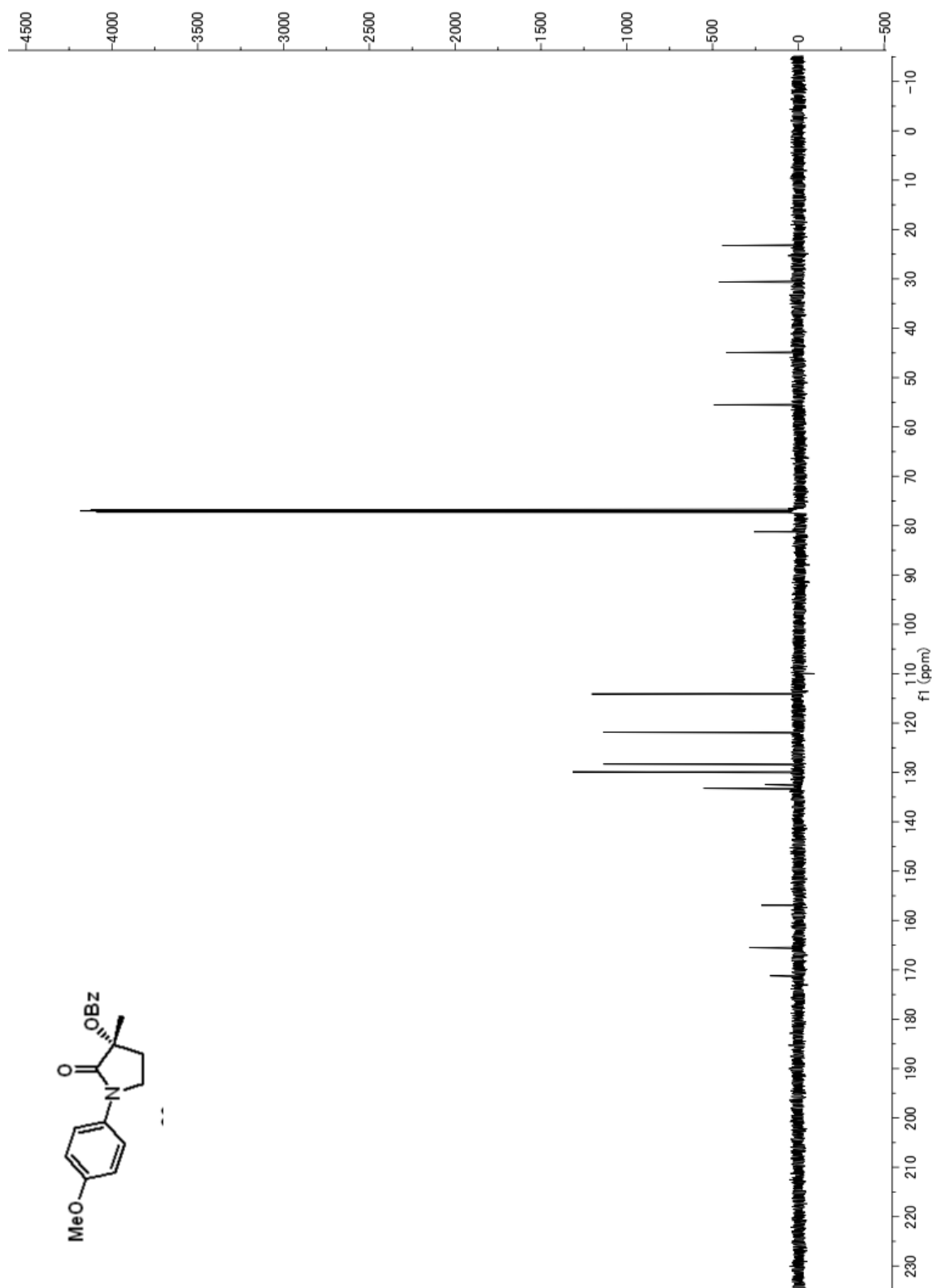
Figure A3.95. ^1H NMR (500 MHz, CDCl_3) of compound **66**.

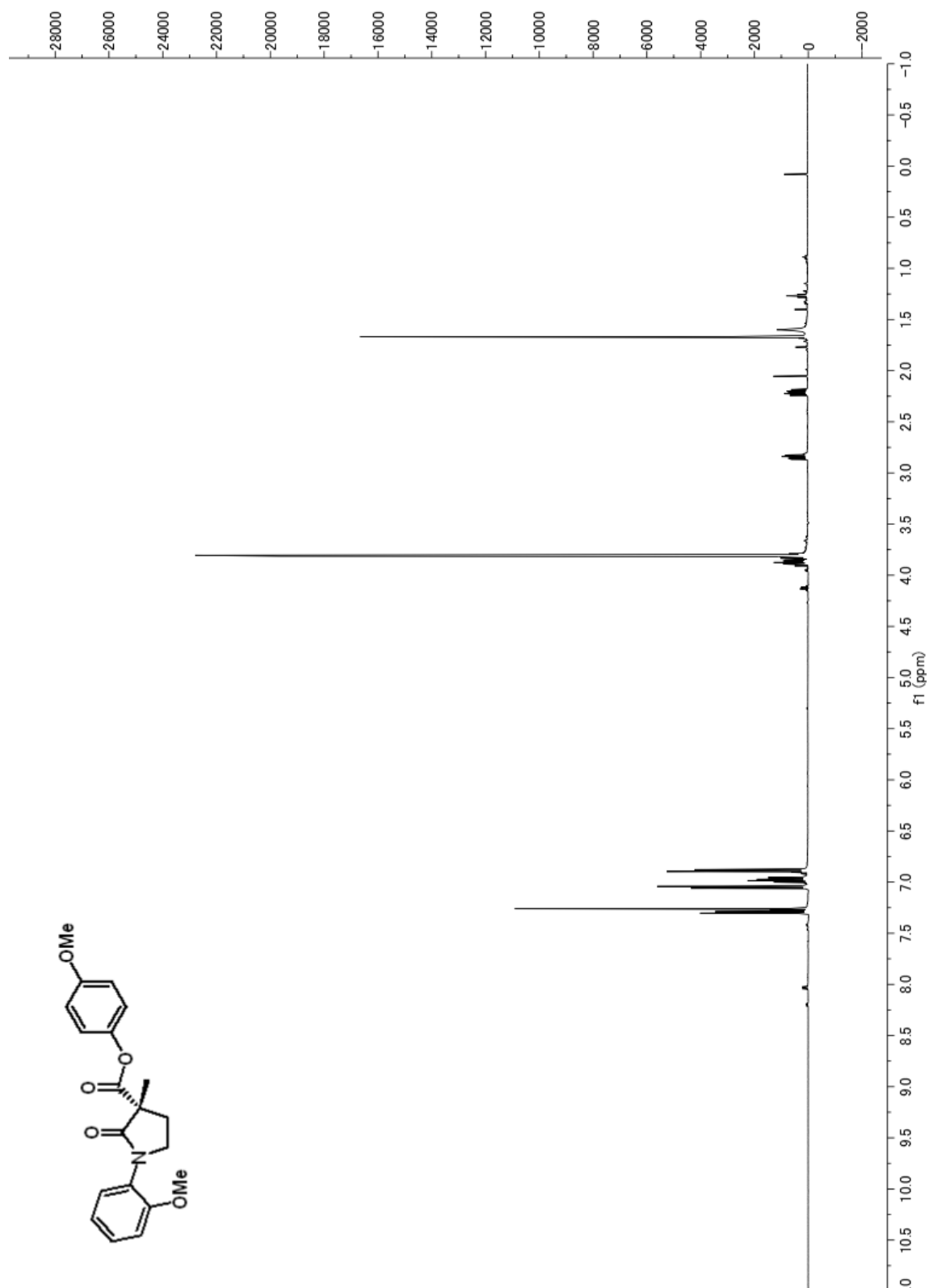
Figure A3.96. ^{13}C NMR (126 MHz, CDCl_3) of compound **66**.

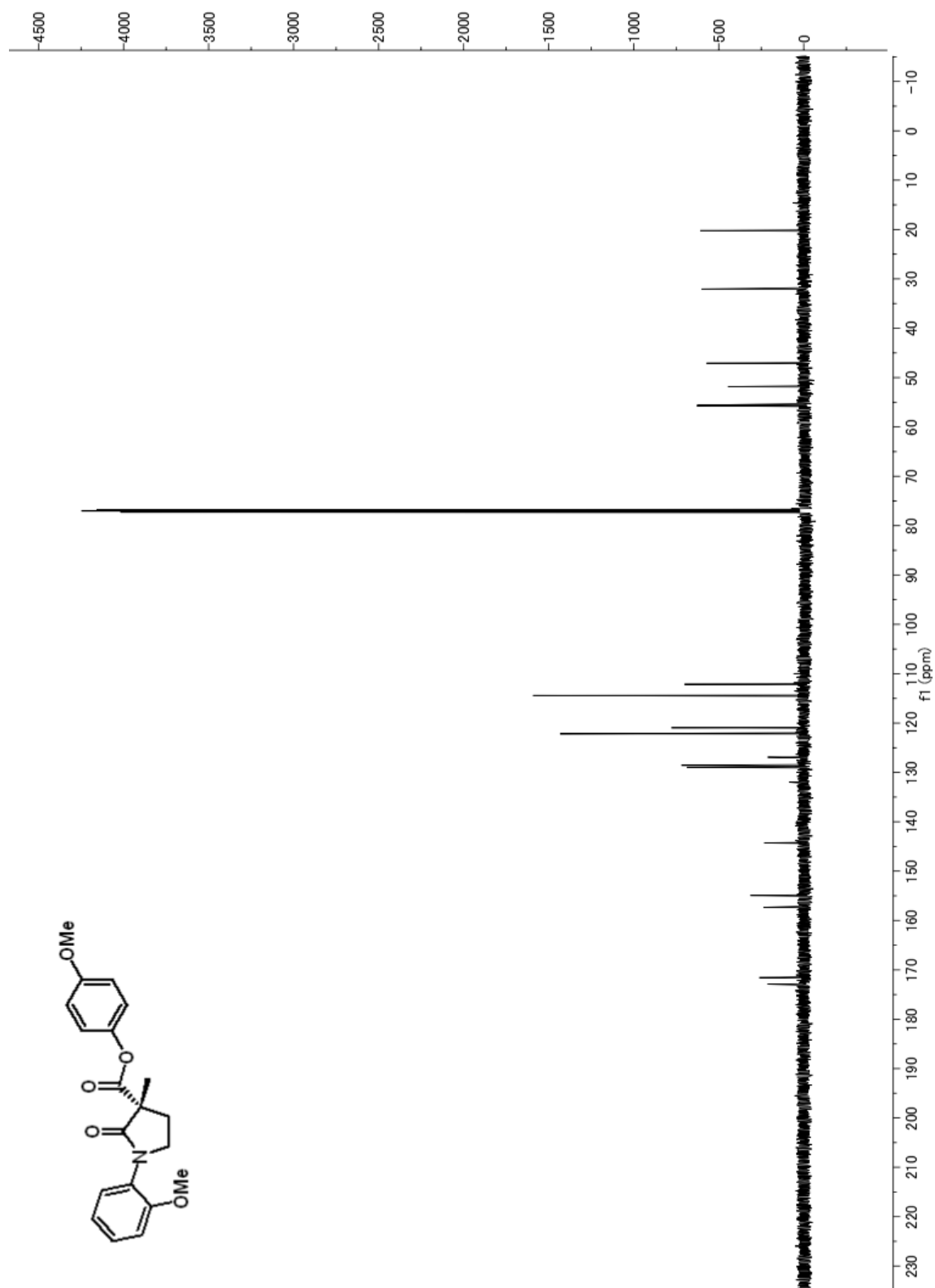
Figure A3.97. ¹H NMR (500 MHz, CDCl₃) of compound **65**.

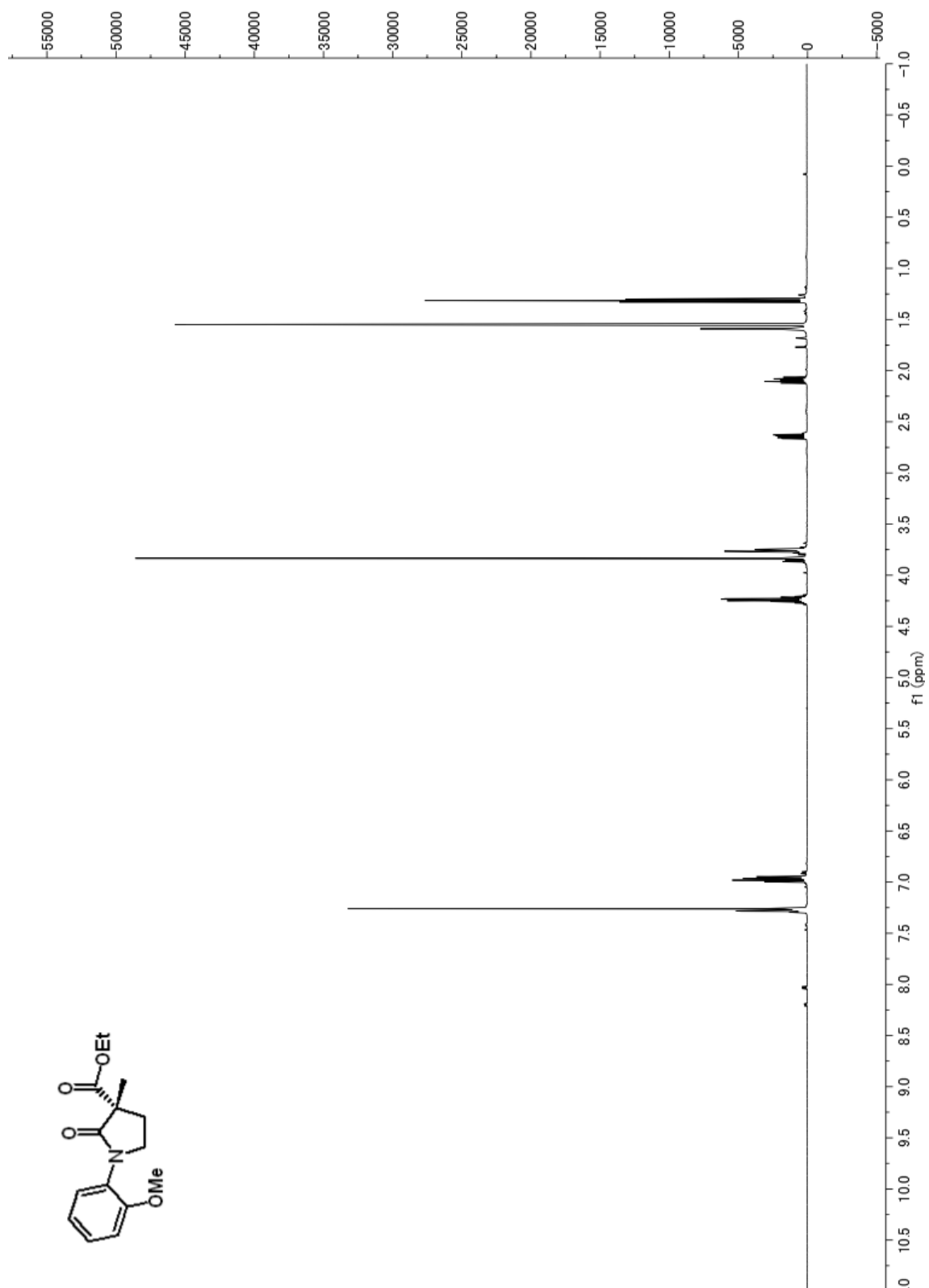
Figure A3.98. ¹³C NMR (126 MHz, CDCl₃) of compound **65**.

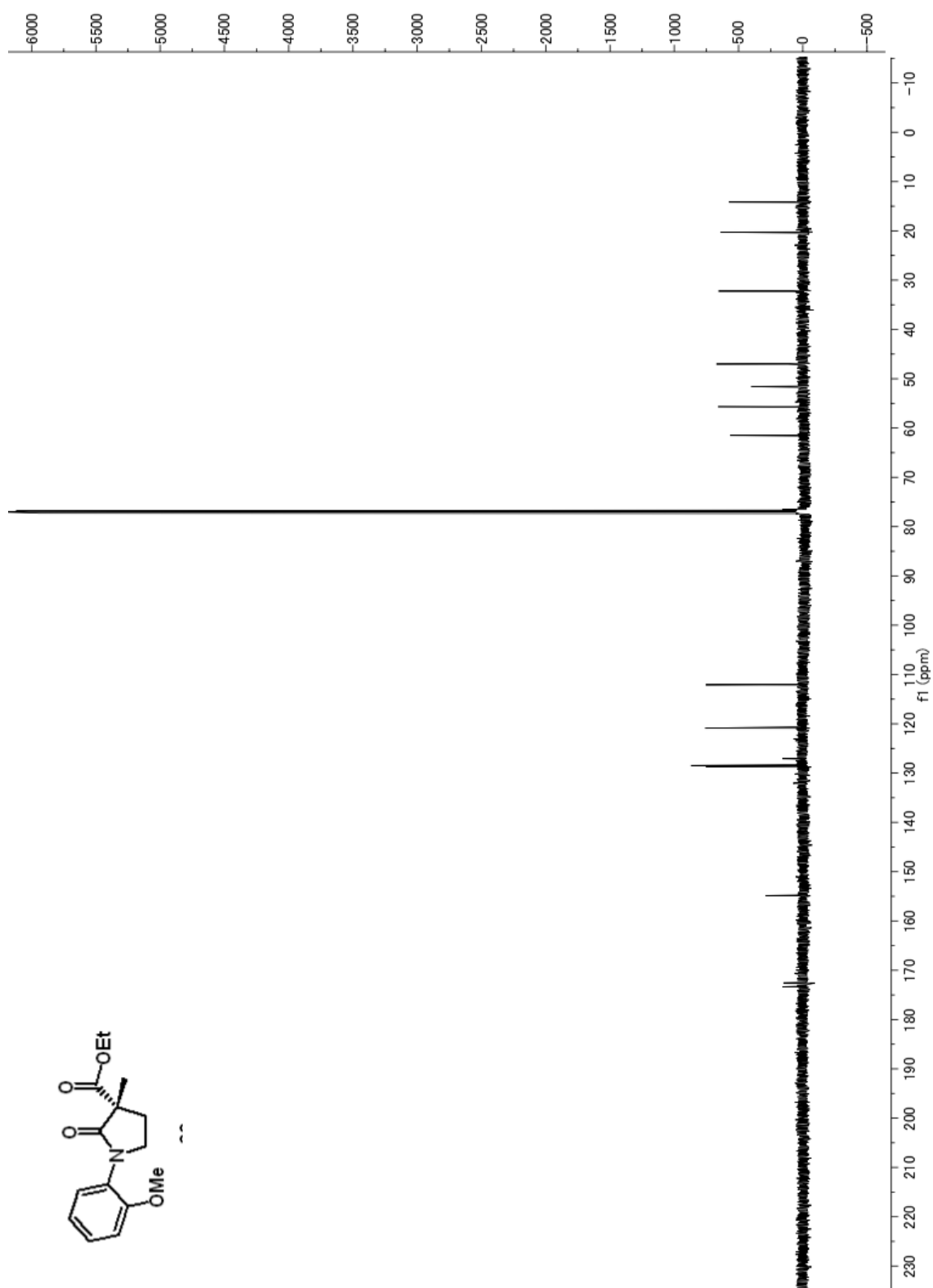
Figure A3.101. ^1H NMR (500 MHz, CDCl_3) of compound **67**.

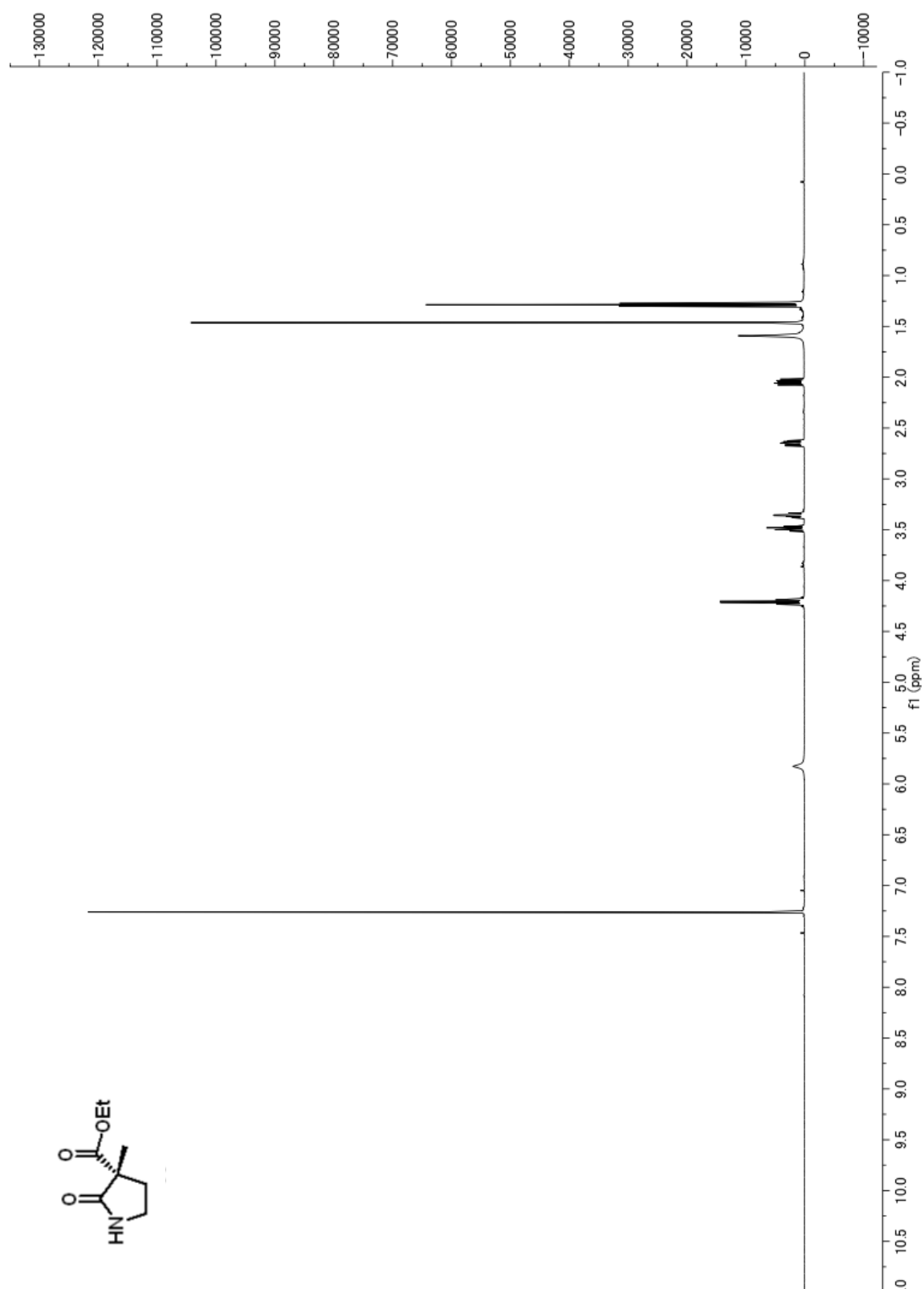
Figure A3.102. ¹³C NMR (126 MHz, CDCl₃) of compound **67**.

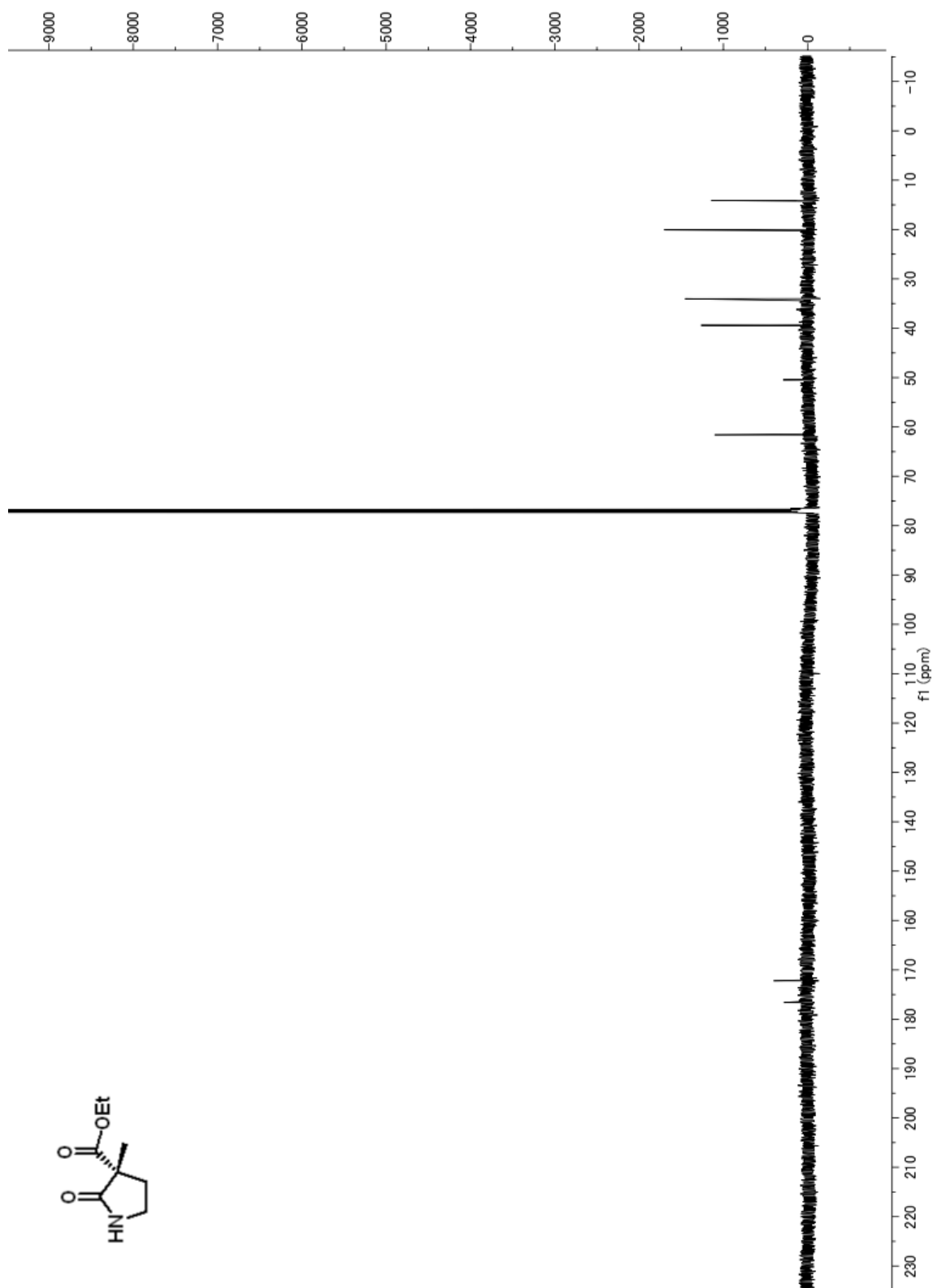
Figure A3.103. ^1H NMR (500 MHz, CDCl_3) of compound **69**.

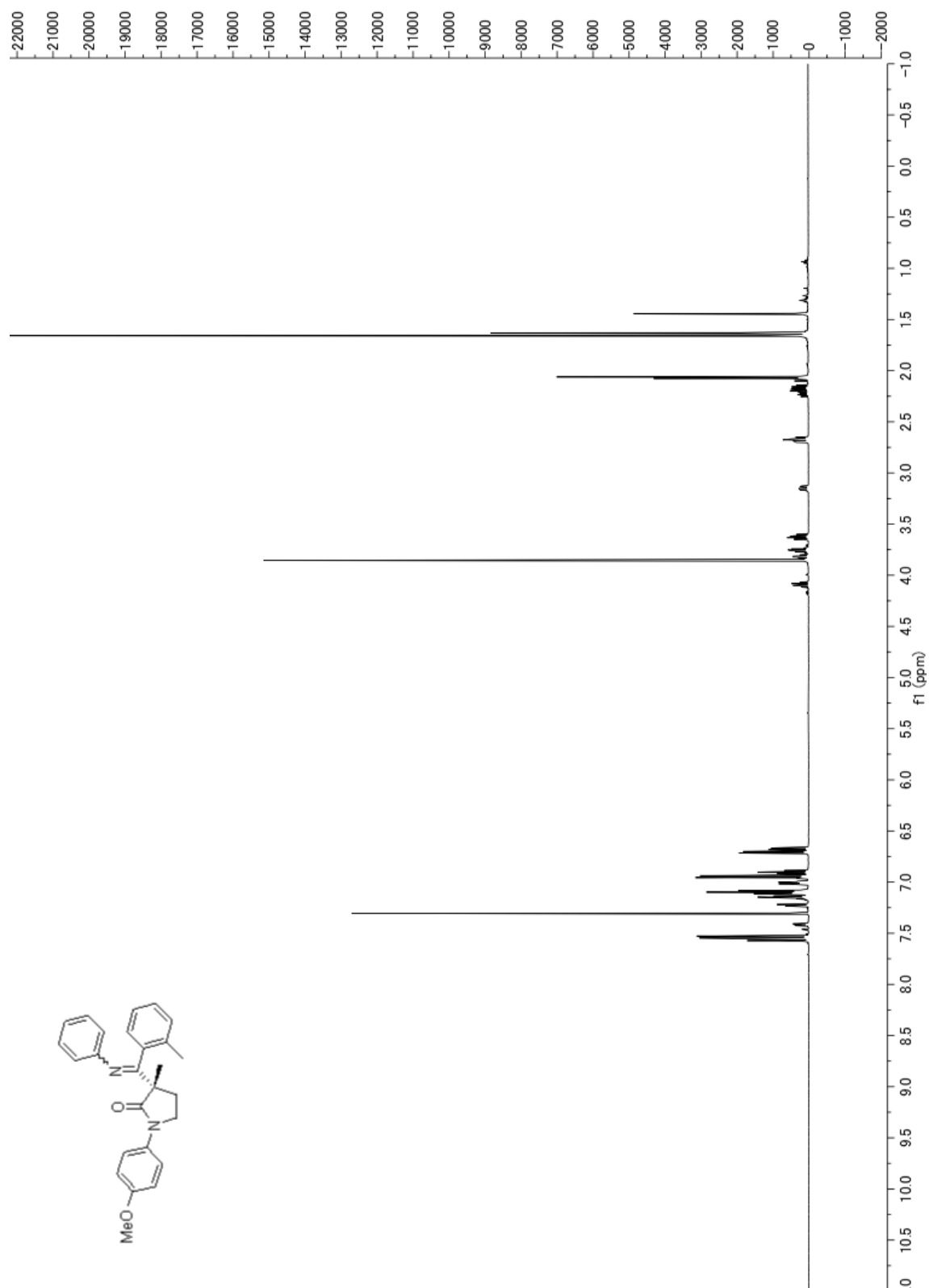
Figure A3.104. ^{13}C NMR (126 MHz, CDCl_3) of compound **69**.

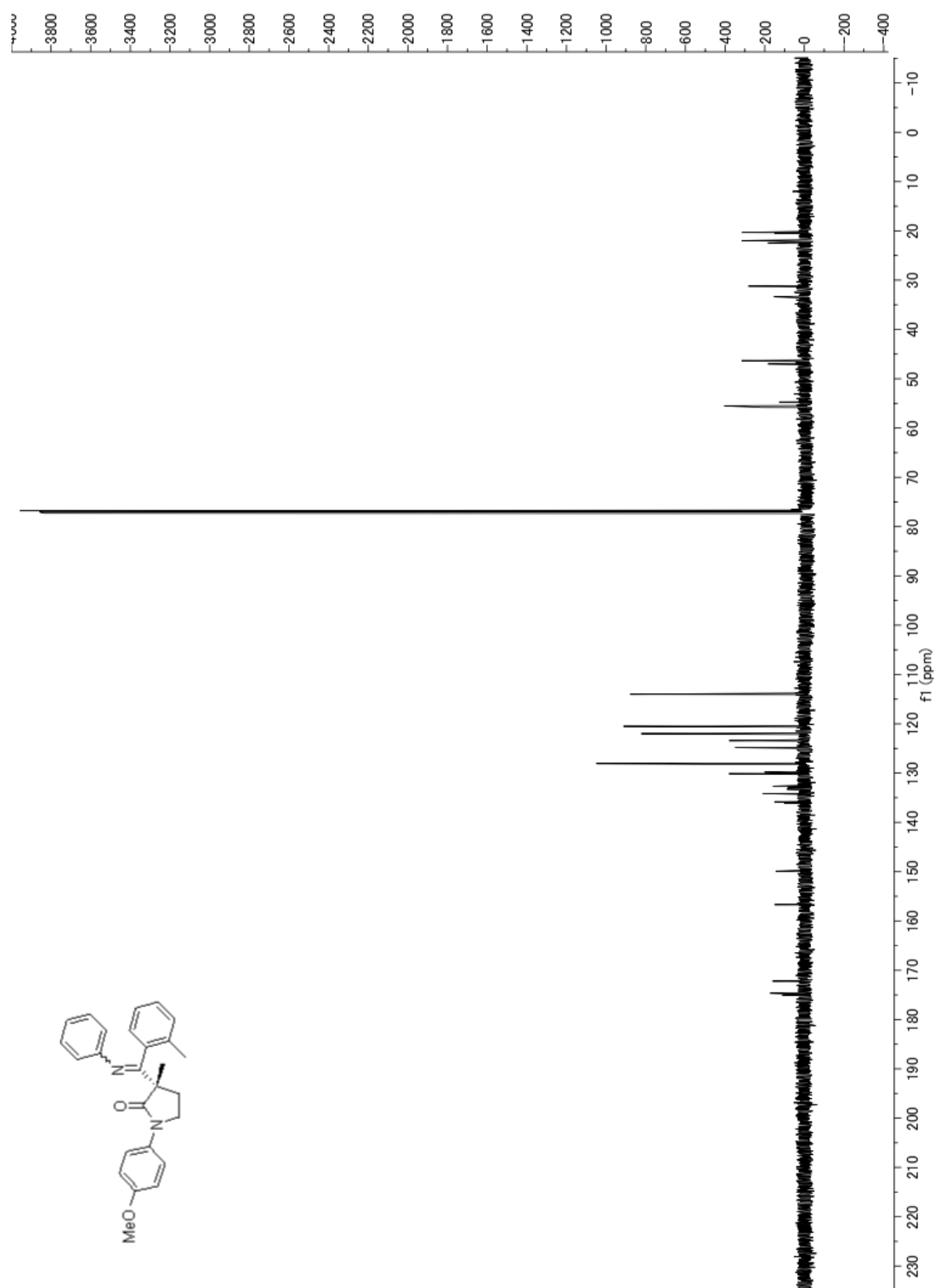
Figure A3.105. ^1H NMR (500 MHz, CDCl_3) of compound **70**.

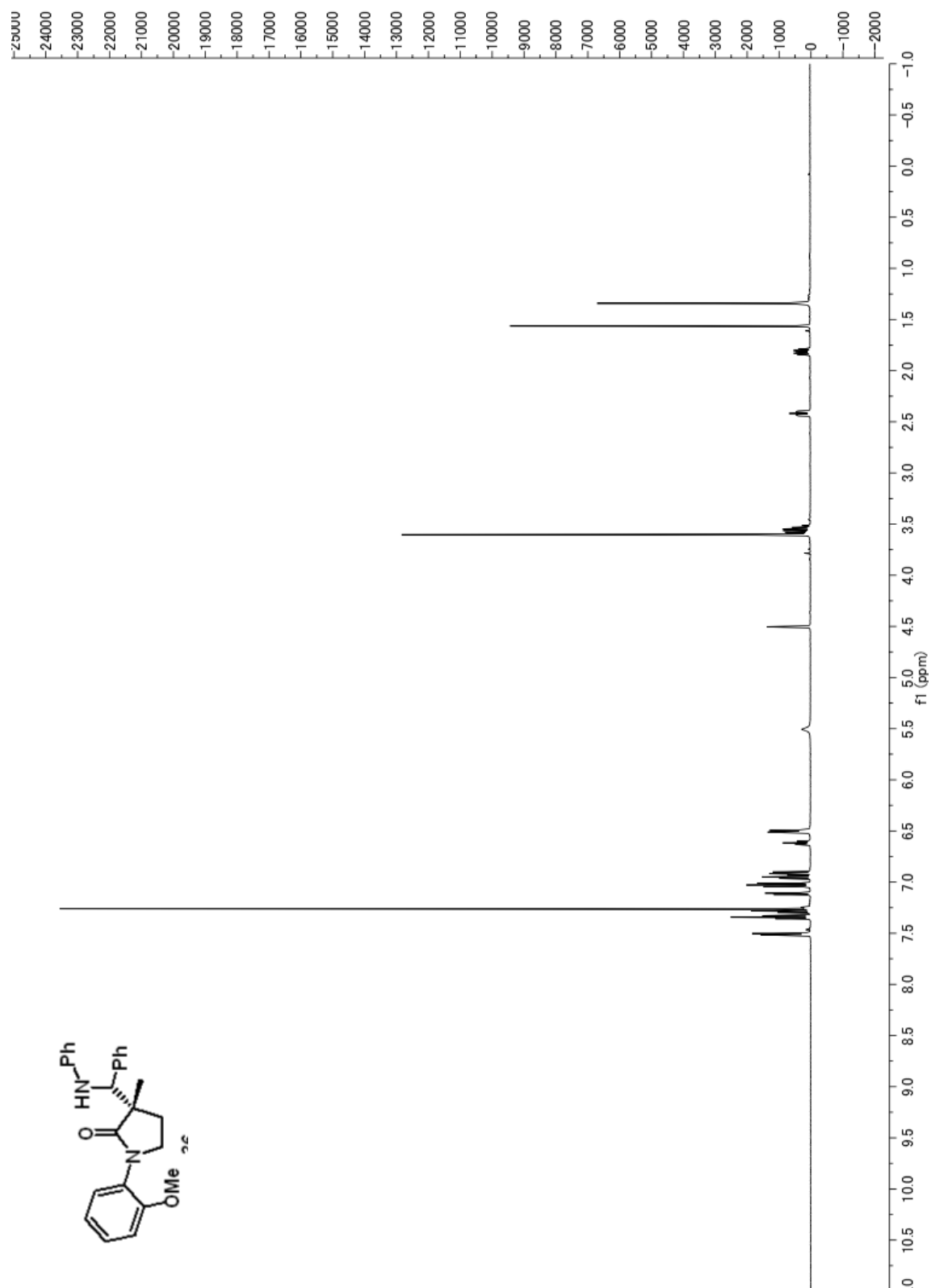
Figure A3.106. ¹³C NMR (126 MHz, CDCl₃) of compound 70.

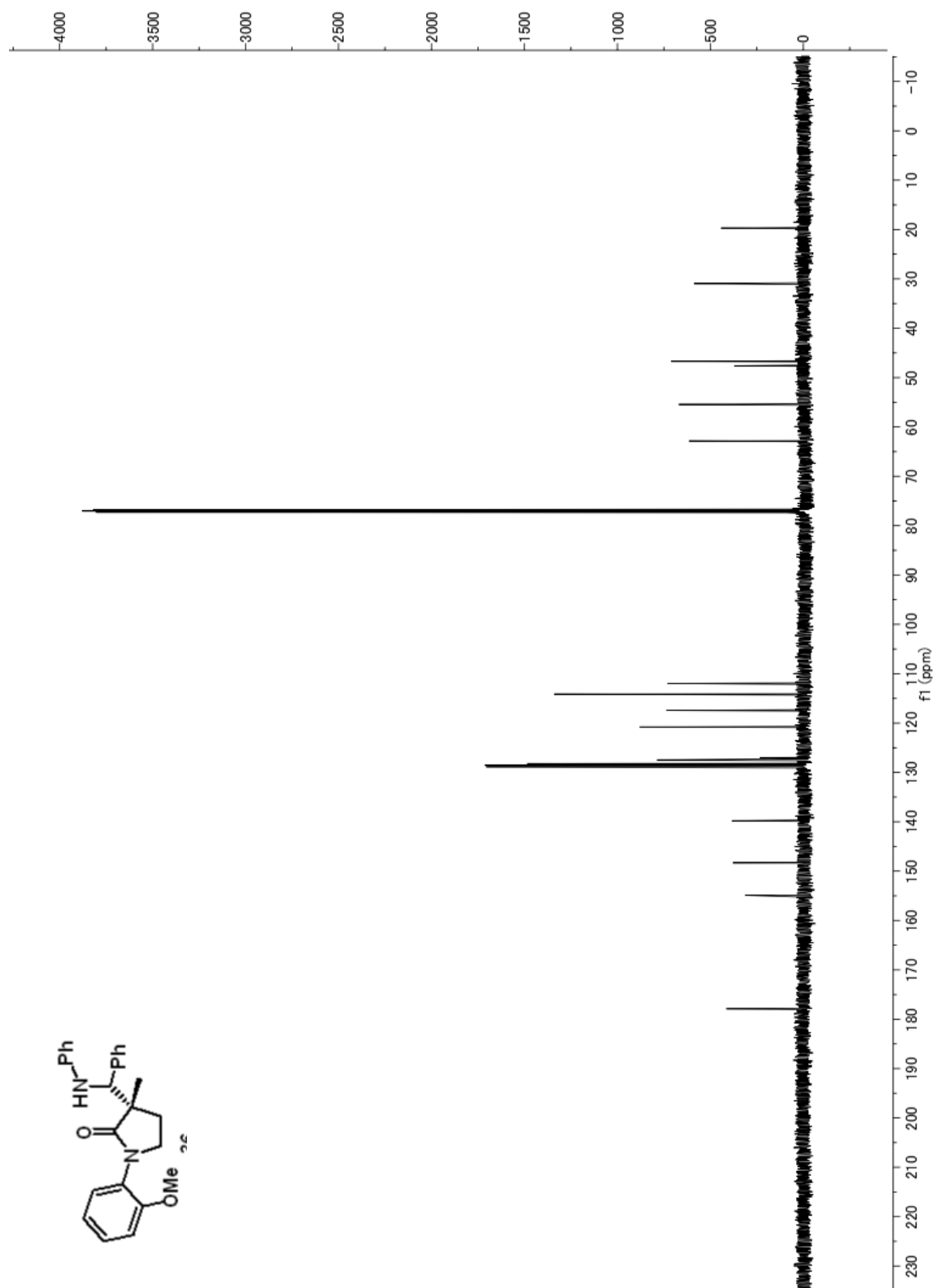
Figure A3.107. ¹H NMR (500 MHz, CDCl₃) of compound 71.

Figure A3.108. ¹³C NMR (126 MHz, CDCl₃) of compound 71.

Figure A3.109. ^1H NMR (500 MHz, CDCl_3) of compound 72.

Figure A3.110. ^{13}C NMR (126 MHz, CDCl_3) of compound 72.

Figure A3.111. ¹H NMR (500 MHz, CDCl₃) of compound 74.

Figure A3.112. ^{13}C NMR (126 MHz, CDCl_3) of compound **74**.