REFERENCES

1. เสงี่ยม พงษ์บุญรอด. ไม้เทศเมืองไทย. กรุงเทพมหานคร : เขษมบรรณกิจ, 2519, 502-503.
2. เต็ม สมิตินันท์. ชื่อพรรณไม้แห่งประเทศไทย(ชื่อพฤกษศาสตร์-ชื่อพื้นเมือง). พิมพ์ครั้งที่ 2. กรุงเทพมหานคร : ฟันนี, 2523, 265.
3. Perry, L. M. Medicinal Plants of East and Southeast Asia : Attributed Properties and Uses. England : The MIT Press, 1980.
4. Norman, R. F. and Bunyapraphatsara, N. Thai Medicinal Plants. Bangkok : Prachachon Co., Ltd., 1992.
5. Matsui, K. and Munakata, K. The Structure of Piperenone, a New Insect Antifeeding Substance from *Piper futokadzura*. *Tetrahedron Lett.* 24 (1975) : 1905-1908.
6. Matsui, K., Wada, K. and Munakata, K. Insecticidal Compounds *from Piper futokadzura*. *Agric. Biol. Chem.* 40(5) (1976) : 1045-1046.
7. Matsui, K. and Munakata, K. Constituents of *Piper futocadzura*. *Agric. Biol. Chem.* 40(6) (1976) : 1113-1118.
8. Miyakado, M., Nakayama, I., Inoue, A., Hatakashi, M. and Ohno, N. Effect of Some Chemical Constituents of *Piper nigrum*. *J. Pesticide Sci.* 10 (1985) : 25-30.
9. Addae-Mensah, I., Torto F. G., Torto, B. and Achenbach, H. A Naturally Occurring trans-2-cis-4-Isomer of Wisanine from *Piper guineense*. *Planta Med.* 41 (1981) : 200-201.
10. Hooker, J. D. Flora of British India. L. Reeve London : 1875-1897.
11. Bernard, C. B., Krishnamurty , H. G., Chauret, D., Durst, T., Philogene, B. J. R., Sanchez-Vindas , P., Hasbun, C., Poveda, L., San Roman, L. and Arnason , J. T. Insecticidal Defenses of Piperaceae from the Neotropics. *J. Chem. Ecol.* 21(6) (1995) : 801-814.

12. Duh, C.-Y., wu, Y-C. and Wang, S.-K. Cytotoxic Pyridone Alkaloids from the Leaves of *Piper Aborescens. J. Nat. Prod.* 53(6) (1990) : 1575-1577.

13. Orjala, J., Erdelmeier, C. A. J., Wrigh, A. D., Rali, T. and Sticher, O. Two Chromenes and a Prenylated Benzoic Acid Derivative from *Piper aduncum. Phytochemistry.* 34(3) (1993) : 813-818.

14. Burke, B. and Nair, M. Chemical Constituents of *Piper aduncum. Phytochemistry.* (25) (1986) : 1427.

15. Dasgupta, S. and Ray, A. B. Amides of *Piper attennuatum. Indian J. Chem. Sect. B.* 17B(5) (1979) : 538-540.

16. Joshi, B. S., Gawad, D. H. and Fuhrer, H. Revised Structures of Pipoxide and pipoxide Chlorohydrin. *Tetrahedron Lett.* 26 (1979) : 2427-2430.

17. Rao, J. M., Subhramanyam, K. and Rao, K. V. J. Alkaloids from the Fruits of *piper aurantiacum* (Piperaceae). *Curr. Sci.* 43 (1974) : 76-77.

18. Benerji, A. and Ray, R. Auranamide,a New Phenylalanine Derivative Isolated from *Piper aurantiacum. Indian J. Chem.* 20B (1981) : 597-598.

19. Banerji, A. and Ray, R. Aurantiamides : A New Class of Modified Dipeptides from *Piper aurantiacum. Phytochemistry.* 20(9) (1981) : 2217-2220.

20. อภิชาติ อิ่มยิ้ม, เฟื่องฟ้า อุ่นอบ. การสกัดและการหาสูตรโครงสร้างของสารเคมีจากลำต้นสะค้านหนู. โครงการการเรียนการสอนเพื่อเสริมประสบการณ์ปริญญาบัณฑิต ภาควิชาเคมี คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย, 2537.

21. Gupta, M. P., Arias, T. D., Williams, N. H., Bos, R. and Tattje D.H.E. Safrole, the Main Component of the Essential Oil from *Piper auritum* of Panama. *J. Nat. Prod.* 48(2) (1985) : 330-343.

22. Yin, M.-L., Liu, J., Chen, Z.-L., Long, K. and Zeng, H.-W. Some New PAF Antagonistic Neolignans from *Piper betle. Planta Med.* (57) (1991) : A66.

23. Koul, S. K., Taneja, S. C., Agarwal, V. K. and Dhar, K. L. Minor Amide of

Piper Spices. *Phytochemistry.* 27(11) (1988) : 3523-3527.

24. Pring, B. G. J. *Chem.Soc.* Isolation and Identification of Amide from *Piper callosum.* Synthesis of Pipercallosine and Piper callosidine. *Perkin Trans.1.* 1(7) (1982) : 1493-1498.

25. Patra, A. and Ghosh, A. Amides of *Piper chaba. Phytochemistry.* (13) (1974) : 2889-2890.

26. Misshra, S. S. and Tewari, J. P. Phytochemical Investigation of *Piper chaba. J. Pharm. Sci.* 53(11) (1964) : 1423-1424.

27. Badheka, L. P., Prabhu, B. R. and Mulchandani, N. B. Lignans of *Piper cf cubeba.. Phytochemistry.* 26 (1987) : 2033-2036.

28. Takahashi, S. The Presence of the Tumor Inhibitor Crotepoxide (Futoxide) in *Piper futokadzura. Phytochemistry.* 8 (1969) : 321-322.

29. Okogun, J. I. and Ekong d. E. U. Extracts from the Fruits of *Piper guineense* Schum. and Thonn. *J. Chem. Soc. Perkin Trans. 1.* 45(32) (1974) : 2195-2198.

30. Addae-Mensah, I., torto, F. G., Dimonyeka, C.I., Baxter, I. and Sanders, J. K.M. Novel Amide Alkaloids from the Roots of *Piper guineense. Phytochemistry.* 16 (1977) : 757-759.

31. Adde-Mensah, I., Torto, F. G. and Baxter, I. Wisanine, a Novel Alkaloid from the Roots of *Piper guineense. Tetrahedron Lett.* 35 (1976) : 3049-3050.

32. Crombie, Lo, Pattenden, G. and Stemp, G. Synthesis of Wisanine, a New Piperine Amide from *Piper guineense. Phytochemistry.* 16 (1977) : 1437-1438.

33. Pedro, P. D. D., Tiberio, A. C. and Pedro, J.-N. A Chromene, an Isoprenylated Methyl Hydroxybenzoate and a C-methyl Flavanone from the Bark of *Piper Hostmannianum. Phytochemistry.* 26 (1987) : 809-811.

34. Chatterjee, A. and Dutta, C. P. Alkaloids of *Piper longum. Tetrahedron.* 23 (1967) : 1769-1781.

35. Atal, C. K., Banga, S. S. Structure of Piplartine a New Alkaloid from *Piper longum. Current Sci. (India).* 32(8) (1963) : 354-355.

36. De Diaz, A. M. P. and Gottlieb, O. R. Propiophenohes from *Piper maginatum. Planta Med.* 35(2) (1979) : 190-191.

37. Alenca, J. W., Craveiro, A. A. and Matos, F. J. A. Kovat's Indices as a Preselection Routine in Mass Spectra Library Searches of Volatiles. *J. Nat. prod.* 47(5) (1984) : 890-892.

38. Banerji, A., et al. Constituents of *Piper nigrum. Indian J. Chem.* 17B (1964) : 146-149.

39. Miyakado, M., Nakayama, I. and Yoshioka, H. *agric. Biol. Chem.* 44(7) (1980) : 1701-1703.

40. Dhar, K. L. and Raina, M. L. Further Chemical Studies of *Piper peepuloides. Planta Med.* 23 (1973) : 295-297.

41. Gupta, O. P., Gupta, S. C., Dhar, K. L. and Atal, C. K. A New Piperidine Alkaloid from *Piper peepuloides. Phytochemistry.* 17(3) (1978) : 601-602.

42. Naito, S. and Kaneko, Y. Two New Phenolic Reductones from *Aspergillus Terreus. Tetrahedron Lett.* 56 (1969) : 4675-4678.

43. Ruangrungsi, N., Prathanturarug, S., Lange, G. L. and Organ, M. G. An N-methylaristolactam and an Oxygenated Cyclohexane Derivative from *Piper ribesoides. Phytochemistry.* 31(7) (1992) : 2397-2400.

44. Kijjoa, A., Pinto, M. M. M., Tantisewie, B. and Herz, W.A New Linalool Derivative and Other Constituents from *Piper ribesoides. Planta Med.* 55 (1989) : 193-194.

45. สุภา เทพย์ปฏิพัธน์. สารประกอบในลำต้นสะค้าน. โครงการการเรียนการสอนเพื่อเสริมประสบการณ์ปริญญาบัณฑิต ภาควิชาเคมี คณะวิทยาศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย, 2527.

46. Linkhitwitayawuid, K. and Ruangrungsi, N. Structural Elucidation and Synthesis of New Components Isolated from *Piper sarmentosum*. *Tetrahedron*. 43(16) (1987) : 3689-3694.

47. Banerji, A., Bernerji, J. Chatterjee, A. and Shoolery, J. N. Structure and Stereochemistry of an Alkamide from *Piper sylvaticum*. *Indian J. Chem.* 19B(5) (1980) : 346-349.

48. Banerji, J. and Dhara, K. P. Lignan and Amides from *Piper sylvaticum*. *Phytochemistry*. 13 (1974) : 2327-2328.

49. Banerji, A. and Pal, S. Constituents of *Piper sylvaticum* : Structure of Sylvatesmin. *J. Nat. Prod.* 45(6) (1982) : 672-675.

50. Singh, J., Santani, D. D., Dhar, K. L. Structure of Tricholein, A New Pyrrolidine Alkaloid from *Piper trichostachyon*. *Phytochemistry*. 15(12) (1976) : 2018-2019.

51. Chopra, R. N., Copra. I. C. and Varma, B. S. Supplement to Glossary of Indian Medicinal Plants. New Delhi : Publications and Information Directorate, C.S.I.R., 1969.

52. Masuda, T., Inazumi, A., Yamada, Y., Padolina, W. G., Kikuzaki, H. and Nakatani, N. Antimicrobial Phenylpropanoids from *Piper sarmentosum*. *Phytochemistry*. 30(10) (1991) : 3227-3228.

53. John, C. Quick Column Chromatography. 1st ed. : James Cook University of North Queensland, 1979, 10-74.

54. Fessenden, R.J. and Fessenden, J.S. Technique and Experiments for Organic Chemistry. London : Willard Grant Press, 1983.

55. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. and Tatchell, A.R. Vogel's Textbook of Practical Organic Chemistry. 5th ed. Great Britain : English Language Book Society. Longman, 1980.

56. Raksilp, T., M.Sc. Thesis, Chemistry Department, Graduate School, Chulalongkorn University, 1995.

57. Pavia, D.L., Lampmon, G.M. and Keiz, G.S. Introduction to Organic Laboratory Techniques. A Contemporary Approach. 2nd ed. New York : Sauders Collage Publishing, 1982.

58. Rabderath, K.Thin-Layer Chromatography.2nd rev. U.S.A. : Academic Press, 1966.

59. Willam, D. H. and Fleming, I. Spectroscopid Methods in Organic Chemistry. 2nd ed. : Mc Graw Hill, 1973, 35.

60. Maneechakr, P. Chemical Constituents and Biological Activities of *Sphaeranthus africanus* Linn. M.Sc. Thesis. Chemistry Department. Graduate School. Chulalongkorn University, 1994.

61. สันทัฏฐ์ เลิศยนต์ชีพ. องค์ประกอบทางเคมีในลำต้นสะค้านพลู. วิทยานิพนธ์ปริญญามหาบัณฑิต ภาควิชาเคมี บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย , 2539.

62. สุรางค์ อนุกูล. ปฏิบัติการเคมีคุณภาพวิเคราะห์. พิมพ์ครั้งที่ 2 : สำนักพิมพ์จุฬาลงกรณ์มหาวิทยาลัย, 2535.

APPENDIX

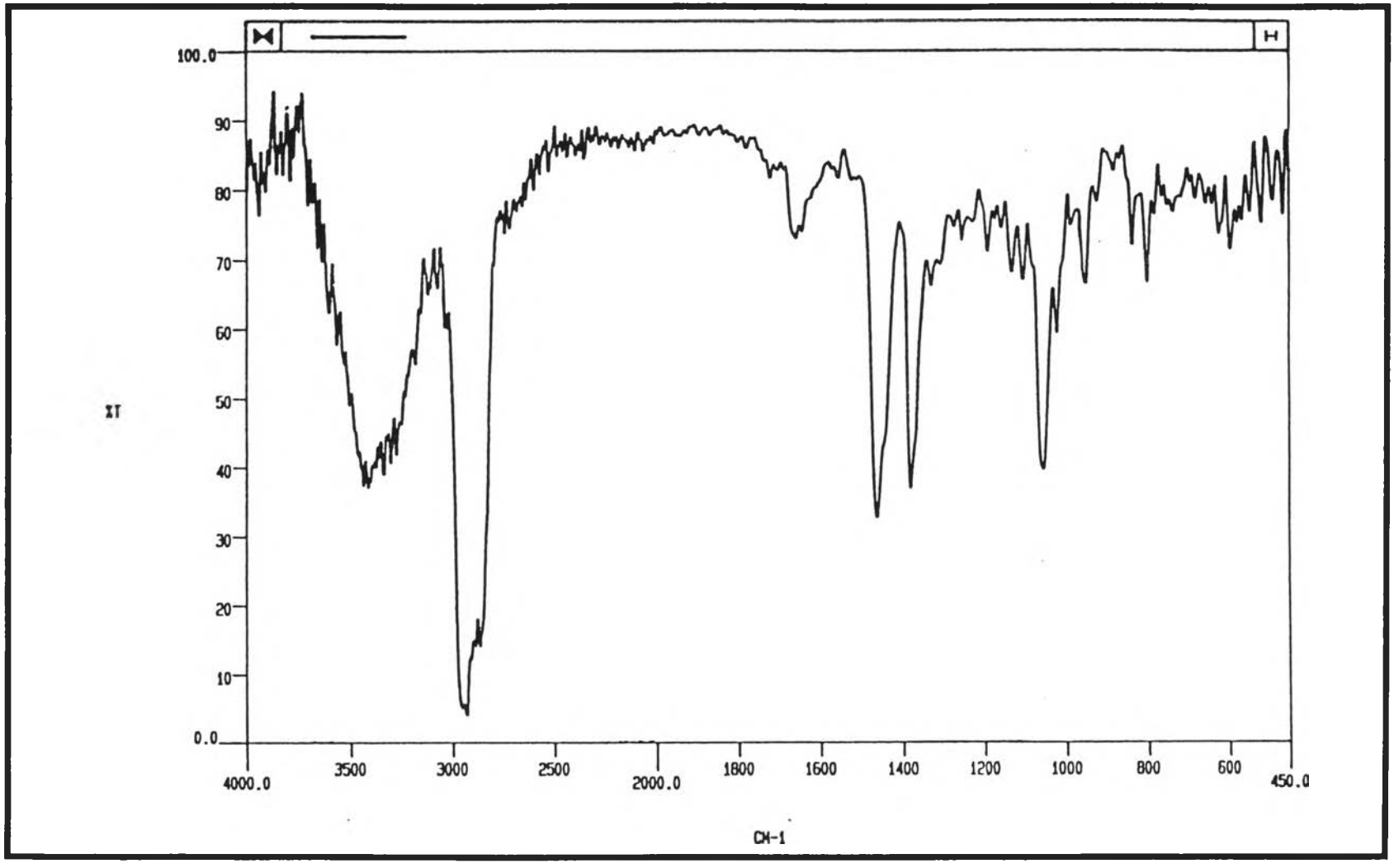


Figure A.1 : The IR spectrum of Compound I

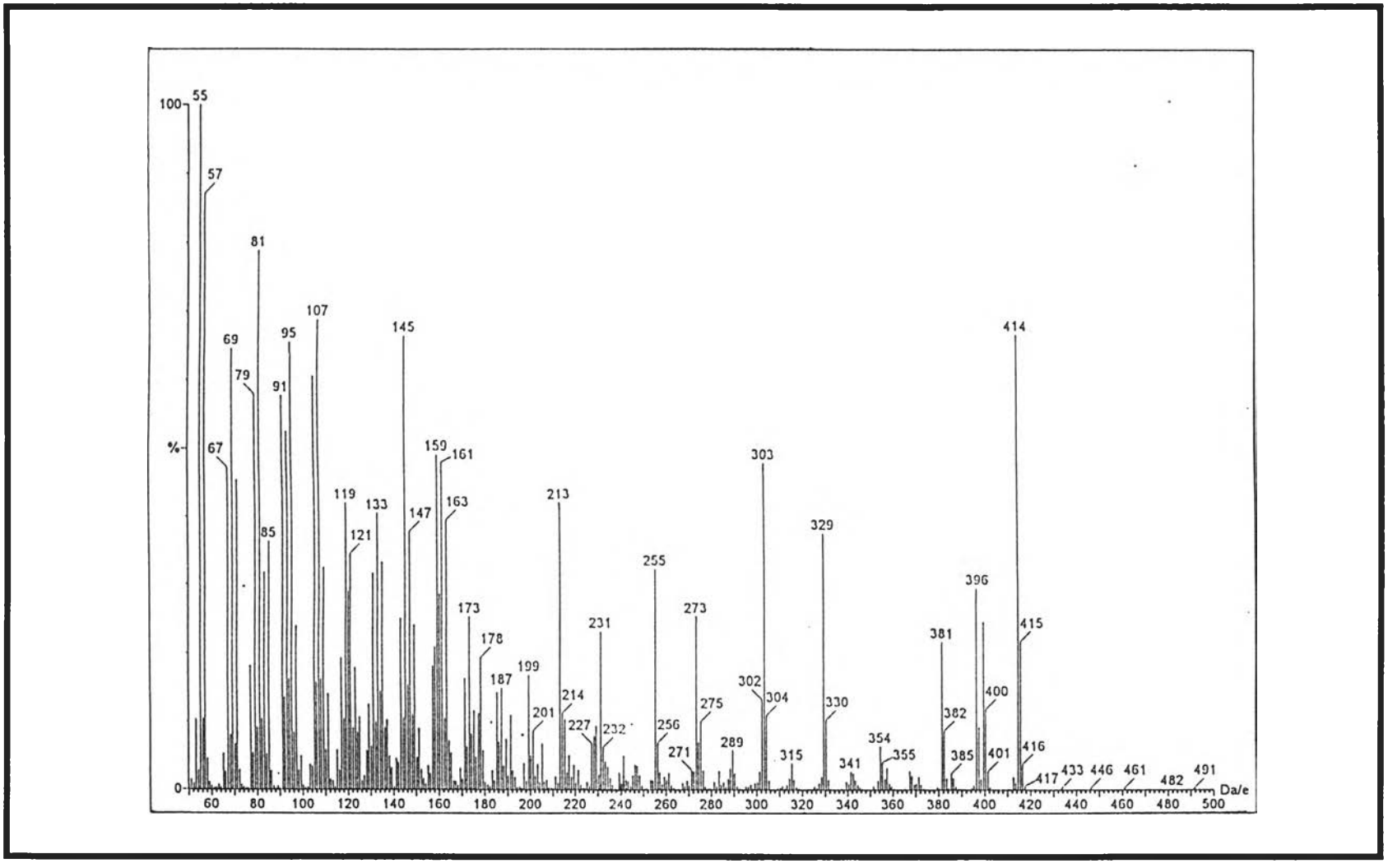


Figure A.2 : The MASS spectrum of Compound I

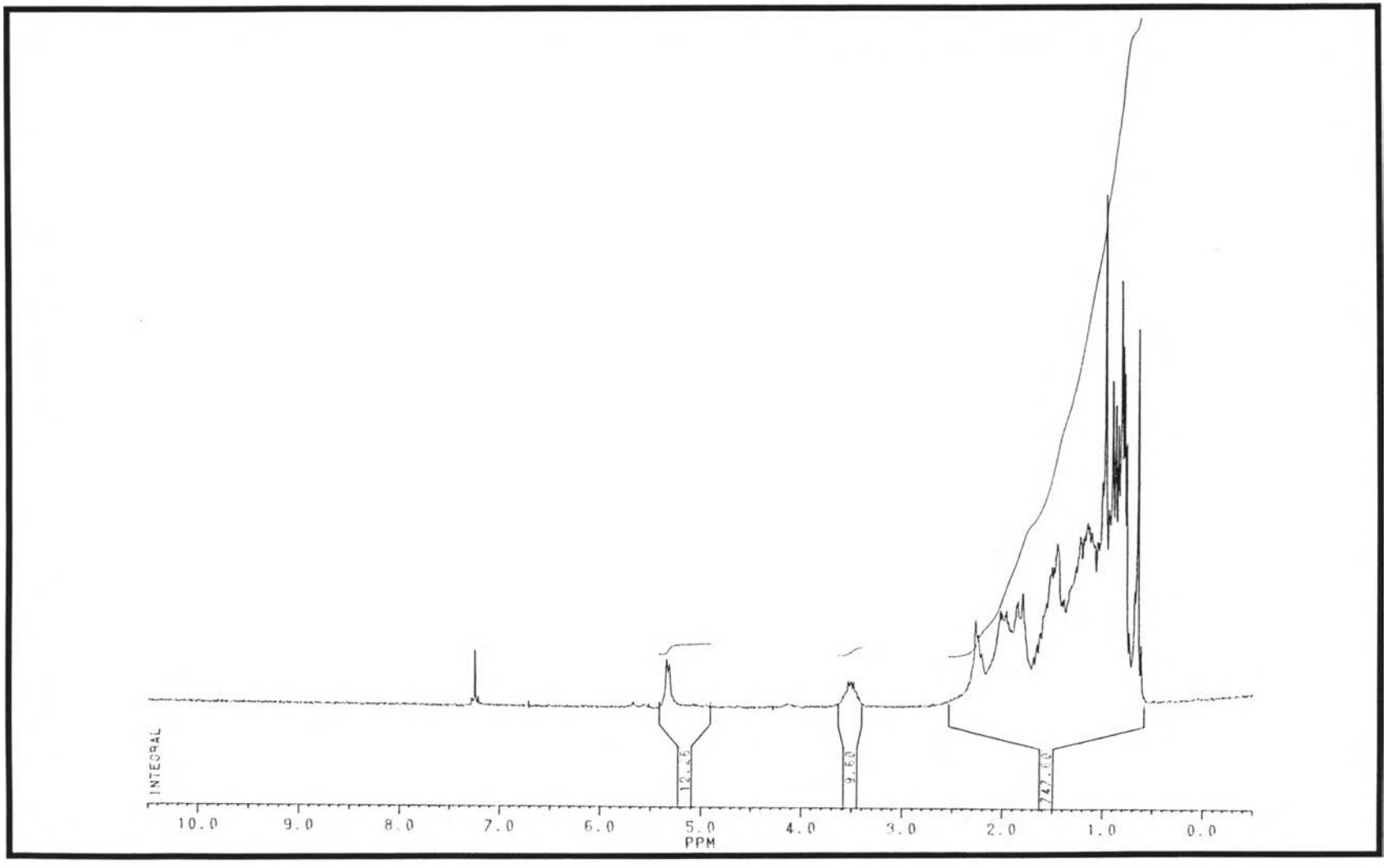


Figure A.3 : The ^{1}H-NMR spectrum of Compound I

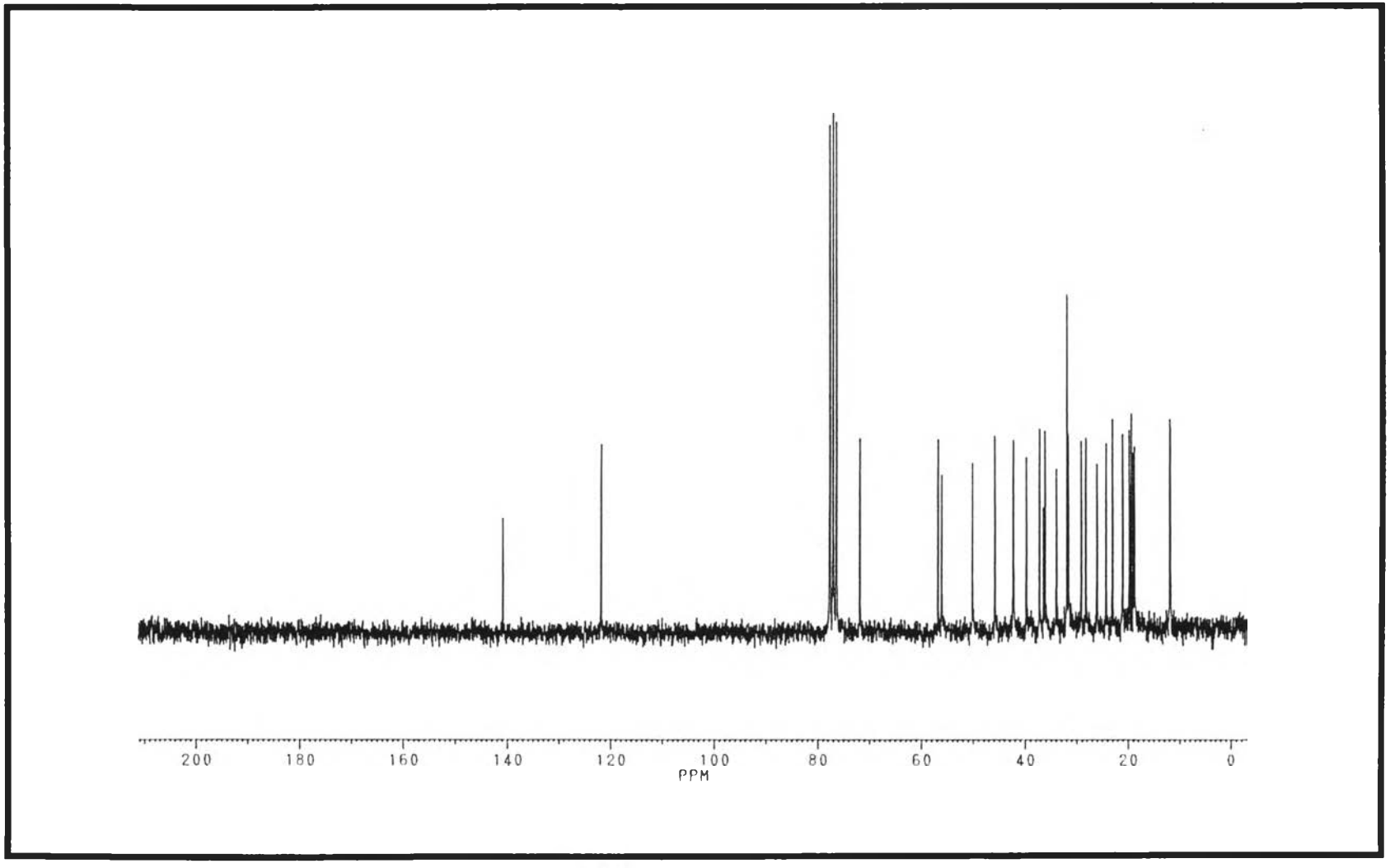


Figure A.4 : The ^{13}C-NMR spectrum of Compound I

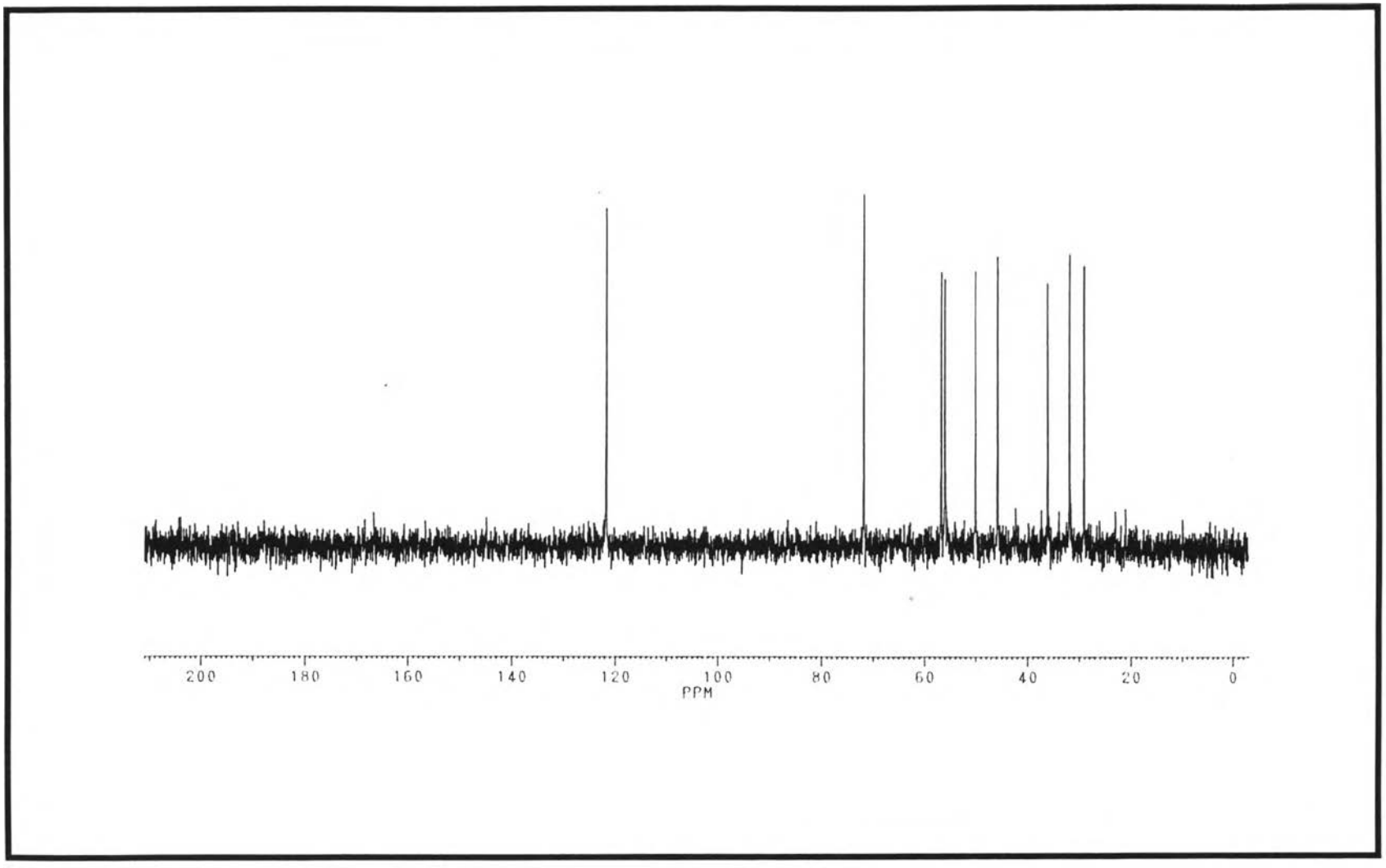


Figure A.5 : The ^{13}C-NMR DEPT-90 spectrum of Compound I

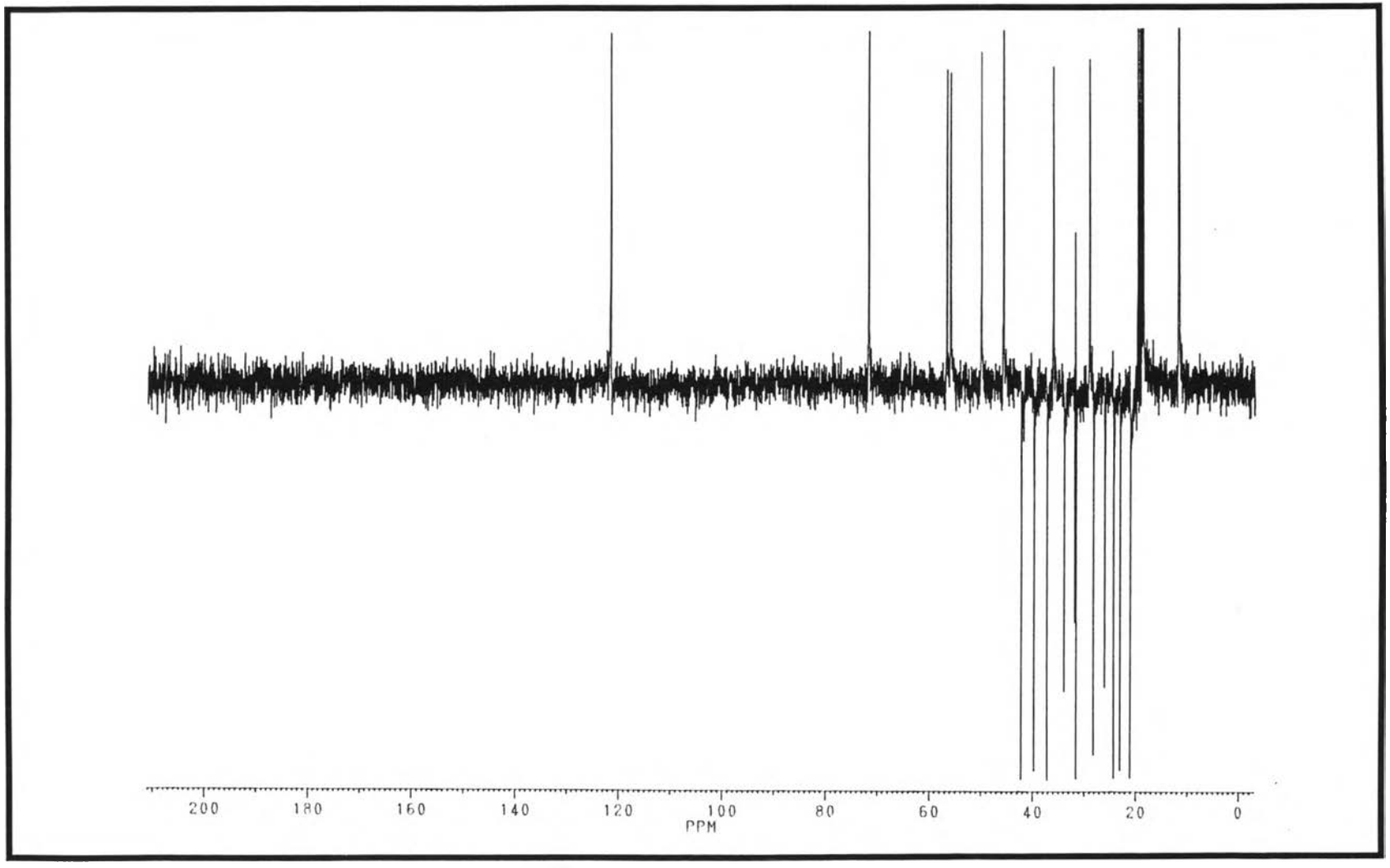


Figure A.6 : The ^{13}C-NMR DEPT-135 spectrum of Compound I

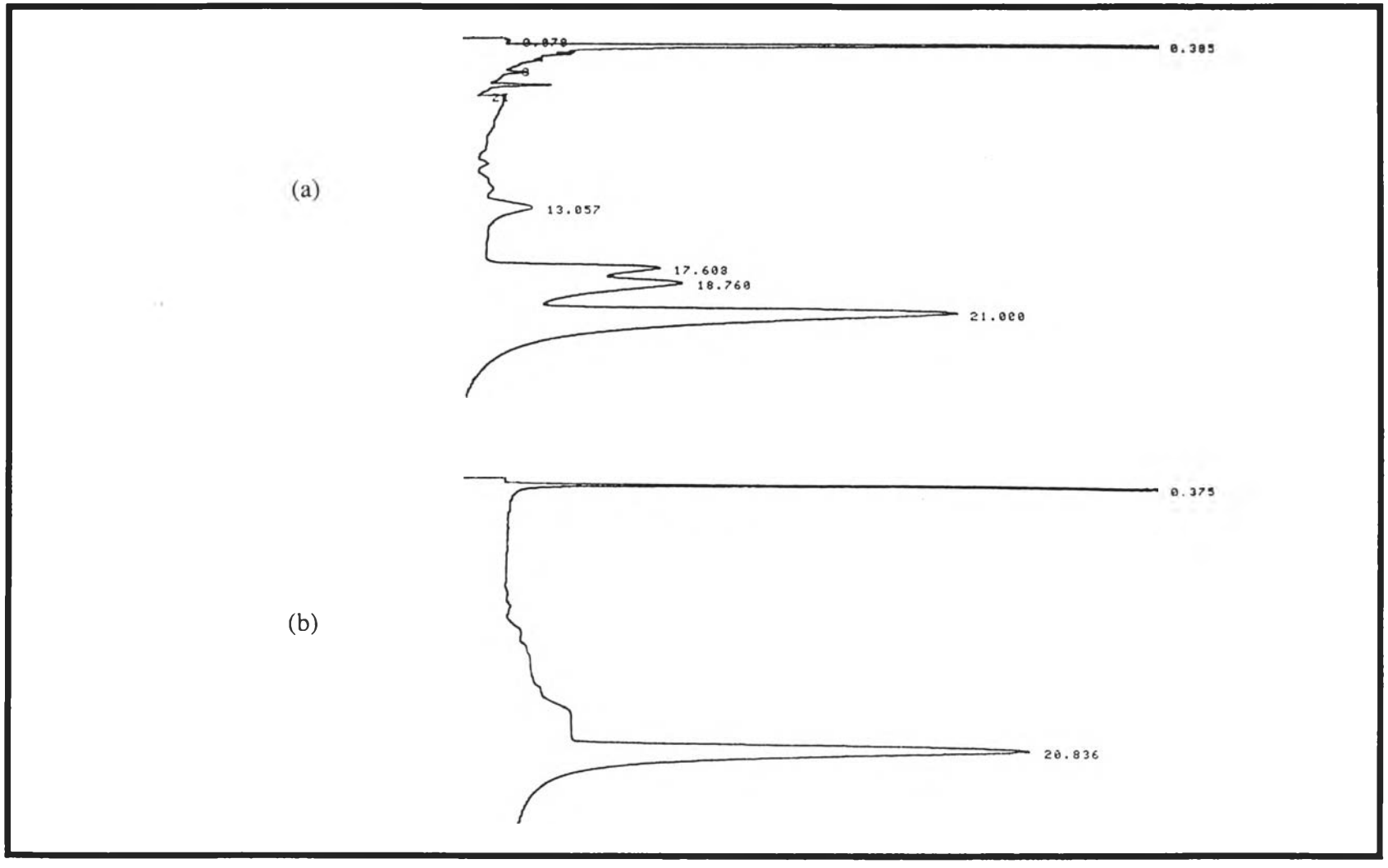


Figure A.7 : The GLC chromatograms of

(a) standard sterorids : cholesterol, campesterol, stigmasterol and β-sitosterol

(b) Compound I

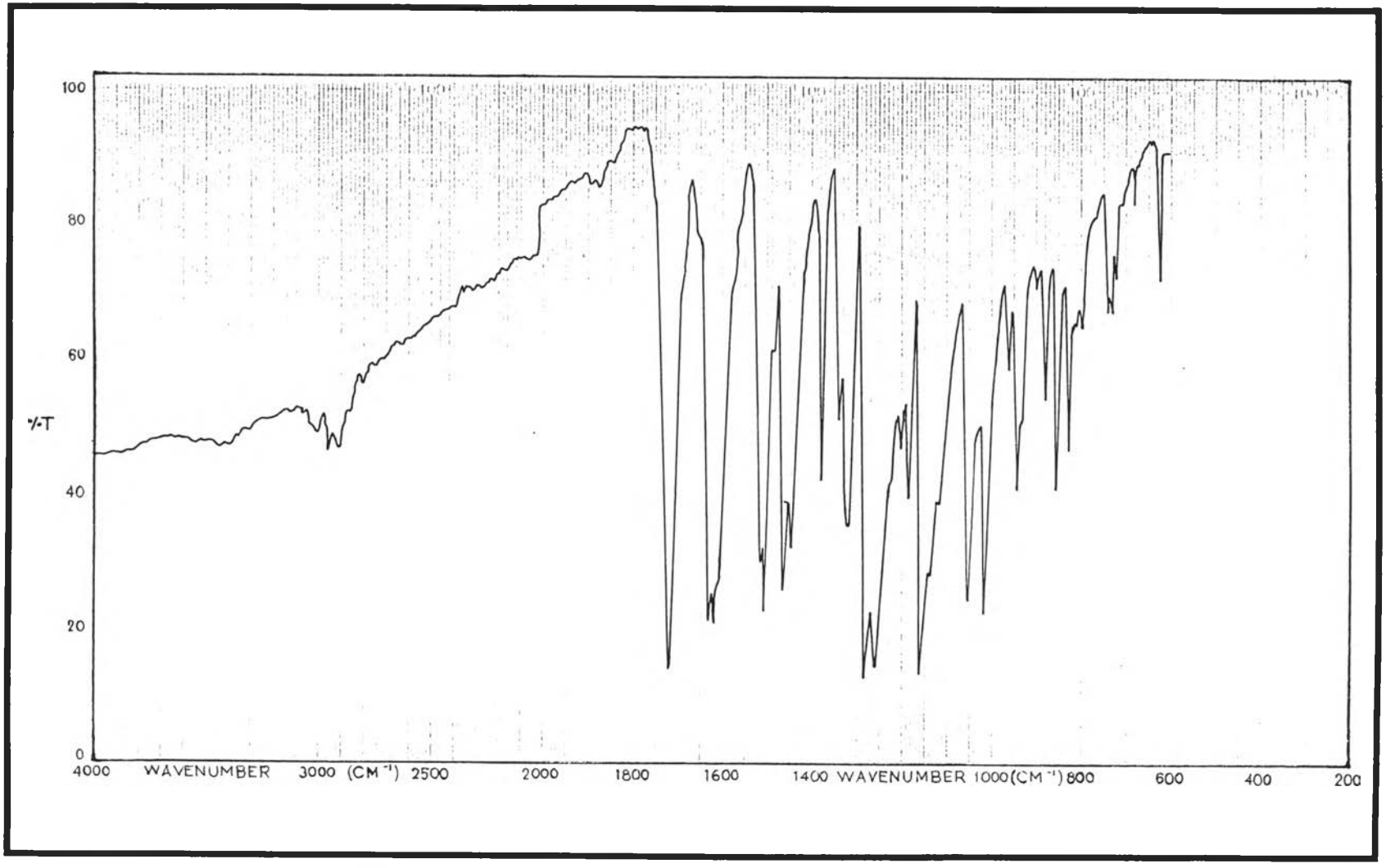


Figure A.8 : The IR spectrum of Compound II

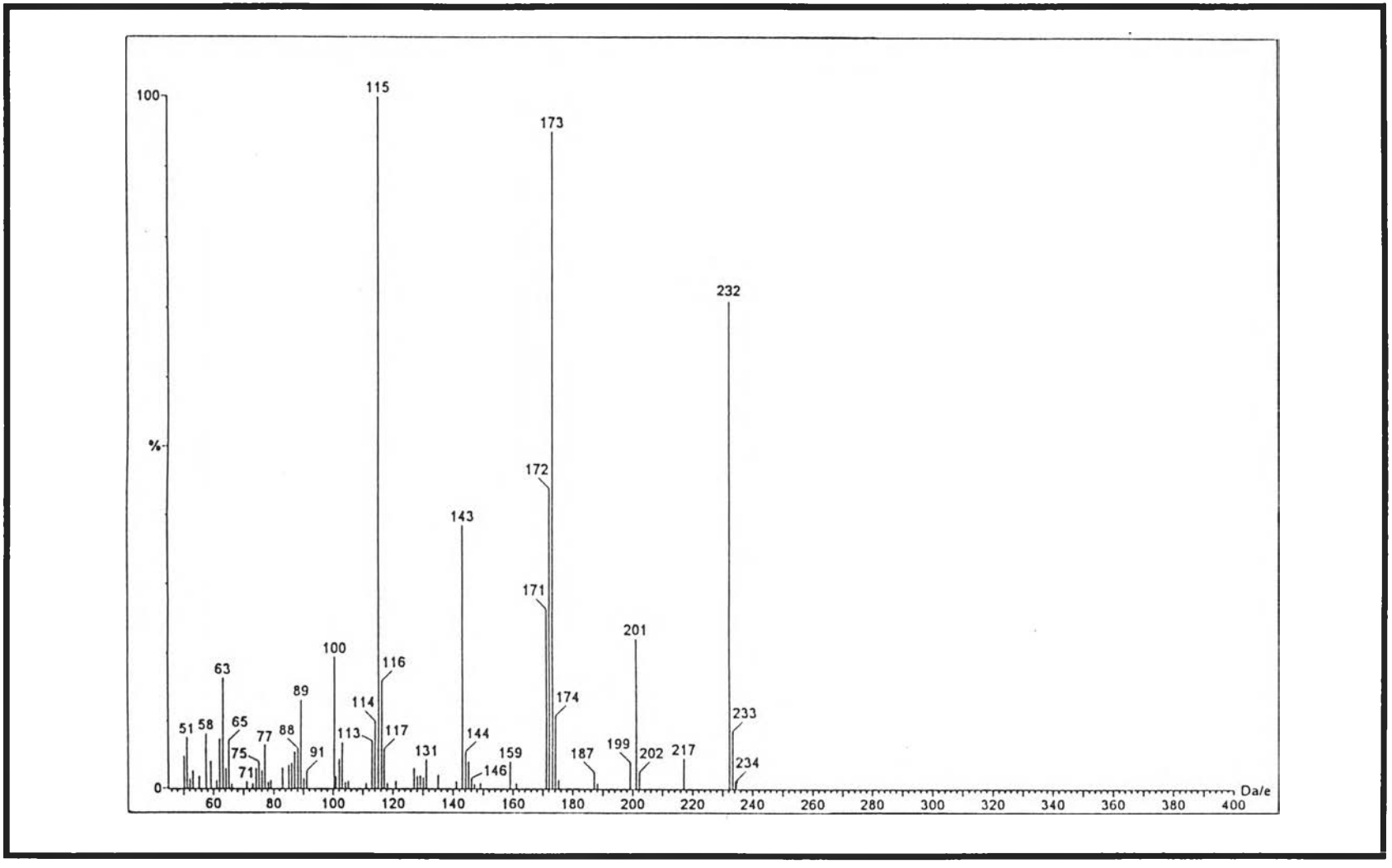


Figure A.9 : The MASS spectrum of Compound II

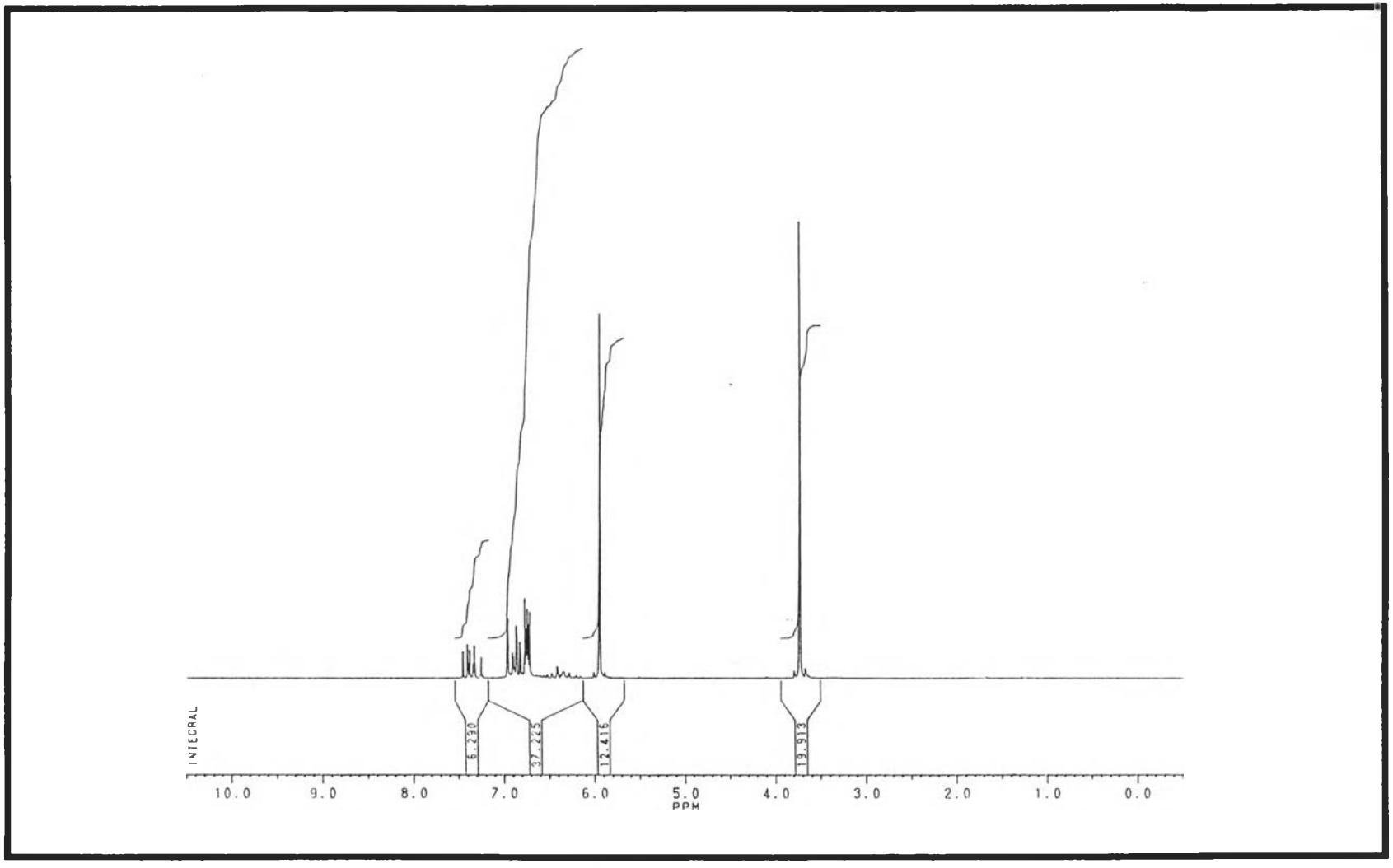


Figure A.10 : The ^{1}H-NMR spectrum of Compound II

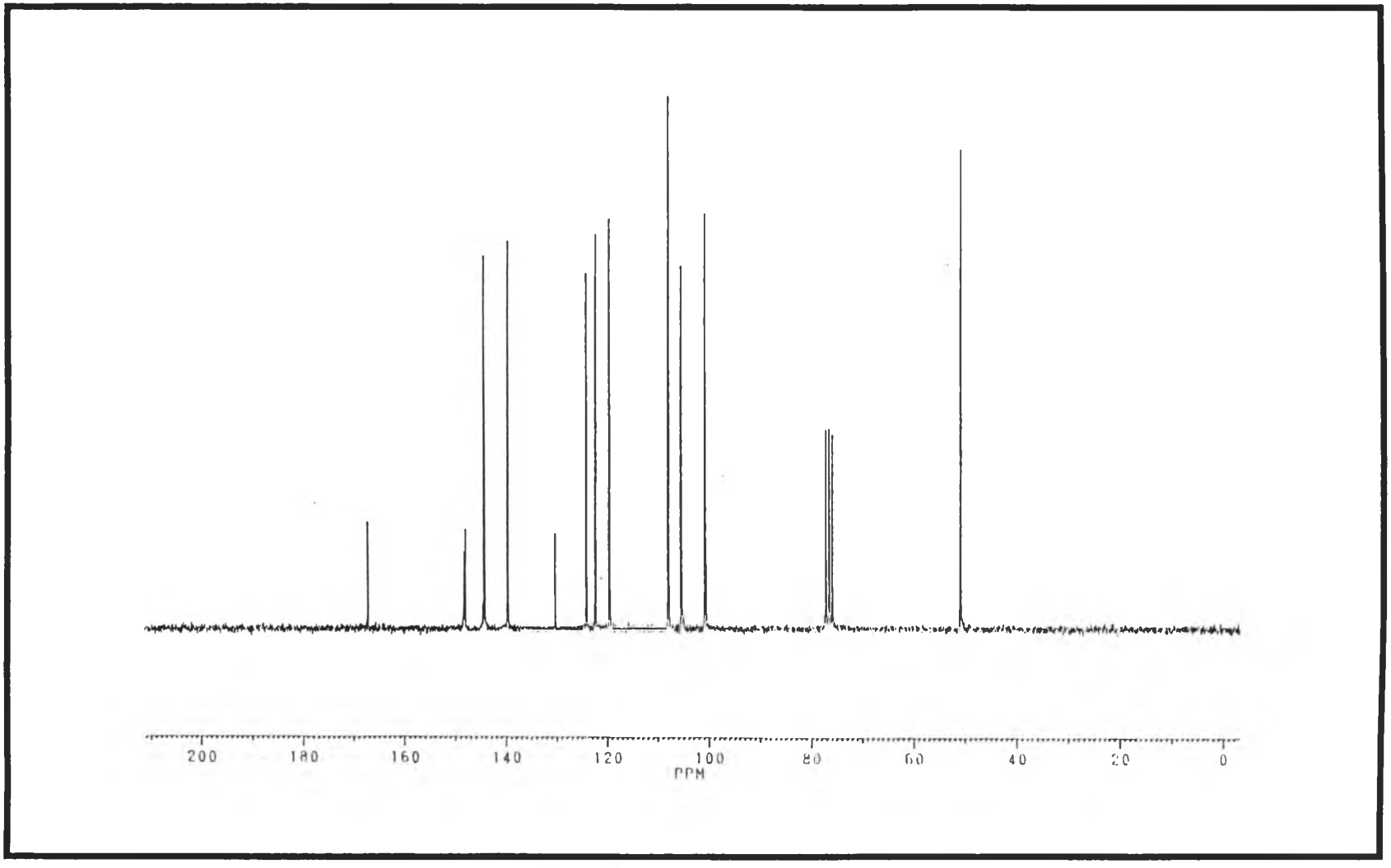


Figure A.11 : The ^{13}C-NMR spectrum of Compound II

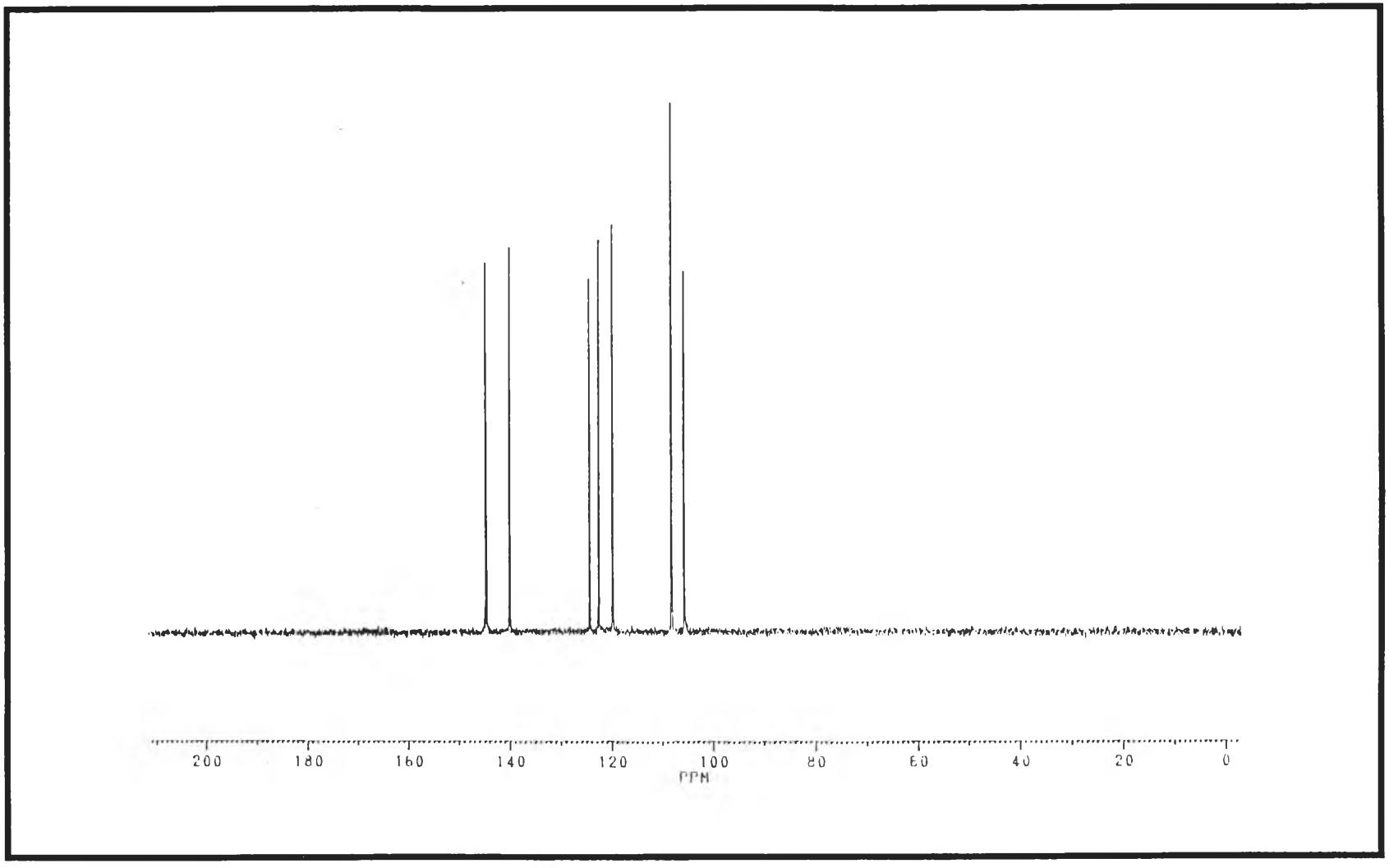


Figure A.12 : The ^{13}C-NMR DEPT-90 spectrum of Compound II

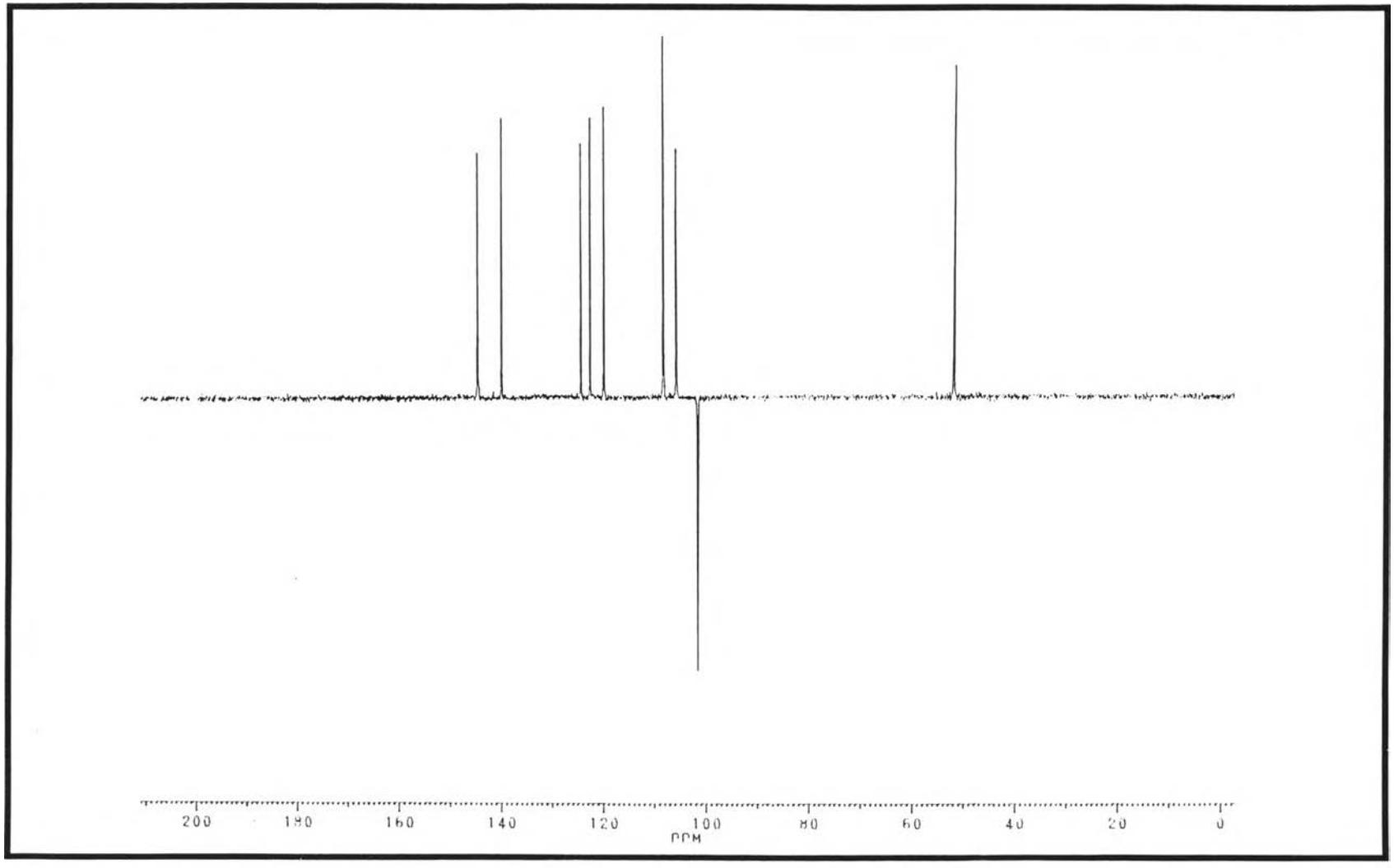


Figure A.13 : The ^{13}C-NMR DEPT-135 spectrum of Compound II

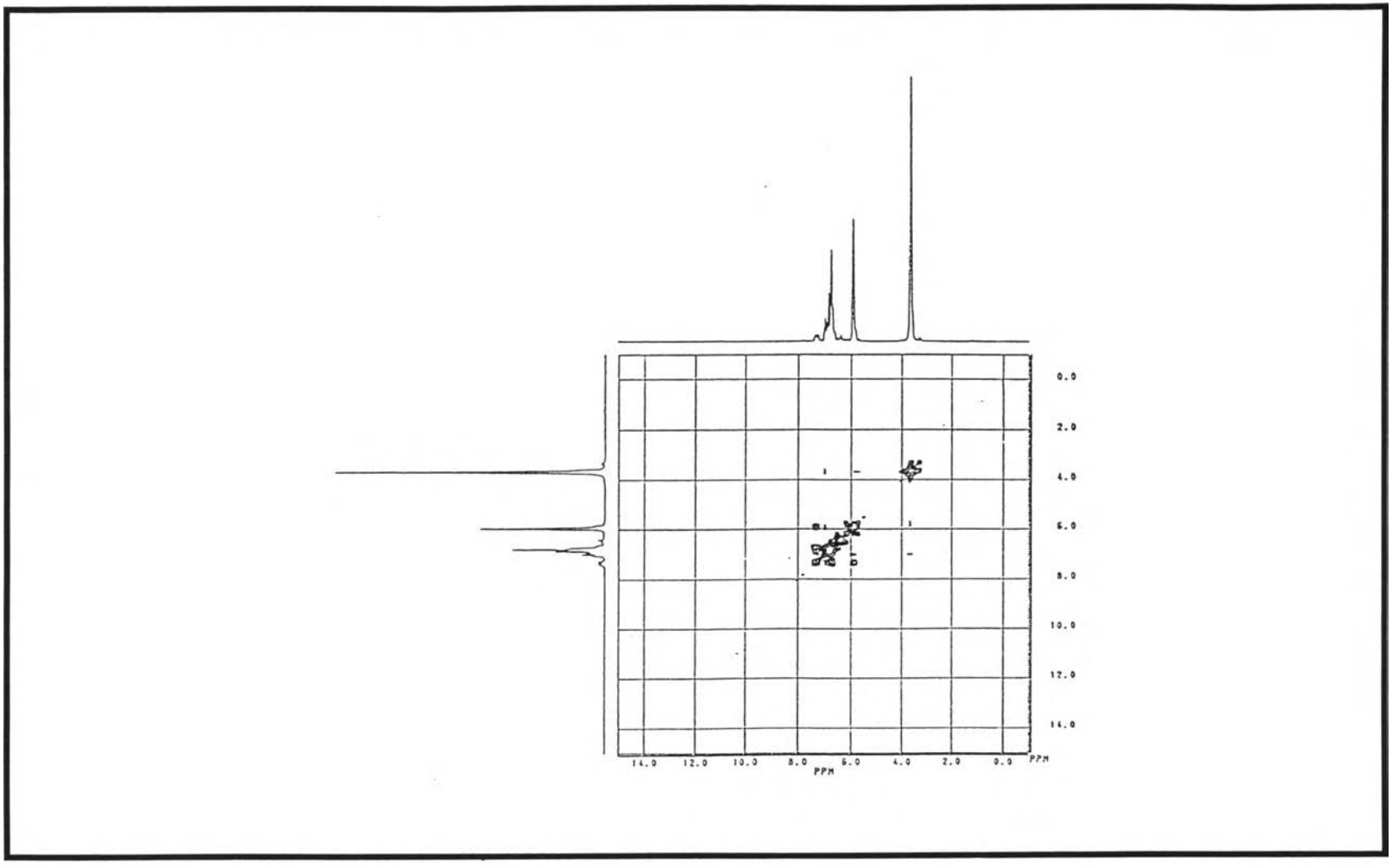


Figure A.14 : The ^{1}H-^{1}H COSY spectrum of Compound II

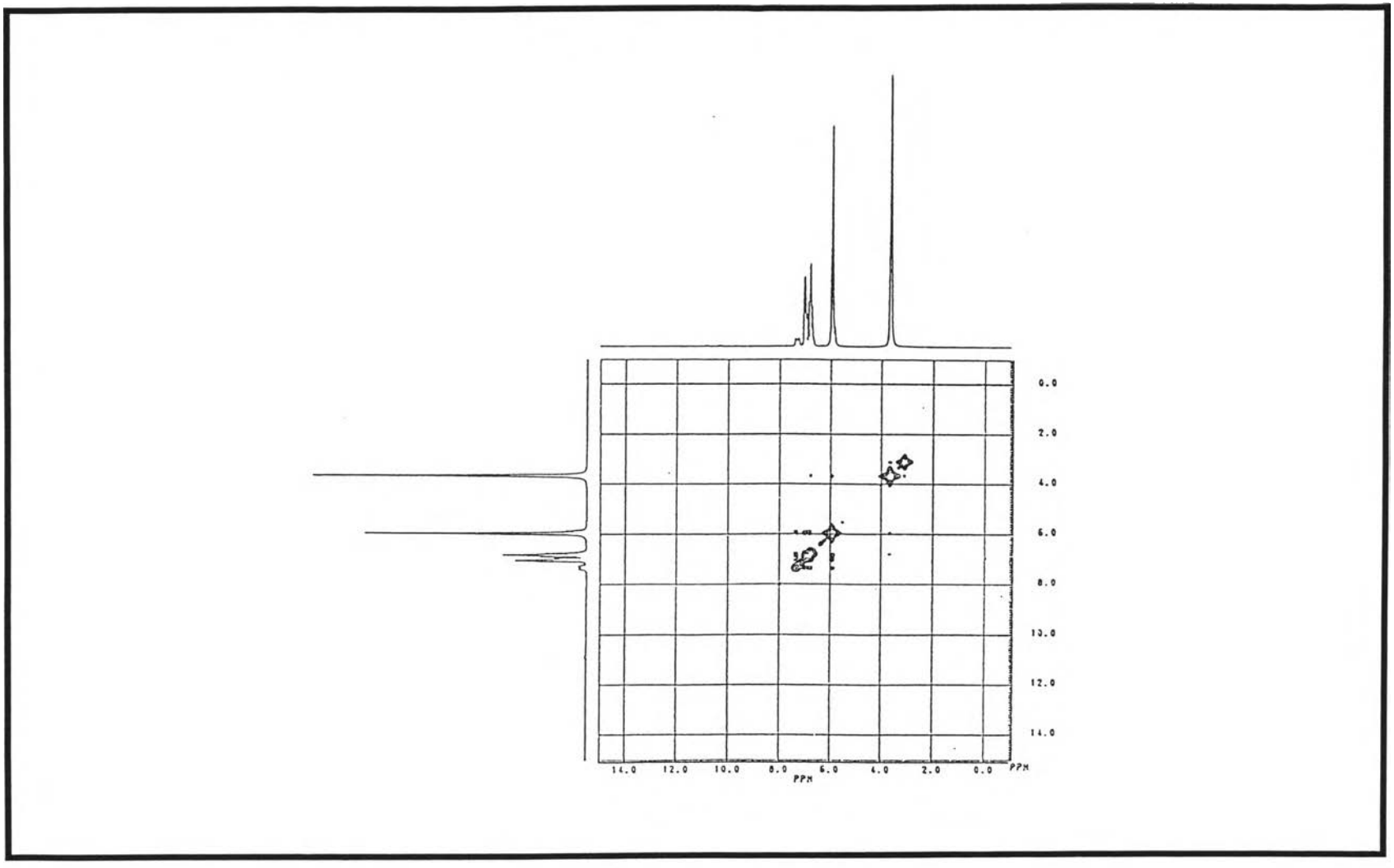


Figure A.15 : The ^{1}H-^{1}H NOESY spectrum of Compound II

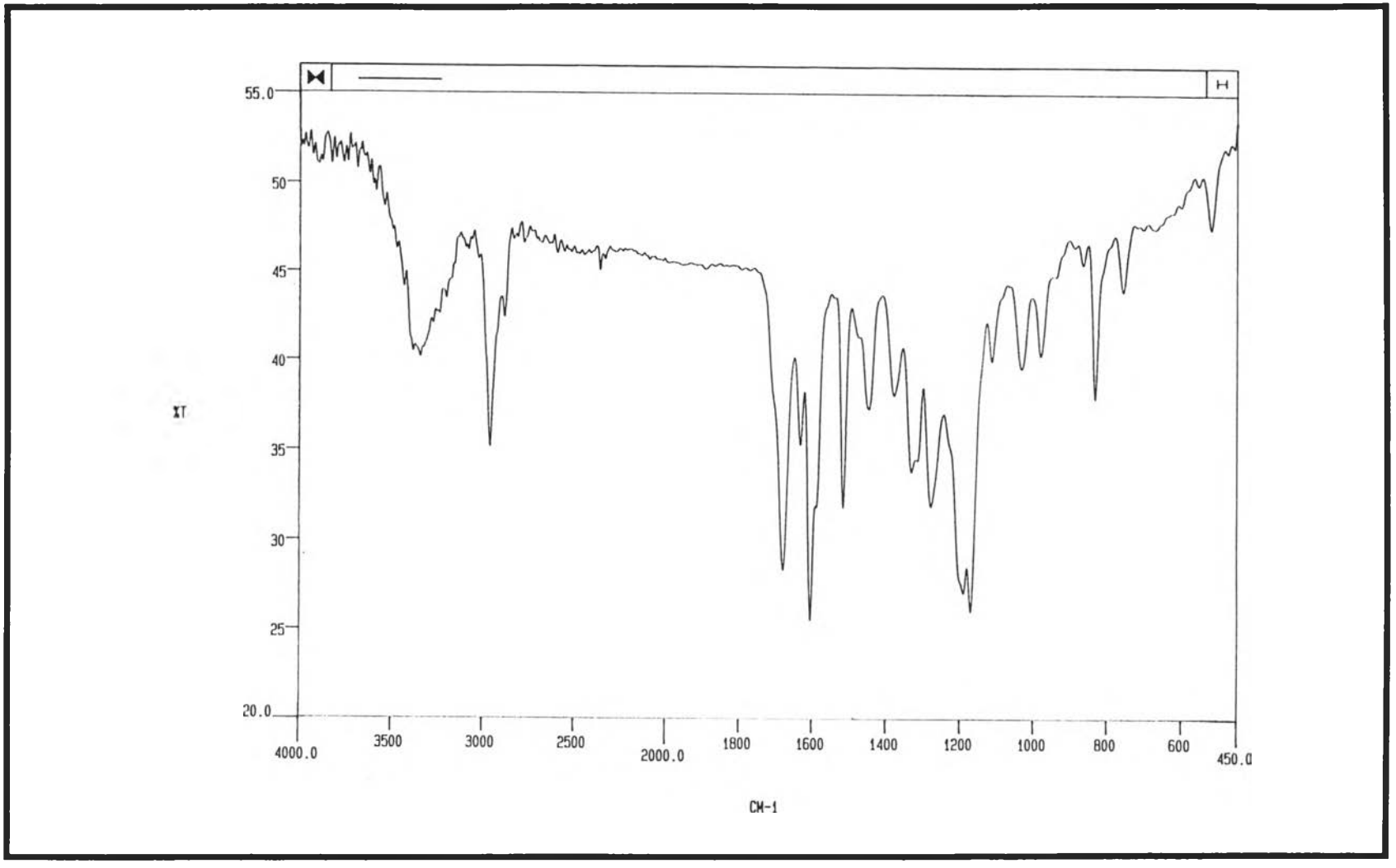


Figure A.16 : The IR spectrum of Compound III

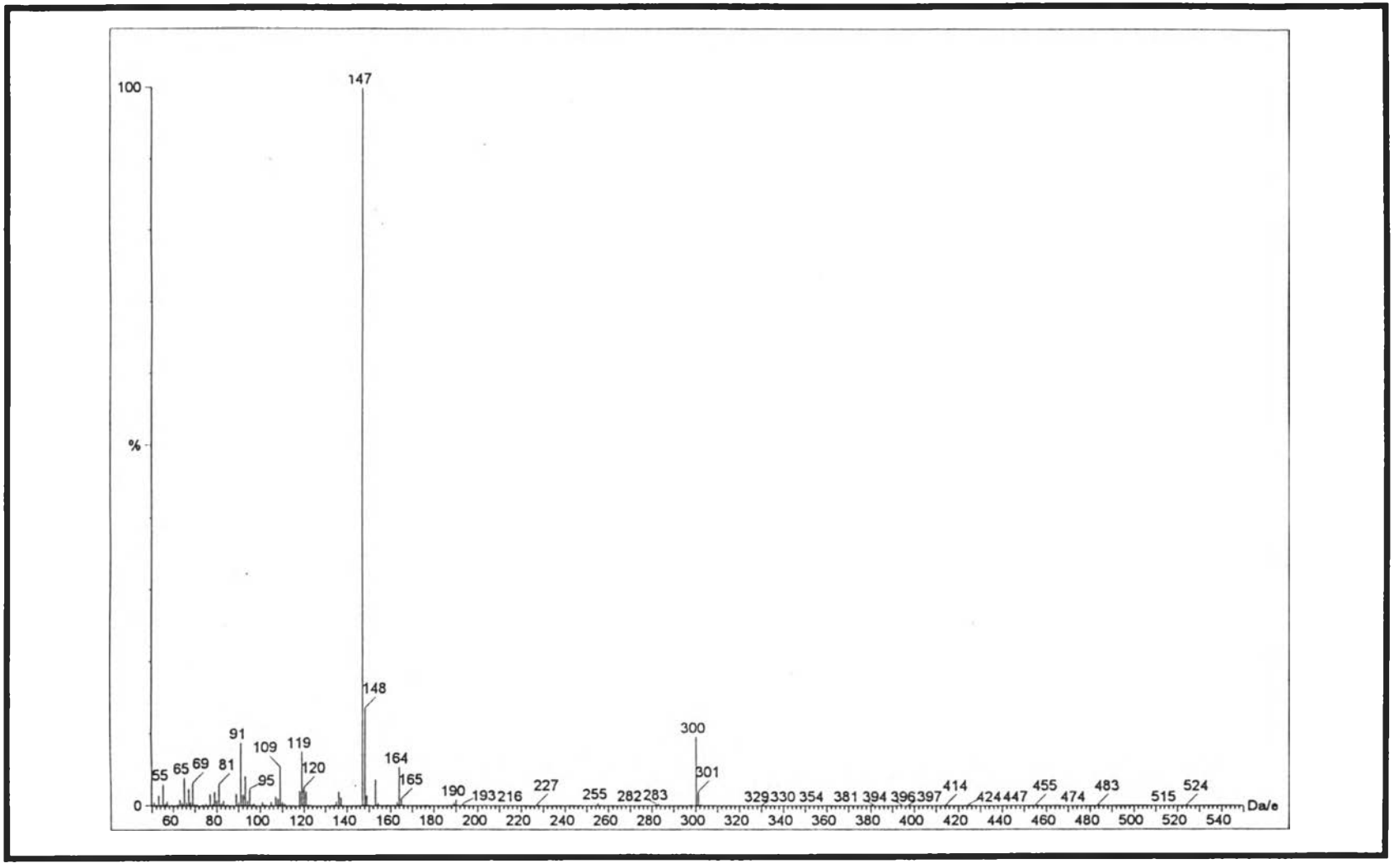


Figure A.17 : The MASS spectrum of Compound III

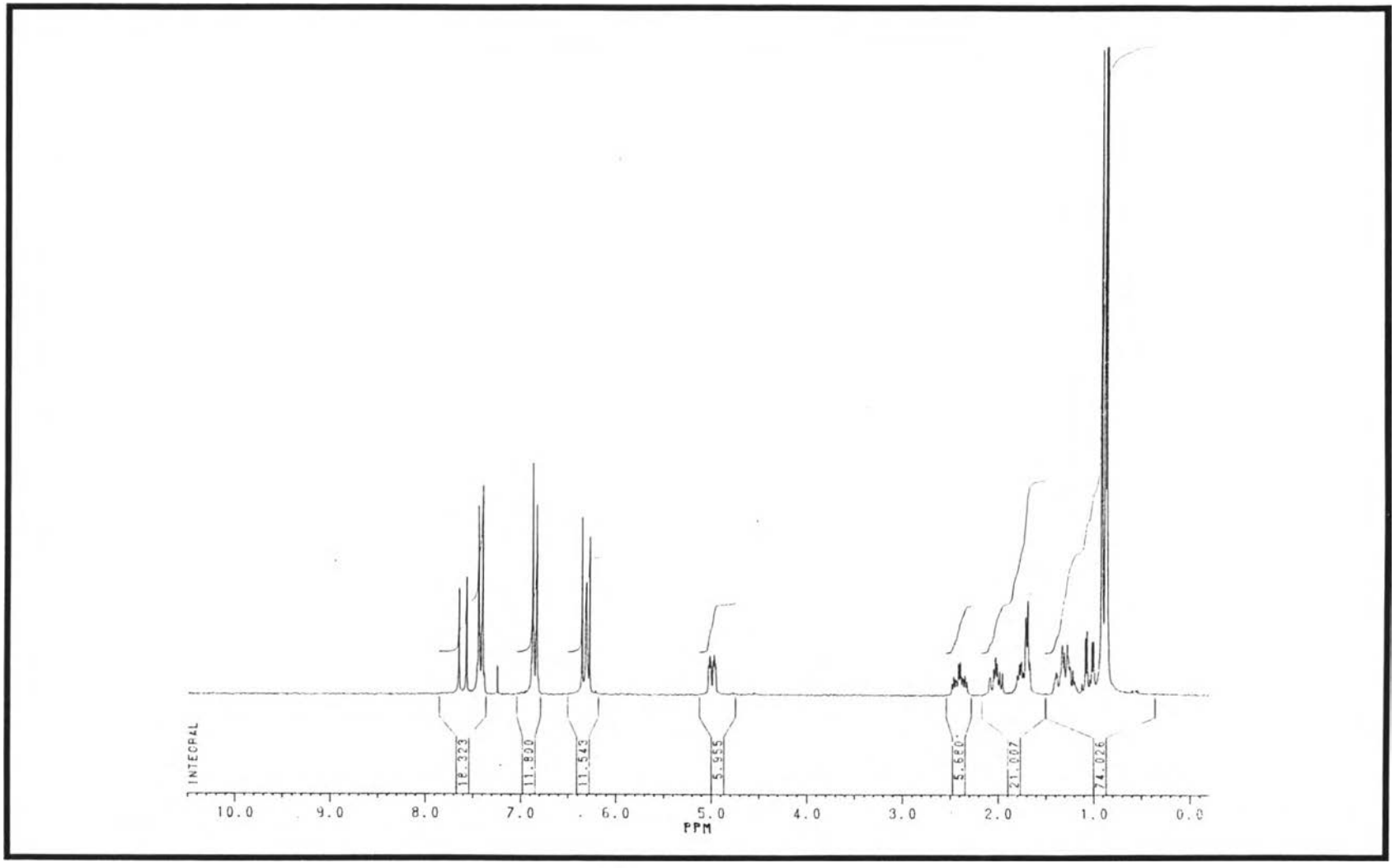


Figure A.18 : The ^{1}H-NMR spectrum of Compound III

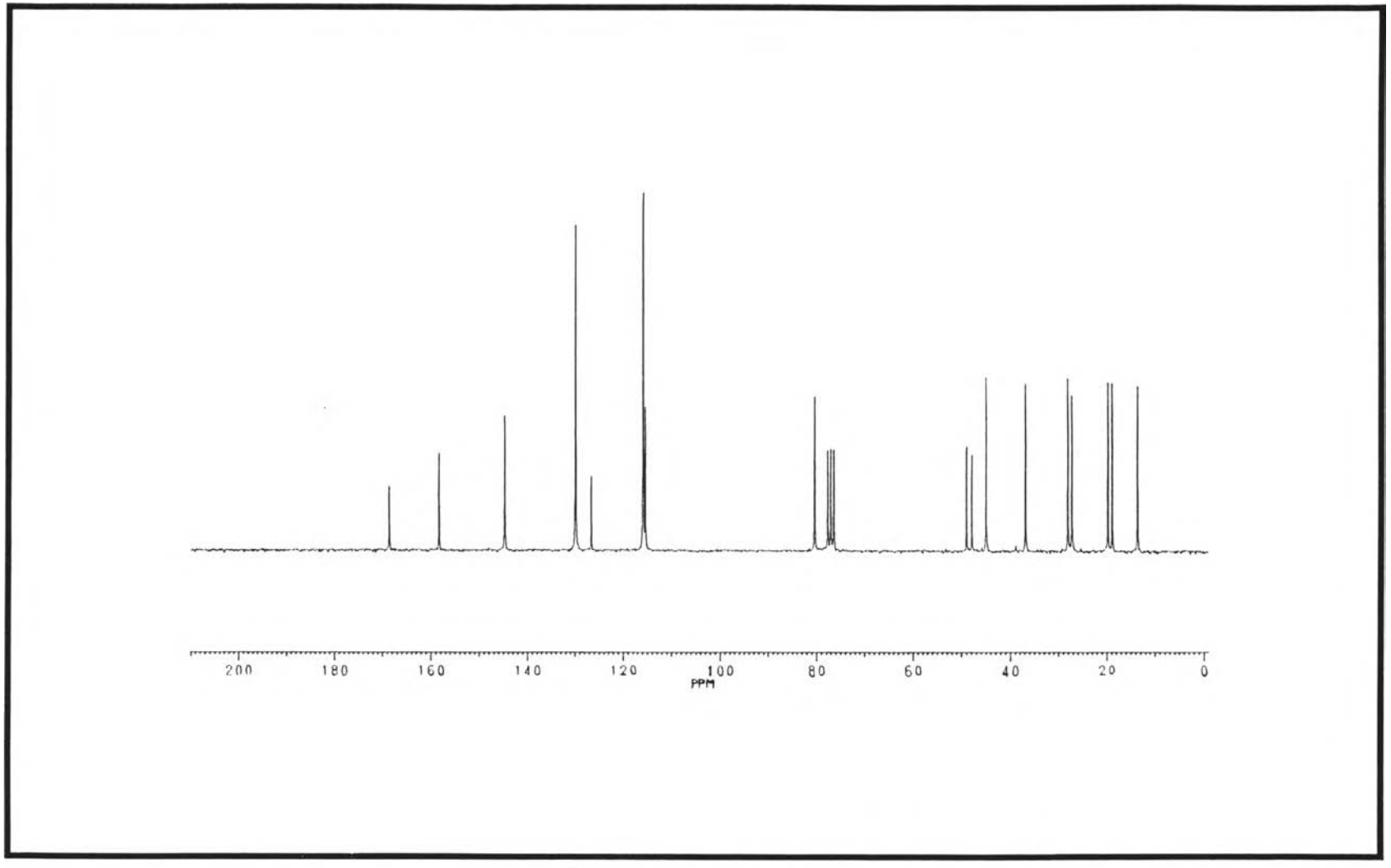


Figure A.19 : The ^{13}C-NMR spectrum of Compound III

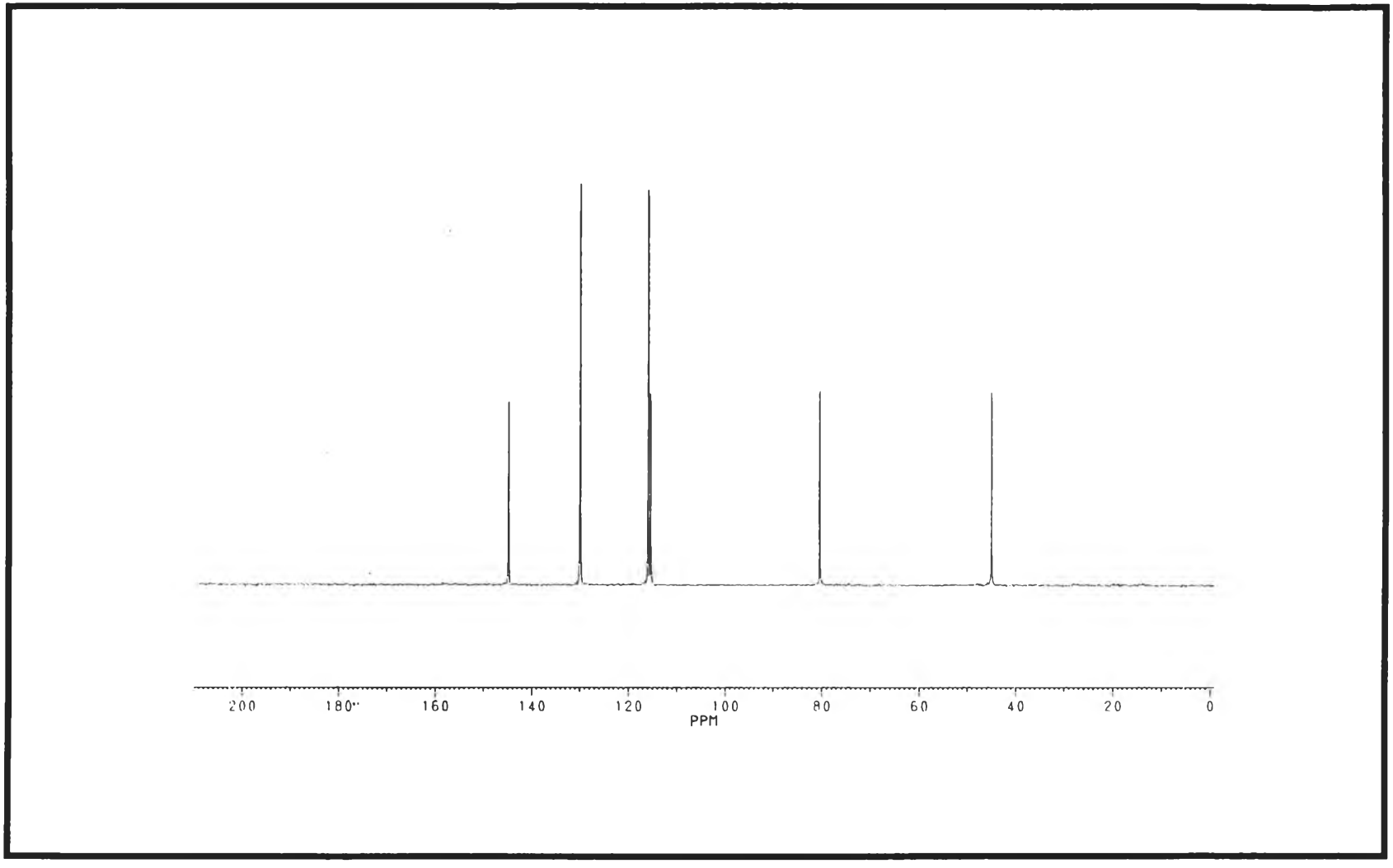


Figure A.20 : The ^{13}C-NMR DEPT-90 spectrum of Compound III

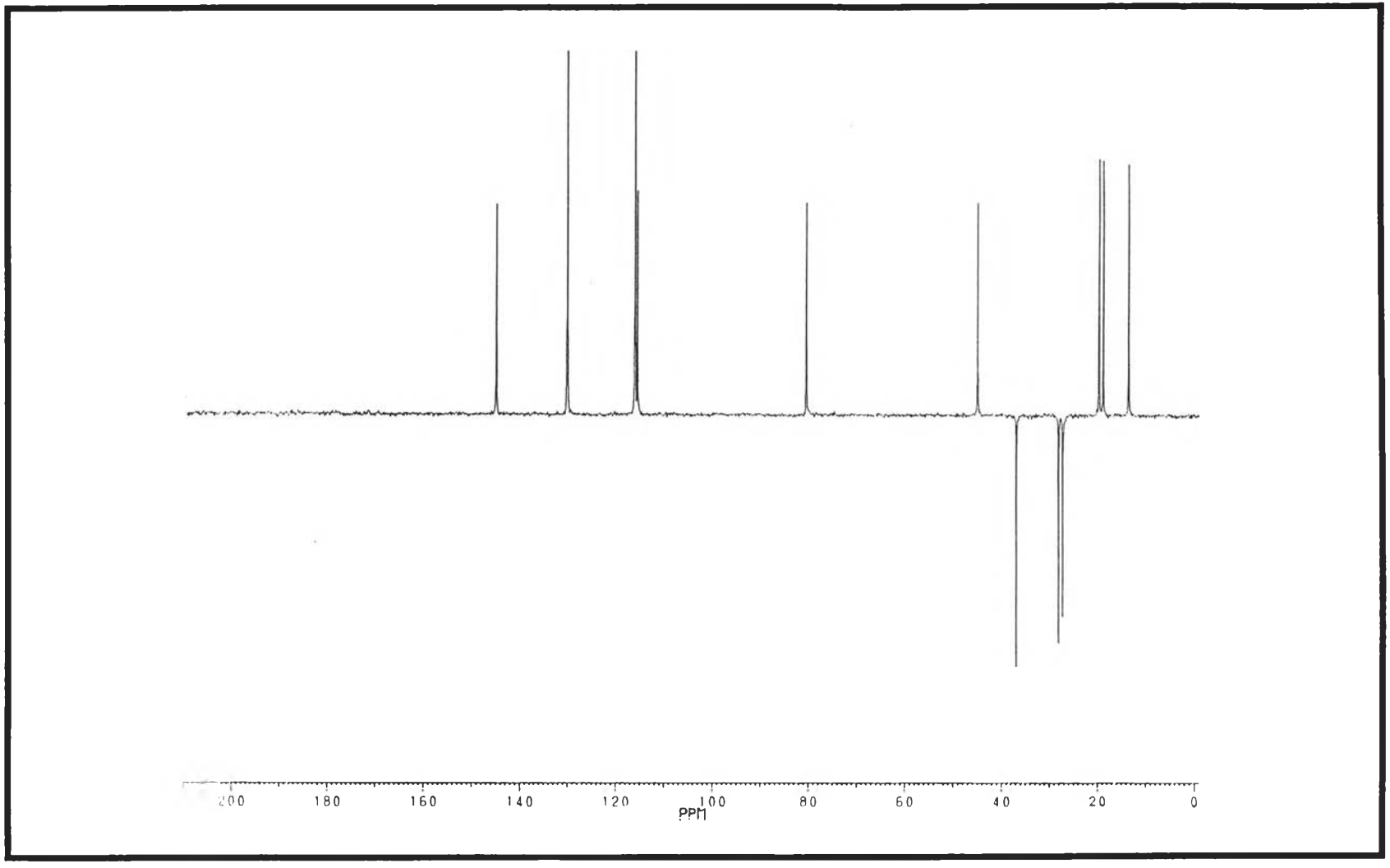


Figure A.21 : The ^{13}C-NMR DEPT-135 spectrum of Compound III

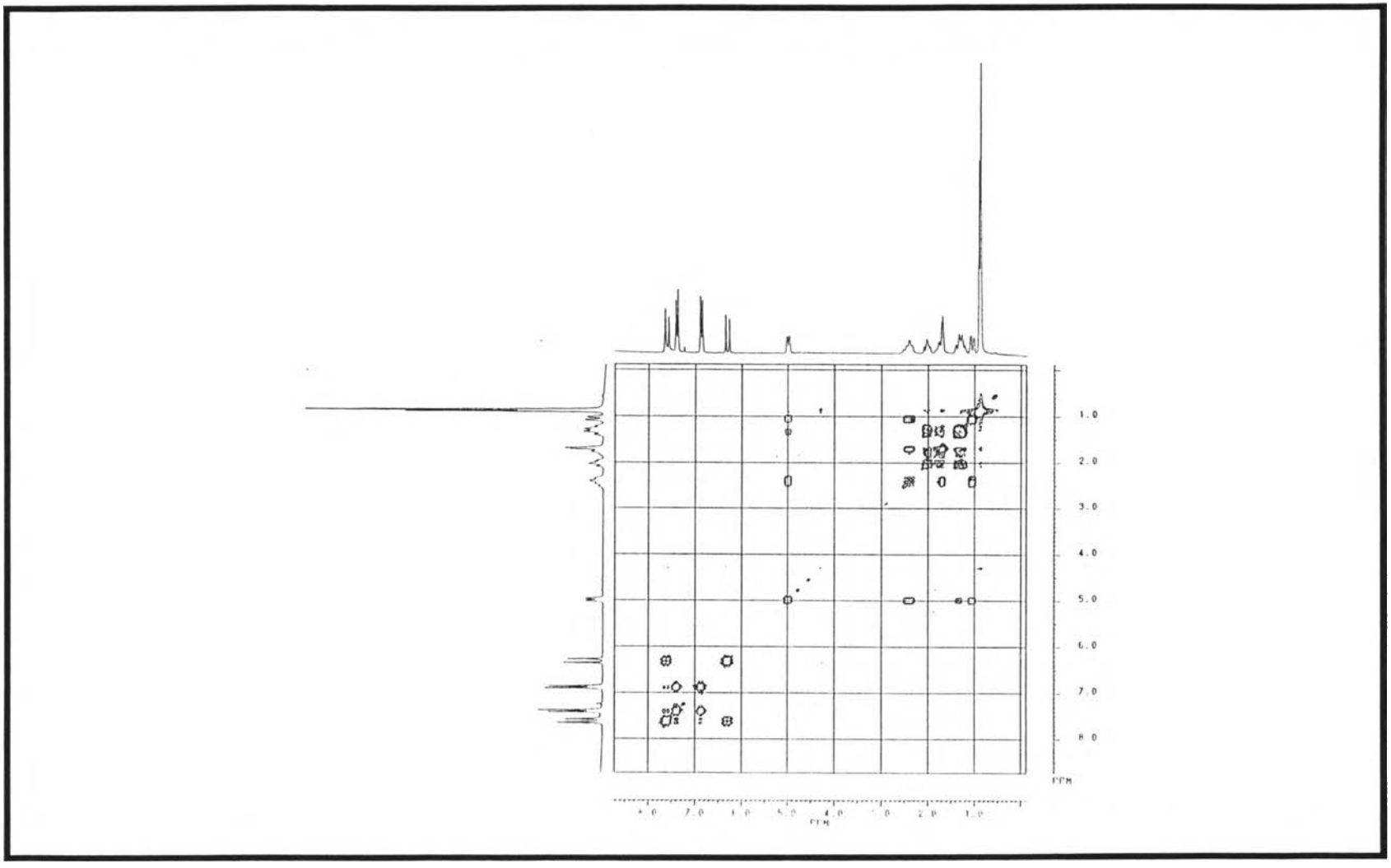


Figure A.22 : The ^{1}H-^{1}H COSY spectrum of Compound III

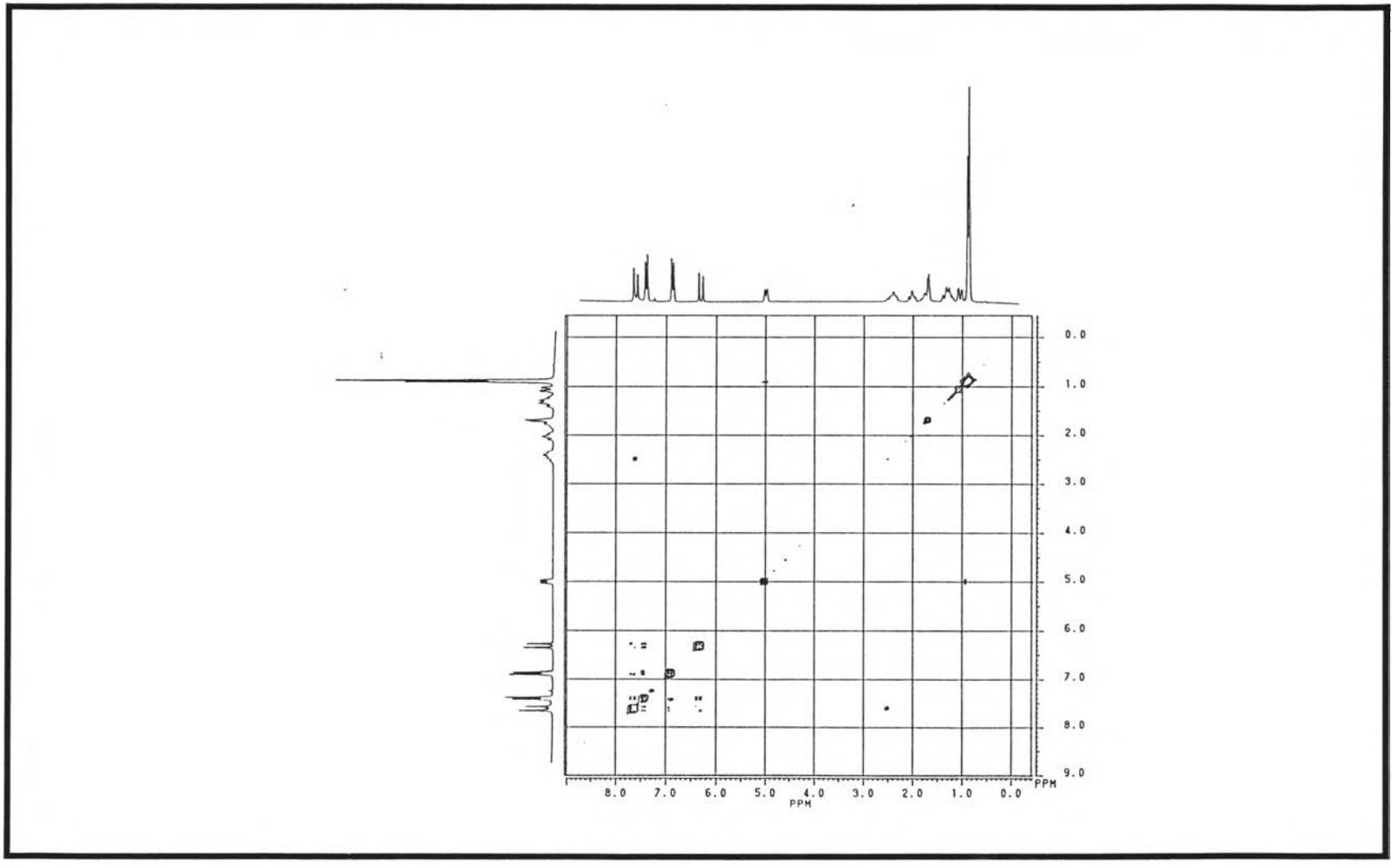


Figure A.23 : The ^{1}H-^{1}H NOESY spectrum of Compound III

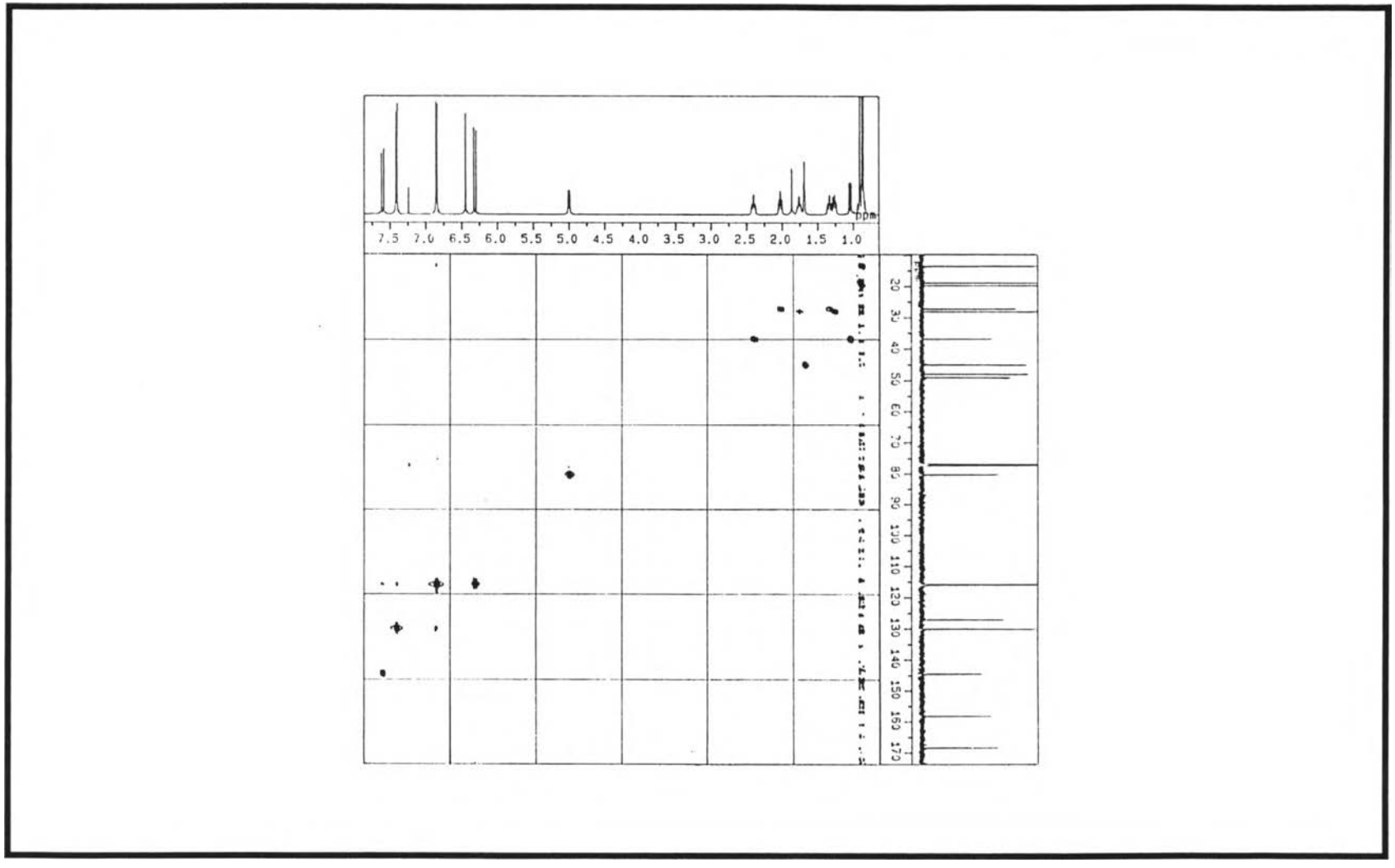


Figure A.24 : The HMQC spectrum of Compound III

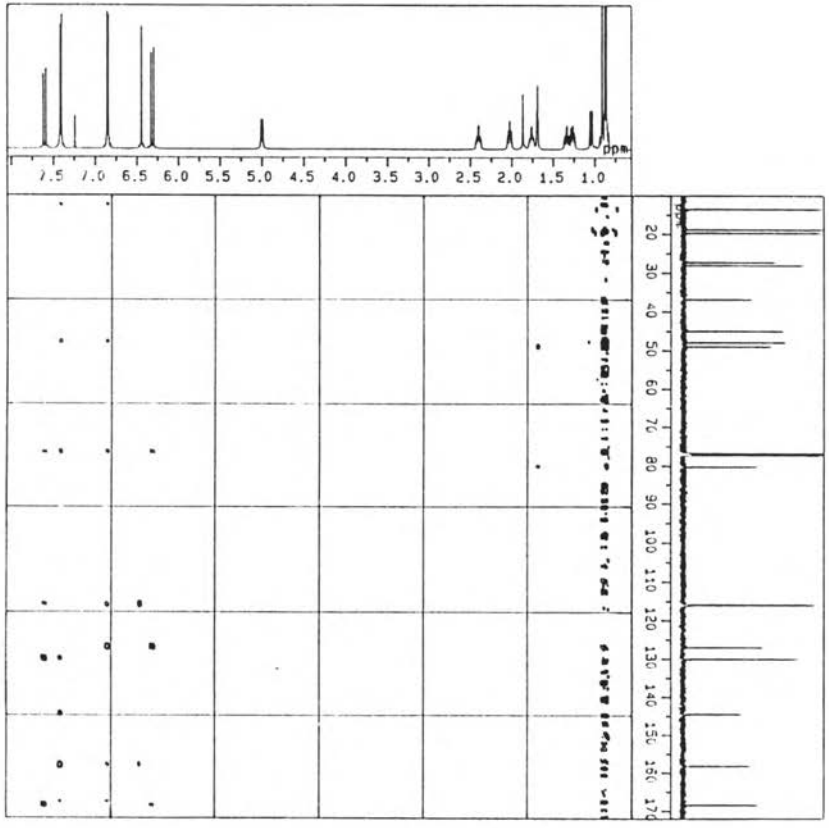


Figure A.25 : The HMBC spectrum of Compound III

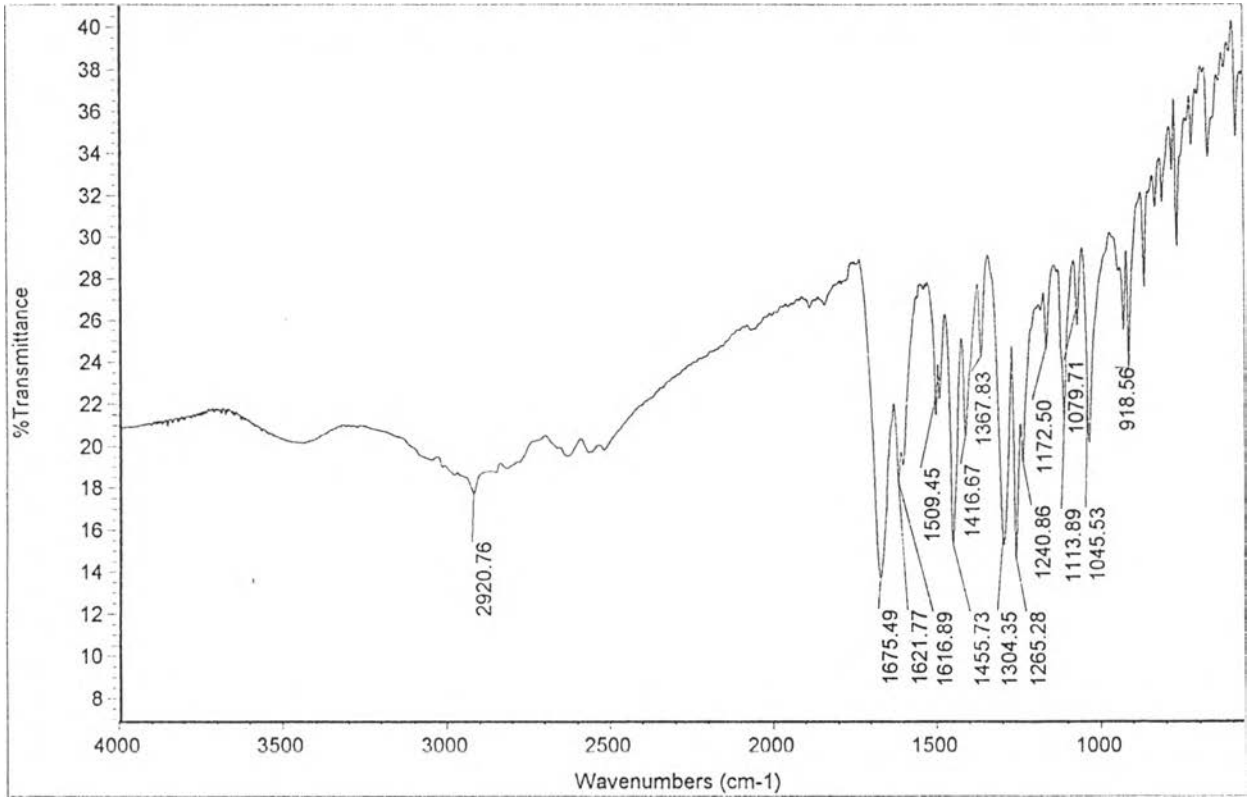


Figure A.26 : The IR spectrum of Compound IV

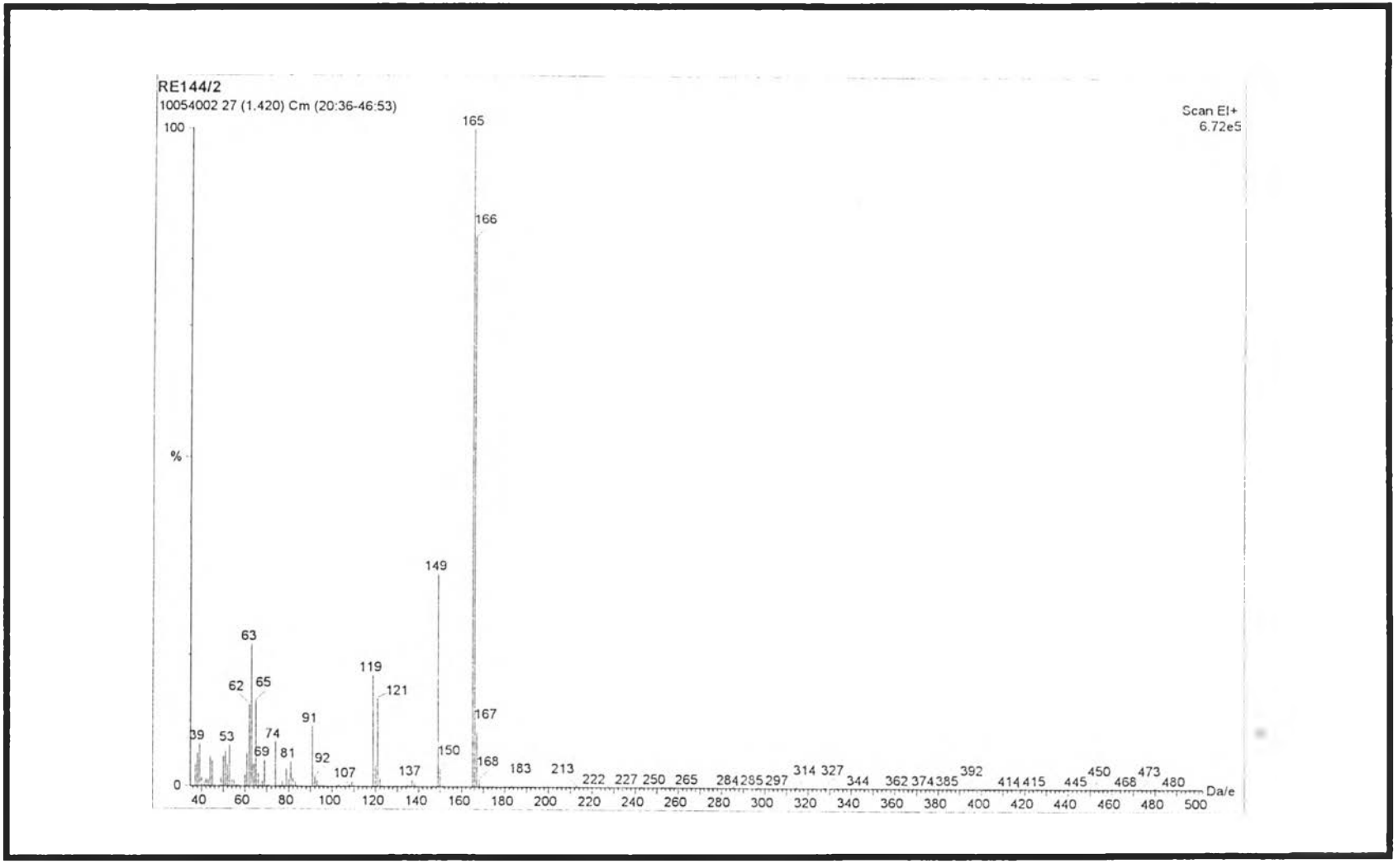
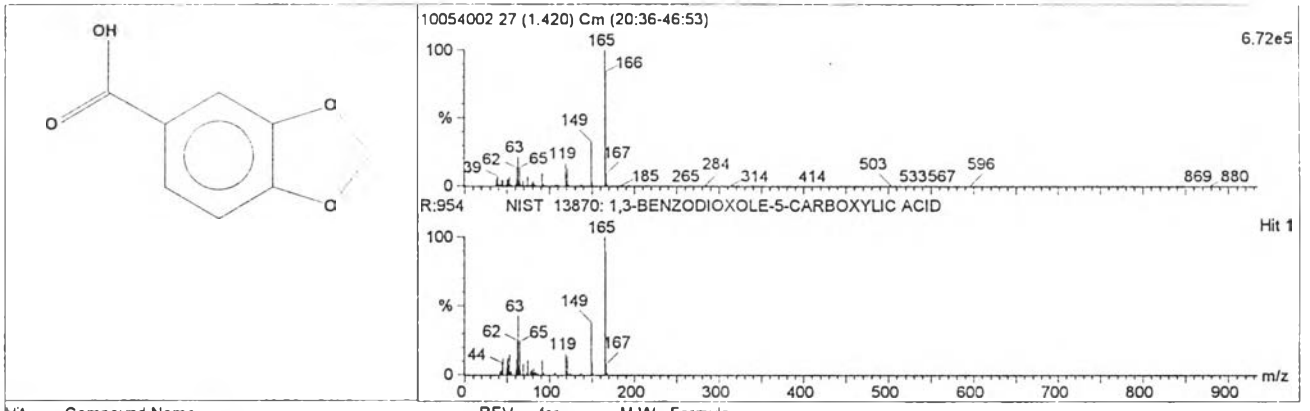


Figure A.27 : The MASS spectrum of Compound IV



Hit	Compound Name	REV	for	M.W.	Formula
1	1,3-BENZODIOXOLE-5-CARBOXYLIC ACID	954	943	166	C8H6O4
2	PIPERONAL	795	325	150	C8H6O3
3	3-METHOXY-4,5-METHYLENEDIOXYAMPHETAMIN	768	504	209	C11H15O3N
4	4-HYDROXY-3-NITROBENZALDEHYDE	743	530	167	C7H5O4N
5	3-HYDROXY-4-NITROBENZALDEHYDE	738	464	167	C7H5O4N
6	BENZALDEHYDE, 2,4-DIMETHOXY-	704	672	166	C9H10O3
7	BENZALDEHYDE, 3,4-DIMETHOXY-	686	652	166	C9H10O3
8	3-METHOXY-2-NITROBENZOIC ACID	664	326	197	C8H7O5N
9	BENZENE, 1,1'-(DIAZOMETHYLENE)BIS-	656	473	194	C13H10N2
10	1H-PURINE, 6-(METHYLTHIO)-	652	476	166	C6H6N4S
11	BENZOIC ACID, 2-HYDROXY-5-NITRO-	641	605	183	C7H5O5N
12	3,4-METHYLENEDIOXYBENZALDOXIME	628	464	165	C8H7O3N
13	BENZOIC ACID, 2-HYDROXY-3-NITRO-	624	599	183	C7H5O5N
14	BENZALDEHYDE, 2-HYDROXY-3-NITRO-	623	425	167	C7H5O4N
15	BENZOIC ACID, 2-HYDROXY-3-NITRO-, METHYL E	620	592	197	C8H7O5N
16	BENZALDEHYDE, 2-HYDROXY-5-NITRO-	585	394	167	C7H5O4N
17	ETHYLPARABEN	540	244	166	C9H10O3
18	BENZENEACETIC ACID, 2,4-DINITRO-	539	494	226	C8H6O6N2
19	2H-1,4-BENZOXAZIN-3(4H)-ONE, 4-HYDROXY-	538	411	165	C8H7O3N
20	1,3-BENZODIOXOLE, 5-NITRO-	536	338	167	C7H5O4N

Figure A.28 : The comparison of fragmentation pattern of Compound IV and 1,3-benzodioxole-5-carboxylic acid

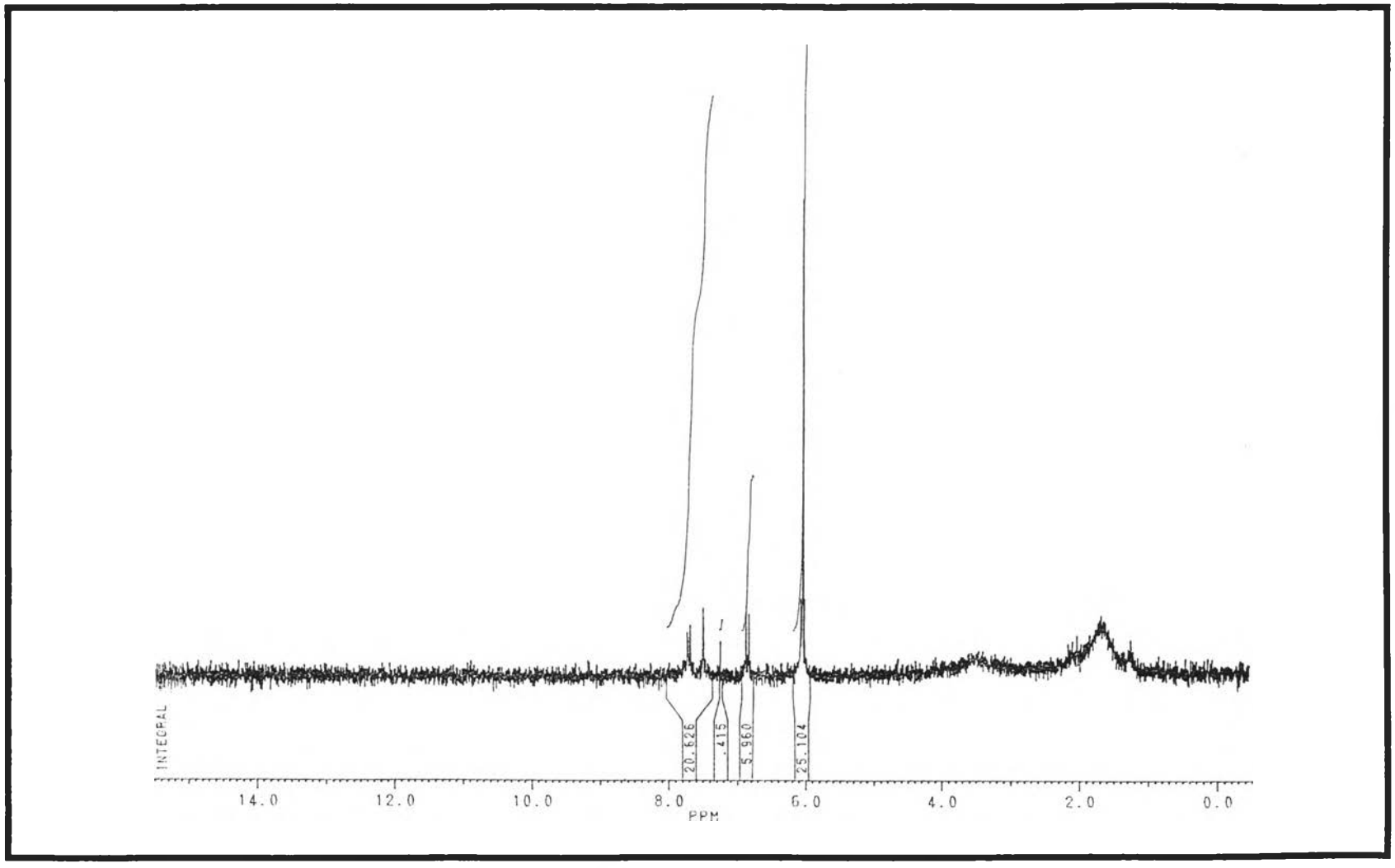


Figure A.29 : The ^{1}H-NMR spectrum of Compound IV

VITA

Miss Muk-apa Mukdathong was born on November 30, 1973 in bangkok, Thailand. She received the Bachelor Degree of Science in Chemistry at Chulalongkorn University in 1994. Since 1994, she has been a graduate student studying Organic Chemistry at Chulalongkorn University. During her studies towards the Master's degree, she was awarded a teacher assistantship by the Faculty of Science from 1995 to 1996 and was supported by research grant for her Master degree's thesis from the Graduate School, Chulalongkorn University.