

REFERENCES

- Abe, M.O., and Taylor, D.A.H. 1971. A quinolone alkaloid from *Orica suaveolens*. *Phytochemistry* 10: 1167-1169.
- Adesina, S.K., and Ette, E.I. 1982. The isolation and identification of anticonvulsant agents from *Clausena anisata* and *Afraegle paniculata*. *Fitoterapia* 53: 63-66. *Chemical Abstracts* 98: 157858g.
- Adesina, S.K., Olantunji, O.A., Bergenthal, D., and Reisch, J. 1988. New biogenetically : Significant constituents of *Clausena anisata* and *Murraya koenigii*. *Pharmazie* 43: 221-222. *Chemical Abstracts* 109: 51768h.
- Adityachaudhury, N., and Gupta, P.K. 1970. Flemichapparin-C: A new coumestan derivative from *Flemingia chappar* Ham. *Chemistry and Industry* : 1113-1114.
- Ahmad, Z.A., and Begum, S. 1986. 3-(1,1-Dimethylallyl) xanthyletin from *Murraya exotica*. *Indian Drugs* 24: 64. *Chemical Abstracts* 106: 99416g.
- Ahmad, Z.A., Tripathi, G.S., and Begum, S. 1987. Sitos terol- β -D-galactoside from *Murraya exotica*. *Planta Medica* 53: 579.

- Ahond, A., Poupat, C., and Potier, P. 1978. Carbon-13 NMR study of 9(10H)-acridinone and 6H-pyrido[4,3-b]carbazole alkaloids. *Tetrahedron* 34: 2385-2388.
- Anwer, F., Kapil, R.S., and Popli, S.P. 1972. Identity of glycozolidine. *Indian Journal of Chemistry* 10: 959.
- Anwer, F., Shoeb, A., Kapil, R.S., and Popli, S.P. 1977. Clausarin: A novel coumarin from *Clausena pentaphylla* (Roxb.) DC. *Experientia* 33: 412-413.
- Atta, R., Zaidi, R., and Firdous, S. 1988. NMR studies on mahanine. *Fitoterapia* 59: 494-495. *Chemical Abstracts* 111: 4279f.
- Barik, B.R., and Bundu, A.B. 1987. A cinnamic acid derivative and a coumarin from *Murraya exotica*. *Phytochemistry* 26: 3319-3321.
- Barik, B.R., Dey, A.K., and Chatterjee, A. 1983. Murrayatin: A coumarin from *Murraya exotica*. *Phytochemistry* 22: 2273-2275.
- Barik, B.R., Dey, A.K., Das, P.C., Chatterjee, A., and Shoolery, J.N. 1983. Coumarins of *Murraya exotica*: Absolute configuration of auraptenol. *Phytochemistry* 22: 792-794.
- Bhattacharya, L., Roy, S.K., and Chakraborty, D.P. 1982. Structure of the carbazole alkaloid isomurrayazoline from *Murraya koenigii*. *Phytochemistry* 21: 2432-2433.

Bhattacharyya, P. 1984. Clausenapin: A new carbazole alkaloid from *Clausena heptaphylla* Wt. & Arn. *Chemistry and Industry* No.8: 301.

Bhattacharyya, P., Chakrabartty, P.K., and Chowdhury, B.K. 1985. Glycozolidol: An antibacterial carbazole alkaloid from *Glycosmis pentaphylla*. *Phytochemistry* 24: 882-883.

Bhattacharyya, P., and Chakraborty, A. 1984a. 3-(1,1-Dimethylallyl)xanthyletin from *Murraya koenigii* Spreng. *Journal of the Indian Chemical Society* 61: 650-651. *Chemical Abstracts* 102: 93005t.

———. 1984b. Mukonal: A probable biogenetic intermediate of pyranocarbazole alkaloids from *Murraya koenigii*. *Phytochemistry* 23: 471-472.

Bhattacharyya, P., Chakraborty, A., and Chowdhury, B.K. 1984. Heptazolicine: A new carbazole alkaloid from *Clausena heptaphylla*. *Phytochemistry* 23: 2409-2410.

Bhattacharyya, P., and Chakraborty, D.P. 1973. Murrayanine and dentatin from *Clausena heptaphylla*. *Phytochemistry* 12: 1831-1832.

Bhattacharyya, P., and Chowdhury, B.K. 1985a. Glycozolidal: A new carbazole alkaloid from *Glycosmis pentaphylla*. *Journal of Natural Products* 48: 465-466.

- Bhattacharyya, P., and Chowdhury, B.K. 1985b. 2-Methoxy-3-methylcarbazole from *Murraya koenigii*. *Indian Journal of Chemistry* 24B: 452.
- Bhattacharyya, P., Jash, S.S., and Chowdhury, B.K. 1986. A biogenetically important carbazole alkaloid from *Murraya koenigii* Spreng. *Chemistry and Industry* No.7: 246.
- Bhattacharyya, P., Roy, S., Biswas, A., Bhattacharyya, L., and Chakraborty, D.P. 1978. Mahanimbine and murrayazoline from *Murraya exotica* Linn. (syn. *Murraya paniculata*). *Journal of the Indian Chemical Society* 55: 308. *Chemical Abstracts* 89: 176325m.
- Bhattacharyya, P., Sarkar, T., Chakraborty, A., and Chowdhury, B.K. 1984. Structure & synthesis of glycozolinol, a new carbazole alkaloid from *Glycosmis pentaphylla* (Retz) DC. *Indian Journal of Chemistry* 23B: 49-51.
- Bishay, D.W., El-Sayyad, S.M., Abd El-Hafiz, M.A., Achenbach, H., and Desoky, E.K. 1987. Phytochemical study of *Murraya exotica* L. (Rutaceae). I. Methoxylated flavonoids of the leaves. *Bull. Pharm. Sci., Assiut Univ.* 10: 55-70. *Chemical Abstracts* 110: 92047m.

- Bishay, D.W., El-Sayyad, S.M., Abd El-Hafiz, M.A., Achenbach, H., and Desoky, E.K. 1988. Phytochemical study of *Murraya exotica* L. cultivated in Egypt. III. Coumarins and cycloartenols of the leaves. Bull. Pharm. Sci., Assiut Univ. 11: 105-121. Chemical Abstracts 112: 30295y.
- Bowen, I.H., and Perera, K.P.W.C. 1982. Alkaloids, coumarins and flavonoids of *Micromelum zeylanicum*. Phytochemistry 21: 433-437.
- Brown, S.A. 1979. Biosynthetic studies on coumarins. Planta Medica 36: 299-310.
- Büchi, G., Klaubert, D.H., Shank, R.C., Weinreb, S.M., and Wogan, G.N. 1971. Structure and synthesis of kotamin and desmethylkotamin, metabolites of *Aspergillus glaucus*. The Journal of Organic Chemistry 36: 1143-1147.
- Büchi, G., and Warnhoff, E.W. 1959. The structure of uleine. Journal of the American Chemical Society 81: 4433-4434.
- Carpenter, I., Mc Garry, E.J., and Scheinmann, F. 1970. The neoflavonoids and 4-alkylcoumarins from *Mammea africana* G.Don. Tetrahedron Letters No.46: 3983-3986.

Cassady, J.M., Ojima, N., Chang, C., and Mc Laughlin, J.L. 1979. An investigation of the antitumor activity of *Micromelum integerrimum* (Rutaceae). *Journal of Natural Products* 42: 274-278.

Chaichantipyuth, C., Pummangura, S., Naowsaran, K., Thanyavuthi, D., Anderson, J.E., and Mc Laughlin, J.L. 1988. Two new bioactive carbazole alkaloids from the root bark of *Clausena harmandiana*. *Journal of Natural Products* 51: 1285-1288.

Chakraborty, D.P. 1966. Chemical taxonomy. V. Glycozoline, a carbazole derivative from *Glycosmis pentaphylla*. *Tetrahedron Letters* No.6: 661-664. *Chemical Abstracts* 65: 12631g.

———. 1969. Glycozoline, a carbazole derivative from *Glycosmis pentaphylla*. *Phytochemistry* 8: 769-772.

———. 1977. Carbazole alkaloids. In W. Herz, H. Grisebach, and G.W. Kirby (eds.), *Progress in the chemistry of organic natural products* Vol. 34. Vienna: Springer-Verlage.

———. 1980. Some aspects of the carbazole alkaloids. *Planta Medica* 39: 97-111.

Chakraborty, D.P., Barman, B.K., and Bose, P.K. 1965. On the constitution of murrayanine, a carbazole derivative isolated from *Murraya koenigii* Spreng. *Tetrahedron* 21: 681-685.

Chakraborty, D.P., Bhattacharyya, P., Islam, A., and Roy, S. 1974. Chemical taxonomy. XXXV. Structure of murrayacinine: A new carbazole alkaloid from *Murraya koenigii* Spreng. *Chemistry and Industry* No.4: 165-166.

———. 1985. Structure of heptazolidine. *Journal of the Indian Chemical Society* 62: 670-672. *Chemical Abstracts* 106: 120111r.

Chakraborty, D.P., Bhattacharyya, P., and Mitra, A.R. 1974. Murrayazolidine. *Chemistry and Industry* No.6: 260.

Chakraborty, D.P., and Chowdhury, B.K. 1968. Synthesis of murrayanine. *The Journal of Organic Chemistry* 33: 1265-1268.

Chakraborty, D.P., Chowdhury, B.K., and Das, B.C. 1967. Mexoticin, a new coumarin from *Murraya exotica* L. *Tetrahedron Letters* No.36: 3471-3473.

Chakraborty, D.P., and Das, B.P. 1966. Glycozolidine, a new carbazole derivative from *Glycosmis pentaphylla*. *Science and Culture (Calcutta)* 32: 181-182. *Chemical Abstracts* 65: 13640c.

Chakraborty, D.P., Das, B.P., and Basak, S.P. 1974.
Chemical taxonomy. XXIX. Structure of glycozolidine.
Plant Biochemical Journal 1: 73-77. Chemical
Abstracts 84: 74473n.

Chakraborty, D.P., Das, K.C., and Chowdhury, B.K. 1971.
Structure of murrayacine. The Journal of Organic
Chemistry 36: 725-727.

Chakraborty, D.P., Das, K.C., and Islam, A. 1970. Chemical
taxonomy. XXIII. Heptazoline, a new carbazole
alkaloid from *Clausena heptaphylla*. Journal of the
Indian Chemical Society 47: 1197-1198. Chemical
Abstracts 74: 142126x.

Chakraborty, D.P., Ganguly, S.N., Maji, P.N., Mitra,
A.R., Das, K.C., and Weinstein, B. 1973.
Murrayazolinine: A carbazole alkaloid from *Murraya*
koenigii Spreng. Chemistry and Industry No.7: 322-
323.

Chakraborty, D.P., Islam, A., Basak, S.P., and Das, R.
1970. Structure of murrayazolidine: The first
pentacyclic carbazole alkaloid. Chemistry and
Industry No.18: 593-594.

Chakraborty, D.P., Islam, A., and Bhattacharyya, P. 1973.
Synthesis of murrayacine. The Journal of Organic
Chemistry 38: 2728-2729.

Chakraborty, D.P., Roy, S., and Guha, R. 1978. Chemical (molecular) taxonomy. Part 44. Structure of mukonidine. *Journal of the Indian Chemical Society* 55: 1114-1115. *Chemical Abstracts* 91: 211634b.

Chatterjee, A., Dutta, C.P., and Bhattacharyya, S. 1967. Micromelumin and micropubescin - two new coumarins from *Micromelum pubescens*. *Science and Culture (Calcutta)* 33: 371-373. *Chemical Abstracts* 69: 2887t.

Chatterjee, A., and Gupta, S.S. 1964. The constitution of archangelin, a new coumarin isolated from the root of *Angelica archangelica* Linn. (Umbelliferae). *Tetrahedron Letters* No.29: 1961-1965.

Choudhury, B.K., and Chakraborty, D.P. 1971. Mukoeic acid, the first carbazole carboxylic acid from a plant source. *Phytochemistry* 10: 1967-1970.

Chowdhury, B.K., and Chakraborty, D.P. 1969. Mukoeic acid : the first carbazole carboxylic acid from plant sources. *Chemistry and Industry* No. 17: 549.

———. 1971a. 3-Formylindole from *Murraya exotica*. *Phytochemistry* 10: 481-483.

_____. 1971b. Hibiscetin heptamethyl ether, a natural flavone. *Journal of the Indian Chemical Society* 48: 80-82. *Chemical Abstracts* 75: 1310m.

Chowdhury, B.K., Hirani, S.K., Mustapha, A., and Bhattacharyya, P. 1987. Photochemical oxidation of 3-methyl group of carbazole alkaloids. *Chemistry and Industry No.4*: 128-129.

Chowdhury, B.K., Mustapha, A., Garba, M., and Bhattacharyya, P. 1987. Carbazole and 3-methylcarbazole from *Glycosmis pentaphylla*. *Phytochemistry* 26: 2138-2139.

Connolly, J.D., and McCrindle, R. 1965. NMR solvent shifts of methyl groups in alicyclic ketones. Reassignment of the methyl groups in camphor. *Chemistry and Industry No.9*: 379-381.

Cordell, G.A., ed. 1981. Alkaloids derived from tryptophan. *Introduction to alkaloids : A biogenetic approach*. New York: John Willey & Sons.

Craib, W.G. 1926. *Murraya siamensis* Craib. *Bulletin of miscellaneous information 1926* : Royal botanic gardens, Kew. London: His Majesty's Stationery Office.

Das, K.C., Chakraborty, D.P., and Bose, P.K. 1965. Antifungal activity of some constituents of *Murraya koenigii* Spreng. *Experientia* 21: 340.

Das, S., Baruah, R.H., Sharma, R.P., Barua, J.N., Kulanthaivel, P, and Herz, W. 1984. 7-Methoxycoumarins from *Micromelum minutum*. *Phytochemistry* 23: 2317-2321.

Davies, R.A., ed. 1987. *Index Kewensis: Supplement seventeen (1976-1980)*. Oxford: Clarendon Press.

De Silva, L.B., De Silva, U.L.L., Mahendran, M., Arnold, D., and Jennings, R.C. 1983. Coumarins of *Micromelum ceylanicum*. *Journal of the National Science Council of Sri Lanka* 11: 139-142. *Chemical Abstracts* 103: 138541d.

De Silva, L.B., De Silva, U.L.L., Mahendran, M., and Jennings, R.C. 1980. 4'-Hydroxy-3,5,6,7,3',5'-hexamethoxyflavone from *Murraya paniculata*. *Phytochemistry* 19: 2794.

Donnelly, B.J., Donnelly, D.M.X., and O'Sullivan, A.M. 1968. *Dalbergia* species. VI. The occurrence of melannein in the genus *Dalbergia*. *Tetrahedron* 24: 2617-2622.

Dreyer, D.L. 1968. Chemotaxonomy of the Rutaceae. IV. Constituents of *Murraya paniculata* (Linn.) Jack. *The Journal of Organic Chemistry* 33: 3574-3576.

Durand, Th., ed. 1906. *Index Kewensis: Supplementum I (1886-1895)*. London: Oxford University Press.

- Dutta, N.L., and Quasim, C. 1969. Constituents of *Murraya koenigii*: Structure of girinimbine. *Indian Journal of Chemistry* 7: 307-308. *Chemical Abstracts* 71: 3516z.
- Dutta, N.L., Quasim, C., and Wadia, M.S. 1969a. Constituents of *Murraya koenigii*: Structure of curryangin. *Indian Journal of Chemistry* 7: 1061-1062. *Chemical Abstract* 72: 32096p.
- . 1969b. Synthesis of mahanimbin and curryangin. *Indian Journal of Chemistry* 7: 1168-1169. *Chemical Abstracts* 72: 43938r.
- Fauvel, M.T., Gleye, J., Moulis, C., and Fouraste, I. 1978. Alkaloids from *Murraya paniculata* (L.) Jack. *Plant. Med. Phytother.* 12: 207-211(Fr). *Chemical Abstracts* 90: 83610f.
- Fiebig, M., Pezzuto, J.M., Soejarto, D.D., and Kinghorn, A.D. 1985. Koenoline, a further cytotoxic carbazole alkaloid from *Murraya koenigii*. *Phytochemistry* 24: 3041-3043.
- Furukawa, H., Ito, C., Yogo, M., and Wu, T.S. 1986. Structures of murrayastine, murrayaline, and pyrayafoline ; three new carbazole alkaloids from *Murraya euchrestifolia*. *Chemical and Pharmaceutical Bulletin* 34: 2672-2675.

- Furukawa, H., Wu, T.S., and Kuoh, C.S. 1985a. Dihydroxygirininimbine, a new carbazole alkaloid from *Murraya euchrestifolia*. *Heterocycles* 23: 1391-1393.
- . 1985b. Structure of murrayoline-B and -C, new binary carbazole alkaloids from *Murraya euchrestifolia*. *Chemical and Pharmaceutical Bulletin* 33: 2611-2613.
- Furukawa, H., Wu, T.S. and Ohta, T. 1983. Bismurrayoline-A and -B, two novel "dimeric" carbazole alkaloids from *Murraya euchrestifolia*. *Chemical and Pharmaceutical Bulletin* 31: 4202-4205.
- Furukawa, H., Yogo, M., Ito, C., Wu, T.S., and Kuoh, C.S. 1985. New carbazolequinones having dimethylpyran ring system, from *Murraya euchrestifolia*. *Chemical and Pharmaceutical Bulletin* 33: 1320-1322.
- Ganguly, S.N., Ghosh, S., and Basak, A. 1977. Coumarin from *Murraya paniculata*. *Transactions of the Bose Research Institute (Calcutta)* 40: 123-126. *Chemical Abstracts* 90: 19071d.
- Ganguly, S.N., and Sarkar, A. 1978. Exozoline, a new carbazole alkaloid from the leaves of *Murraya exotica*. *Phytochemistry* 17: 1816-1817.

- Gebreyesus, T., and Chapya, A. 1983. Antifeedants from *Clausena anisata* (Willd.) Hook F. ex Benth (Rutaceae). *Curr. Themes Trop. Sci.* 2: 237-242. *Chemical Abstracts* 99: 208072b.
- Gosh, S., and Chakraborty, D.P. 1979. Structure of mahanimboline. *Chemistry and Industry* No. 19: 669-670.
- Govindachari, T.R., Pai, B.R., Subramaniam, P.S., and Muthukumaraswamy, N. 1968. Coumarins of *Clausena dentata* (Willd.) R. and S. *Tetrahedron* 24: 753-757.
- Gray, A.I., and Waterman, P.G. 1978. Coumarins in the Rutaceae. *Phytochemistry* 17: 845-864.
- Gupta, G.L., and Nigam, S.S. 1971. Chemical examination of the leaves of *Murraya koenigii*. *Planta Medica* 19: 83-86.
- Hill, A.W., ed. 1926. *Index Kewensis : Supplementum VI (1916-1920)*. London: Oxford University Press.
- . 1929. *Index Kewensis : Supplementum VII (1921-1925)*. London: Oxford University Press.
- . 1933. *Index Kewensis : Supplementum VIII (1926-1930)*. London: Oxford University Press.
- . 1938. *Index Kewensis : Supplementum IX (1931-1935)*. London: Oxford University Press.

- Hooker, J.D. and Jackson, B.D., eds. 1895. Index Kewensis. Vol. II. London: Oxford University Press.
- Husson, H.P. 1985. Simple indole alkaloids including β -carbolines and carbazoles. In A. Brossi (ed.), The alkaloids : Chemistry and Pharmacology Vol. 26, pp. 1-51. Orlando: Academic Press.
- Imai, F., Itoh, K., Kishibuchi, N., Kinoshita, T., and Sankawa, U. 1989. Constituents of the root bark of *Murraya paniculata* collected in Indonesia. Chemical and Pharmaceutical Bulletin 37: 119-123.
- Imai, F., Kinoshita, T., and Sankawa, U. 1987. New coumarin derivatives from *Murraya paniculata*. Shoyakugaku 41: 157-158. Chemical Abstracts 108: 52809p.
- . 1989. Constituents of the leaves of *Murraya paniculata* collected in Taiwan. Chemical and Pharmaceutical Bulletin 37: 358-362.
- Irie, H., Uyeo, S., Yamamoto, K., and Kinoshita, K. 1967. The structure of glaupalol: A novel furanocoumarin from *Glaucidium palmatum*. Chem. Commun. No.11: 547-548. Chemical abstracts 68: 59457m.
- Ishii, H., Ishikawa, T., Sekiguchi, H., and Hosoya, K. 1973. Xanthoarnol: A new dihydrofuranocoumarin. Chemical and Pharmaceutical Bulletin 21: 2346-2348.

- Ito, C., and Furukawa, H. 1987a. Constituents of *Murraya exotica* L. structure elucidation of new coumarins. *Chemical and Pharmaceutical Bulletin* 35: 4277-4285.
- . 1987b. Three new coumarins from *Murraya exotica*. *Heterocycles* 26: 1731-1734.
- . 1987c. Three new coumarins from leaves of *Murraya paniculata*. *Heterocycles* 26: 2959-2962.
- . 1989. Two new coumarins from *Murraya* plants. *Chemical and Pharmaceutical Bulletin* 37: 819-820.
- Ito, C., Wu, T.S., and Furukawa, H. 1987. Three new carbazole alkaloids from *Murraya euchrestifolia*. *Chemical and Pharmaceutical Bulletin* 35: 450-452.
- . 1988. New carbazole alkaloids from *Murraya euchrestifolia*. *Chemical and Pharmaceutical Bulletin* 36: 2377-2380.
- Johnson, A.P., and Pelter, A. 1964. The structure of robustic acid. *Tetrahedron Letters* No. 20: 1267-1274.
- Joshi, B.S., and Gawad, D.H. 1971. Isolation of some furanocoumarins from *Clausena indica* and identity of chalepensis with xylotenin. *Phytochemistry* 10: 480-481.

- _____. 1974. Isolation & structure of indizoline, a new carbazole alkaloid from *Clausena indica* Oliv. *Indian Journal of Chemistry* 12: 437-440.
- Joshi, B.S., Gawad, D.H., and Kamat, V.N. 1972. 6-Methoxyheptaphylline, a new carbazole alkaloid from *Clausena indica* Oliv. *Indian Journal of Chemistry* 10: 1123-1124.
- Joshi, B.S., and Kamat, V.N. 1966. Structures of clausenin, clausenidin and a synthesis of clausenin and xanthoxyletin. *Tetrahedron Letters* No. 46: 5767-5773.
- _____. 1969. Structure of exoticin, a flavone from the leaves of *Murraya exotica*. *Indian Journal of Chemistry* 7: 636. *Chemical Abstracts* 71: 49706q.
- _____. 1970. Isolation of 3,3',4'5,5',7,8-heptamethoxyflavone from *Murraya exotica*. *Phytochemistry* 9: 889.
- Joshi, B.S., Kamat, V.N., and Gawad, D.H. 1970. On the structures of girinimbine, mahanimbine, isomahanimbine, koenimbidine and murrayacine. *Tetrahedron* 26: 1475-1482.
- _____. 1974. Structure of Clausindine, a new coumarin from *Clausena indica* Oliv. *Experientia* 30: 223.

Joshi, B.S., Kamat, V.N., Gawad, D.H., and Govindachari, T.R. 1972. Structure and synthesis of heptaphylline. *Phytochemistry* 11: 2065-2071.

Joshi, B.S., Kamat, V.N., and Saksena, A.K. 1967. Structures of clausenin and clausenidin two new pyranoncoumarins from the roots of *Clausena heptaphylla* Wt. & Arn. *Tetrahedron* 23: 4785-4789.

Joshi, B.S., Kamat, V.N., Saksena, A.K., and Govindachari, T.R. 1967. Structure of heptaphylline, a carbazole alkaloid from *Clausena heptaphylla* Wt. & Arn. *Tetrahedron Letters* No. 41: 4019-4022.

Joshi, P.P., Shukla, Y.N., Bhakuni, D.S., and Dhar, M.M. 1975. 6- (2 , 3 - Dihydroxy - 3 - methylbutyl) - 7 - methoxycoumarin , a new coumarin from *Micromelum pubescens* Blume. *Indian Journal of Chemistry* 13: 772-774.

Kamaruzzman, Roy, S., and Chakraborty, D.P. 1989. Mupamine from *Glycosmis pentaphylla*. *Phytochemistry* 28: 677-678.

Kaneda, M., Sakano, K., Nakamura, S., and Kushi, Y. 1981. The structure of carbazomycin B. *Heterocycles* 15: 993-998.

- Khan, N.U., Naqvi, S.W.I., and Ishratullah, K. 1983. Wampetin, a furanocoumarin from *Clausena wampi*. *Phytochemistry* 22: 2624-2625.
- Khosa, R.L. 1972. Coumarins from the leaves of *Murraya paniculata* Jack. *The Indian Journal of Pharmacy* 34: 47-48.
- _____. 1975. Chemical studies on *Murraya paniculata* (Jack) leaves. *Journal of Research in Indian Medicine* 10: 75-76. *Chemical Abstracts* 85: 2562p.
- Kinoshita, T., Tataru, S., Ho, F.C., and Sankawa, U. 1989. 3-Prenylindoles from *Murraya paniculata* and their biogenetic significance. *Phytochemistry* 28: 147-151.
- Kinoshita, T., Tataru, S., and Sankawa, U. 1985. Structures of paniculidines A and B : Novel prenylindoles from *Murraya paniculata*. *Chemical and Pharmaceutical Bulletin* 33: 1770-1773.
- Kong, Y.C., But, P.P.H., Ng, K.H., Li, Q., Cheng, K.F., and Waterman, P.G. 1988. *Micromelum* : A key genus in the chemosystematics of the Clauseneae. *Biochemical Systematics and Ecology* 16: 485-489. *Chemical Abstracts* 110: 92079y.

- Kong, Y.C., Cheng, K.F., Cambie, R.C., and Waterman, P.G. 1985. Yuehchunene : A novel indole alkaloid with antiimplantation activity. *Journal of the Chemical Society Chemical Communications* No. 2: 47-48. *Chemical Abstracts* 102: 218299a.
- Kong, Y.C. *et al.* 1986a. A chemotaxonomic division of *Murraya* based on the distribution of the alkaloids yuehchunene and girinimbine. *Biochemical Systematics and Ecology* 14: 491-497.
- . 1986b. Sources of the anti-implantation alkaloid yuehchukene in the genus *Murraya*. *Journal of Ethnopharmacology* 15: 195-200.
- Kong, Y.C., Lau, K.H., Tam, Y.Y., Cheng, K.F., Waterman, P.G., and Cambie, R.C. 1983. Dehydroindicolactone, a new coumarin from *Clausena lansium*. *Fitoterapia* 54: 47-48. *Chemical Abstracts* 99: 191647t.
- Kong, Y.C., Ng, K.H., But, P.P.H., Cheng, K.F., and Waterman, P.G. 1987. Aurantiamide acetate in the stem bark of *Murraya exotica*. *Planta Medica* 53: 393.
- Kumar, V. 1985. Coumarins from *Murraya* species. *Chem. Sri Lanka* 2: 22-24. *Chemical Abstracts* 106: 99371p.
- Kumar, V., Reisch, J., Wickramaratne, D.B.M., Hussain, R.A., Adesina, K.S., and Balasubramaniam, S. 1987. Gleinene and gleinadiene, 5,7-dimethoxycoumarins from *Murraya gleinei* root. *Phytochemistry* 26: 511-514.

- Kureel, S.P., Kapil, R.S., and Popli, S.P. 1969a. New alkaloids from *Murraya koenigii* Spreng. *Experientia* 25: 790-791.
- _____. 1969b. Terpenoid alkaloids from *Murraya koenigii* Spreng. II. The constitution of cyclomahanimbine, bicyclomahanimbine, and mahanimbidine. *Tetrahedron Letters* No.44: 3857-3862.
- _____. 1970a. Terpenoid alkaloids from *Murraya koenigii* Spreng. IV. Structure and synthesis of mahanimbicine. *Experientia* 26: 1055.
- _____. 1970b. Two novel alkaloids from *Murraya koenigii* Spreng. : Mahanimbicine and bicyclomahanimbicine. *Chemistry and Industry* No.29: 958.
- Lakshmi, M.V., Ratnam, C.V., and Subba Rao, N.V. 1972. 7-Methoxy-8-(3-butenyl-3-methyl-2-oxo)coumarin, a new coumarin from *Murraya exotica* Linn. *Indian Journal of Chemistry* 10: 564-565.
- Lakshmi, V., Prakash, D., Raj, K., Kapil, R.S., and Popli, S.P. 1984. Monoterpenoid furanocoumarin lactones from *Clausena anisata*. *Phytochemistry* 23: 2629-2631.

- Lakshmi, V., Raj, K., Kapil, R.S., and Patanik, G.K. 1987. Spasmolytic activity of furanocoumarins from *Clausena anisata*. *Indian Drugs* 24: 285-287. *Chemical Abstracts* 107: 147105z.
- Lamberton, J.A., Price, J.R., and Redcliffe, A.H. 1967. Micromelin, a new coumarin from *Micromelum minutum* (Forst.f.) Seem (Family Rutaceae). *Australian Journal of Chemistry* 20: 973-979.
- Li, Q., Zhang, H., and Zhu, L. 1988. The chemical constituents of the essential oil from *Murraya kwangsiensis*. *Yunnan Zhiwu Yanjiu* 10: 359-361. *Chemical Abstracts* 110: 92116h.
- Lontsi, D., Ayafor, J.F., Sondengam, B.L., Connolly, J.D., and Rycroft, D.S. 1985. The use of two-dimensional long-range δ_C/δ_H correlation in conjunction with the one-dimensional proton-coupled ^{13}C NMR spectrum in the structural elucidation of ekeberginine: A new carbazole alkaloid from *Ekebergia senegalensis* (Meliaceae). *Tetrahedron Letters* 26: 4249-4252.
- Majumder, P.L., Sengupta, G.C., Dinda, B.N., and Chatterjee, A. 1974. Edgeworthin, a new bis-coumarin from *Edgeworthia gardneri*. *Phytochemistry* 13: 1929-1931.
- Manandhar, M.D. 1980. 8- Substituted 7-methoxycoumarins from *Murraya exotica* Linn. *Indian Journal of Chemistry* 19B: 1006-1008.

- Martinez, E.A., Reyes, R.E., Gonzalez, A.G., and Luis, F.R. 1967. New sources of natural coumarins. VIII. Coumarins from *Pimpinella rupicola* roots: Structure of a new coumarin. *An. Real. Soc. Espan. Fis. Quim.*, Ser. 63: 205-212 (Span). *Chemical Abstracts* 67: 47087g.
- Mc Phail, A.T., Wu, T.S., Ohta, T., and Furukawa, H. 1983. Structure of (+)-murrayoline, a novel biscarbazole alkaloid from *Murraya euchrestifolia*. *Tetrahedron Letters* 24: 5377-5380.
- Mester, I. 1973. Occurrence of alkaloids in Rutaceae. *Fitoterapia* 44: 123-152.
- Mester, I., Bergenthal, D., and Reisch, J. 1979. Constituents of *Clausena anisata* (Willd.) Oliv. (Rutaceae). III. Carbon-13 NMR spectra of mupamine, carbazole and some carbazole derivatives. *Z. Naturforsch., B: Anorg. Chem., Org. Chem.* 34B: 650-652. *Chemical Abstracts* 91: 74758.
- Mester, I., and Reisch, J. 1977. Constituents of *Clausena anisata* (Willd.) Oliv. (Rutaceae). II. Isolation and structure of mupamine, a new carbazole alkaloid. *Justus Liebigs Annalen der Chemie* No.10: 1725-1729 (Ger). *Chemical Abstracts* 88: 117781p.

- Mester, I., Szendrei, K., and Reisch, J. 1977. Constituents of *Clausena anisata* (Willd.) Oliv. (Rutaceae) I. Coumarins from the root bark. *Planta Medica* 32: 81-85.
- Mukherjee, M., Mukherjee, S., Shaw, A.K., and Ganguly, S.N. 1983. Mukonicine, a carbazole alkaloid from leaves of *Murraya koenigii*. *Phytochemistry* 22: 2328-2329.
- Murray, R.D.H. 1978. Naturally occurring plant coumarins. In W. Herz, H. Grisebach, and G.W. Kirby (eds.), *Progress in the chemistry of organic natural products* Vol. 35. Vienna: Springer-Verlag.
- Murray, R.D.H., Méndez, J., and Brown, S.T., eds. 1982. Occurrence. *The natural coumarins : Occurrence, chemistry and biochemistry*. Chichester: John Wiley & Sons.
- Narasimhan, N.S., and Kelkar, S.L. 1976. Alkaloids of *Murraya koenigii* : Part III- Structure of curryanine & curryangine. *Indian Journal of Chemistry* 14B: 430-433.
- Narasimhan, N.S., Paradkar, M.V., and Chitguppi, V.P. 1968. Structures of mahanimbin and koenimbin. *Tetrahedron Letters* No.53: 5501-5504.

Narasimhan, N.S., Paradkar, M.V., Chitguppi, V.P., and Kelkar, S.L. 1975. Alkaloids of *Murraya koenigii* : Structure of mahanimbine, koenimbine, (-)-mahanine, koenine, koenigine, koenidine & (+)-isomahanimbine. *Indian Journal of Chemistry* 13: 993-999.

Narasimhan, N.S., Paradkar, M.V., and Kelkar, S.L. 1970. Alkaloids of *Murraya koenigii*. Structures of mahanine, koenine, koenigine, and koenidine. *Indian Journal of Chemistry* 8: 473-474. *Chemical Abstracts* 73: 56278w.

Ngadjui, B.T., Ayafor, J.F., Sondengam, B.L., and Connolly, J.D. 1989a. Coumarins from *Clausena anisata*. *Phytochemistry* 28: 585-589.

———. 1989b. Prenylated coumarins from the leaves of *Clausena anisata*. *Journal of Natural Products* 52: 243-247.

———. 1989c. Quinolone and carbazole alkaloids from *Clausena anisata*. *Phytochemistry* 28: 1517-1519.

Nigam, S.K., Mitra, C.R., Kunesch, G., Das, B.C., and Polonsky, J. 1967. Constituents of *Calophyllum tomentosum* and *Calophyllum apetalum* nuts: Structure of a new 4-alkyl- and of two new 4-phenyl-coumarins. *Tetrahedron Letters* No.28: 2633-2636.

Nikki, K., and Nakagawa, N. 1978. Aromatic solvent-induced shifts (ASIS). II. Interpretation of benzene and hexafluorobenzene induced shifts by means of electrostatic interaction model. *Bulletin of the Chemical Society of Japan* 51: 3267-3272.

Okorie, D.A. 1975. A new carbazole alkaloid and coumarins from roots of *Clausena anisata*. *Phytochemistry* 14: 2720-2721.

Pelter, A., and Johnson, A.P. 1964. The structures of scandenin and lonchocarpic acid. *Tetrahedron Letters* No. 39: 2817-2822.

Pongboonrod, S., ed. 1950. *Maitet Meaung Thai*. Bangkok: Kasembanakij Press.

Positong, P. 1980. Certain chemical constituents of *Murraya paniculata* leaves. *Tistr Bibliographical* No.6: 57. *Abstracts on Medicinal Plants in Thailand*: 198.

Prain, D., ed. 1913. *Index Kewensis: Supplementum IV (1906-1910)*. London: Oxford University Press.

_____. 1921. *Index Kewensis: Supplementum V (1911-1915)*. London: Oxford University Press.

- Prakash, D., Raj, K., Kapil, R.S., and Popli, S.P. 1980.
Chemical constituents of *Clausena lansium* : Part I -
Structure of lansamide-I & lansine. *Indian Journal
of Chemistry* 19B: 1075-1076.
- Raj, K., Mishra, S.C., Kapil, R.S., and Popli, S.P. 1976.
Coumarins from *Murraya paniculata*. *Phytochemistry*
15: 1787.
- Prakash, D., Raj, K., Kapil, R.S., and Popli, S.P. 1978.
Coumarins from *Clausena indica*. *Phytochemistry* 17:
1194-1195.
- Rama Rao, A.V., Bhide, K.S., and Mujumdar, R.B. 1980.
Mahanimbinol. *Chemistry and Industry* No. 17: 697-
698. *Chemical Abstracts* 94: 157114d.
- Rastogi, K., Kapil, R.S., and Popli, S.P. 1980. New
alkaloids from *Glycosmis mauritiana*. *Phytochemistry*
19: 945-948.
- Ray, S., and Chakraborty, D.P. 1976. Murrayacine from
Clausena heptaphylla. *Phytochemistry* 15: 356.
- Reichardt, C. (ed.). 1988. *Solvents and solvent effects
in organic chemistry* 2nd Ed. Weinheim: VCH
Publisher.

- Roy, S., and Bhattacharya, L. 1981. Girinimbine and koenimbine from *Murraya exotica* Linn. Journal of the Indian Chemical Society 58: 1212. Chemical Abstracts 96: 100964t.
- Roy, S., Bhattacharyya, L., and Chakraborty, D.P. 1982. Structure and synthesis of mukoline and mukolidine, two new carbazole alkaloids from *Murraya koenigii* Spreng. Journal of the Indian Chemical Society 59: 1369-1371. Chemical Abstracts 99: 136833a.
- Roy, S., Bhattacharyya, P., and Chakraborty, D.P. 1974. 3-Methylcarbazole from *Clausena heptaphylla*. Phytochemistry 13: 1017.
- Roy, S., and Chakraborty, D.P. 1974. Mahanimbine from *Murraya koenigii* Spreng. Phytochemistry 13: 2893.
- Salisbury, E.J., ed. 1947. Index Kewensis : Supplementum X (1936-1940). London: Oxford University Press.
- _____. 1953. Index Kewensis : Supplementum XI (1941-1950). London: Oxford University Press.
- Sastri, B.N., ed. 1950. The wealth of India Vol. 2. Delhi-12: INSDOC.
- _____. 1956. The wealth of India Vol. 4. New Delhi: Government of India Press.
- _____. 1962. The wealth of India Vol. 6. Calcutta: Sree Saraswaty Press.

- Seshadri, T.R., Sood, M.S., Handa, K.L., and Vishwapaul. 1967. Chemical components of the roots of *Selinium vaginatum*. I. Coumarins of the petroleum ether extract. *Tetrahedron* 23: 1883-1891.
- Seshadri, T.R., and Vishwapaul. 1973. Recent advances in naturally occurring coumarins. *Journal of Scientific and Industrial Research* 32: 227-255.
- Shoeb, A., Manandhar, M.D., Kapil, R.S., and Popli, S.P. 1978. Clausmarins A and B: Two novel spasmolytic terpenoid coumarins from *Clausena pentaphylla* (Roxb.) DC. *Journal of the Chemical Society Chemical Communications* No.7: 281-282. *Chemical Abstracts* 89: 129725g.
- Smitinand, T., ed. 1980. Thai plant names (Botanical names-Vernacular names). Bangkok: Funny Publishing.
- Soine, T.O. 1964. Naturally occurring coumarins and related physiological activities. *Journal of Pharmaceutical Sciences* 53: 231-264.
- Southon, I.W., and Buckingham, J., eds. 1989. Description of main alkaloid types. *Dictionary of alkaloids*. London: Chapman and Hall.
- Steck, W. 1972. Paniculatin, a new coumarin from *Murraya paniculata* (L.) Jack. *Canadian Journal of Chemistry* 50: 443-445.

- Steck, W., and Mazurek, M. 1972. Identification of natural coumarins by NMR spectroscopy. *Journal of Natural Products* 35: 418-439.
- Stone, B.C. 1985. Rutaceae. In M.D. Dassanayake (ed.), *A revised handbook of the flora of Ceylon volume V*. New Delhi: Amerind Publishing.
- Subba Rao, G.S.R., Raj, K., and Kumar, V.P.S. 1981. Chemical examination of *Clausena willdenovii* W & A : Isolation of 3-(1,1-dimethylallyl)xanthyletin from the root & bark. *Indian Journal of Chemistry* 20B: 88-89.
- Talapatra, B., Chaudhuri, M.K., and Talapatra, S.K. 1975. Coumarins of *Glycosmis cyanocarpa* Spreng: Selenium dioxide oxidation of dihydro- & tetrahydro xanthyletins. *Indian Journal of Chemistry* 13: 835.
- Talapatra, S.K., Dutta, L.N., and Talapatra, B. 1973a. Structure of murralongin, a novel monomeric coumarin from *Murraya elongata*: Stereochemistry and preferred conformation of its unique side chain. *Tetrahedron Letters* No. 50: 5005-5008.
- . 1973b. The structure and stereochemistry of murrangatin: A new monomeric coumarin from *Murraya elongata* Alph. DC. *Tetrahedron* 29: 2811-2814.

Tandon, S., and Rastogi, R.P. 1979. Recent advances in naturally occurring coumarins. *Journal of Scientific and Industrial Research* 38: 428-441.

Tantishaiyakul, V., Pummangura, S., Chaichantipyuth, C., Ma, W., and Mc Laughlin, J.L. 1986. Phebalosin from the bark of *Micromelum minutum*. *Journal of Natural Products* 49: 180-181.

Tantivatana, P., et al. 1983. Microminutin, a novel cytotoxic coumarin from *Micromelum minutum* (Rutaceae). *The Journal of Organic Chemistry* 48: 268-270.

Taylor, G., ed. 1966. *Index Kewensis: Supplementum XIII (1956-1960)*. London: Bentham-Maxon Trustees.

Wangboonskul, J.D., Pummangura, S., and Chaichantipyuth, C. 1984. Five coumarins and a carbazole alkaloid from the root bark of *Clausena harmandiana*. *Journal of Natural Products* 47: 1058-1059.

Wickramaratne, D.B.M., Kumar, V., and Balasubramaniam, S. 1984. Murragleinin, a coumarin from *Murraya gleinei* leaves. *Phytochemistry* 23: 2964-2966.

Wu, T.S. 1981. Omphamurin- a new coumarin from *Murraya omphalocarpa*. *Phytochemistry* 20: 178-179.

_____. 1988. Coumarins from the leaves of *Murraya paniculata*. *Phytochemistry* 27: 2357-2358.

- Wu, T.S., and Furukawa, H. 1982. Biological and phytochemical investigation of *Clausena excavata*. *Journal of Natural Products* 45: 718-720.
- Wu, T.S., Lin, C.N., Yang, L.K., and Lin, S.T. 1975. Constituents of *Murraya paniculata*. *J. Chin. Chem. Soc. (Taipei)* 22: 167-170. *Chemical Abstracts* 83: 144538t.
- Wu, T.S., Liou, M.J., and Kuoh, C.S. 1989. Coumarins of the flowers of *Murraya paniculata*. *Phytochemistry* 28: 293-294.
- Wu, T.S., Ohta, T., and Furukawa, H. 1983. Structure of murrayaquinone-B: A novel carbazole alkaloid from *Murraya euchrestifolia* Hayata. *Heterocycle* 20: 1267-1269.
- Wu, T.S., Tien, H.J., Arisawa, M., Shimizu, M., and Morita, N. 1980. Flavonols and coumarins from the fruit of *Murraya omphalocarpa*. *Phytochemistry* 19: 2227-2228.
- Yang, J., and Du, M. 1984a. Chemical constituents of *Murraya paniculata* (L.) Jack. grown in Yunnan [China]. *Zhiwu Xuebao* 26: 184-188. *Chemical Abstracts* 101: 87483k.

Yang, J., and Du, M. 1984b. Constituents of *Murraya paniculata* (L.) Jack. grown in Hainan [China]. *Hauxue Xuebao* 42: 1308-1311. Chemical Abstracts 102: 128816n.

Yang, J., and Su, Y. 1983. Studies on the chemical constituents of *Murraya paniculata* (L.) Jack. *Yaoxue Xuebao* 18: 760-765. Chemical Abstracts 100: 64986s.

Yokoyama, H., and Guerrero, H.C. 1970. Natural occurrence of semi- α -carotenone. *Phytochemistry* 9: 231-232.

APPENDIX

Solvent system a) Chloroform

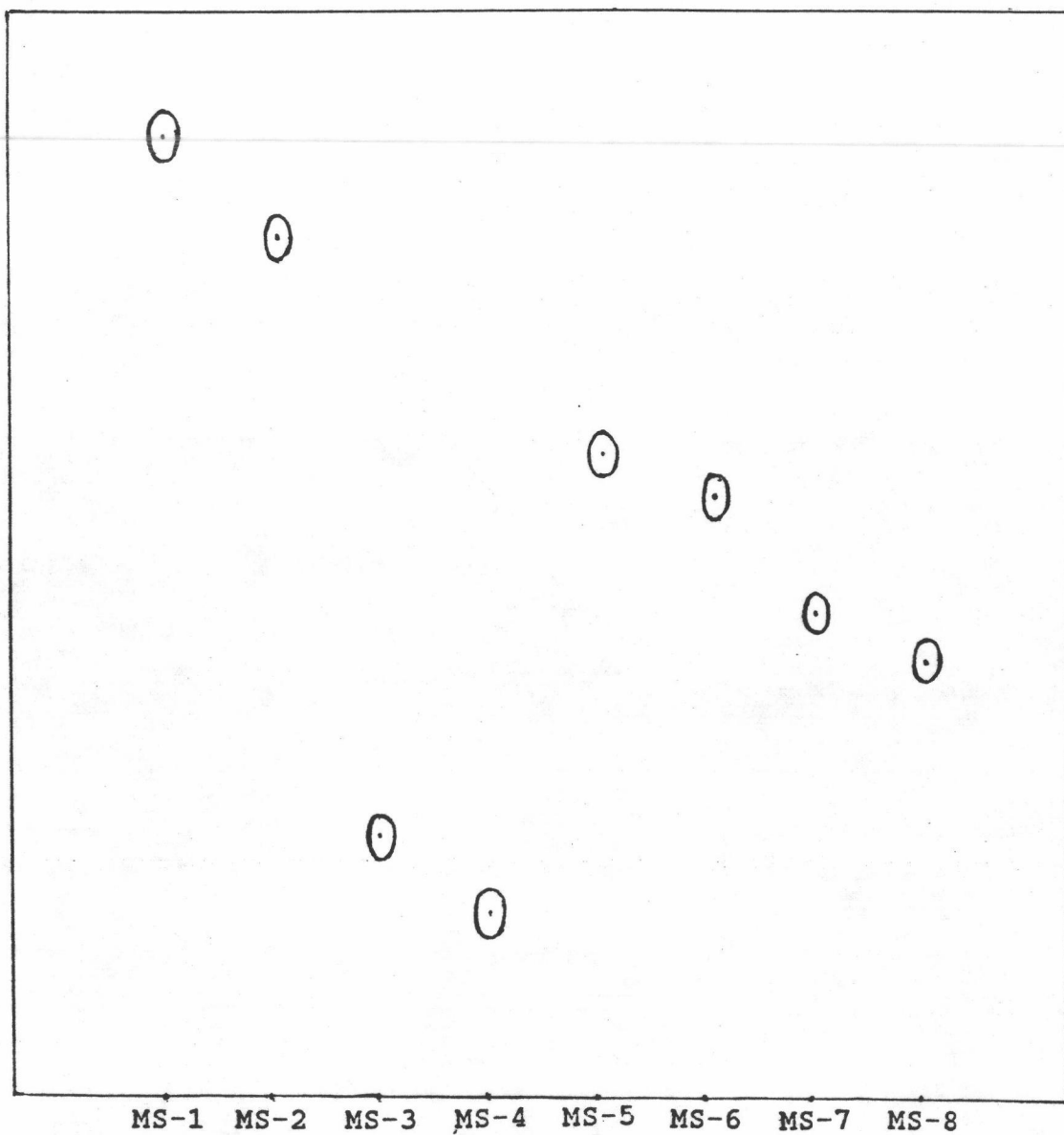


Figure 8

Thin layer chromatography (TLC) of eight isolated compounds from *Murraya siamensis* Craib

Solvent system b) Chloroform : benzene (5:5)

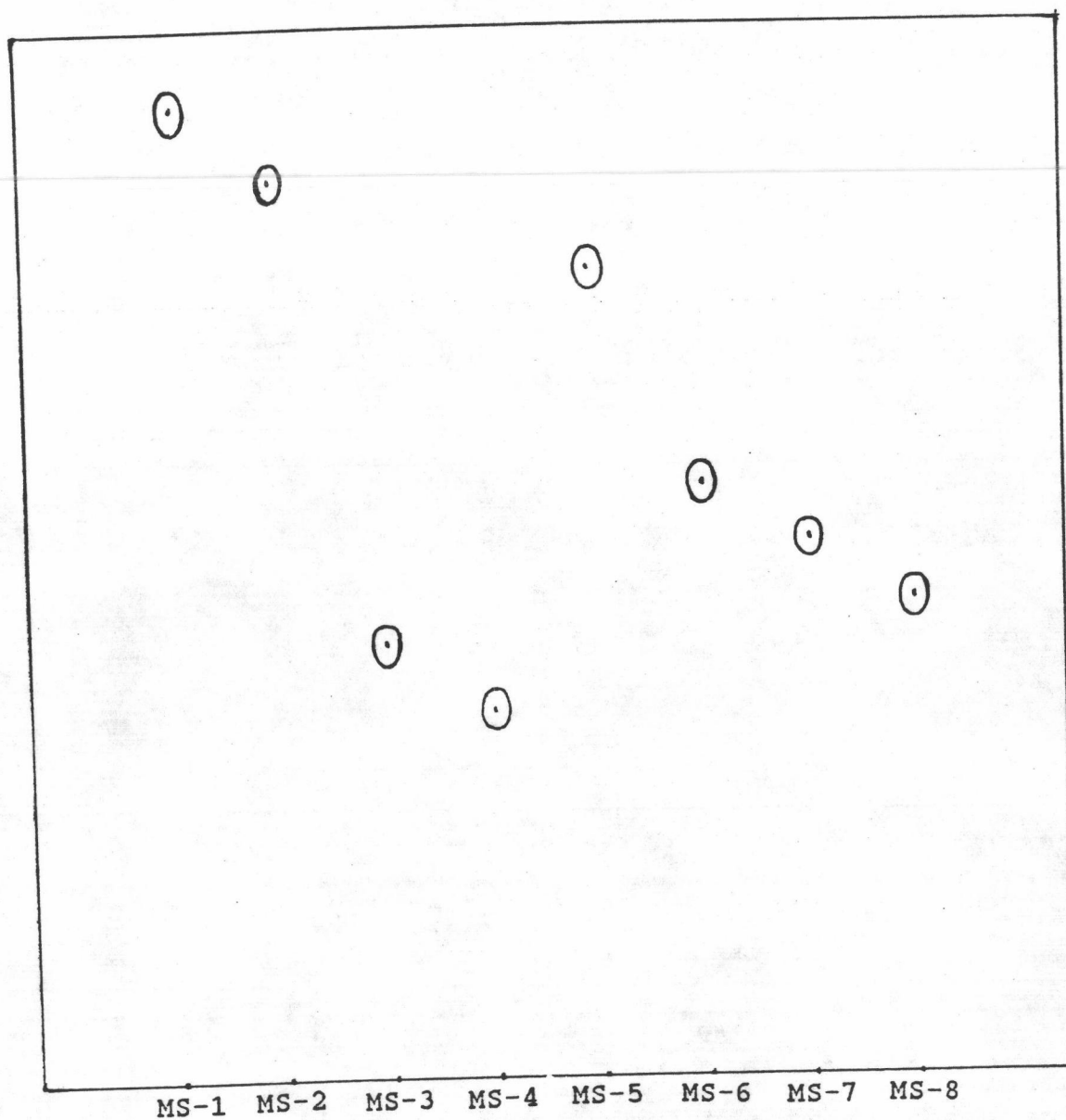


Figure 9

Thin layer chromatography (TLC) of eight isolated compounds from *Murraya siamensis* Craib

Solvent system c) Chloroform : hexane (5:5)

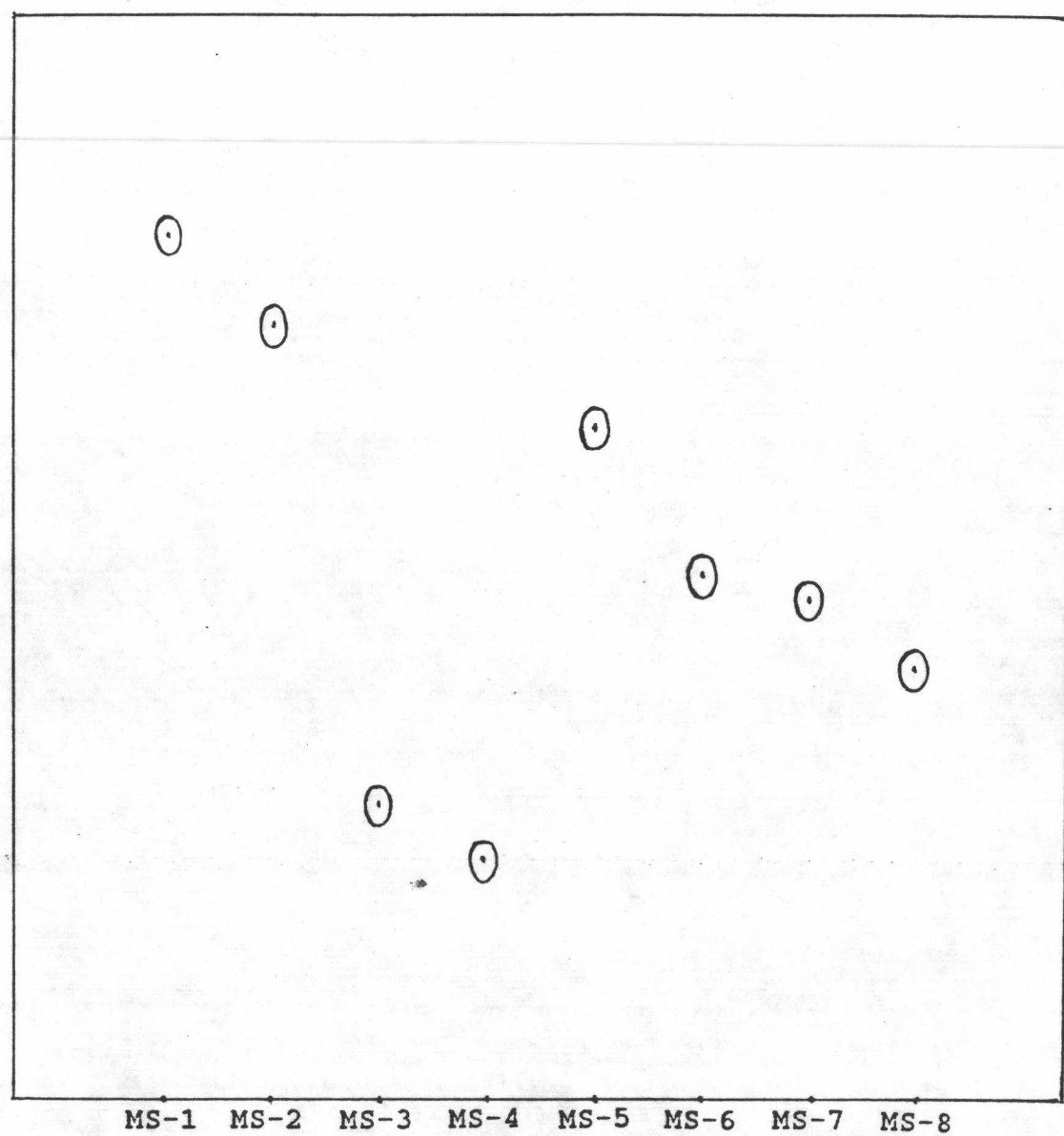


Figure 10

Thin layer chromatography (TLC) of eight isolated compounds from *Murraya siamensis* Craib

Solvent system d) Chloroform : petroleum ether (5:5)

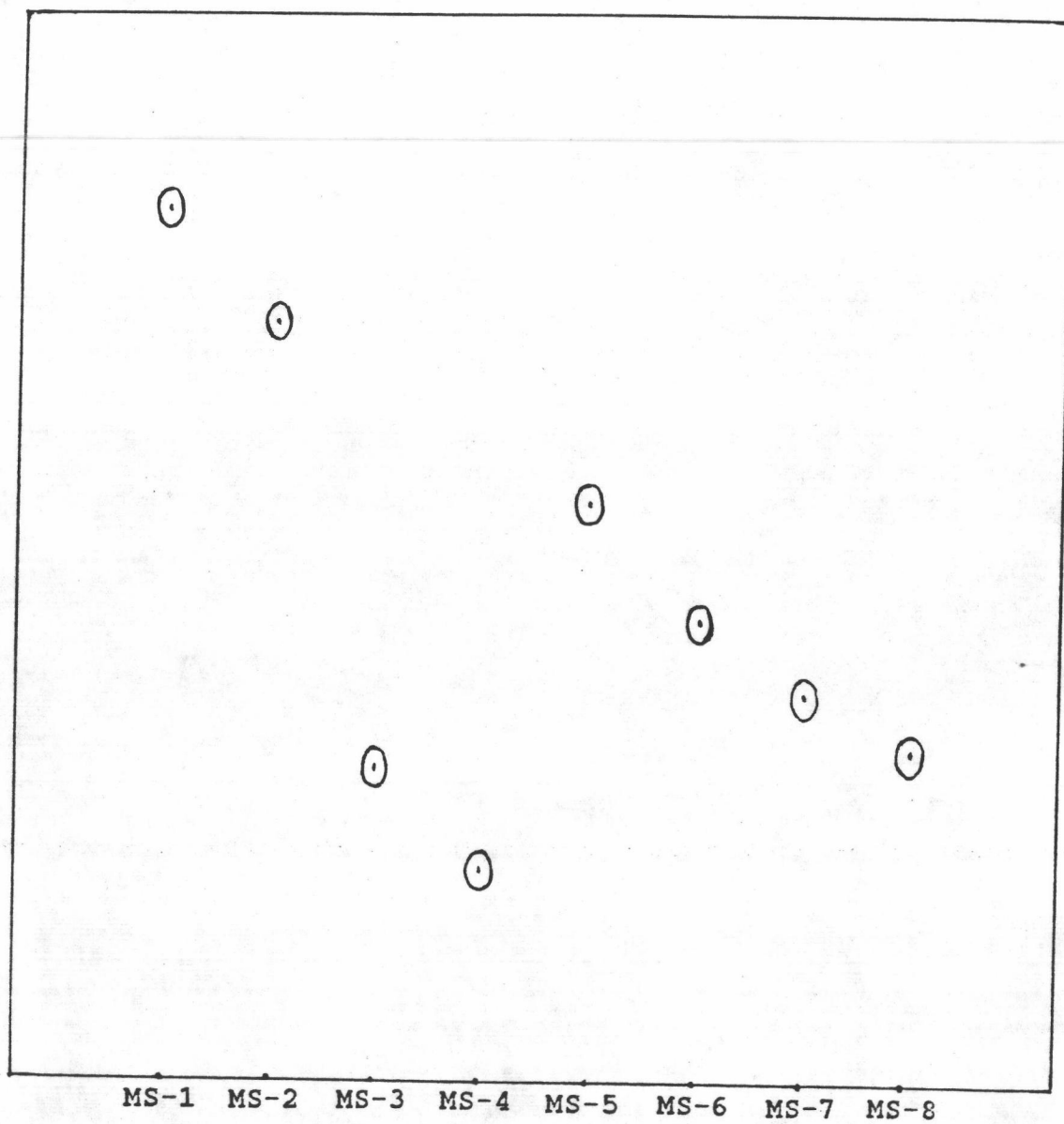


Figure 11

Thin layer chromatography (TLC) of eight isolated compounds from *Murraya siamensis* Craib

Solvent system e) Chloroform : petroleum ether (7:3)

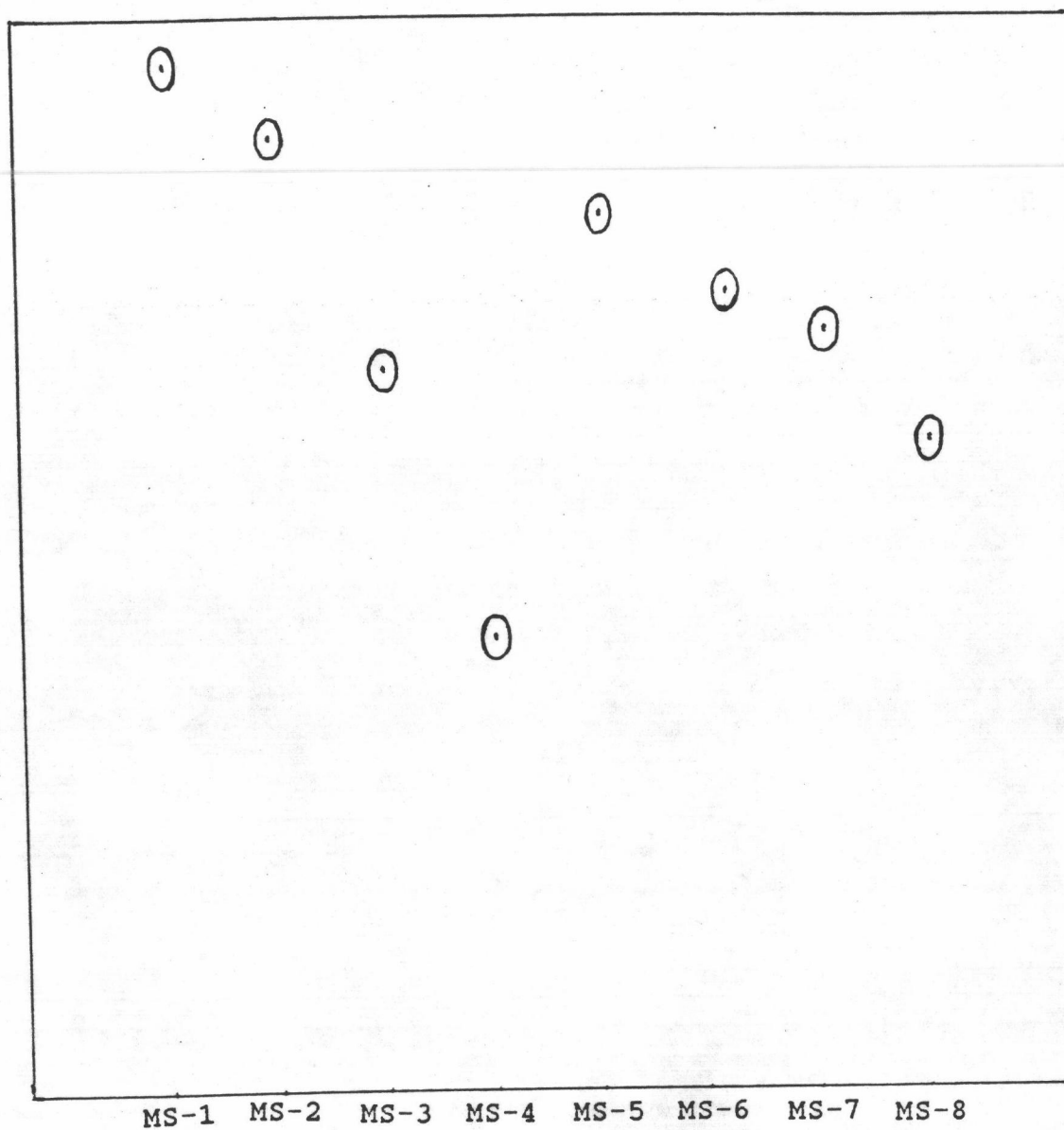


Figure 12

Thin layer chromatography (TLC) of eight isolated compounds from *Murraya siamensis* Craib

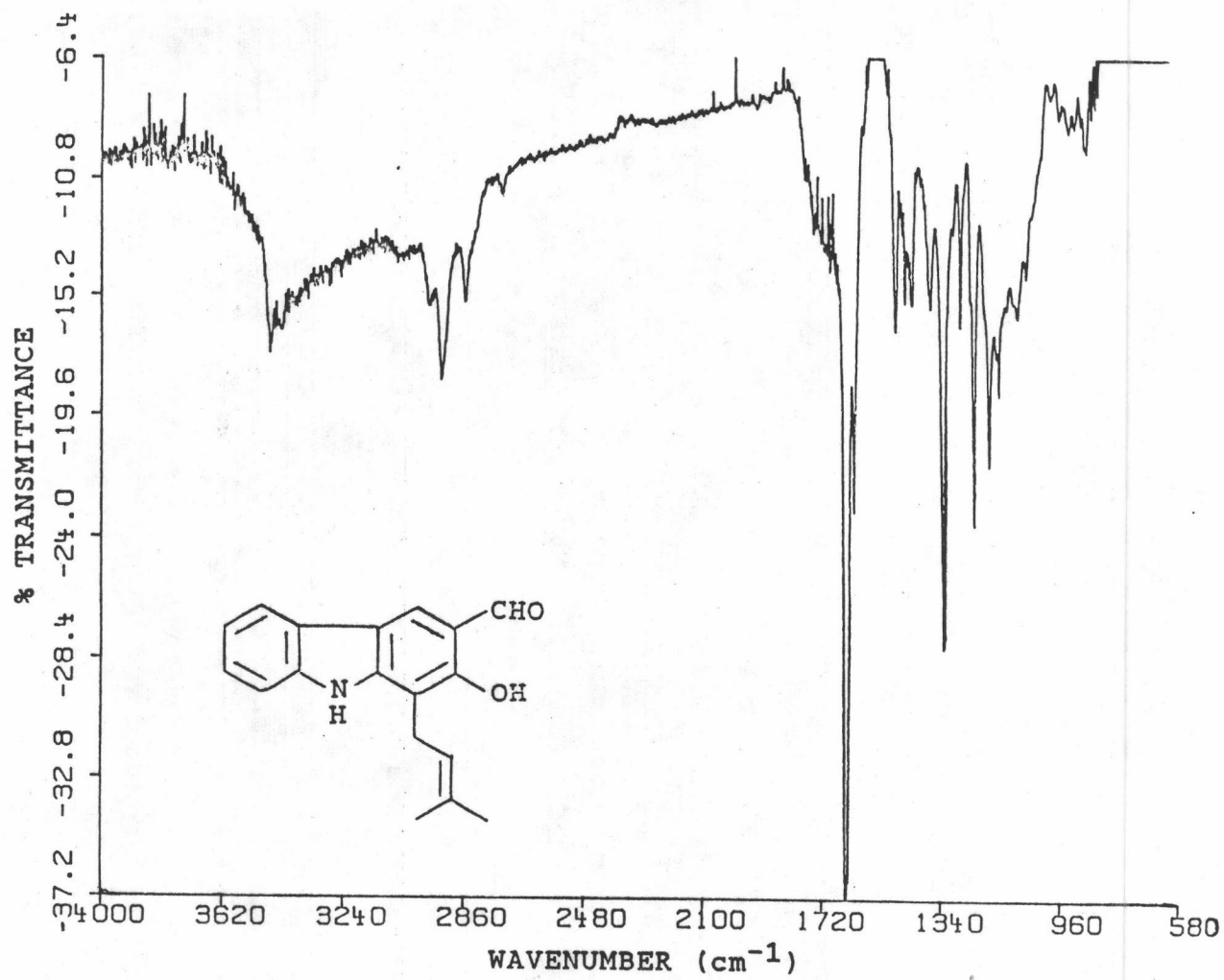


Figure 13 IR spectrum of MS-1 (in CCl₄)

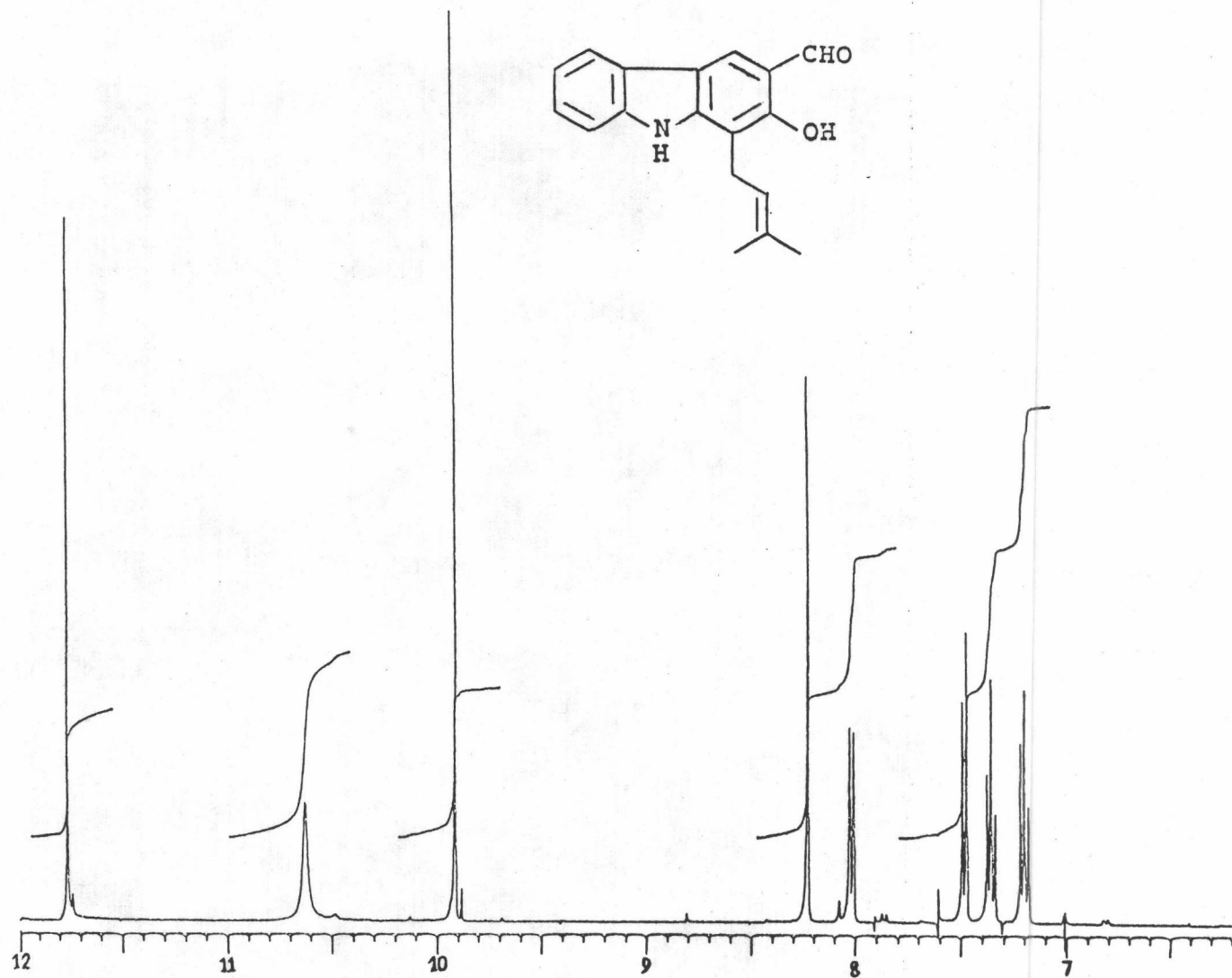


Figure 14 ^1H NMR spectrum of MS-1 (in acetone- d_6)

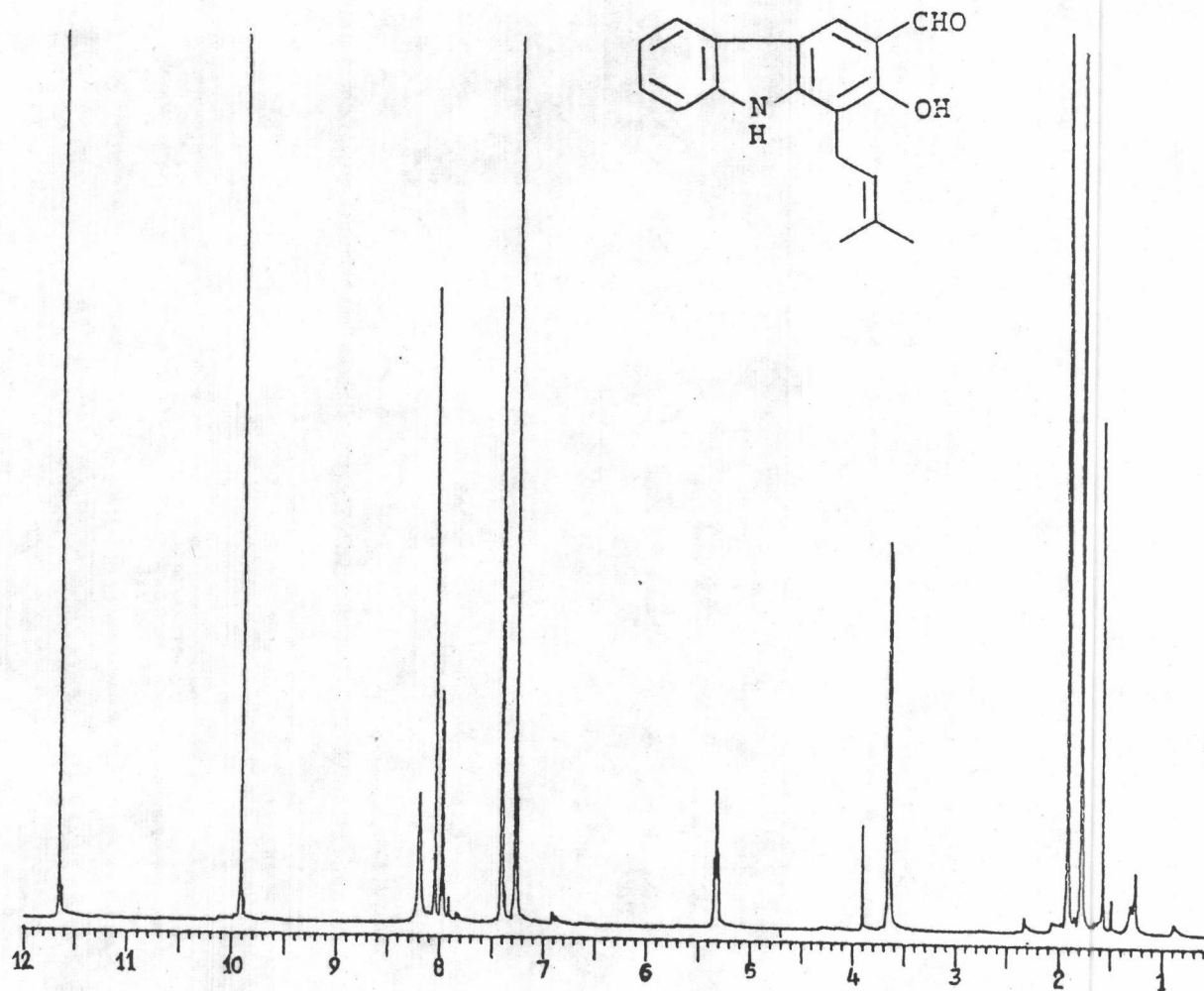


Figure 15 ^1H NMR spectrum of MS-1 (in CDCl_3)

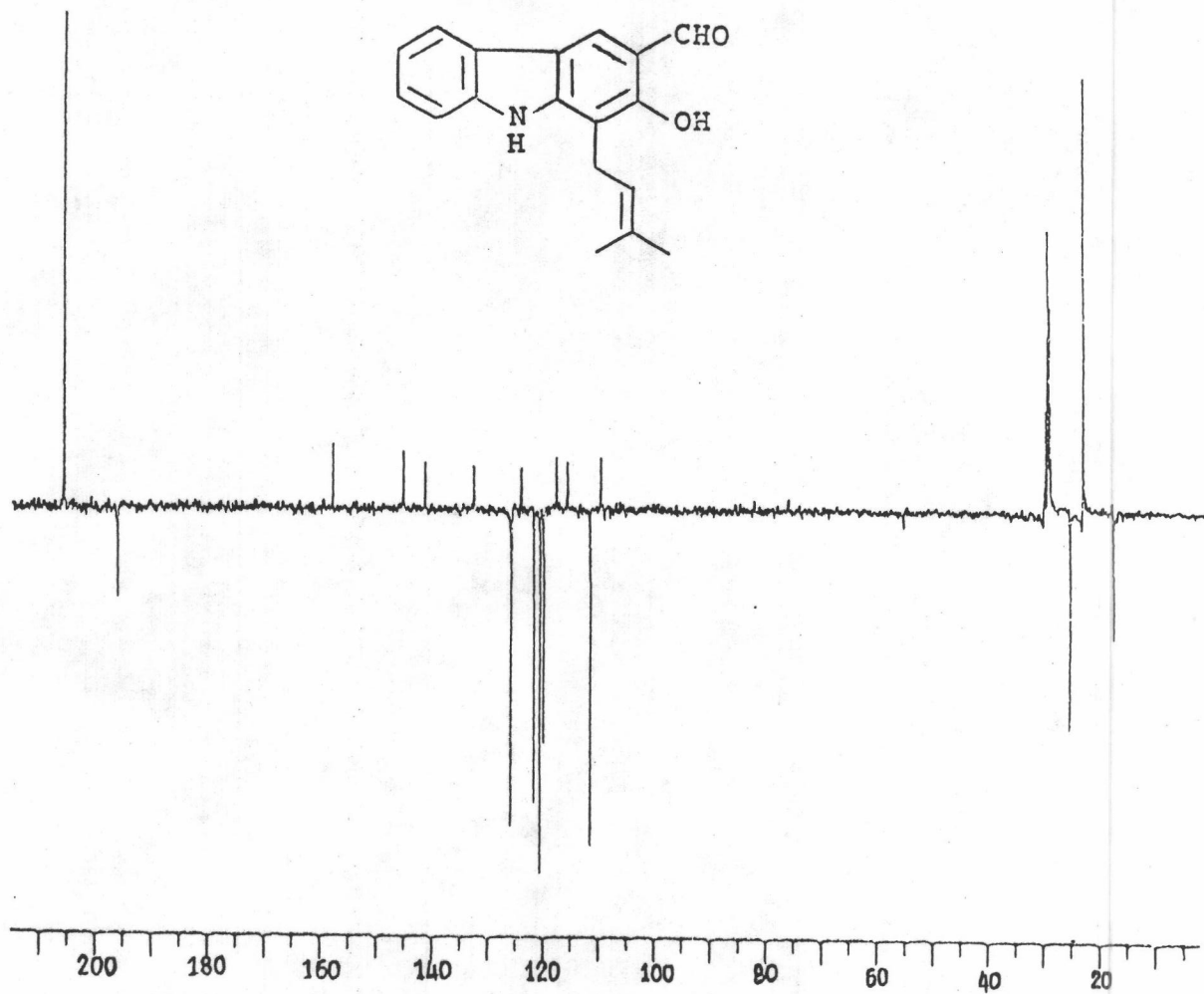


Figure 16 ^{13}C NMR spectrum of MS-1 (in acetone- d_6)

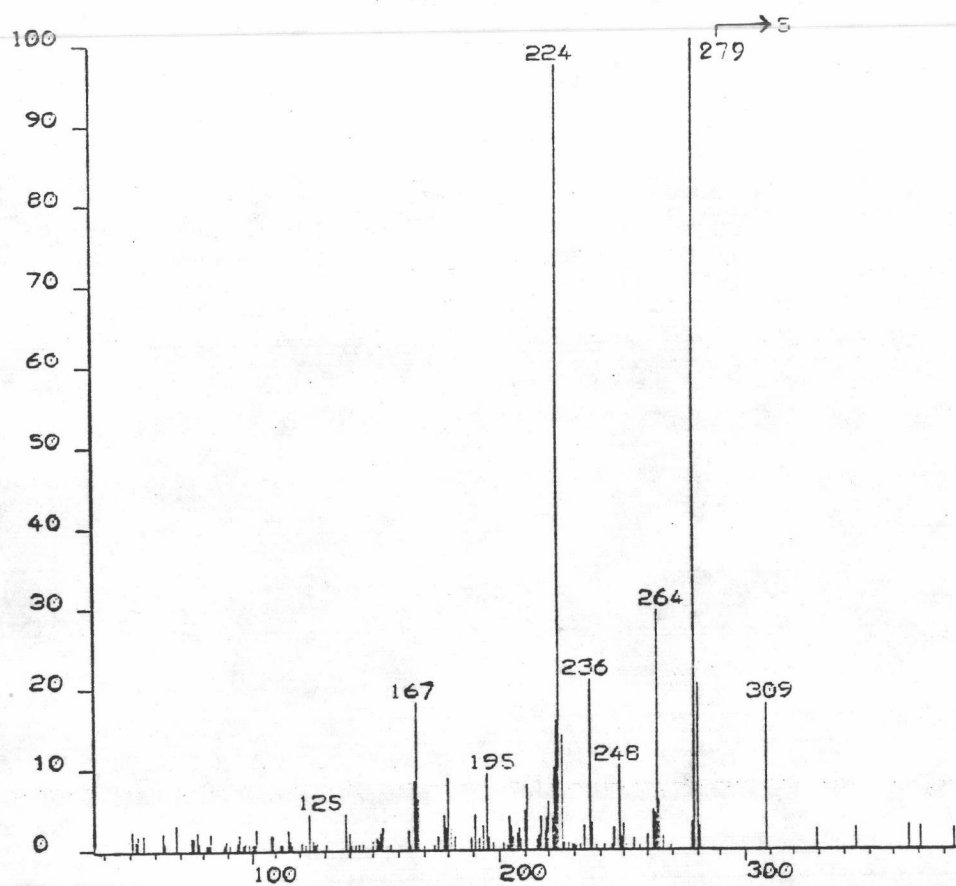


Figure 17 Mass spectrum of MS-1 (EIMS)

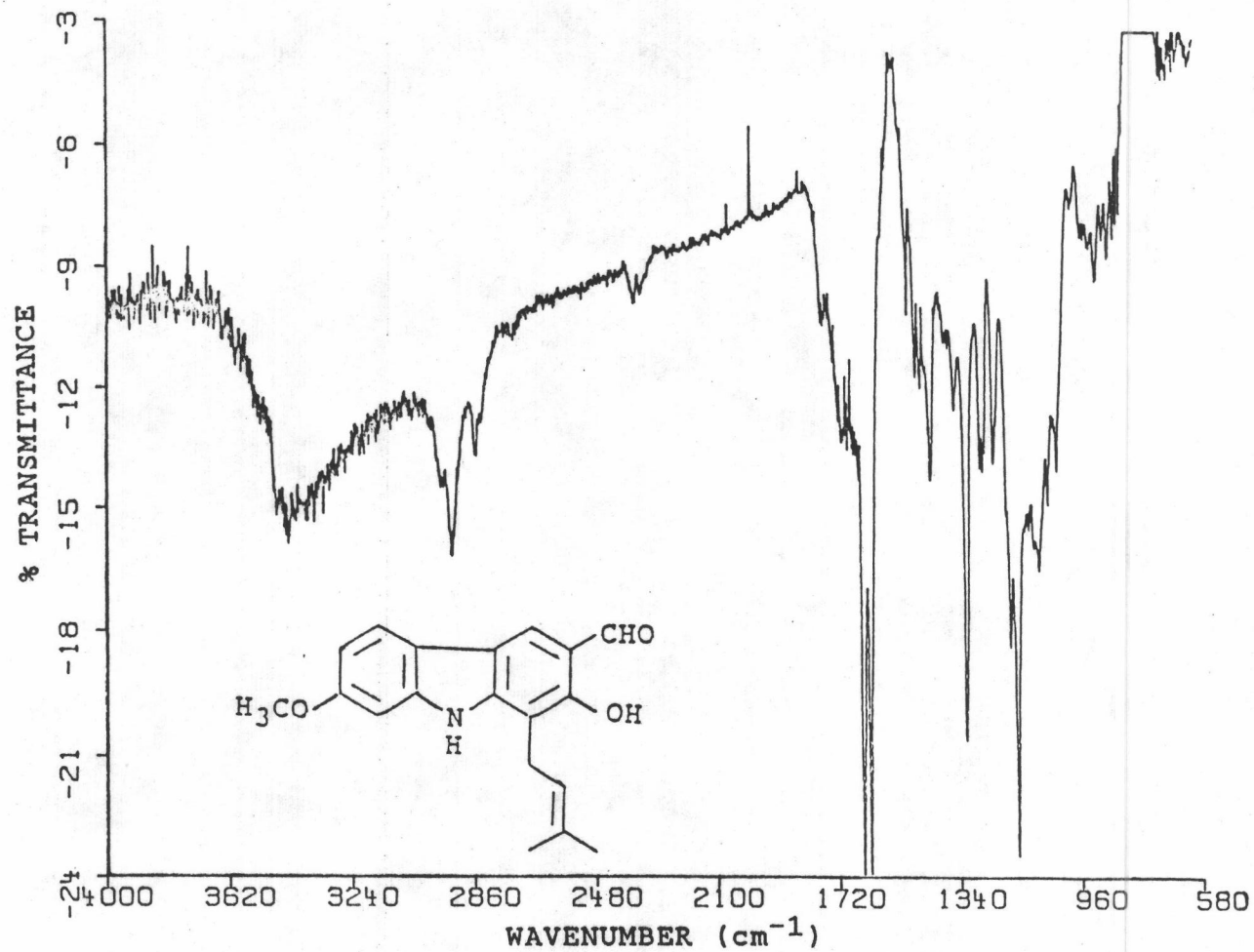


Figure 18 IR spectrum of MS-2 (in CCl₄)

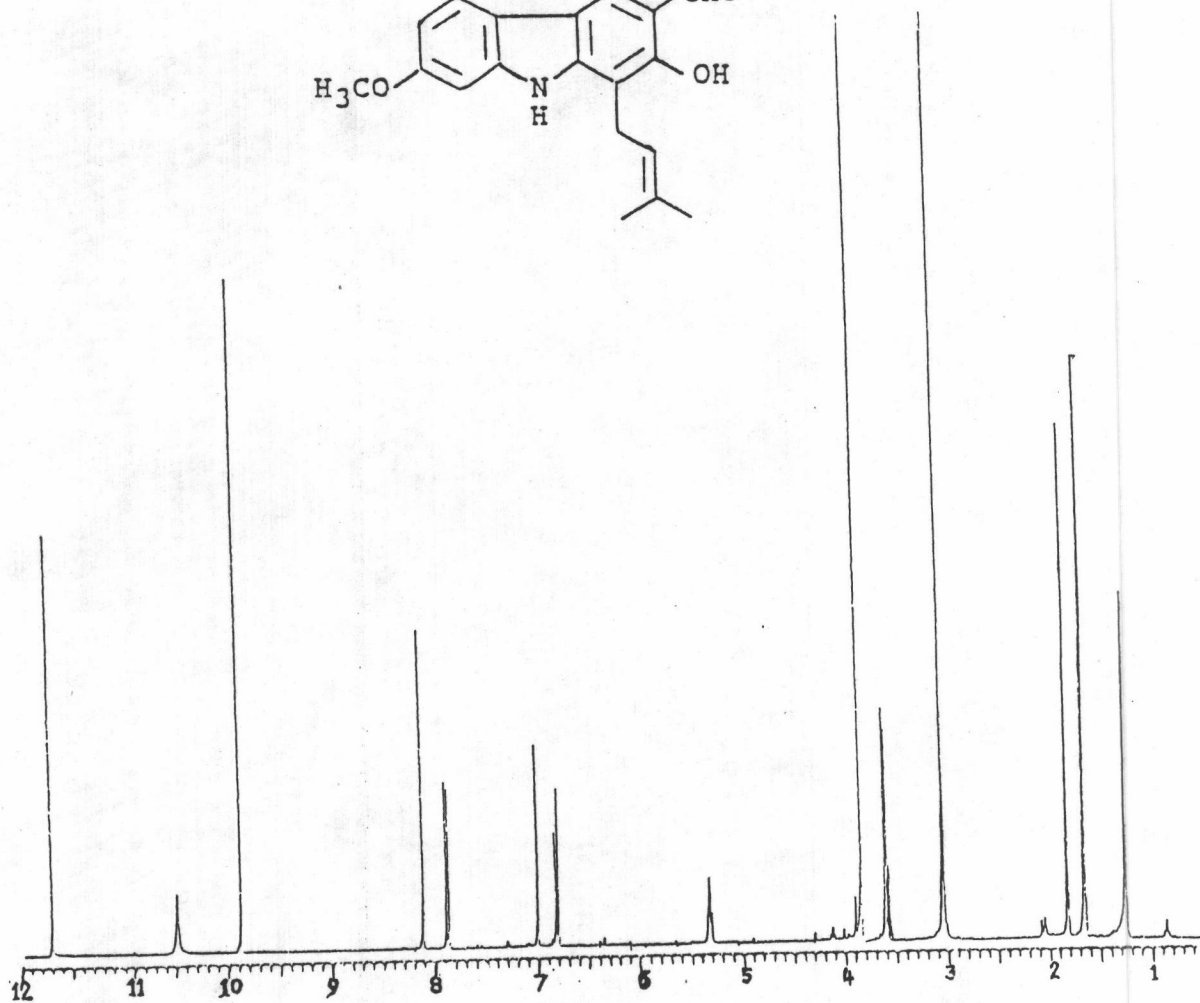
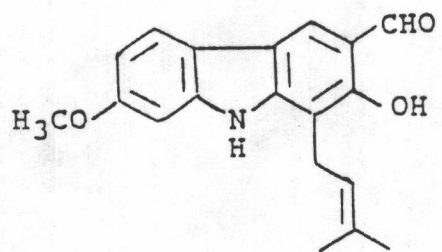


Figure 19 ¹H NMR spectrum of MS-2 (in acetone-d₆)

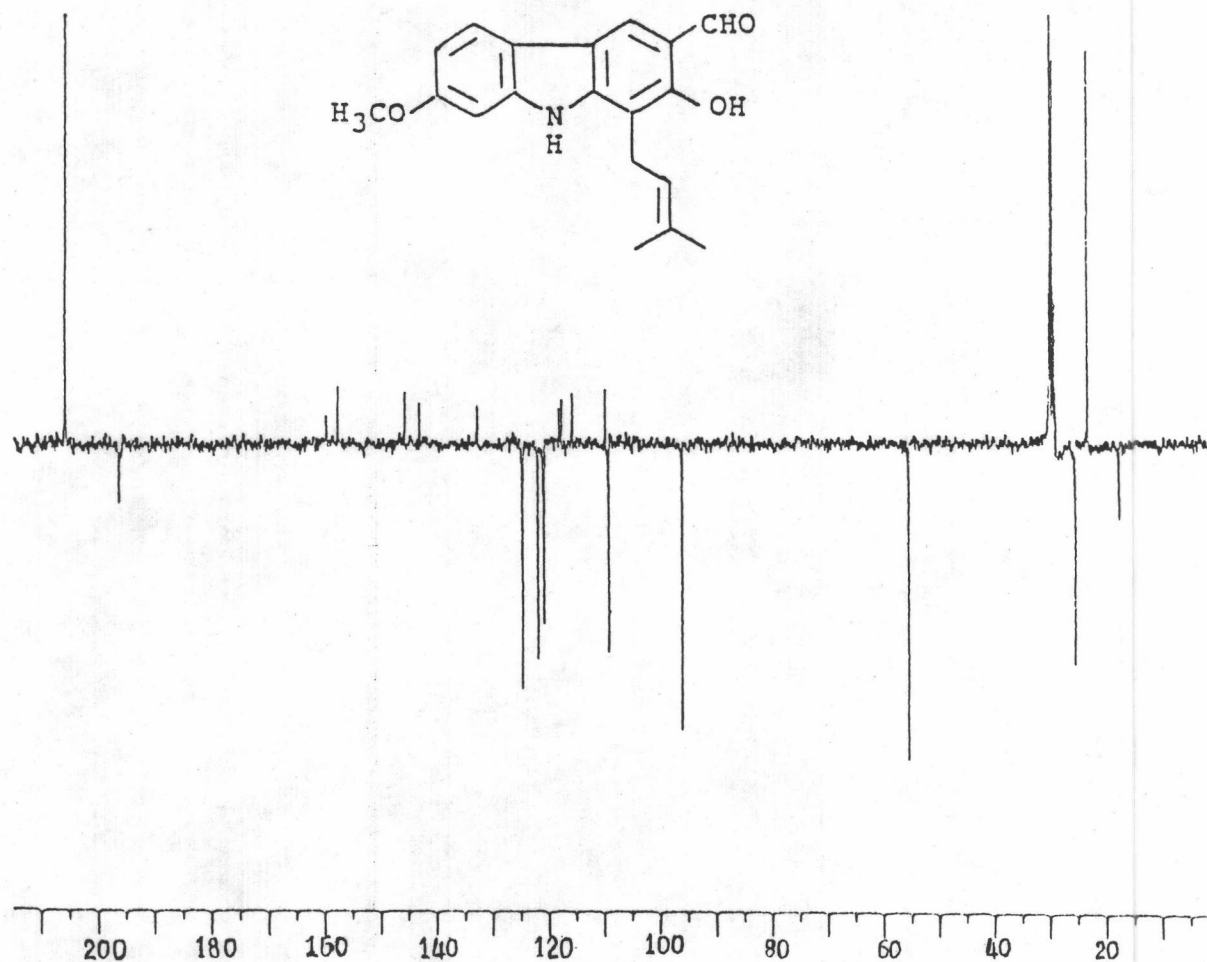


Figure 20 ^{13}C NMR spectrum of MS-2 (in acetone- d_6)

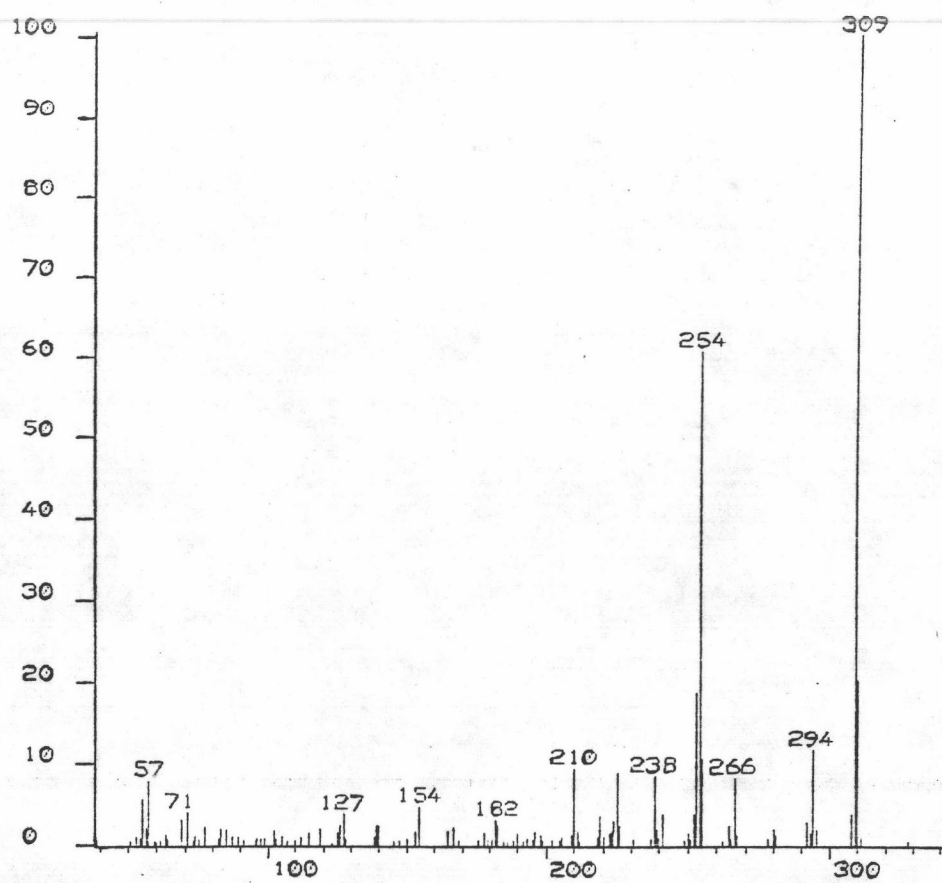


Figure 21 Mass spectrum of MS-2 (EIMS)

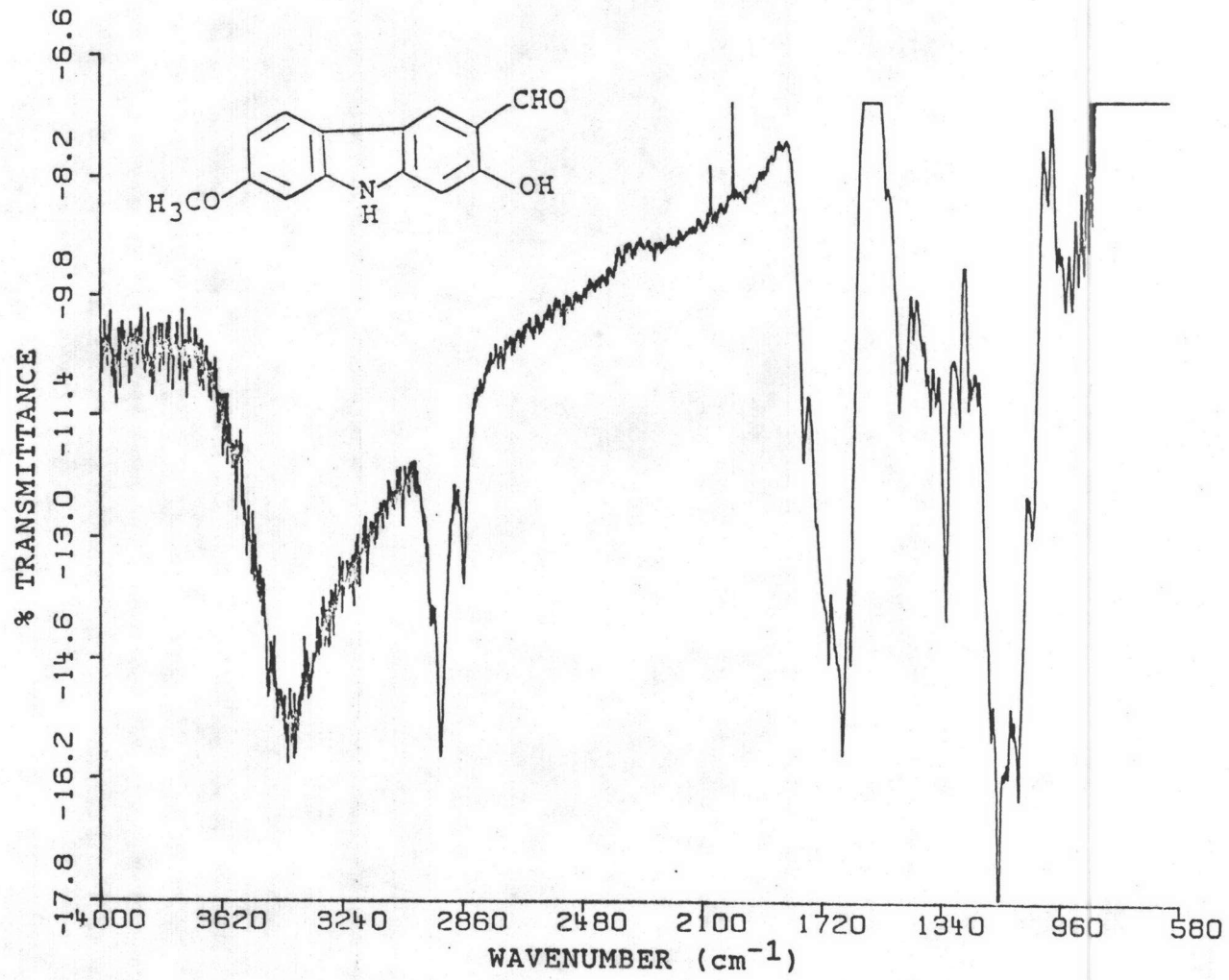


Figure 22 IR spectrum of MS-3 (in CCl₄)

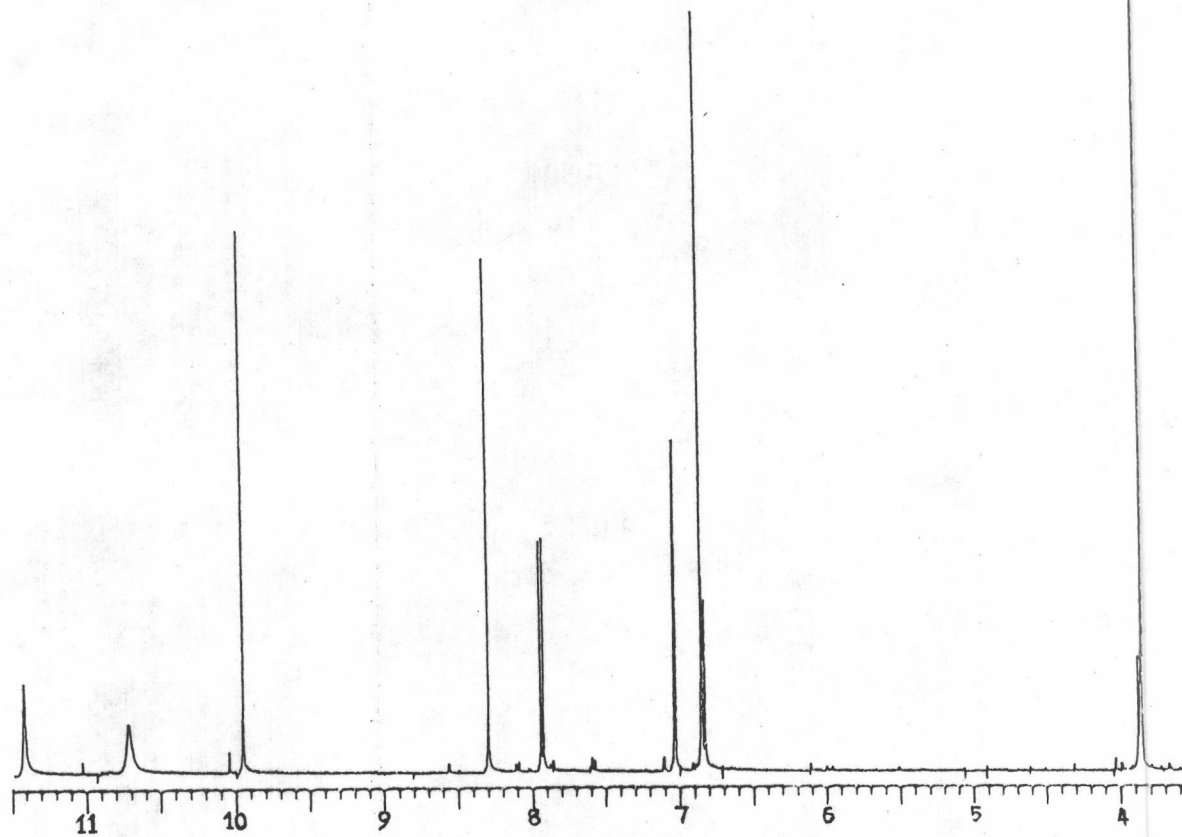
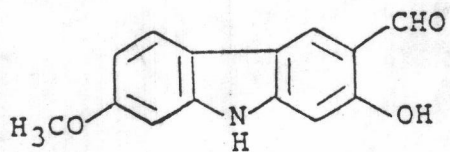


Figure 23 ^1H NMR spectrum of MS-3 (in acetone- d_6)

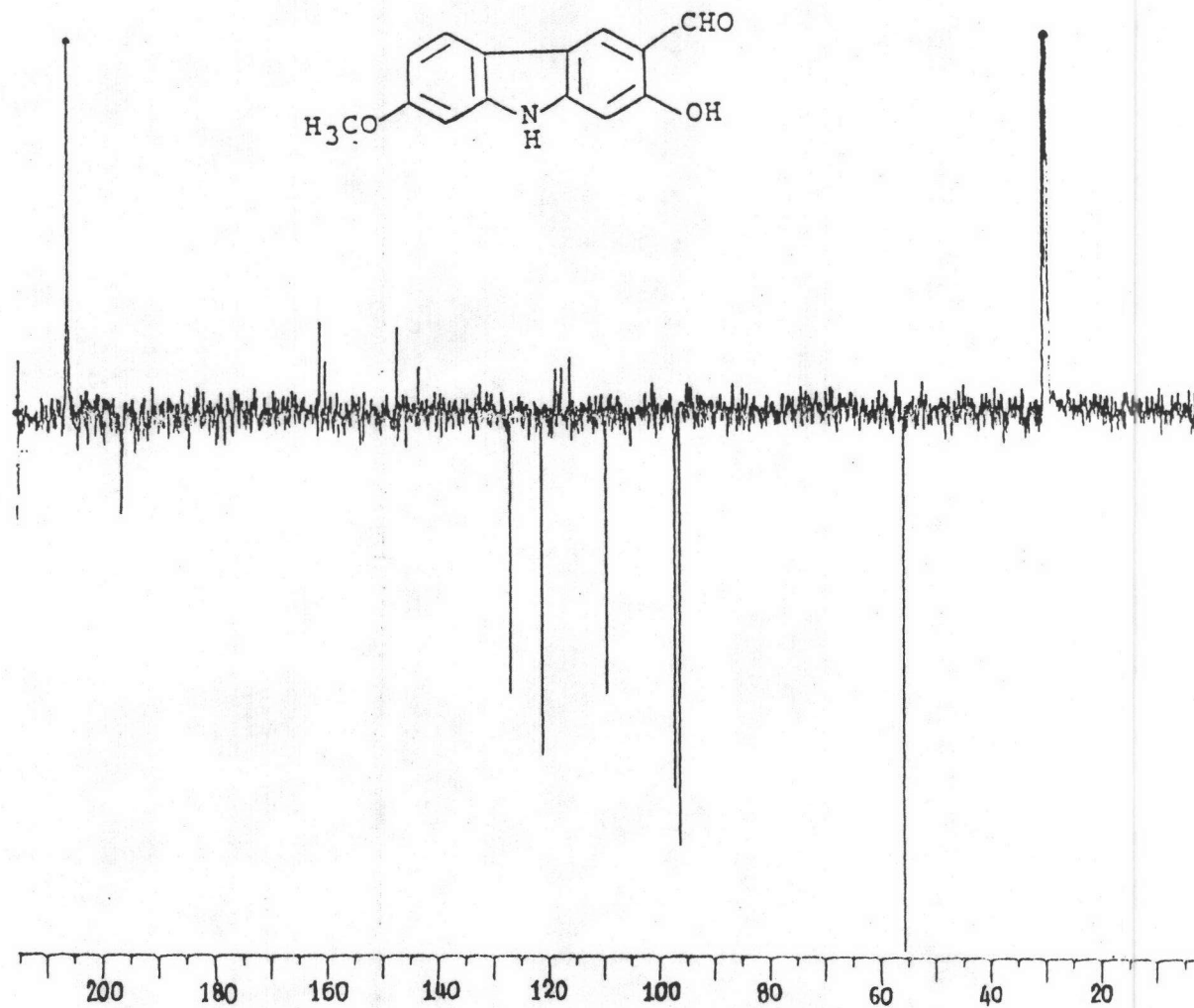


Figure 24 ^{13}C NMR spectrum of MS-3 (in acetone- d_6)

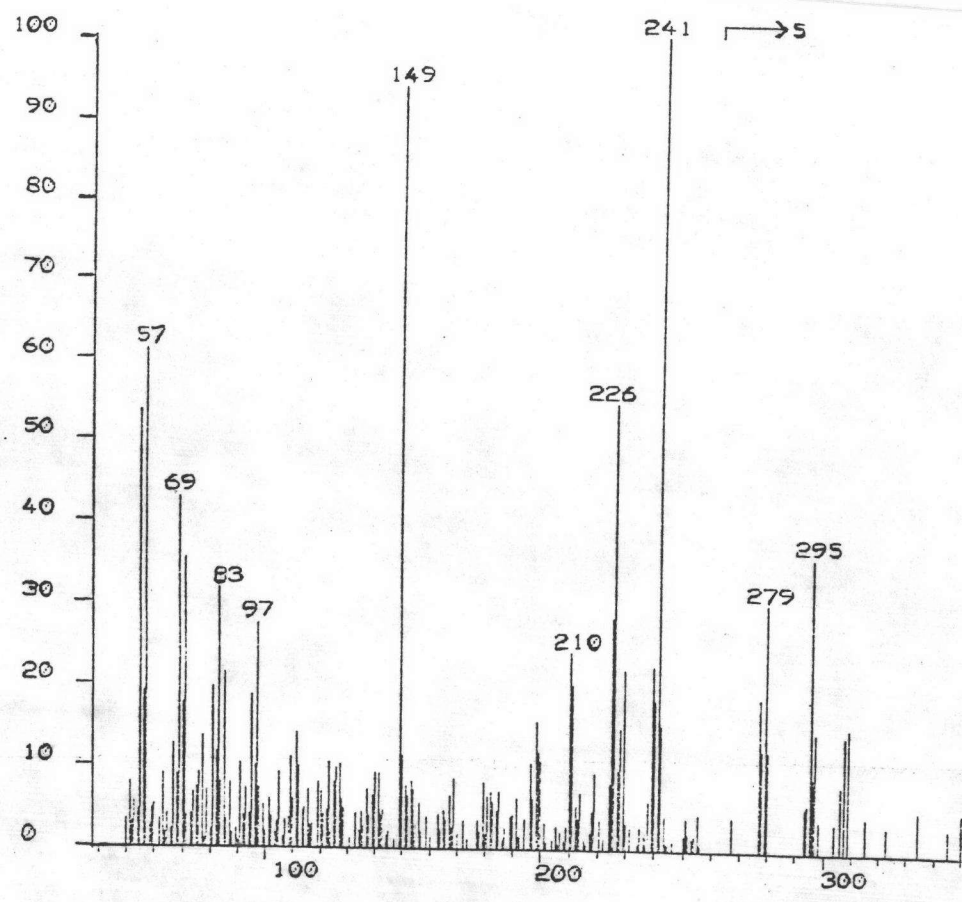


Figure 25 Mass spectrum of MS-3 (EIMS)

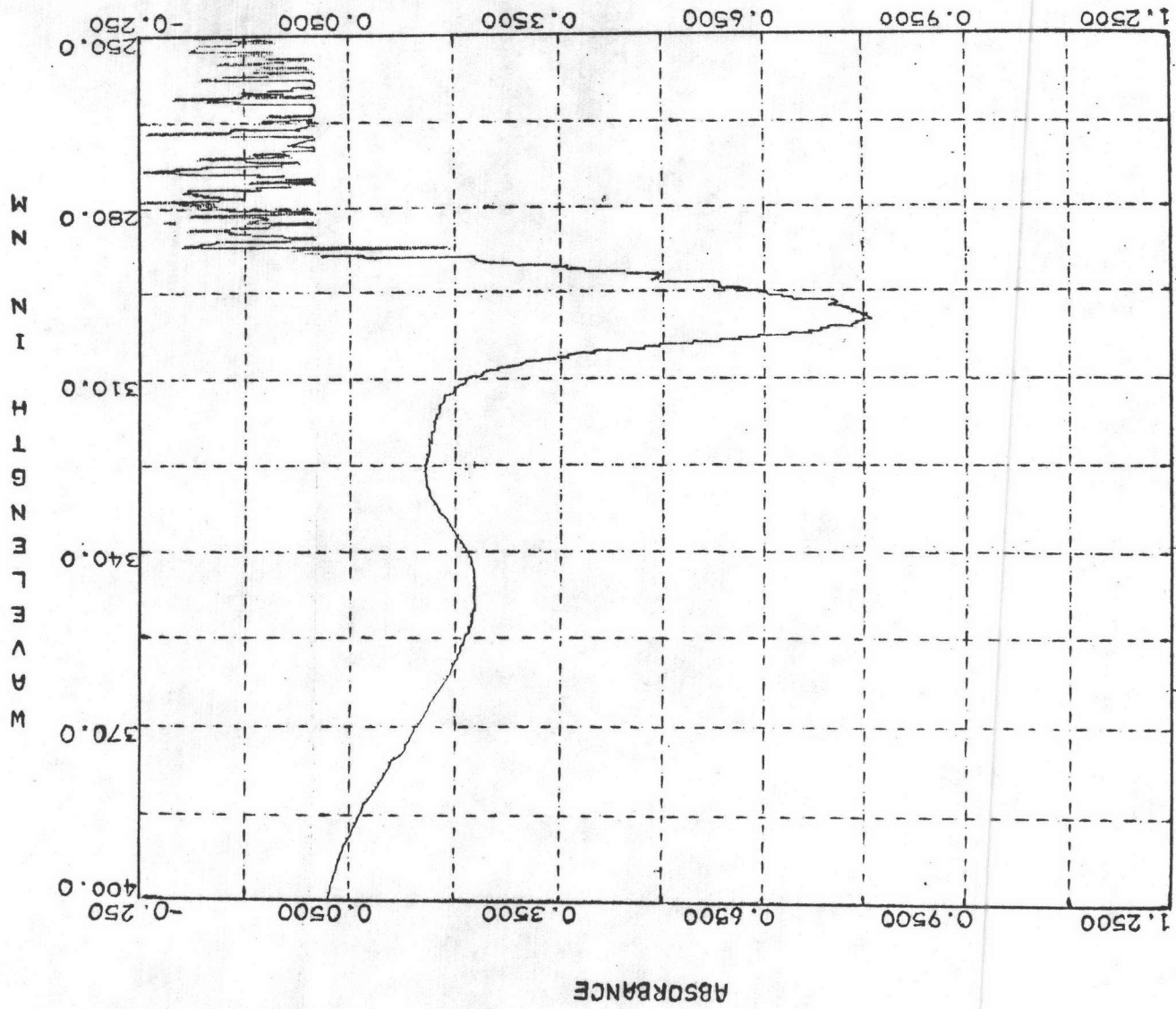


Figure 26 UV spectrum of MS-4 (in EtOH)

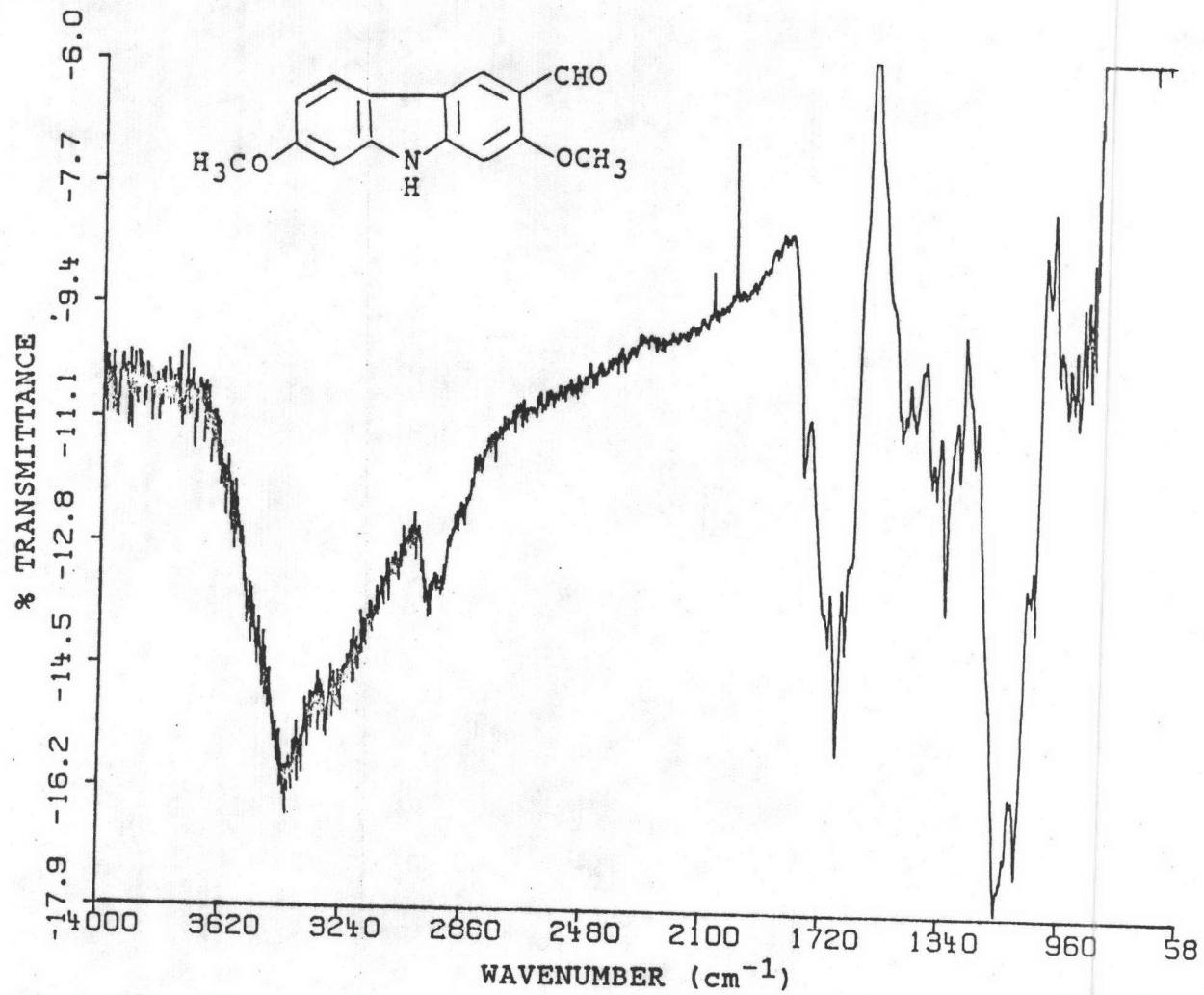


Figure 27 IR spectrum of MS-4 (in CCl₄)

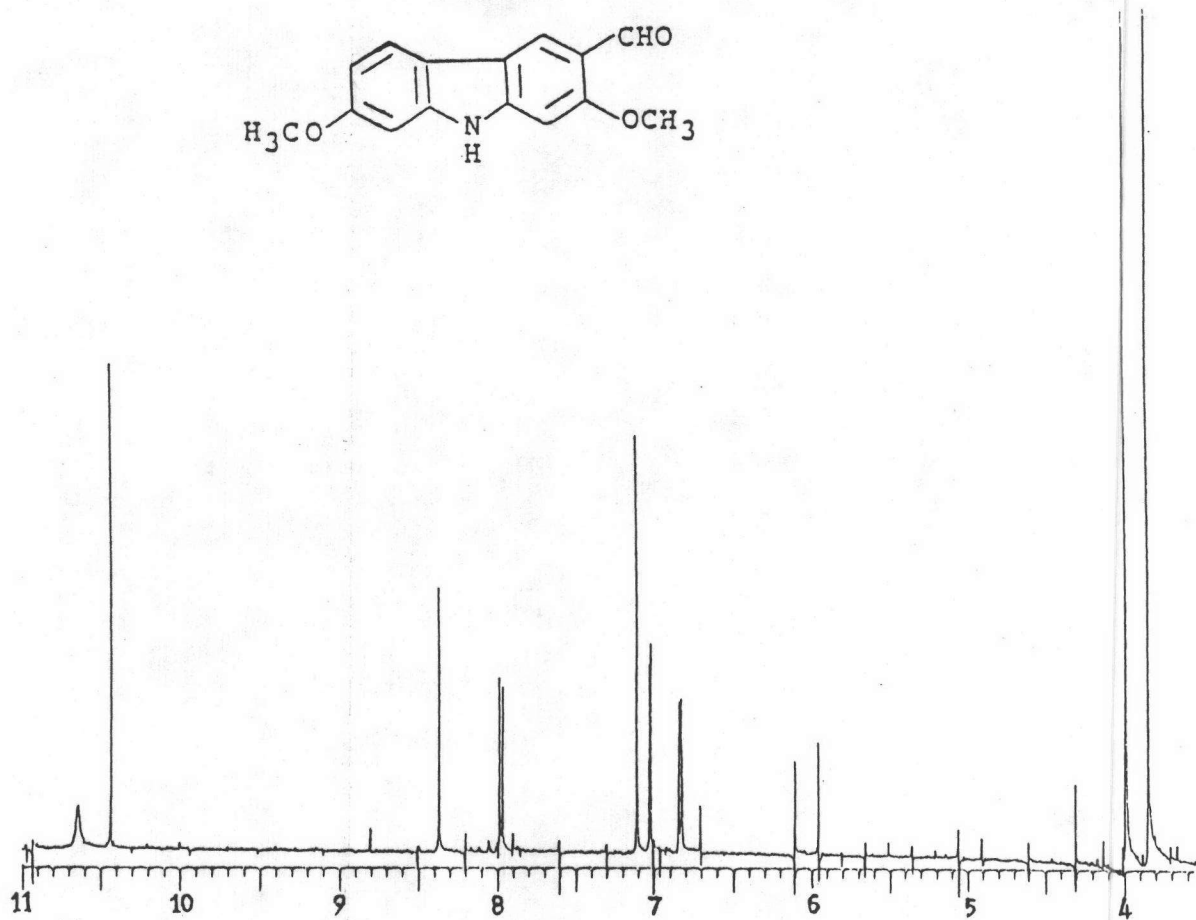
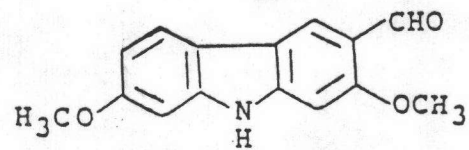


Figure 28 ¹H NMR spectrum of MS-4 (in acetone-d₆)

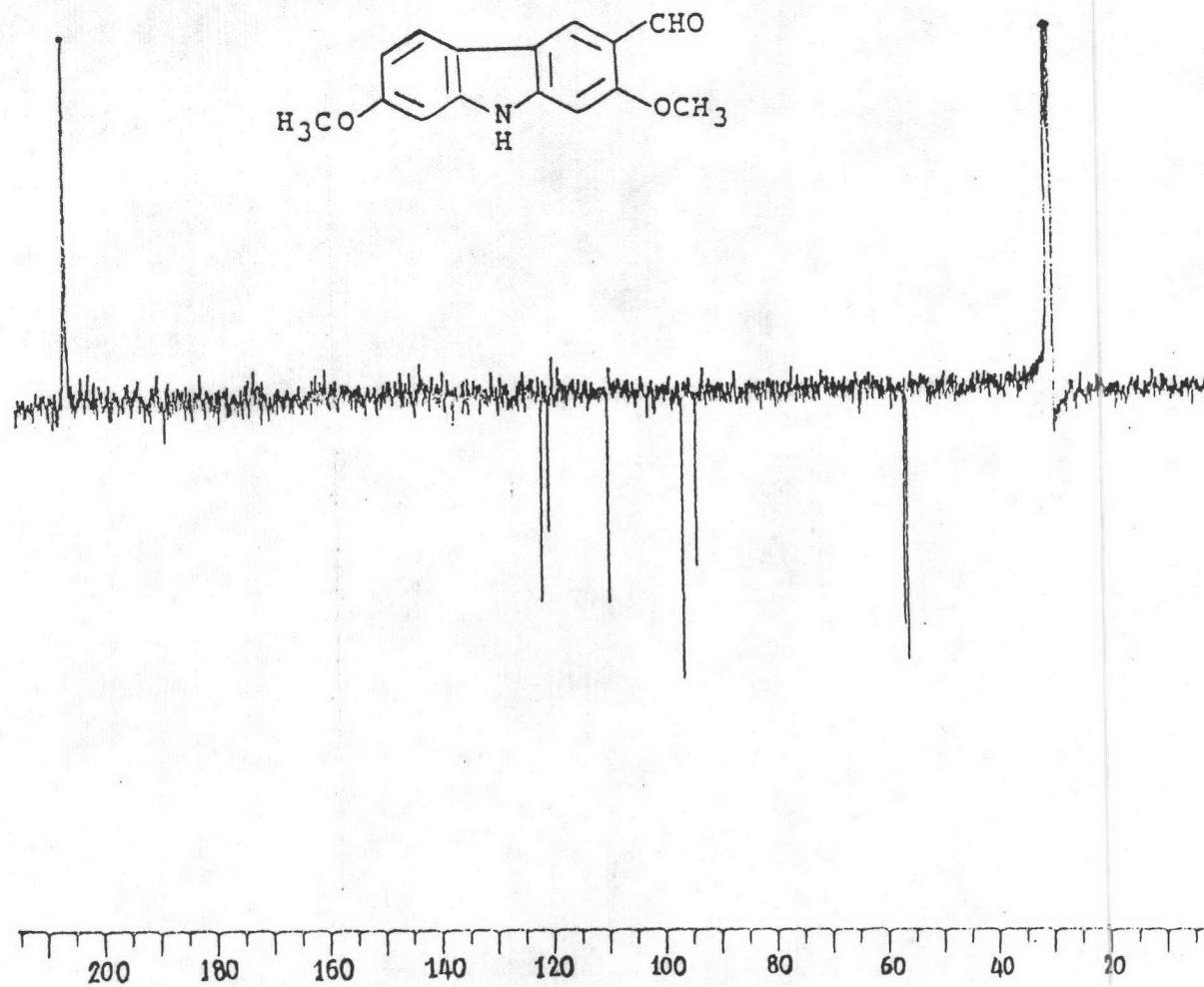


Figure 29 ^{13}C NMR spectrum of MS-4 (in acetone- d_6)

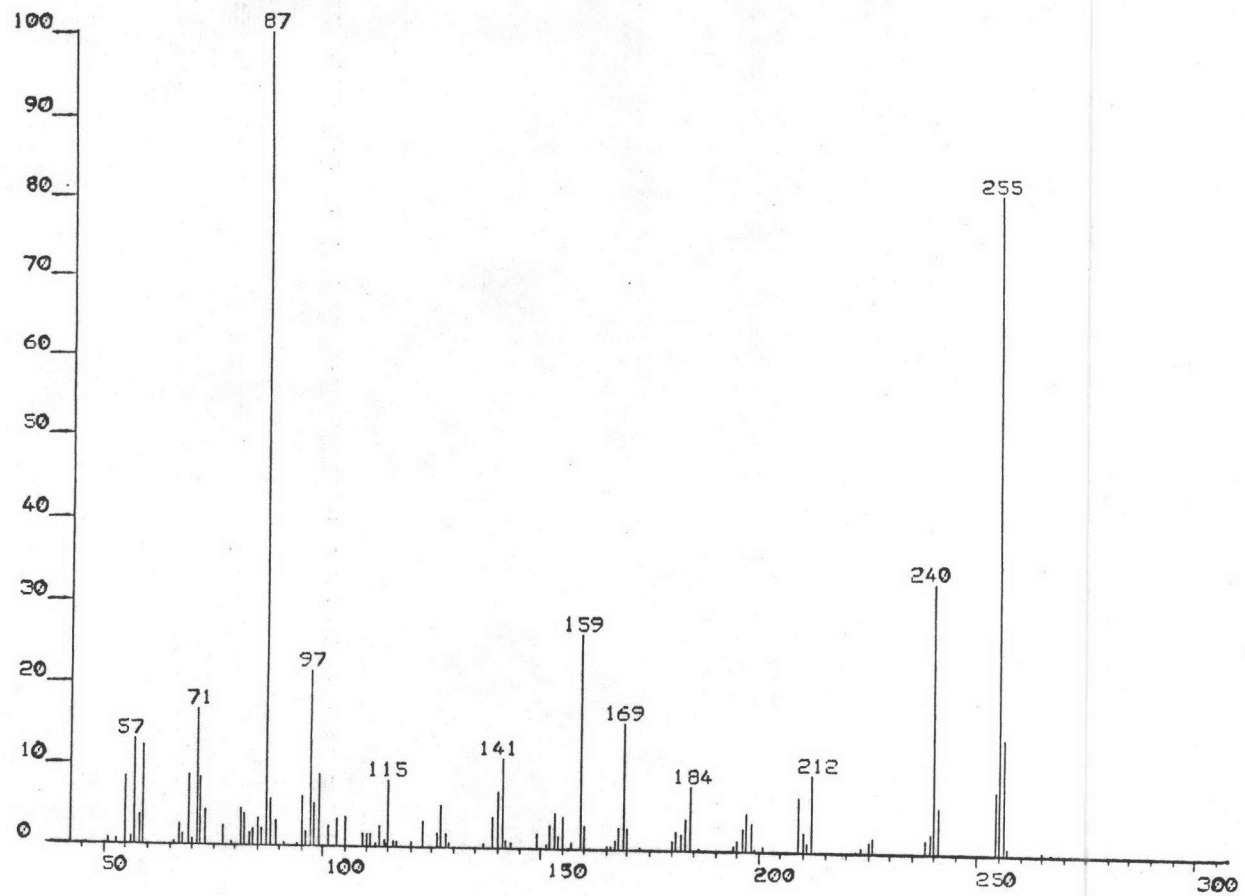


Figure 30 Mass spectrum of MS-4 (EIMS)

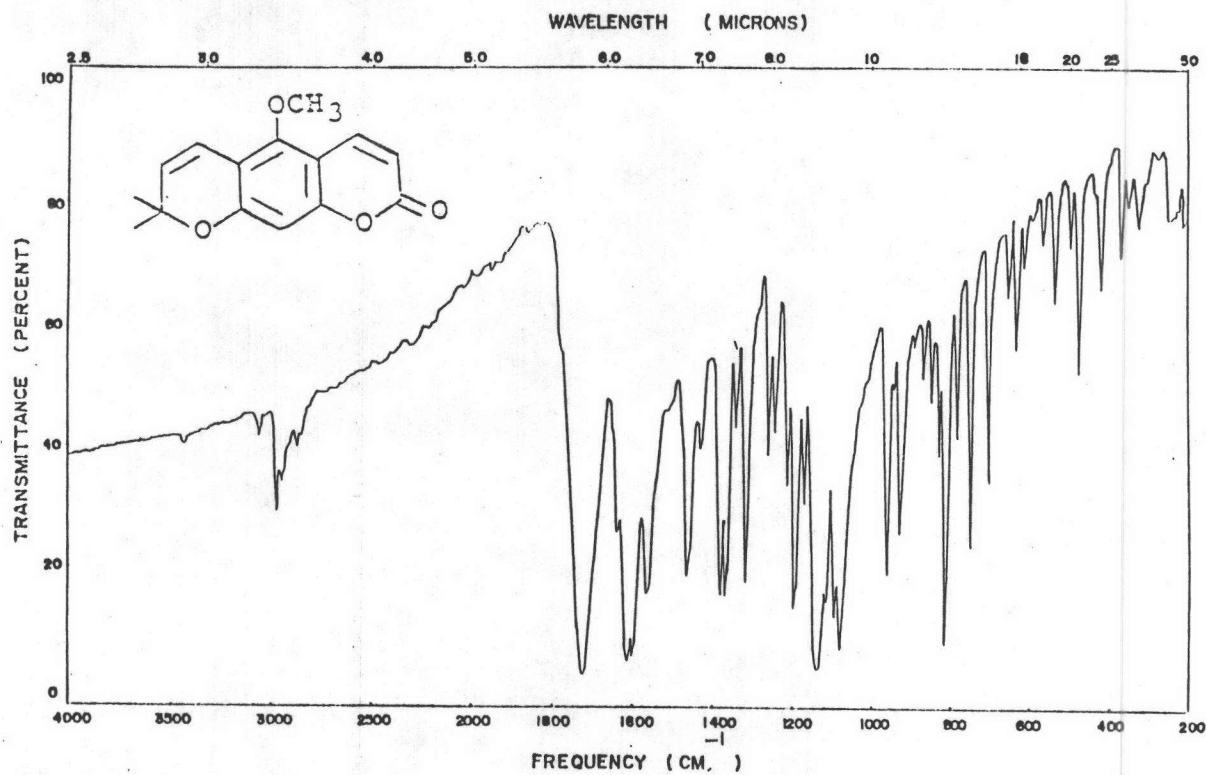


Figure 31 IR spectrum of MS-5 (KBr disc)

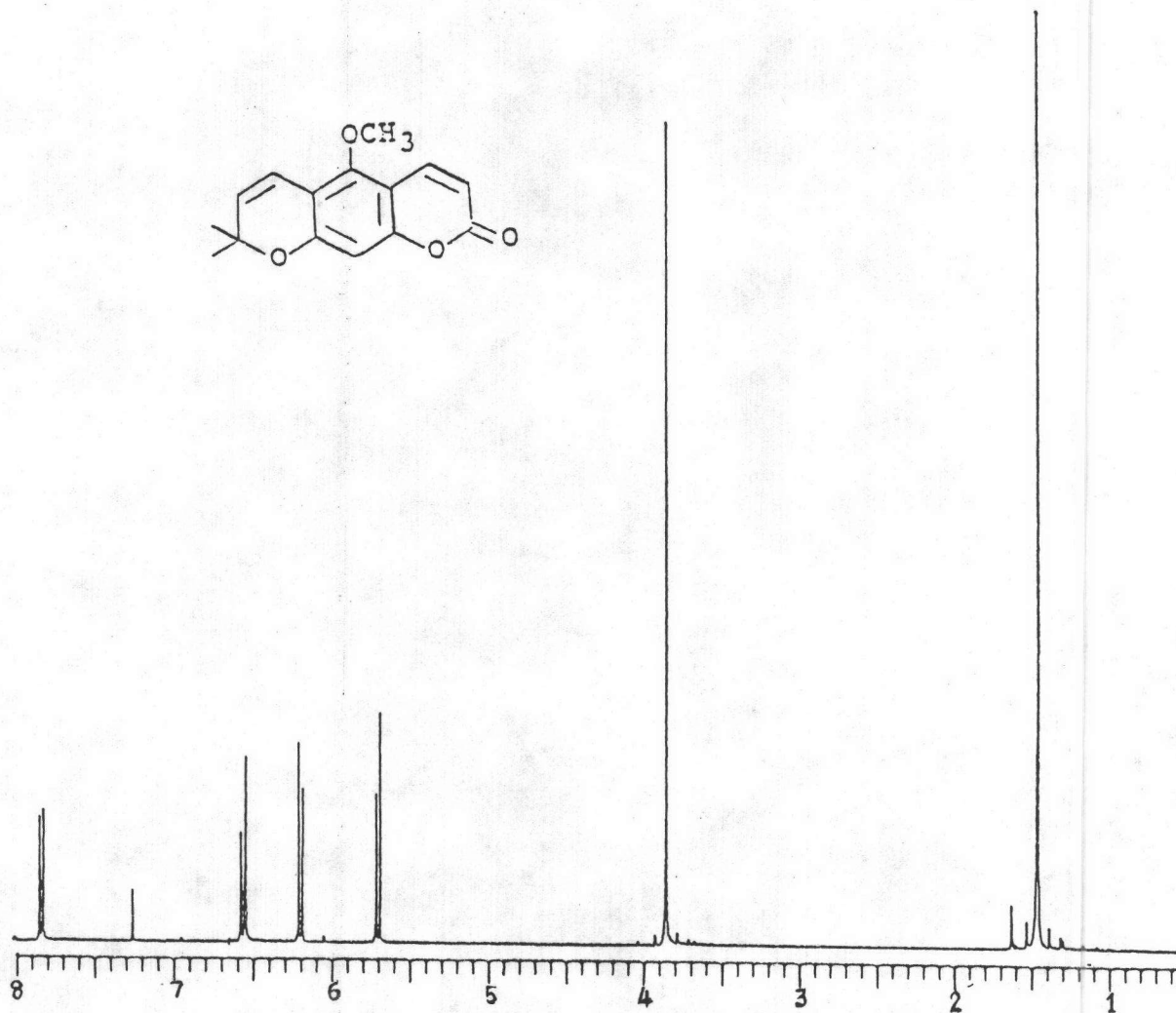
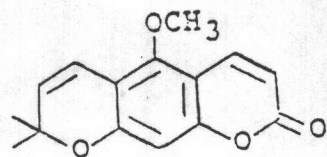


Figure 32 ¹H NMR spectrum of MS-5 (in acetone-d₆)

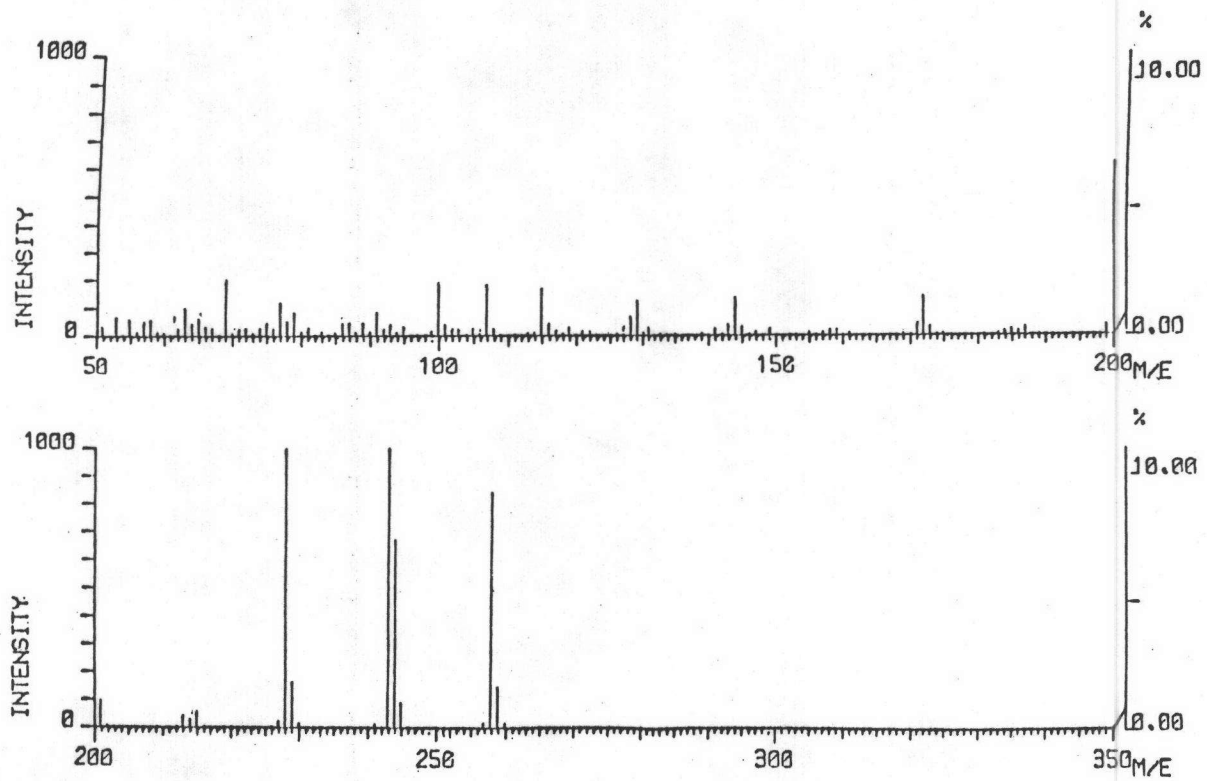


Figure 33 Mass spectrum of MS-5 (EIMS)

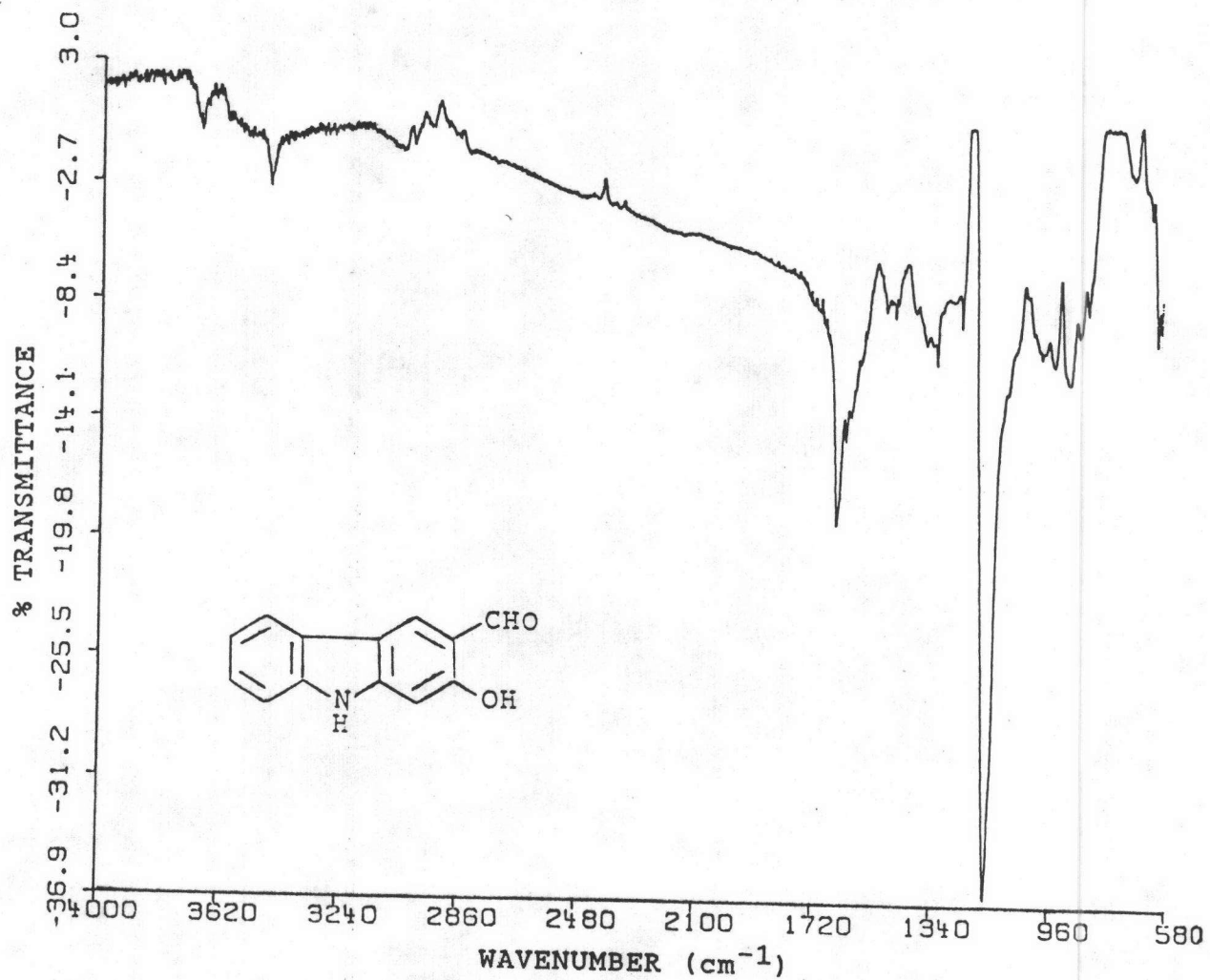


Figure 34 IR spectrum of MS-6 (in CHCl_3)

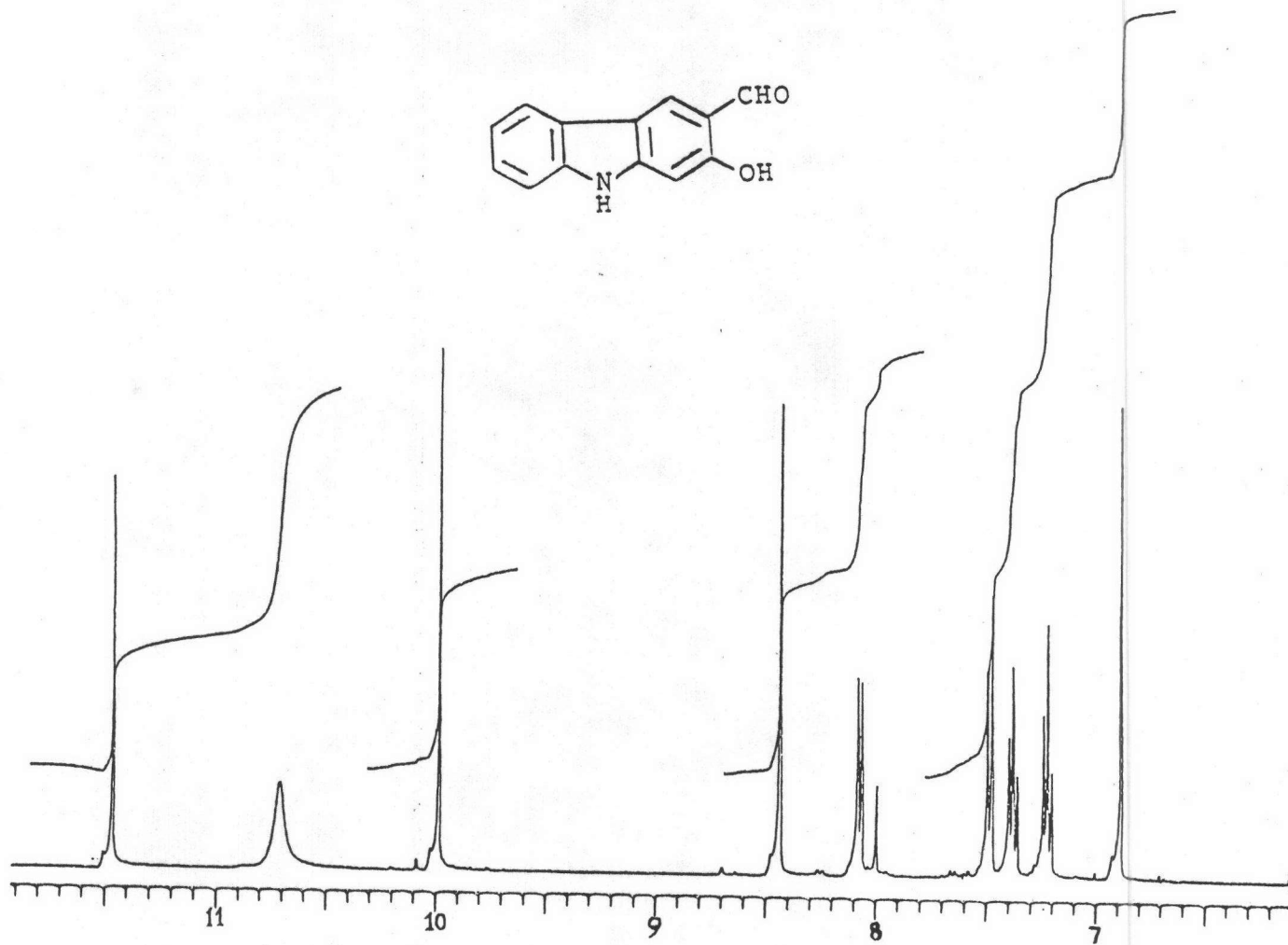


Figure 35 ^1H NMR spectrum of MS-6 (in acetone- d_6)

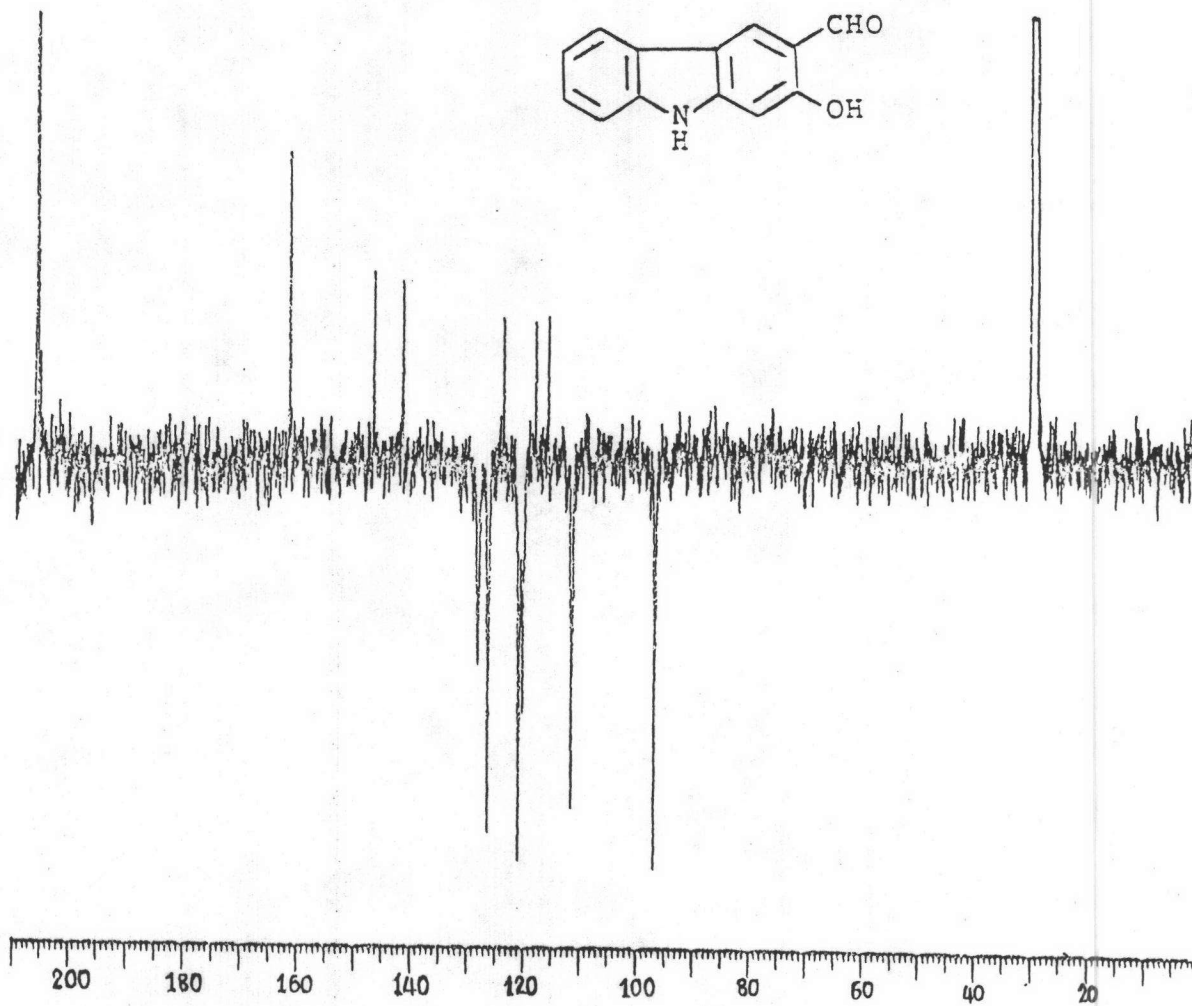


Figure 36 ^{13}C NMR spectrum of MS-6 (in acetone- d_6)

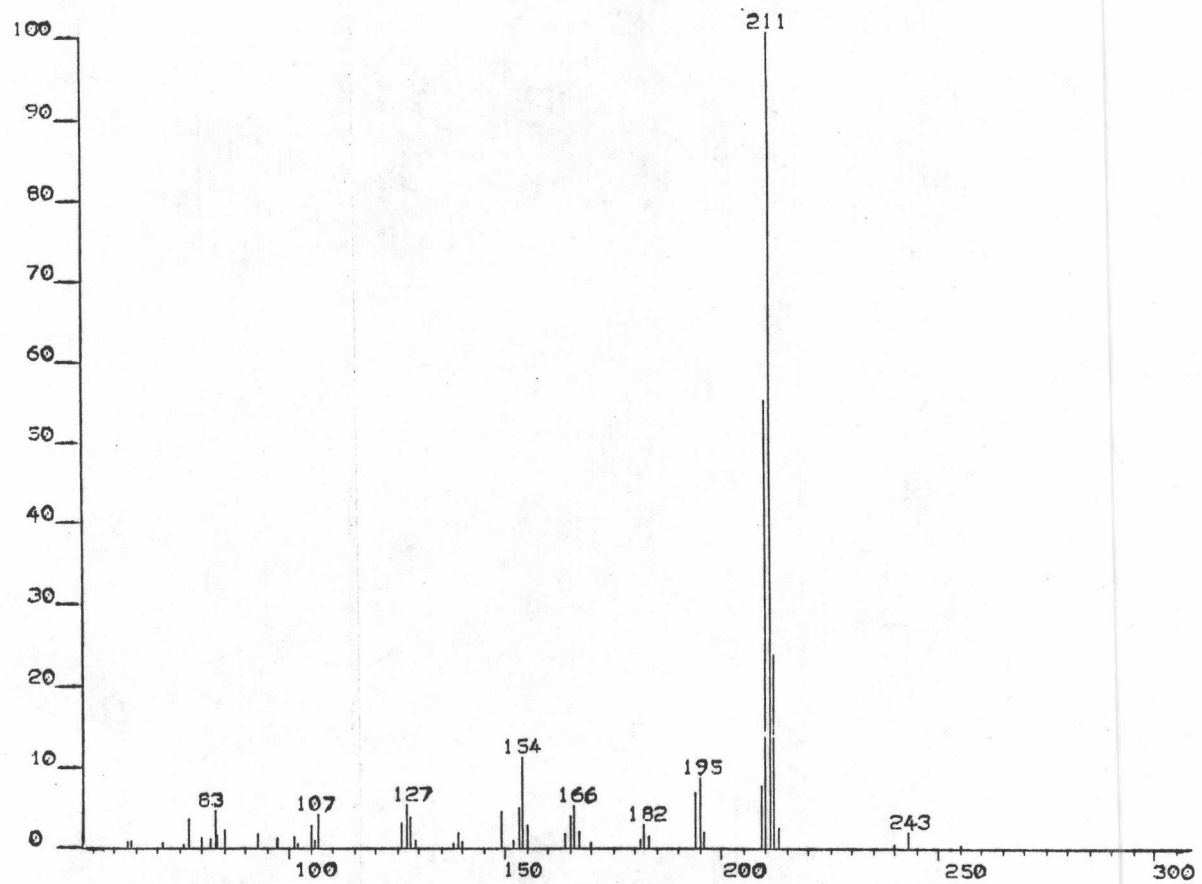


Figure 37 Mass spectrum of MS-6 (EIMS)

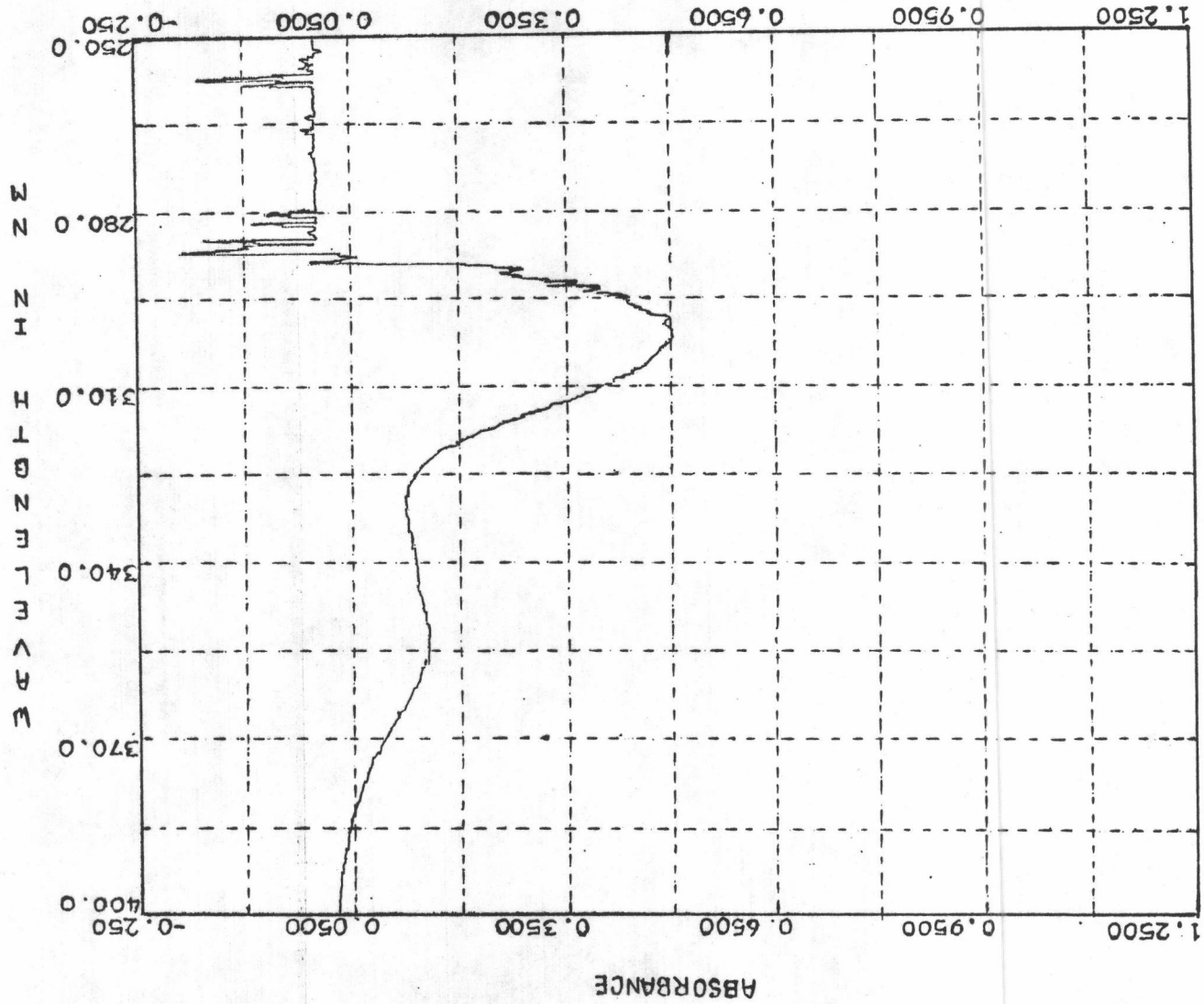


Figure 38 UV spectrum of MS-7 (in EtOH)

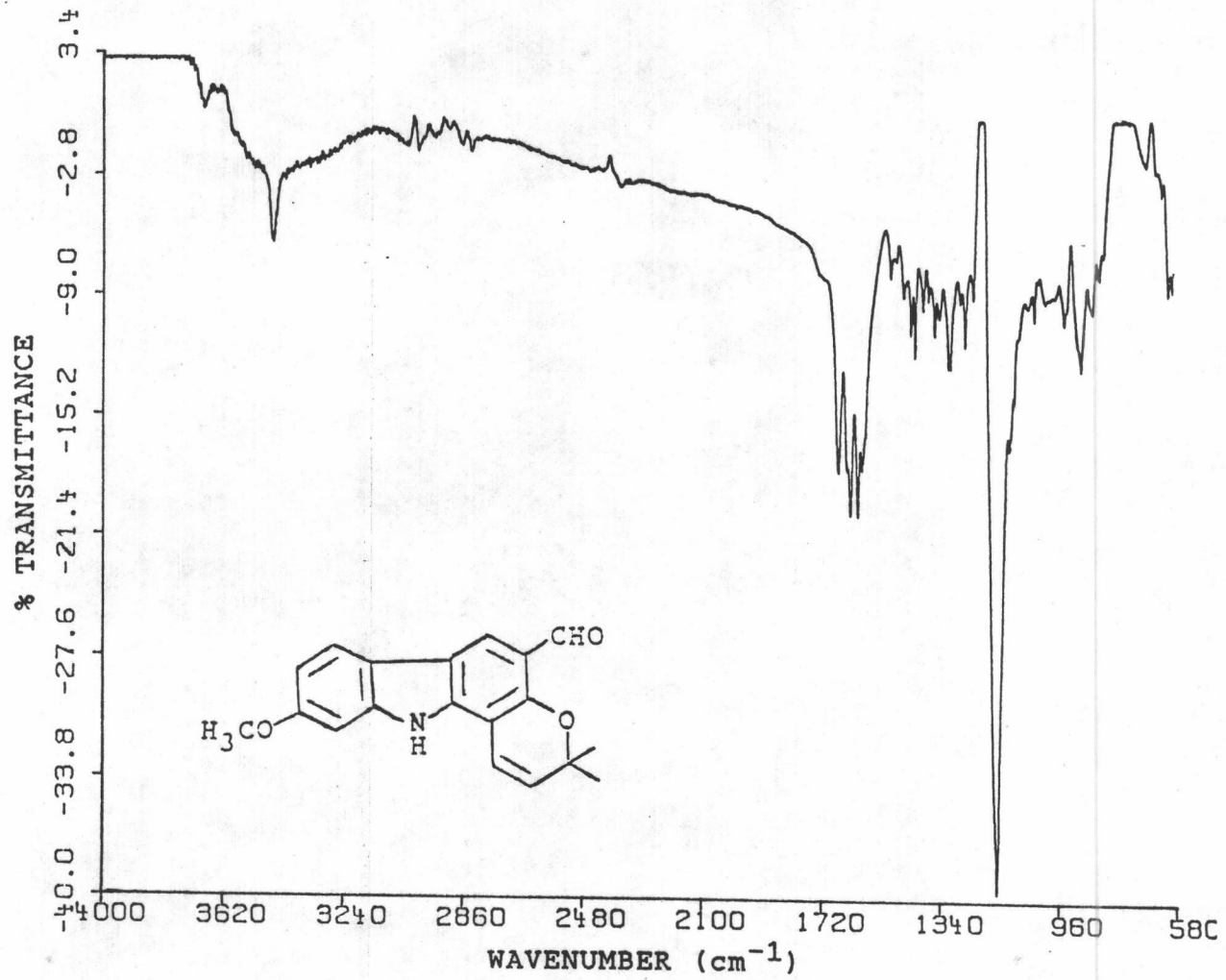


Figure 39 IR spectrum of MS-7 (in CHCl_3)

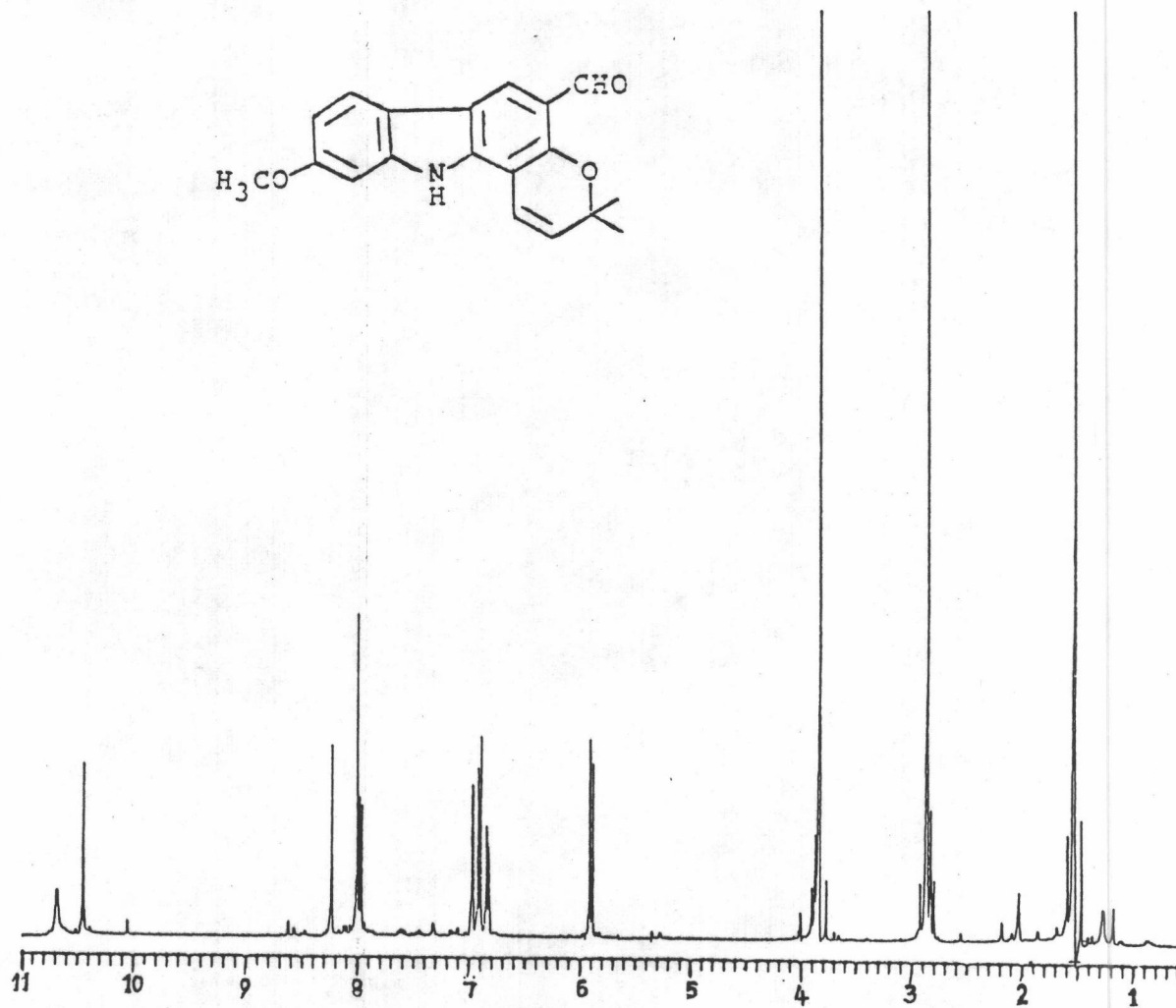
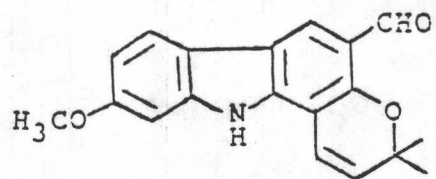


Figure 40 ¹H NMR spectrum of MS-7 (in acetone-d₆)

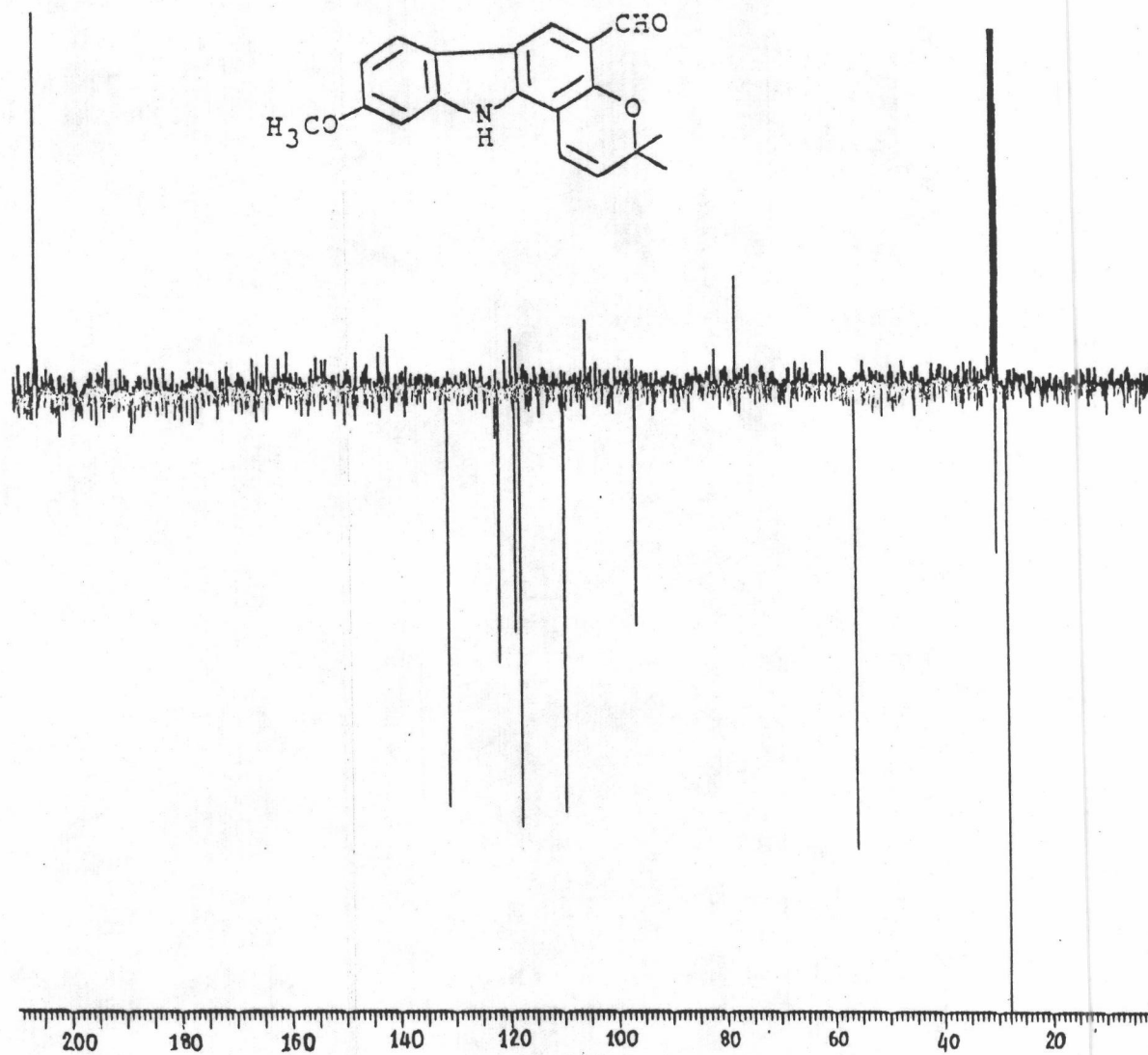


Figure 41 ^{13}C NMR spectrum of MS-7 (in acetone- d_6)

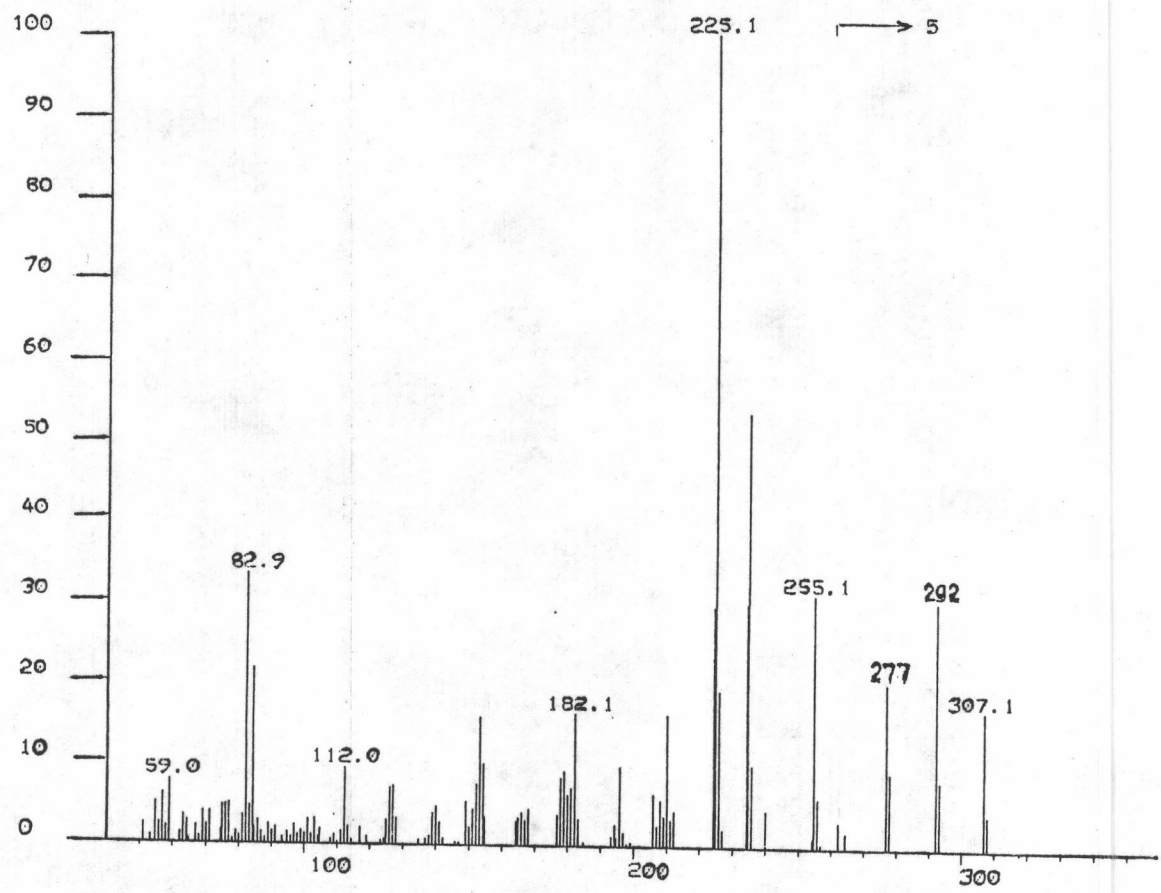
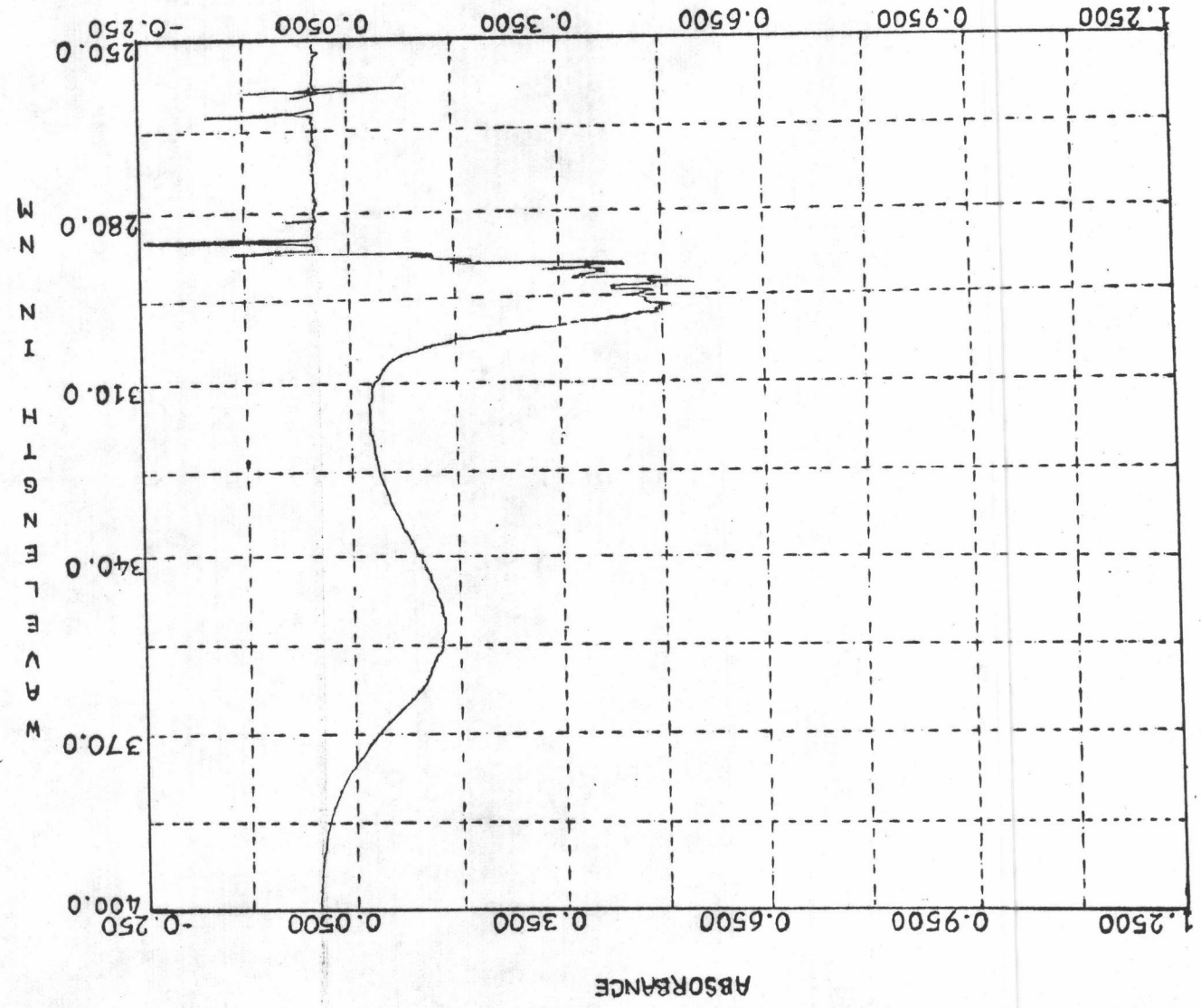


Figure 42 Mass spectrum of MS-7 (EIMS)

Figure 43 UV spectrum of MS-8 (in EtOH)



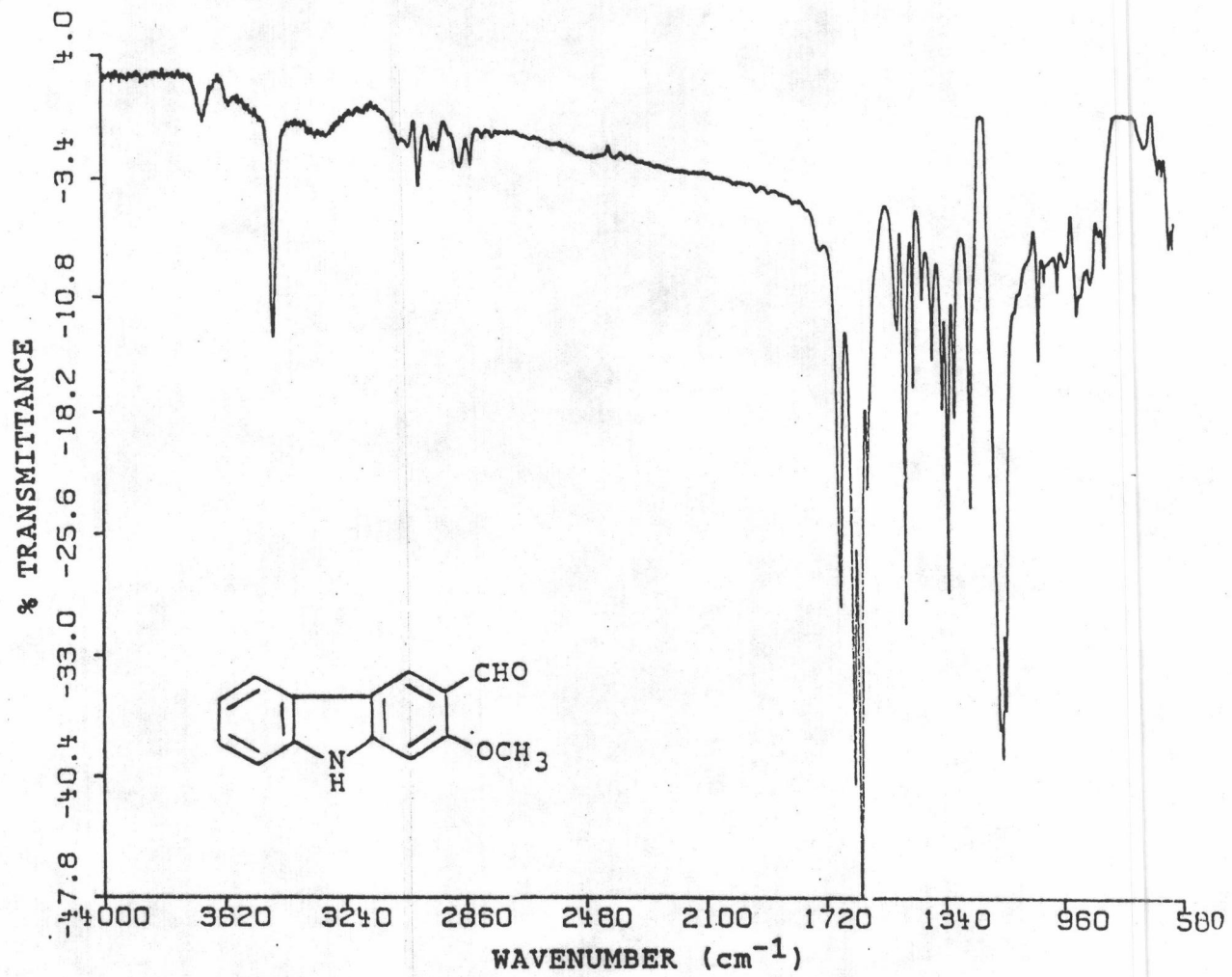


Figure 44 IR spectrum of MS-8 (in CHCl_3)

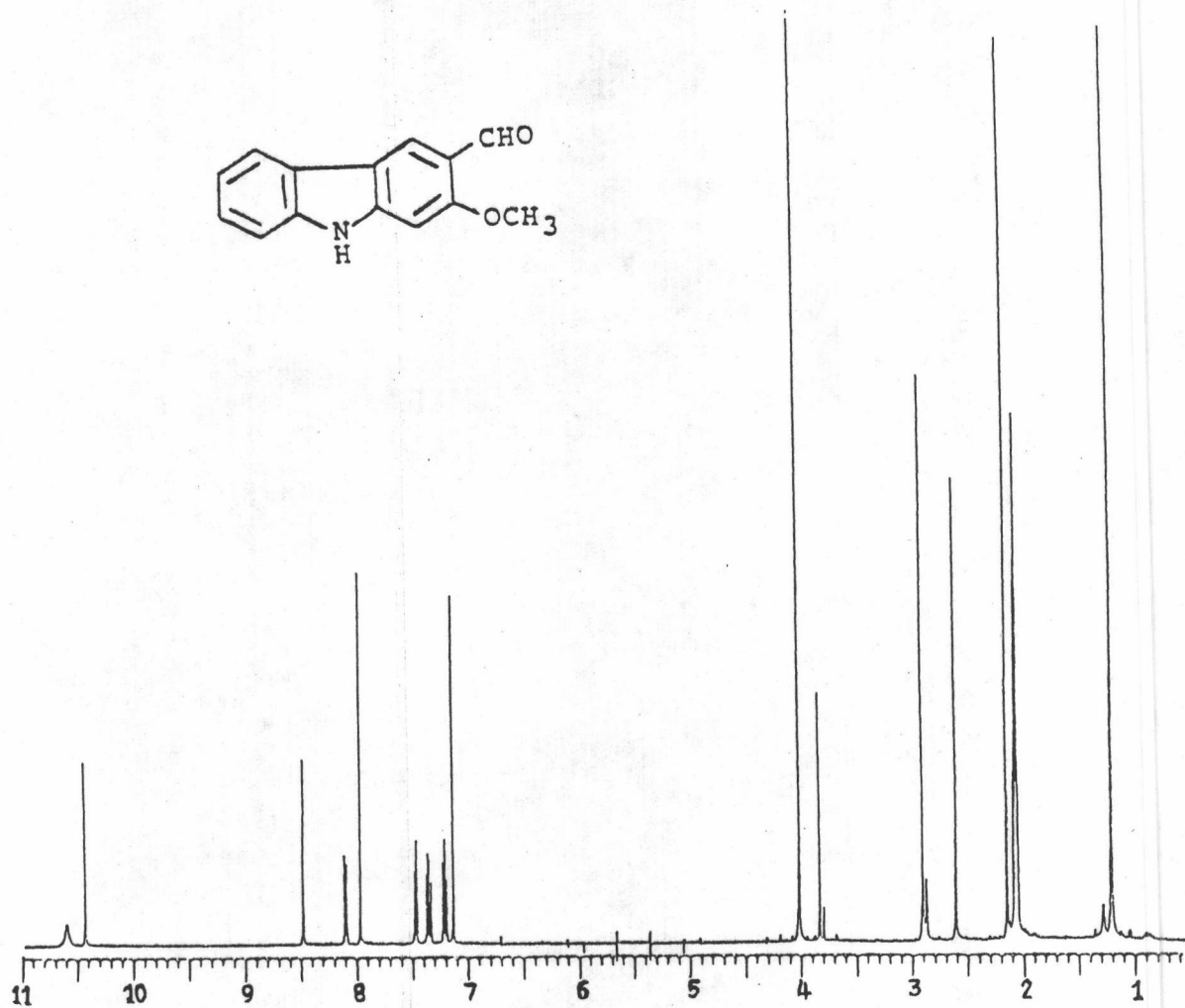
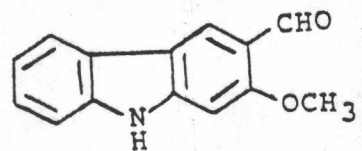


Figure 45 ¹H NMR spectrum of MS-8 (in acetone-d₆)

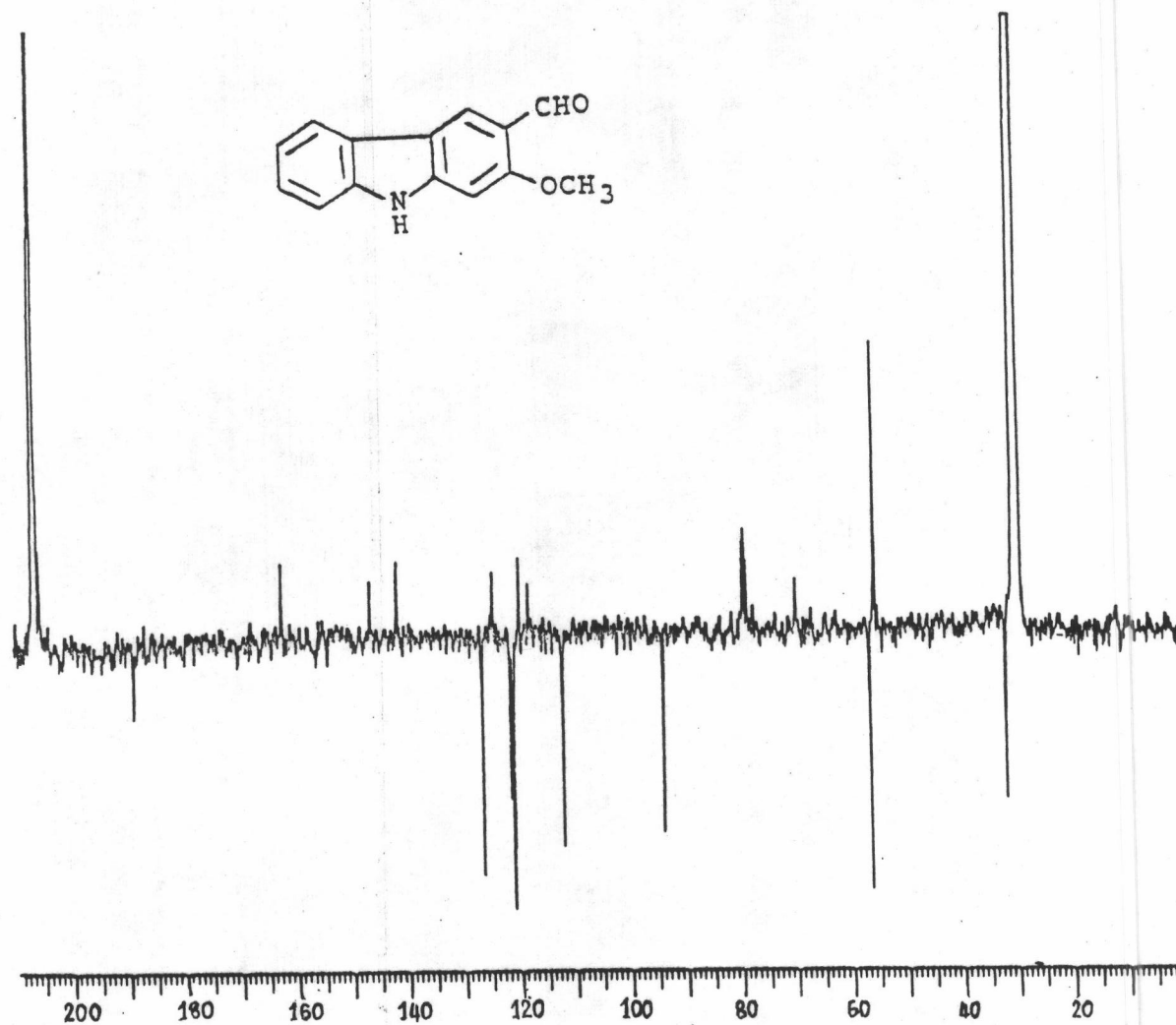


Figure 46 ^{13}C NMR spectrum of MS-8 (in acetone-d₆)

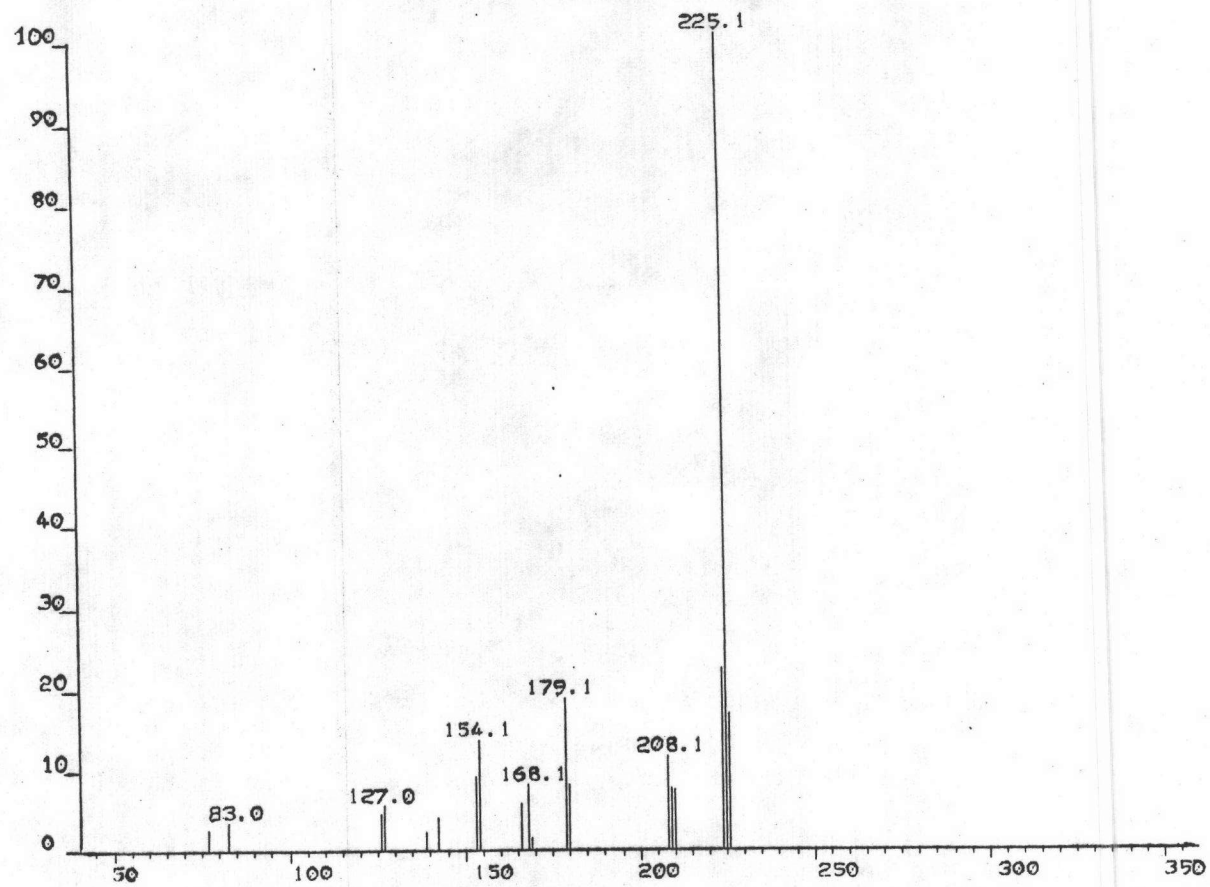


Figure 47 Mass spectrum of MS-8 (EIMS)



VITA

Miss Jongjit Ariyaprayoon was born on May 23, 1959 in Chumphon province, Thailand. She obtained her Bachelor of Science in Pharmacy in 1983 from the Faculty of Pharmacy, Chiangmai University, Chiangmai, Thailand. At present, she is a pharmacist of the Medical Service of Srinarkharinwirot University, Srinarkharinwirot University, Bangsaen, Cholburi, Thailand.