REFERENCES

สายสนม กิตติขจร. ตำราสรรพคุณสมุนไพรยาไทยแผนโบราณ. พิมพ์ครั้งที่ 1. กรุงเทพมหานคร : โรงพิมพ์อักษรไทย, 2526.

Addae-Mensah, I., Achenbach, H., Thoithi, G.N., Waibel, R. and Mwangi, J.W.1992. Constituents of tropical medicinal plants 51. Epoxychiromodine and other constituents of *Croton megalocarpus*. Phytochemistry 31: 2055-2058.

Addae-Mensah, I., Muriuki, G., Karanja, G., Wandera, C., Waibel, R. and Achenbach, H. 1992. Constituents of the stem bark and twigs of *Croton macrostachys*. Fitoterapia 63: 81.

Addae-Mensah, I., Waibel, R., Achenbach, H., Muriuki, G., Pearce, C. and Sanders, J.K.M. 1989. Constituents of tropical medicinal plants. Part 31. A clerodane diterpene and other constituents of *Croton megalocarpus*. Phytochemistry 28: 2759-2761.

Adesogan, E.K. 1981. The structure of penduliflaworosin, a new furanoid diterpene from *Croton penduliflorus*. J. Chem. Soc. Perkin. Trans. 1 (4): 1151-1153. (CA 95: 98062f).

Aiyar, V. N., Rao, P. S., Sachdev, G. P. and Seshadri, T. R. 1969. Isolation and constitution of deoxyoblongifoliol from *Croton oblongifolius* Roxb. Indian J. Chem. 7(8): 838-839.

Aiyar, V. N. and Seshadri, T. R. 1971. Chemical components of *Croton oblongifolius* Roxb.: Part IV – constitution of oblongifoliol & deoxyoblongifoliol. Indian J. Chem. 9: 1055-1059.

Aiyar, V. N. and Seshadri, T. R. 1971. Chemical components of *Croton oblongifolius* Roxb.: Part V. Indian J. Chem. 9: 613-614.

Aiyar, V. N. and Seshadri, T. R. 1971. Isolation of acetyl aleuritolic acid from *Croton oblongifolius* Roxb. Indian J. Chem. 9: 1028-1029.

Aiyar, V. N. and Seshadri, T. R. 1970. Components of *Croton oblongifolius* Roxb.-III constitution of oblongifolic acid. Tetrahedron. 26: 5275-5279

Aiyar, V. N. and Seshadri, T. R. 1972. 11-dehydro-(-)- hardwickiic acid from *Croton oblongifolius* Roxb. Phytochemistry 11: 1473-1476.

Aiyar, V. N. and Seshadri, T. R. 1972. Chemical components of *Croton oblongifolius* Roxb.: Part VIII. Current Science 41: 839-840.

Alexander, I.C., Pascoe, K.O., Manchard, P. and Williams, L.A.D. 1991. An insecticidal diterpene from *Croton linearis*. Phytochemistry 30: 1801-1803.

Amaral, A.C.F. and Barnes, R.A. 1997. Alkaloids of *Croton celtidifolius*. Planta Med. 63: 485.

Bandara, B.M. and Wimalasiri, W.R. 1988. Diterpene alcohols from *Croton lacciferus*. Phytochemistry 27: 225-226.

Bandara, B.M., Wimalasiri, W.R. and Macleod, J.K. 1988. *Ent*-kauranes and oleananes from *Croton lacciferus*. Phytochemistry 27: 869-871.

Bandara, B.M., Wimalasiri, W.R., Wickremasinghe, W.A. and Bandara, K.A. 1990. Cyperenoic acid and (-)-hardwickiic acid from the chloroform extract of the root of *Croton aromaticus*: isolation and insecticidal properties. J. Natl. Sci. Counc. Sri-Lunka. 18: 119-126. (CA 19: 24605c).

Banerji, A., Nandi, G. and Kundu, A.B. 1988. Investigation of *Croton caudatus* Geisel.-isolation of stigmastan-3,6-dione,5α. J. Indian. Chem. Soc. 65: 459.

Birtwistle, J.S. *et al.* 1962. Proc. Chem. Soc. 329.

Bevan, C.W.L., Ekong, D.E. U. and Okogun, J.I. 1968. West African timbers. Part XXI. extractives from *Daniellia* species. The structure of a new diterpene, ozic acid. J. Chem.Soc. C.:1063-1068.

Blatter, E., Caius, J.F. and Mhaskar, K.S. Indian Medicinal Plants. Vol. III. 2nd ed. Delhi: Jayyed Press, 1975.

Bohlmann, F., Jakupovic, J., King, R.M. and Robinson, H. 1980. Nueu *ent*-atisiren- und *ent*-kaurensaure-derivate aus Helianthus-arten. Phytochemistry 19: 863-868.

Bohlmann, F., Zdero, C., King, R.M. and Robinson, H. 1982. Sesquiterpenes, guaianolides and diterpenes from *Stevia myriadenia*. Phytochemistry 21: 2021-2025.

Boonyarathanakornkit, L., Che, C.T., Fong, H.H.S. and Farnsworth, N.R. 1988. Constituents of *Croton crassifolius* roots. Planta Med. 54: 61-63.

Borques, J., *et al.* 1995. Isolation and structure of crotonic acid, a clerodane diterpenoid from *Croton chilensis*. Bol. Soc. Chil. Quim. 40: 157-162. (CA 123: 107802y).

Bruneton, J. 1995. Pharmacognosy, phytochemistry, medicinal plants. pp. 506-508, 564-565. Paris: Lavoisier.

Burke, B.A., Chan, W.R., Pascoe, K.O. and Blount, J.F. 1979. The structure of crotofolin E, a novel tricyclic diterpene from *Croton corylifolius*. Tetrahedron Lett. : 3345-3348.

Burke, B.A., Chan, W.R., Pascoe, K.O., Blount, J.F. and Manchand, P.S. 1981. The structure of crotonitenone, a new casbane diterpene from *Croton niten* Sw. (Euphorbiaceae). J. Chem. Soc. Perkin. Trans. 1 (10): 2666-2669.

Burke, B.A., Chan, W.R., Prince, E.C., Manchand, P.S., Eickman, N. and Clardy, J. 1976. The structure of crotofolin A, a diterpene with a new skeleton. J. Am. Chem. Soc. 97: 4437-4439.

Cai, Y., Chen, Z.P. and Phillipson, J.D. 1993. Biological and chemical investigation of Dragon's blood from Croton species of south America. Part 3. Clerodane diterpenoids from *Croton lechleri*. Phytochemistry 34: 265-268.

Chatterjee, A., Banerjee, A. and Bohlmann, F. 1977. Crotocaudin, a rearranged labdane type norditerpene from *Croton caudatus* Geisel. Tetrahedron 33: 2407-2414.

Chatterjee, A., Banerjee, A. and Bohlmann, F. 1978. Isocrotocaudin, a new norclerodane-type diterpene from *Croton caudatus*. Phytochemistry 17: 1777-1779.

Chavez, P.I., Jolad, S.D., Hoffmann, J.J. and Cole, J.R. 1982. Four new 12-deoxyphorbol diesters from *Croton californicus*. J. Nat. Prod. 45: 745-748.

Craveiro, A.A. and Silveira, E.R. 1982. Two cleistanthane-type diterpenes from *Croton sonderianus*. Phytochemistry 21: 2571-2574.

Craveiro, A.A., Silveira, E.R., Braz, F.R. and Mascarenhas, I.P. 1981. Sonderianin, a furanoid diterpene from *Croton sonderianus*. Phytochemistry 20: 852-854.

De Alvarenga, M.A., Gottlieb, H.E., Gottlieb, O.R., Magalhaes, M.T. and Da Silva, V.O. 1978. The chemistry of Brazillian Euphorbiaceae. Part 3. Diasin, a diterpene from *Croton diasii*. Phytochemistry 17: 1773-1776.

De Mendonca, I.M.D., Rodilla, J.M.L., Lithgow, A.M. and Marcos, I.S. 1997. Hydrohalimic acids from *Halimium viscosum*. Phytochemistry 44: 1301-1307.

Hanson, J.R. 1984. Diterpenoids. Nat. Prod. Rep. 1: 171-180.

Hanson, J.R. 1986. Diterpenoids. Nat. Prod. Rep. 3: 307-322.

Hanson, J.R. 1988. Diterpenoids. Nat. Prod. Rep. 5: 211-227.

Hanson, J.R. 1989. Diterpenoids. Nat. Prod. Rep. 6: 347-358.

Hanson, J.R. 1991. Diterpenoids. Nat. Prod. Rep. 8: 1-16.

Hanson, J.R. 1992. Diterpenoids. Nat. Prod. Rep. 9: 1-16.

Hanson, J.R.. 1994. Diterpenoids. Nat. Prod. Rep. 11: 265-277.

Hanson, J.R. 1997. Diterpenoids. Nat. Prod. Rep. 14: 245-258.

Hanson, J.R. 1998. Diterpenoids. Nat. Prod. Rep. 15: 93-106.

Itokawa, H., et al. 1988a. Cytotoxic diterpenes from the rhizomes of *Hedychium coronarium*. Planta Med. 54: 311-315.

Itokawa, H., Ichihara, Y., Shimizu, H., Takeya, K. and Motidome, H. 1990. Cajucarins A and B, new clerodane diterpenes from *Croton cajucara* and their conformations. Chem. Pharm. Bull. 38: 701-705.

Itokawa, H., Ichihara, Y., Kojima, H., Watanabe, K. and Takeya, K. 1989. Nor-clerodane diterpenes from *Croton cajucara*. Phytochemistry 28: 1667-1669.

Jogia, M.K., Anderson, R.J., Parkanyi, L., Clardy, J., Dublin, H.T. and Sinclair, A.R.E. 1989. Crotofolane diterpenoids from the African shrub *Croton dichogamus* Pax. J. Org. Chem. 54: 1654-1657.

Kim,J.H., Lee, S.J., Han, Y.B., Moon, J.J. and Kim, J.B. 1994. Isolation of isoguanine from *Croton tiglium* and its antitumor activity. Arch. Pharmacal. Res. 17: 115-118. (CA 122:230295s).

Kitazawa, E. and Ogiso, A. 1981. Two diterpene alcohols from *Croton sublyratus*. Phytochemistry 20: 287-289.

Kitazawa, E. *et al.* 1979. Plaunol A and B, new antiulcer diterpenelactones from *Croton sublyratus*. Tetrahedron Lett. 13: 1117-1119.

Kitazawa, E., Sato, A., Tanahashi, S., Kuwano, H. and Ogiso, A. 1980. Novel diterpene lactones with anti-peptic ulcer activity from *Croton sublyratus*. Chem. Pharm. Bull. 28: 227-234.

Kitazawa, E., Kurabayashi, M., Kasuga, S., Oda, O. and Ogiso, A. 1982. New ester of diterpene alcohols from *Croton sublyratus*. Ann. Res. Sankyo Res. Lab. 34: 39-41.

Krebs, H.C. and Ramiarantsoa, H. 1996. Clerodane diterpenes and other constituents of *Croton horvarum*. Phytochemistry 41: 561-563.

Krebs, H.C. and Ramiarantsoa, H. 1997. Clerodane diterpenes of *Croton horvarum*. Phytochemistry 45: 379-381.

Kubo, I., Asaka, Y. and Shibata, K. 1991. Insect growth inhibitory nor diterpenes, cis-dehydrocrotonin and trans-dehydrocrotonin from *Croton cajucara*. Phytochemistry 30: 2545-2546.

Kubo, I. *et al.* 1990. Tetrahedron 46: 1515-1522.

Li, C., Wu, S., Tao, G. and Sun, H. 1990. Chemical constituents from the stem bark of *Croton hutchinsonianus*. Yunnan. Zhiwu Yanjiu 12: 457-459. (CA 114: 244253y).

Luzbetak, D.J., Torrance, S.J., Hoffmann, J.J. and Cole, J.R. 1979. Isolation of (-)-hardwickiic acid and 1-triacontanol from *Croton californicus*. J. Nat. Prod. 42: 317-318.

Manez, S., Alcaraz, M.L., Paya, M., Rios, J.L. and Hancke, J.L. 1990. Selected extracts from medicinal plants as anti-inflammatory agents. Planta. Med. 56

McChesney, J.D. and Silveira, E.R. 1989. 12-hydroxyhardwickiic acid and sonderianial, neo-clerodanes from *Croton sonderianus*. Phytochemistry 28: 3411-3414.

McChesney, J.D. and Silveira, E.R. 1990. *Ent*-clerodanes of *Croton sonderianus*. Fitoterapia 61: 172-175. (CA 114: 98133r).

Monte, F.J.Q., Andrade, C.H.S. and Craveiro, A.A. 1984. New tetracyclic diterpenes from *Croton argyrophylloides*. J. Nat. Prod. 47: 55-58.

Monte, F.J.Q., Dantas, E.M.G. and Braz, R. 1988. New diterpenoids from *Croton argyrophylloides*. Phytochemistry 27: 3209-3212.

Morita, H. and Itokawa, H. 1988. Cytotoxic and antifungal diterpenes from the seeds of *Alpinia galanga*. Planta. Med. 54: 117-120.

Mossa, J.S. *et al.* 1985. Saudin, a hypoglycemic diterpenoid with a novel 6,7-secolabdane carbon skeleton, from *Cluytia richardiana*. J. Org. Chem. 50: 916-918.

Moulis, C., Bon, M., Jaud, J. and Fouraste, I. 1992. Crovatin, a furanoid diterpene from *Croton levatii*. Phytochemistry 31: 1421-1423.

Moura, V.L.A., Monte, F.J.O. and Braz Fiho, R. 1990. A new casbane-type diterpenoid from *Croton nepetaefolius*. J. Nat. Prod. 53: 1566-1571.

Mukherjee, J. 1969. Chemical examination of *Croton tiglium*. Indian J. Appl. Chem. 32: 211-212.

Ogiso, A. *et al.* 1978. Isolation and structure of antipeptic ulcer diterpene from Thai medicinal plant. Chem Pharm. Bull. 26: 3117-3123.

Rao, P. S., Sachdev, G. P., Seshadr , T. R. and Singh, H. B. 1968. Isolation and constitution of oblongifoliol, a new diterpene of *Croton oblongifolius* Roxb. Tetrahedron Lett. 45: 4685-4688.

Rodriguez-Hahn, L., Rodriguez, J J. and Romo, J. 1975. Isolation and structure of draconin. Rev. Latinoam. Quim. 6: 123-126. (CA 84: 56485p).

Rodriguez-Hahn, L., Valencia, A., Saucedo, R., Diaz, E. and Negron, G. 1981. Separation and structure of the chemical components of *Croton pyramidalis*. Rev. Latinoam. Quim. 12: 16-19. (CA 94: 205402v).

Roengsumran, S., Achayindee, S., Petsom, A., Pudhom, K., Singtothong, P., Surachetapan, C. and Vilaivan, T. 1998a. Two new cembranoids from *Croton oblongifolius*. J. Nat. Prod. 61: 652-654.

Roengsumran, S., Luangdilok, W , Petsom, A., Praruggamo, S. and Pengprecha, S. 1982. Structure of swassir , a new furanoid diterpene. J. Nat. Prod. 45: 772-773.

Roengsumran, S., Petsom, A., Sornmit, D. and Vilaivan, T. 1998b. Labdane diterpenoids from *Croton oblongifolius*. Phytochemistry 50: 449-453.

Rojas, E.T. and Rodriguez-Hahn, L. 1978. Nivenolide, a diterpenelactone from *Croton niveus*. Phytochemistry 17: 574-575.

Satish, S. and Bhakuni, D.S. 1972. Constituents of Indian and other plants. Phytochemistry 11: 2888-2890.

Sato, A., Ogiso, A. and Kuwano, H. 1980. Acyclic diterpenes from *Croton kerrii*. Phytochemistry 19: 2207-2209.

Schneider, C., Breitmaier, E., Bayma, J.de C., De Franca, L.F., Kneifel, H. and Krebs, Hans-Christoph. 1995. Maravuic acid, a new seco-labdane diterpene from *Croton matourensis*. Liebigs Ann. (4): 709-710. (CA 123: 29610t).

Silveira, E.R. and McChesney, J.D. 1994. 6,7-oxygenated neo-clerodane furan diterpenes from *Croton sonderianus*. Phytochemistry 36: 1457-1463.

Siripong, P., Kongkathip, B., Preechanukool, K., Picha, P., Tunsuwan, K. and Taylor, W.C. 1992. Cytotoxic diterpenoid constituents from *Andrographis paniculata* Nees. Leaves. J. Sci. Soc. Thailand 18: 187-194.

Smitinand, T. Thai plant names (botanical names-vernacular names). p. 98. 2nd ed. Bangkok: Funny, 1980.

Takahashi, S., Kurabayashi, M., Kitazawa, E., Haruyama, H. and Ogiso, A. 1983. Plaunolide, a furanoid diterpene from *Croton sublyratus*. Phytochemistry 22: 302-303.

Tavares Carvalho, J.C., Coser Silva, M.F., Mendes, L., Kenupp, B.J. and Sarti, S.J. 1996. Investigation of anti-inflammatory and antinociceptive activities of *trans*-dehydrocrotonin, a 19-nor-clerodane diterpene from *Croton cajucara*. Part I. Planta Med. 62: 402-404.

Tchissambou, L., Chiaroni, A., Riche, C. and Khuong-Huu, F. 1990. Crotocorylifuran and crotohaumanoxide, new diterpenees from *Croton haumanianus* J. Leonard. Tetrahedron 46: 5199-5202.

Tomita, M., Lee, H. and Nakano, T. 1965. Alkaloids of *Croton cumingii*. Yakugaku Zasshi 85: 276-277.

Upadhyay, R.R. and Hecker, E. 1976. A new cryptic irritant and cocarcinogen from seeds of *Croton sparciflorus*. Phytochemistry 15: 1070-1072.

Visen, P.K.S., Shukla, B., Patnaik, G.K. and Dhawan, B.N. 1993. Andrographolide protects rat hepatocytes against paracetamol-induced damage. J. Ethnopharmacol. 40: 131-136.

Wilson, S.R., Neubert, L.A. and Hoffmann, J.C. 1976. The chemistry of the euphorbiaceae. A new diterpene from *Croton californicus*. J. Am. Chem. Soc. 98: 3669-3674. (CA 91: 35738c).

APPENDIX

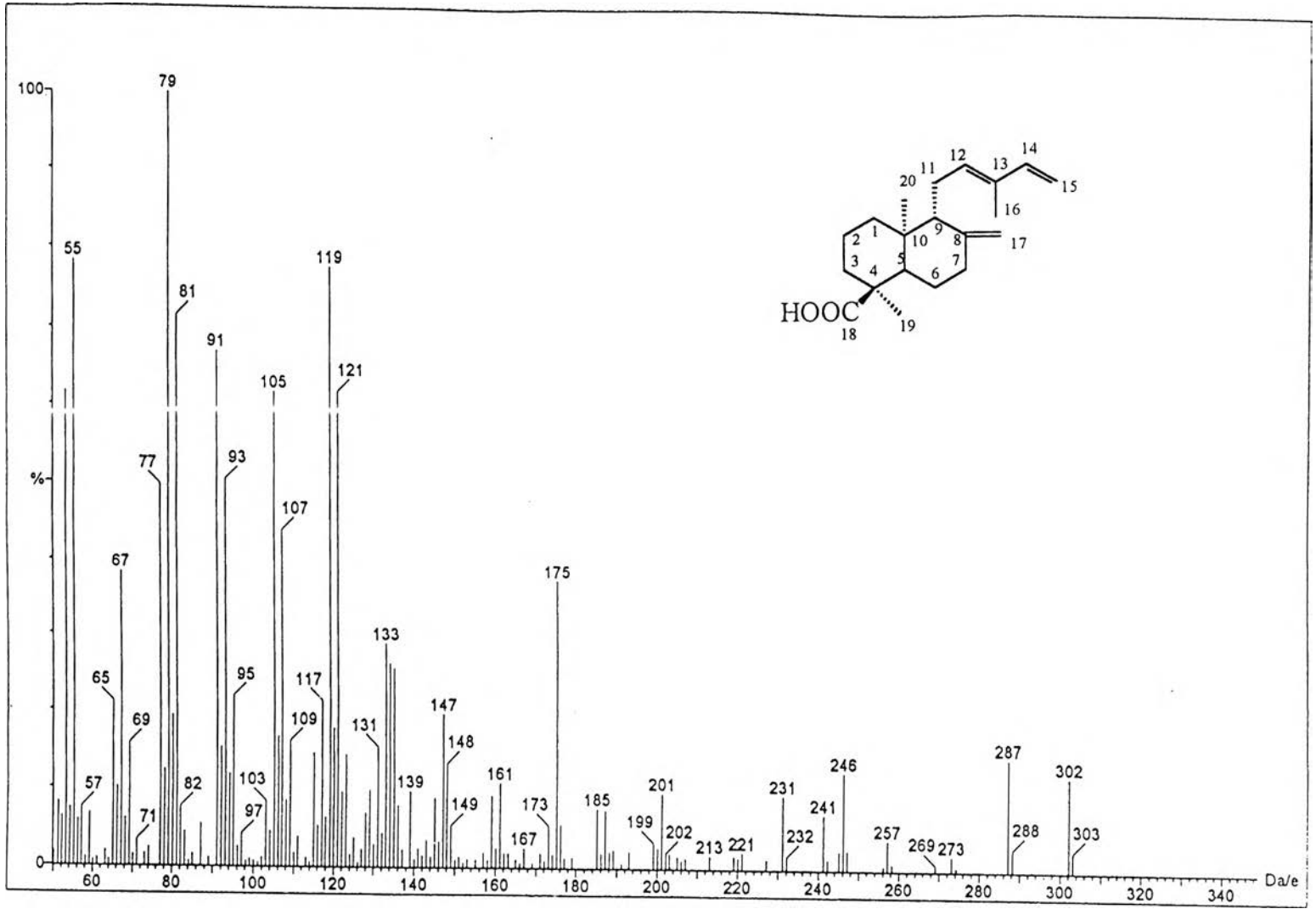


Figure 2. EI-mass spectrum of compound COY4

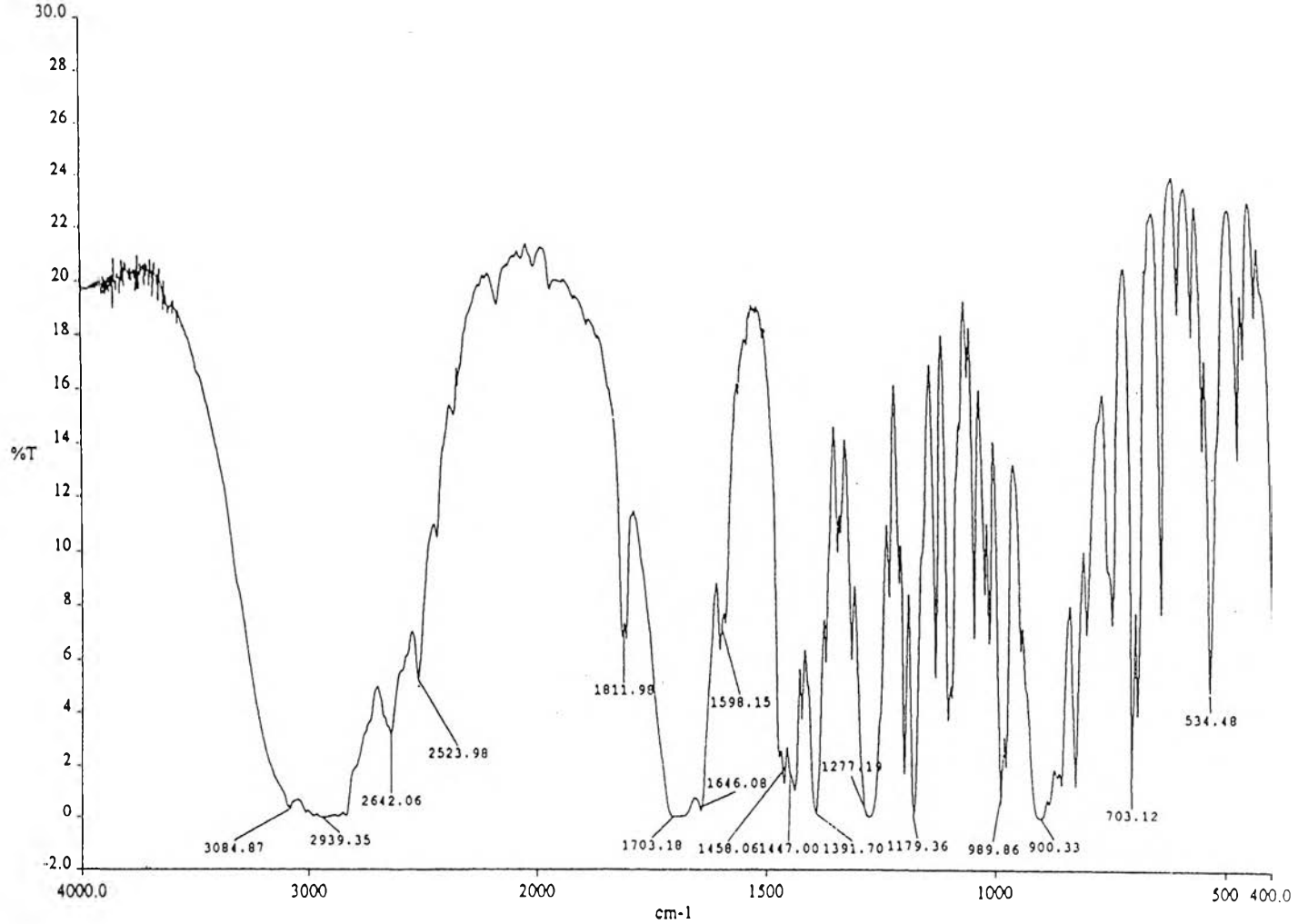


Figure 3. IR spectrum of compound COY4

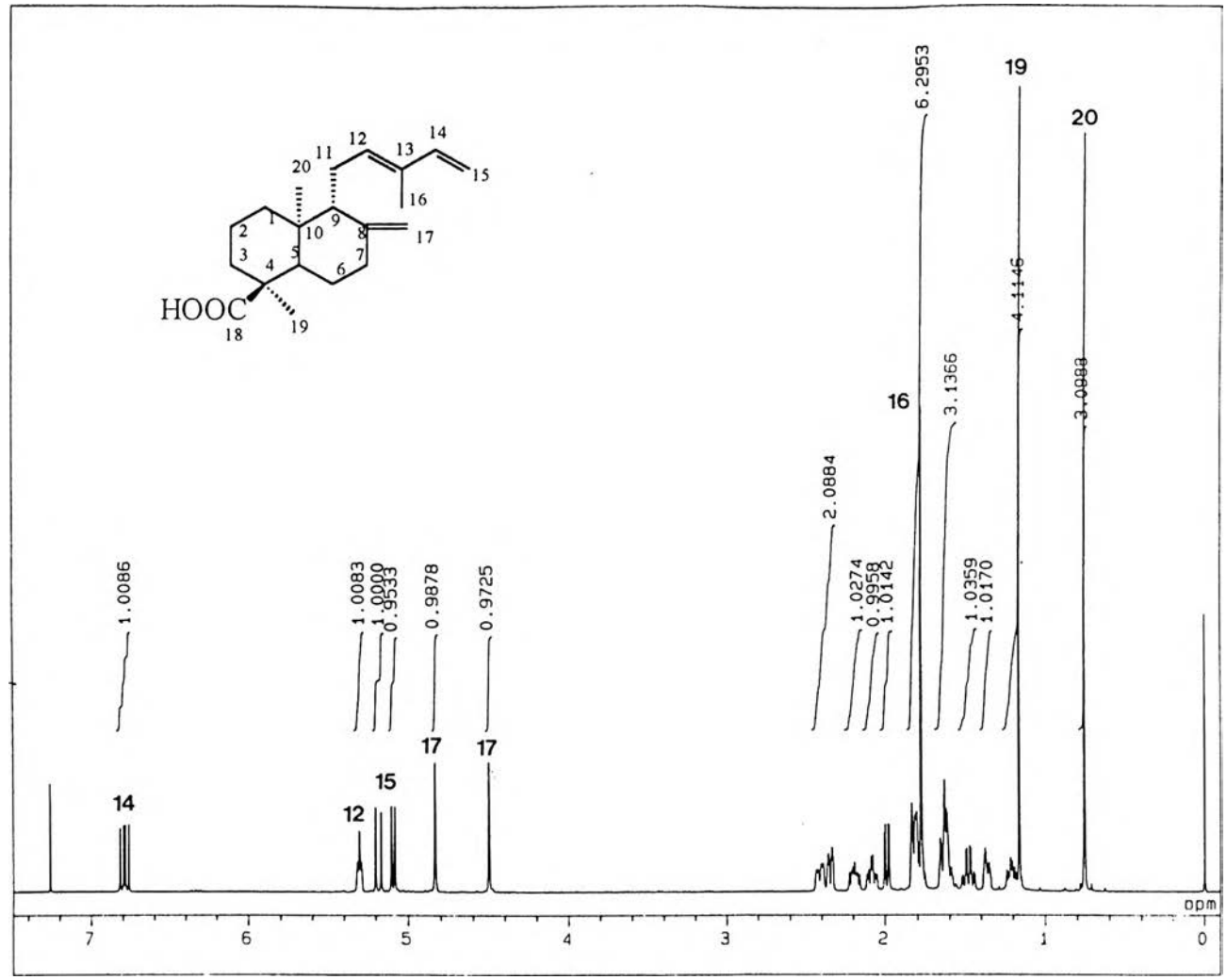


Figure 4. 500 MHz ^{1}H NMR spectrum of compound COY4 (in $CDCl_3$)

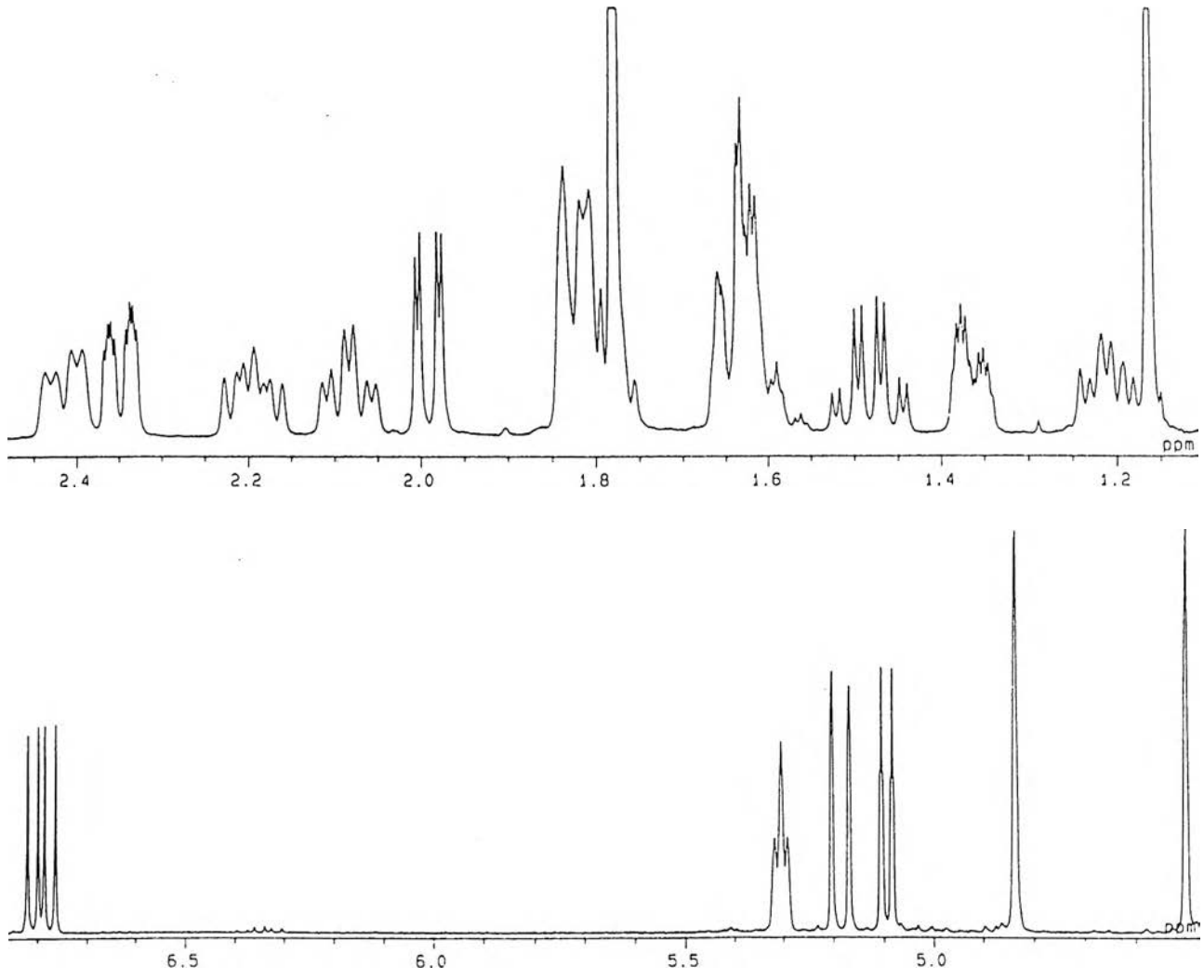


Figure 5. 500 MHz ^{1}H NMR spectrum of compound COY4 (in $CDCl_3$) (expanded)

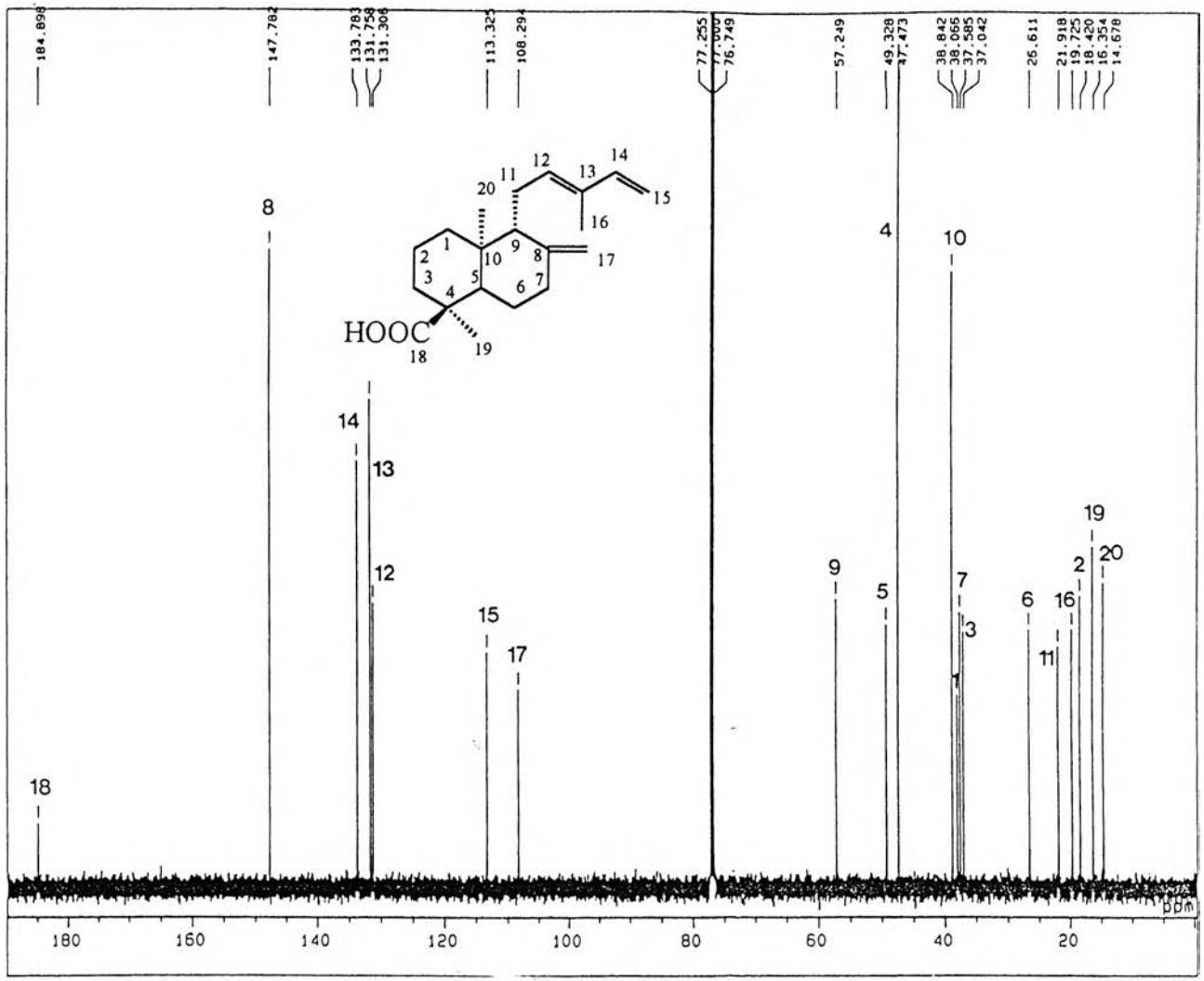


Figure 6. 125 MHz ^{13}C NMR spectrum of compound COY4 (in $CDCl_3$)

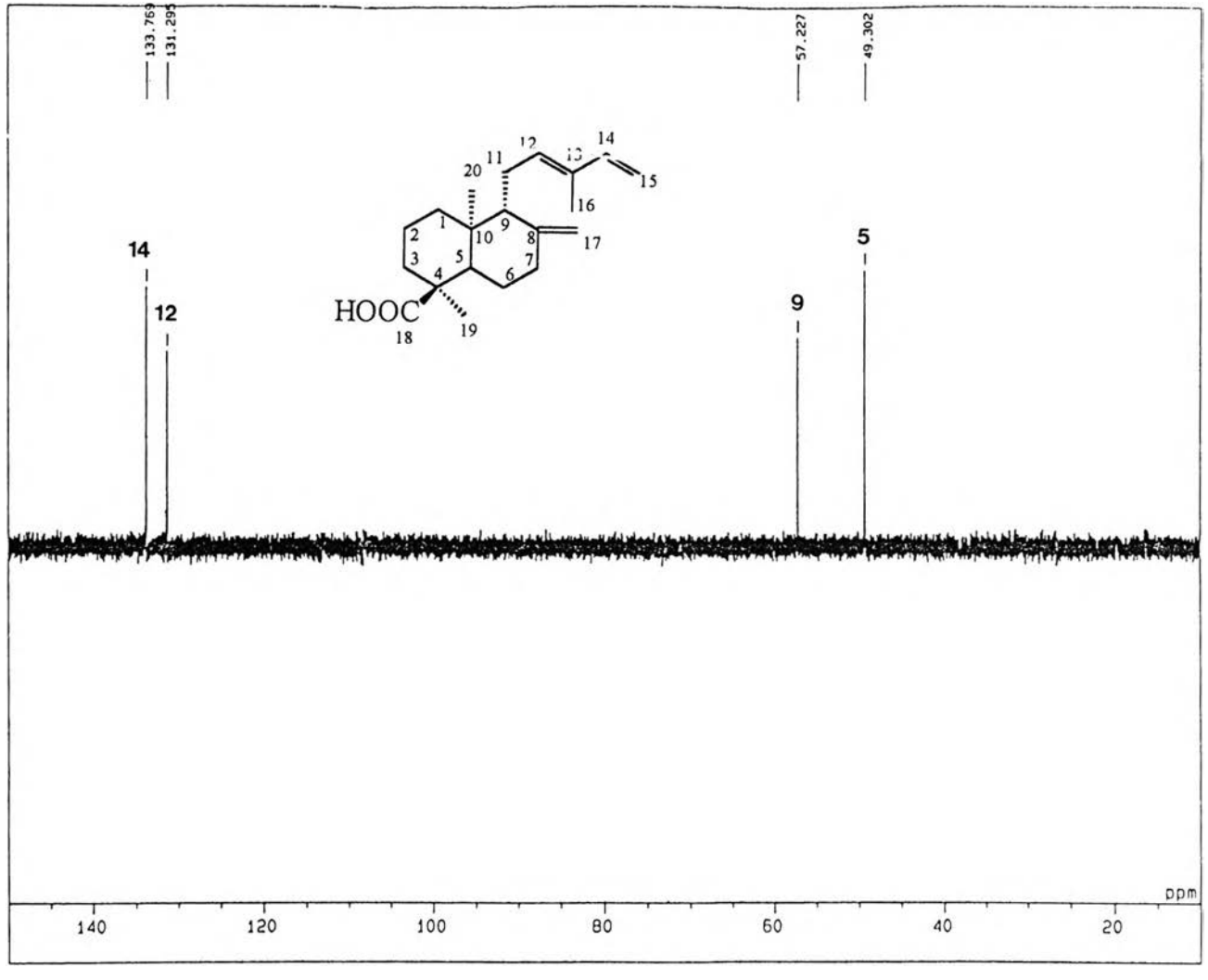


Figure 7. 125 MHz DEPT-90 spectrum of compound COY4 (in $CDCl_3$)

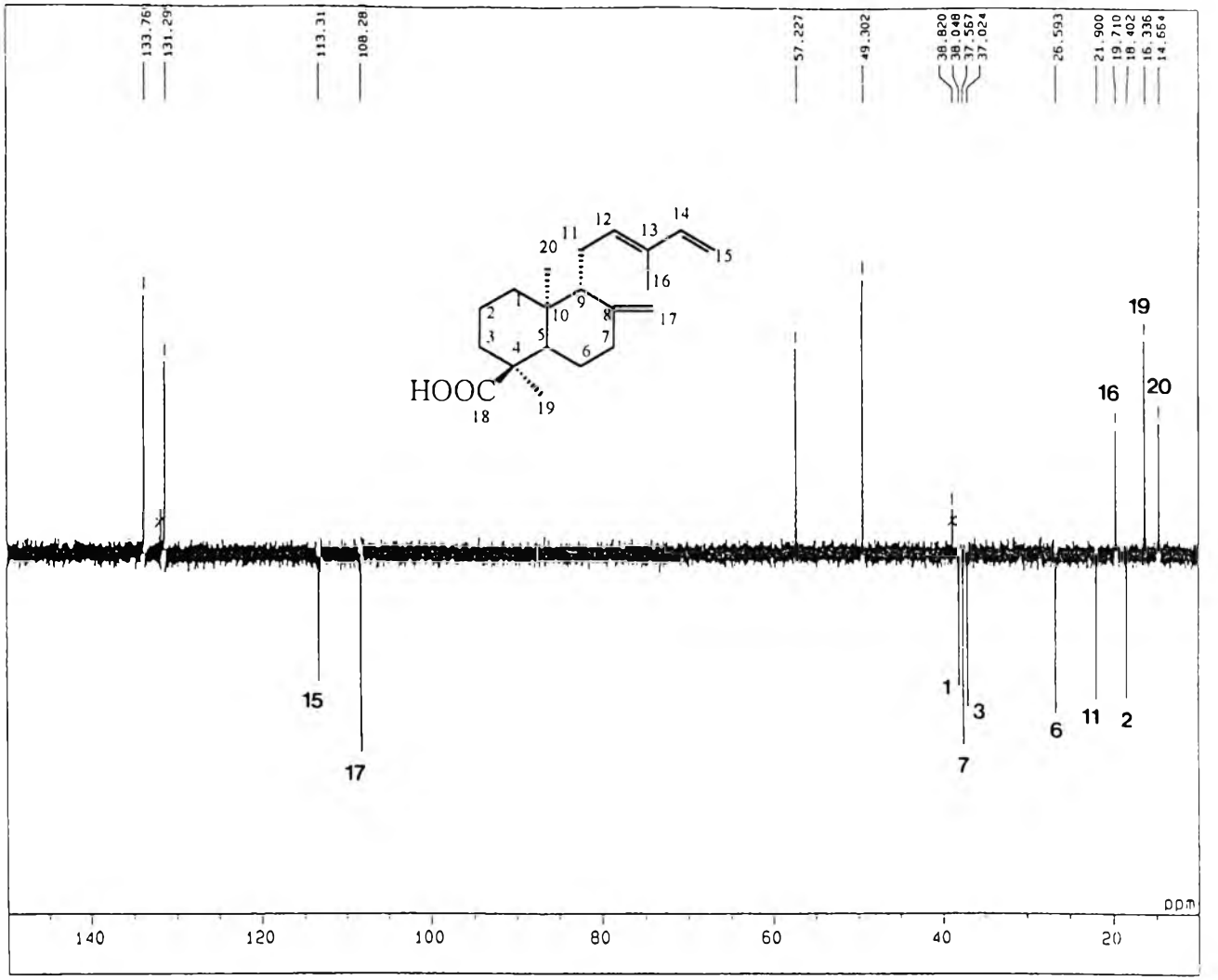


Figure 8. 125 MHz DEPT-135 spectrum of compound COY4 (in $CDCl_3$)

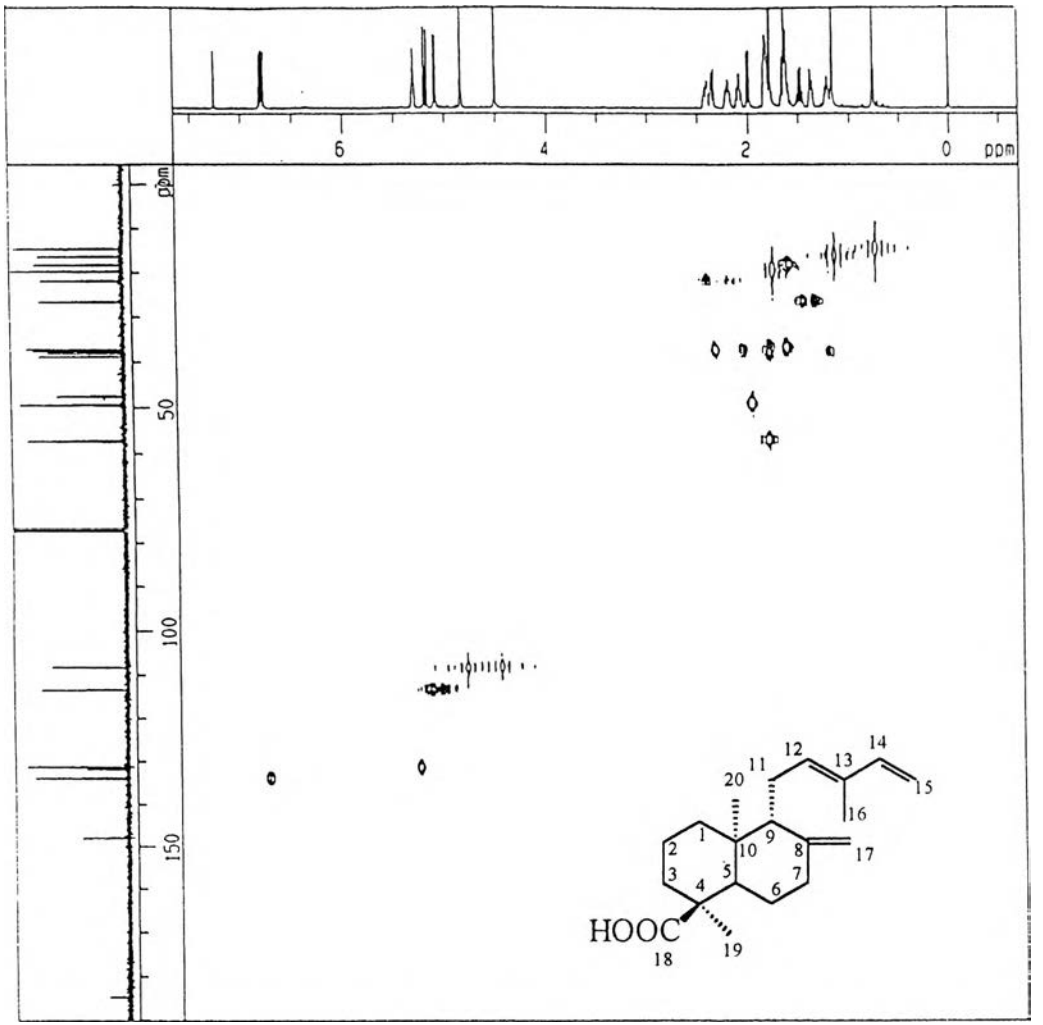
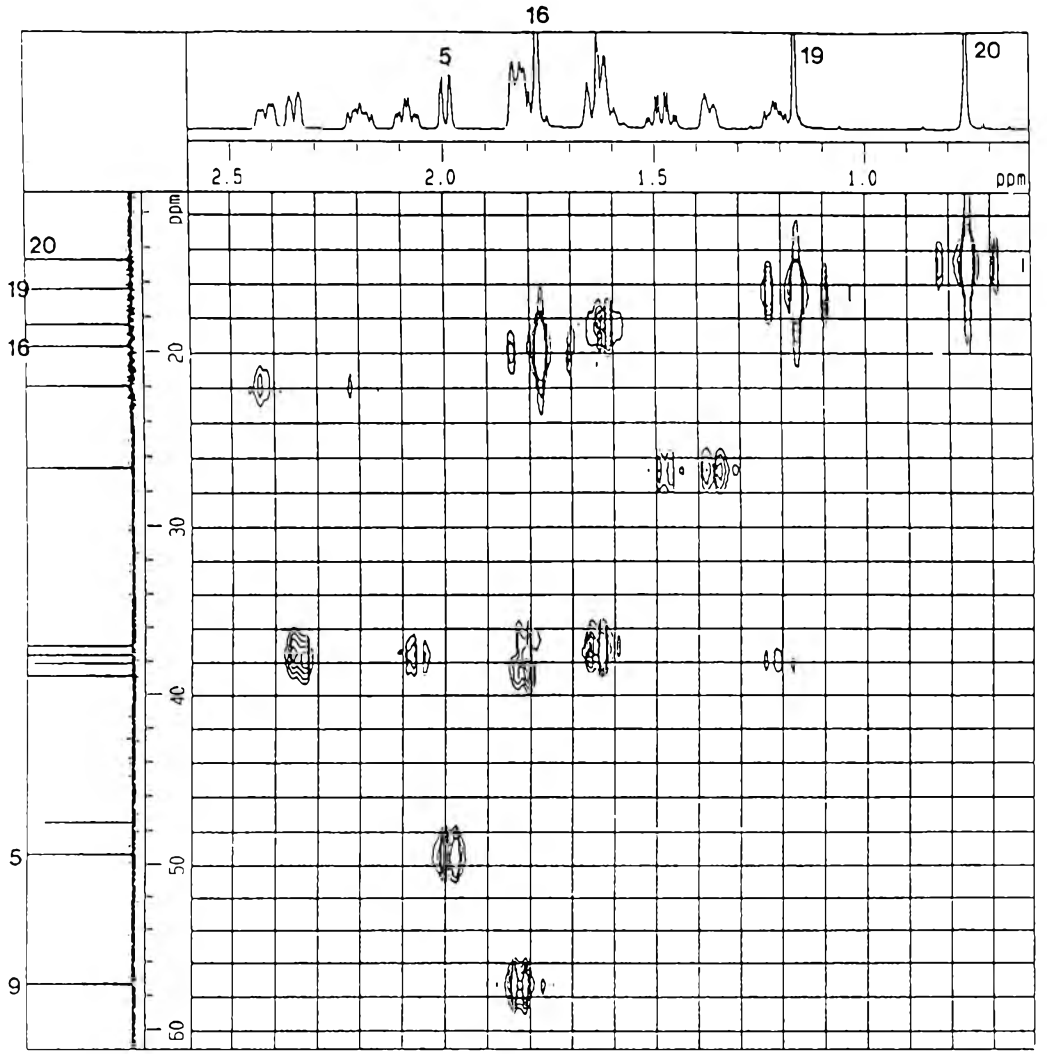


Figure 9. ^{1}H-^{13}C HMQC spectrum of compound COY4 (in $CDCl_3$)



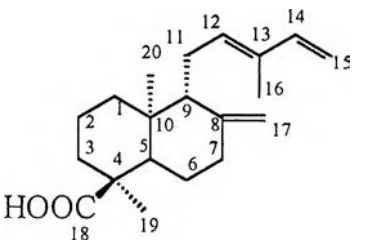


Figure 10. ^{1}H-^{13}C HMQC spectrum of compound COY4 (in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 0-2.5 ppm and $\delta^{13}C$ 0-60 ppm)

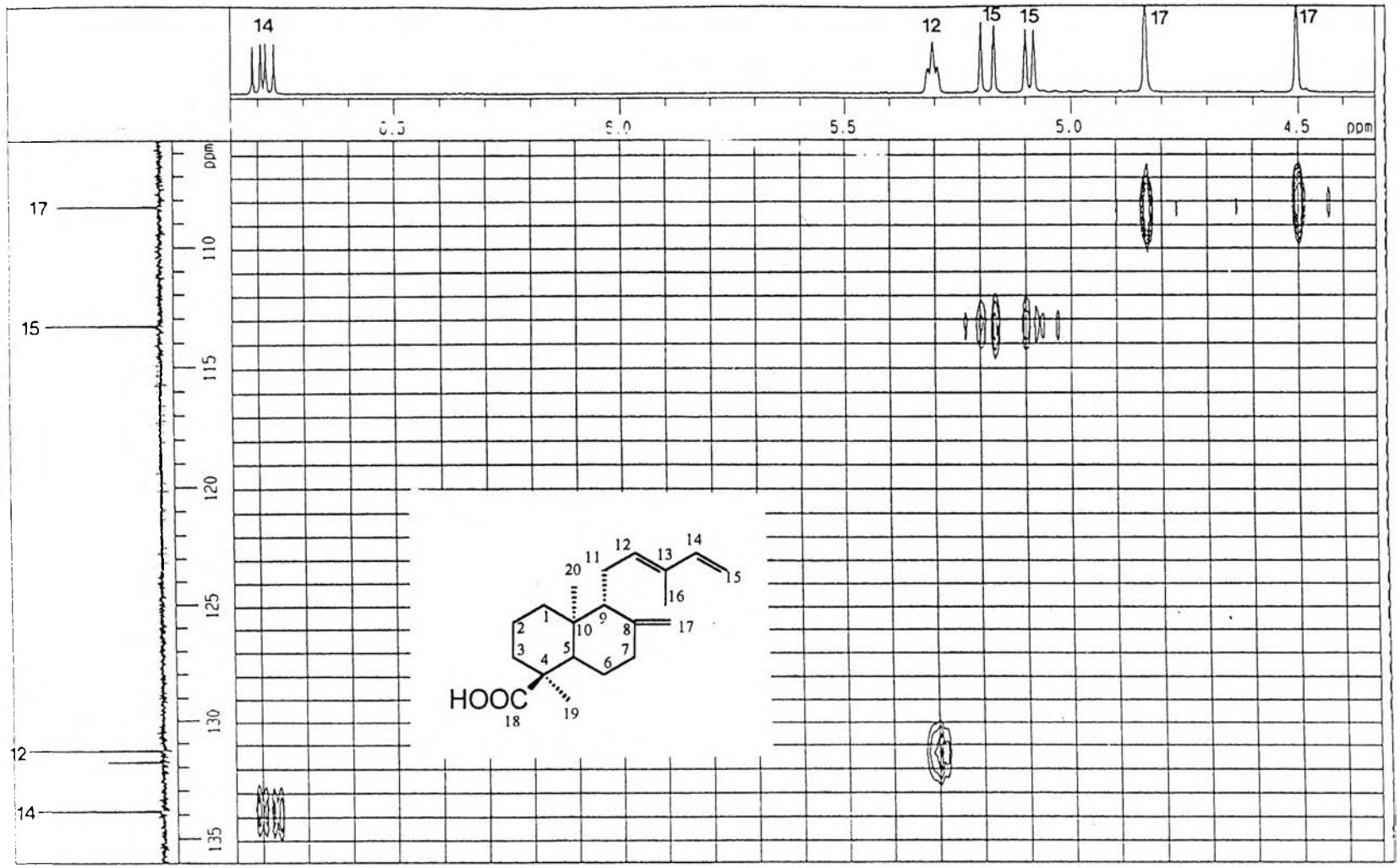


Figure 11. ^{1}H-^{13}C HMQC spectrum of compound COY4 (in $CDCl_3$)

(expanded in the range of $\delta^{1}H$ 4.4-6.9 ppm and $\delta^{13}C$ 106-135 ppm)

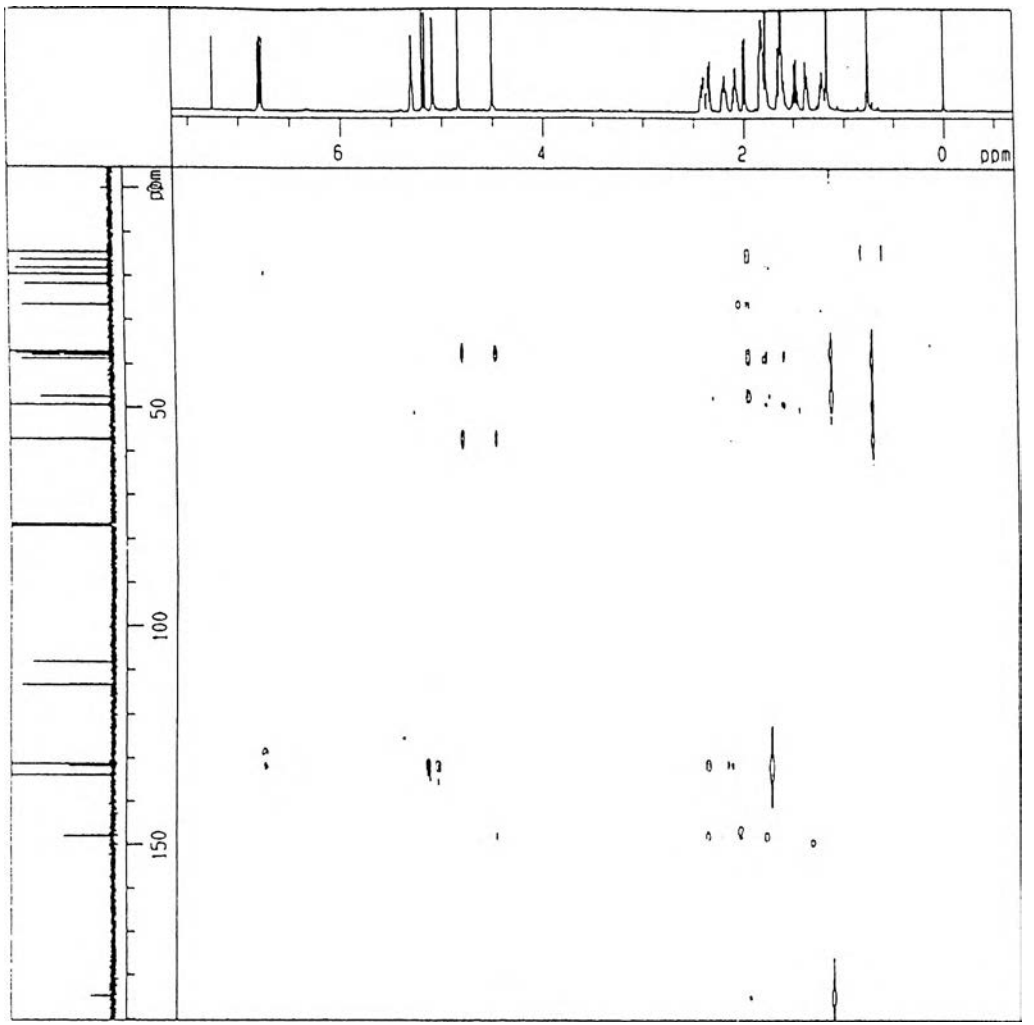


Figure 12. ^{1}H-^{13}C HMBC spectrum of compound COY4 (in $CDCl_3$)

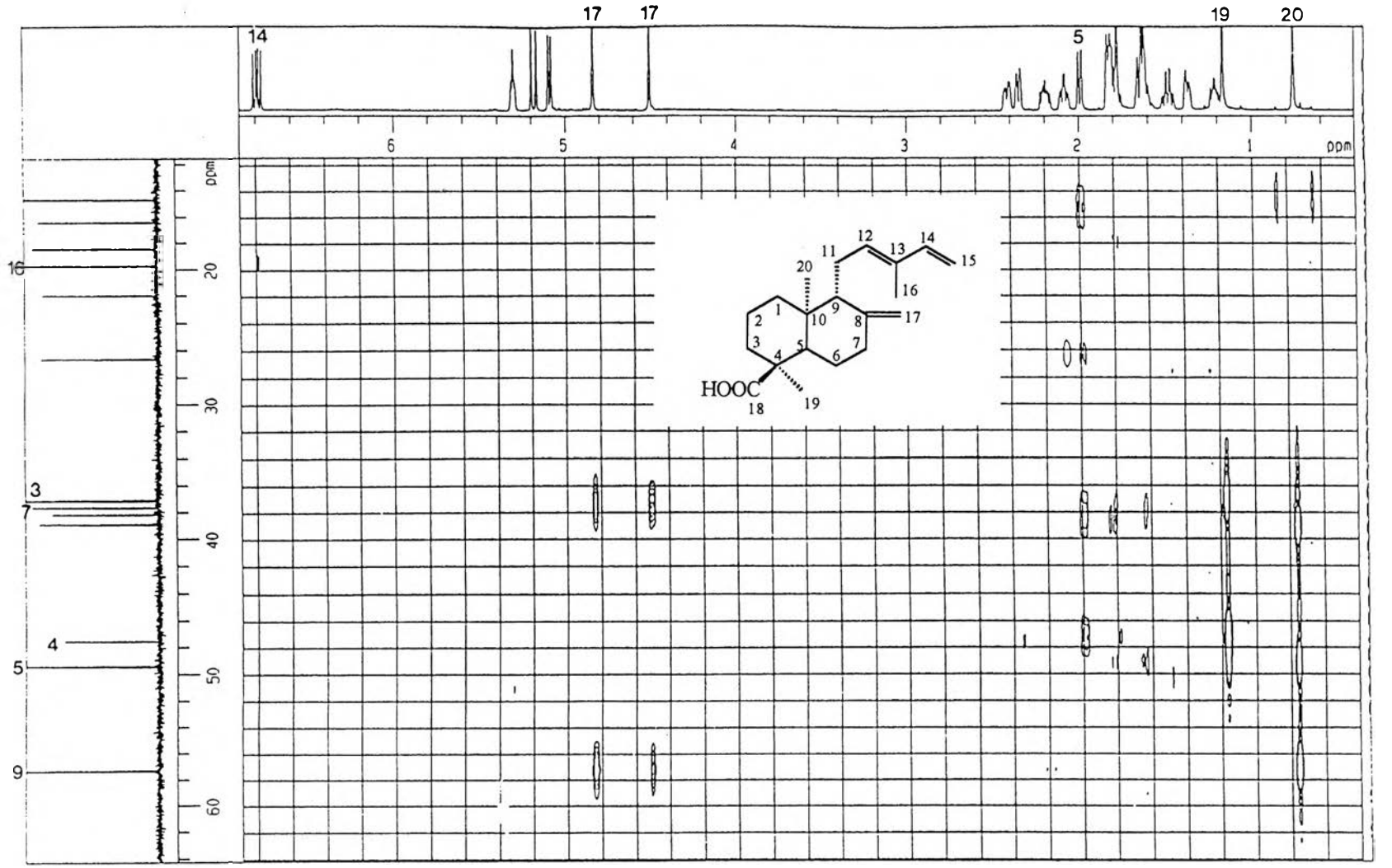
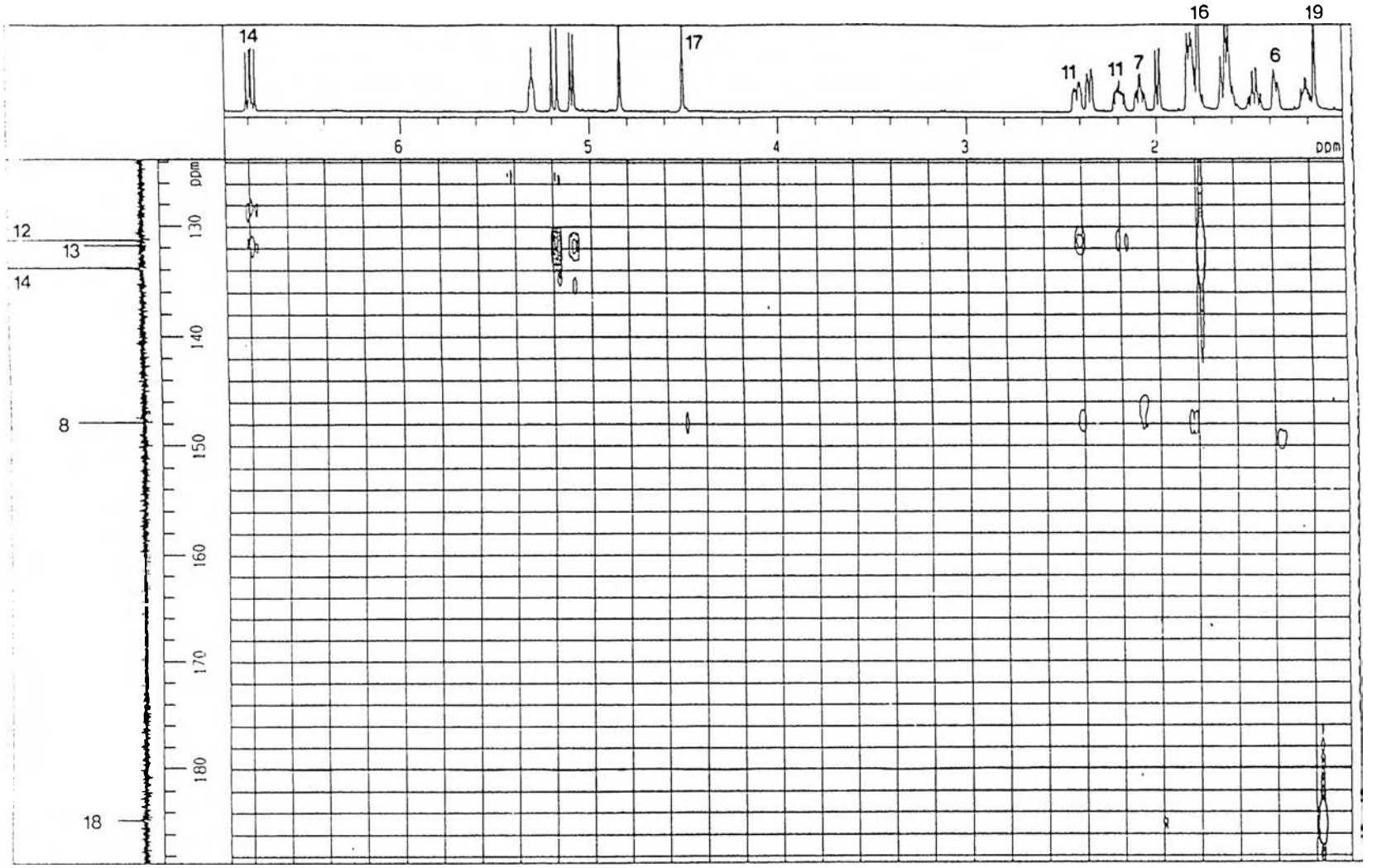


Figure 13. ^{1}H-^{13}C HMBC spectrum of compound COY4 (in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 0.6-6.8 ppm and $\delta^{13}C$ 12-60 ppm)



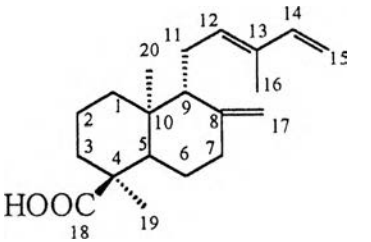


Figure 14. ^{1}H-^{13}C HMBC spectrum of compound COY4 (in $CDCl_3$)
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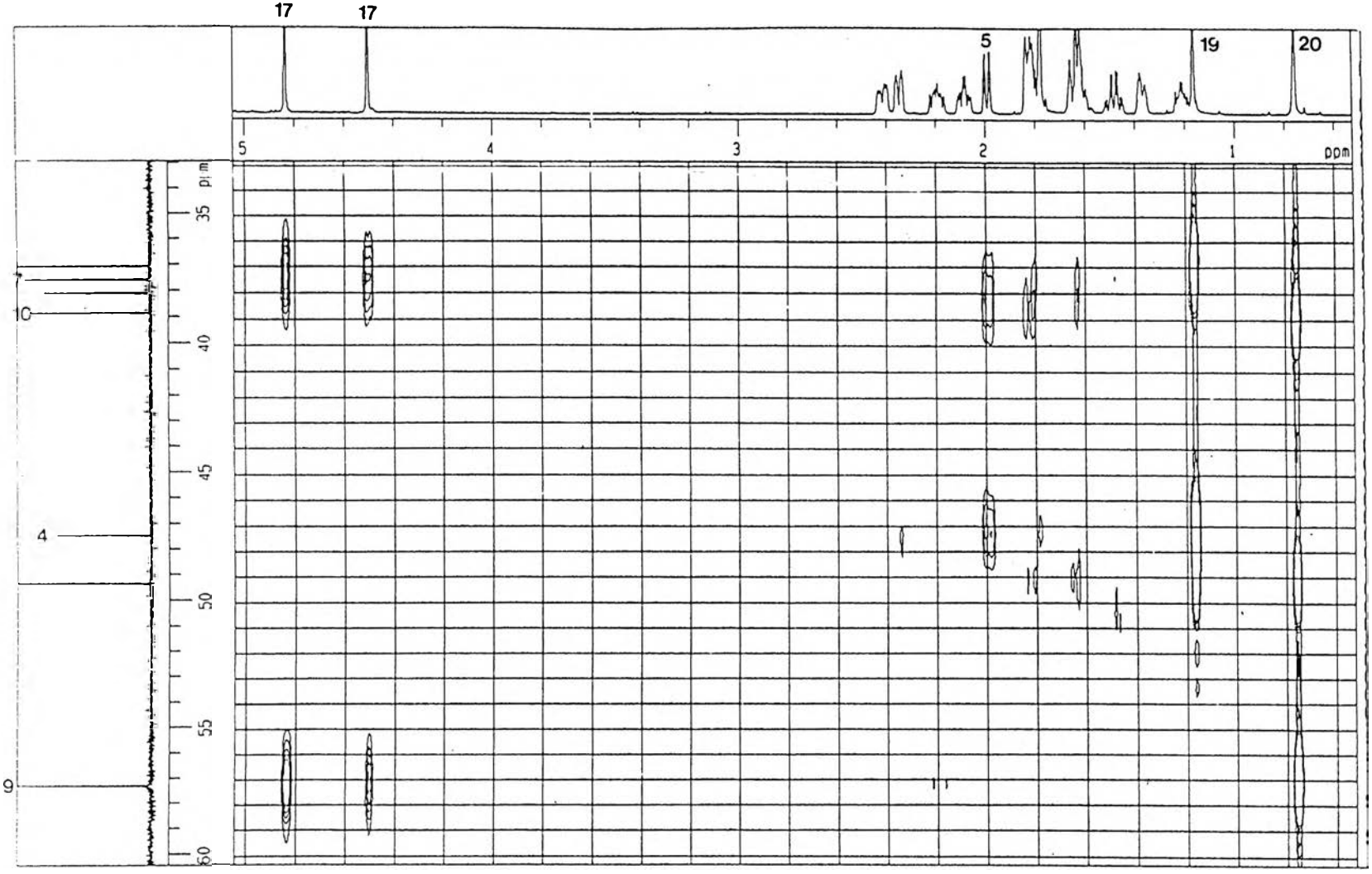


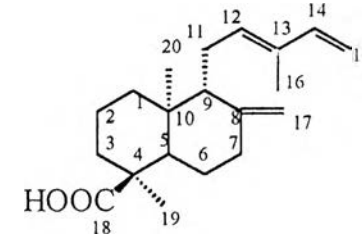
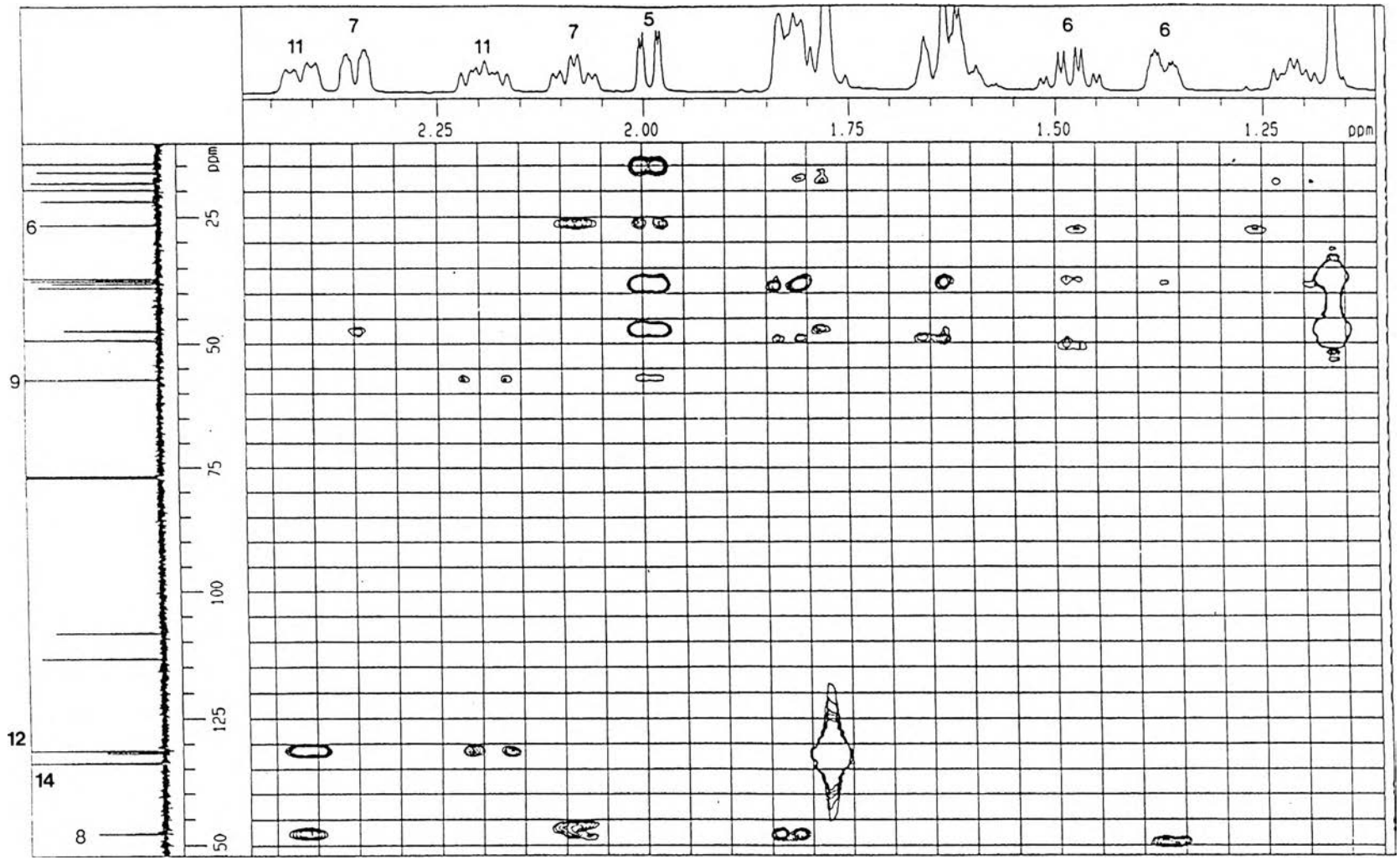


Figure 15. ^{1}H-^{13}C HMBC spectrum of compound COY4 (in $CDCl_3$)

(expanded in the range of $\delta^{1}H$ 0.6-5 ppm and $\delta^{13}C$ 33-60 ppm)



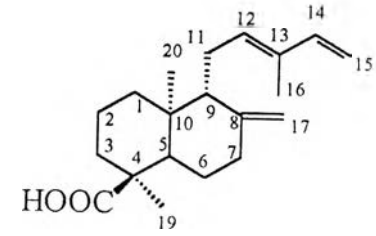
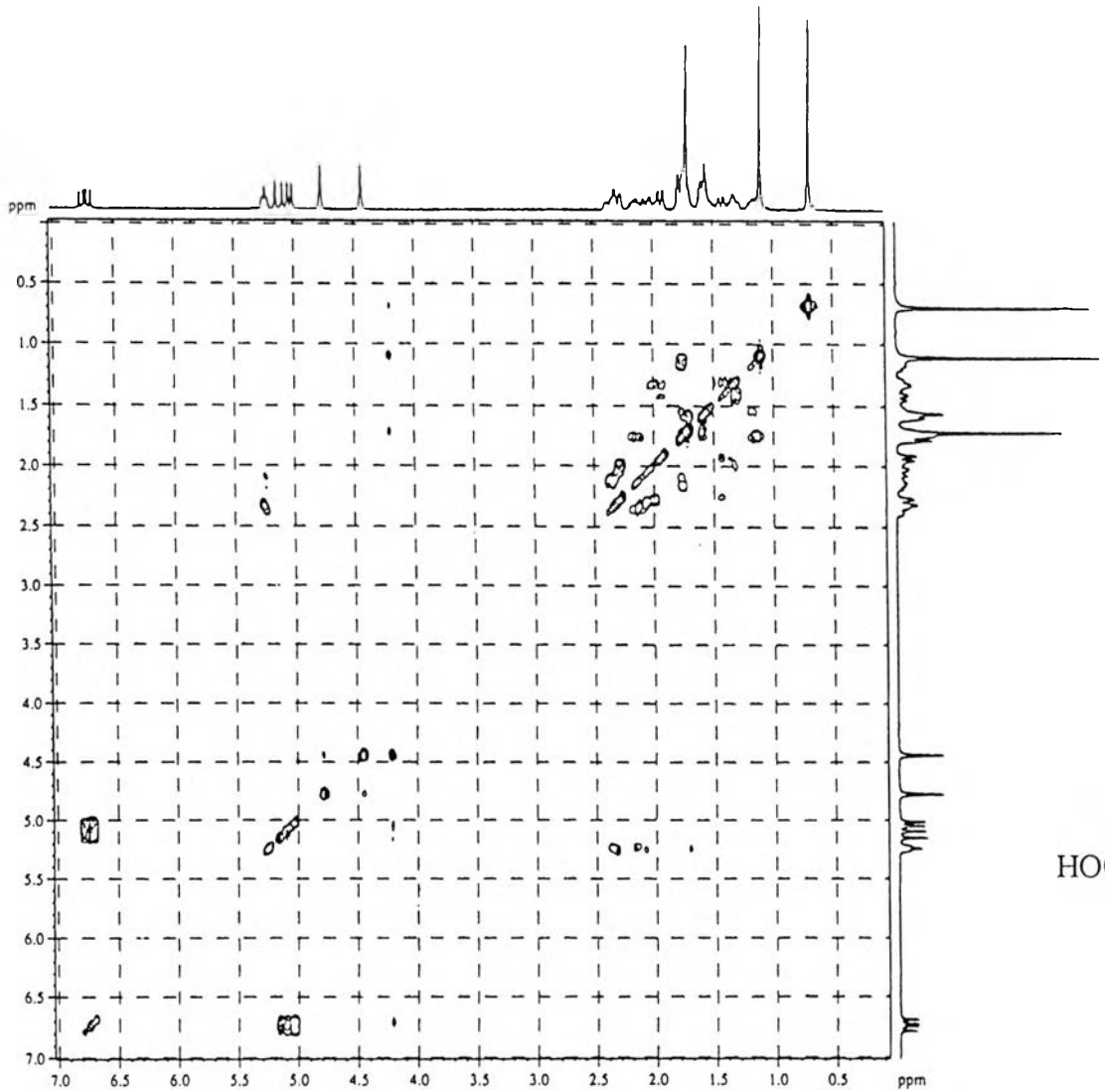


Figure 16. ^{1}H-^{13}C HMBC spectrum of compound COY4 (in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 1.15-2.45 ppm and $\delta^{13}C$ 15-50 ppm)



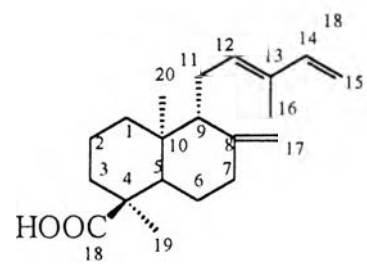


Figure 17. ^{1}H-^{1}H COSY spectrum of compound COY4 (in $CDCl_3$)

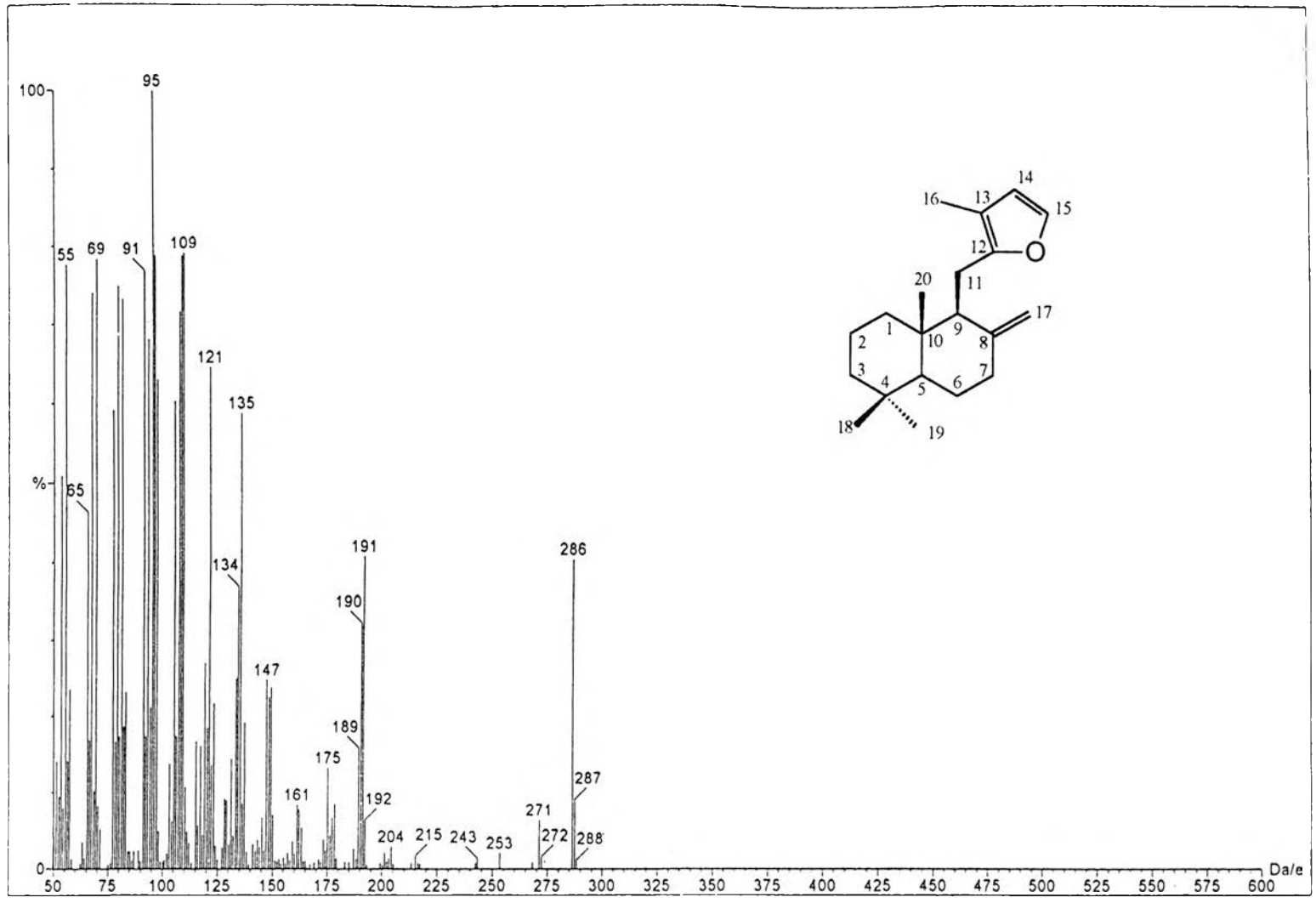


Figure 18. EI-mass spectrum of compound COY11

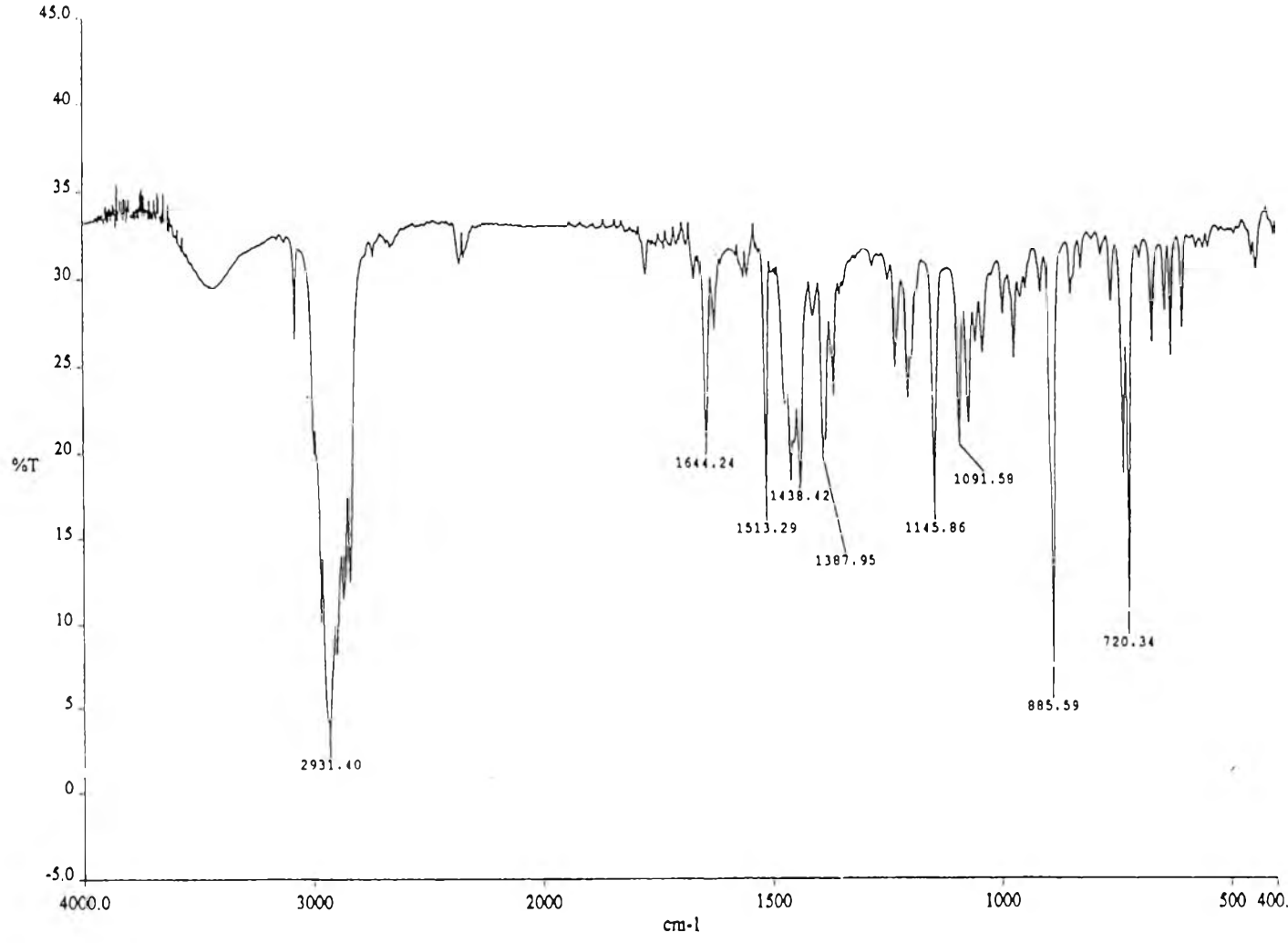


Figure 19. IR spectrum of compound COY11

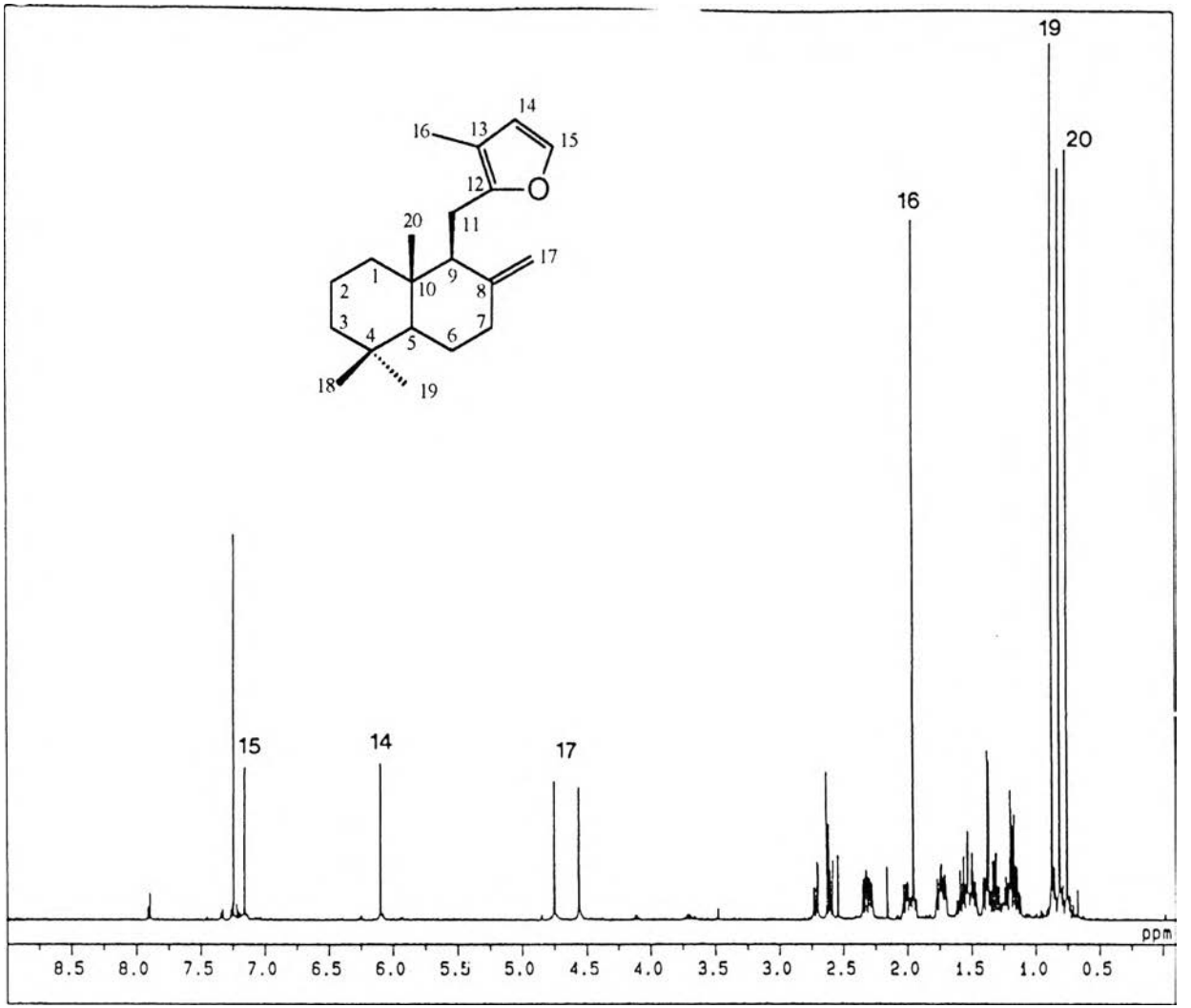


Figure 20. 500 MHz ^{1}H NMR spectrum of compound COY11 (in $CDCl_3$)

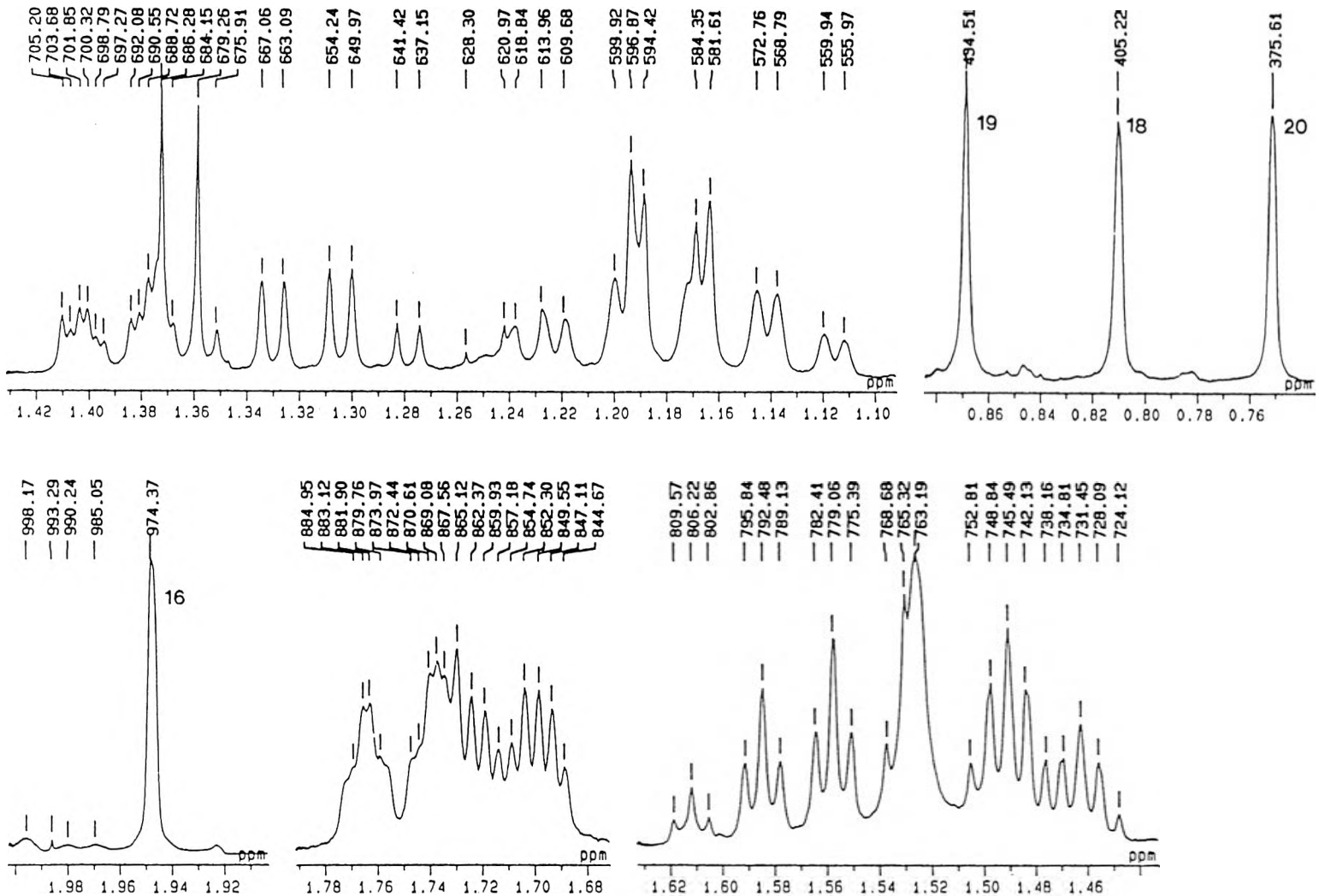


Figure 21. 500 MHz ^{1}H NMR spectrum of compound COY11(in $CDCl_3$)

(expanded in the range of $\delta^{1}H$ 0.75-2 ppm)

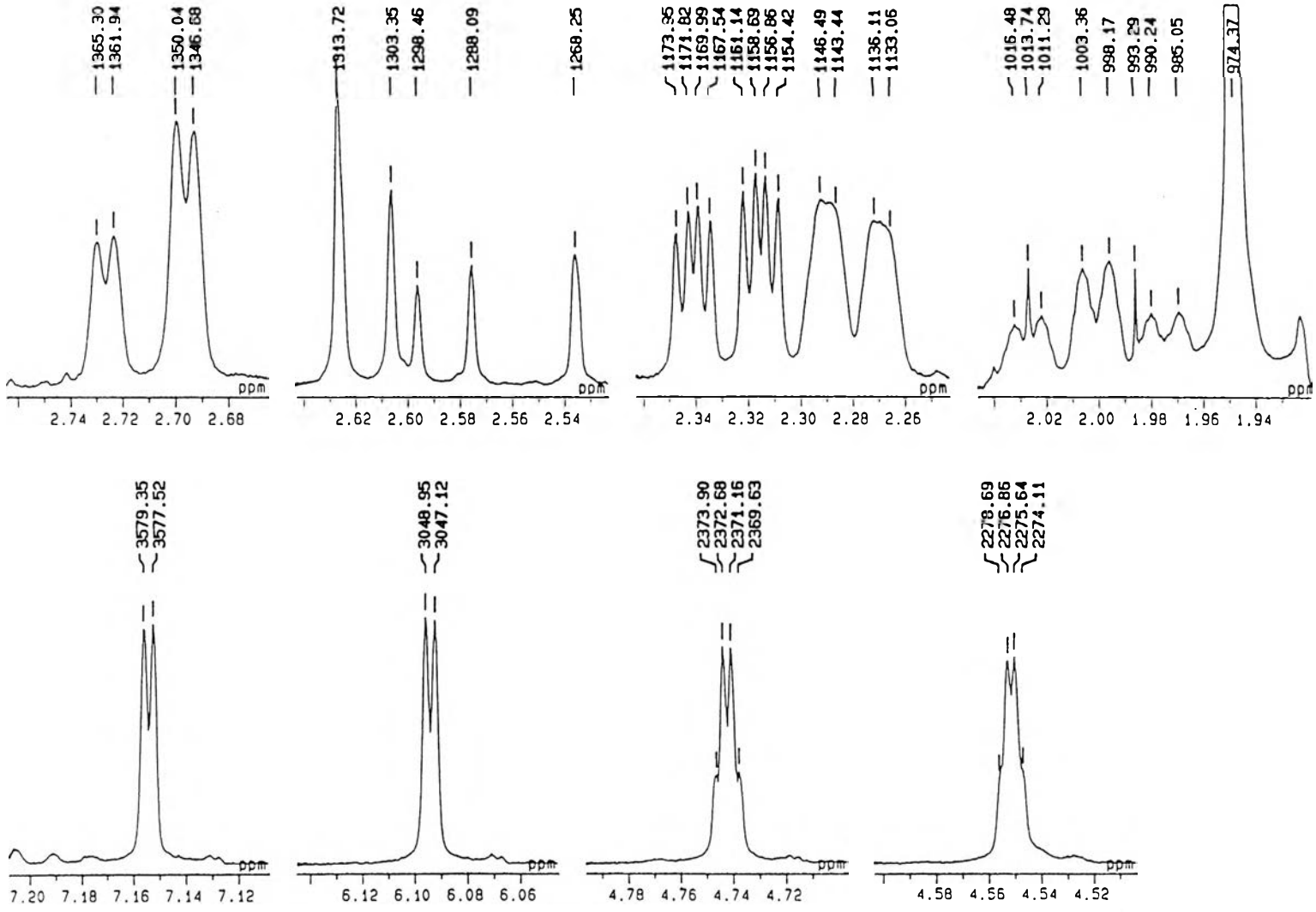


Figure 22. 500 MHz ^{1}H NMR spectrum of compound COY11(in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 2.74-7.2 ppm)

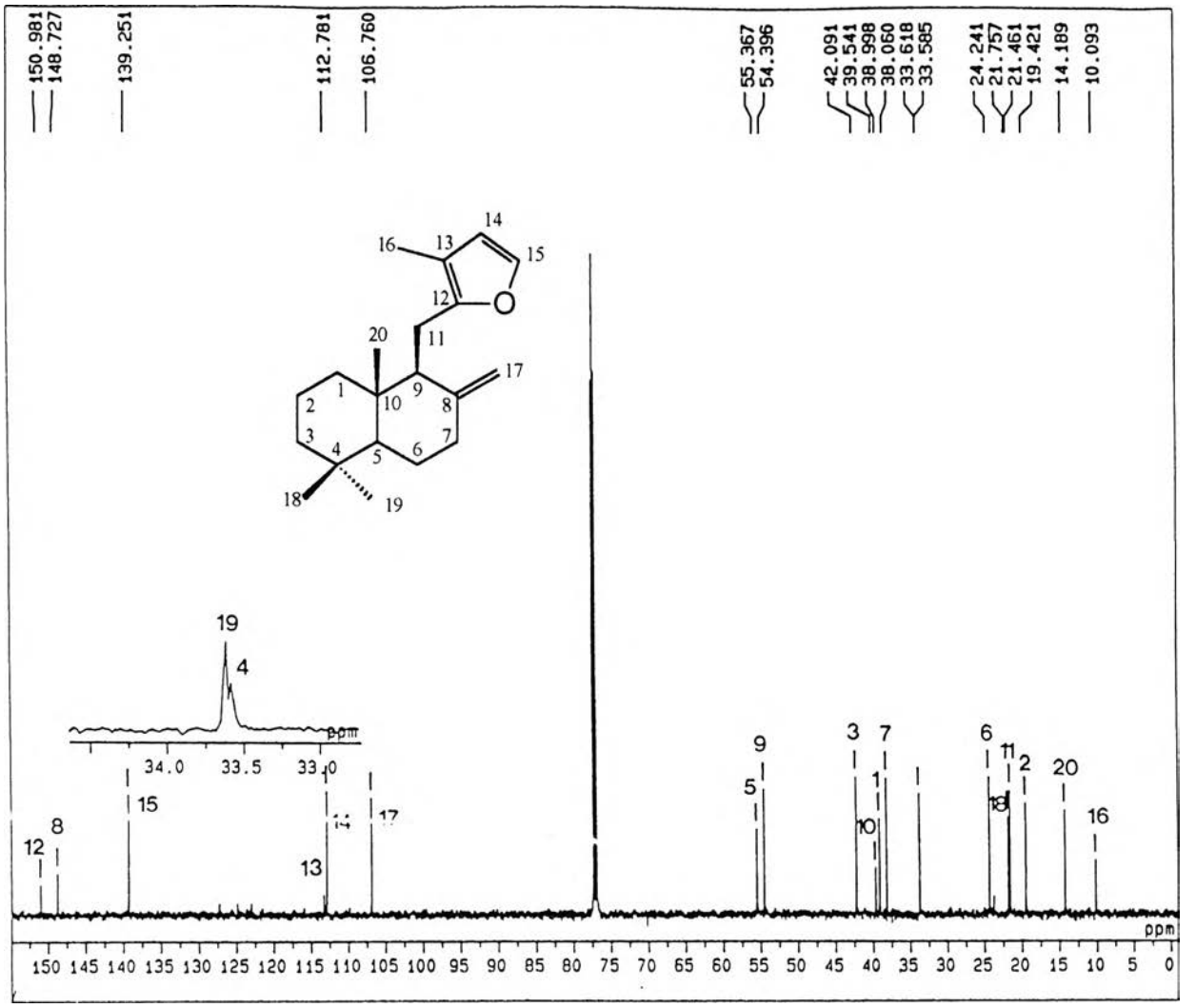


Figure 23. 125 MHz ^{13}C NMR spectrum of compound COY11 (in $CDCl_3$)

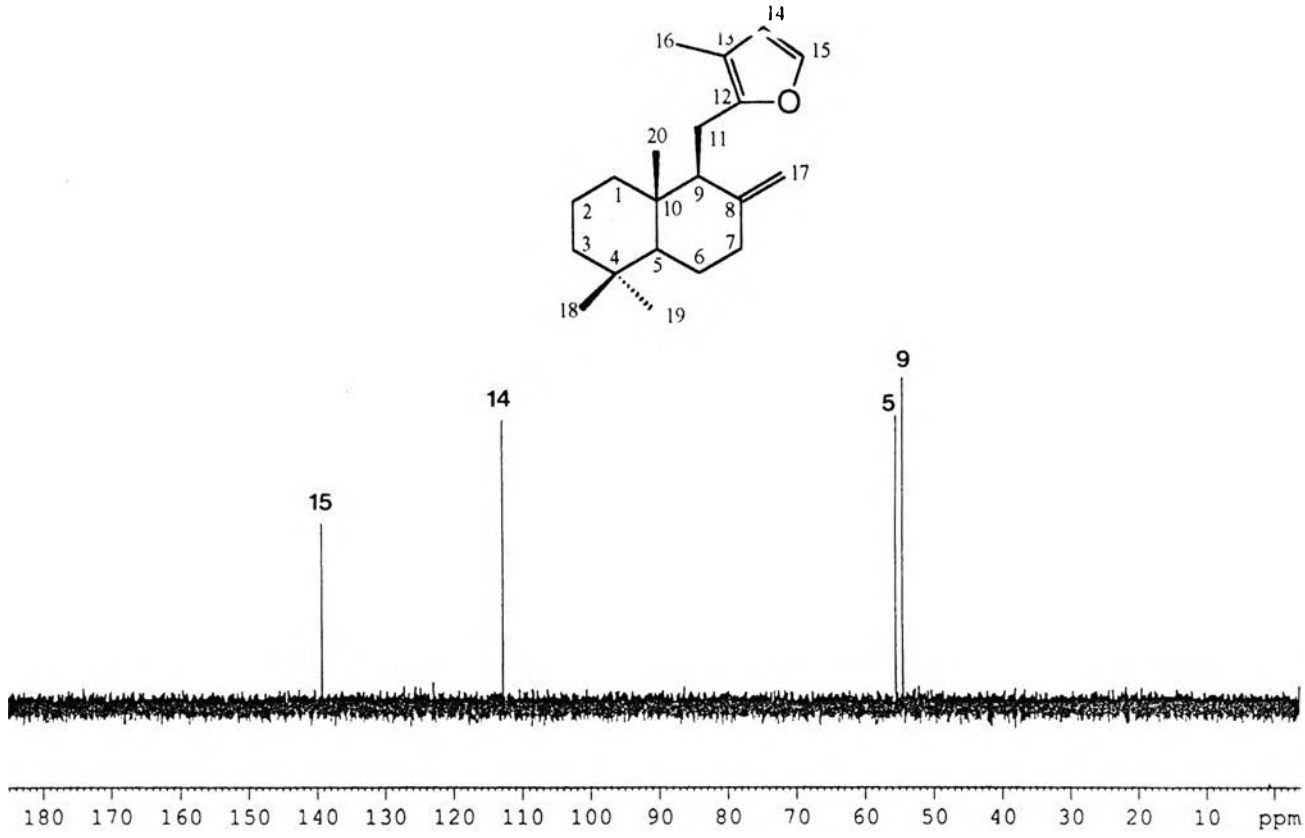


Figure 24. 75 MHz DEPT-90 spectrum of compound COY11 (in $CDCl_3$)

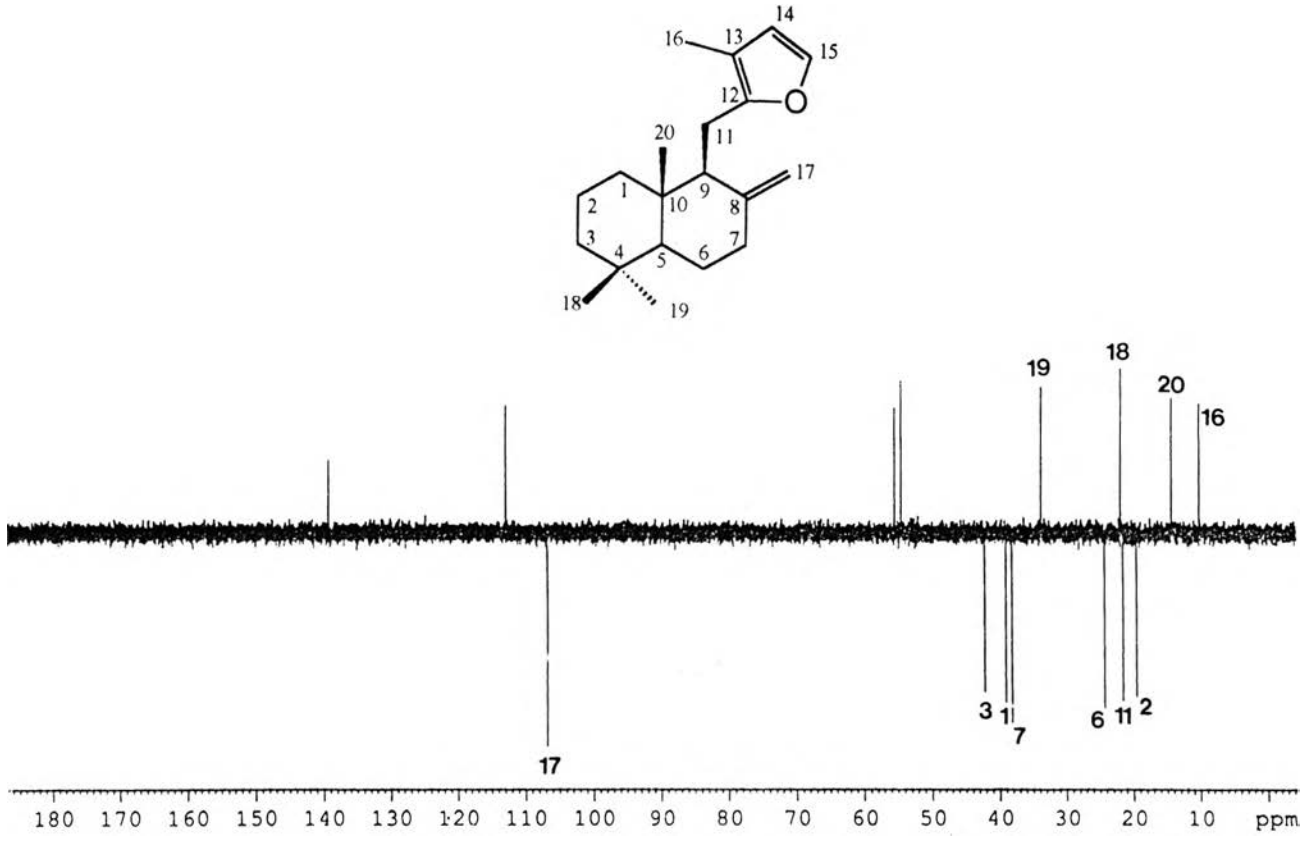
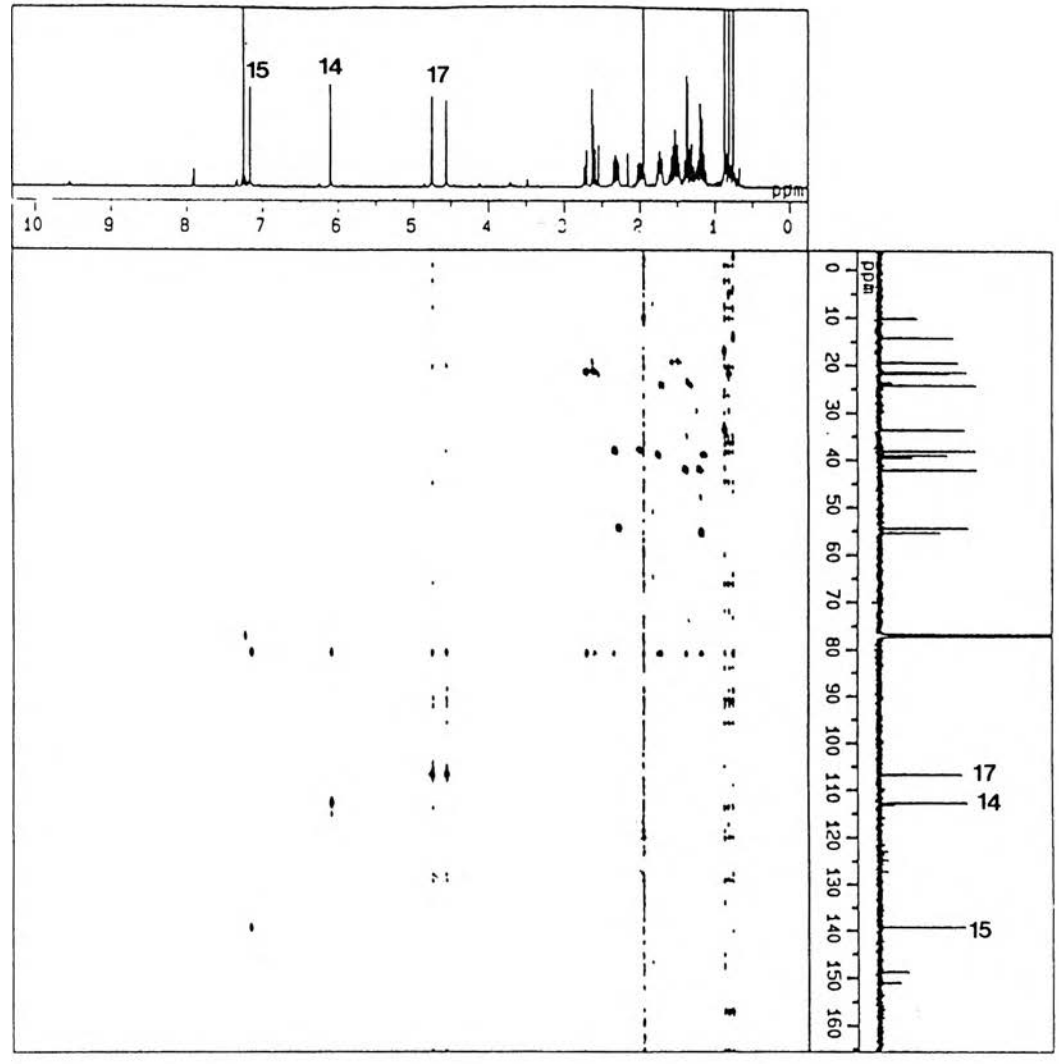


Figure 25. 75 MHz DEPT-135 spectrum of compound COY11 (in $CDCl_3$)



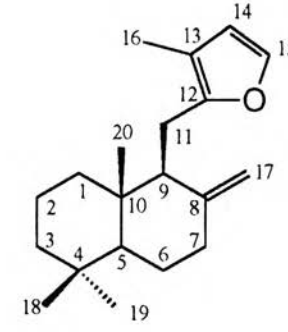


Figure 26. ^{1}H-^{13}C HMQC spectrum of compound COY11 (in $CDCl_3$)

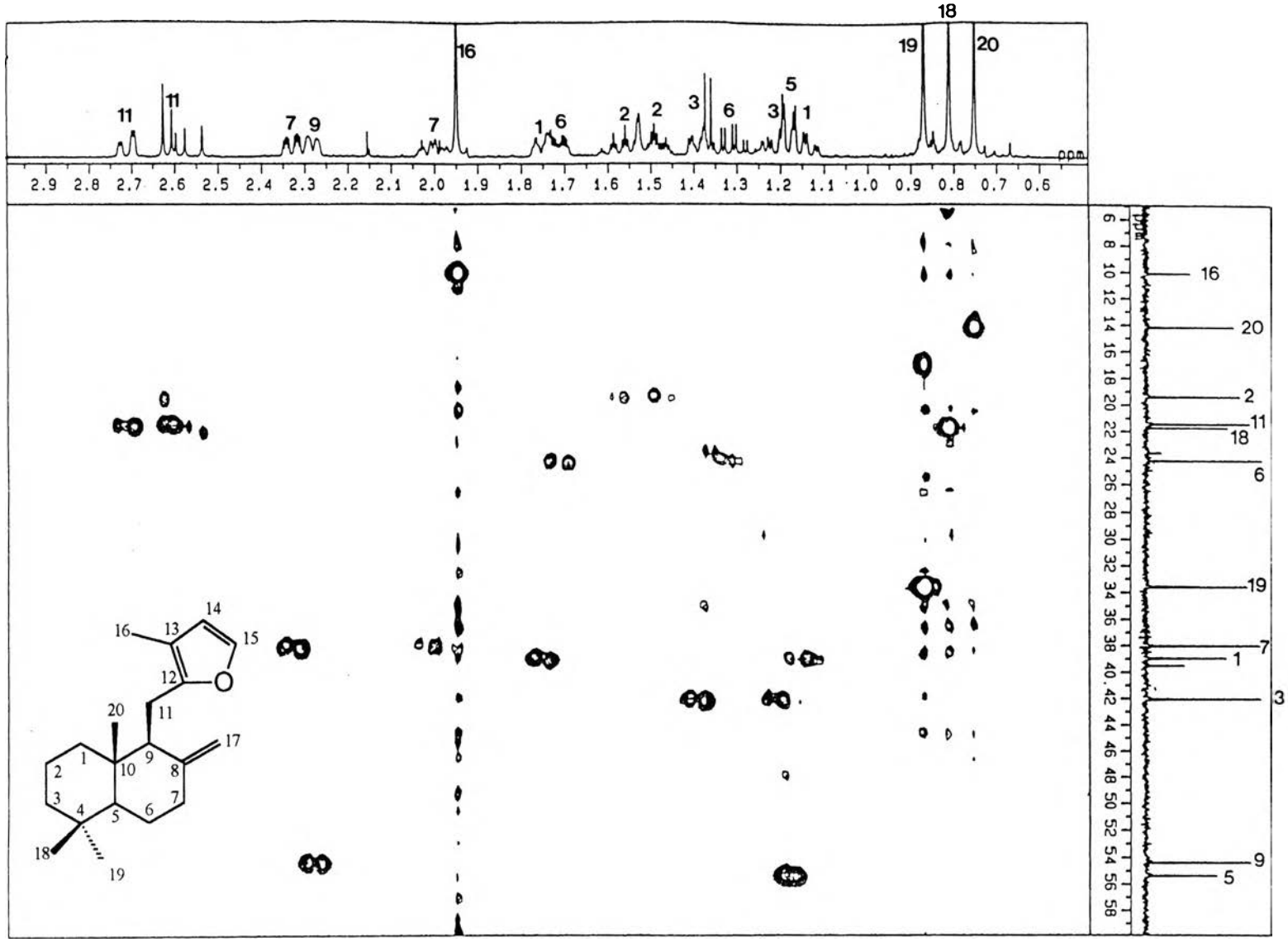
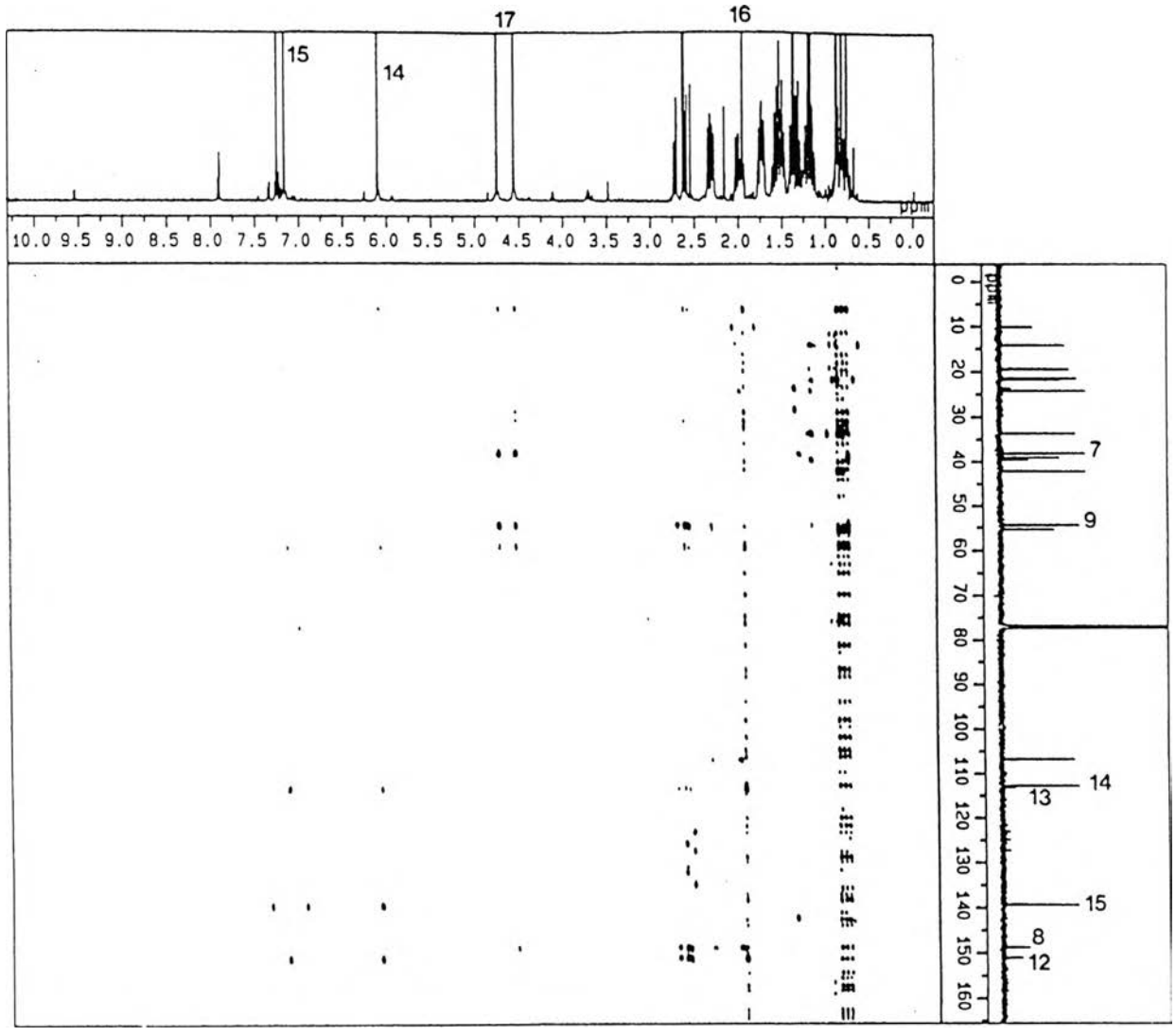


Figure 27. ^{1}H-^{13}C HMQC spectrum of compound COY11 (in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 0.6-2.9 ppm and $\delta^{13}C$ 6-58 ppm)



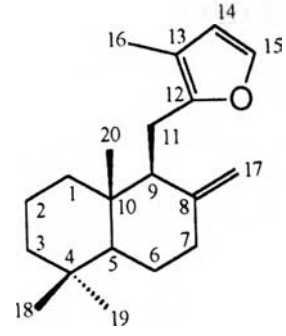
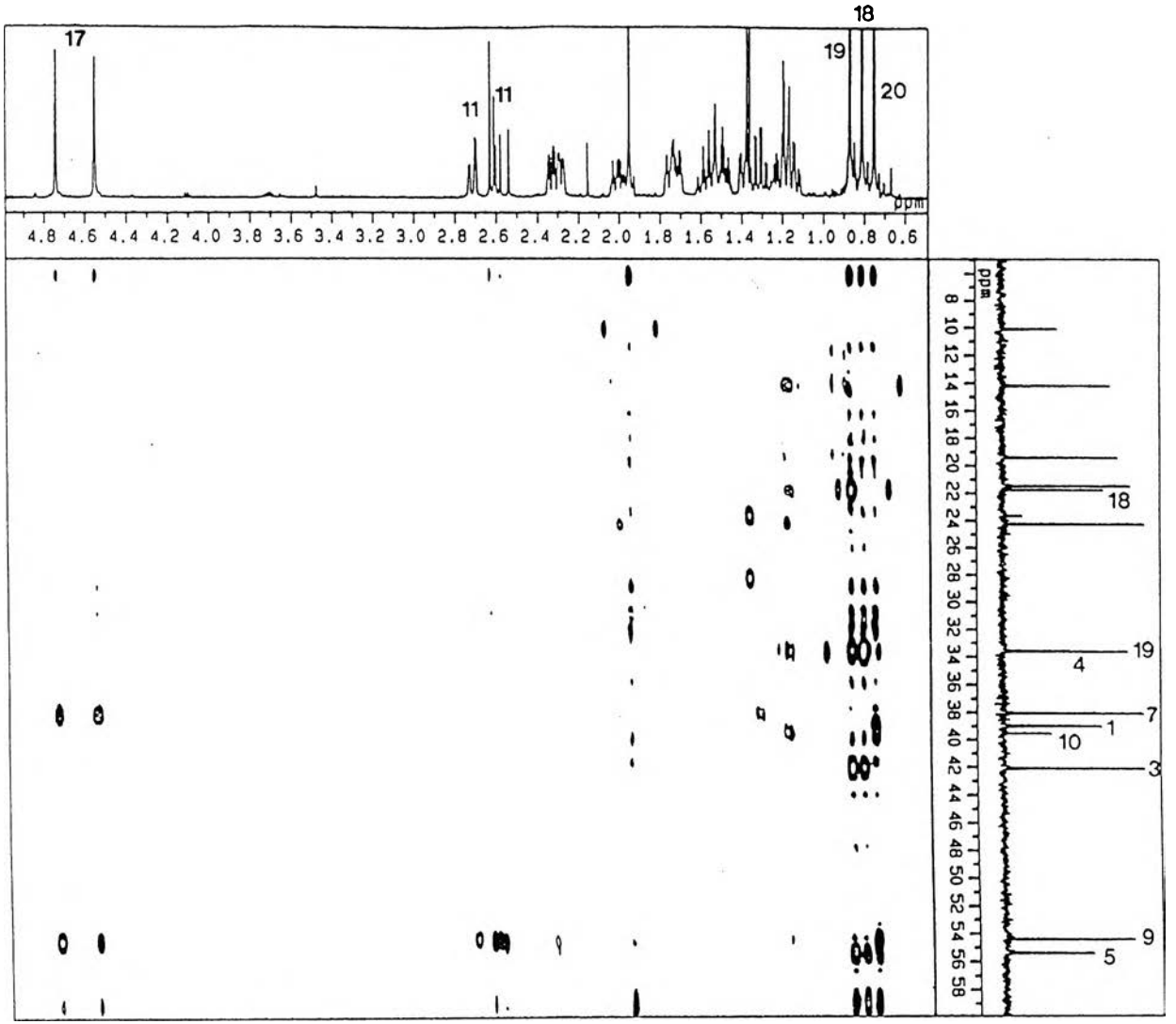


Figure 28. ^{1}H-^{13}C HMBC spectrum of compound COY11 (in $CDCl_3$)



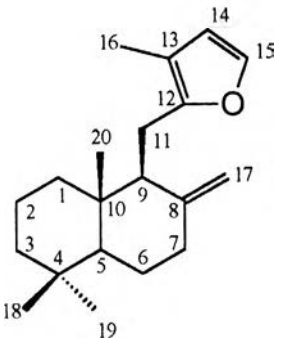
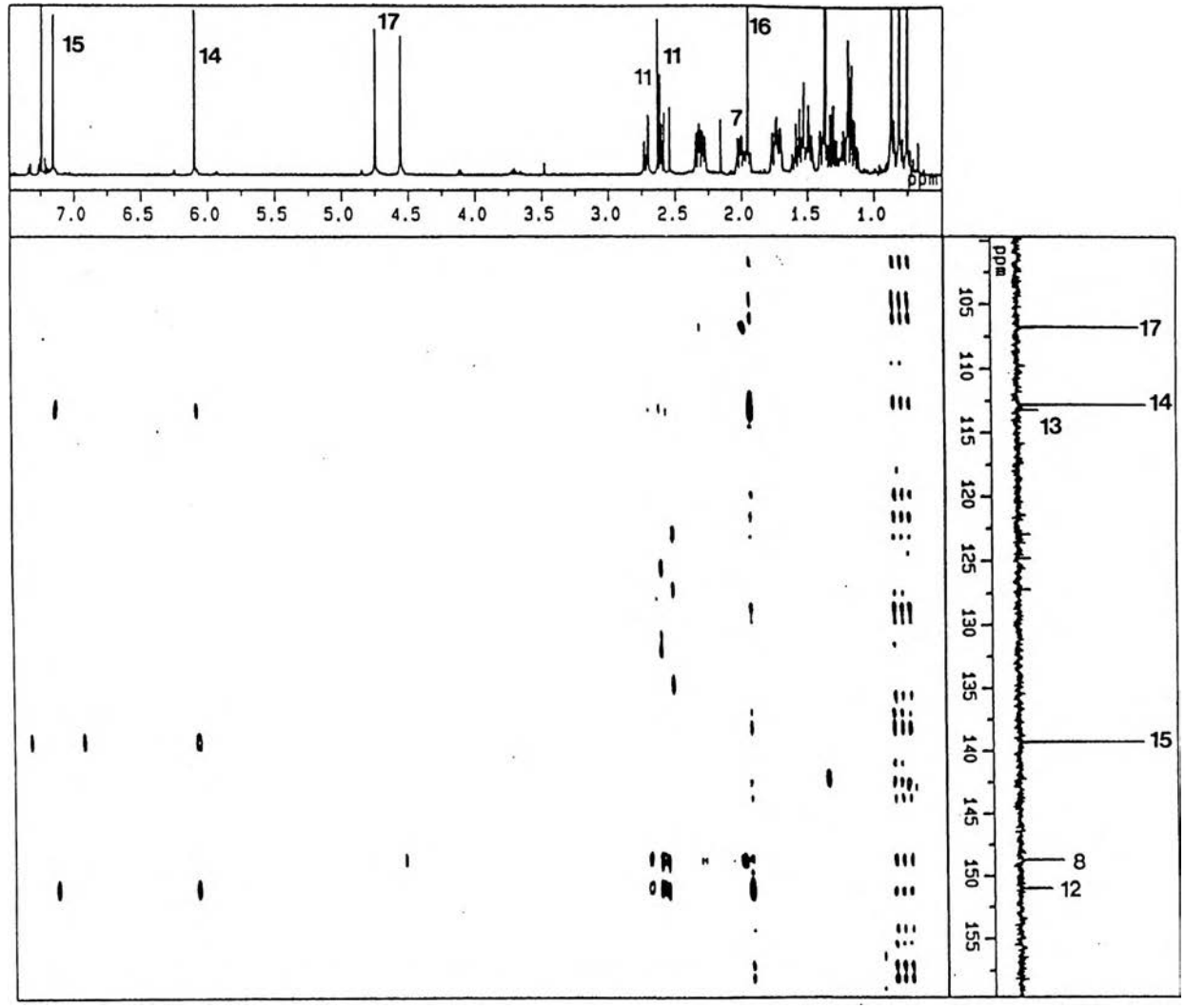


Figure 29. ^{1}H-^{13}C HMBC spectrum of compound COY11 (in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 0.6-4.8 ppm and $\delta^{13}C$ 8-58 ppm)



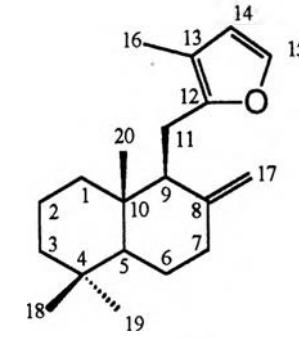
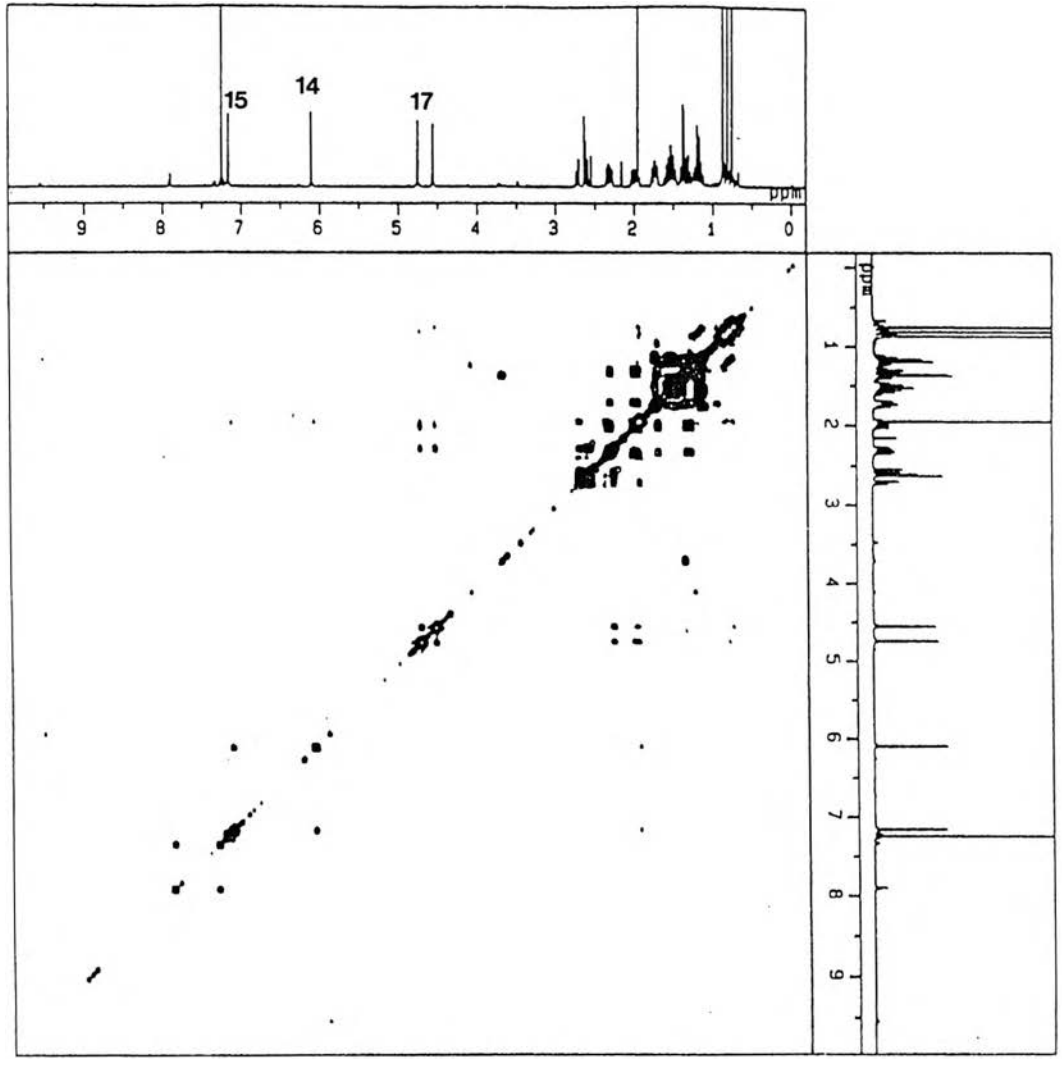


Figure 30. ^{1}H-^{13}C HMBC spectrum of compound COY11 (in $CDCl_3$)

(expanded in the range of $\delta^{1}H$ 0.5-7.5 ppm and $\delta^{13}C$ 105-155 ppm)



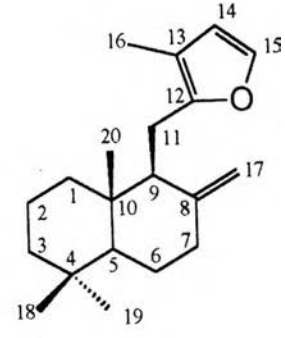
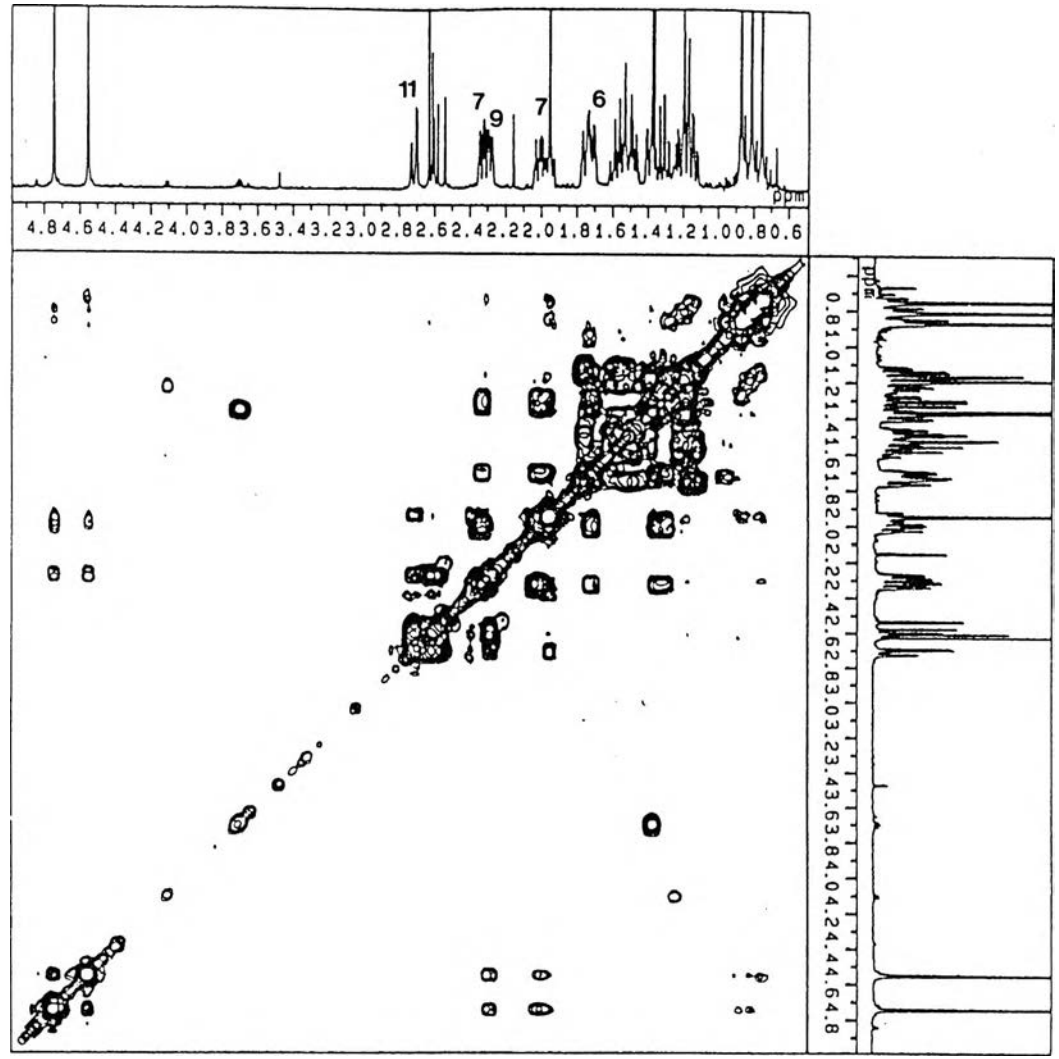


Figure 31. ^{1}H-^{1}H COSY spectrum of compound COY11 (in $CDCl_3$)



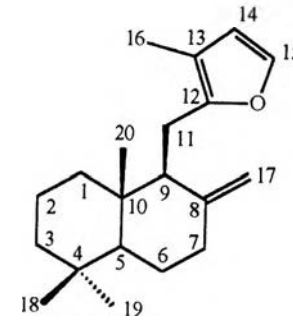
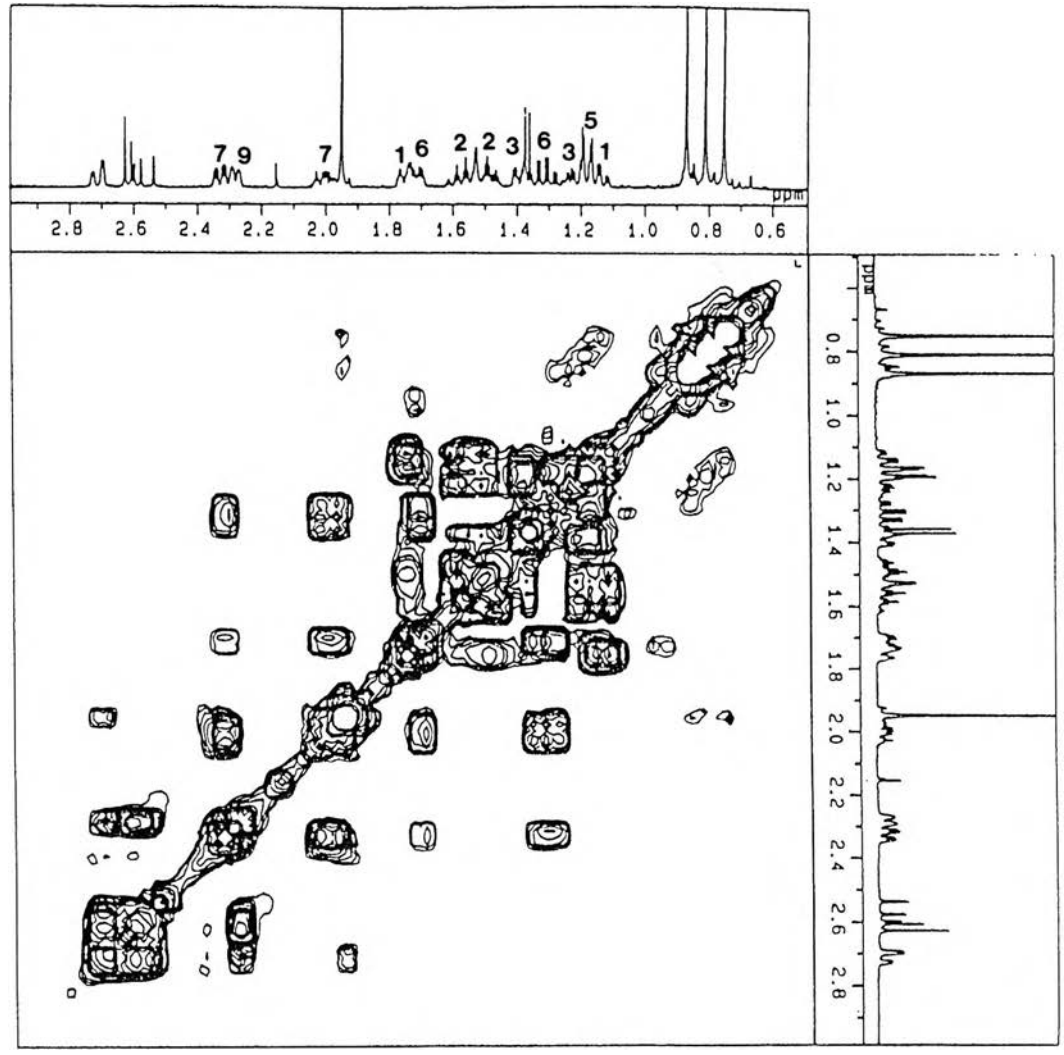


Figure 32. ^{1}H-^{1}H COSY spectrum of compound COY11 (in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 0.6-4.8 ppm and $\delta^{1}H$ 0.6-4.8 ppm)



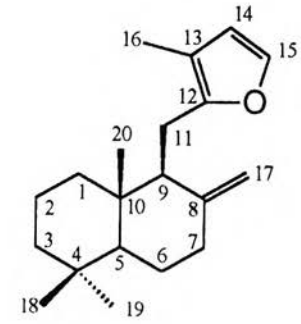


Figure 33. ^{1}H-^{1}H COSY spectrum of compound COY11 (in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 0.6-2.8 ppm and $\delta^{1}H$ 0.6-2.8 ppm)

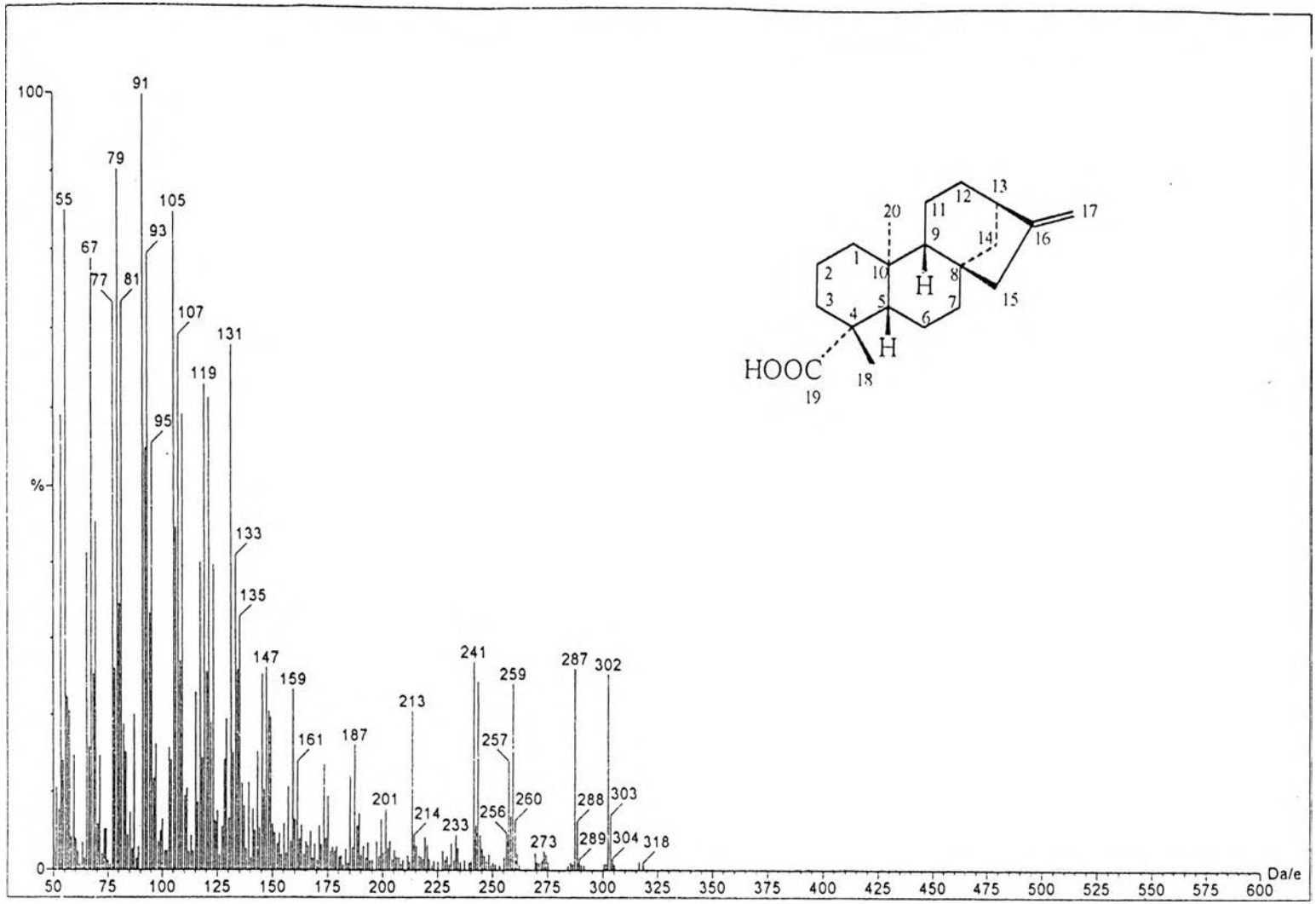


Figure 34. EI-mass spectrum of compound COY10

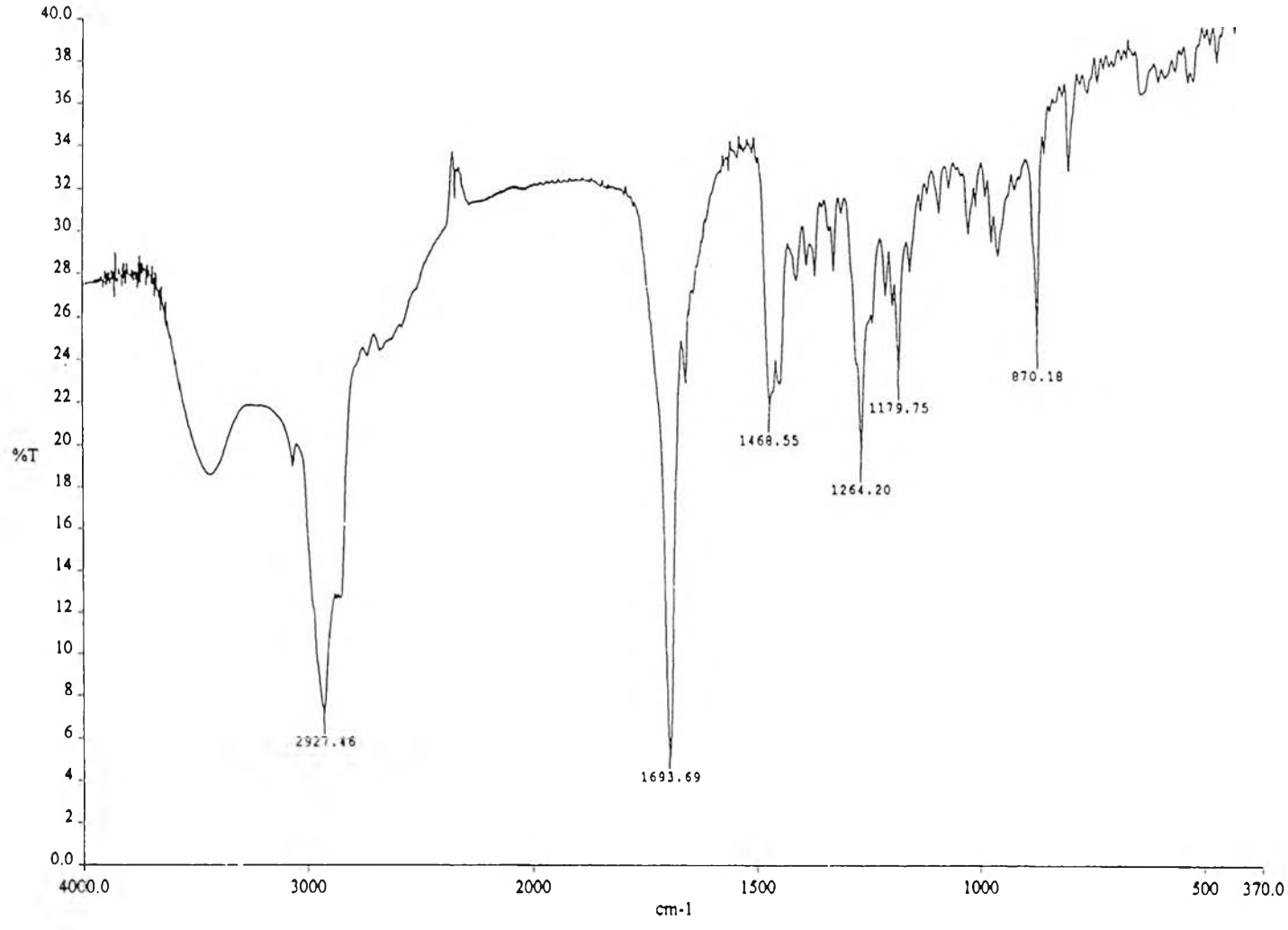


Figure 35. IR spectrum of compound COY10

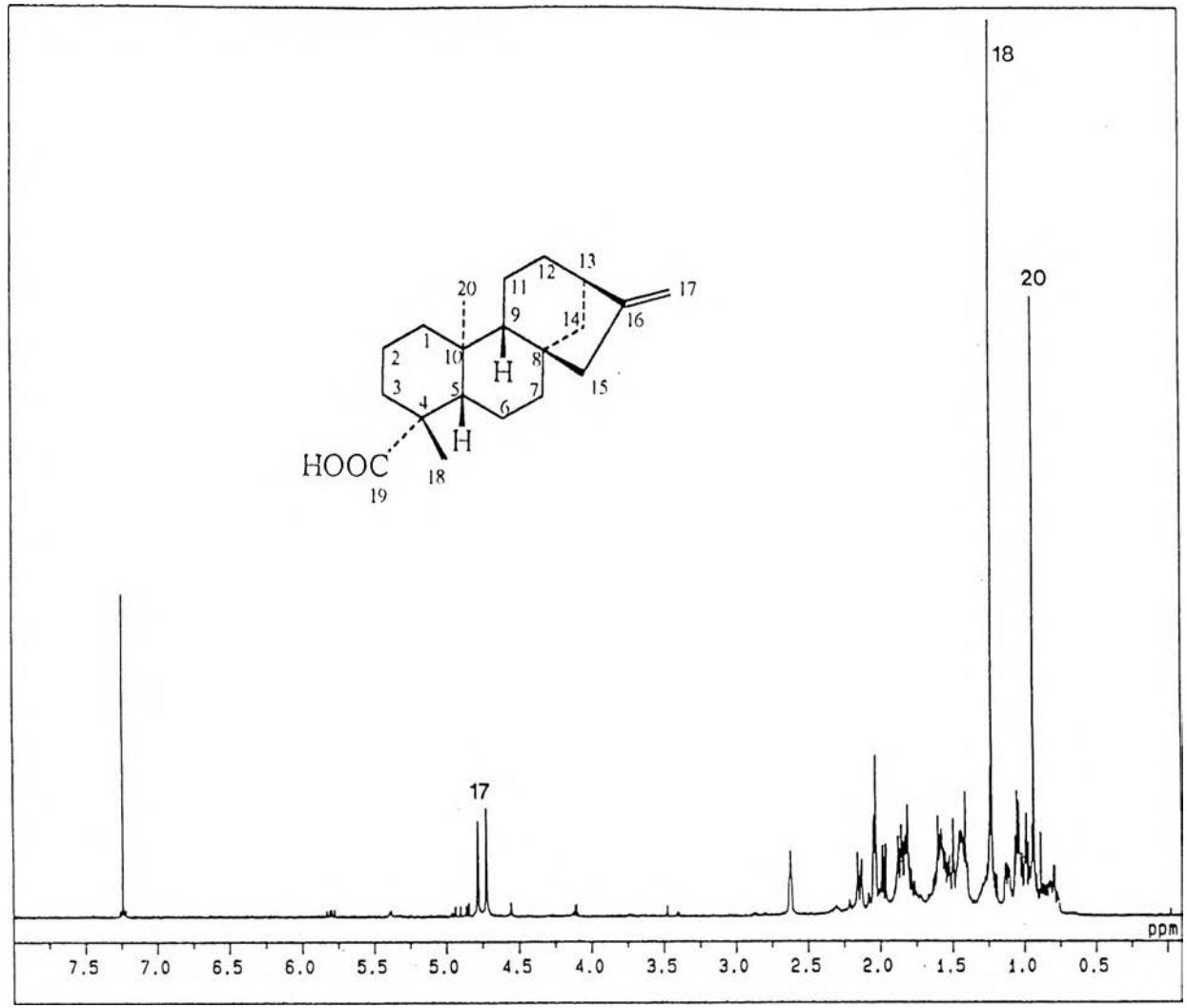


Figure 36. 500 MHz ^{1}H NMR spectrum of compound COY10 (in $CDCl_3$)

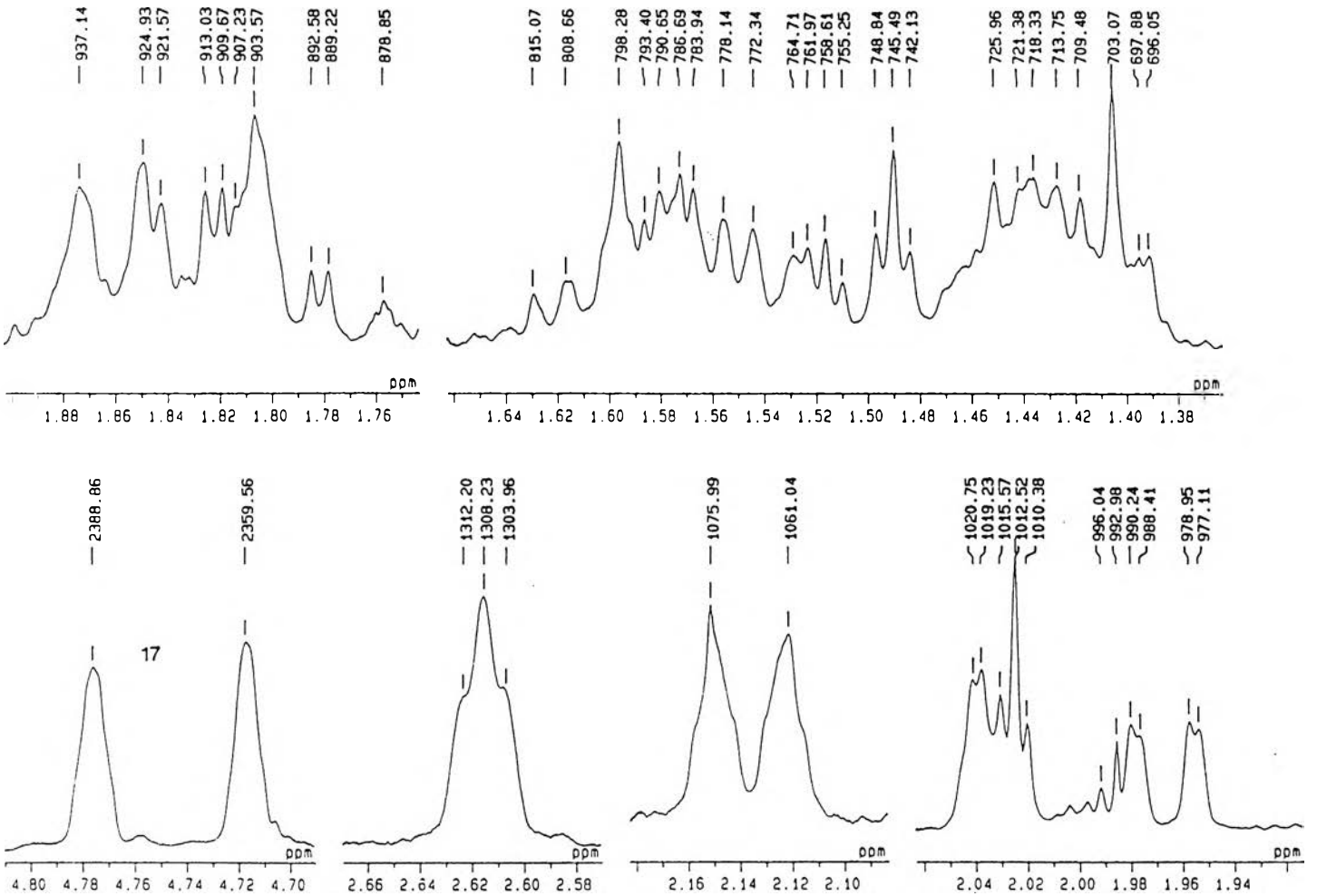


Figure 37. 500 MHz ^{1}H NMR spectrum of compound COY10 (in $CDCl_3$) (expanded)

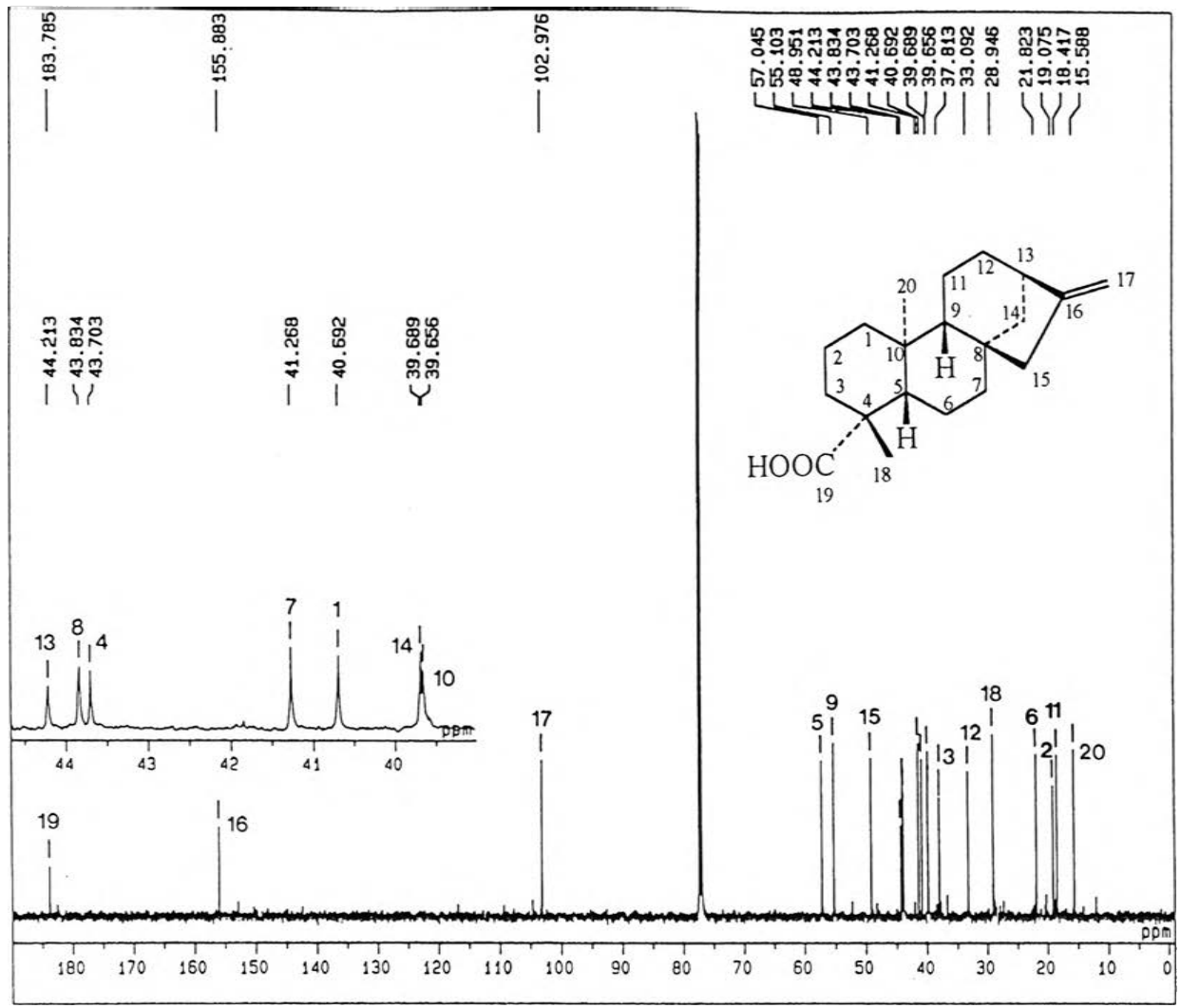


Figure 38. 125 MHz ^{13}C NMR spectrum of compound COY10 (in $CDCl_3$)

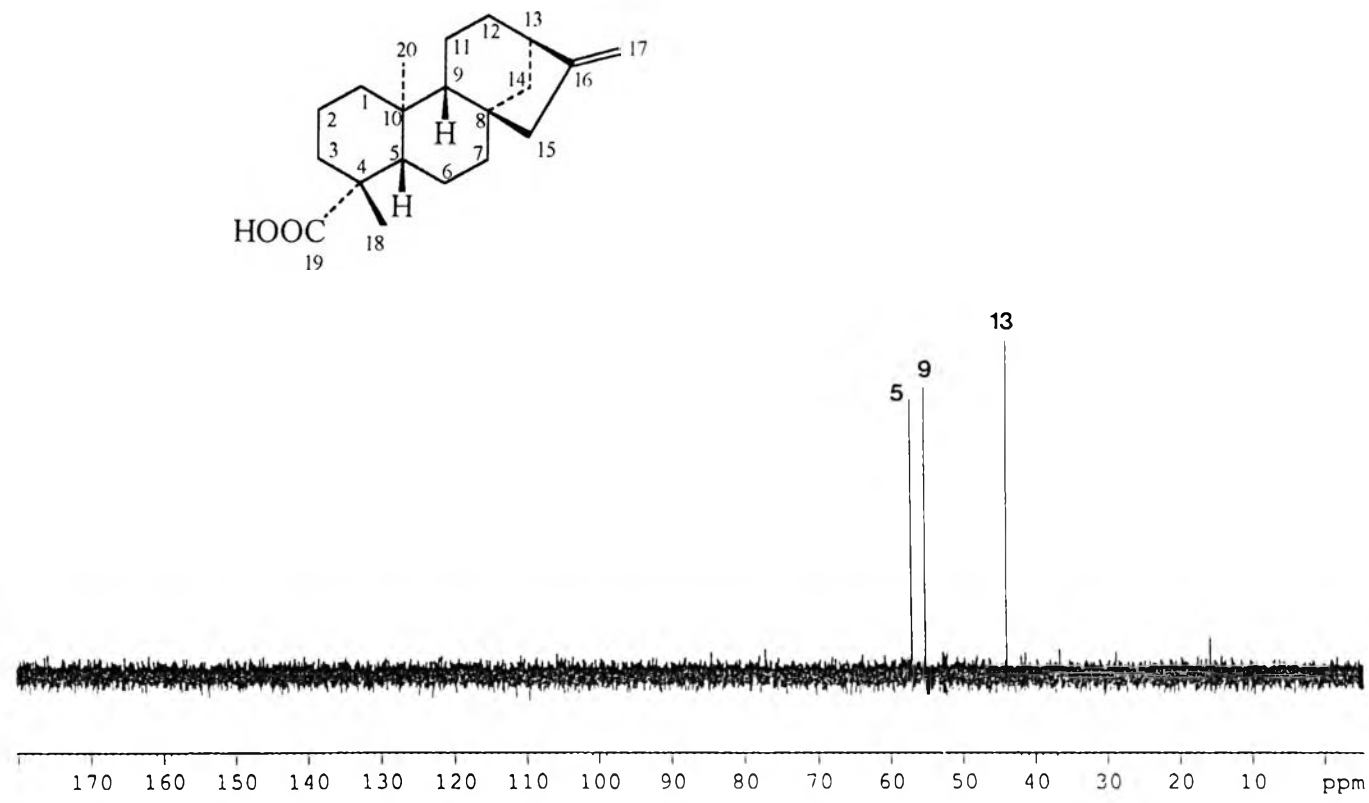


Figure 39. 75 MHz DEPT-90 spectrum of compound COY10 (in $CDCl_3$)

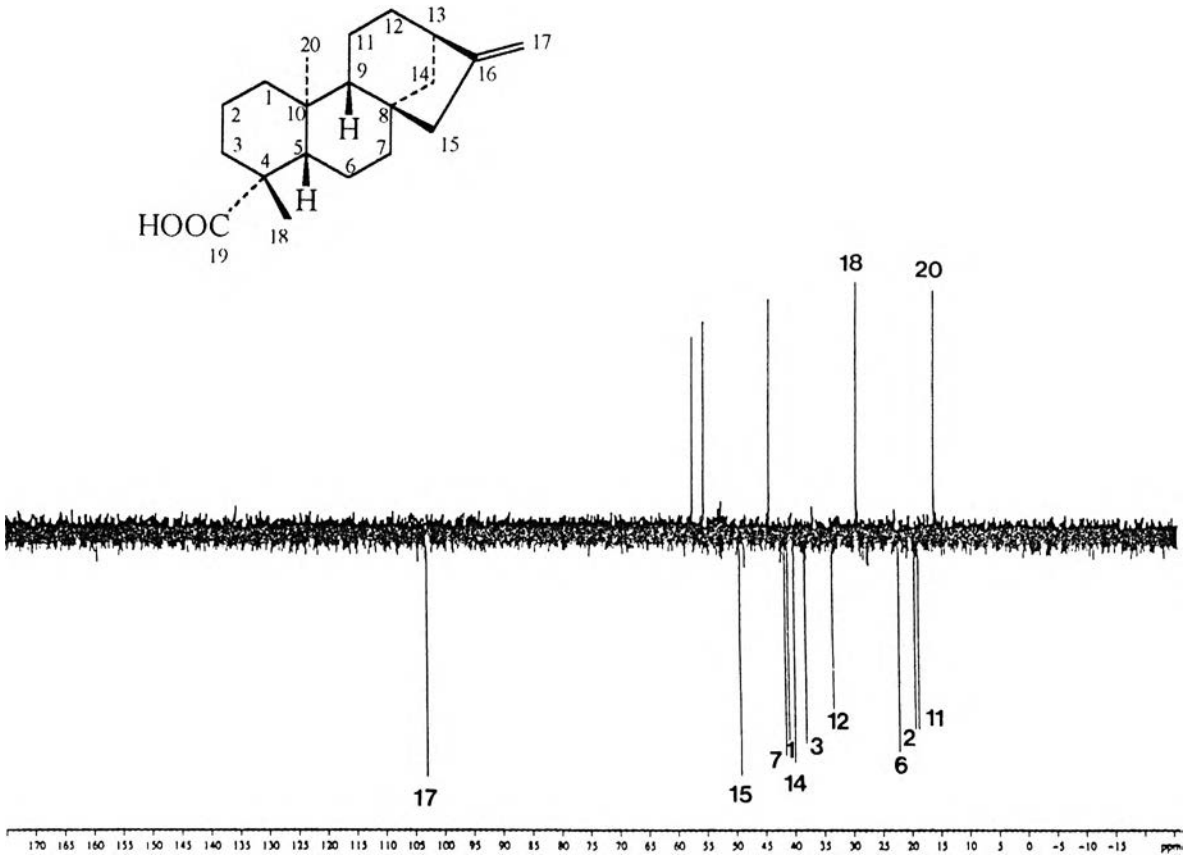
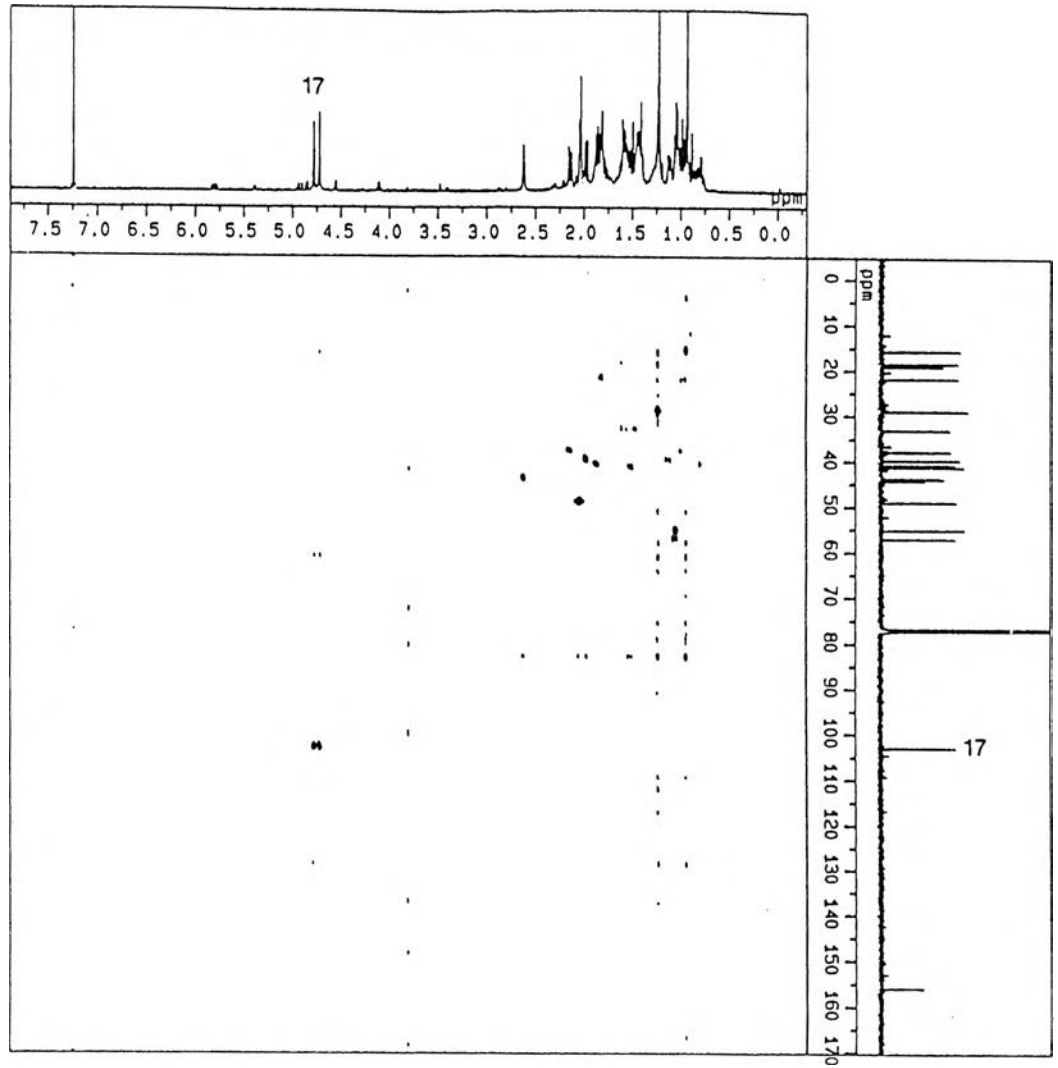


Figure 40. 75 MHz DEPT-135 spectrum of compound COY10 (in $CDCl_3$)



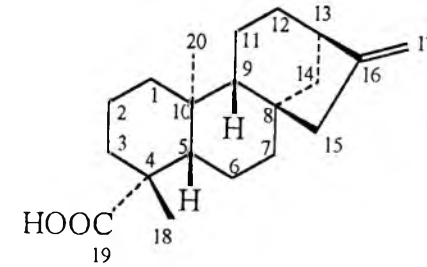


Figure 41. ^{1}H-^{13}C HMQC spectrum of compound COY10 (in $CDCl_3$)

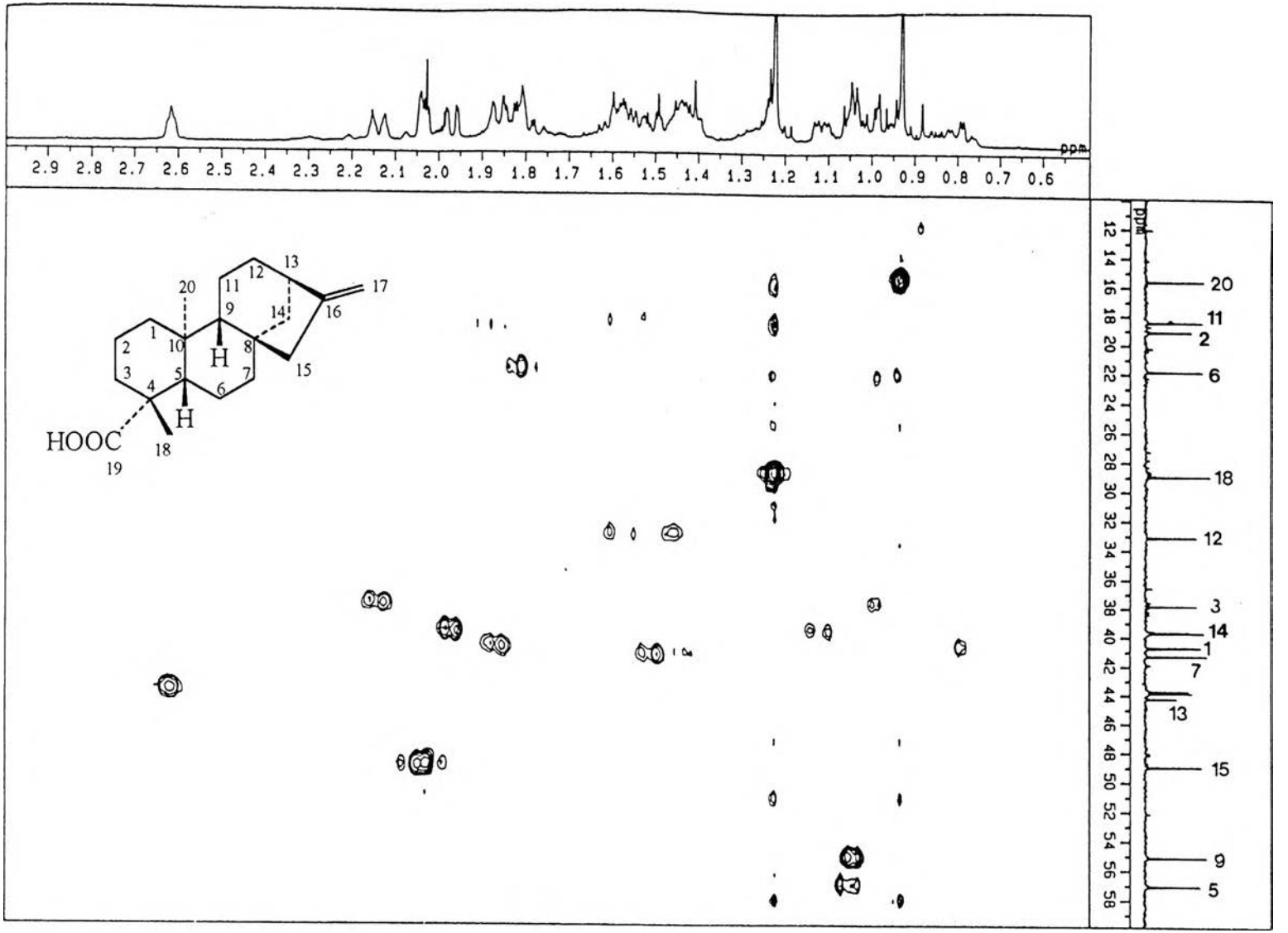
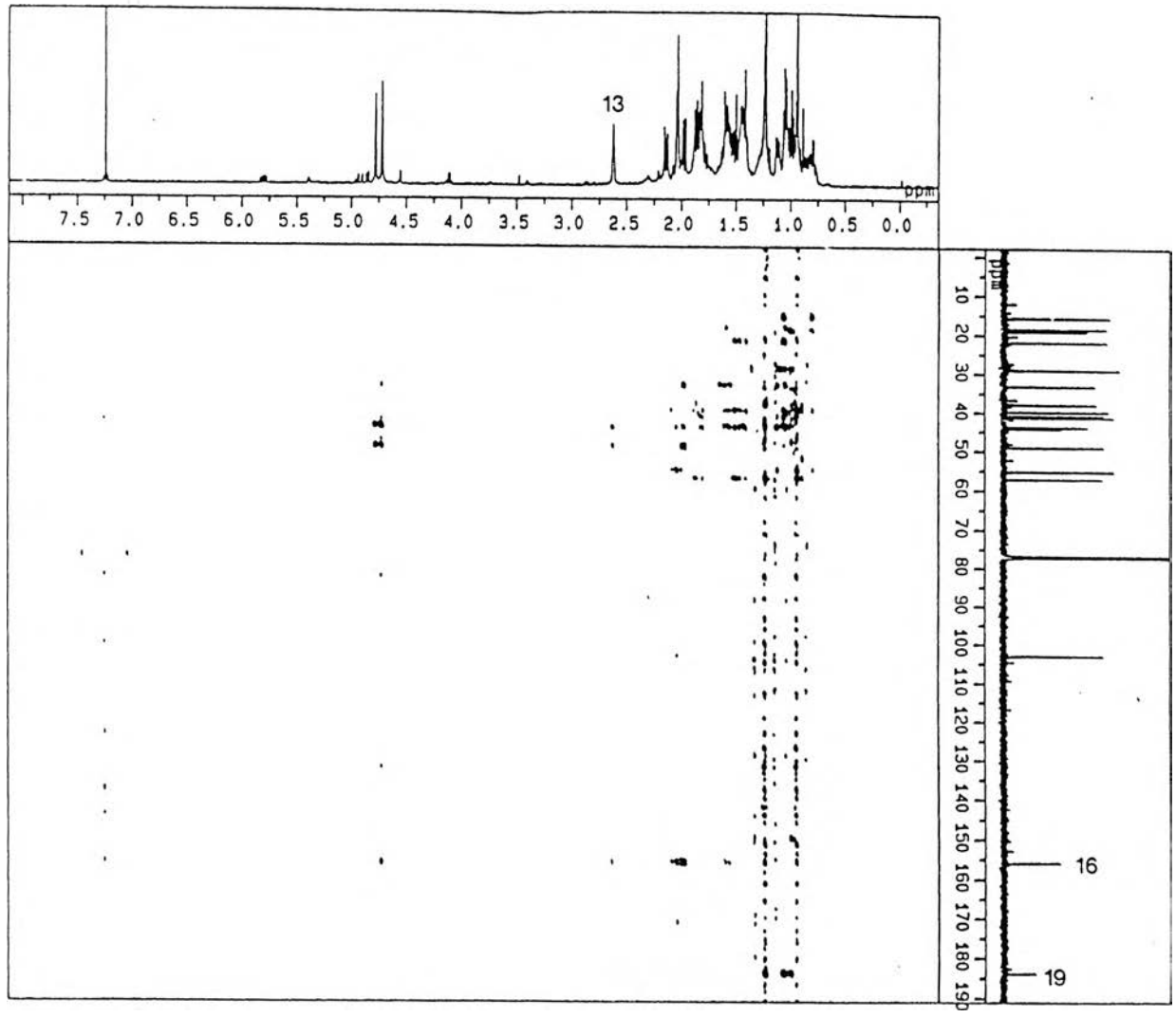


Figure 42. ^{1}H-^{13}C HMQC spectrum of compound COY10 (in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 0.6-2.9 ppm and $\delta^{13}C$ 12-58 ppm)



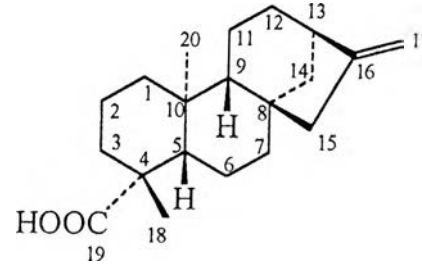


Figure 43. ^{1}H-^{13}C HMBC spectrum of compound COY10 (in $CDCl_3$)

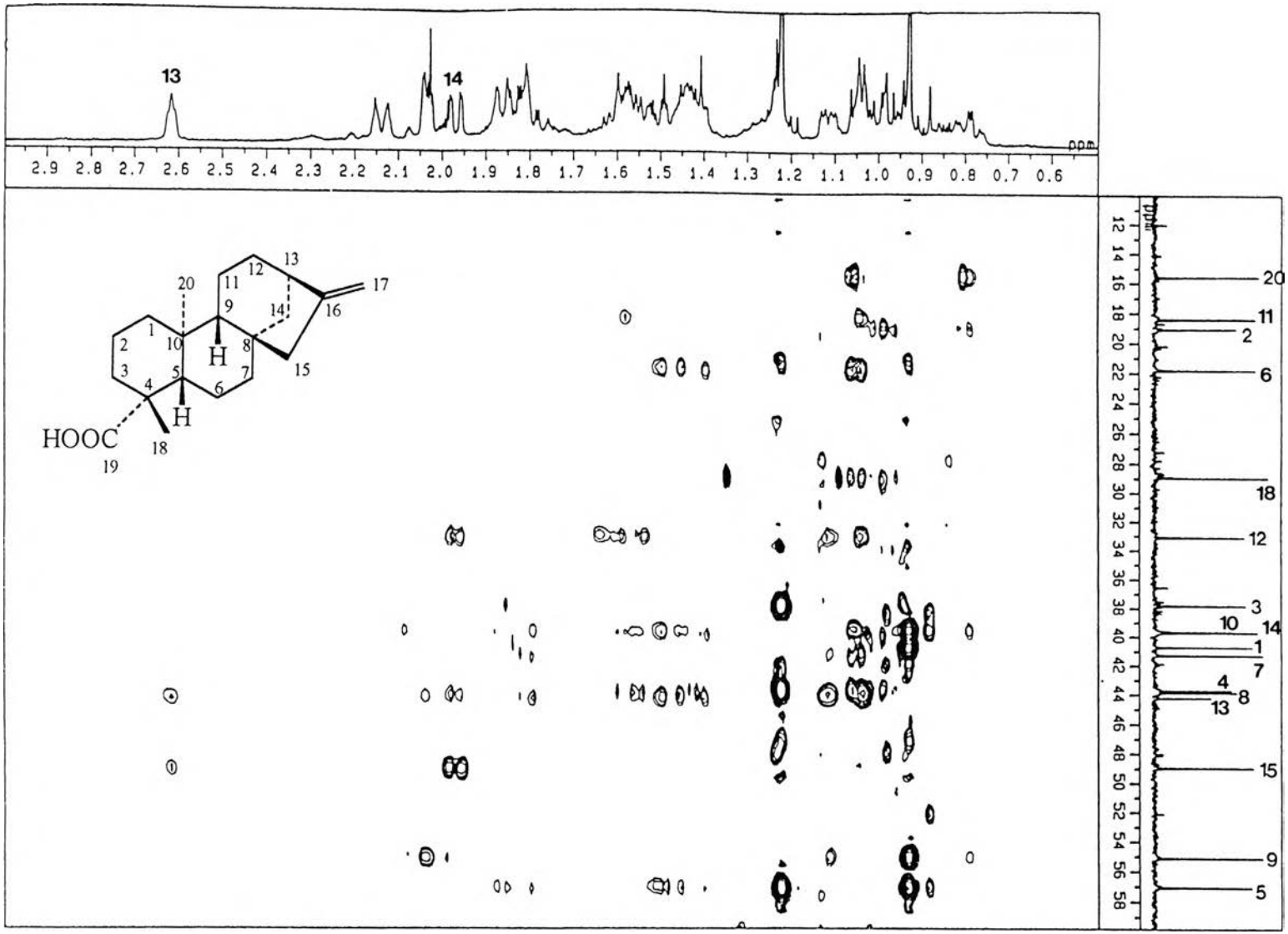


Figure 44. ^{1}H-^{13}C HMBC spectrum of compound COY10 (in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 0.6-2.9 ppm and $\delta^{13}C$ 12-58 ppm)

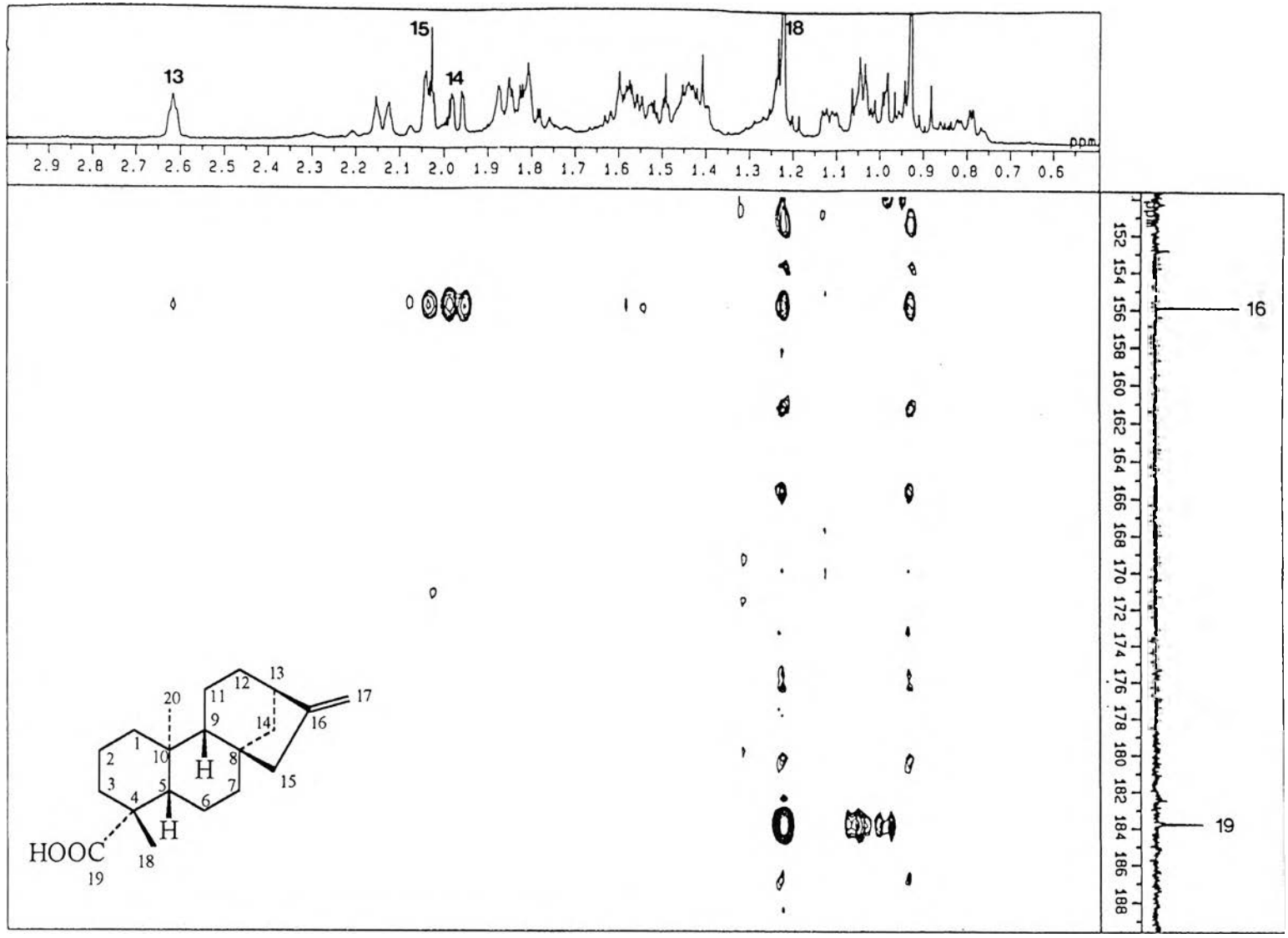
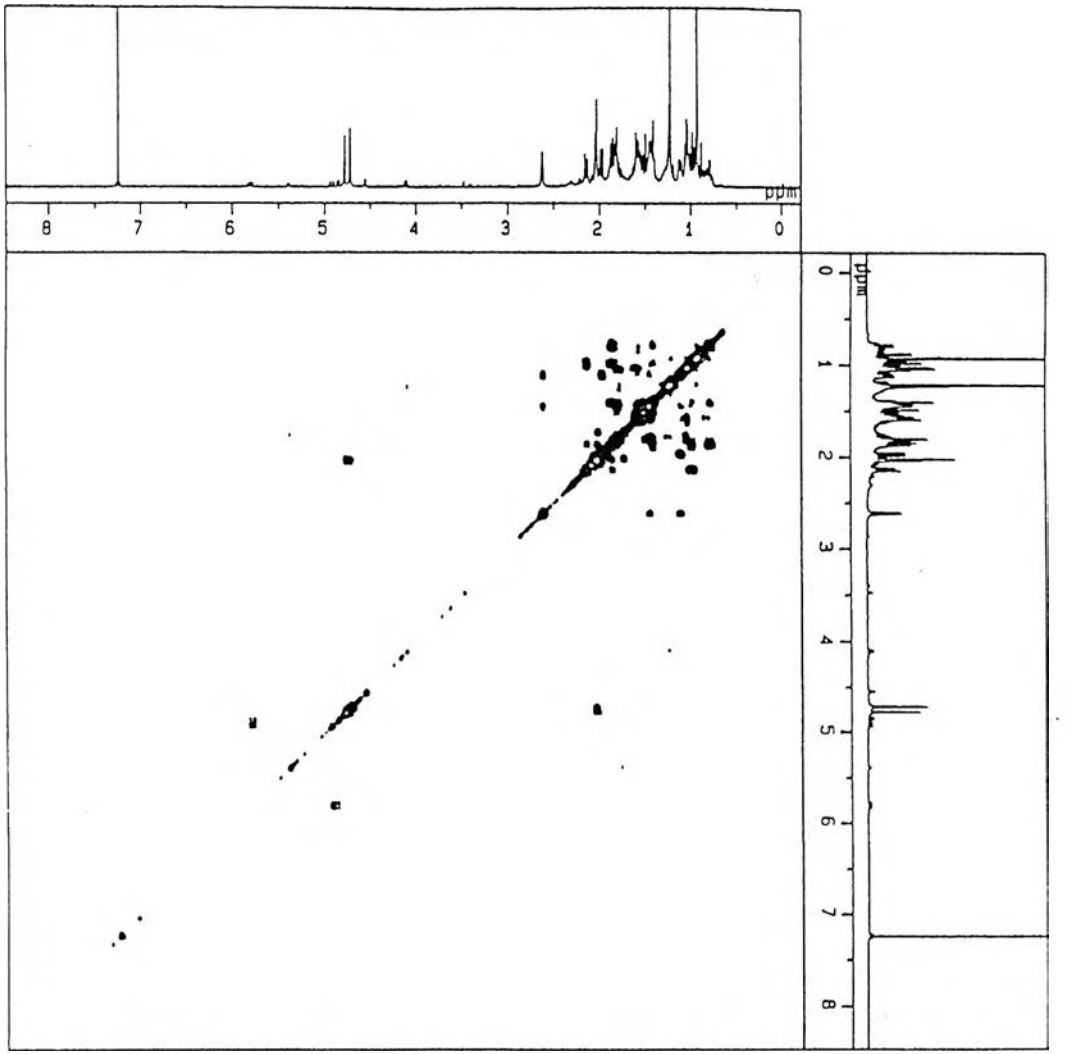


Figure 45. ^{1}H-^{13}C HMBC spectrum of compound COY10 (in $CDCl_3$)

(expanded in the range of $\delta^{1}H$ 0.6-2.9 ppm and $\delta^{13}C$ 152-188 ppm)



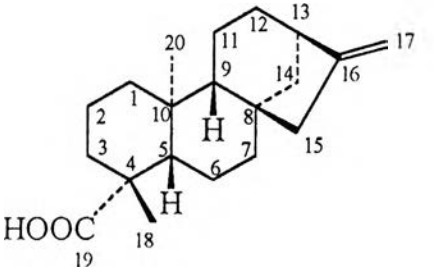
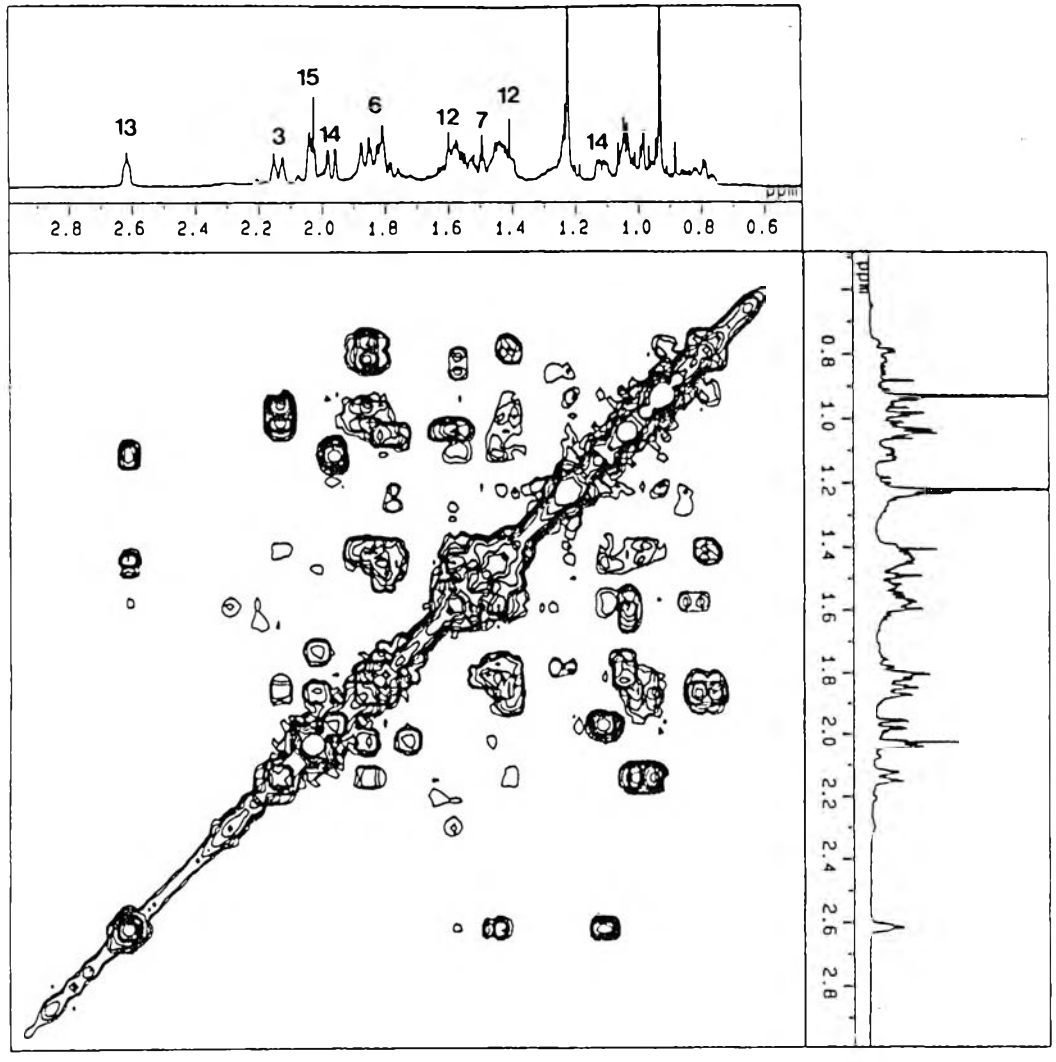


Figure 46. ^{1}H-^{1}H COSY spectrum of compound COY10 (in $CDCl_3$)



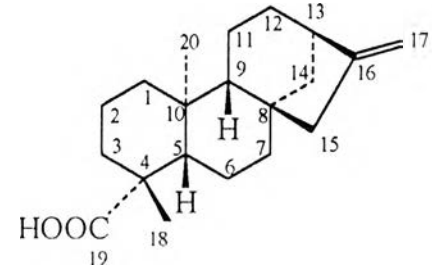
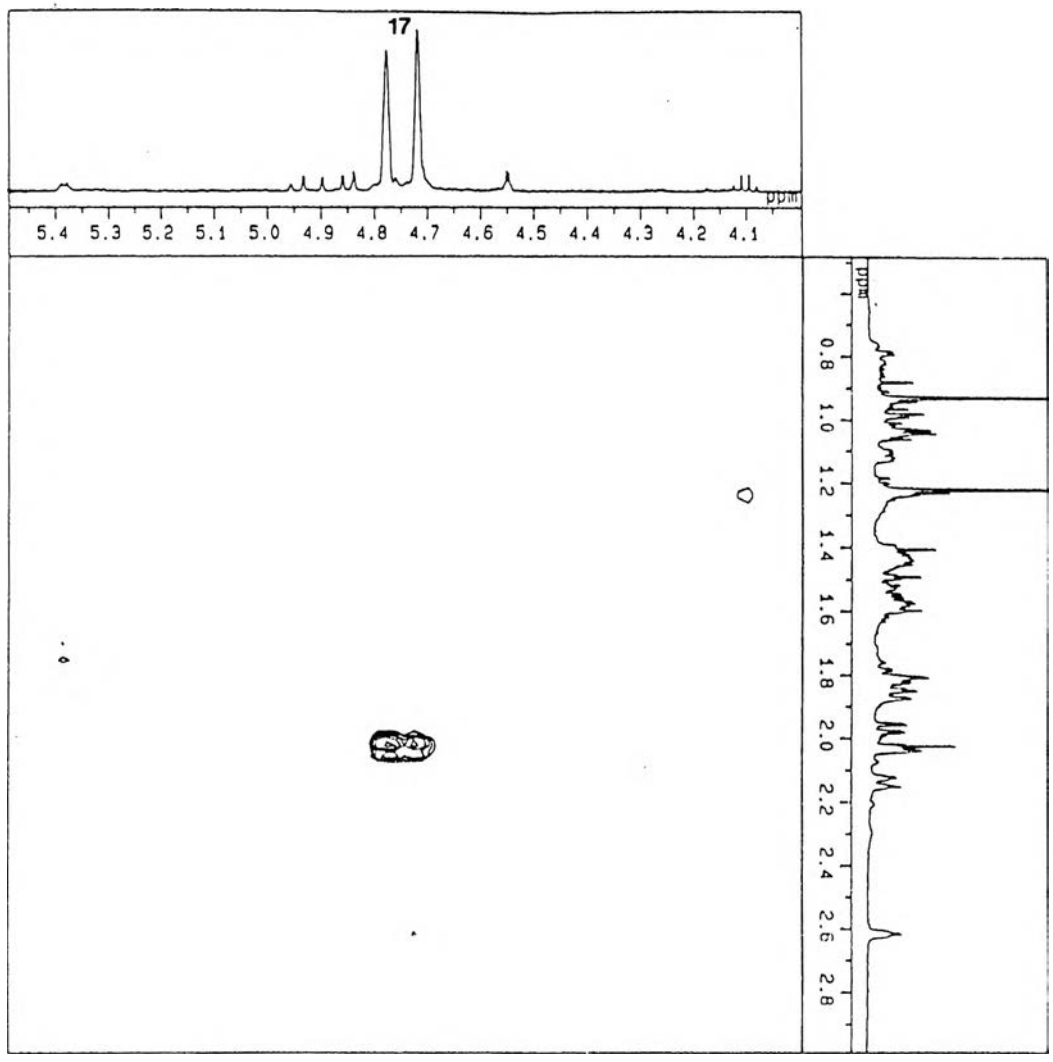


Figure 47. ^{1}H-^{1}H COSY spectrum of compound COY10 (in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 0.6-2.8 ppm and $\delta^{1}H$ 0.6-2.8 ppm)



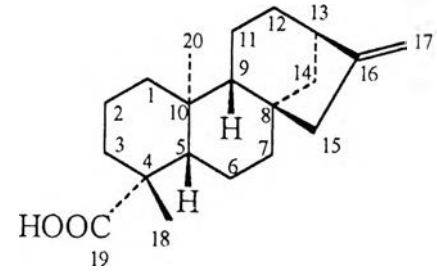


Figure 48. ^{1}H-^{1}H COSY spectrum of compound COY10 (in $CDCl_3$)
(expanded in the range of $\delta^{1}H$ 4.1-5.4 ppm and $\delta^{1}H$ 0.8-2.8 ppm)

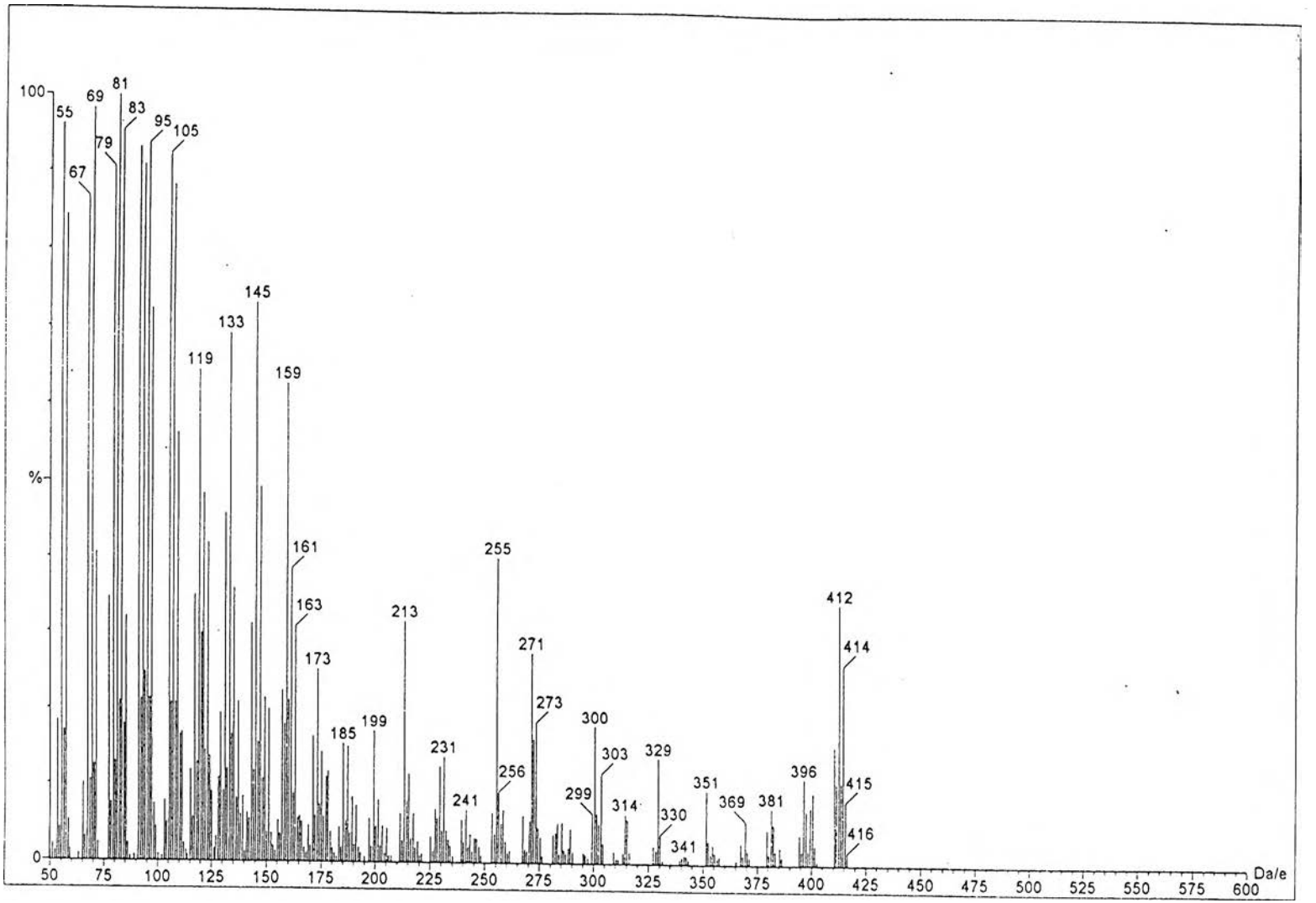


Figure 49. EI-mass spectrum of isolate COY6

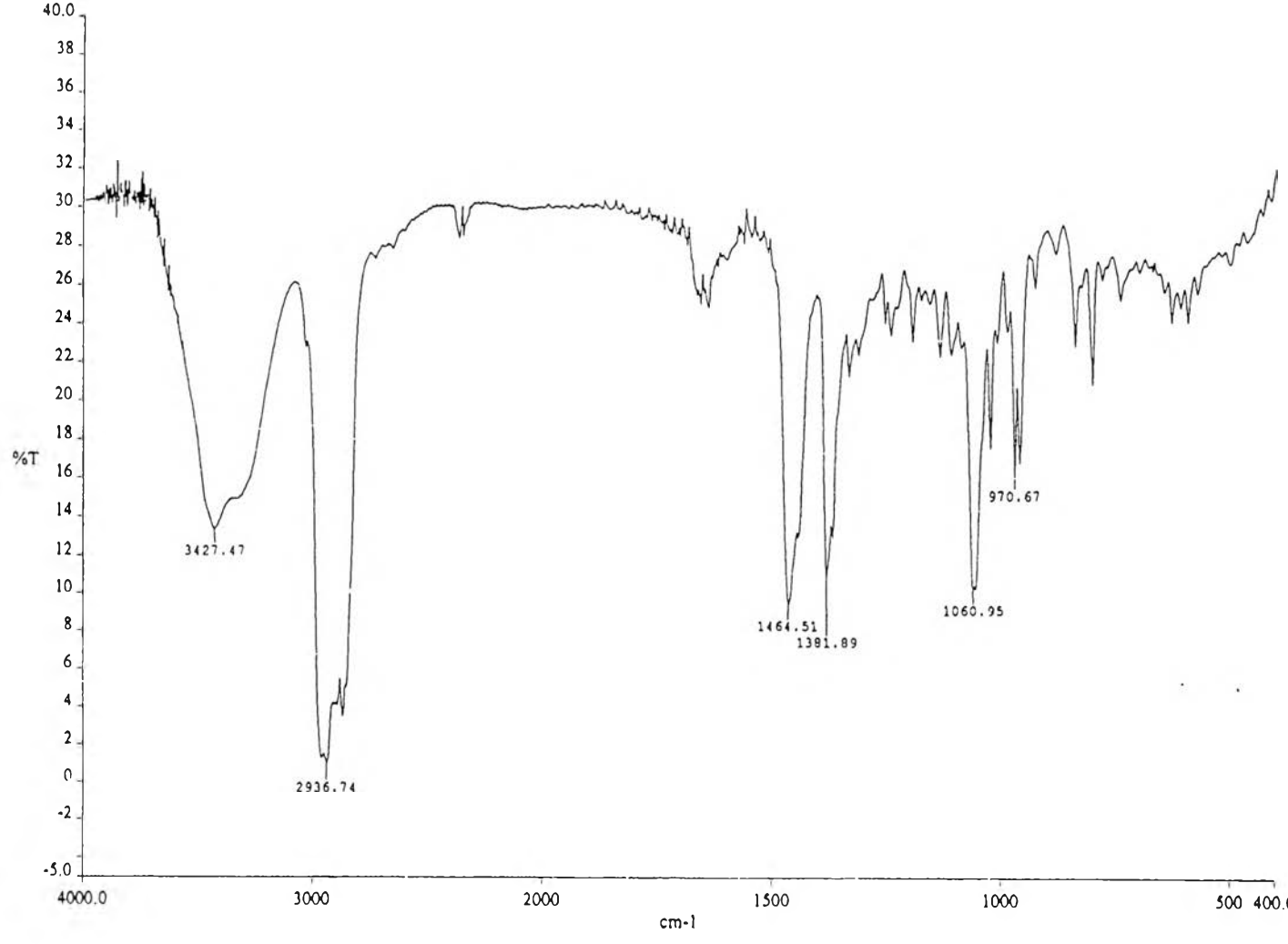


Figure 50. IR spectrum of isolate COY6

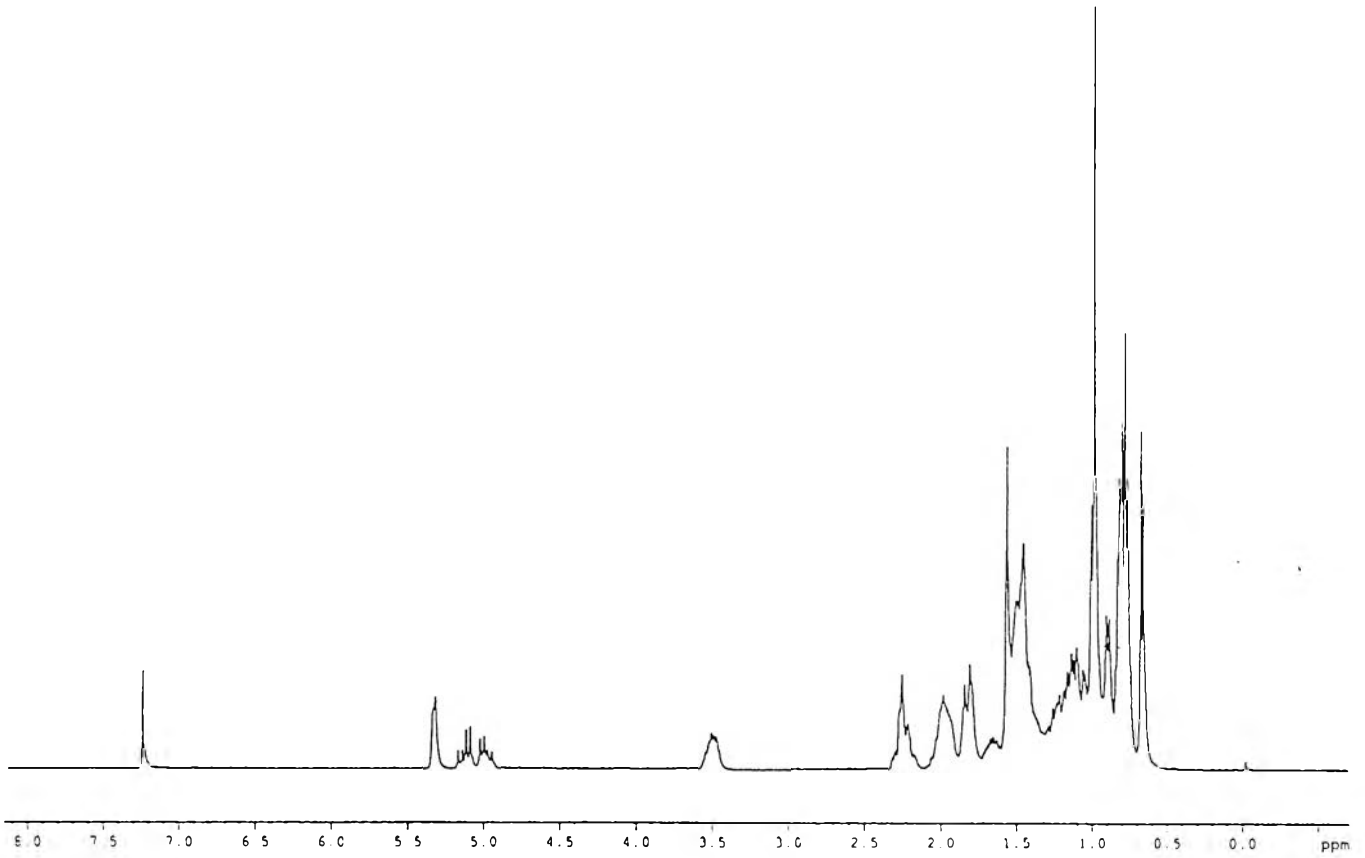


Figure 51. 300 MHz ^{1}H NMR spectrum of isolate COY6 (in $CDCl_3$)

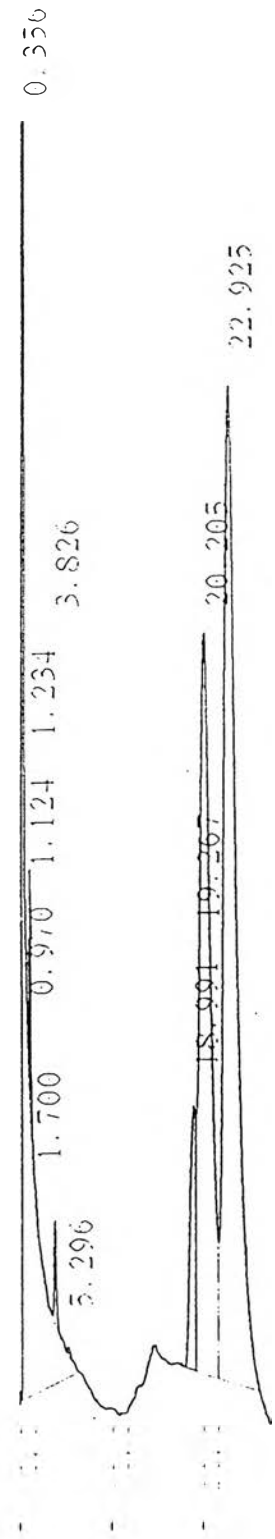


Figure 52. GC chromatogram of isolate COY6

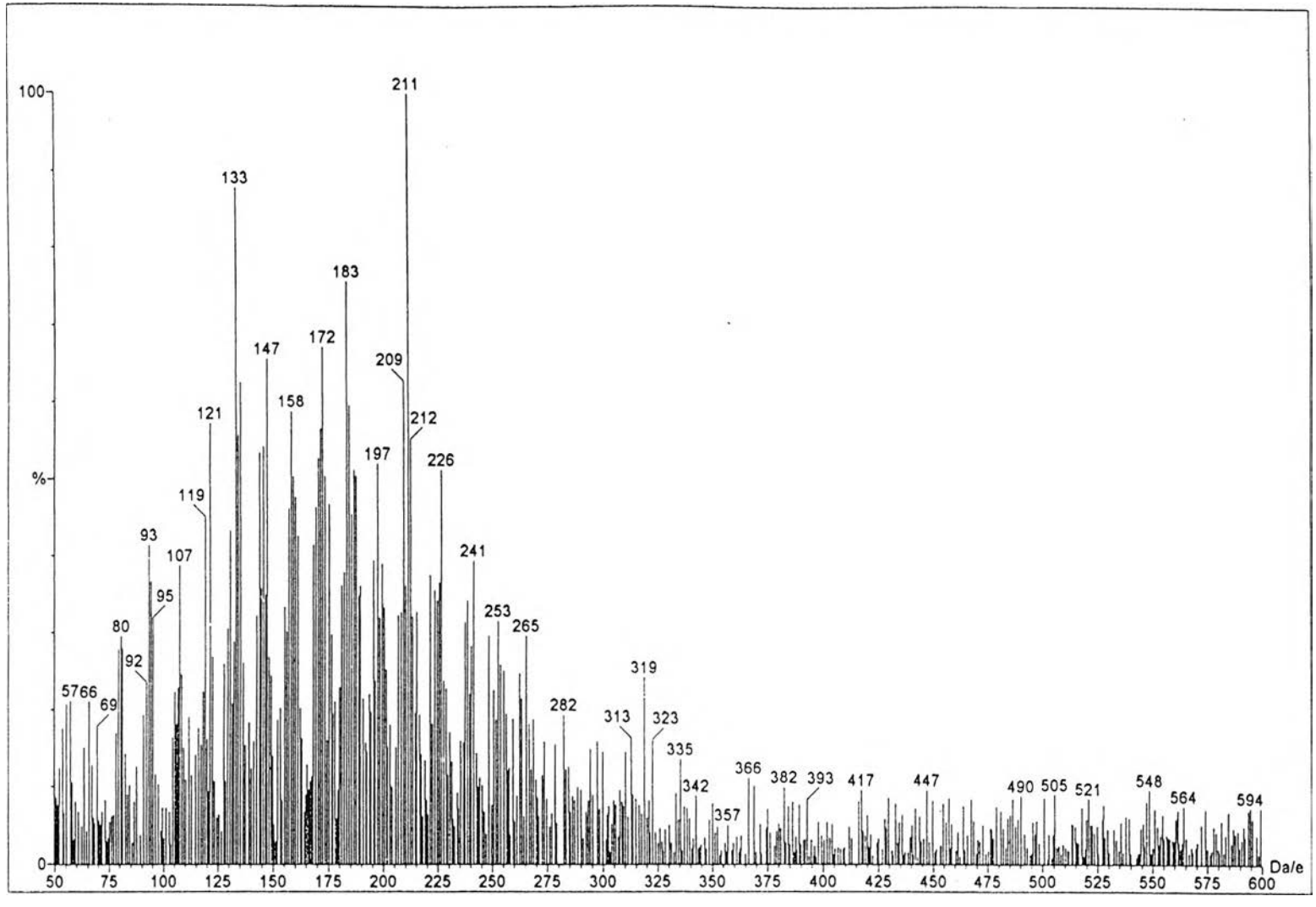


Figure 53. EI-mass spectrum of isolate COY8

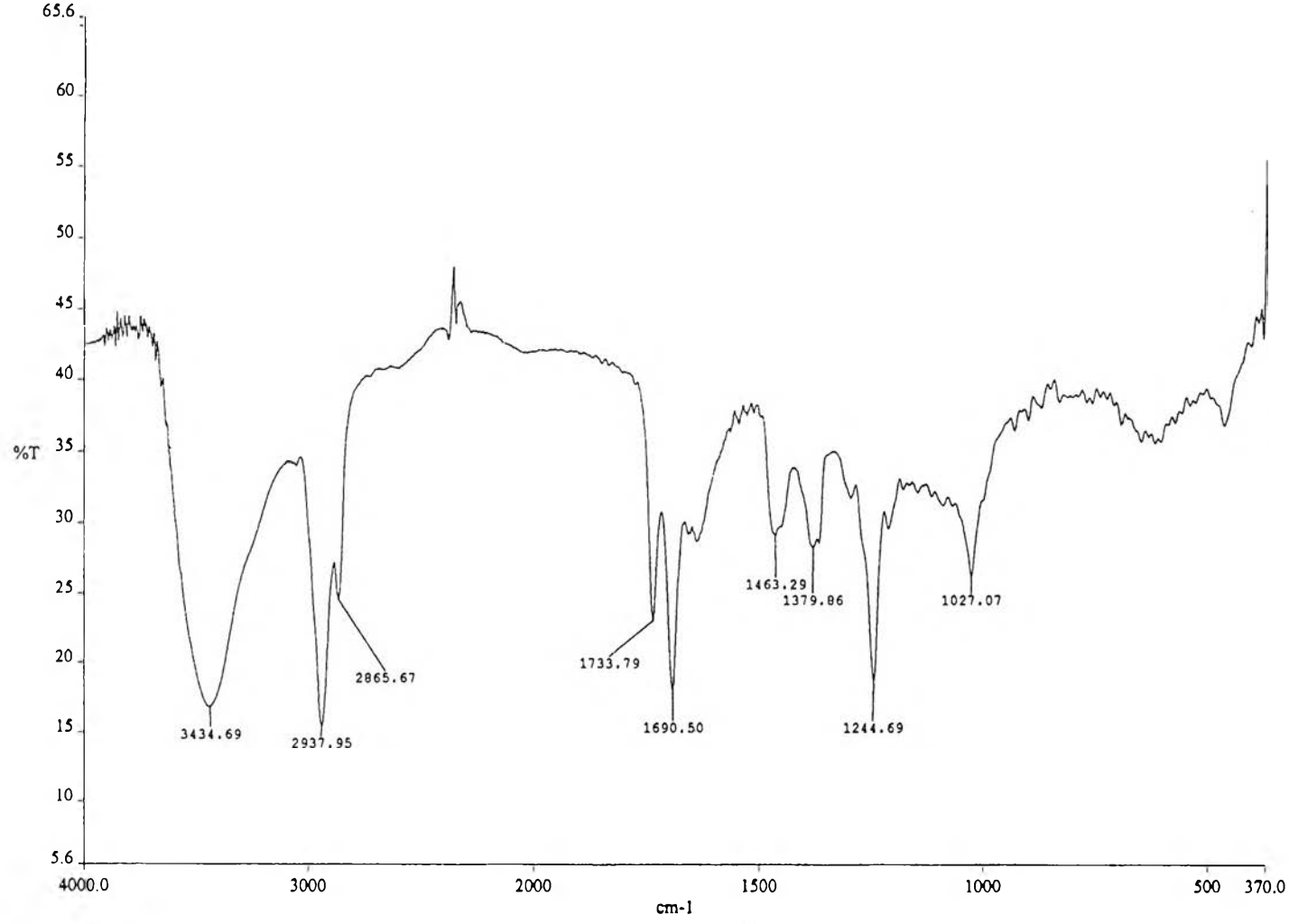


Figure 54. IR spectrum of isolate COY8

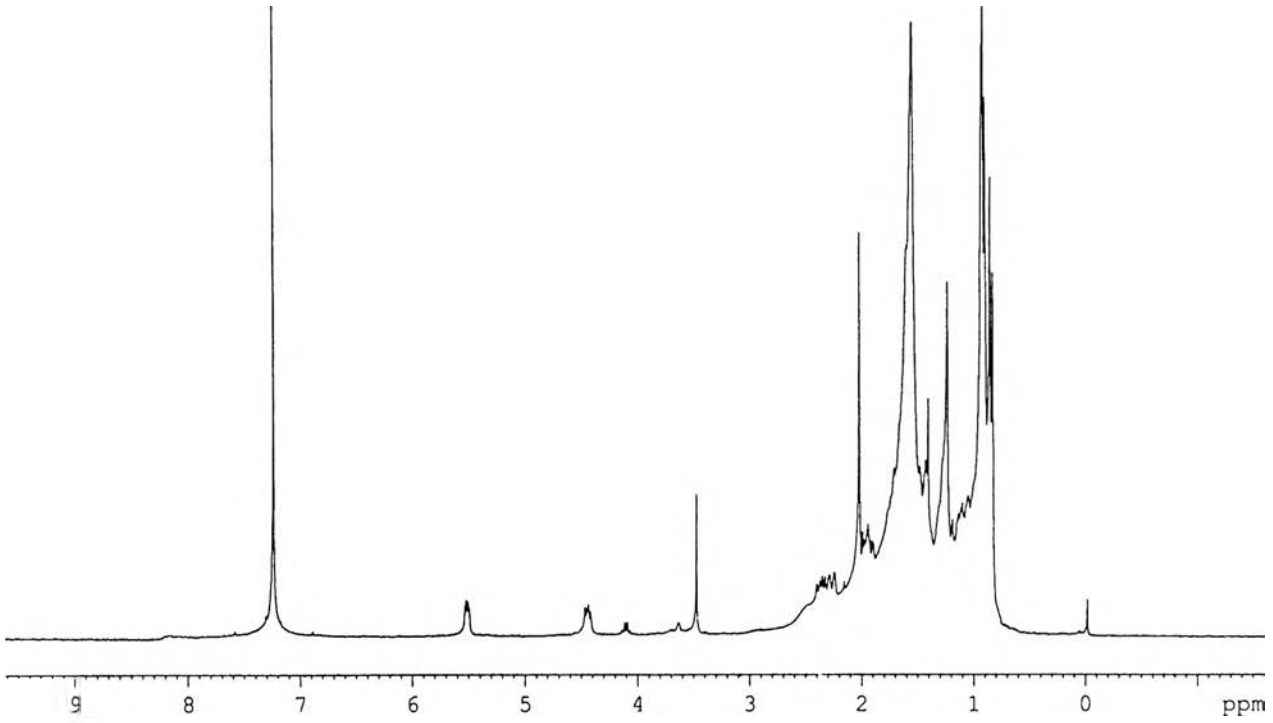


Figure 55. 300 MHz ^{1}H NMR spectrum of isolate COY8 (in $CDCl_3$)

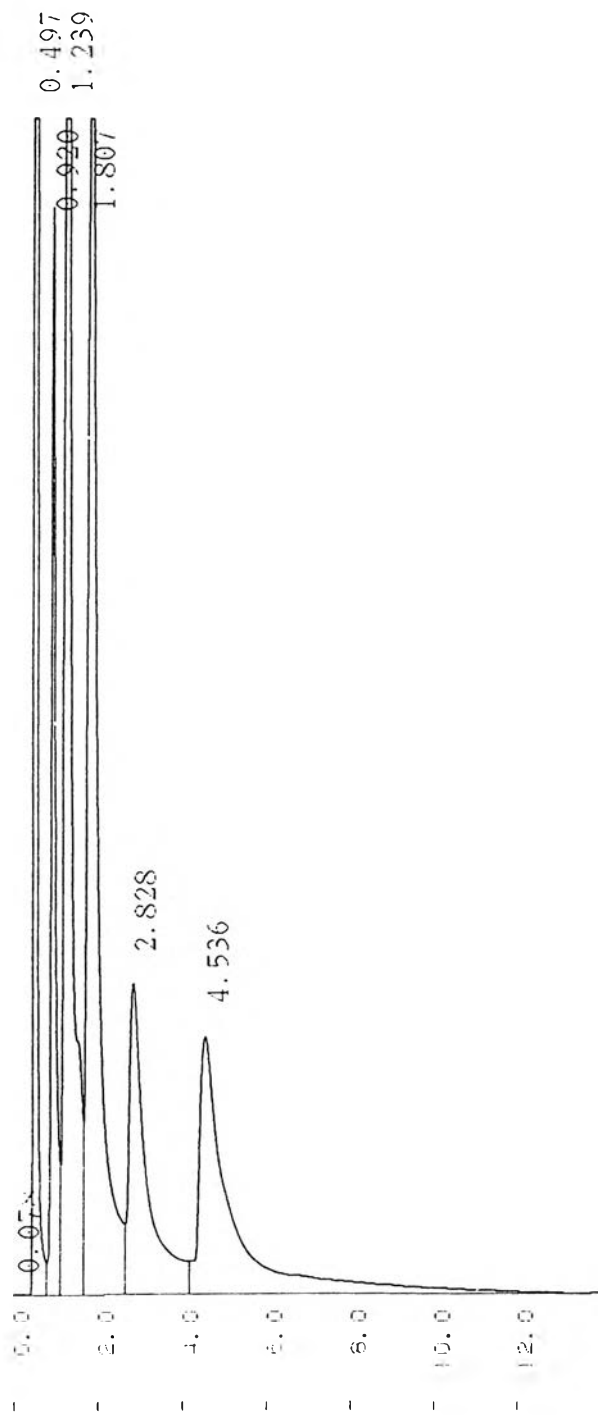


Figure 56. GC chromatogram of authentic C_{19-22} long chain alcohols

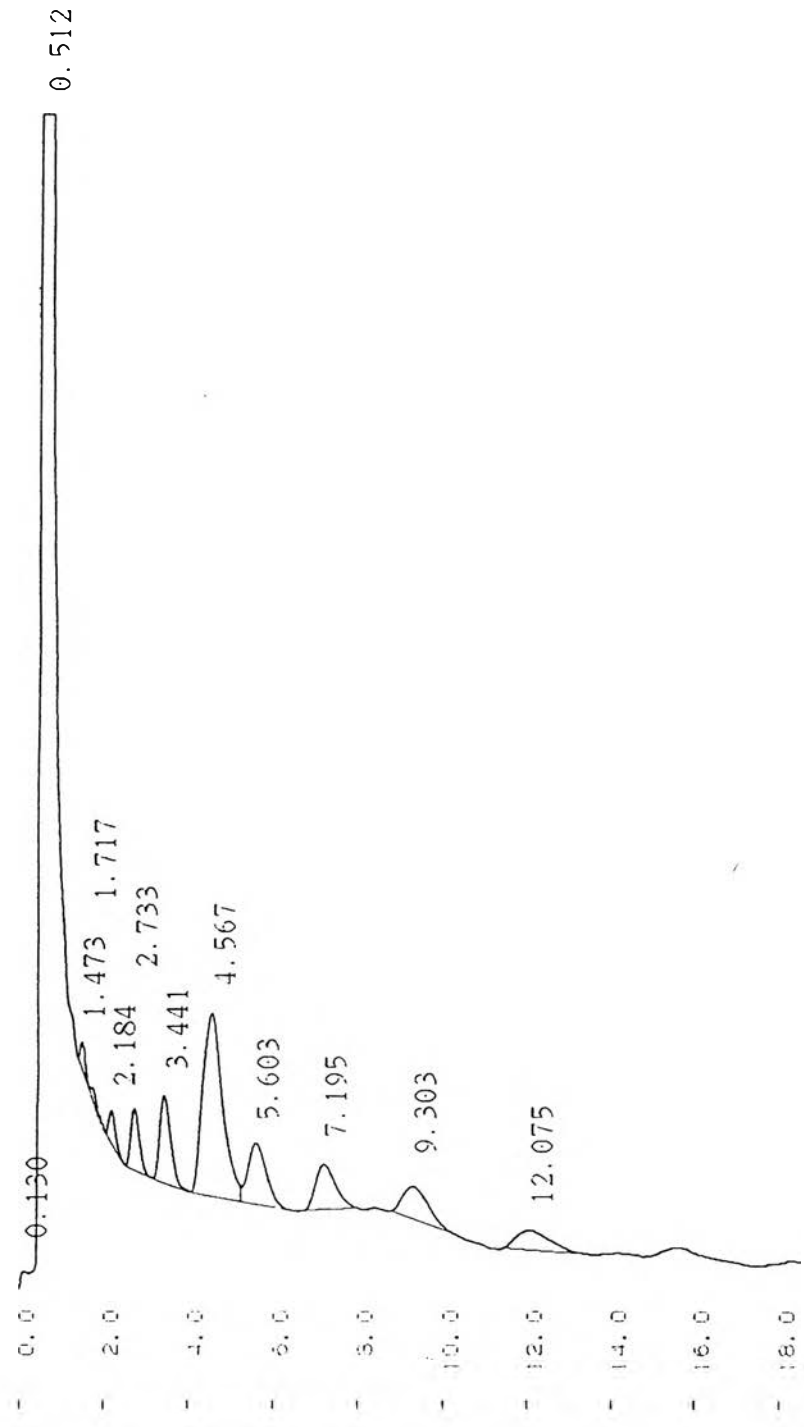


Figure 57. GC chromatogram of isolate COY8

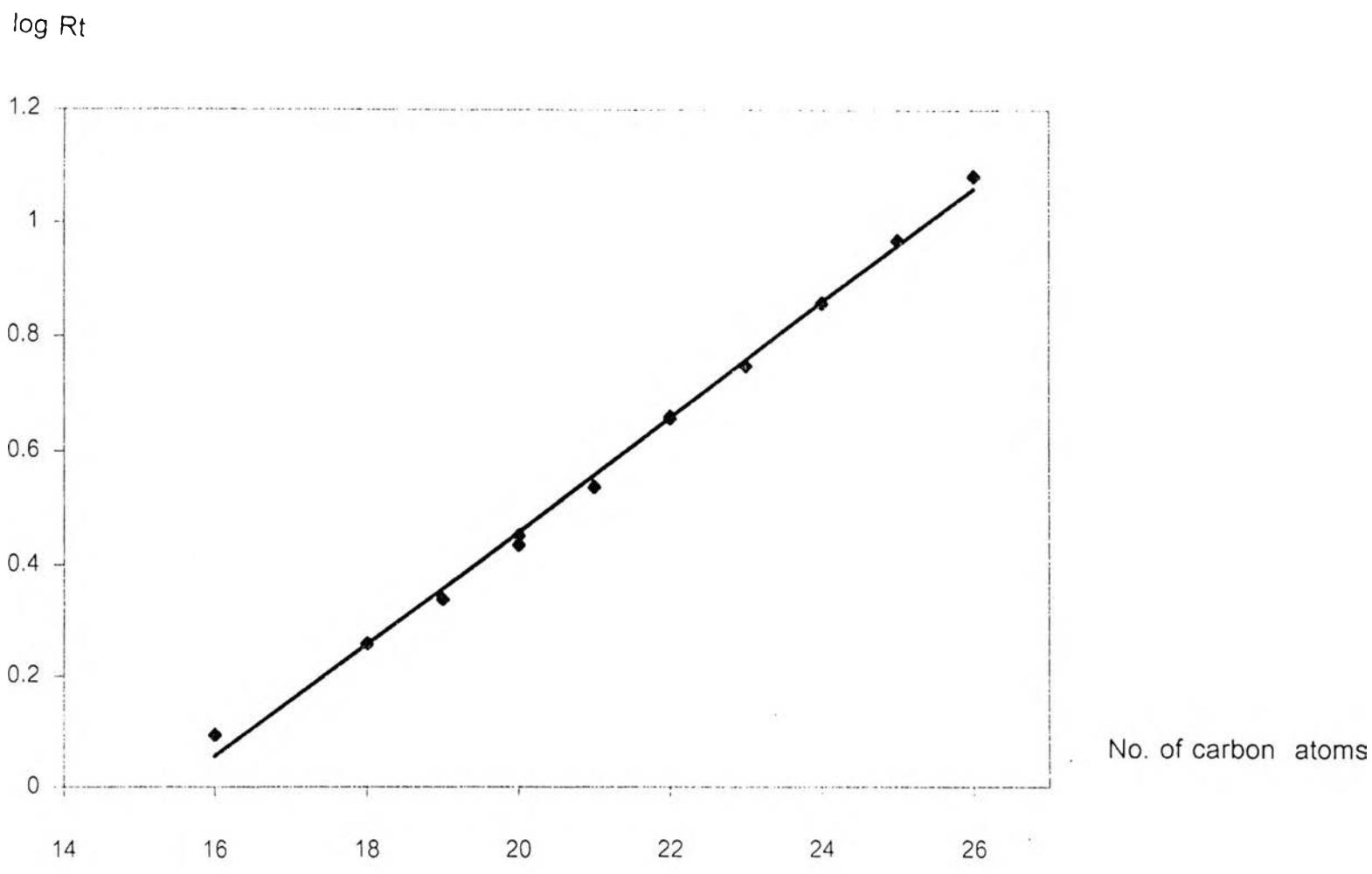


Figure 58. Relationship between log Rt and the number of carbons of Authentic long chain alcohols and isolate COY8

VITA

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