



REFERENCE

1. Falak. A., A. Shoeb, R.S. Fapil, and S.P.Popil, "Clausarin a novel coumarin from Clausena pentaphylla (Roxb).D.C." Experentia, 33 , 412 - 413 ,1977
2. Tang, S.W., and H. Furukawa, "Biologigal and phytochemica investigation of Clausena excavata" Journal of Natural Product, 45 , 718 - 720, 1982
3. Govindachari, T.R., B.R. Pai, P.S. Subramania, and N. muth maraswamy, " Coumarin of Clausena dentata (wild.) R. and S. " Tetrahedron , 24 , 753 - 757, 1968
4. Joshi, B.S. and V.N. kamat, "Structure of Clausenidin and a synthesis of Clausenin and Xanthoxyletin " Tetrahedron letters , 46 , 5767 - 5773, 1966
5. Joshi, B.S., V.N. Kamat, and A.K. Saksena,"Structure of Clausenin and Clausenidin two new pyrano coumarins from the roots of Clausena heptaphylla. Wt & Arn." Tetrahedron, 23 ,4783 - 4789 , 1967
6. Ernst, R.R. and W.A. Anderson, "Application of Fourier transform spectroscopy to magnetic resonance " Rev.Sci.Instrum. 37 , 93, 1966
7. Ernst, R.R., "Nuclear magnetic resonance with incoherent radiofrequency field " Journal of chemical and physic , 45 , 3845, 1966

8. Yoder, C.H. and C.D. Schaeffer.Jr., "Introduction to multinuclear NMR theory and application" pp.22-52 Newyork Benjamin / Cumming Publishing company Inc, 1987
9. Breitmaier, E. and W. Voelter, "¹³C NMR Spectroscopy,Meth and Application" pp. 1 - 5 , Weinheim West Germa : Verlag chemie , 1974
10. Levy ,G.C.,R.L.Lichter and G.L.Nelson, "Carbon-13 Nuclear Magnetic Resonance Spectroscopy" pp. 5 - 24 Newyork:Wieley-Interscience, 1980
11. Wehrli, F. and T. Wirthlin, "Interpretation of Carbon-13 NMR Spectra" pp. 64 - 109, London : Heyden , 1976
12. Grutzner, J.B., "Carbon 13 NMR Spectroscopy and its application in biological system " Journal of Natural product, 35 , 375 - 397, 1972
13. Chang, C.J.,"Carbon-13 Magnetic Resonance Spectroscopy of Flavonoid. Application of ¹³C - H Long Range coupling constant" Journal of Natural Product , 41, 17 - 28, 1978
14. Freeman,R., "Nuclear magnetic resonance studies by the Fourier Transform technique" Journal of chemical and physic , 53 , 457 - 458, 1970
15. Gansow, O.A. and W. Schittenhelm, "Alternately pulsed carbon 13 and Proton magnetic resonance , an alternative to nuclear off resonance decoupling" Journal of american chemical society, 93 ,

4294 - 4295, 1971

16. Wehrli, F.W., "Proton - coupled ^{13}C nuclear magnetic resonance spectra involving $^{13}\text{C-H}$ spin - spin coupling to hydroxy protons, a complimentary assignment aid" Journal of chemical soc. chemical communication, 663 - 664, 1975
17. Robert, J.D., H.J. Reich, M.Jautelat, and M.T. Messe, "Nuclear magnetic resonance spectroscopy. Carbon -13 spectra of steroid" Journal of american chemical society, 91, 7445, 1969
18. Johnson, L.F., and W.C. Jankowski, "Carbon -13 NMR spectra NO.333" Newyork:Wiley interscience, 1972
19. Lapper, R.D."The carbon-13 nuclear magnetic resonance spectrum of Siderin" Tetrahedron letter, 49-51, 4293 - 4296, 1974
20. Sojka, S.A. "Carbon - 13 Nuclear Magnetic Resonance spectra of 2H - 1 - Benzopyran -2- one (coumarin) in chloroform and sulfuric acid" Journal of organic chemistry, 40, 1175 - 1178, 1975
21. Cussan, N.J., and T.N. Huckerby, " Carbon - 13 NMR spectroscopy of heterocyclic compound II. A 20 MHz study of chemical and carbon - proton coupling constants for coumarin and some bromocoumarins" Tetrahedron, 31, 2587 - 2590 , 1975

22. Stothers, J.B., "Carbon - 13 NMR spectroscopy" pp. 84
 Newyork : Academic press, 1987
23. Bose, A.K., H. Fujiwara, V.S. Kamat, G.K.Triviedi, and
 S.C. Bhattacharyya " ^{13}C NMR spectra of some
 Furanocoumarin " Tetrahedron , 35 , 13-16, 1979
24. Cussans, N.J. and T.K. Huckerby," Carbon -13 N M R
 Spectroscopy of heterocyclic compounds III.
 A 20 MHz syudy of chemical shift and carbon
 - proton coupling constants for the methyl
 coumarins " Tetrahedon , 31 , 2591 - 2594,
 1975
25. Wenkert, E., B.L. Buckwalter, I.R. Burfitt, M.J. Gasic,
 H.E Gottlieb, E.W. Hagaman, F.M. Schell, and
 P.M. Wovkulich " carbon - 13 Nuclear Magnetic
 Resonance Spectroscopy of Naturally occurring
 substances " Topics in Carbon - 13 NMR
Spectroscopy , Vol 2 , pp.111 - 121 , Newyork
 Wiely interscience , 1976
26. Lauterbur, P.C. , " C-13 Nuclear Magnetic Resonance
 Spectroscopy II. Phenol, Anisole and
 Dimethoxybenzenes " Journal of American
Chemical Society , 83 , 1846 - 1852 ,1961
27. Chan, K.K., D.D. Giannini, A.H. Cain, and D. Roberts
 " Carbon 13 Nuclear Magnetic Resonance
 studies of coumarin and related compounds "
Tetrahedon ,33 , 899 - 906, 1977
28. Gunther, H., H. Schmickler, and G. Jikeli " Application

of carbon - 13 resonance spectroscopy V . Fingerprints for the assignment of carbon - 13 resonance signals " Journal of Magnetic Resonance , 11 , 344 - 351, 1973

29. Cussans, N.J. and T.N. Huckerby " Carbon - 13 NMR spectroscopy of heterocyclic compounds IV . A 20 MHz study of chemical shift and carbon - proton coupling constants in a series of hydroxy, methoxy and Glucosyl coumarins " Tetrahedron , 31 , 2719 - 2726 , 1975
30. Parker, R.G. and J.D. Roberts " Nuclear magnetic resonance spectroscopy ^{13}C spectra of Indole and Methyl Indoles " The journal of organic chemistry , 35 , 996 - 999, 1970
31. Bose, A.K., and P.R. Srinivasan " NMR spectral studies XI. Titanium tetrachloride induced shift on C-13 NMR spectra of carbonyl compounds." Tetrahedron , 19 , 1571 - 1574, 1975
32. Bose, A.K. and P.R. Srinivasan " Titanium tetrachloride Induced shift in Carbon - 13 NMR spectra " Journal of Magnetic Resonance. 15 : 592-593 1974
33. Abraham, R.J. and P. Loftus," Proton and Carbon - 13 NMR spectra " pp. 136-137, London : Heyden, 1978
34. Gray, A.I. and P.G. Waterman," Review coumarins in the

- Rutaceae " Phytochemistry , 17 , 845 - 864
1987
35. Seshadri, T.R. and Vishwapaull., " Recent advance in Naturally occurring coumarins " Journal of scientist industrial reserch , 32 , 227-255
1973
36. Asao, T., G. Buchi , M.M. Abdel - kader , S.B. Chang , E.L. Wick and G.N. Wogan " Alfatoxins B and G " Journal of American Chemical Society , 85 , 1706 - 1707 ,1963
37. Lederer,E. " Chemistry and Biochemistry of some Mammalian secretion and excretions " Journal of Chemical Society, 2115 - 2123 , 1949
38. Steck, W. and M. Mazurek , " Identification of natural coumarins by NMR spectroscopy " Lloydia , 31 , 418 - 439 , 1972
39. Tem Smitinand, Thai Plant names (Botanical names vernacular names),pp.82, Bangkok, Thailand, 1980
40. Guillaumin,A. Flore Generale de L'Indo-Chine., Vol.I,(6),665,Mason Et Cie,Paris,1911.
41. Pelletier, S.W., H.P. Ghokshi, and H.K. Desai " Separation of diterpenoid alkaloid mixture using vacuum liquid chromatography " Journal of Natural Product , 49 , 892 - 900, 1986
42. Kumar, V., J. Reisch, D.B. Mahinda, R.A. Hussain,

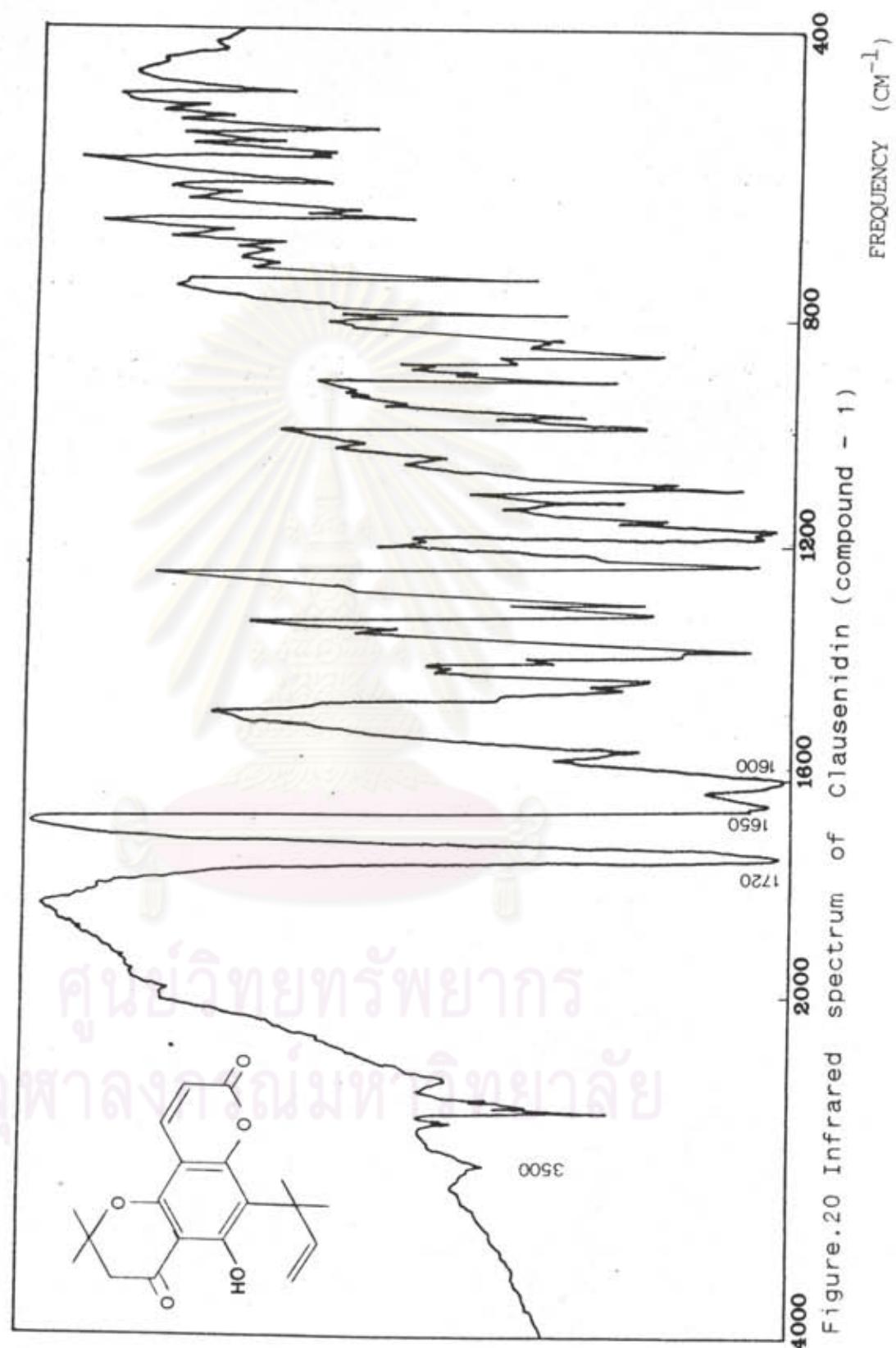
- K.S. Adesina. and S. Balasubramaniam.,
 " Gleinene and Gleinadiene - 5,7 - dimethoxy
 coumarins from Murraya Gleinei root "
Phytochemistry , 26 , 511 - 514, 1987
43. Harkar,S., T.K.Razdan, and E.S. Waight " Steroids,
 chromone and coumarin from Angelica
officinalis" Phytochemistry, 23 , 419 - 426
 1984
44. Ngadjui, B.T., J.F. Ayafor, and B.L. Sodengam,
 " Prenylated coumarins from the leaves of
Clausena anisnata" Journal of Natural Product,
 52 ,243 - 247, 1989

ศูนย์วิทยทรัพยากร
 จุฬาลงกรณ์มหาวิทยาลัย



APPENDIX

ศูนย์วิทยทรัพยากร จุฬาลงกรณ์มหาวิทยาลัย



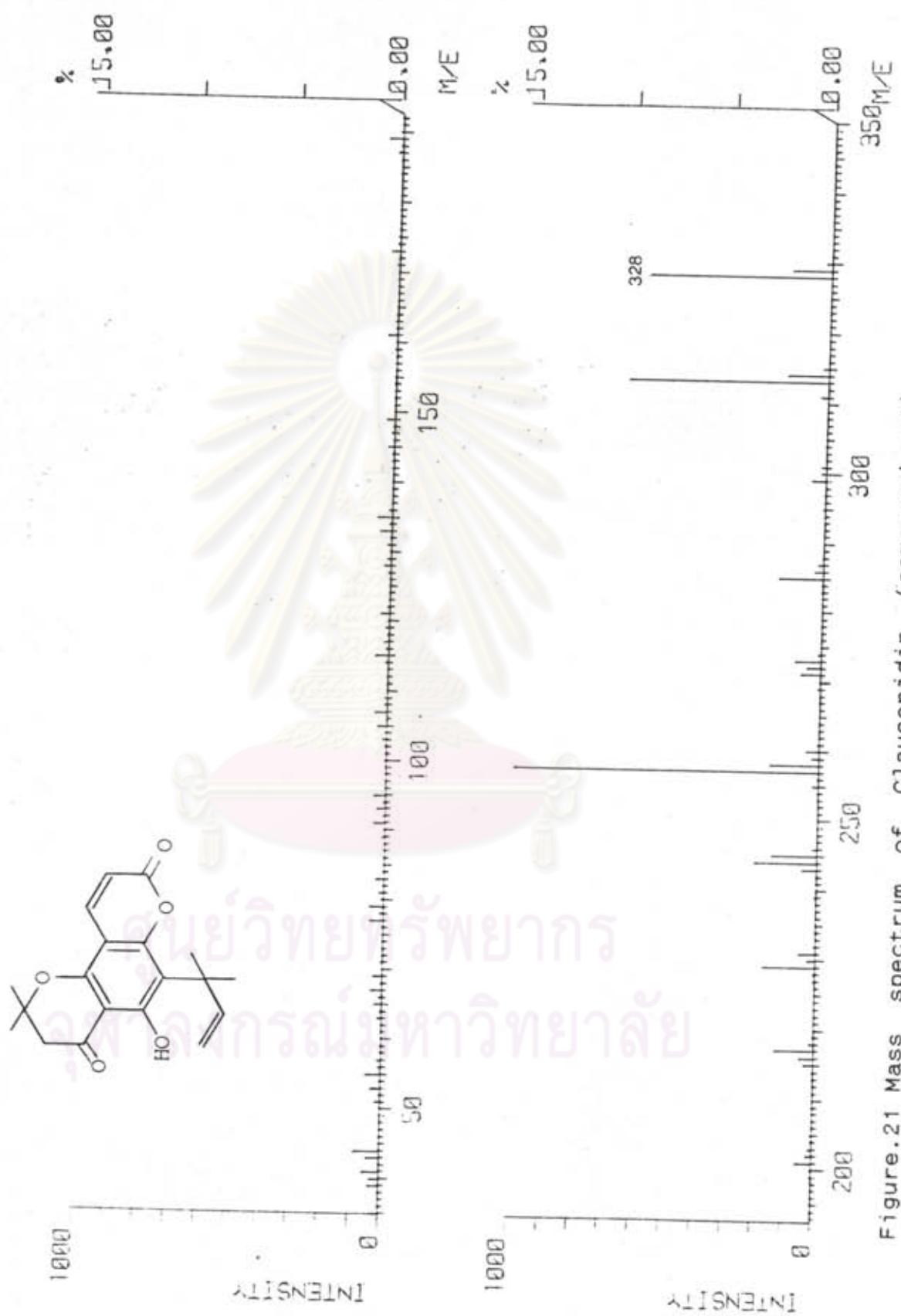


Figure. 21 Mass spectrum of Clausenidin (compound - 1)

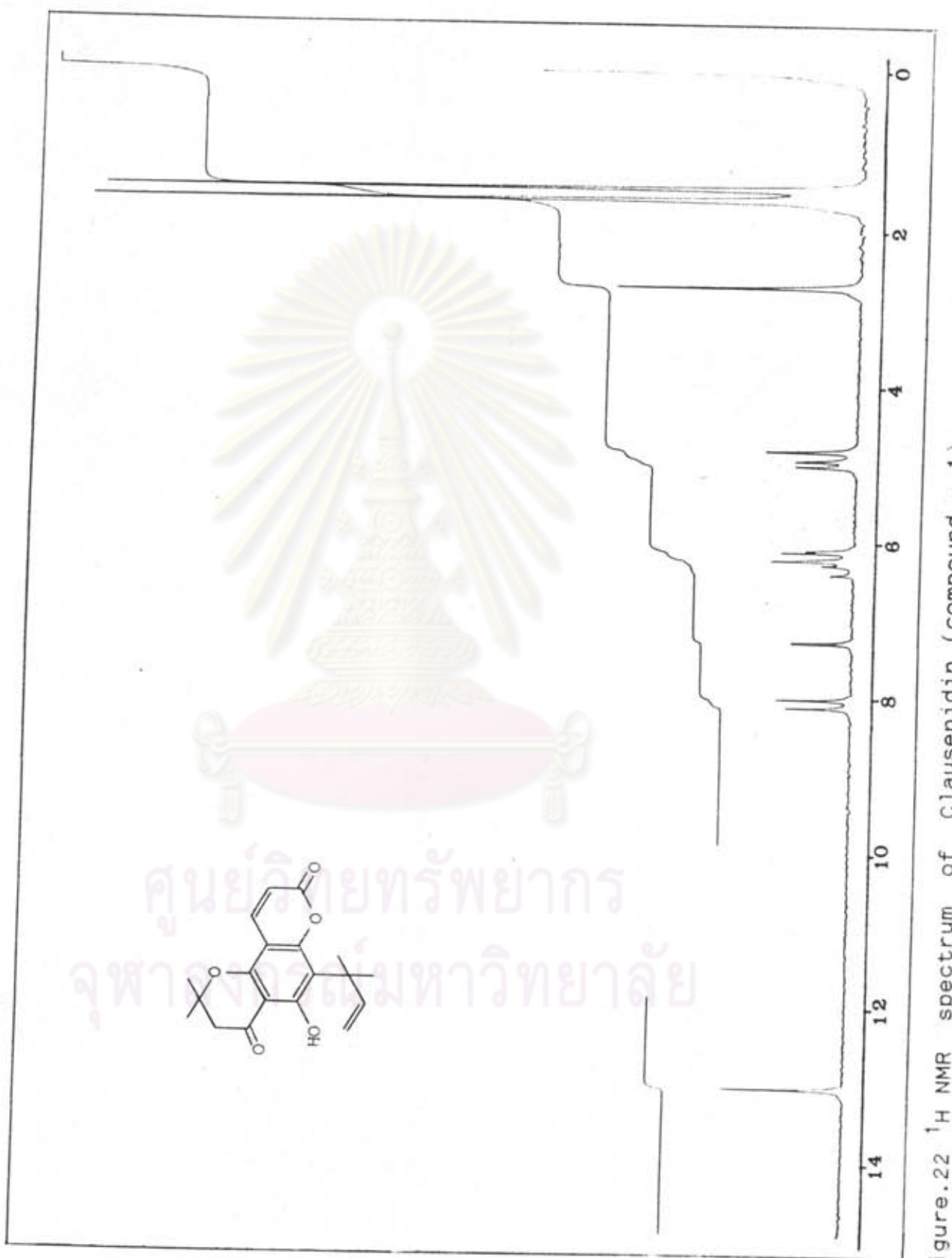


Figure.22 ^1H NMR spectrum of Clausenidin (compound - 1)

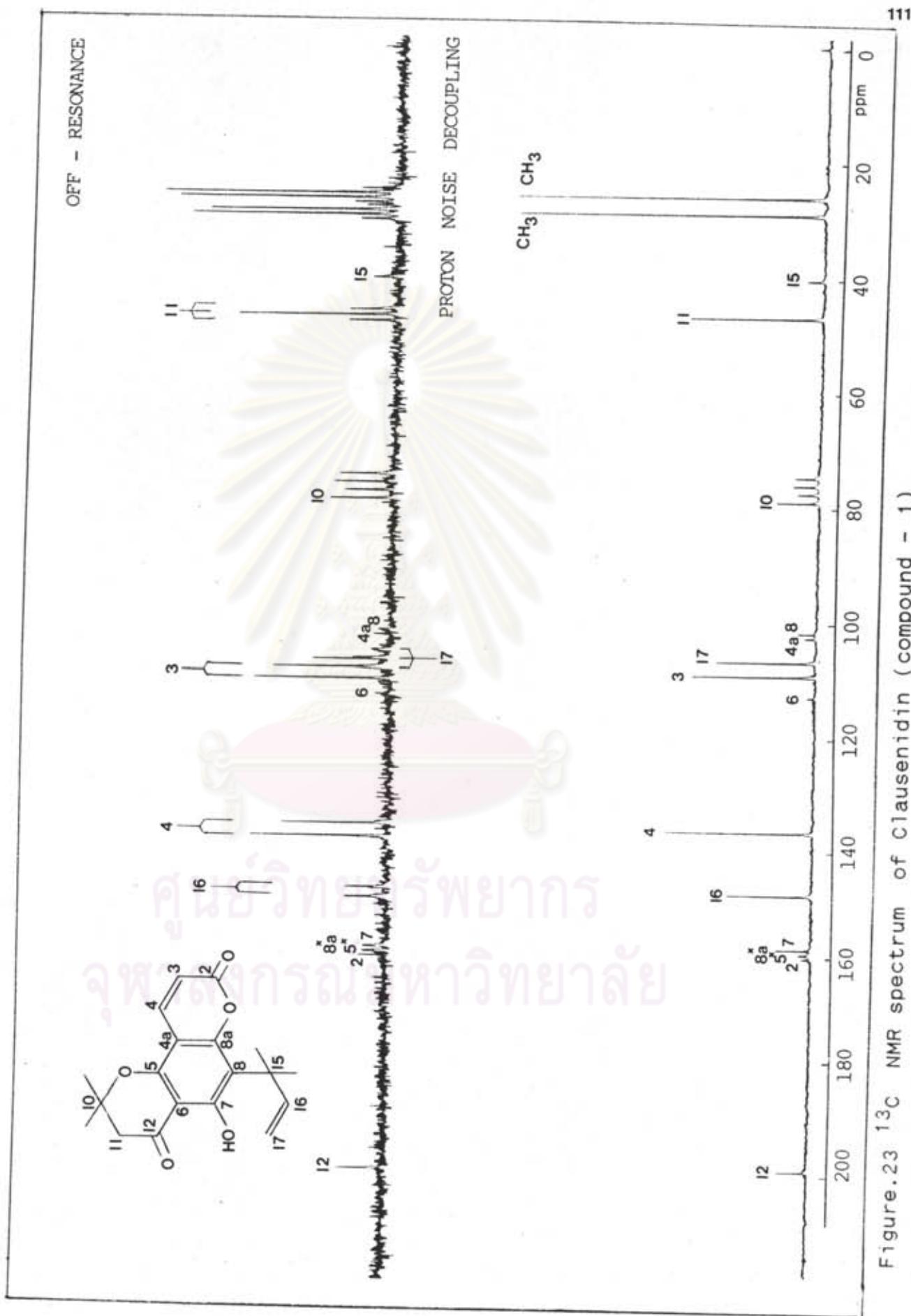


Figure.23 ^{13}C NMR spectrum of Clausenidin (compound - 1)

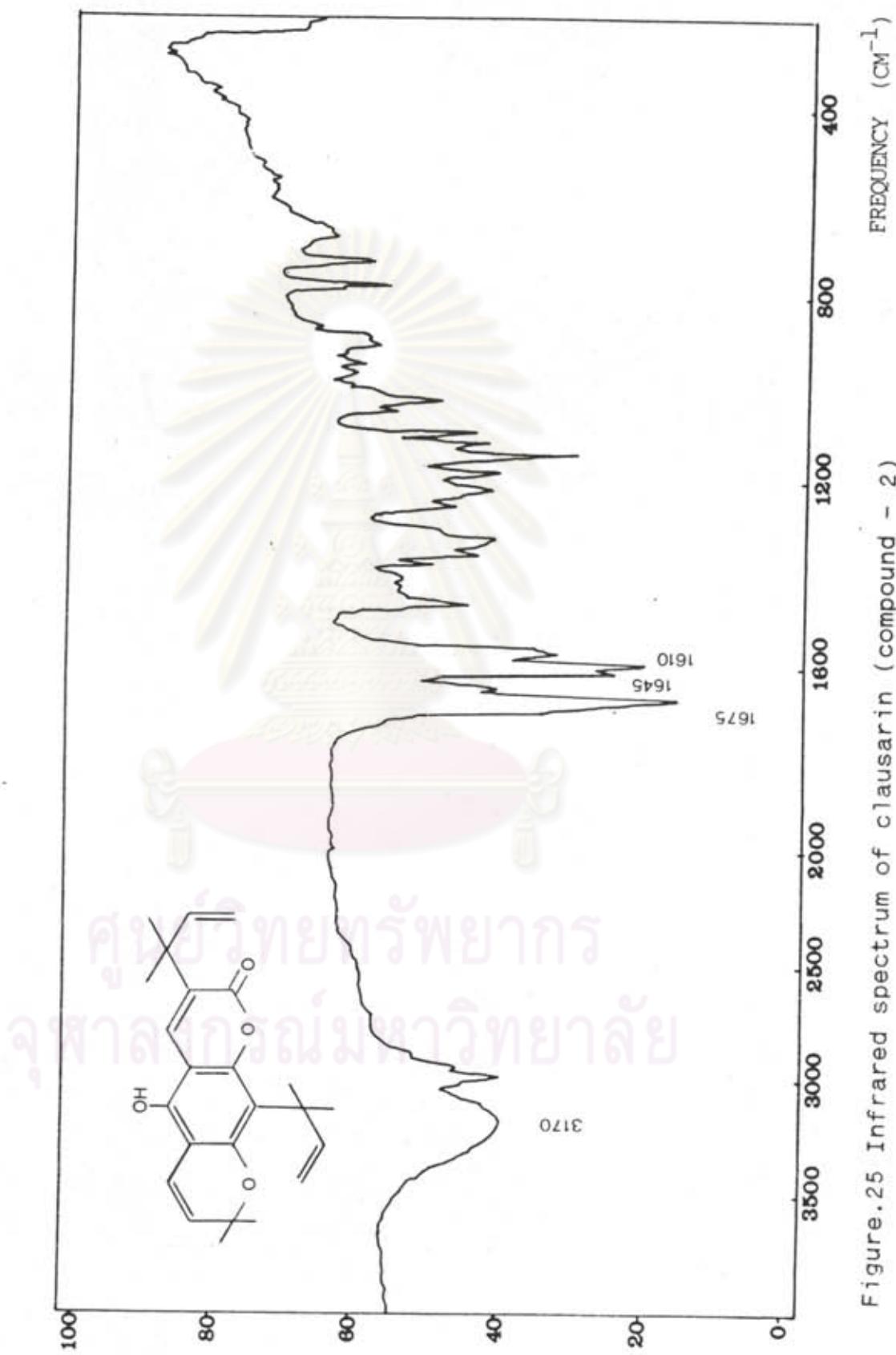
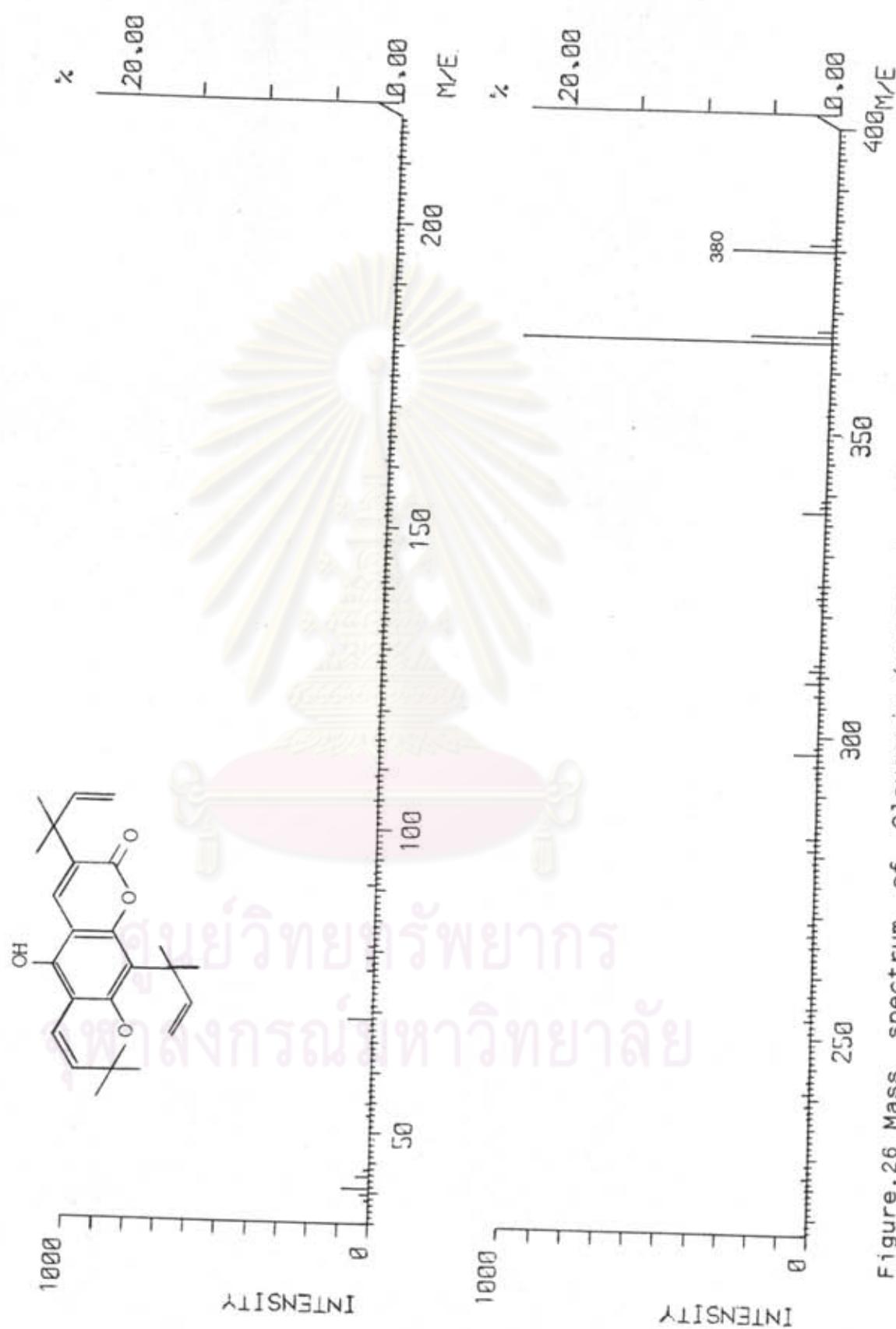
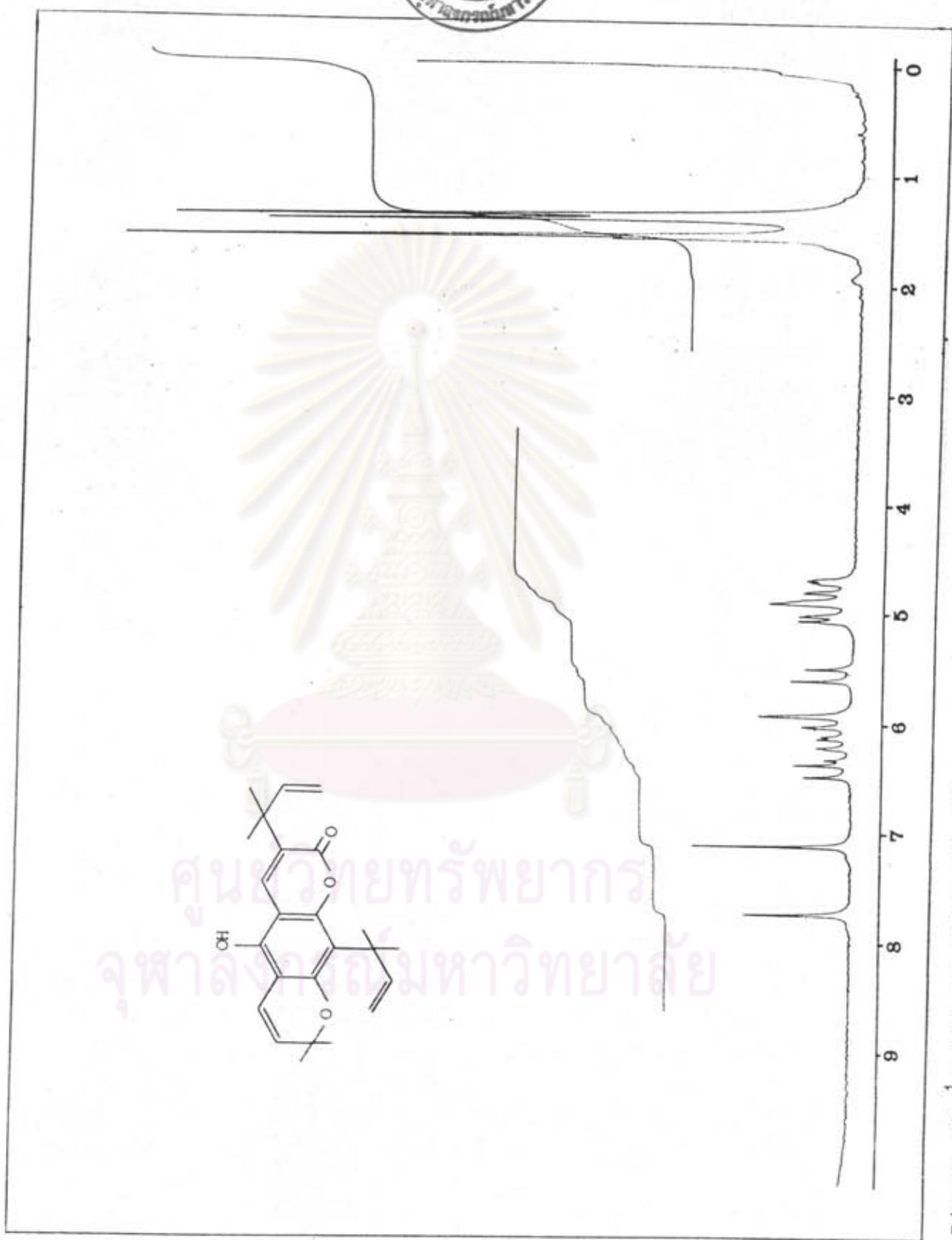


Figure. 25 Infrared spectrum of claussarin (compound - 2)



Figure.27 ^1H NMR spectrum of Clausarin (compound - 2)

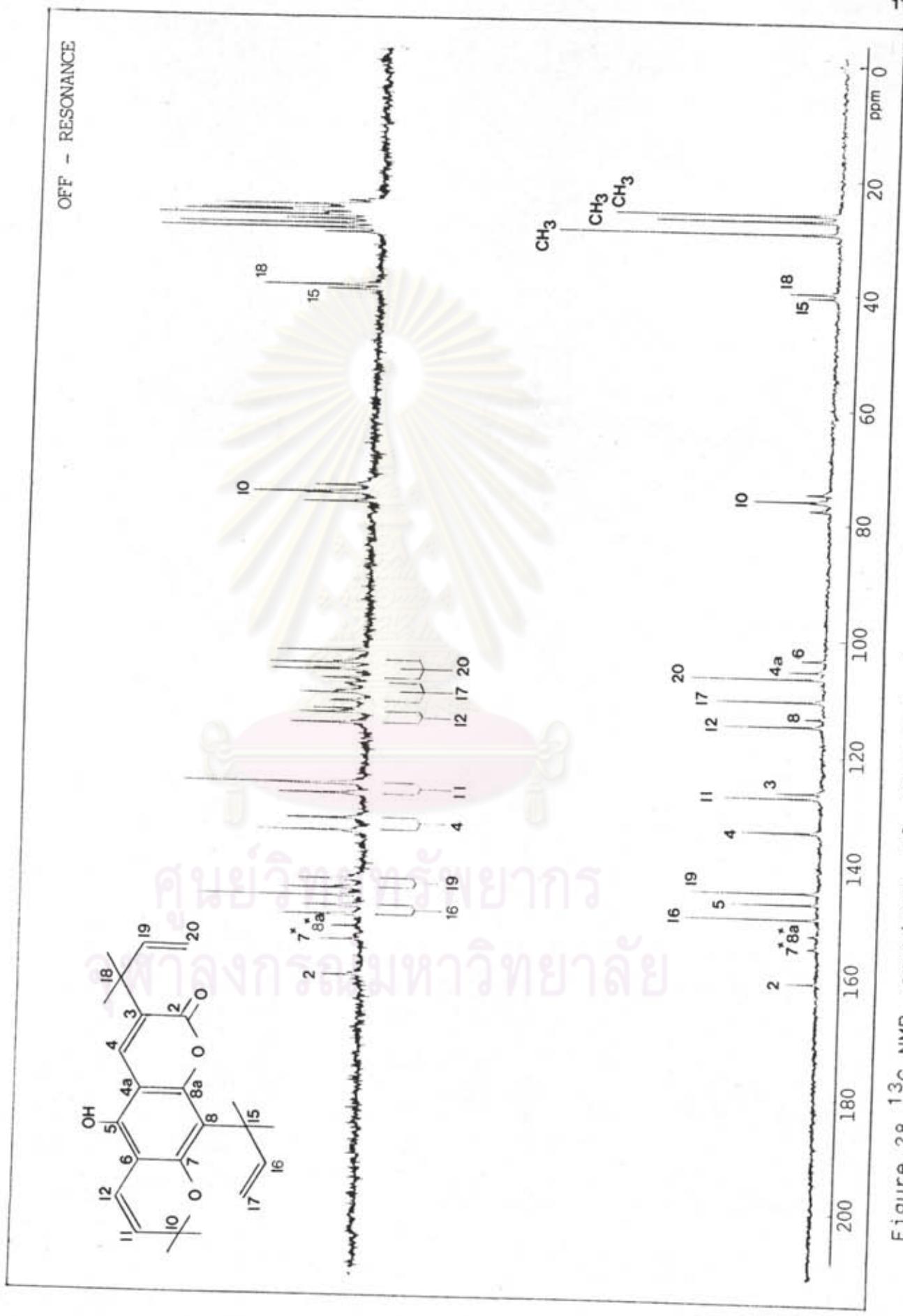
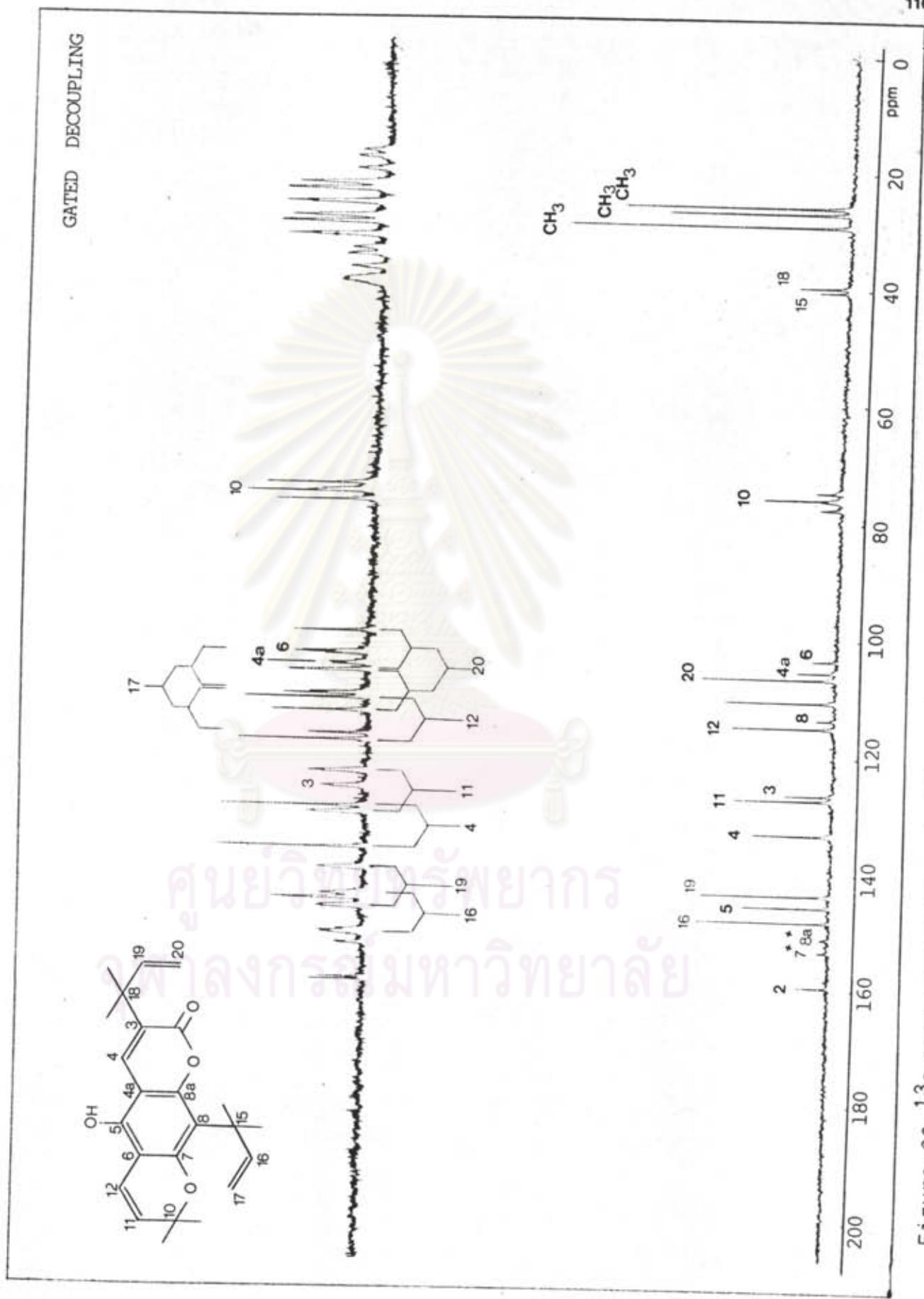


Figure.28 ^{13}C NMR spectrum of Clausarin (compound - 2)



ศูนย์วิจัยและพัฒนาการคุ้มครองทรัพยากราก
และการอนุรักษ์มหาวิทยาลัย
Figure.29 ^{13}C NMR spectrum of Clavosarin (rammatind - ๙)

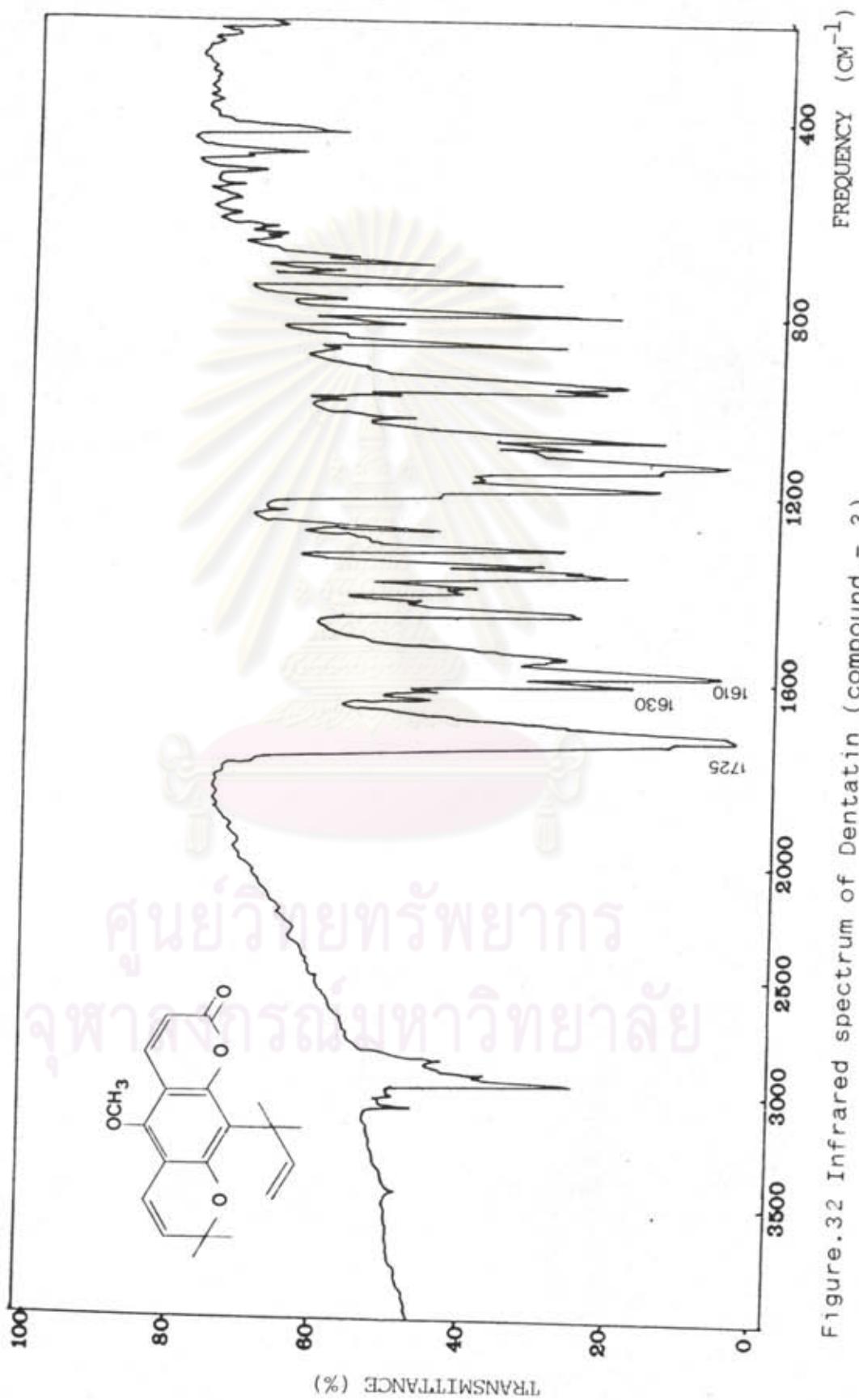


Figure.32 Infrared spectrum of Dentatin (compound - 3)

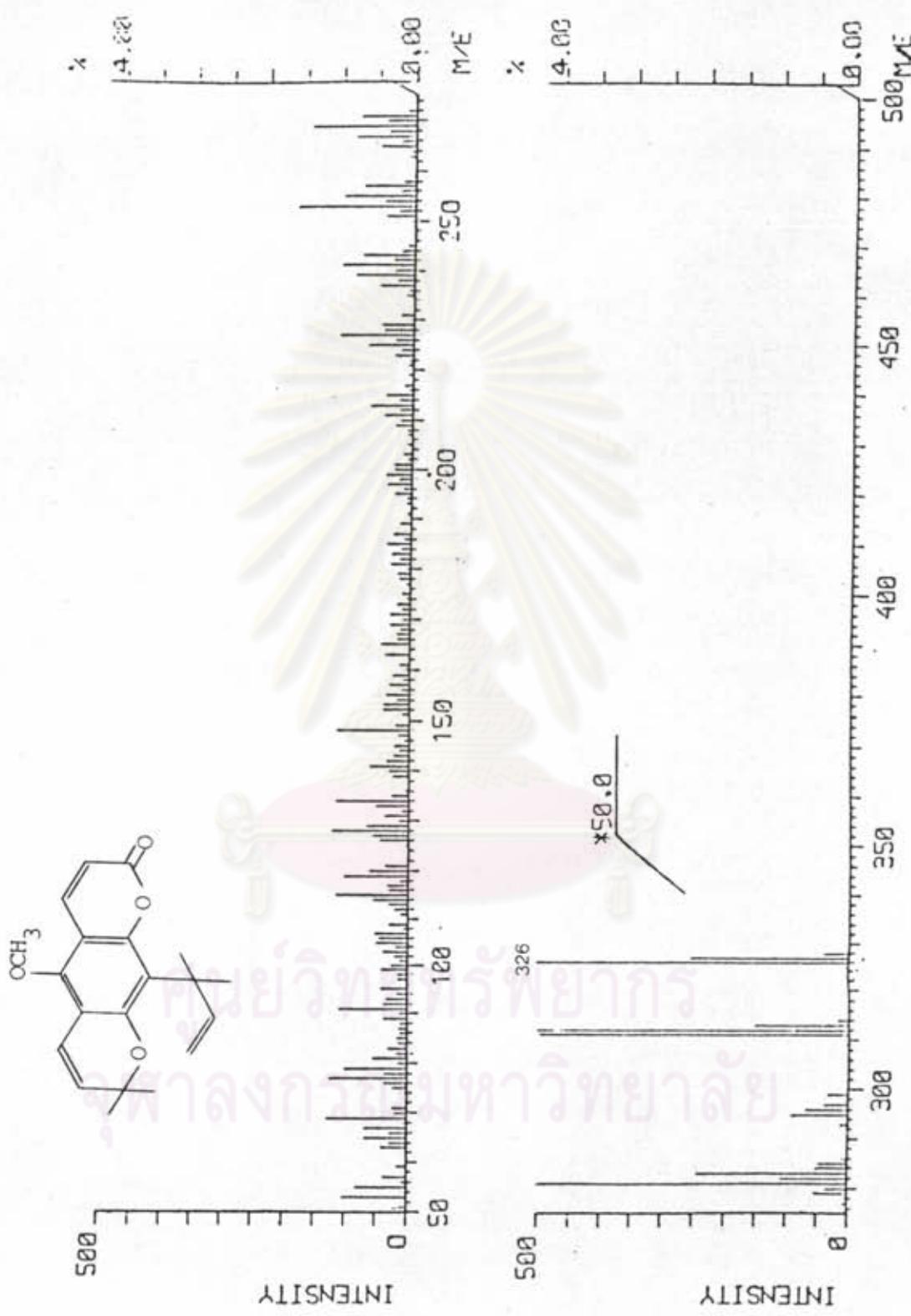


Figure.33 Mass spectrum of Dentatin (compound - 3)

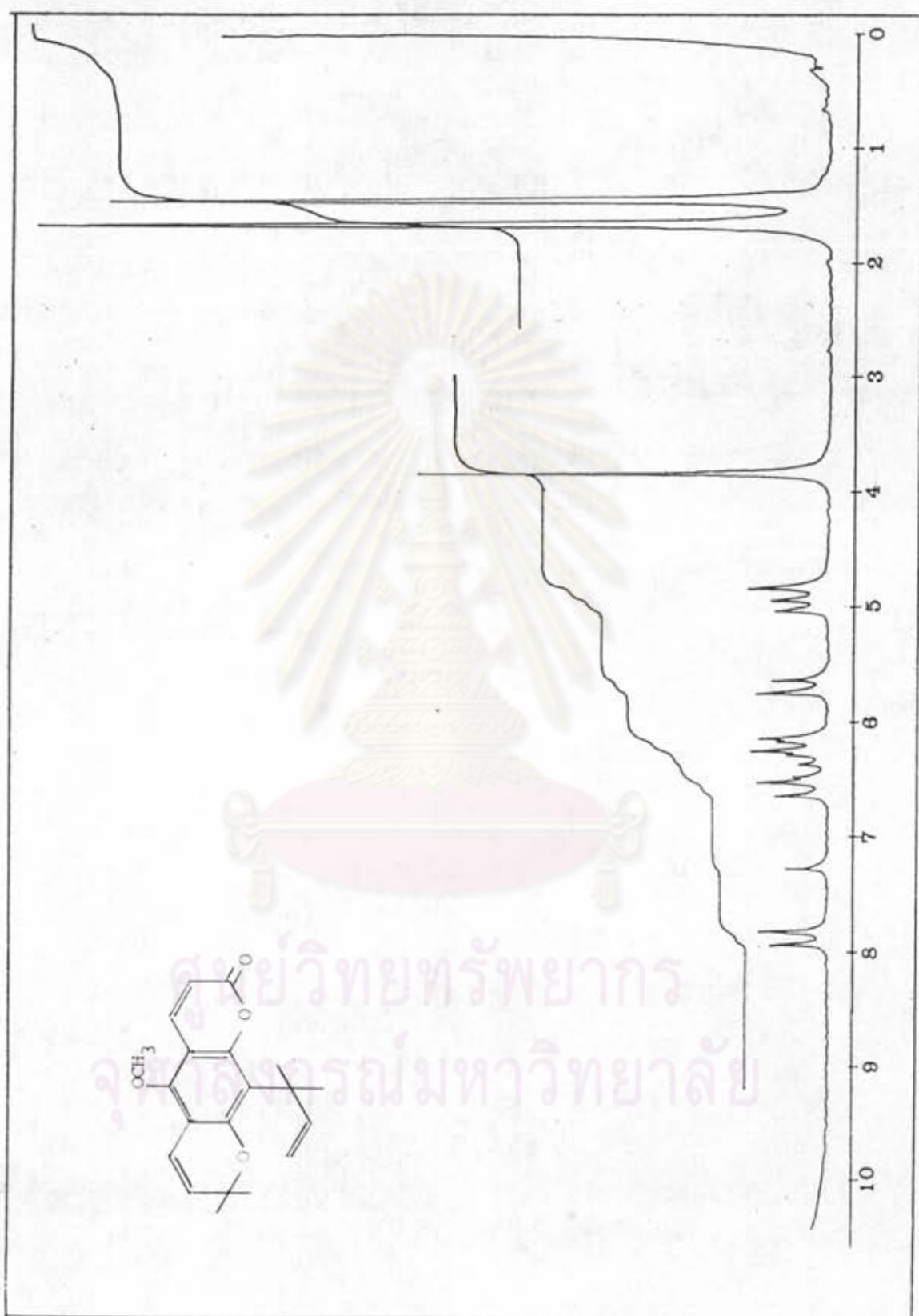
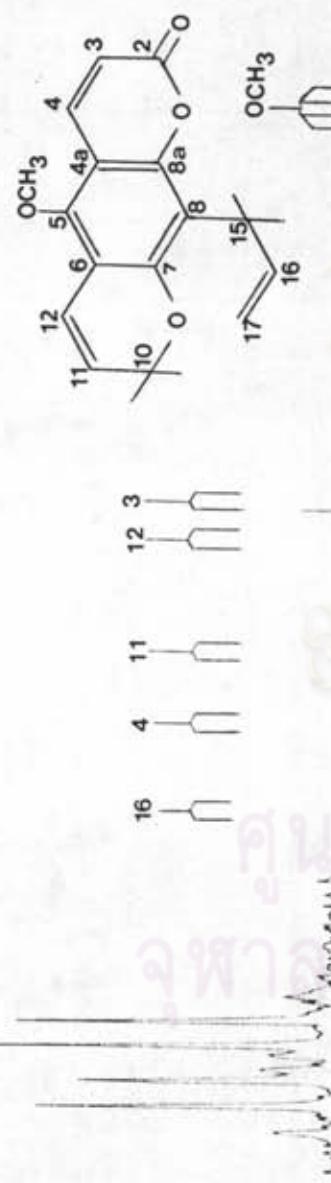
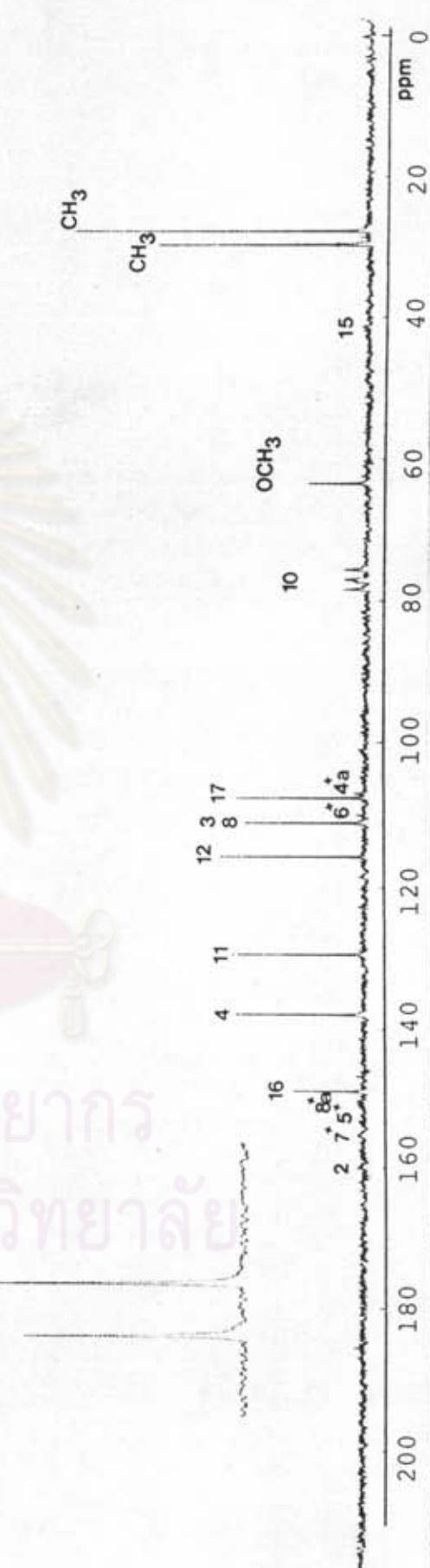


Figure. 34 ^1H NMR spectrum of Dentatin (compound - 3)

OFF - RESONANCE



PROTON NOISE DECOUPLING

Figure.35. ¹³C NMR spectrum of Dentatin (compound - 3)

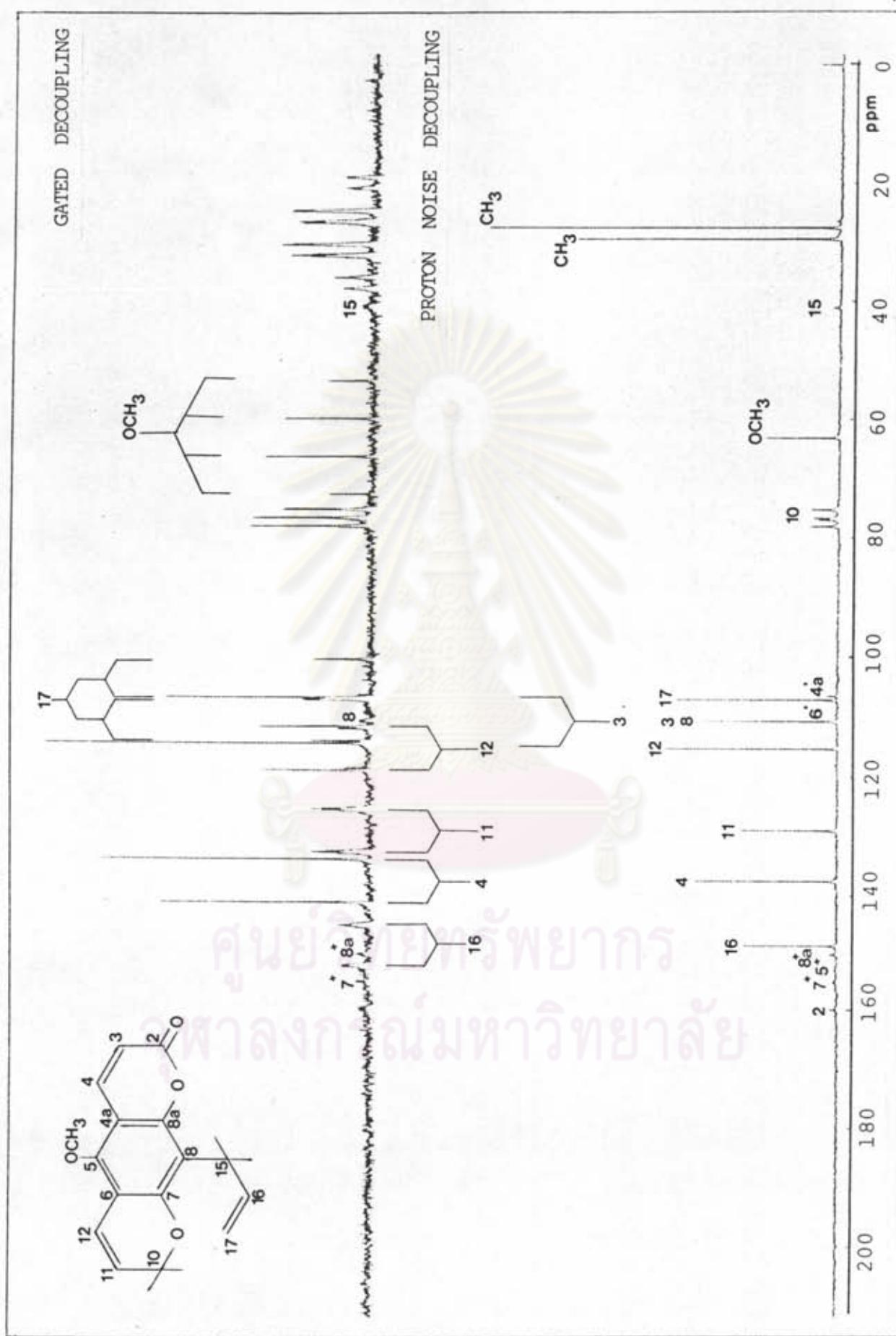


Figure 36 ^{13}C NMR spectrum of Dentatin (compound - 3)

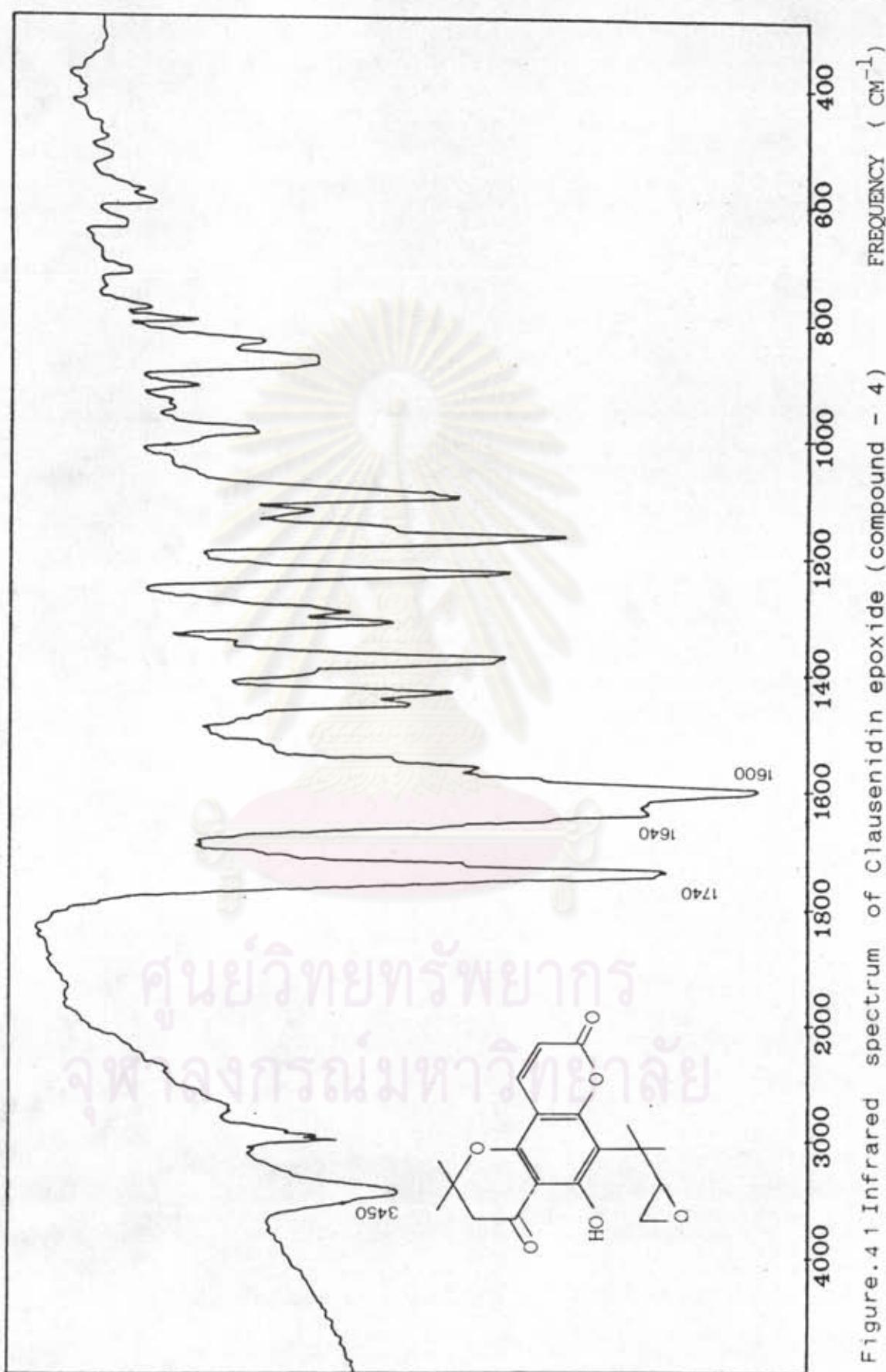


Figure. 4 1 Infrared spectrum of Claussenidin epoxide (compound - 4)

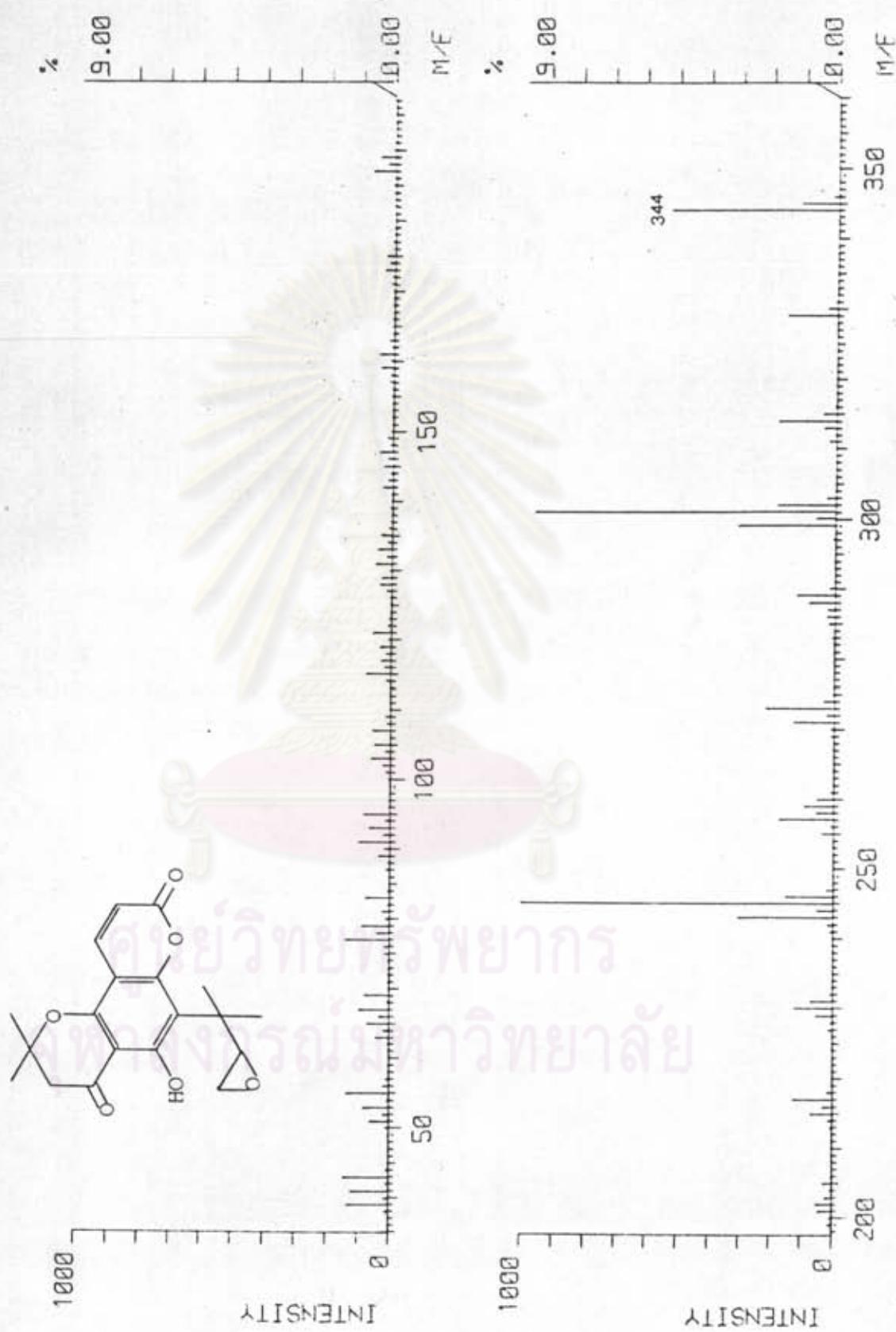


Figure. 4.2 Mass spectrum of Clausenidin epoxide (compound - 4)

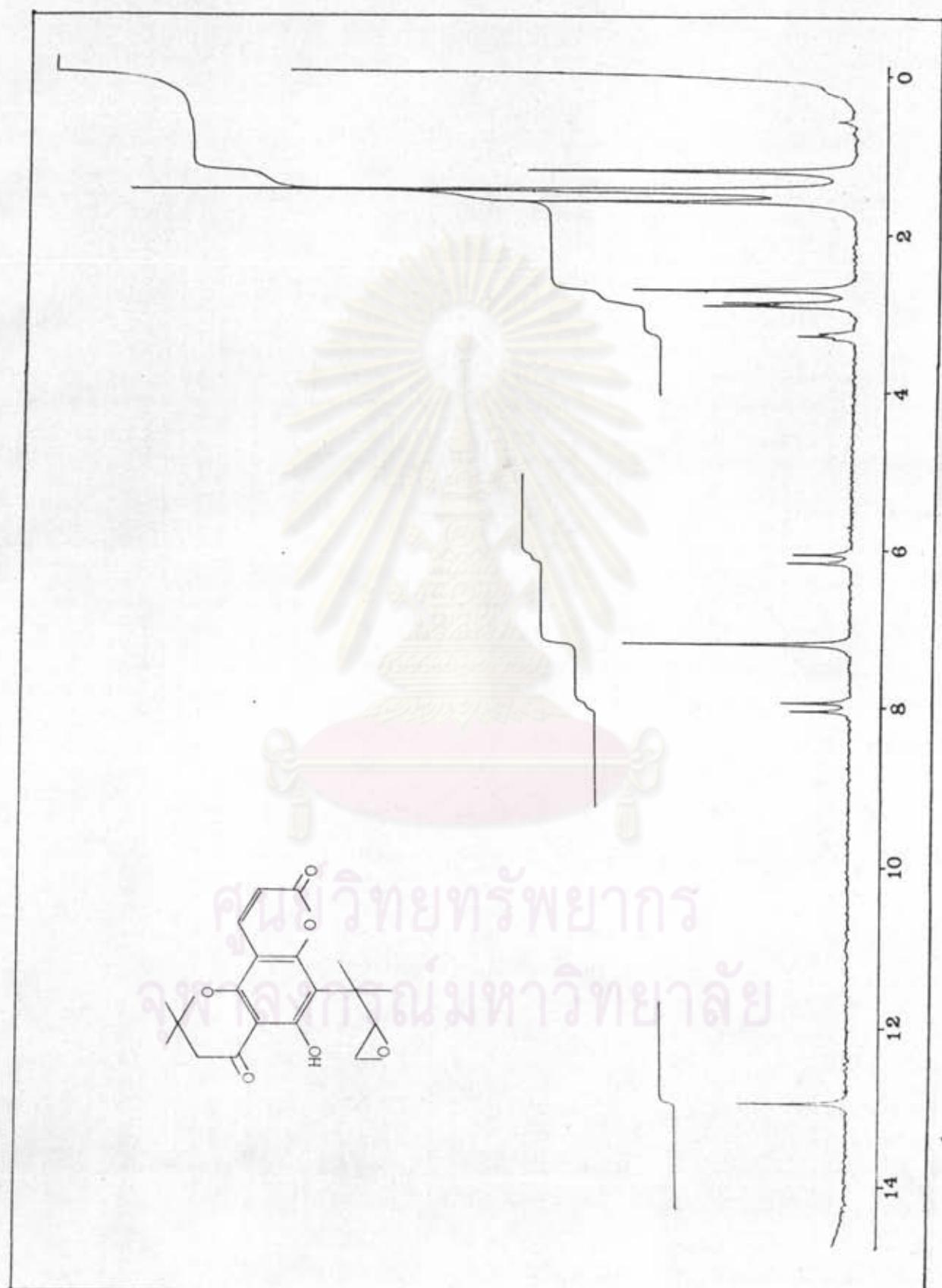


Figure 4.3 ^1H NMR spectrum of Clausenidin epoxide (compound - 4)

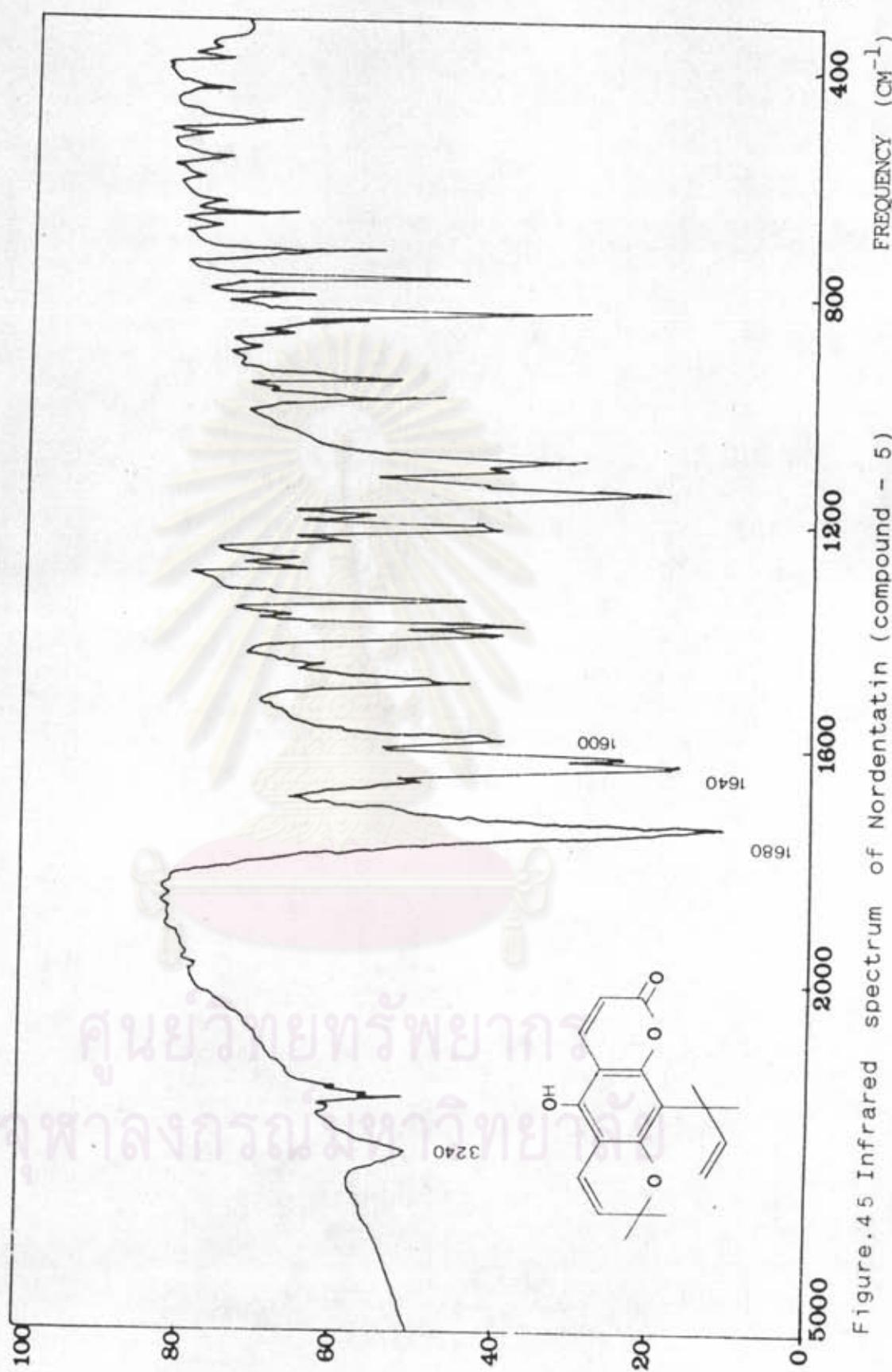


Figure. 4.5 Infrared spectrum of Nordinatatin (compound - 5)

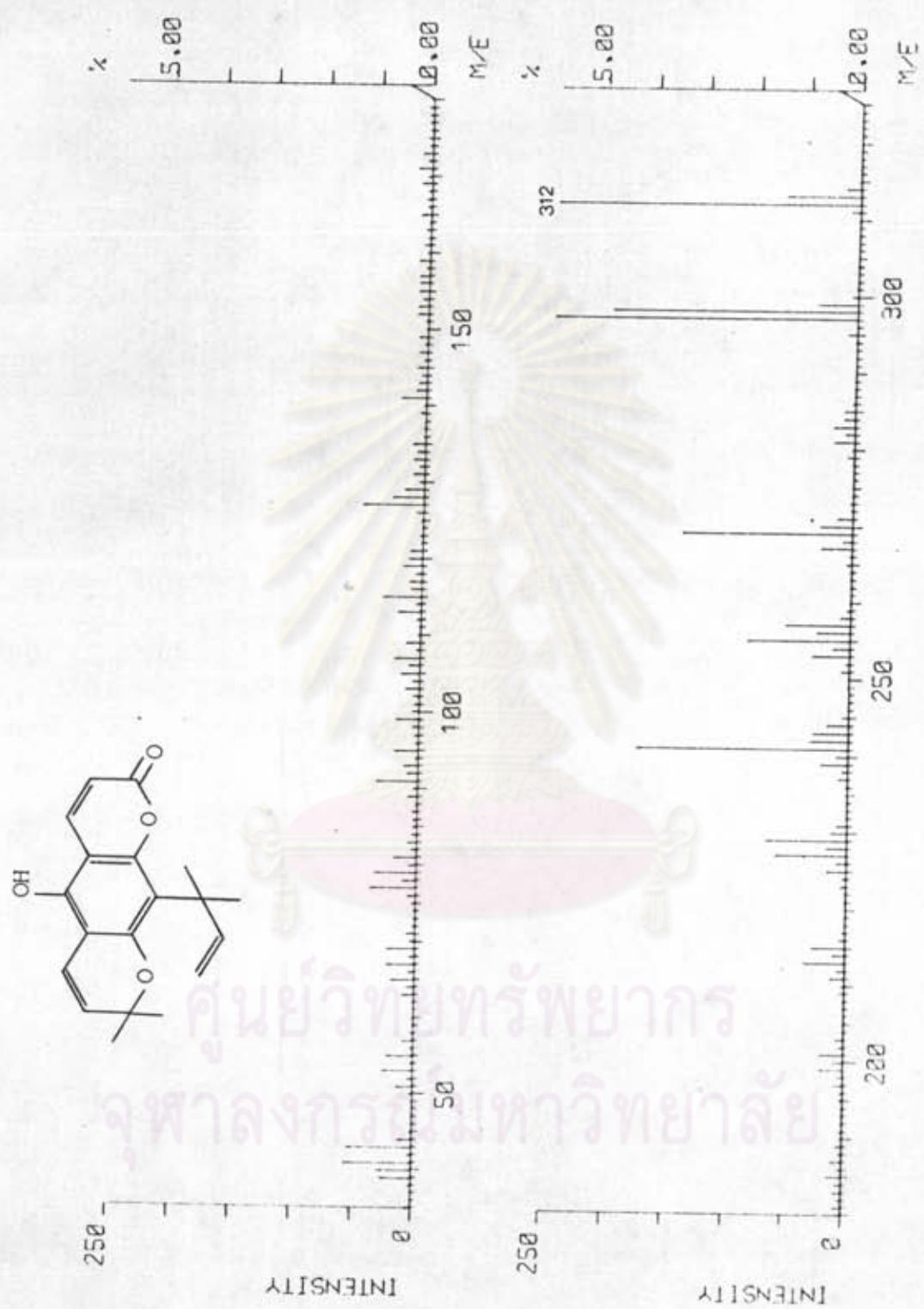


Figure.46 Mass spectrum of Nordenstatin (compound - 5)

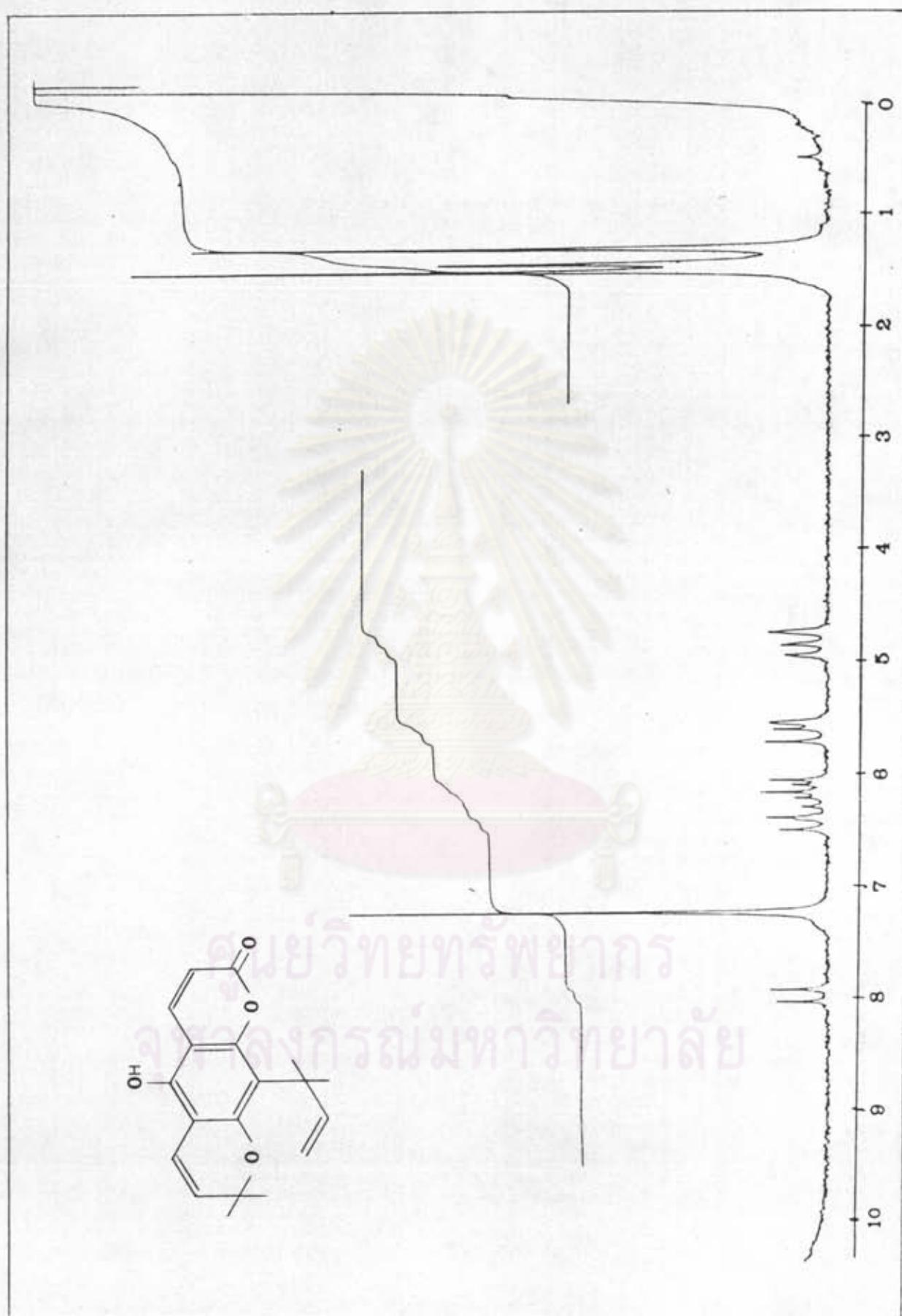


Figure.4.7 ^1H NMR spectrum of Nordentatin (compound - 5)

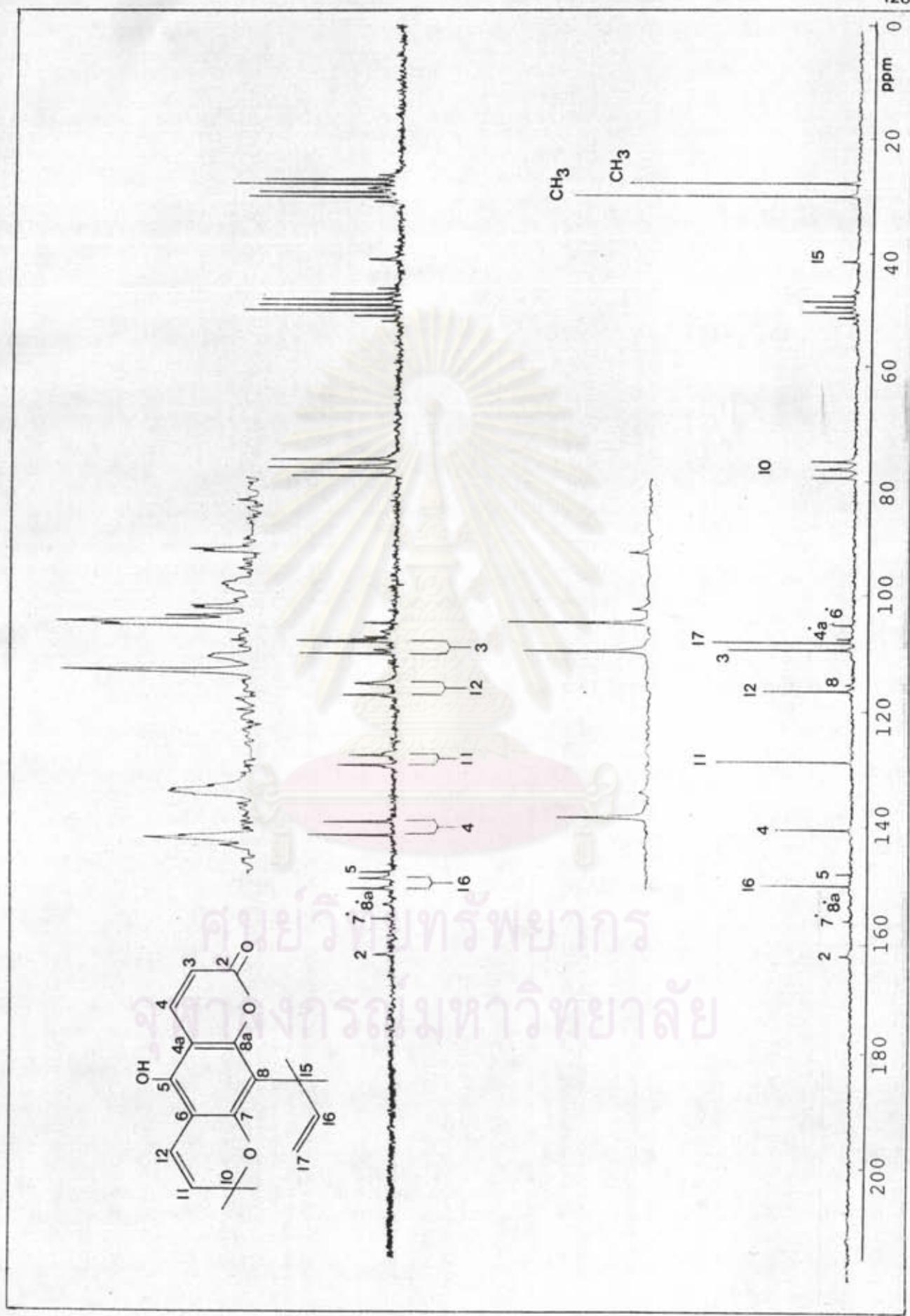


Figure .48 ^{13}C NMR spectrum of Nordentatin (compound - 5)

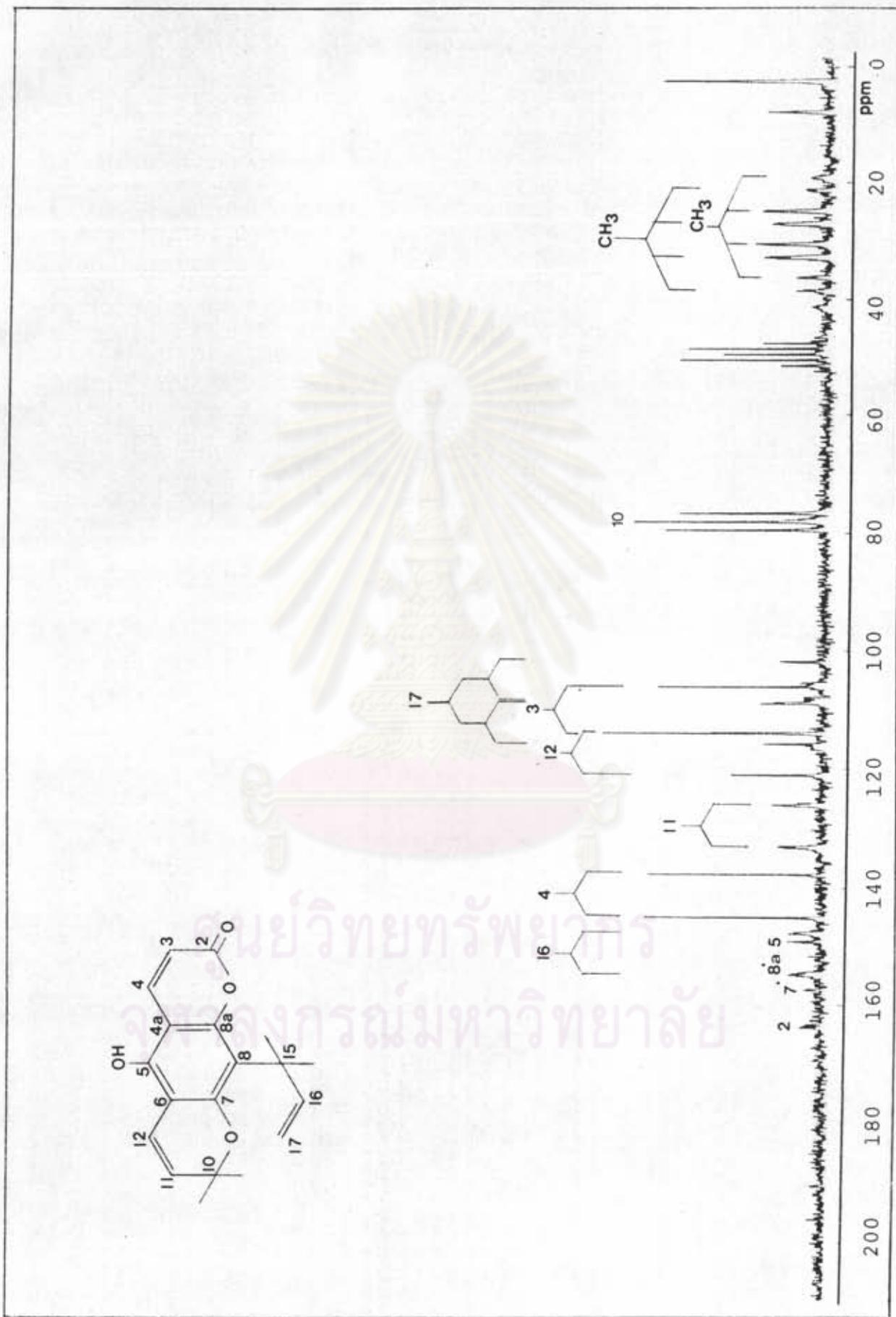


Figure. 4.9 ^{13}C NMR spectrum of Nordentatin (compound - 5)

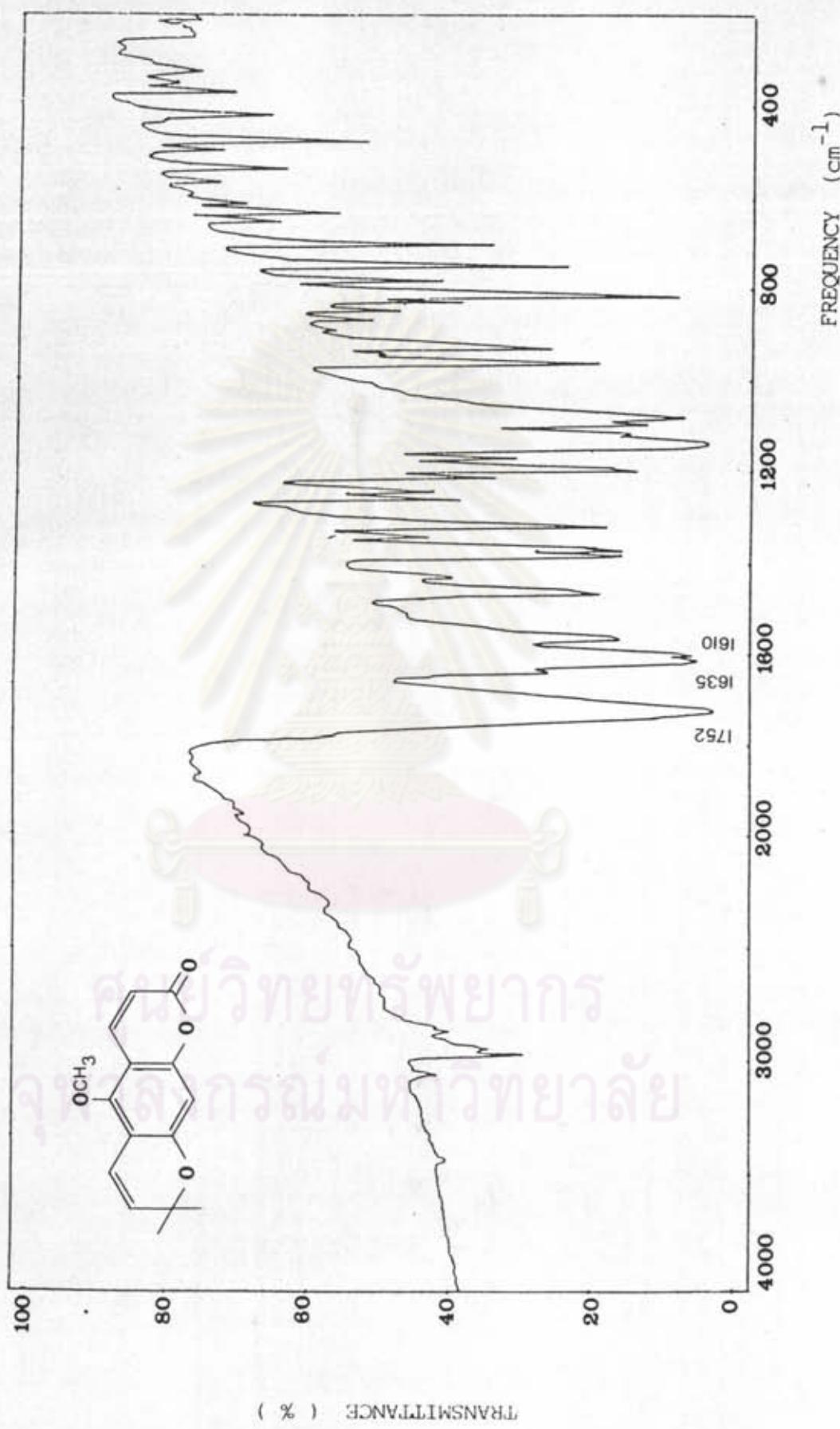


Figure.50 Infrared spectrum of Xanthoxyletin (compound - 6)

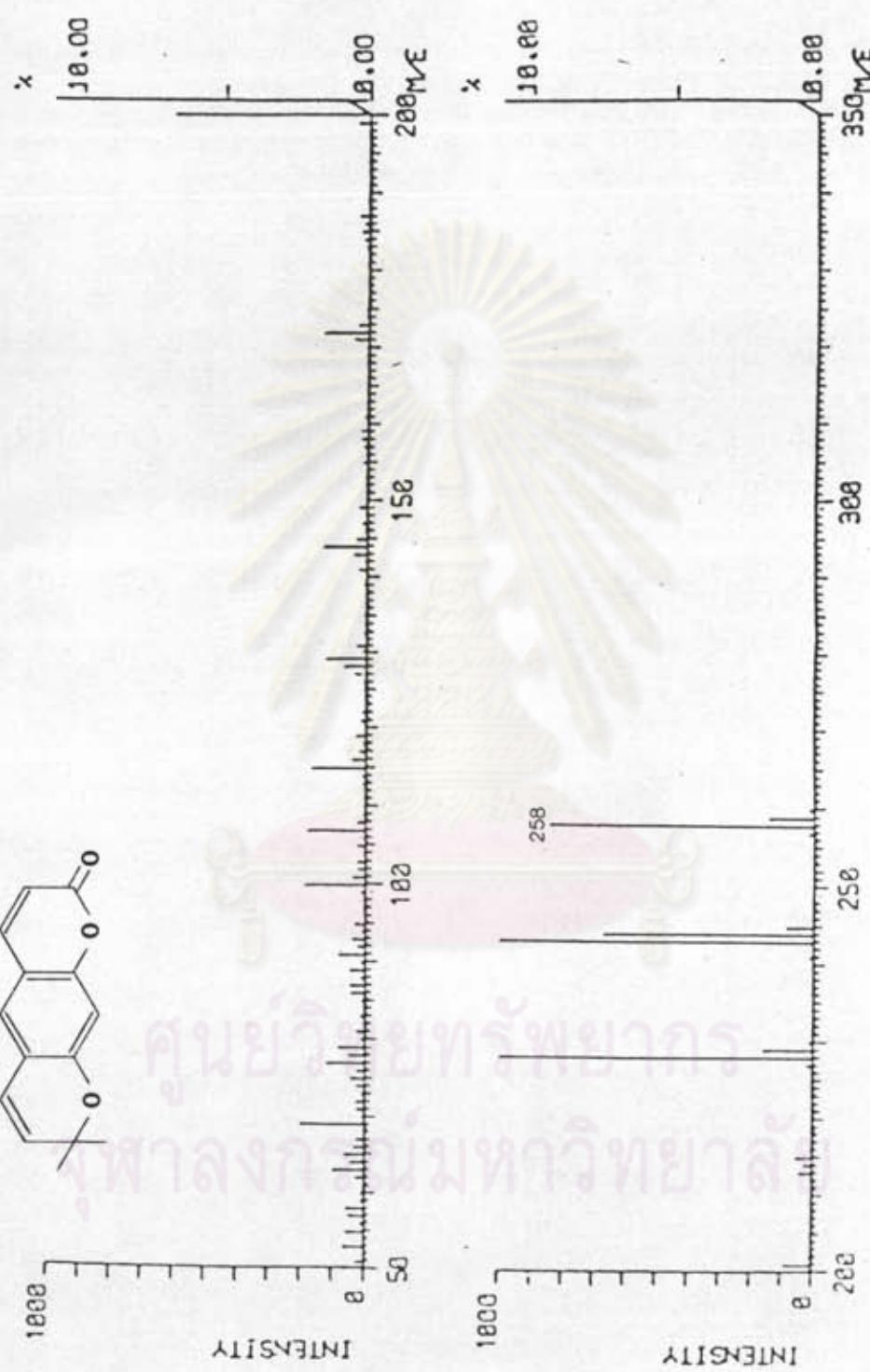
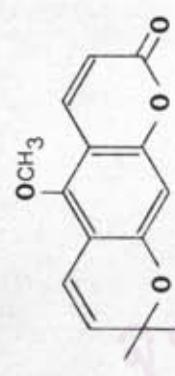


Figure.51 Mass spectrum of Xanthoxyletin (compound - 6)

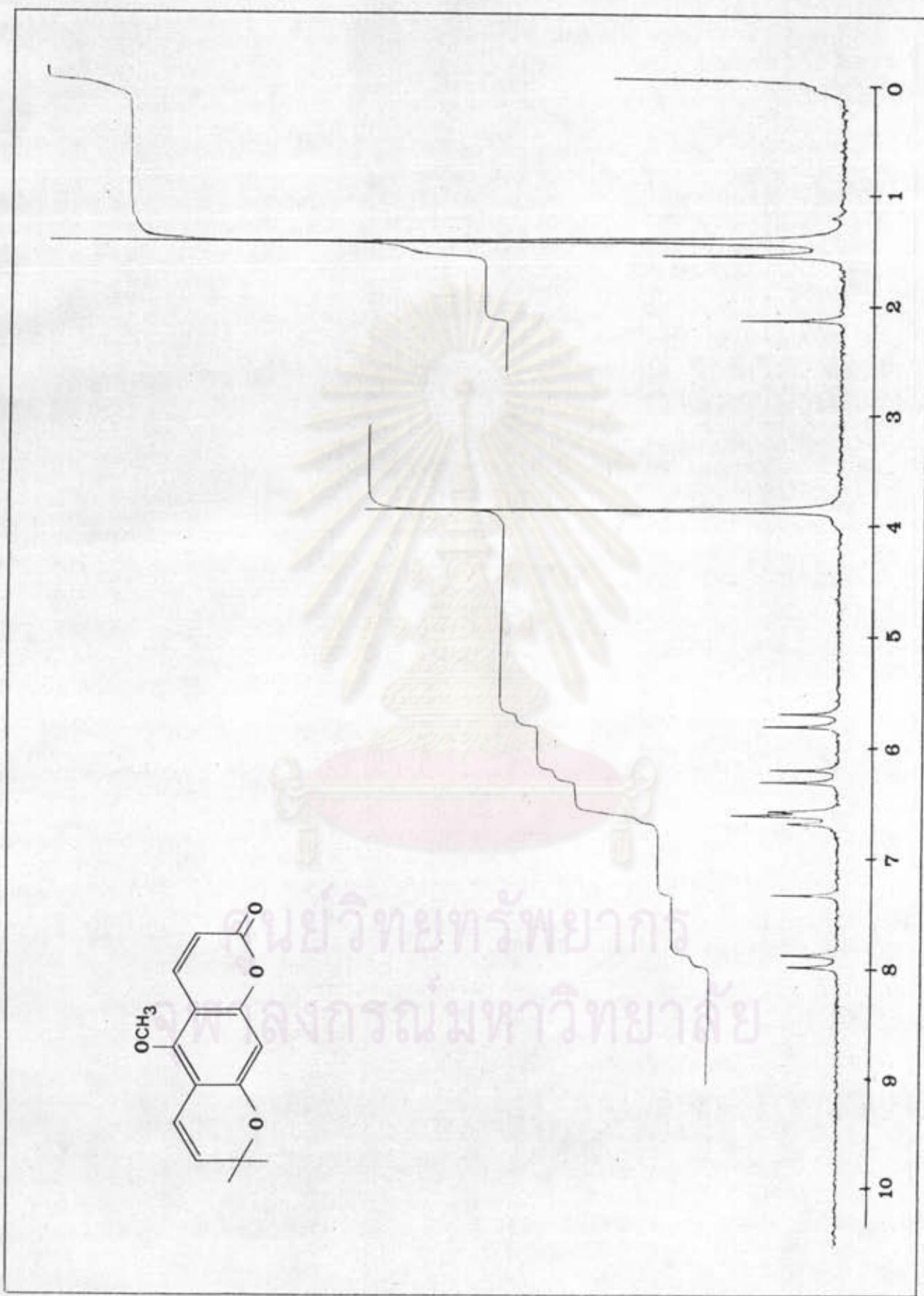


Figure 5.2 ^1H NMR spectrum of Xanthoxyletin (compound - 6)

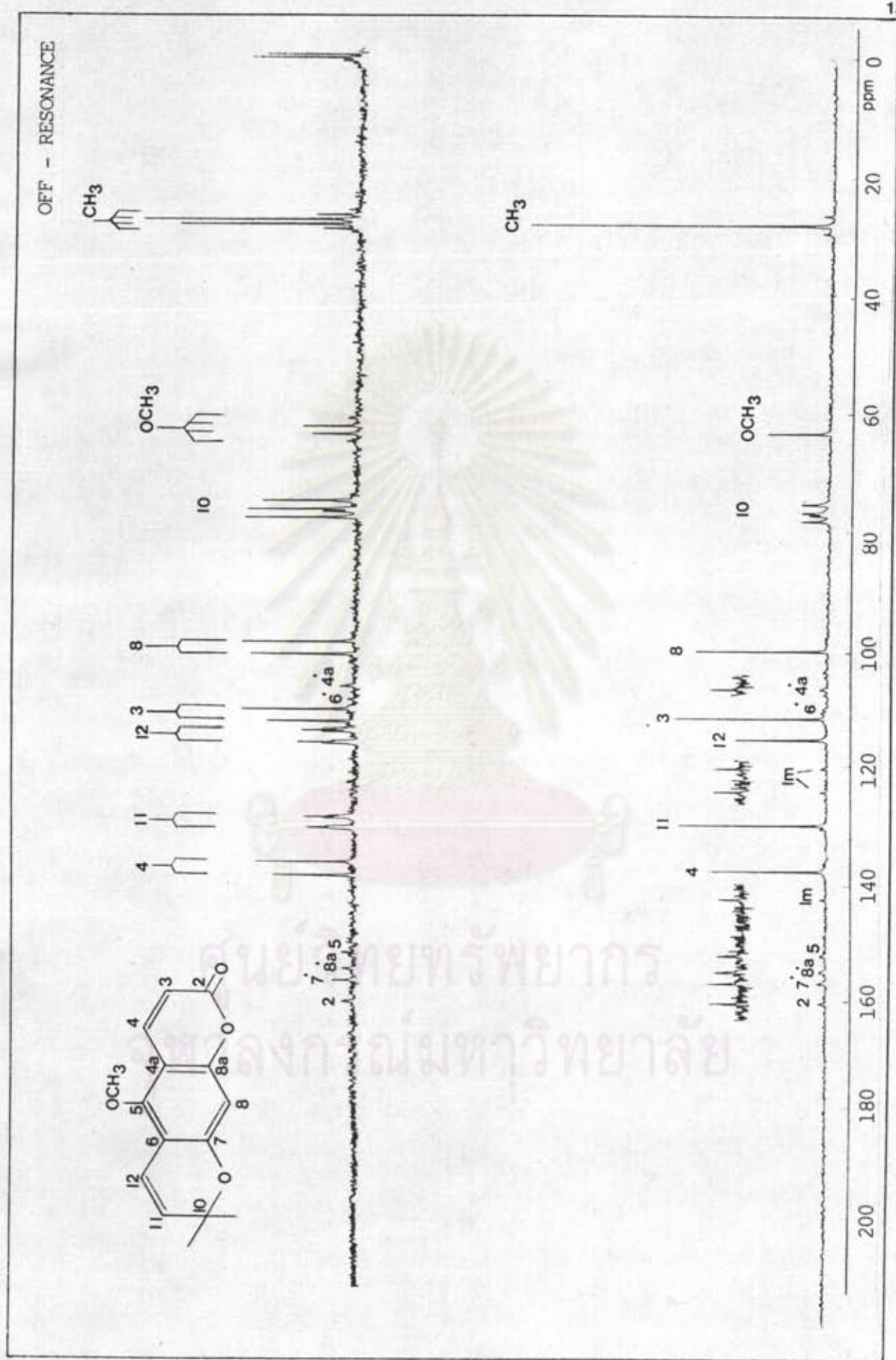


Figure.53 ^{13}C NMR spectrum of Xanthoxyletin (compound - 6)

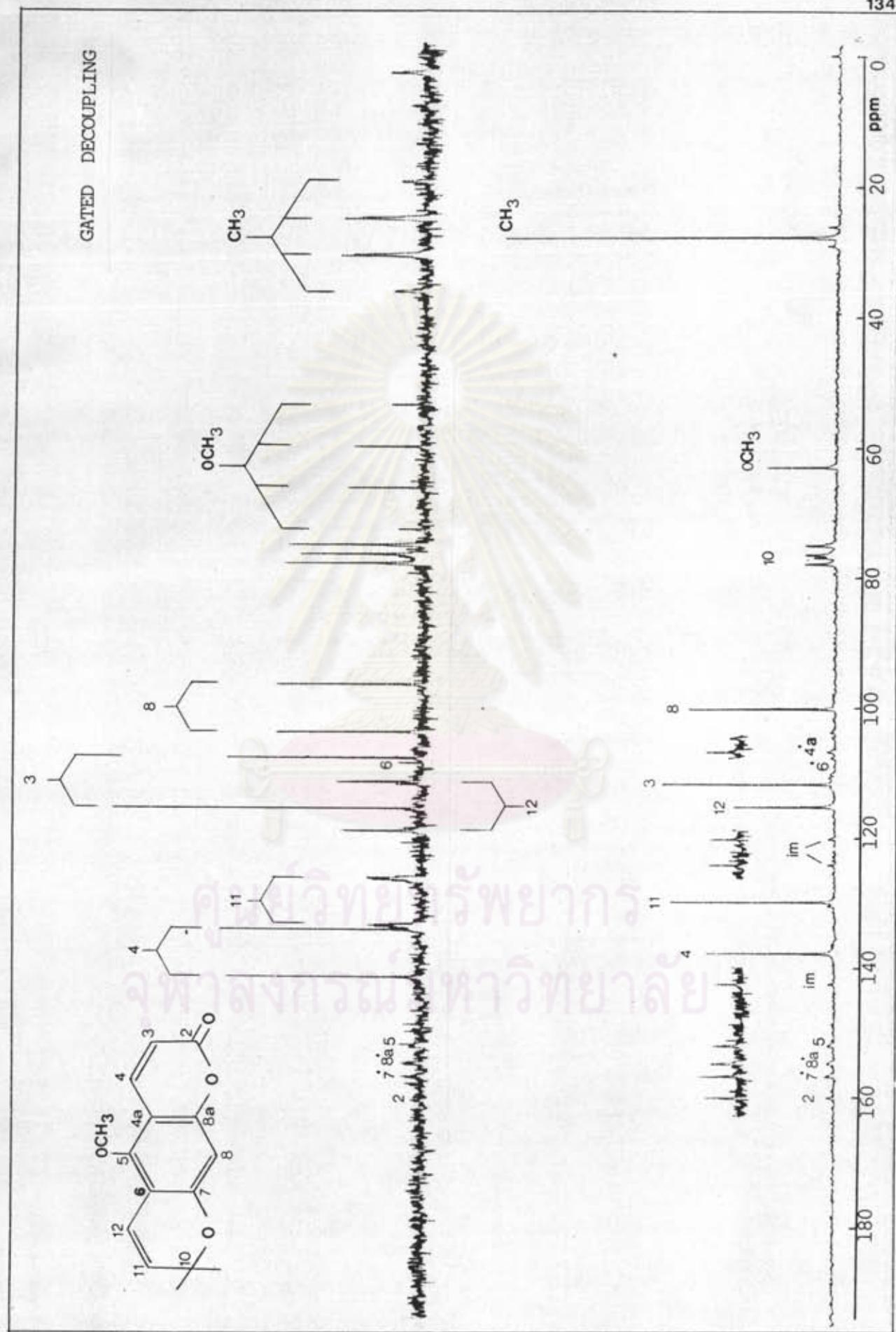


Figure.54 ^{13}C NMR spectrum of Xanthoxyletin (compound - 6)



VITA

Name Mr. Prasan Tangyuenyongwatthana

Education B.Sc. in Pharm., Faculty of Pharmaceutical Science, Prince of Songkla University, Haadyai, Songkla, Thailand, 1983.

Position and site of the Employer's office

Lecturer / instructor in department of Pharmaceutical Chemistry, Faculty of Pharmaceutical Sciences, Prince of Songkla University, Haadyai, Songkla, Thailand.

ศูนย์วิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย