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สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย



APPENDIX

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

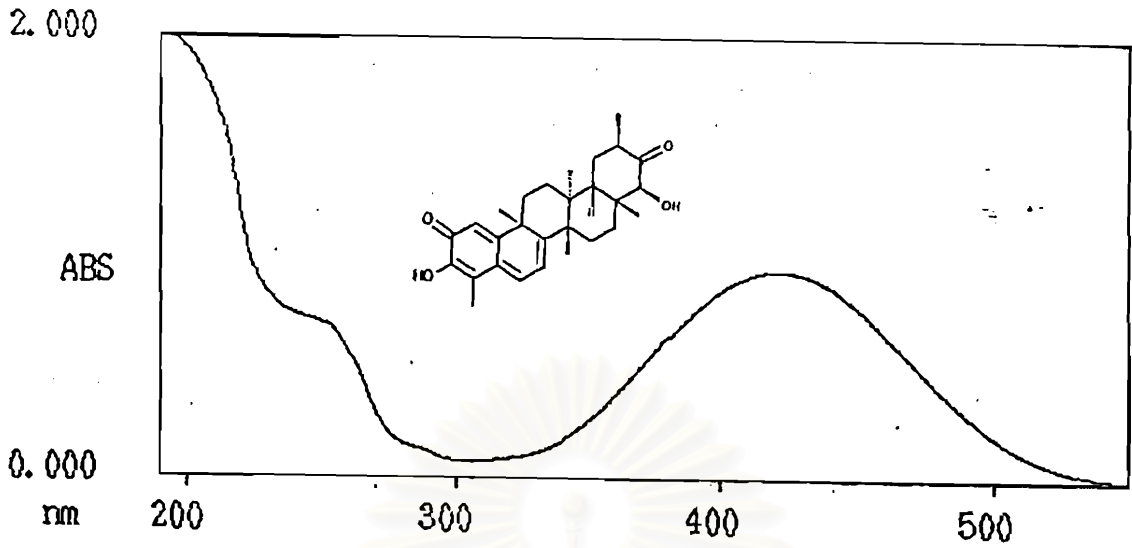


Figure 40. UV absorption spectrum of GS-T-1 (1) (in MeOH).

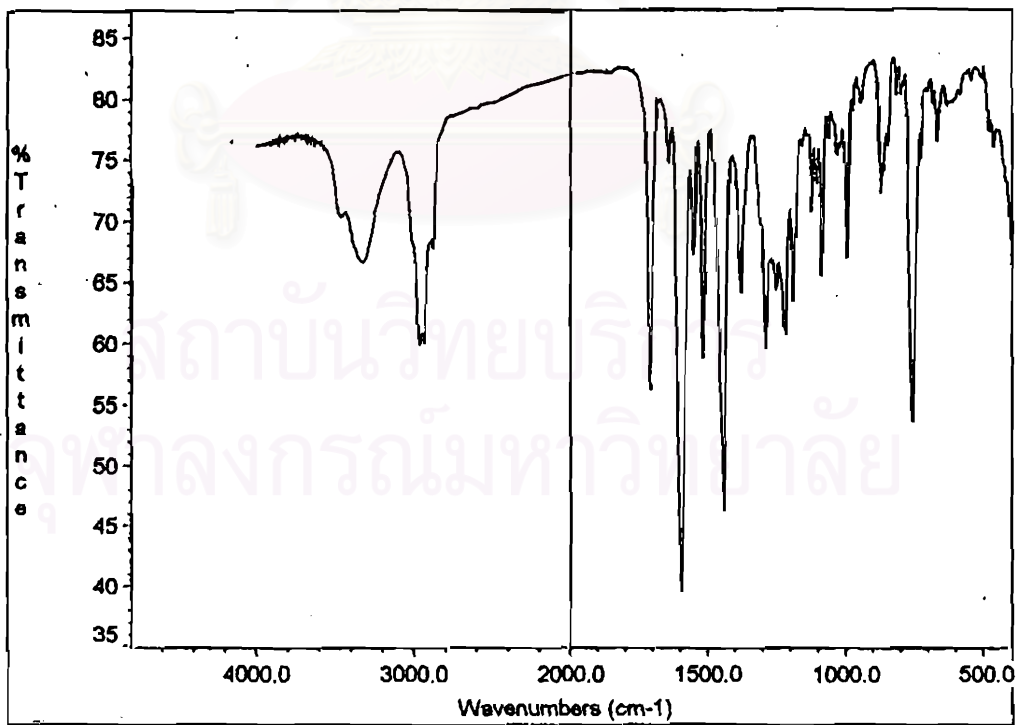


Figure 41. IR spectrum of GS-T-1 (1) (dry film).

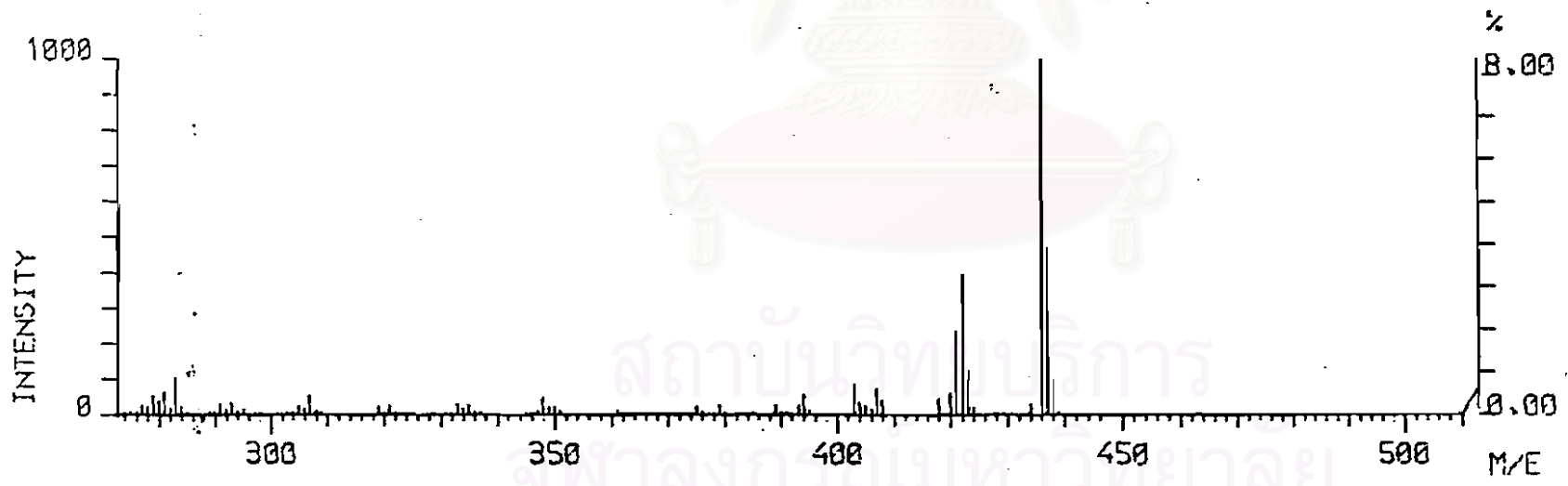
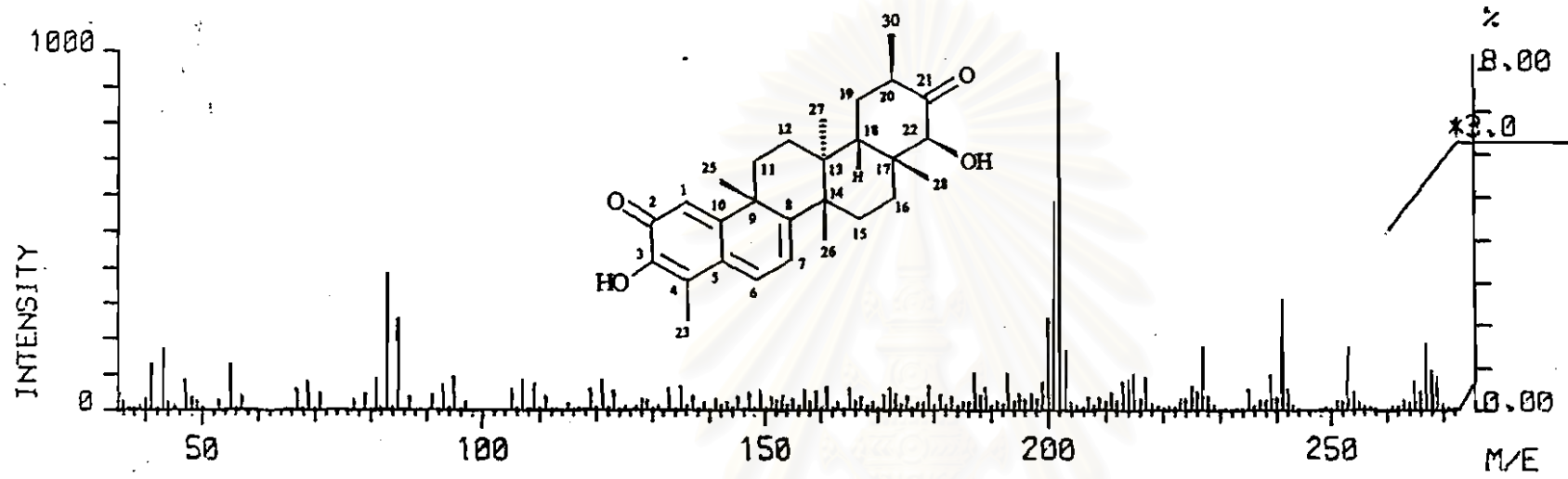


Figure 42. EIMS of GS-T-1 (1).

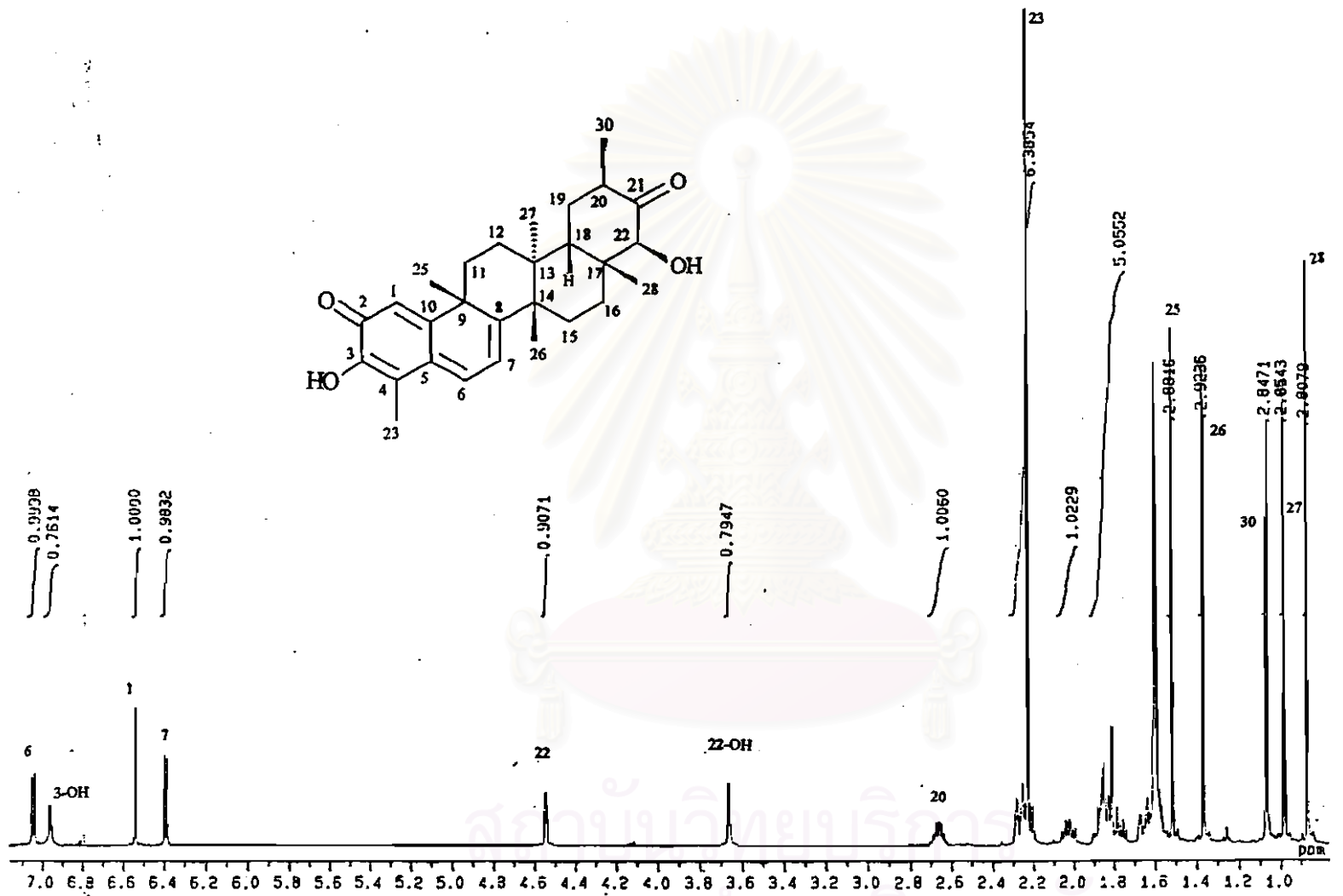
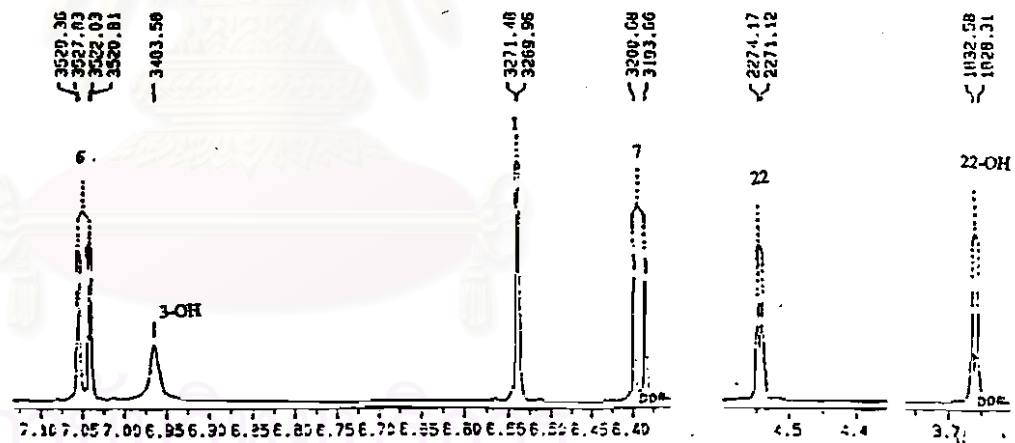
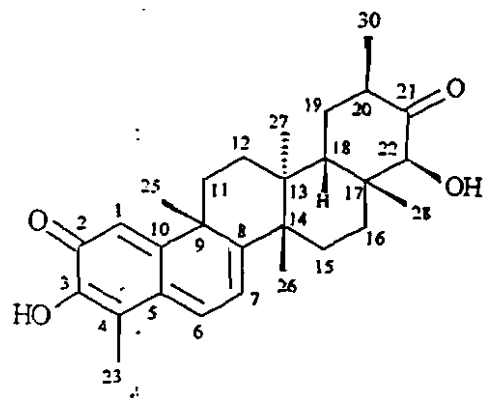
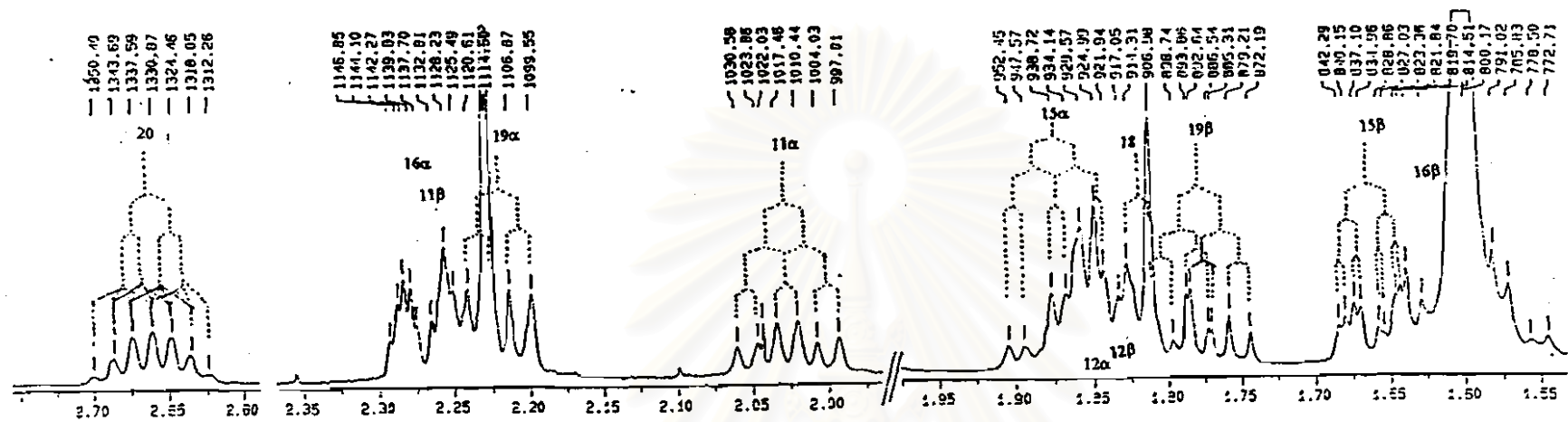


Figure 43. (a) ¹H NMR spectrum (500 MHz) of GS-T-1 (1) (in CDCl₃).



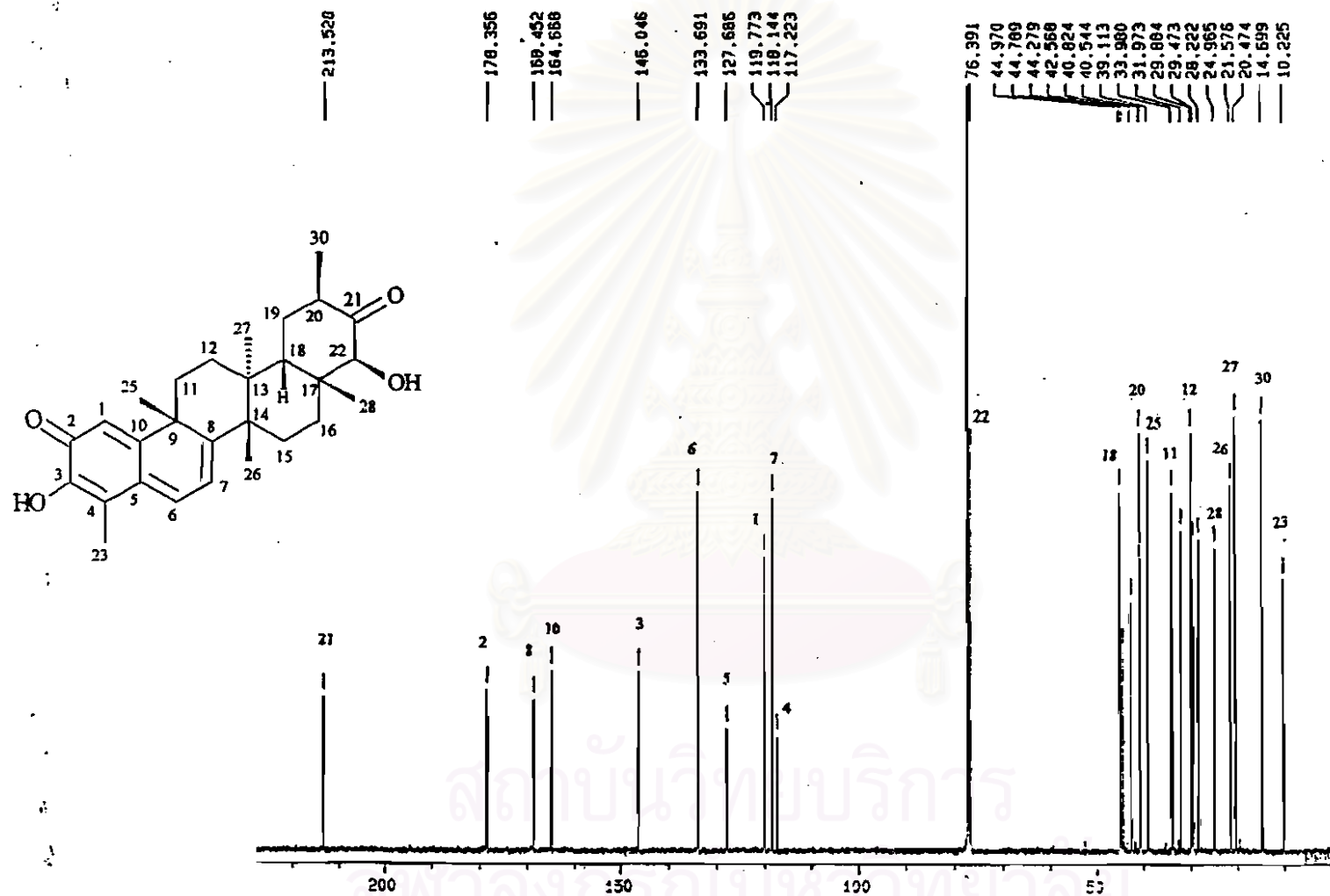


Figure 44. ¹³C NMR spectrum (125 MHz) of GS-T-1 (1) (in CDCl₃).

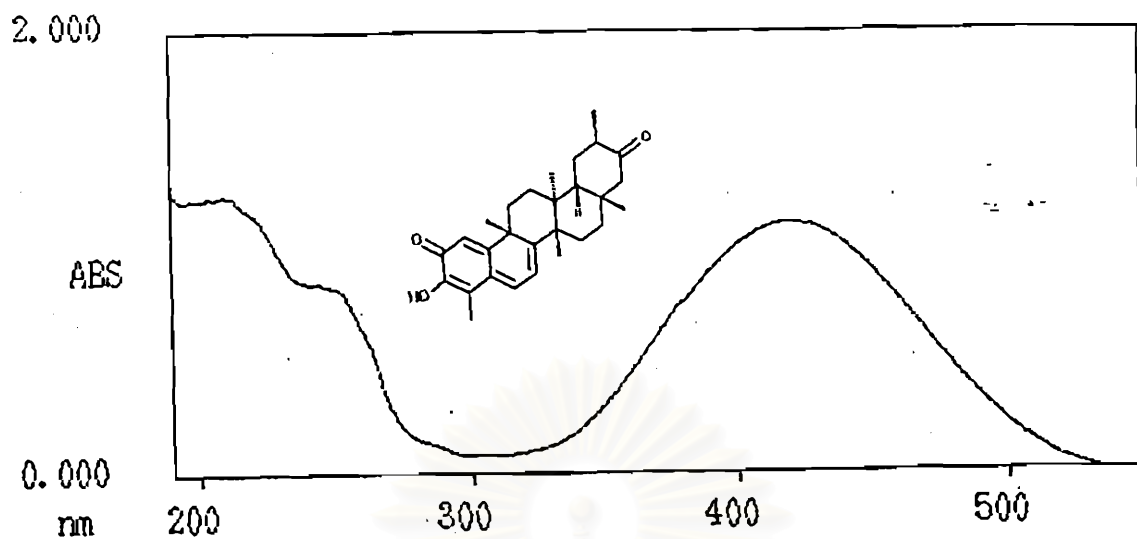


Figure 45. UV absorption spectrum of GS-T-2 (15) (in MeOH).

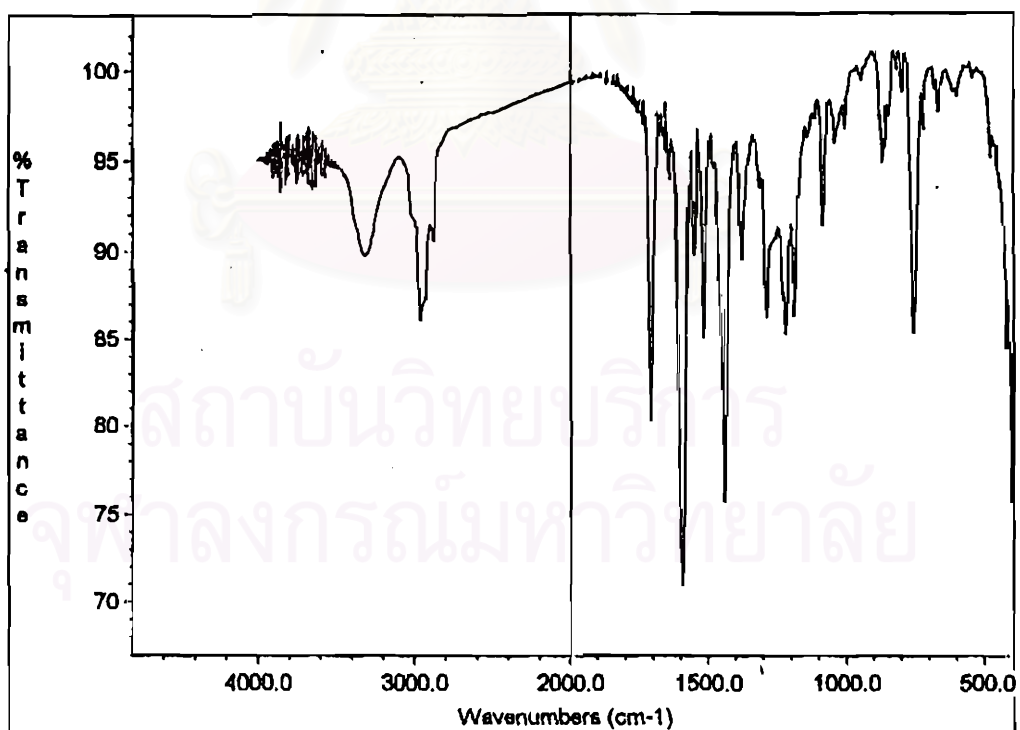


Figure 46. IR spectrum of GS-T-2 (15) (dry film).

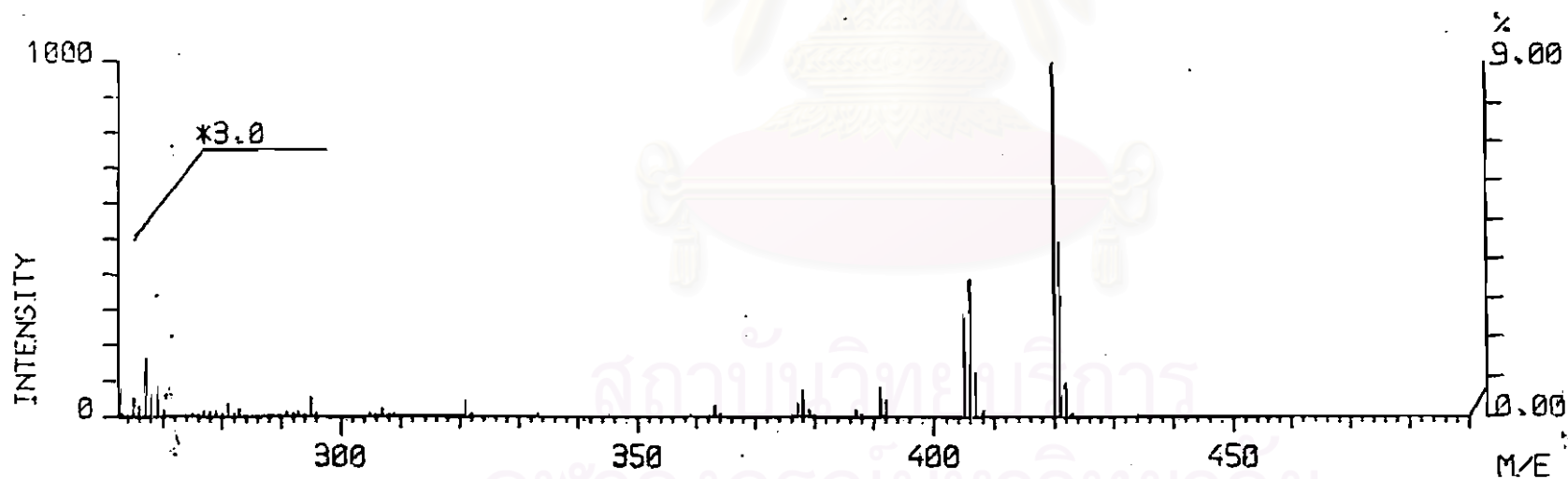
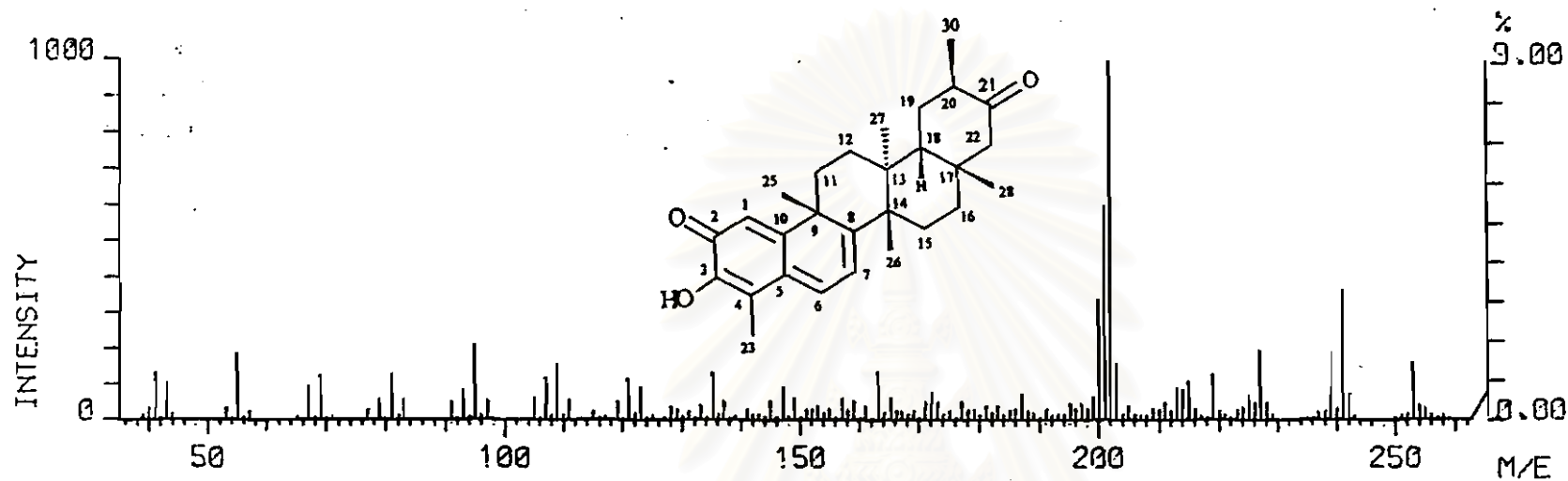


Figure 47. EIMS of GS-T-2 (15).

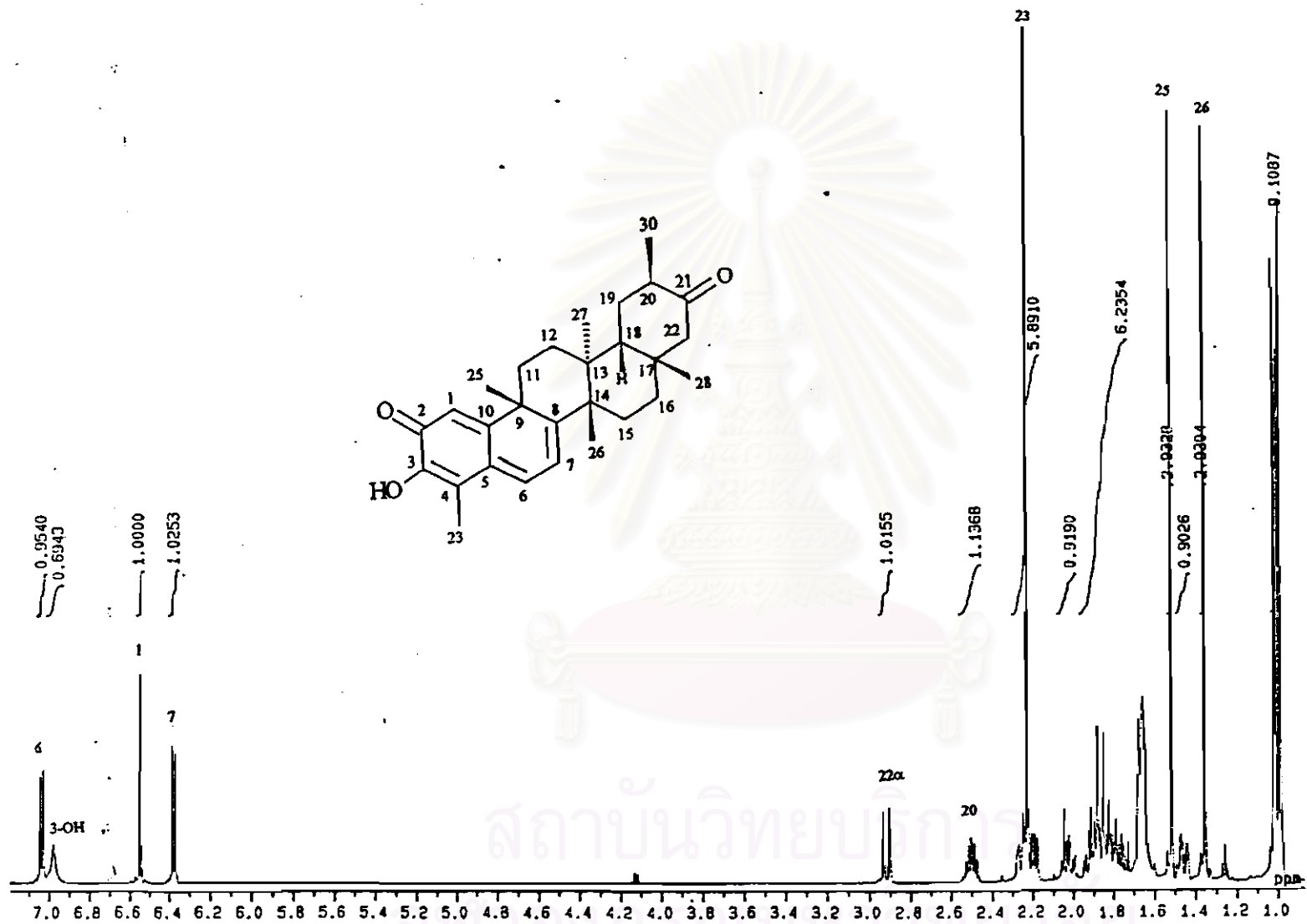


Figure 48. (a) ¹H NMR spectrum (500 MHz) of GS-T-2 (15) (in CDCl₃).

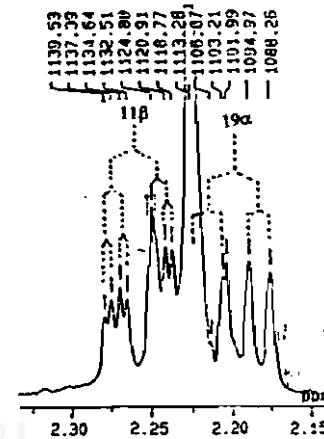
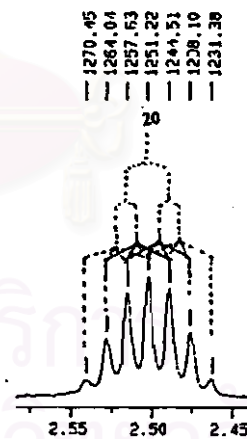
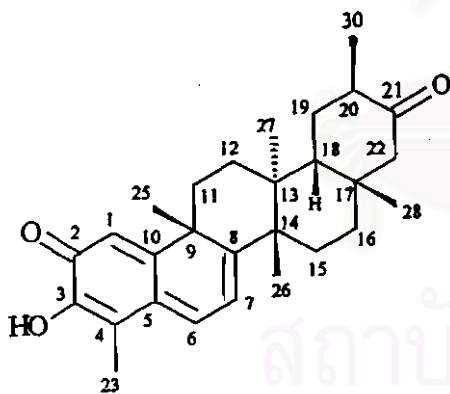
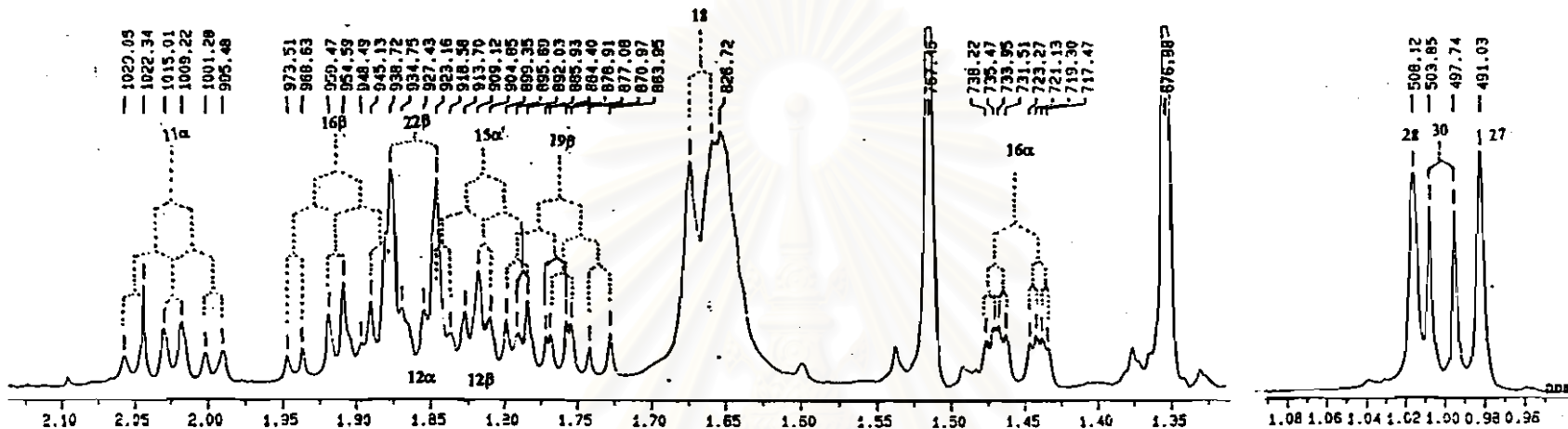


Figure 48. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-T-2 (15) (in CDCl_3).

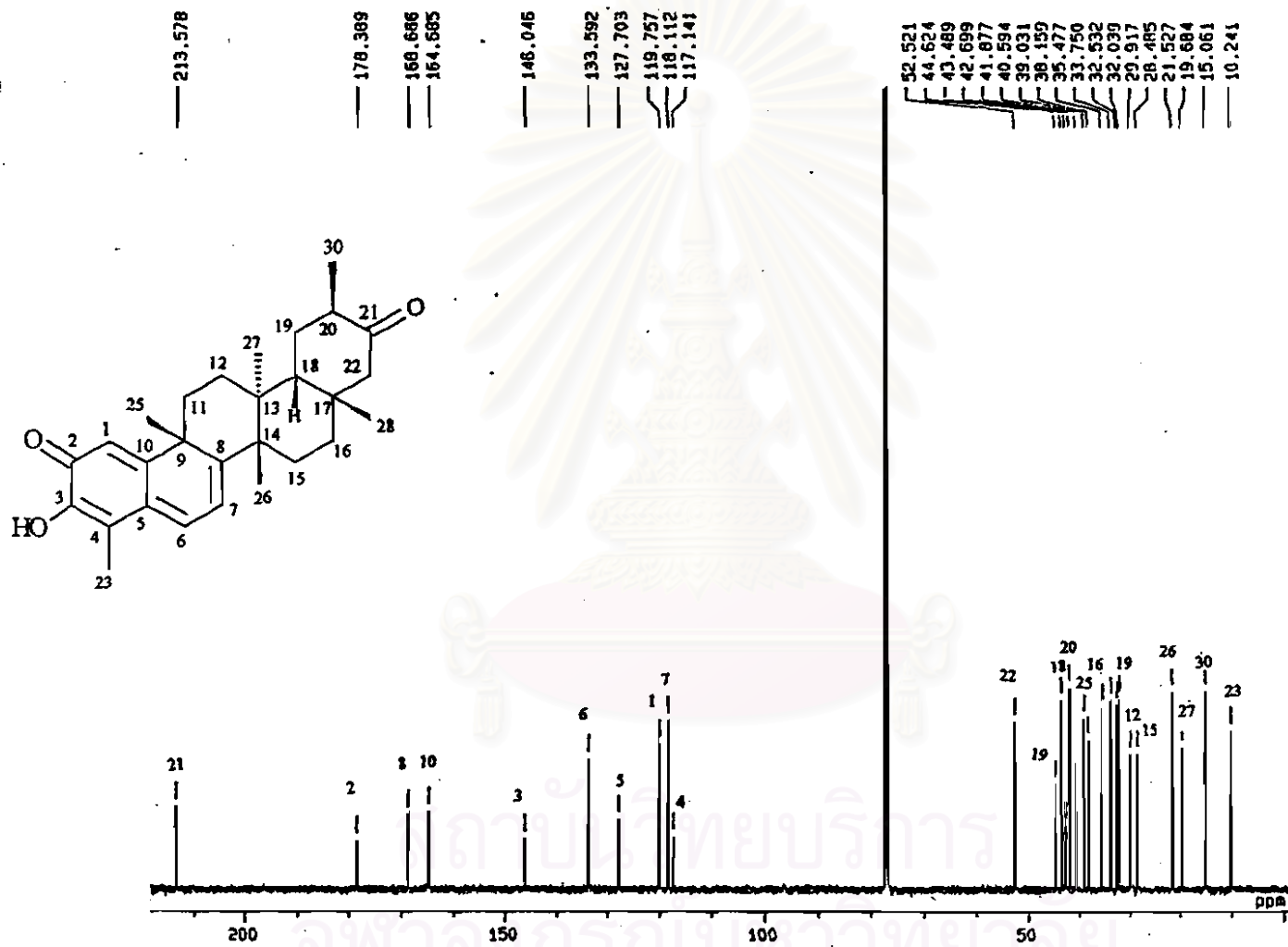


Figure 49. ^{13}C NMR spectrum (125 MHz) of GS-T-2 (15) (in CDCl_3).

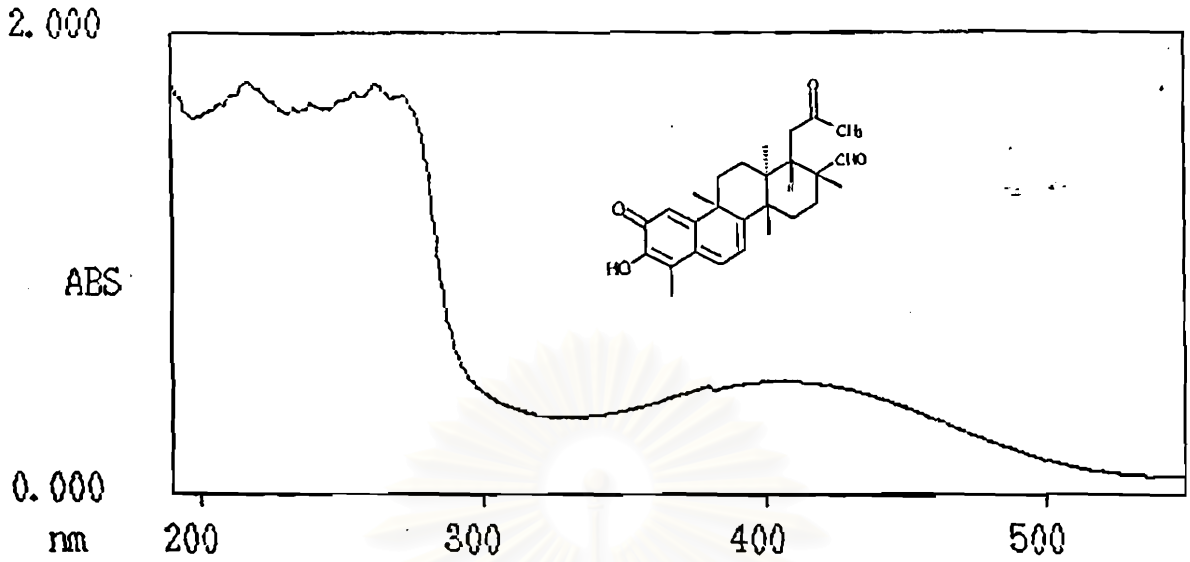


Figure 50. UV absorption spectrum of GS-Y0-2 (52) (in MeOH).

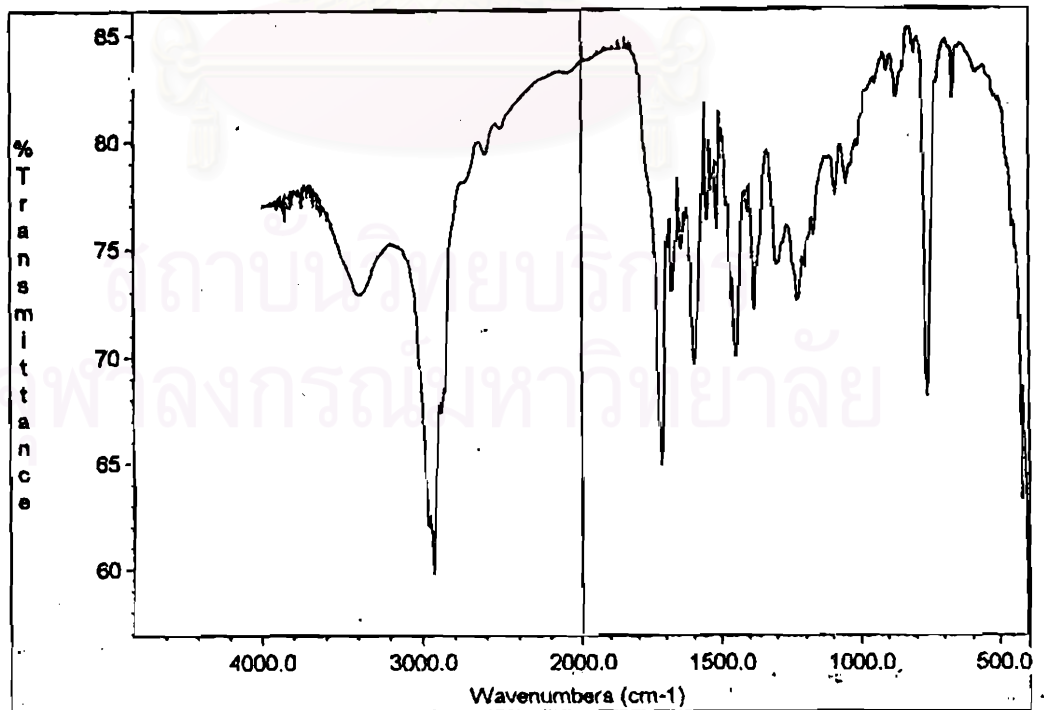


Figure 51. IR spectrum of GS-Y0-2 (52) (dry film).

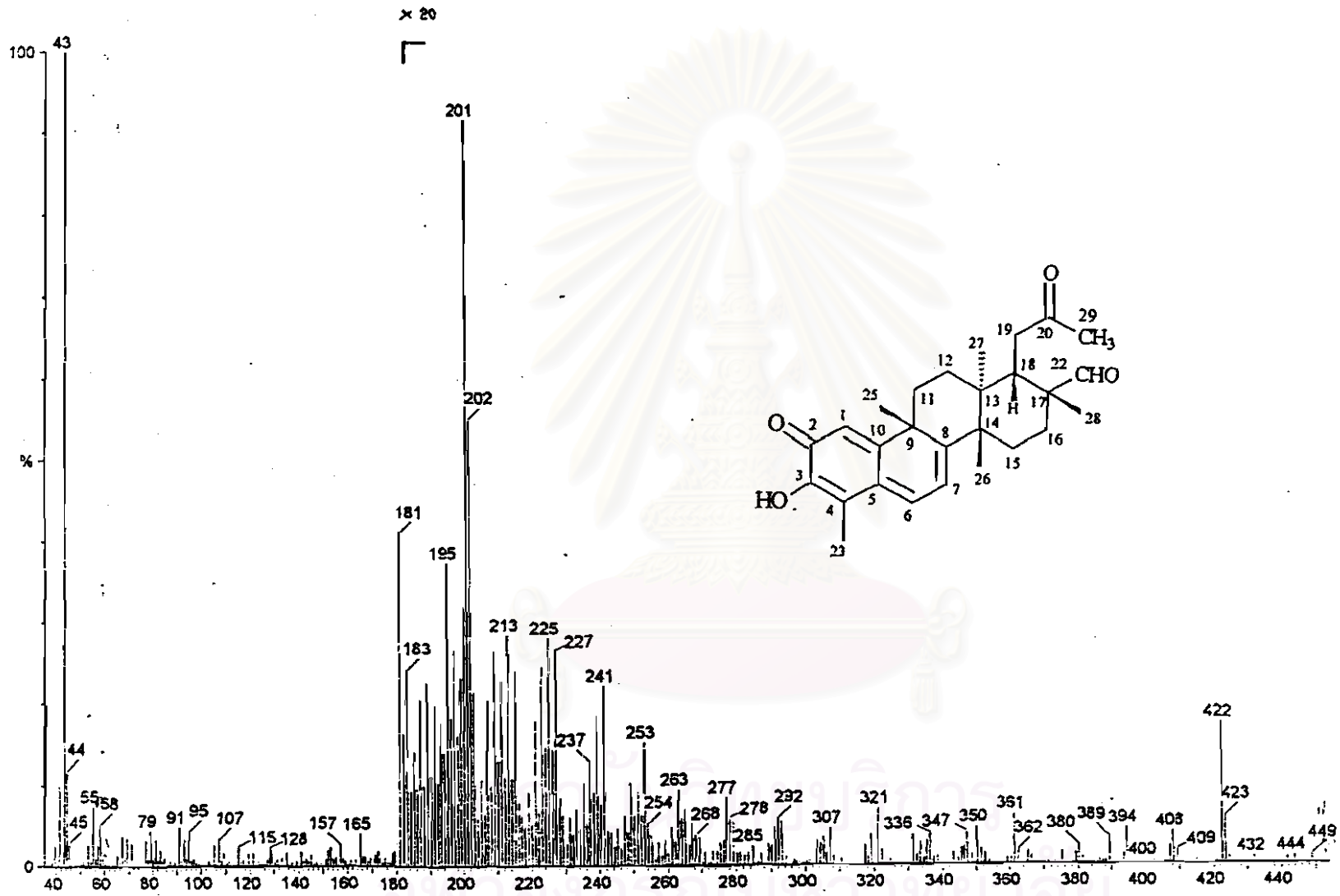


Figure 52. EIMS of GS-Y0-2 (52).

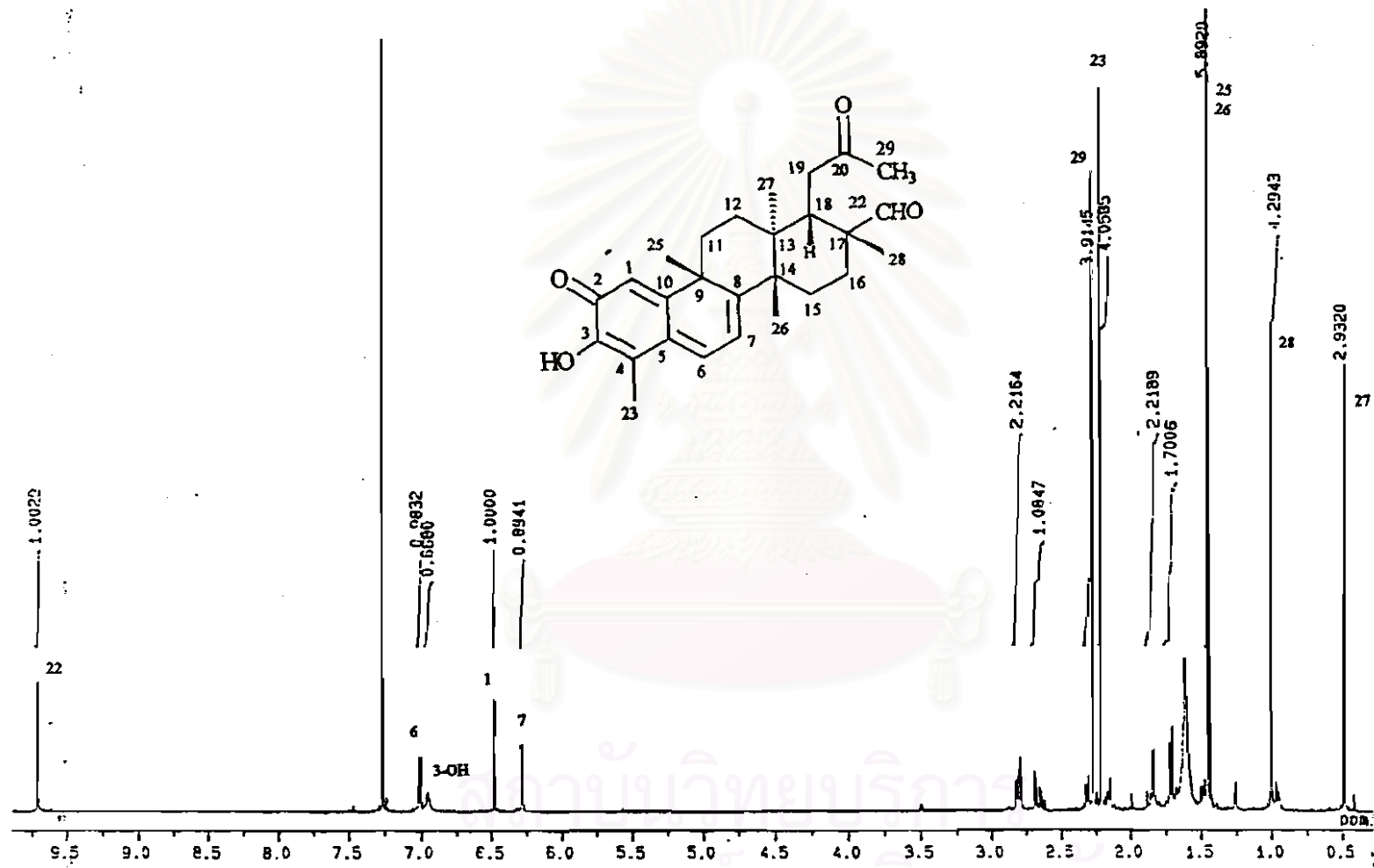


Figure 53. (a) ¹H NMR spectrum (500 MHz) of GS-Y0-2 (52) (in CDCl₃).

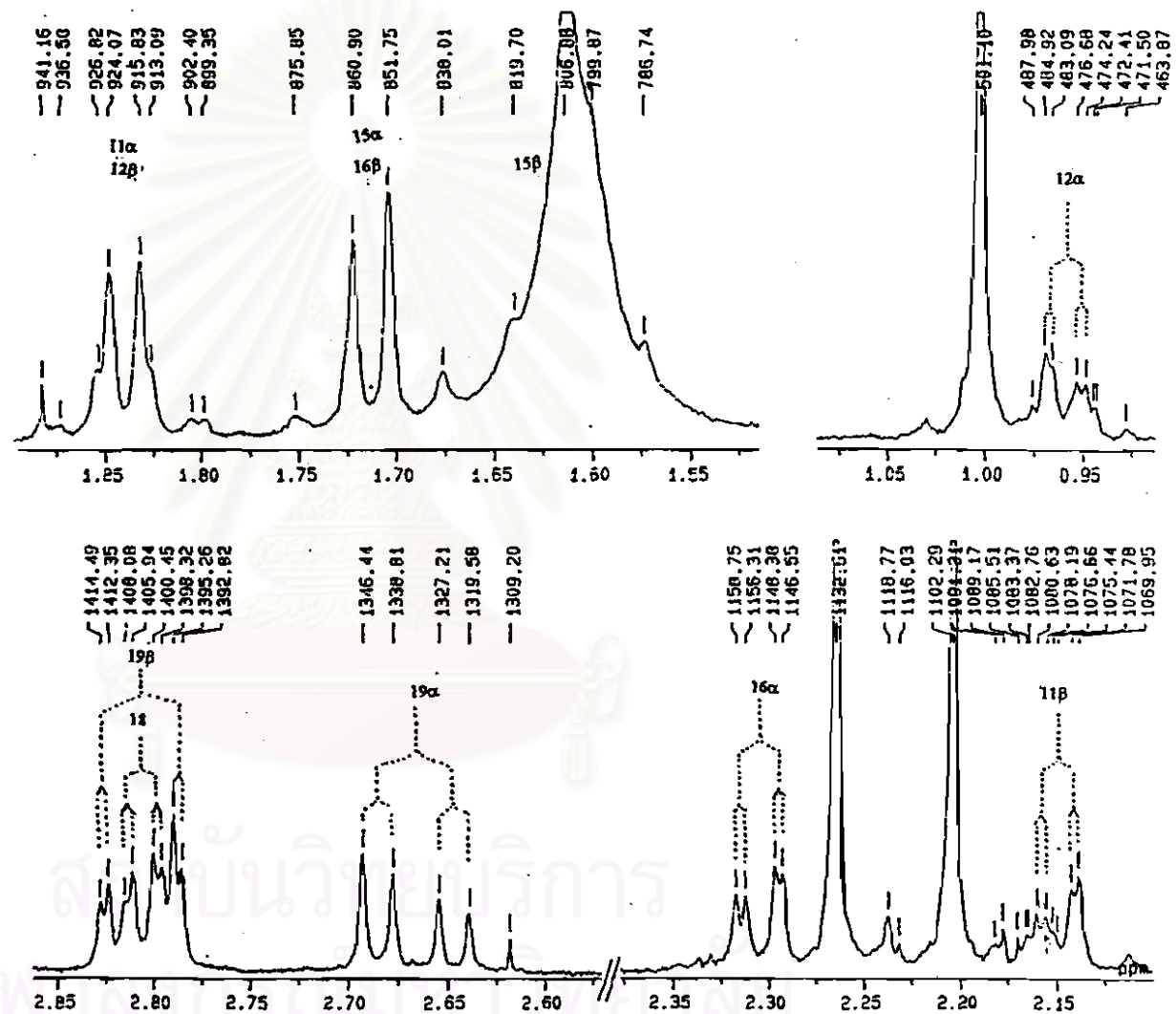
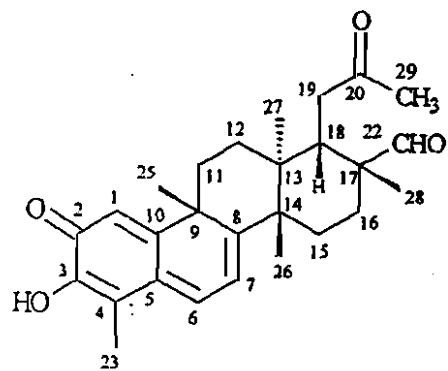


Figure S3. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-Y0-2 (52) (in CDCl_3) in the range of δ 2.85-0.90 ppm.

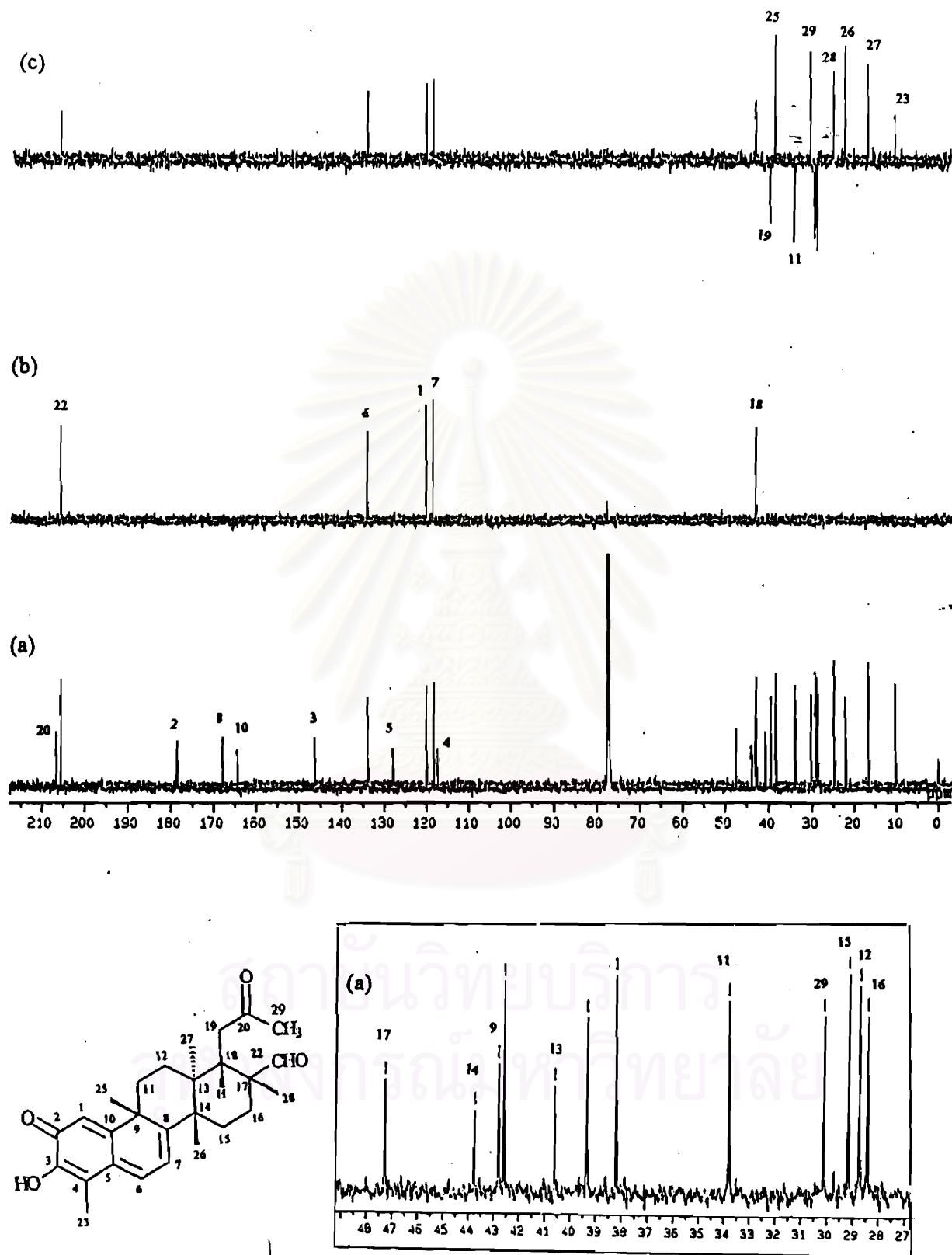


Figure 54. (a) ^{13}C NMR spectrum (125 MHz) of GS-Y0-2 (52) (in CDCl_3).
 (b) DEPT 90° spectrum.
 (c) DEPT 135° spectrum.

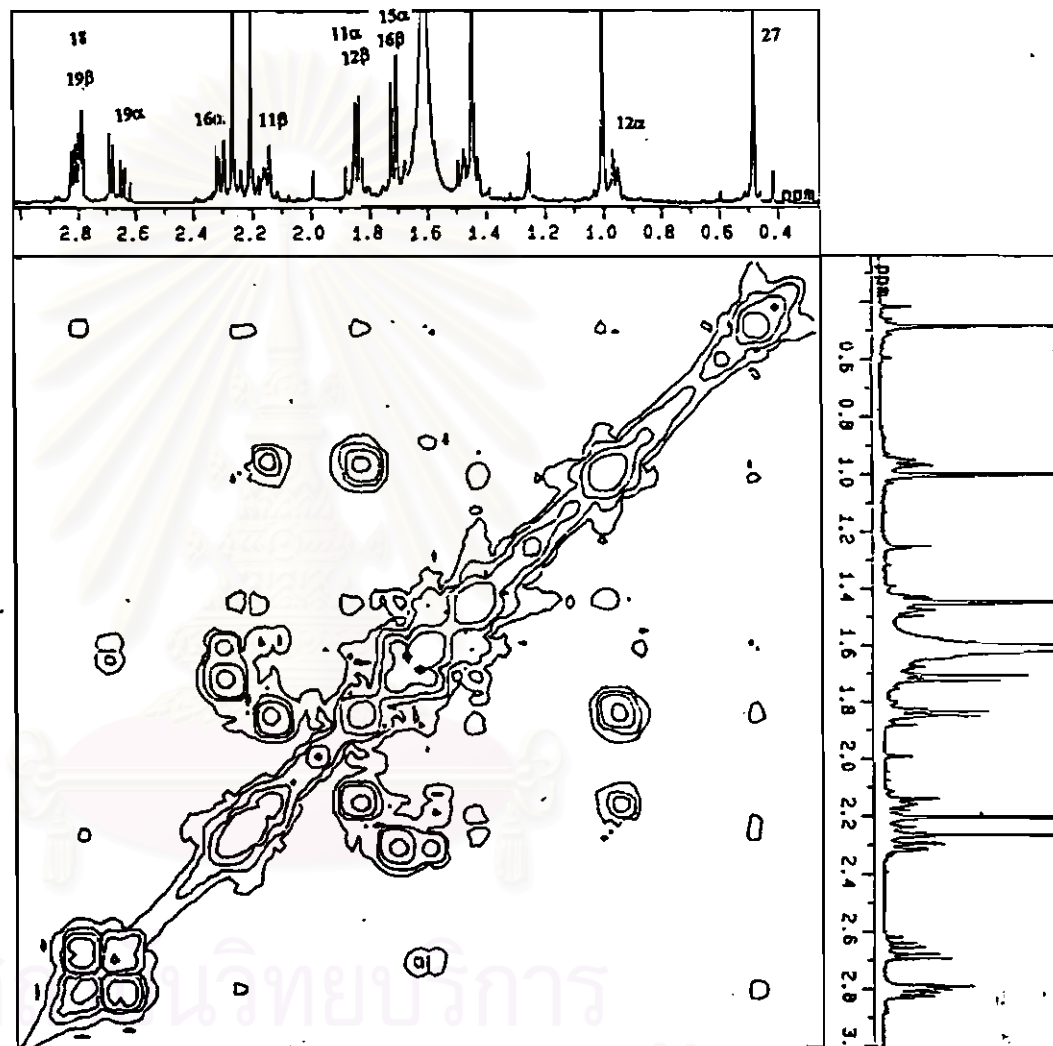
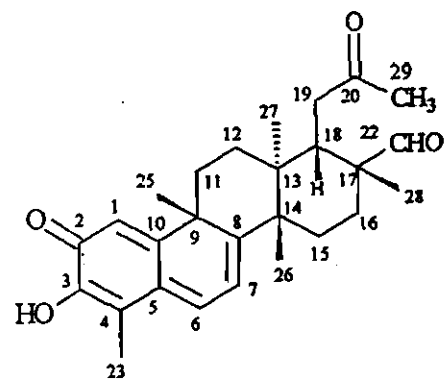


Figure 55. Expanded ^1H - ^1H COSY spectrum of GS-Y0-2 (52) (in CDCl_3) in the range of δ 3.0-0.3 ppm.

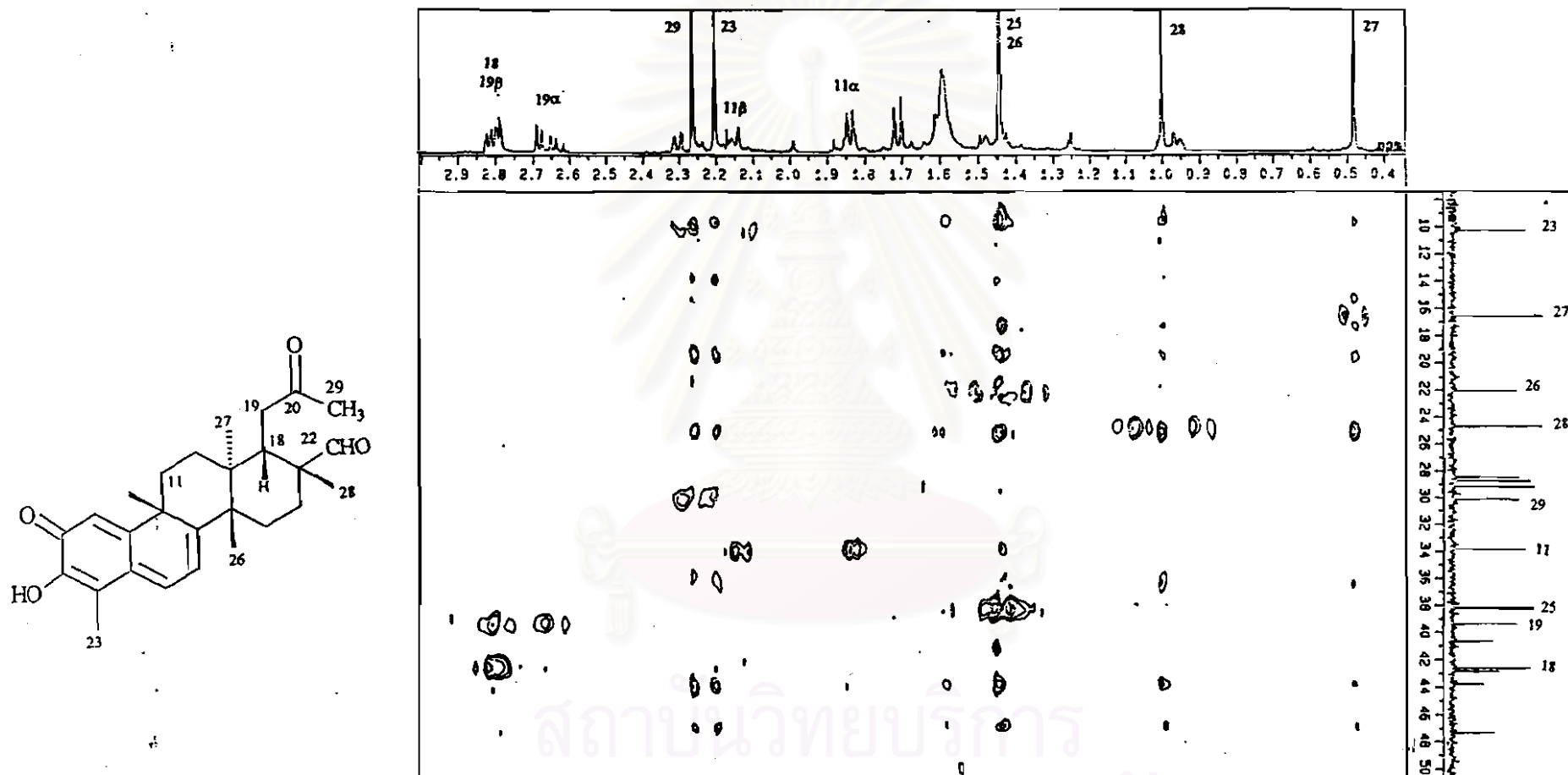


Figure 56. Expanded HMQC spectrum of GS-Y0-2 (52) (in CDCl₃) in the ranges of δ ¹H 3.0-0.3 ppm and δ ¹³C 50-5 ppm.

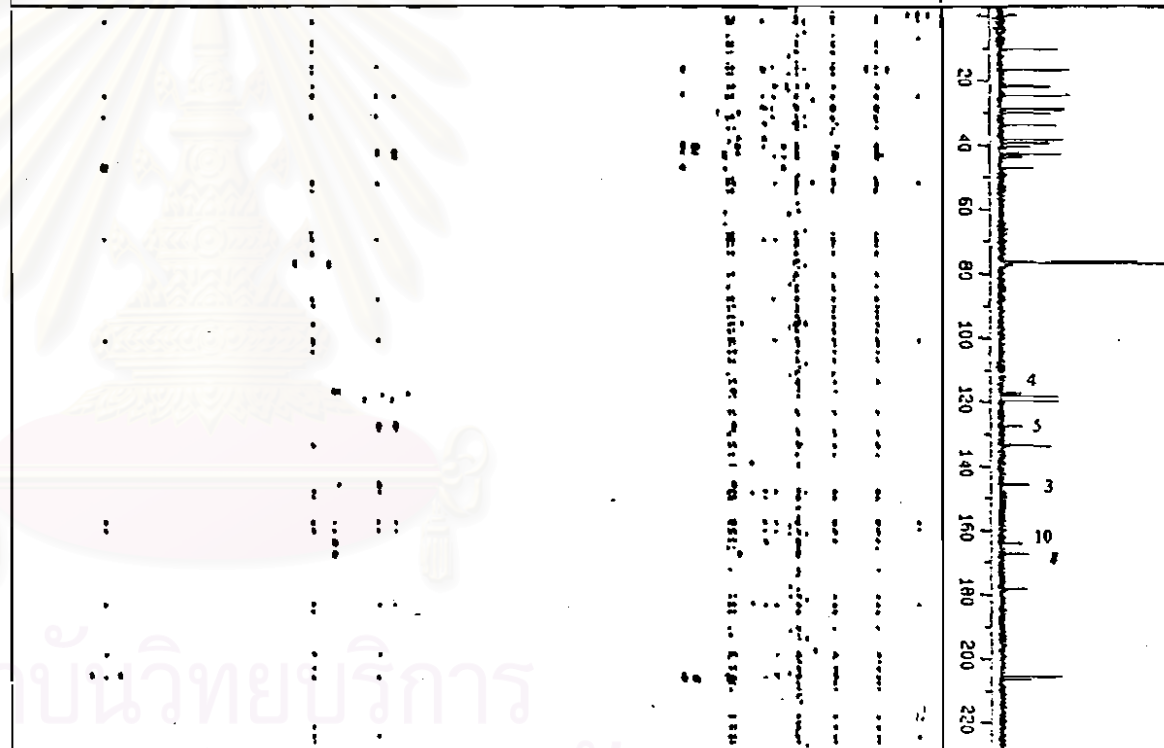
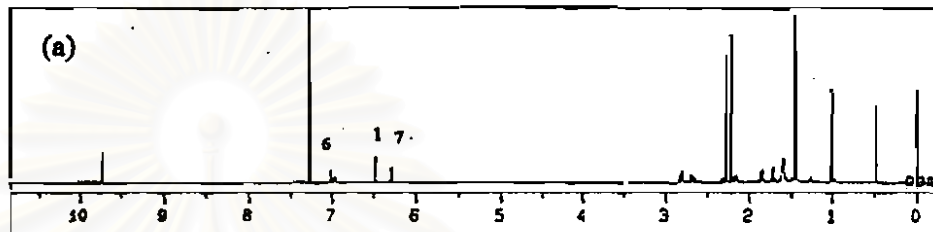
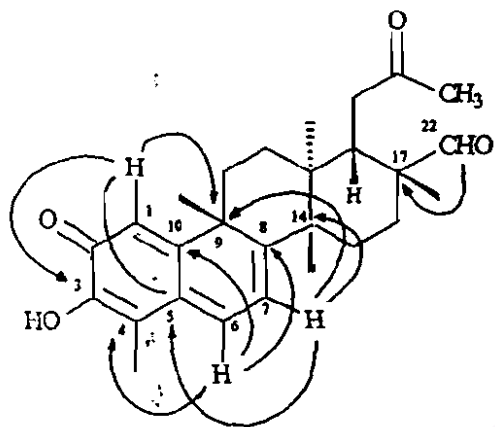
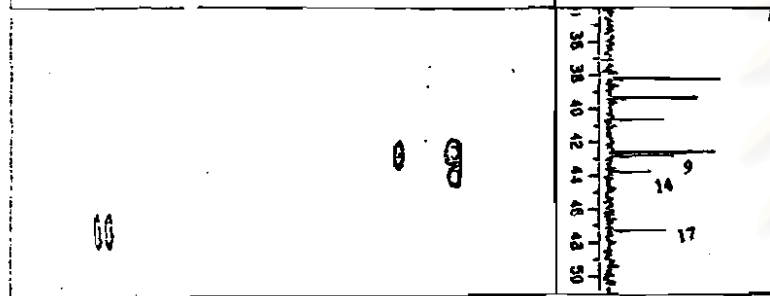
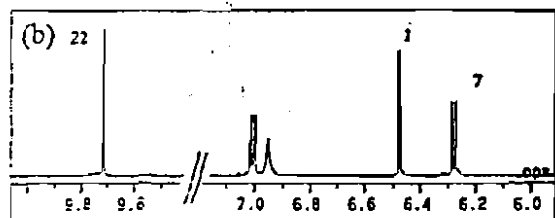


Figure 57. (a) HMBC spectrum of GS-Y0-2 (52) (in CDCl_3)

(b) Expanded HMBC spectrum of GS-Y0-2 (52) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 10.0-6.0 ppm and $\delta^{13}\text{C}$ 50-36 ppm.

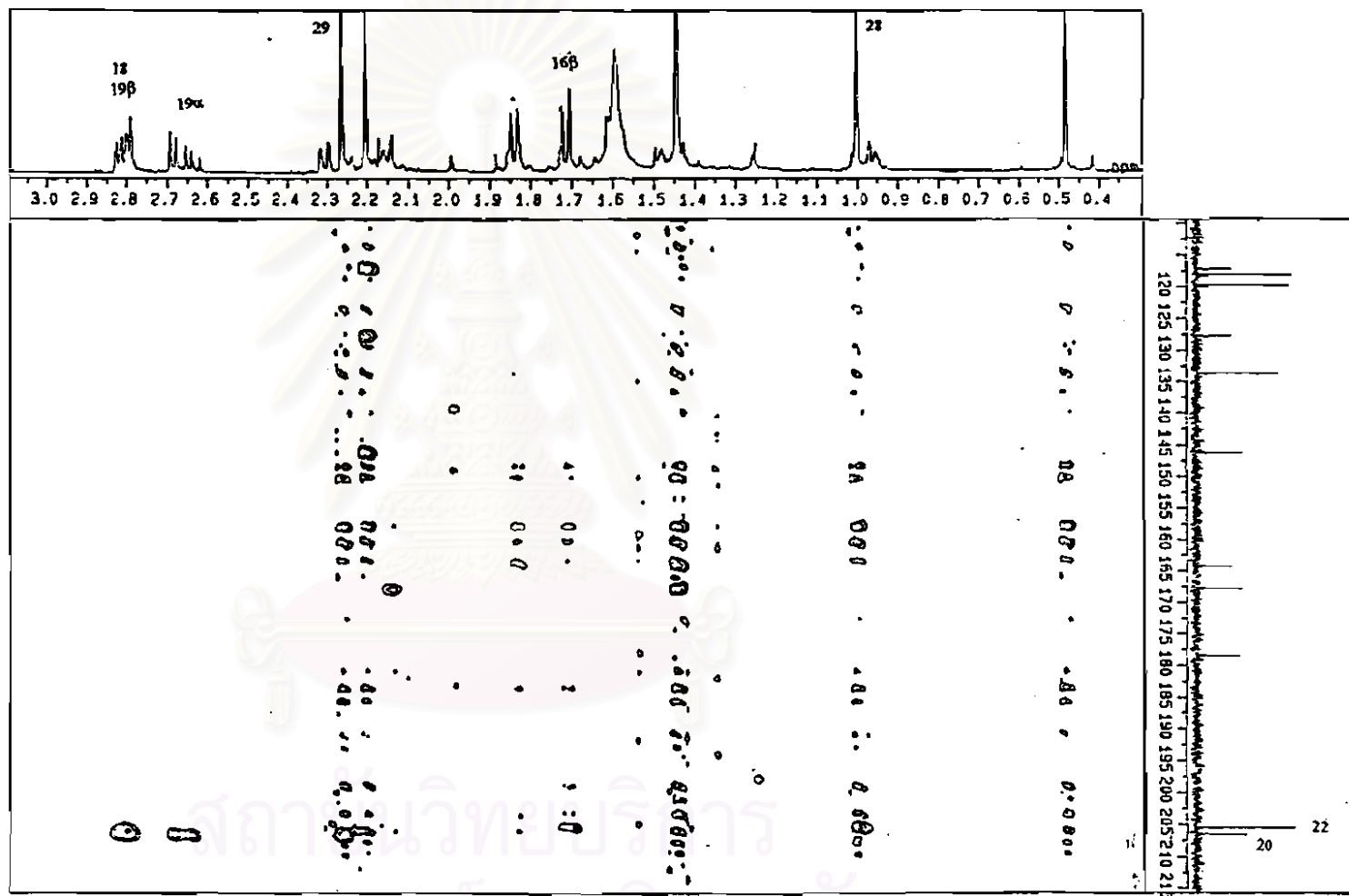
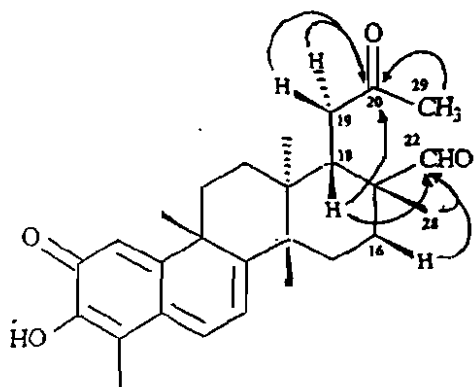


Figure 57. (c) Expanded HMBC spectrum of GS-Y0-2 (52) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 3.1-0.3 ppm and $\delta^{13}\text{C}$ 215-110 ppm.

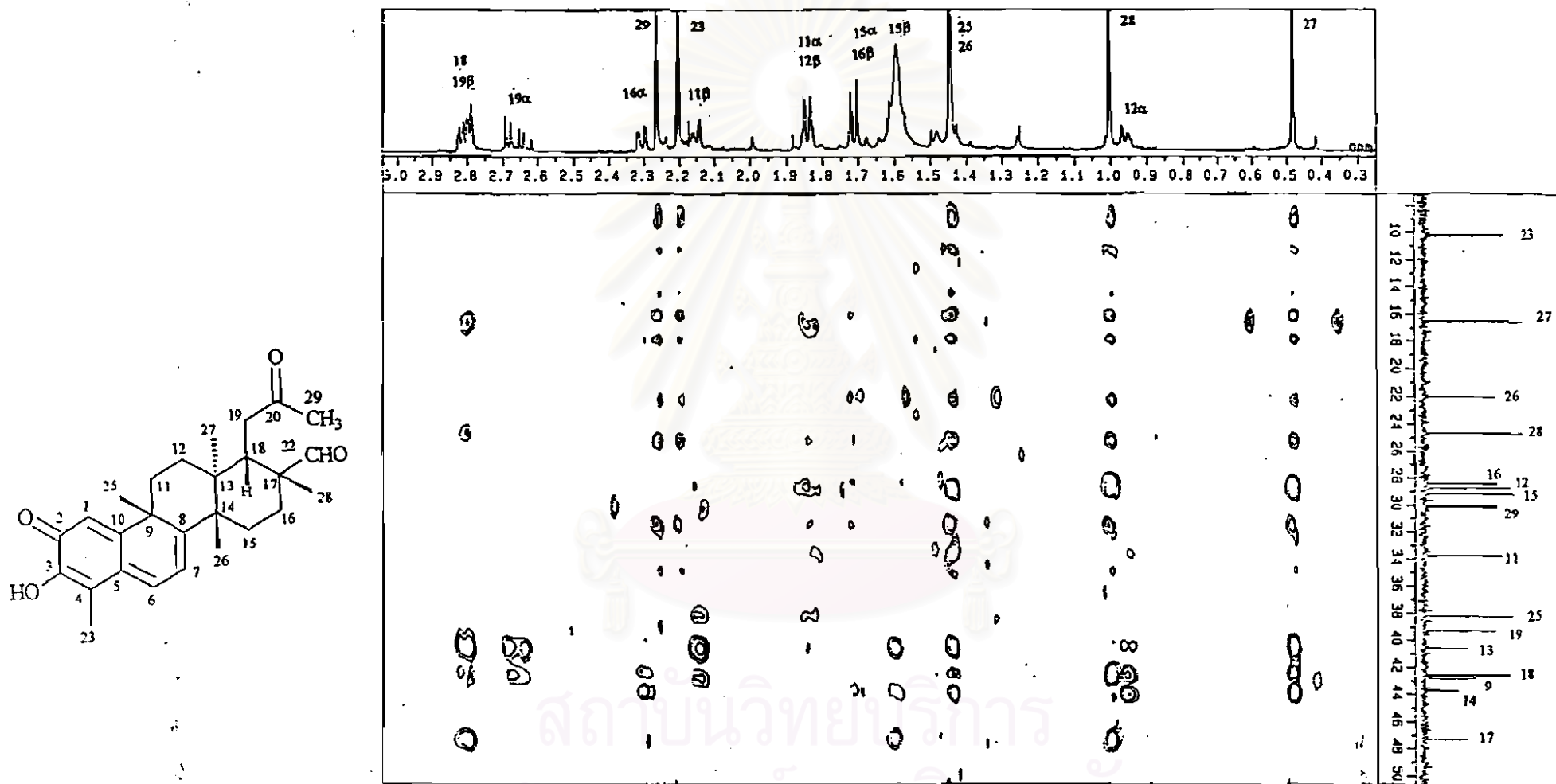


Figure 57. (d) Expanded HMBC spectrum of GS-Y0-2 (52) (in CDCl₃) in the ranges of $\delta^1\text{H}$ 3.1-0.3 ppm and $\delta^{13}\text{C}$ 50-5 ppm.

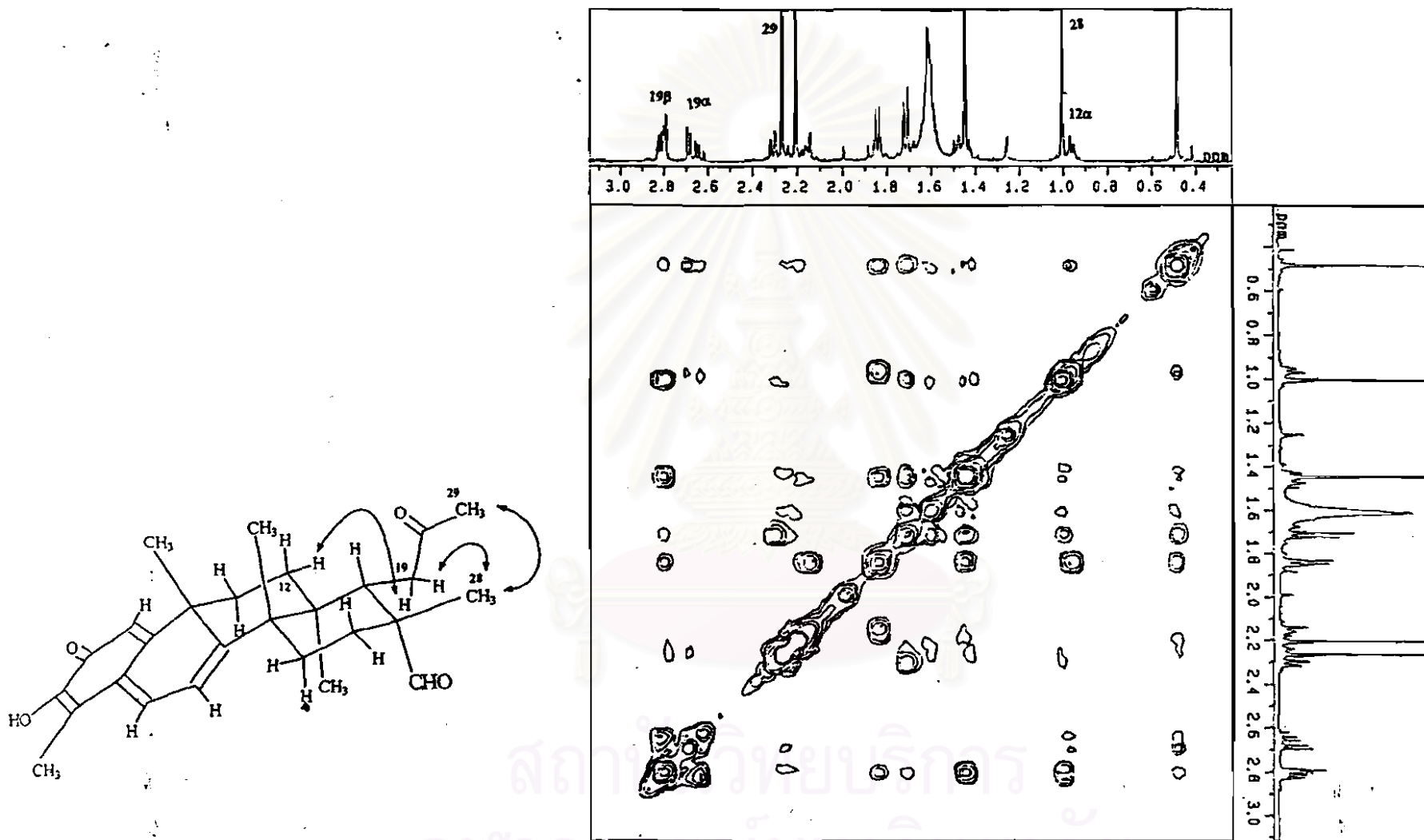


Figure 58. (a) Expanded NOESY spectrum of GS-Y0-2 (52) (in CDCl_3) in the range of δ 3.1-0.3 ppm.

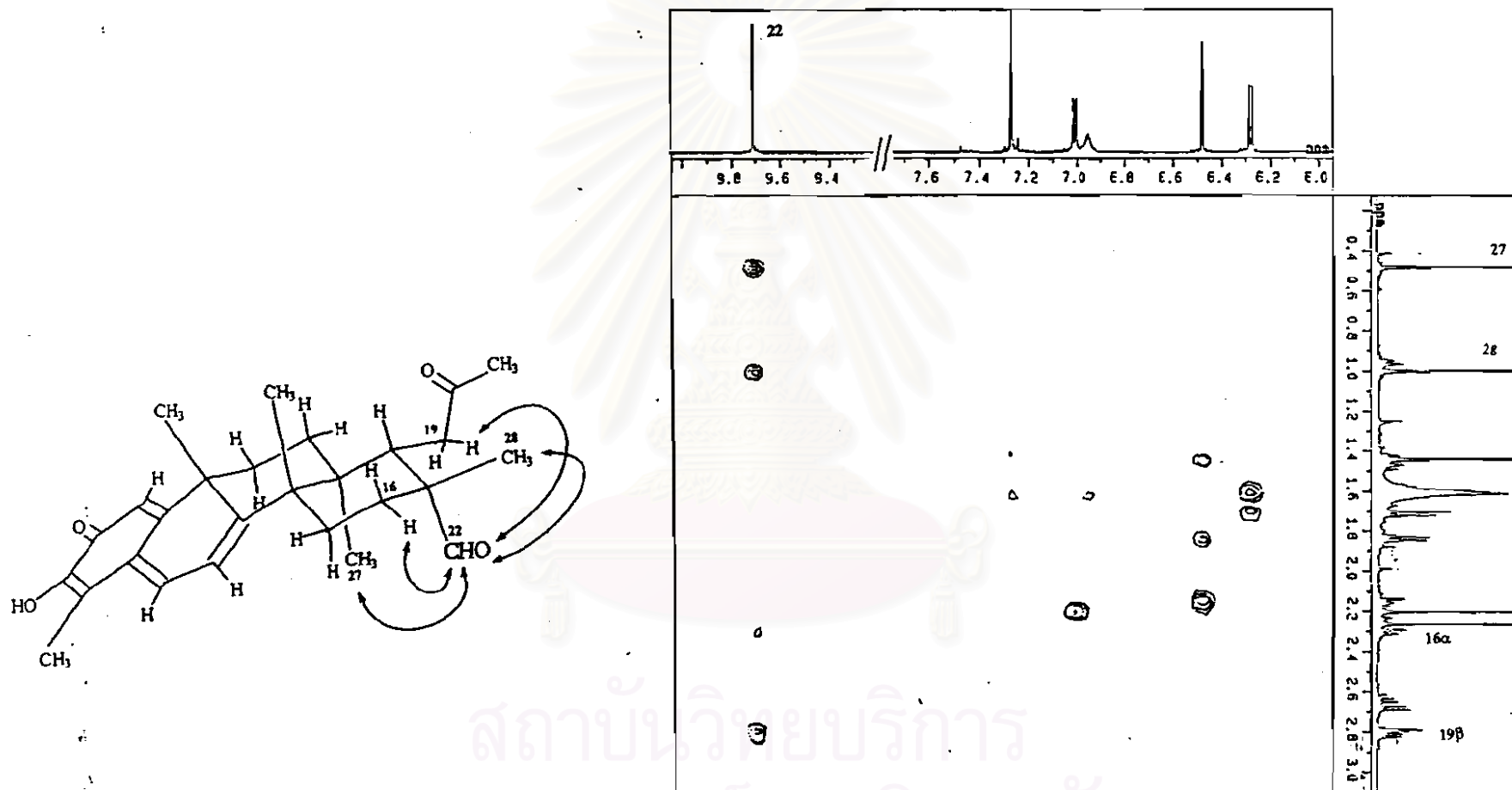


Figure 58. (b) Expanded NOESY spectrum of GS-Y0-2 (52) (in CDCl_3) between the ranges of δ 10.0-6.0 ppm and δ 3.1-0.3 ppm.

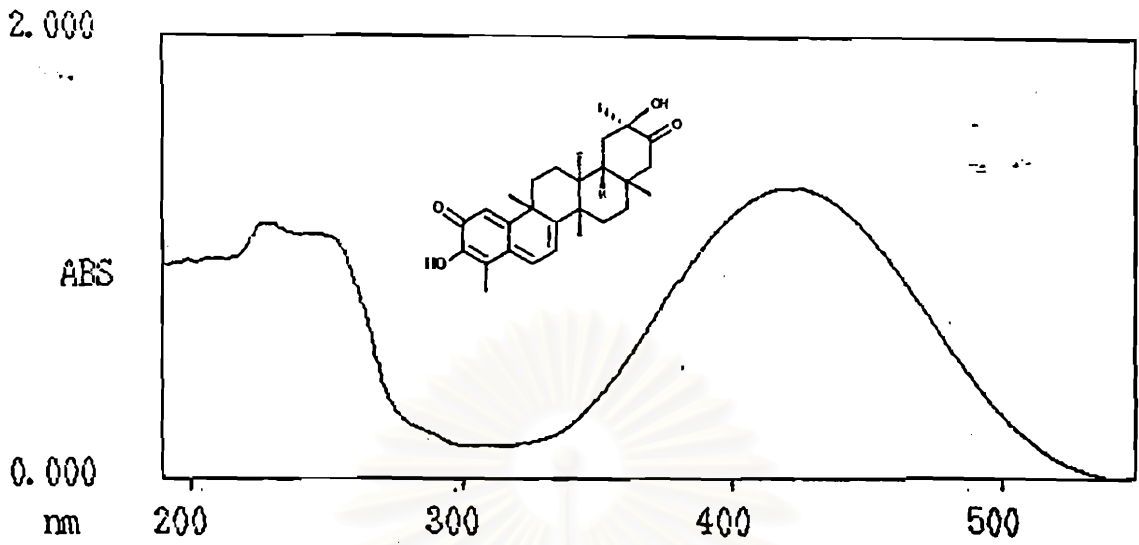


Figure 59. UV absorption spectrum of GS-Y1-1 (2) (in MeOH).

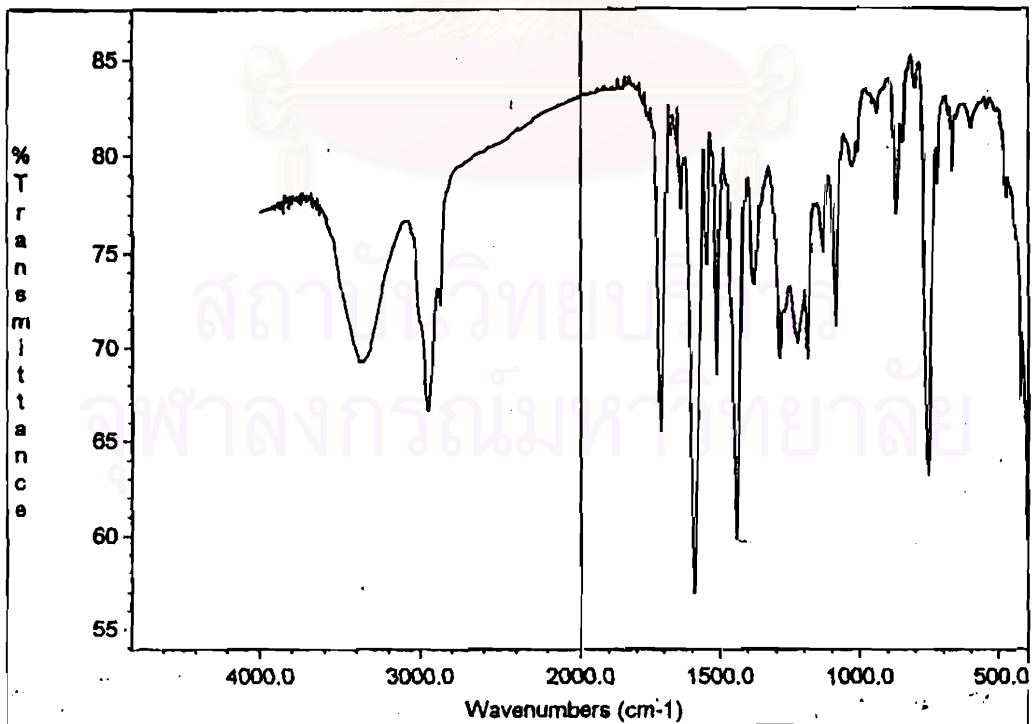


Figure 60. IR spectrum of GS-Y1-1 (2) (dry film).

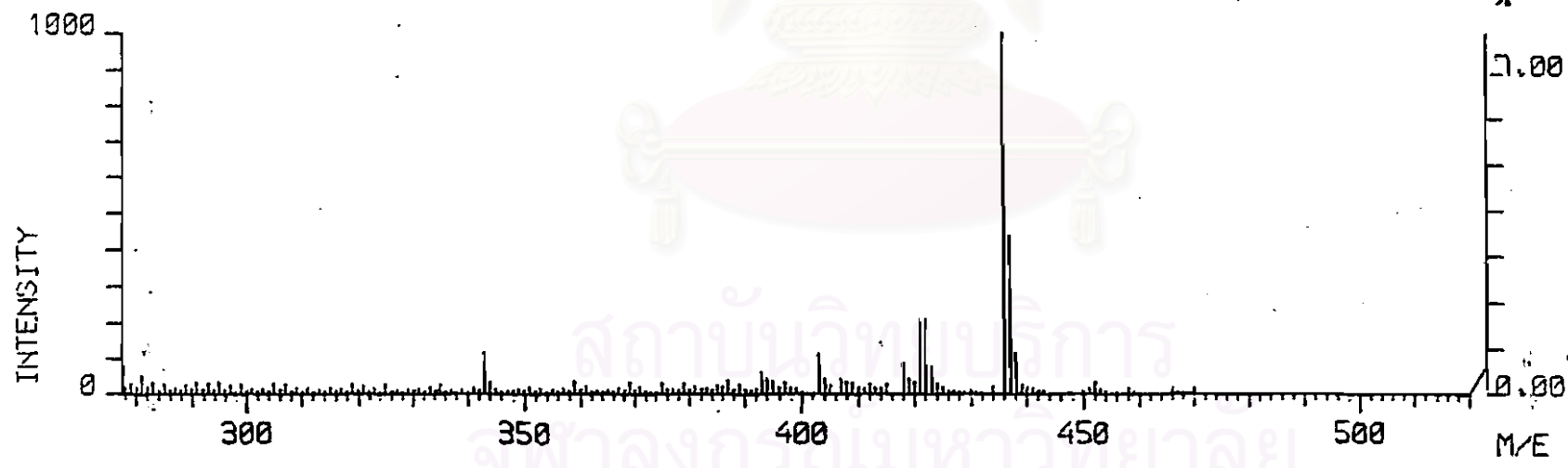
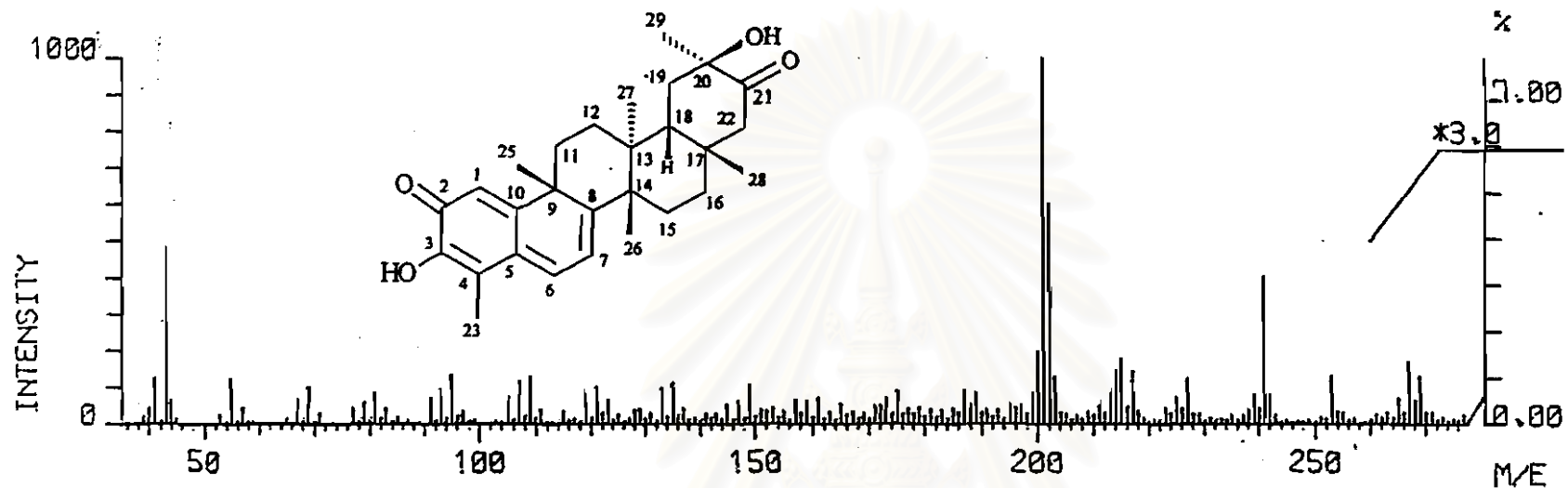


Figure 61. EIMS of GS-Y1-1 (2).

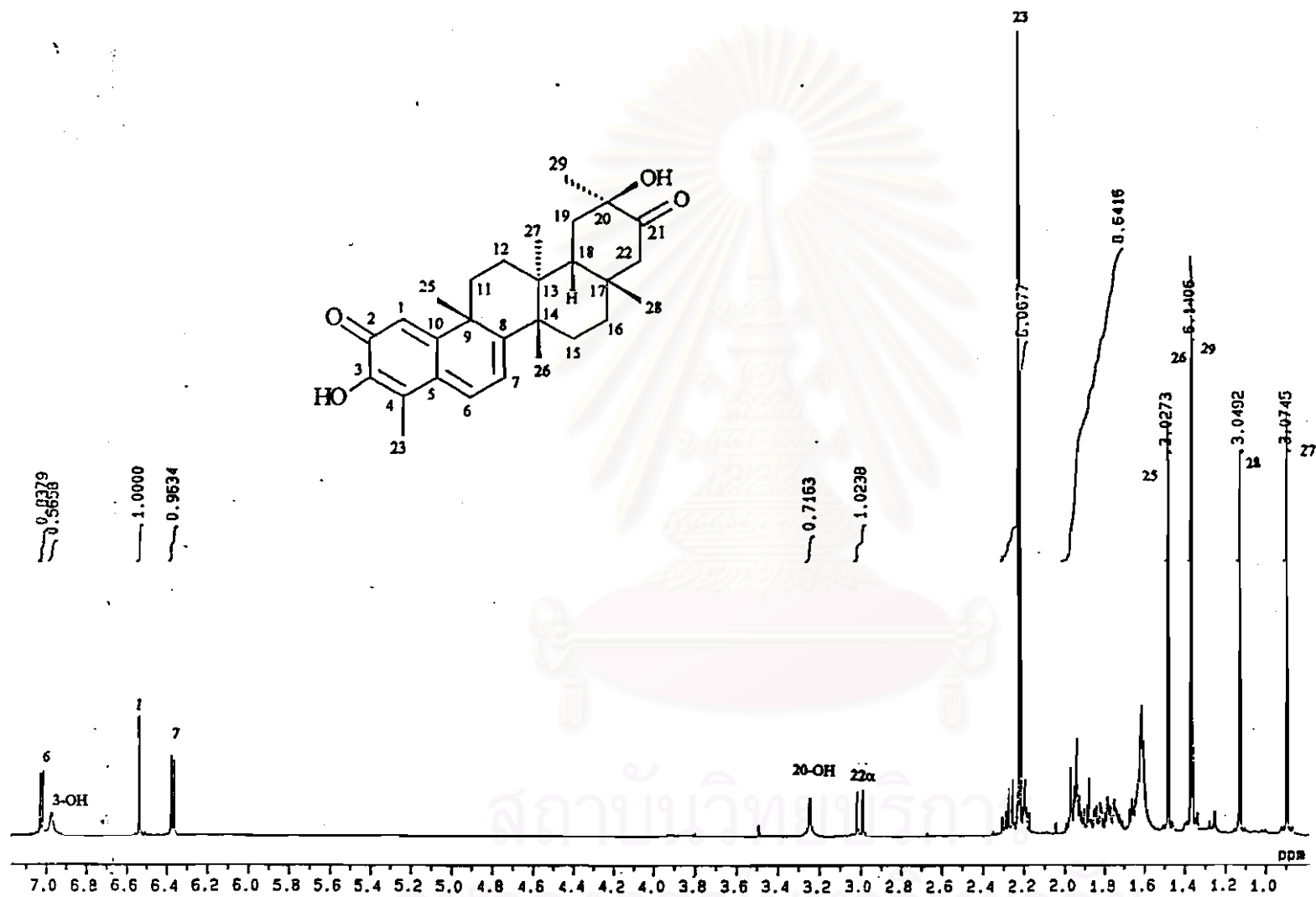


Figure 62. (a) ¹H NMR spectrum (500 MHz) of GS-Y1-1 (2) (in CDCl₃).

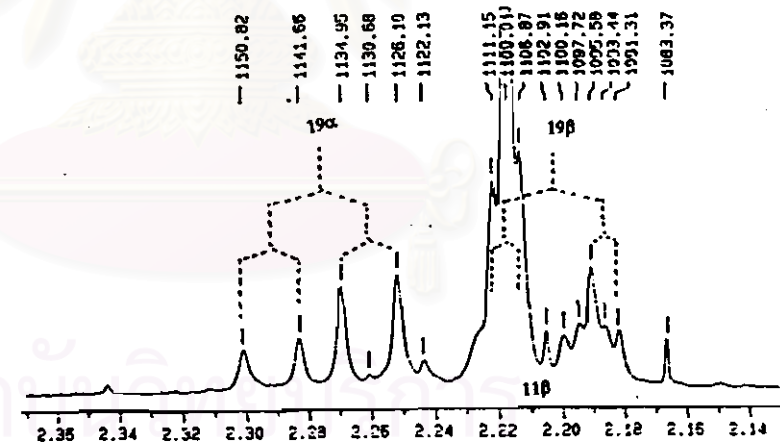
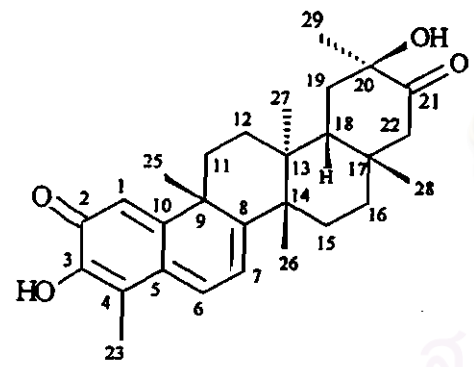
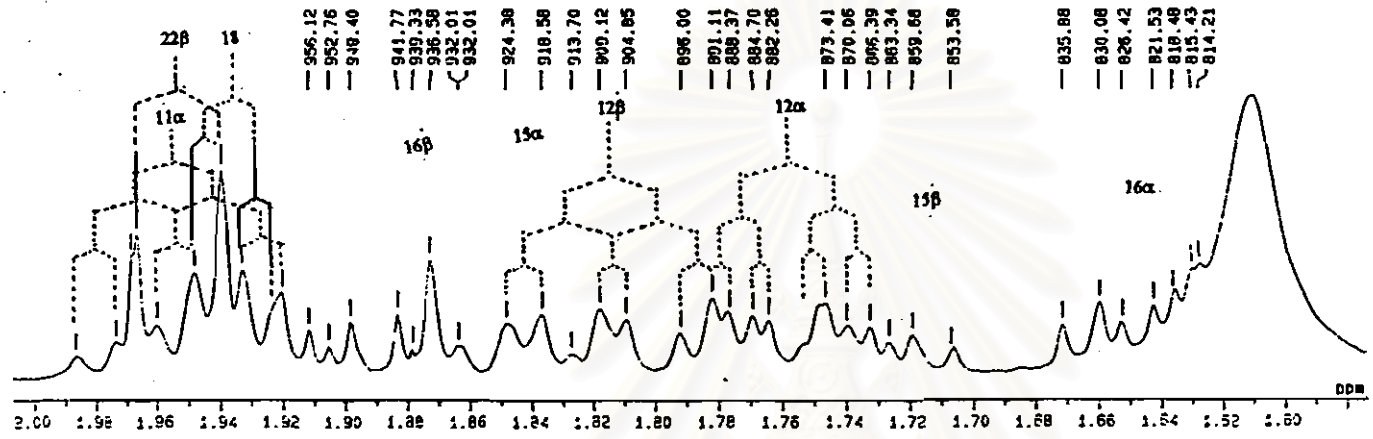


Figure 62. (b) Expanded ¹H NMR spectrum (500 MHz) of GS-Y1-1 (2) (in CDCl₃).

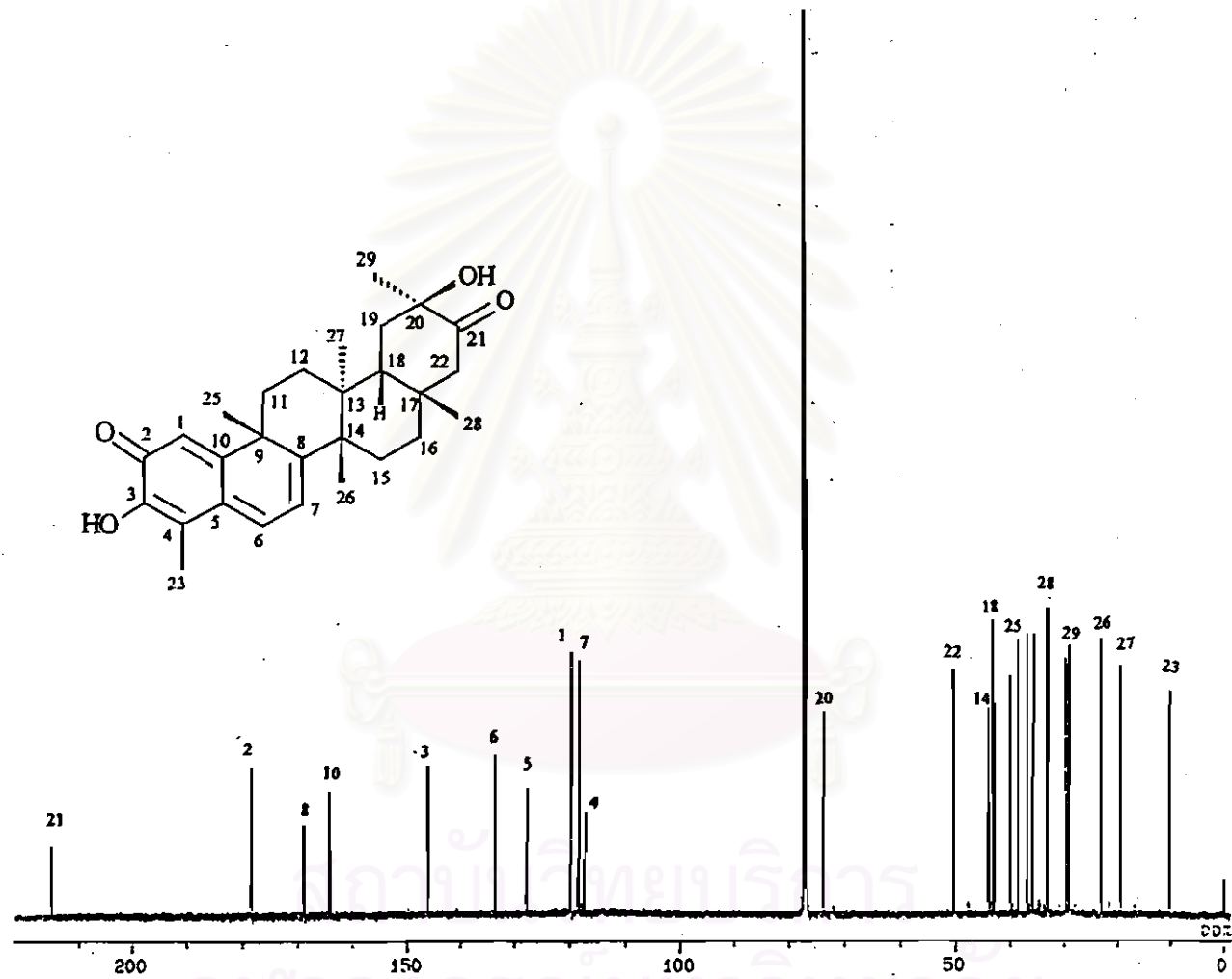


Figure 63. ^{13}C NMR spectrum (125 MHz) of GS-Y1-1 (2) (in CDCl_3).

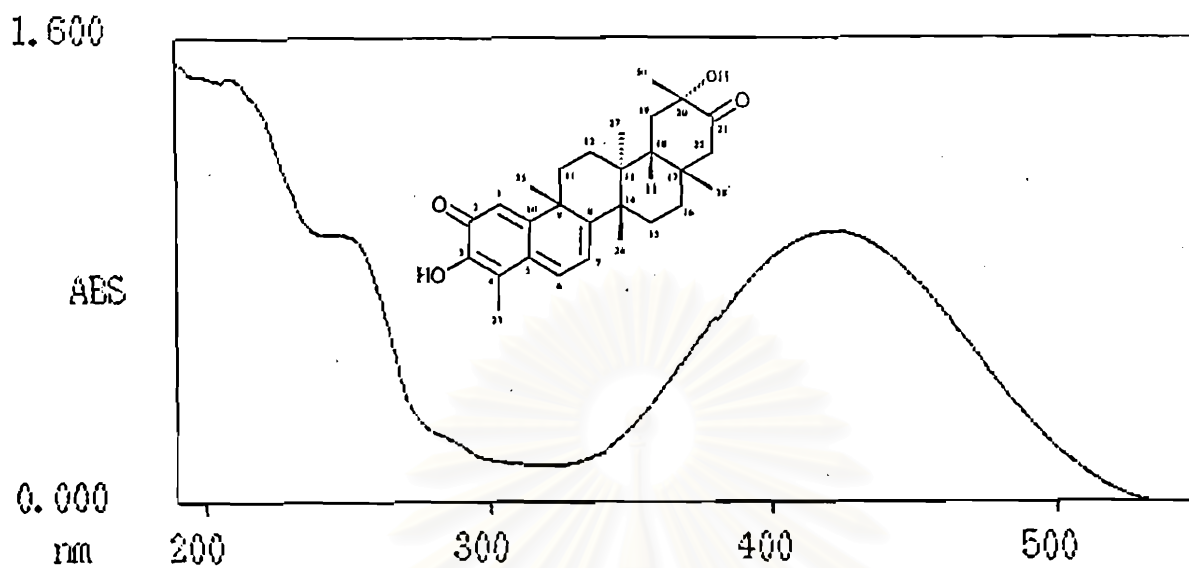


Figure 64. UV absorption spectrum of GS-Y1-2 (45) (in MeOH).

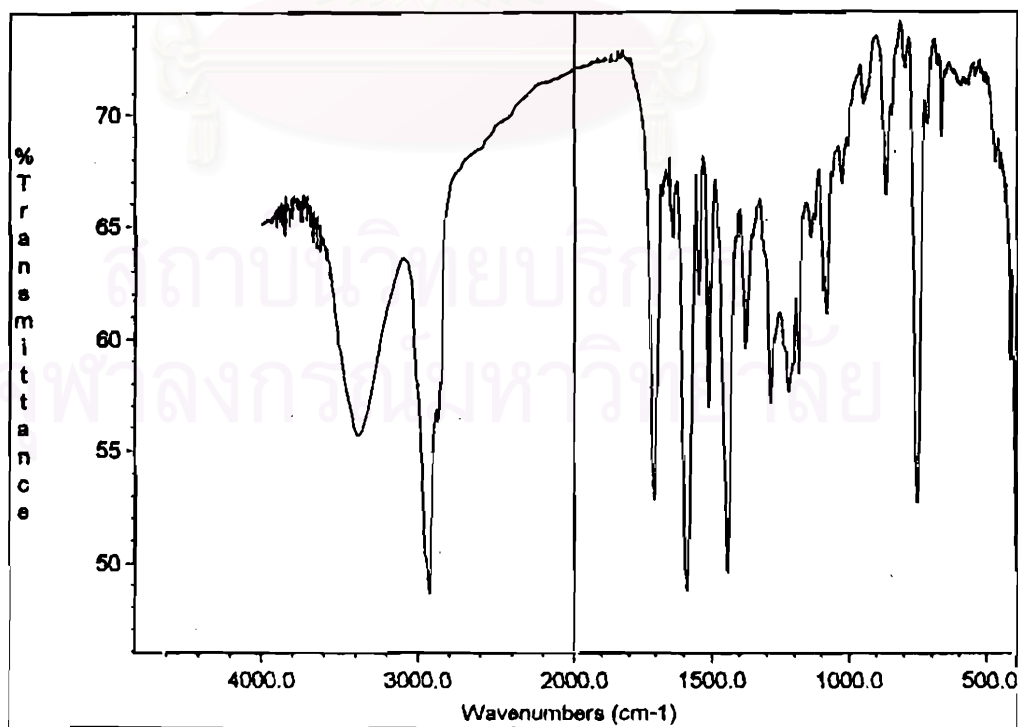


Figure 65. IR spectrum of GS-Y1-2 (45) (dry film).

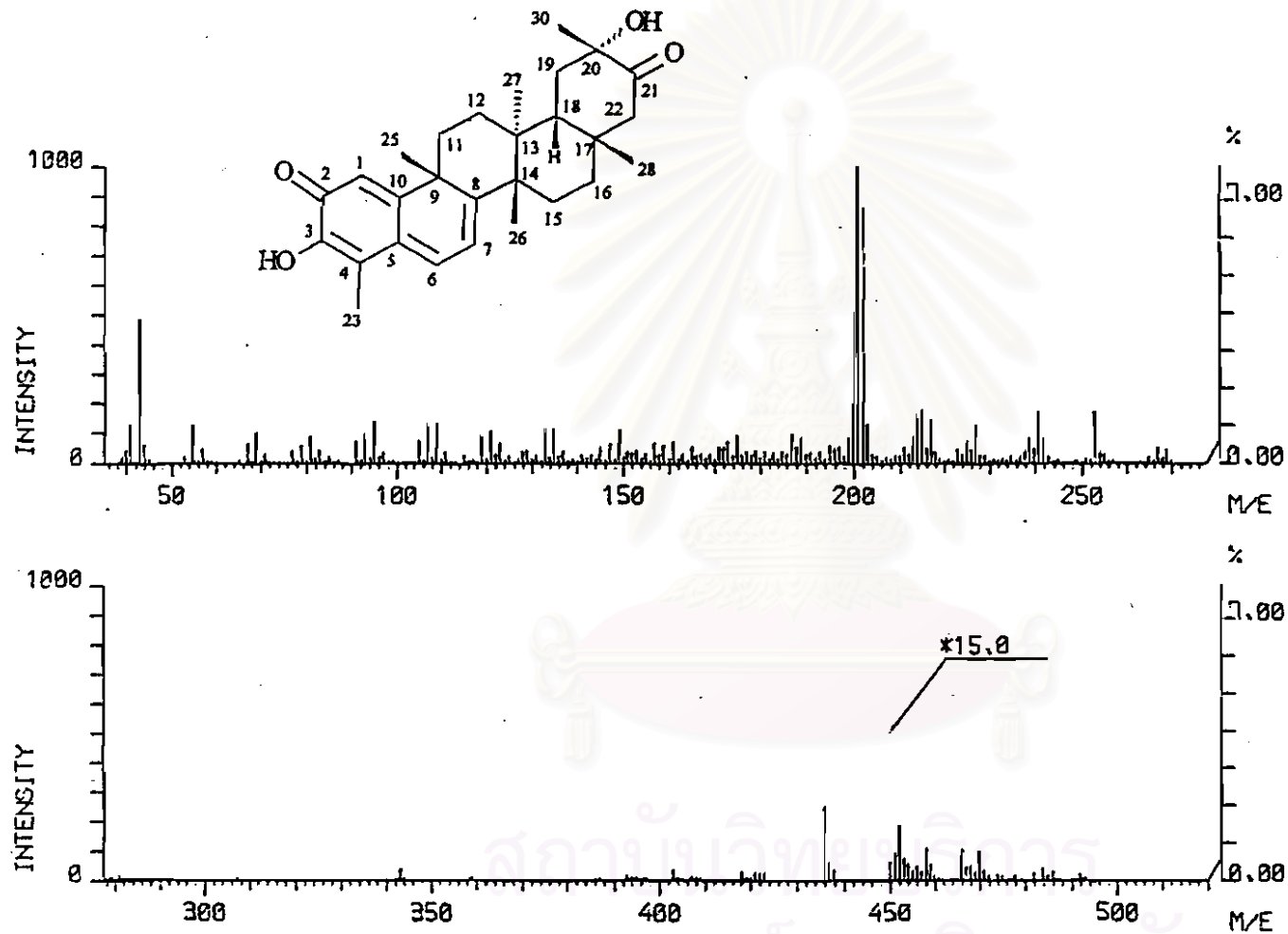


Figure 66. EIMS of GS-Y1-2 (45).

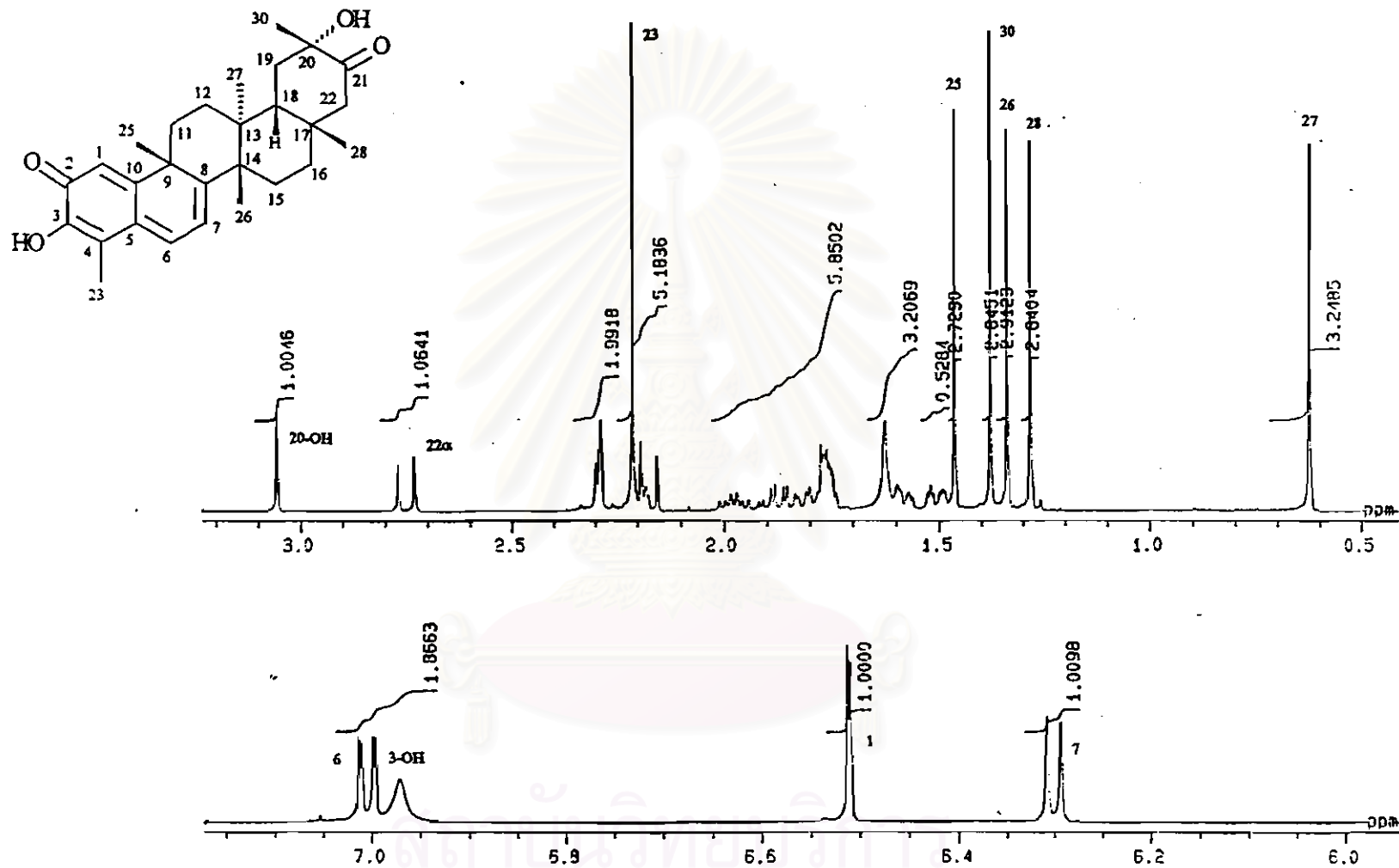


Figure 67. (a) ^1H NMR spectrum (500 MHz) of GS-Y1-2 (45) (in CDCl_3).

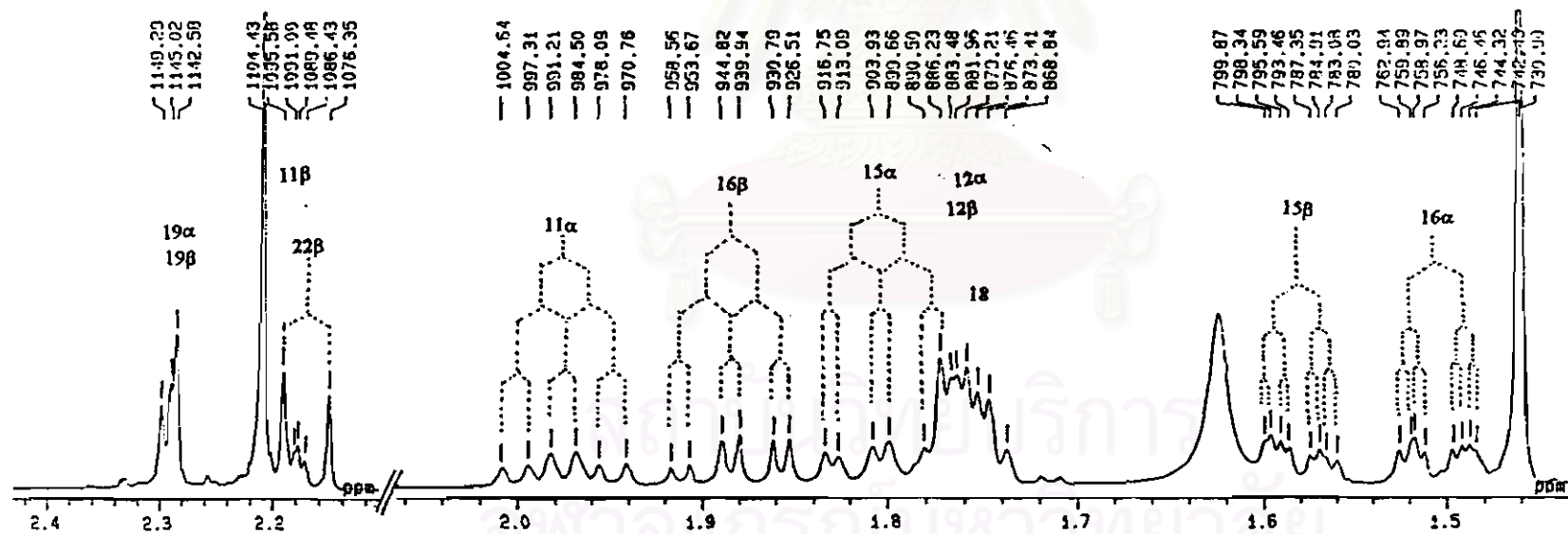
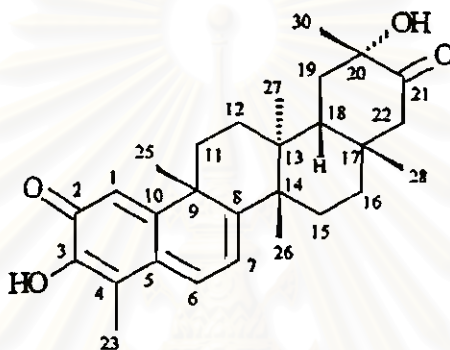


Figure 67. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-Y1-2 (45) (in CDCl_3) in the range of δ 2.42-1.46 ppm.

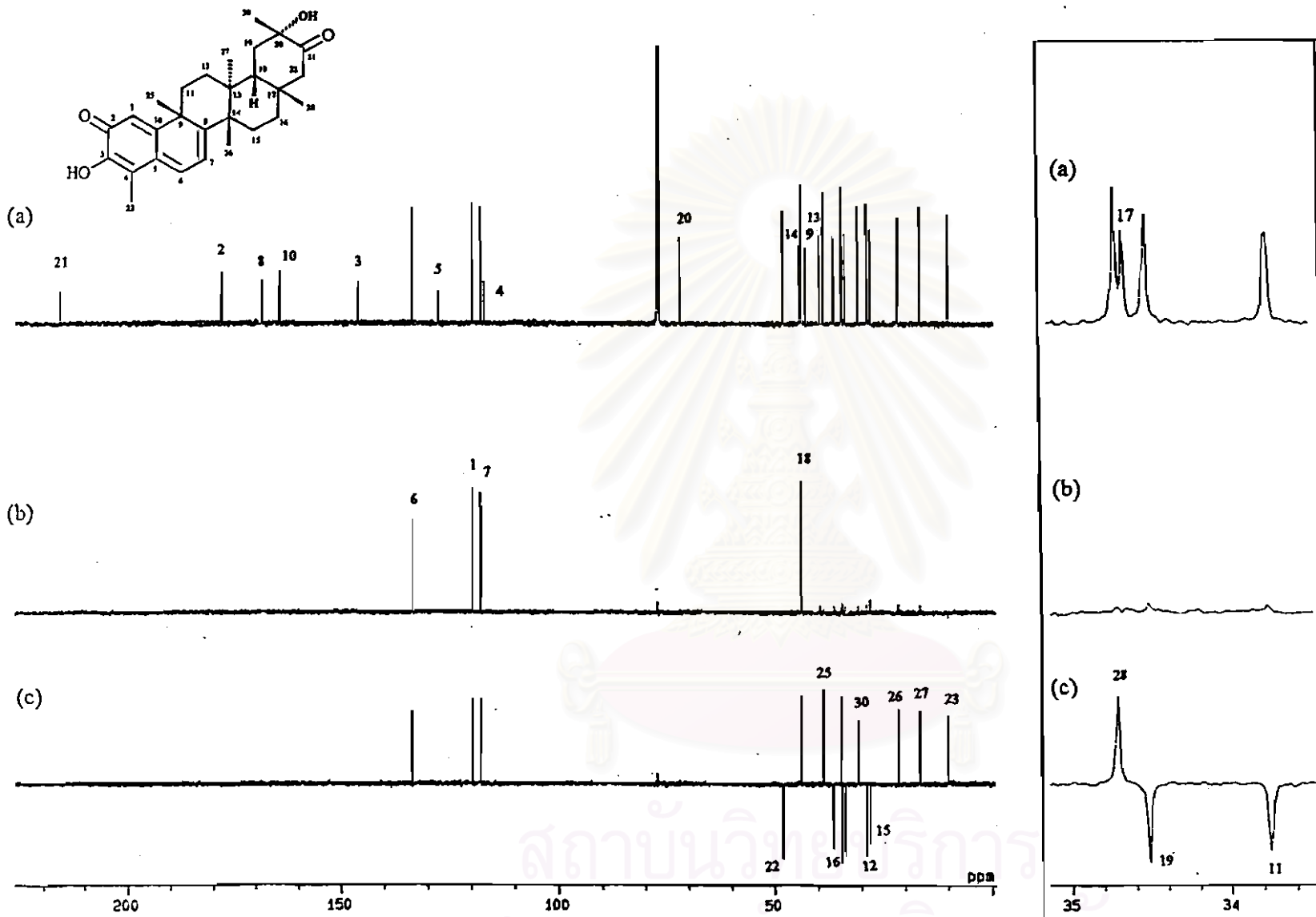


Figure 68. (a) ^{13}C NMR spectrum (125 MHz) of GS-Y1-2 (45) (in CDCl_3).
 (b) DEPT 90° spectrum.
 (c) DEPT 135° spectrum.

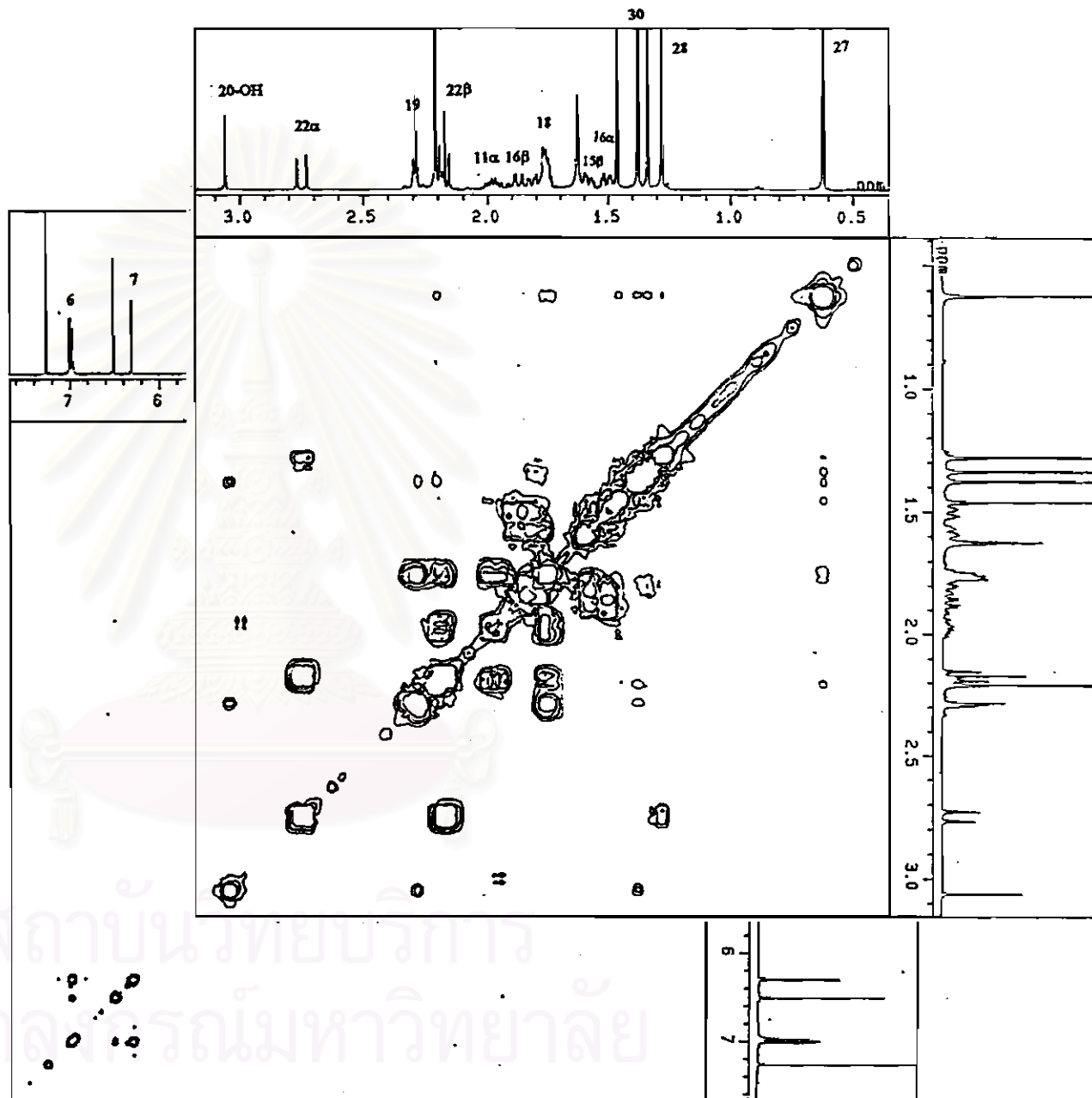
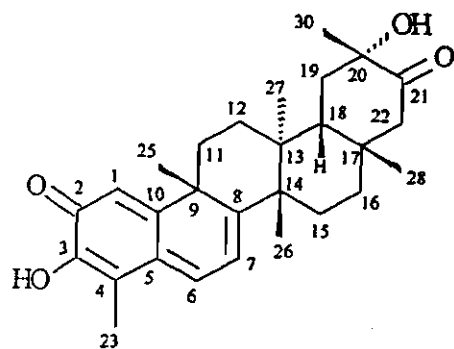


Figure 69. ^1H - ^1H COSY spectrum of GS-Y1-2 (45) (in CDCl_3).

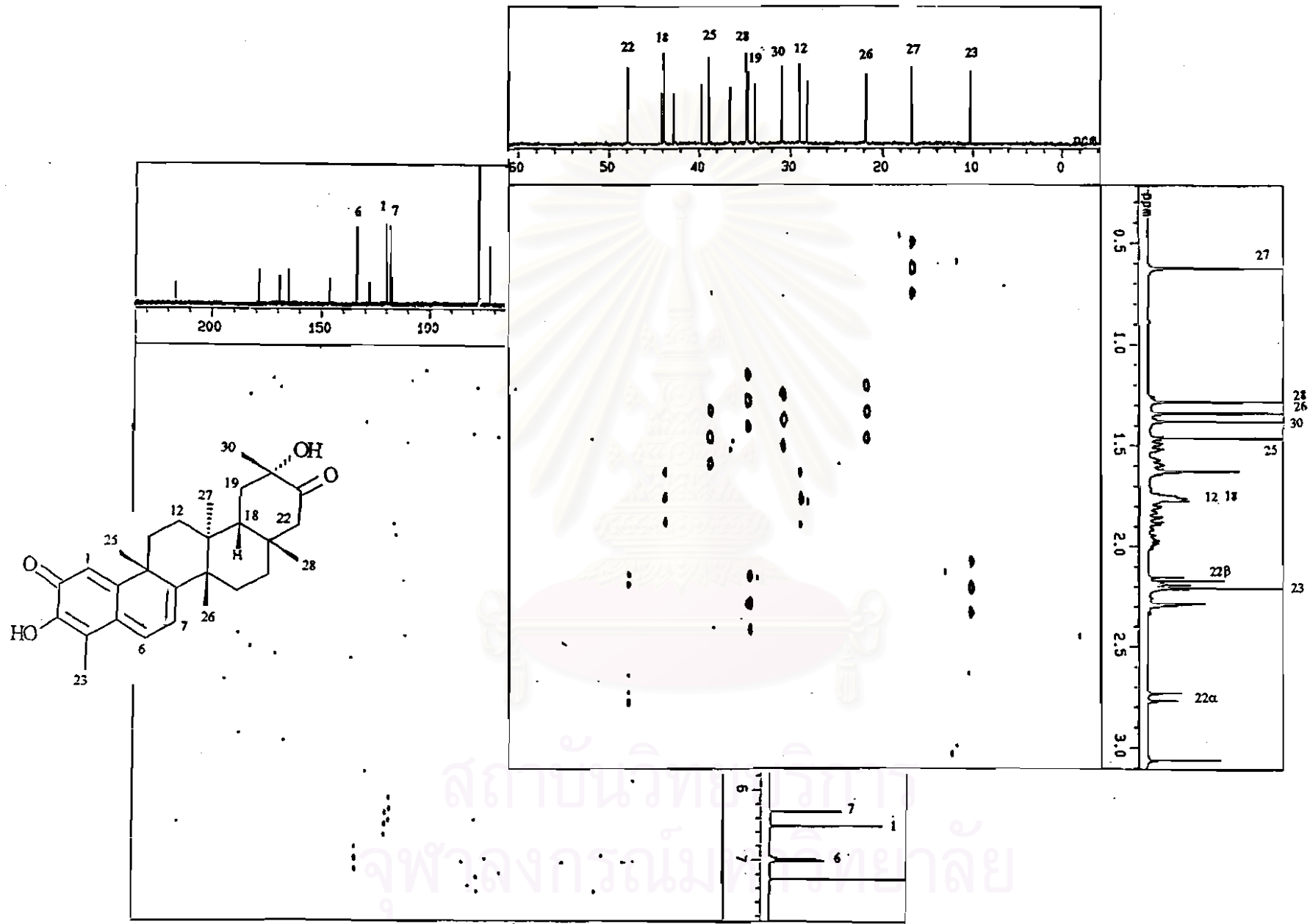


Figure 70. HMQC spectrum of GS-Y1-2 (45) (in CDCl₃).

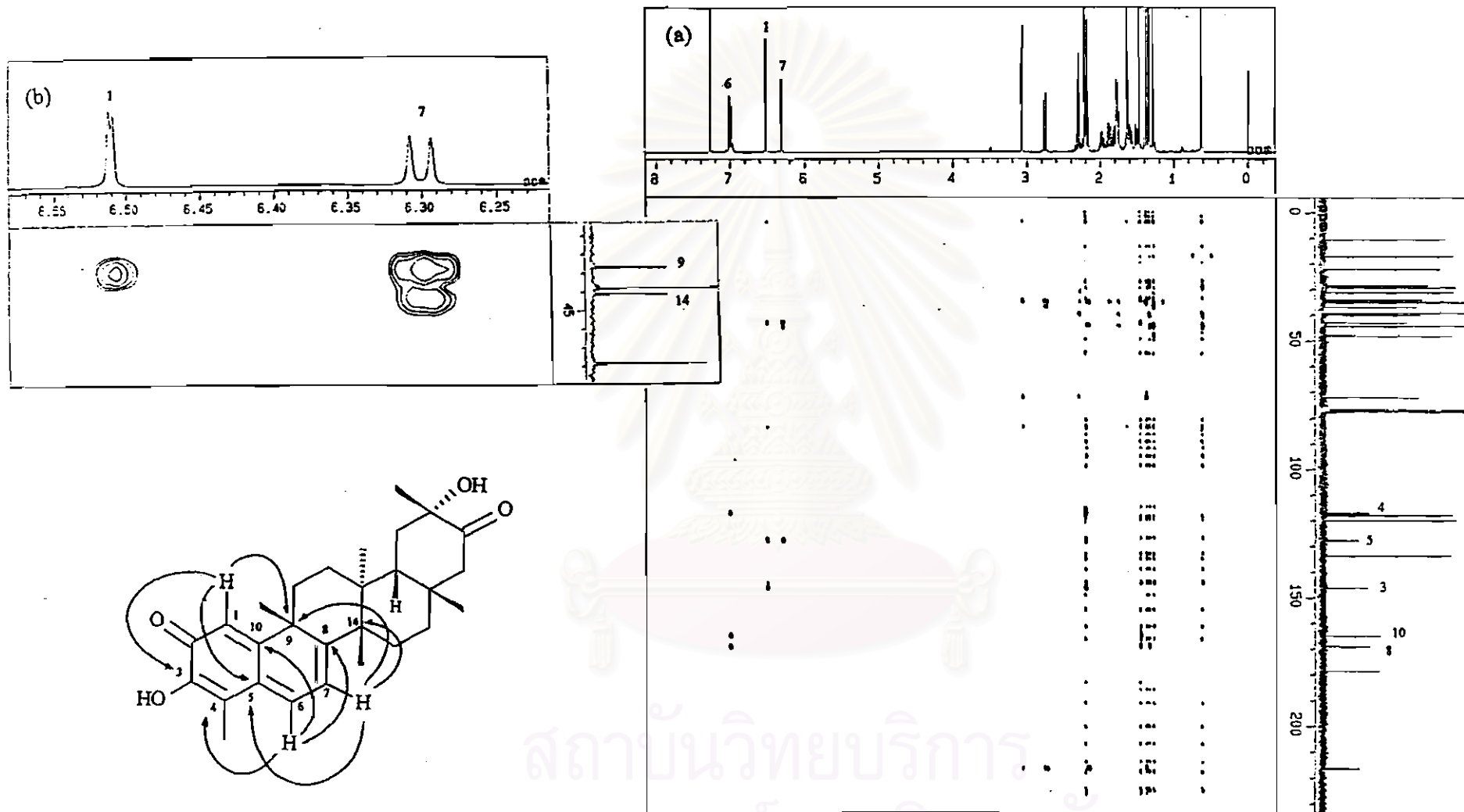
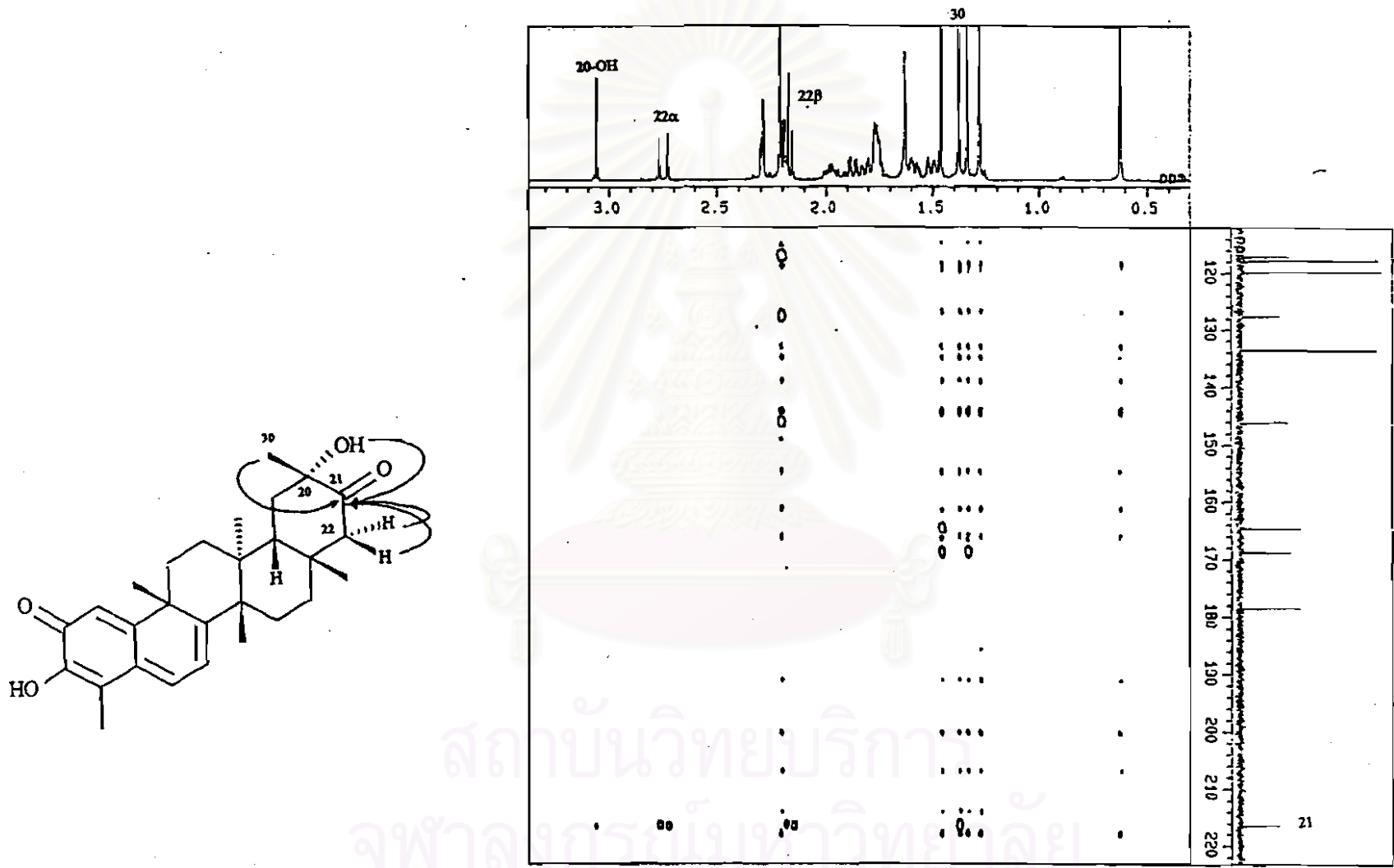


Figure 71. (a) HMBC spectrum of GS-Y1-2 (45) (in CDCl₃)

(b) Expanded HMBC spectrum of GS-Y1-2 (45) (in CDCl₃) in the ranges of δ ¹H 6.58-6.22 ppm and δ ¹³C 50-40 ppm.



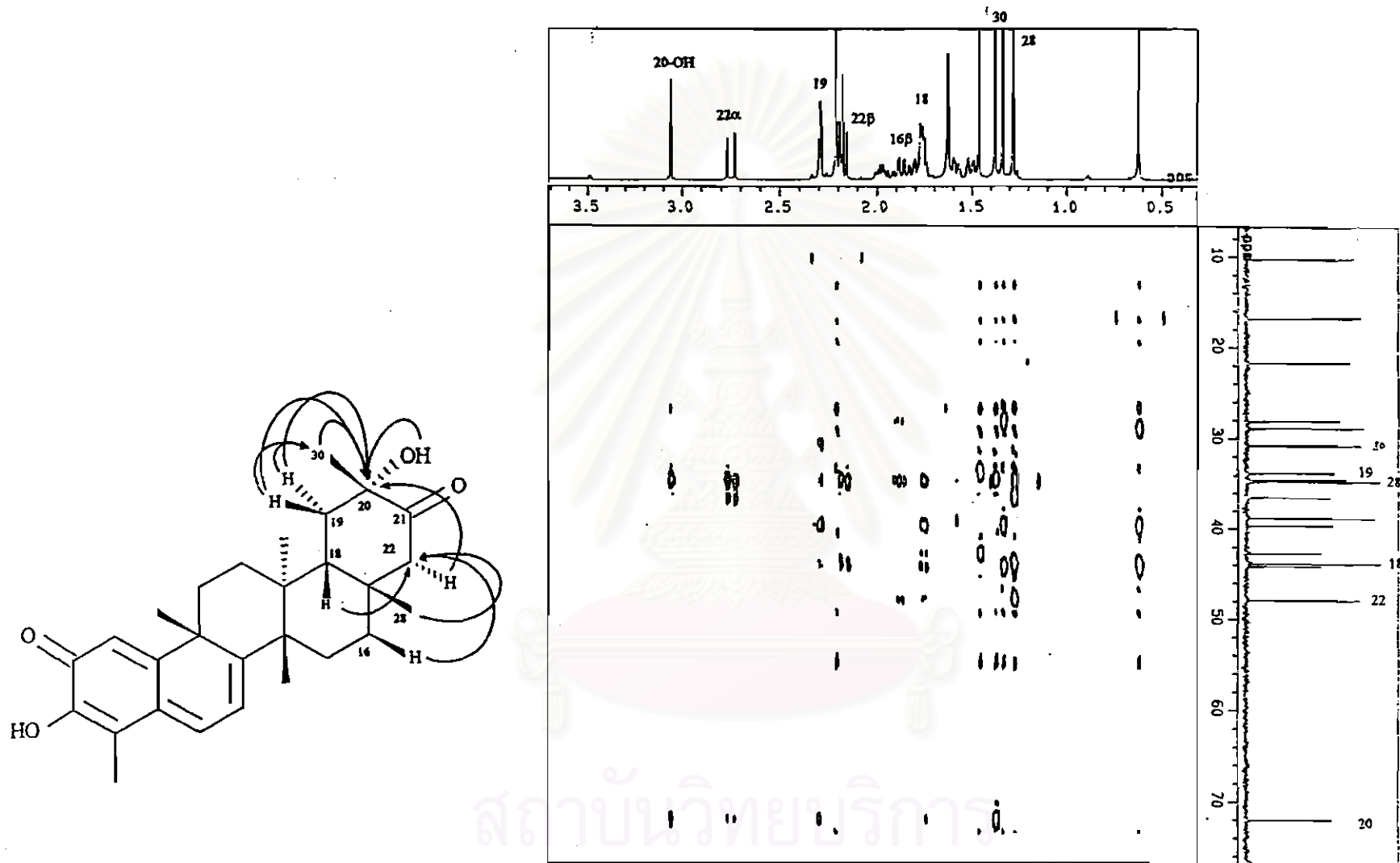


Figure 71. (d) Expanded HMBC spectrum of GS-Y1-2 (45) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 3.7-0.3 ppm and $\delta^{13}\text{C}$ 78-6 ppm.

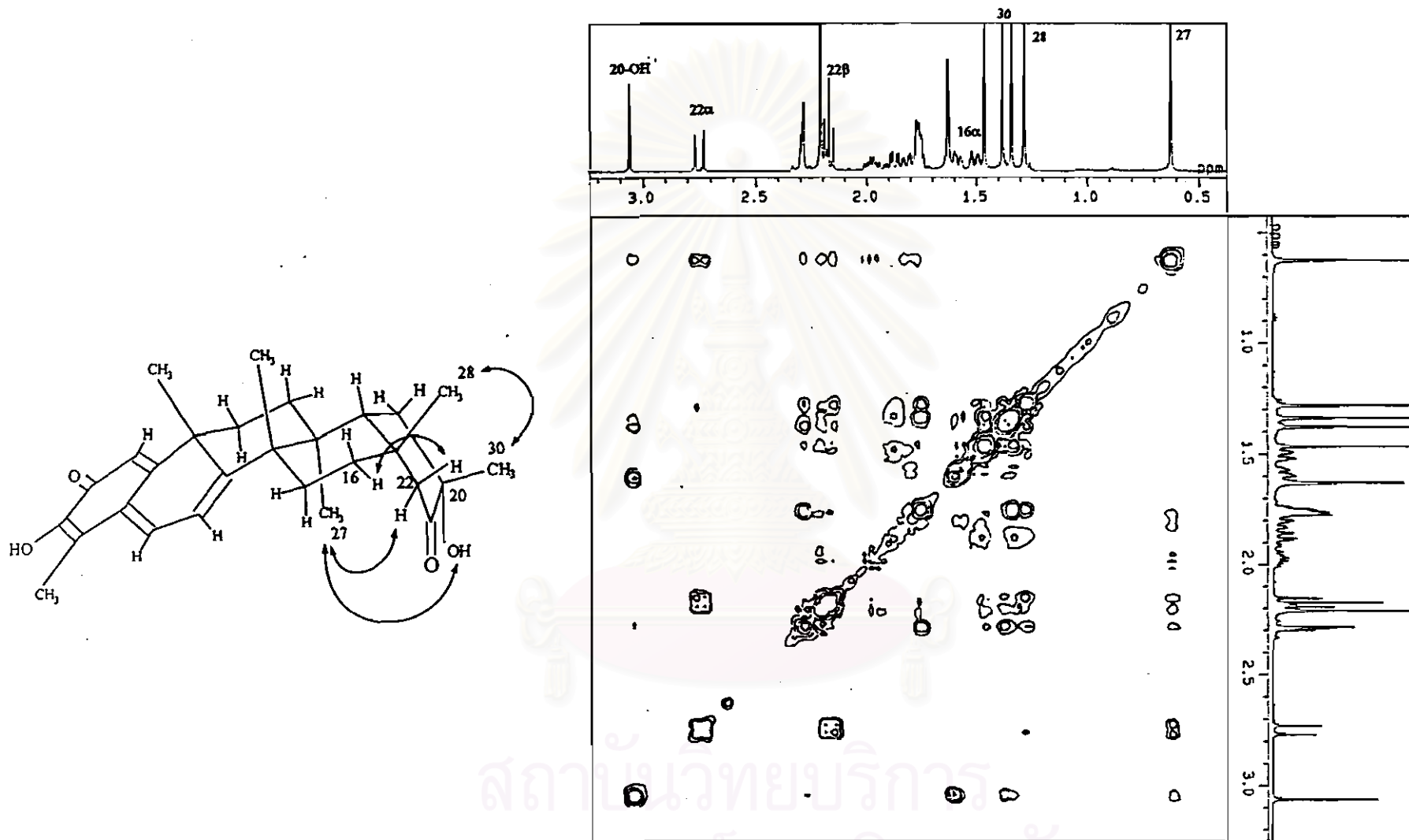
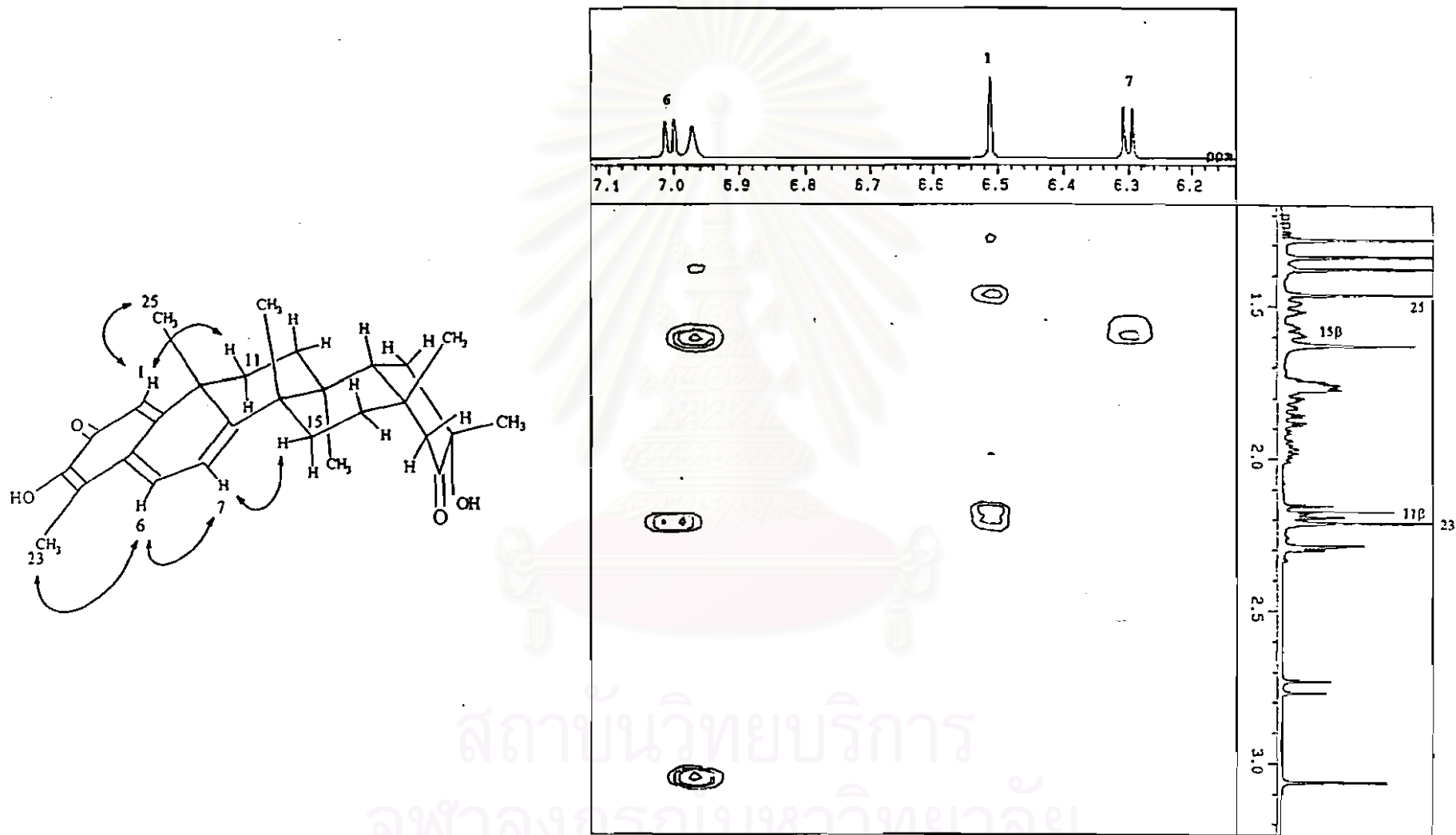


Figure 72. (a) Expanded NOESY spectrum of GS-Y1-2 (45) (in CDCl_3) in the range of δ 3.3-0.4 ppm.



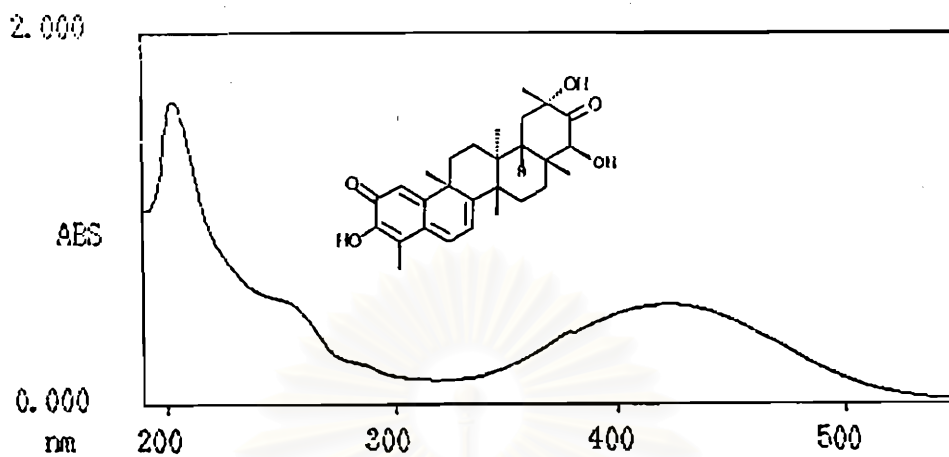


Figure 73. UV absorption spectrum of GS-Y2-1 (46) (in MeOH).

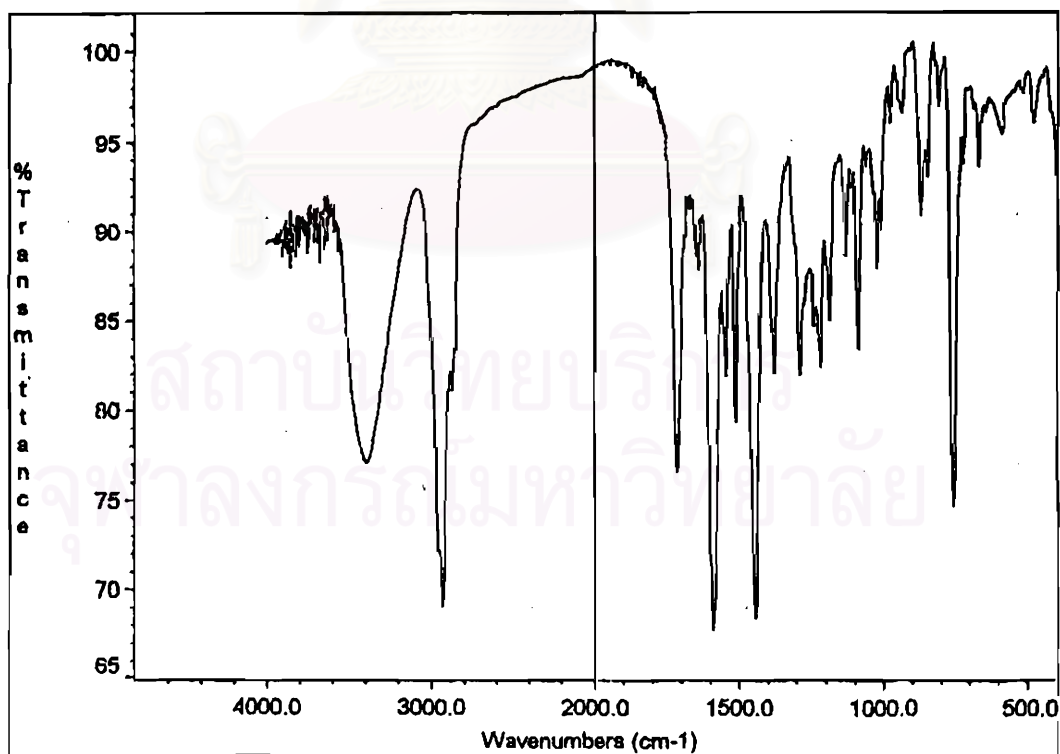


Figure 74. IR spectrum of GS-Y2-1 (46) (dry film).

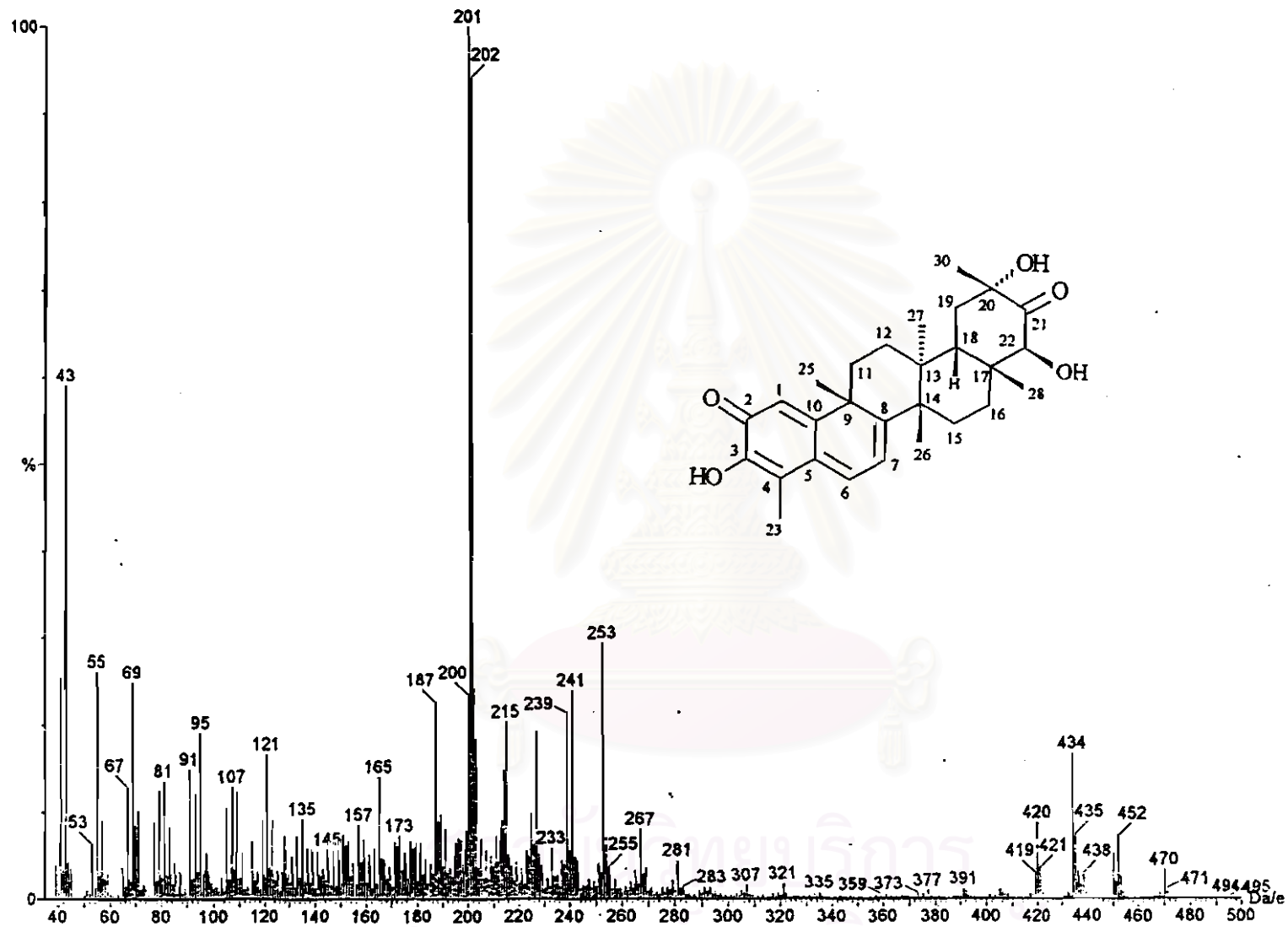


Figure 75. EIMS of GS-Y2-1 (46).

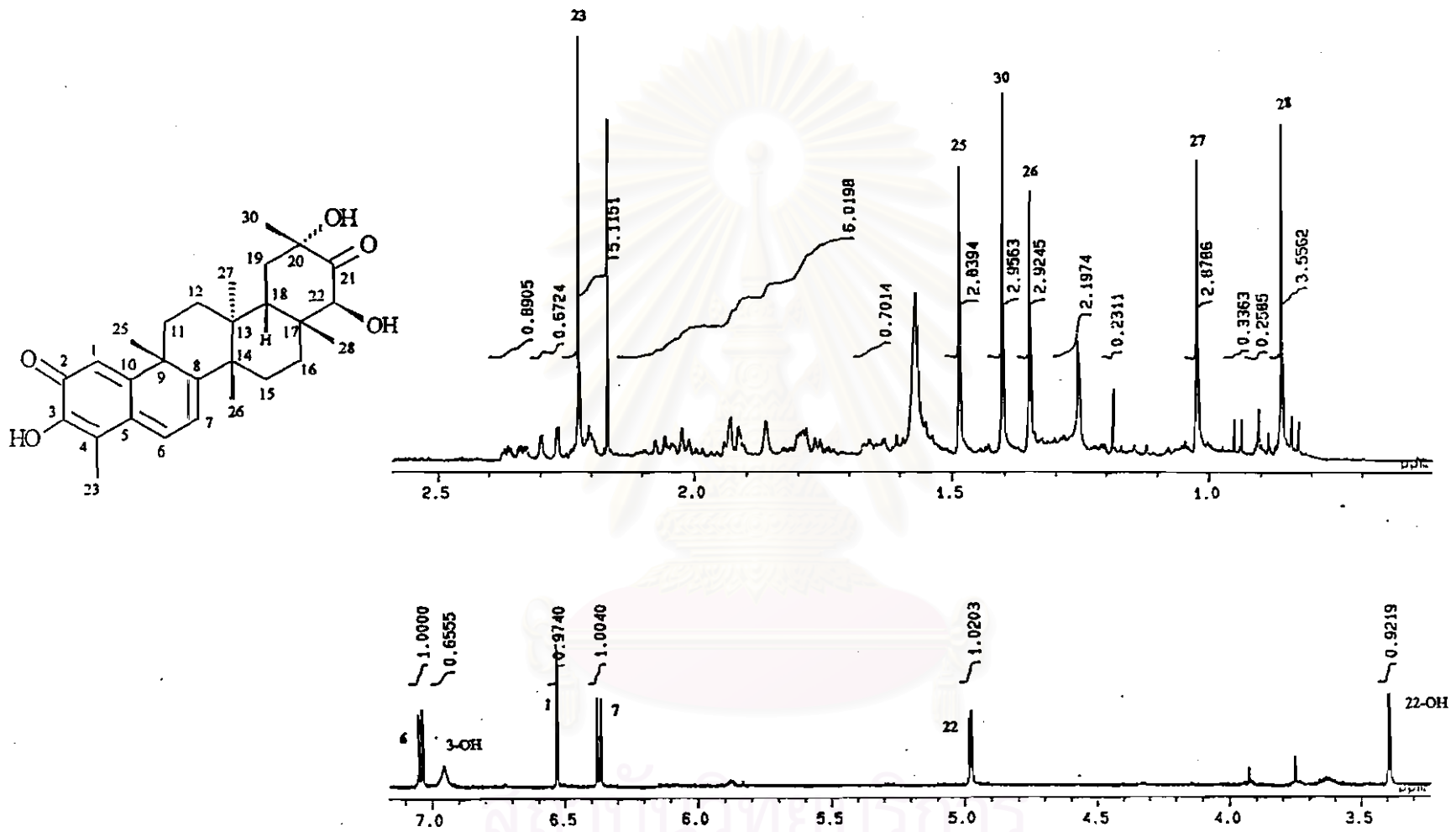


Figure 76. (a) ^1H NMR spectrum (500 MHz) of GS-Y2-1 (46) (in CDCl_3).

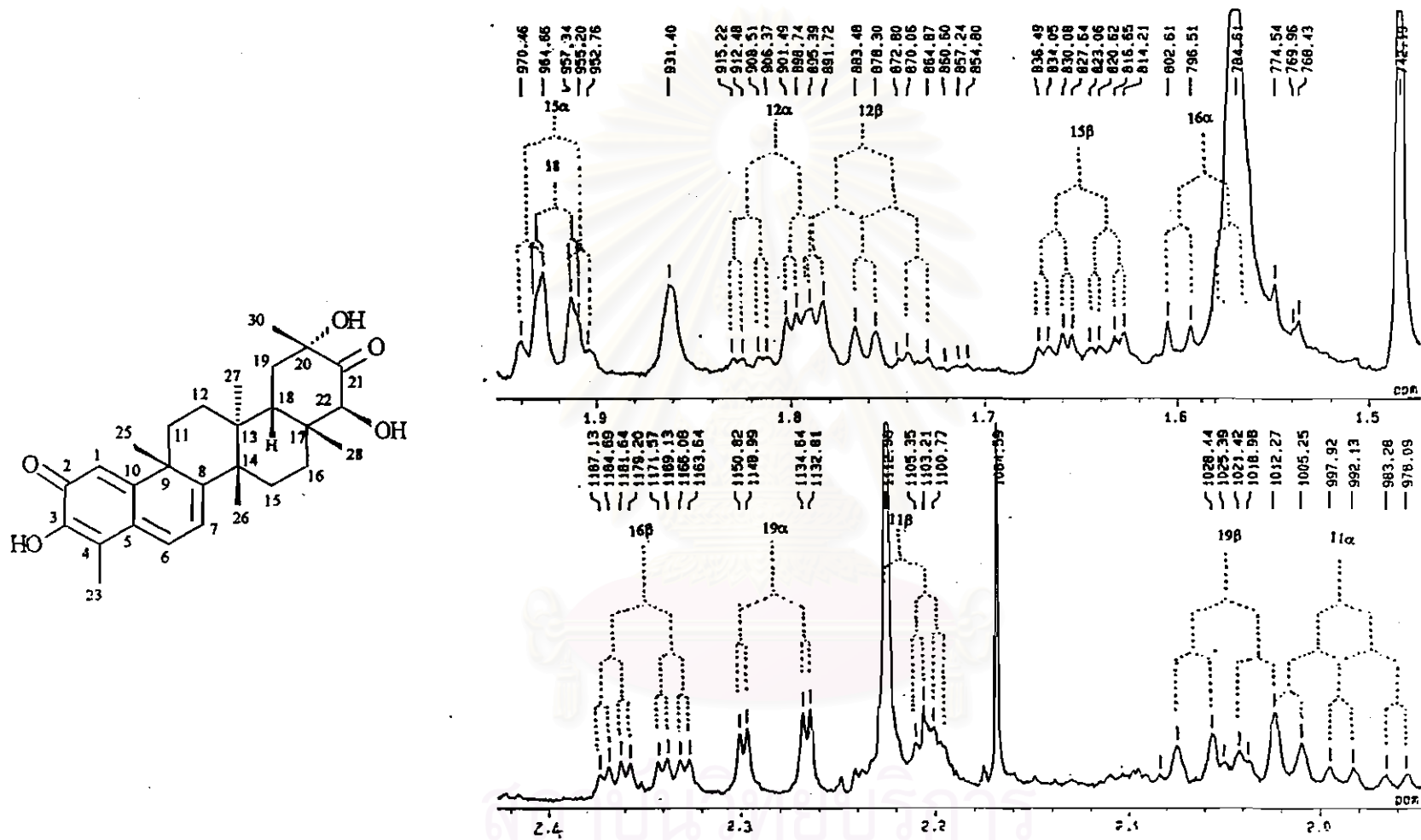


Figure 76. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-Y2-1 (46) (in CDCl_3) in the range of δ 2.45-1.46 ppm.

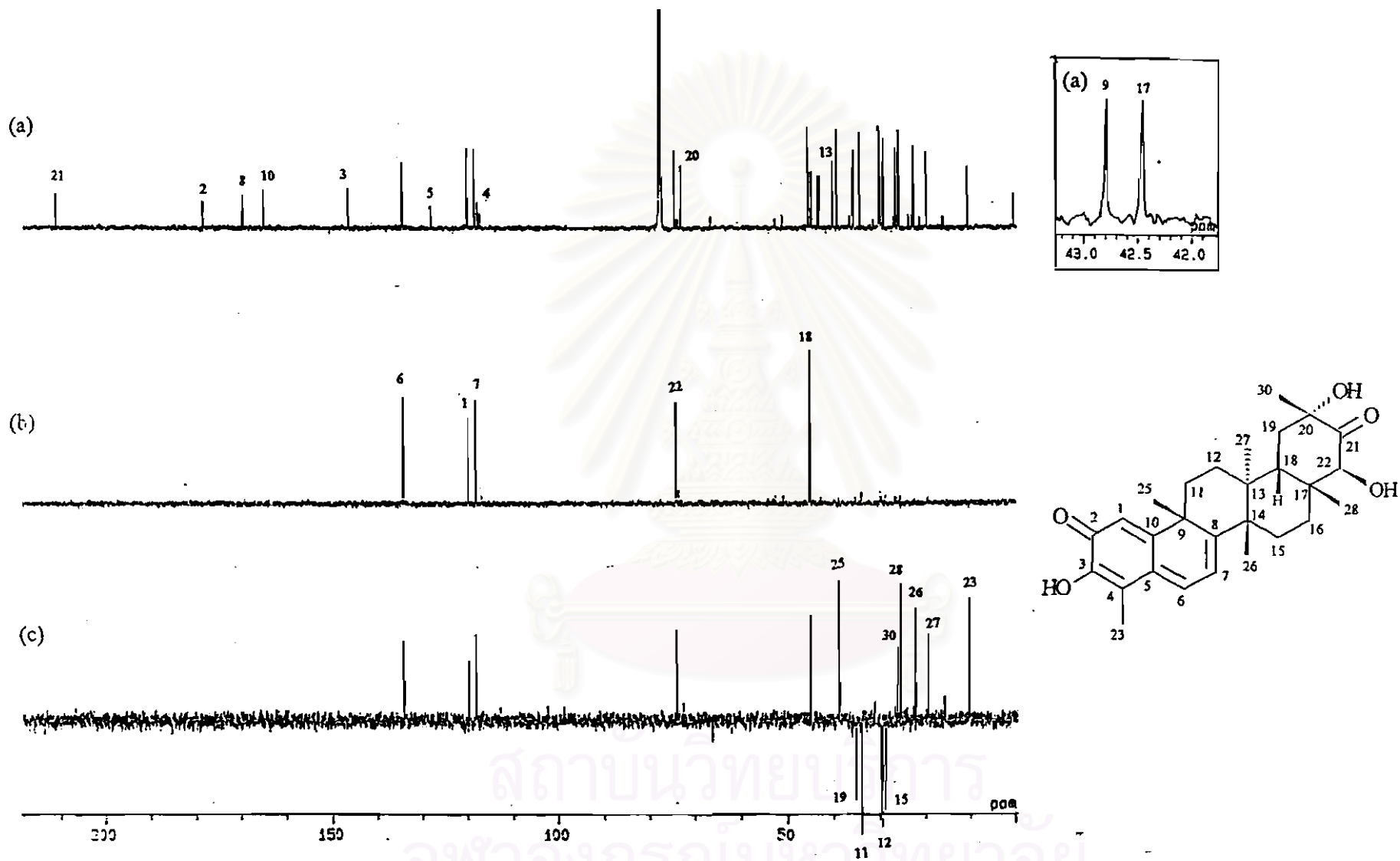


Figure 77. (a) ^{13}C NMR spectrum (125 MHz) of GS-Y2-1 (46) (in CDCl_3).
 (b) DEPT 90° spectrum.
 (c) DEPT 135° spectrum.

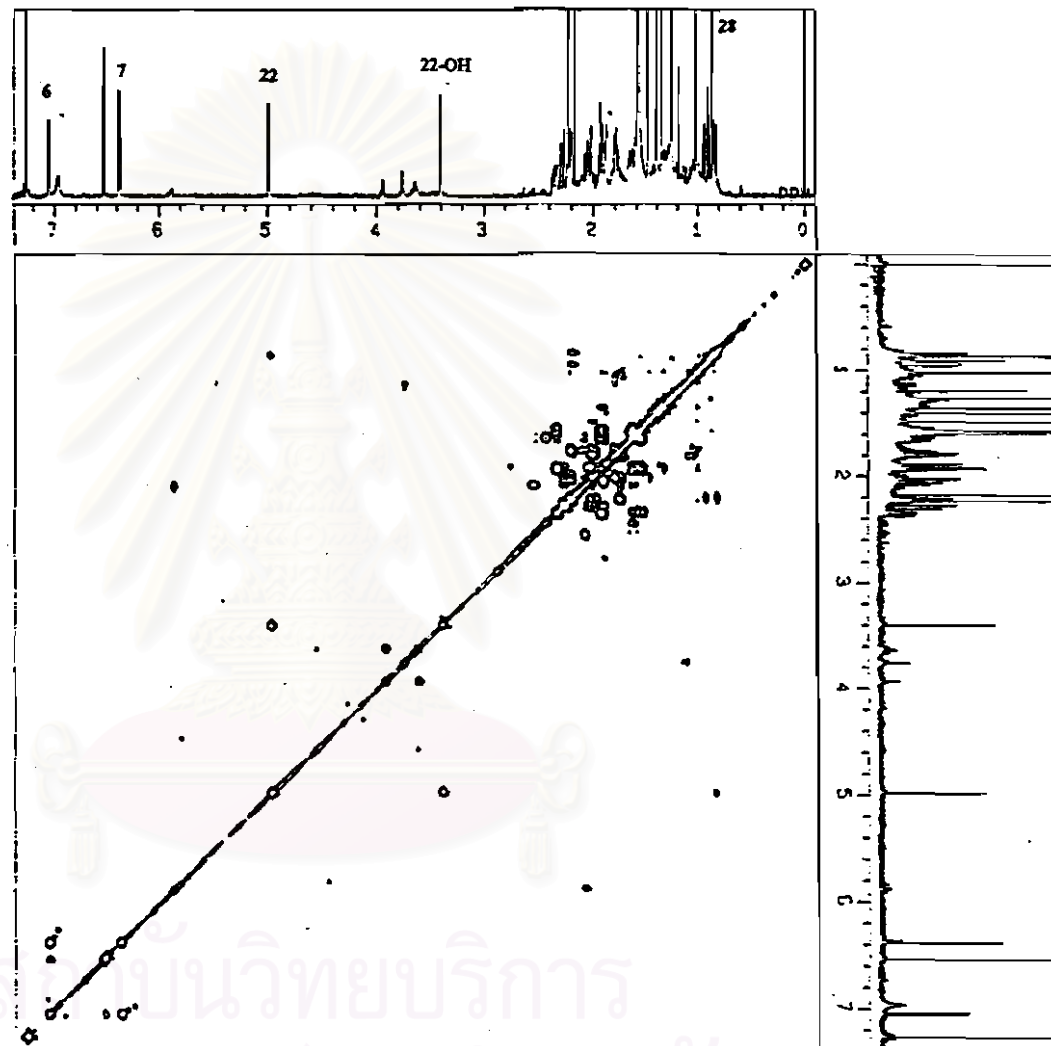
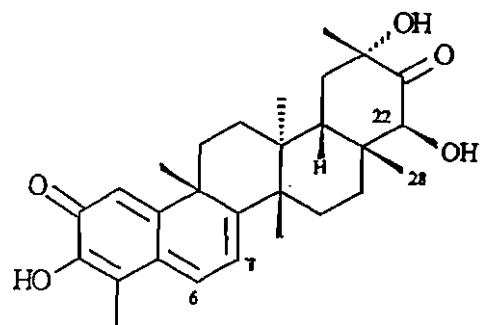


Figure 78. (a) ^1H - ^1H COSY spectrum of GS-Y2-1 (46) (in CDCl_3).

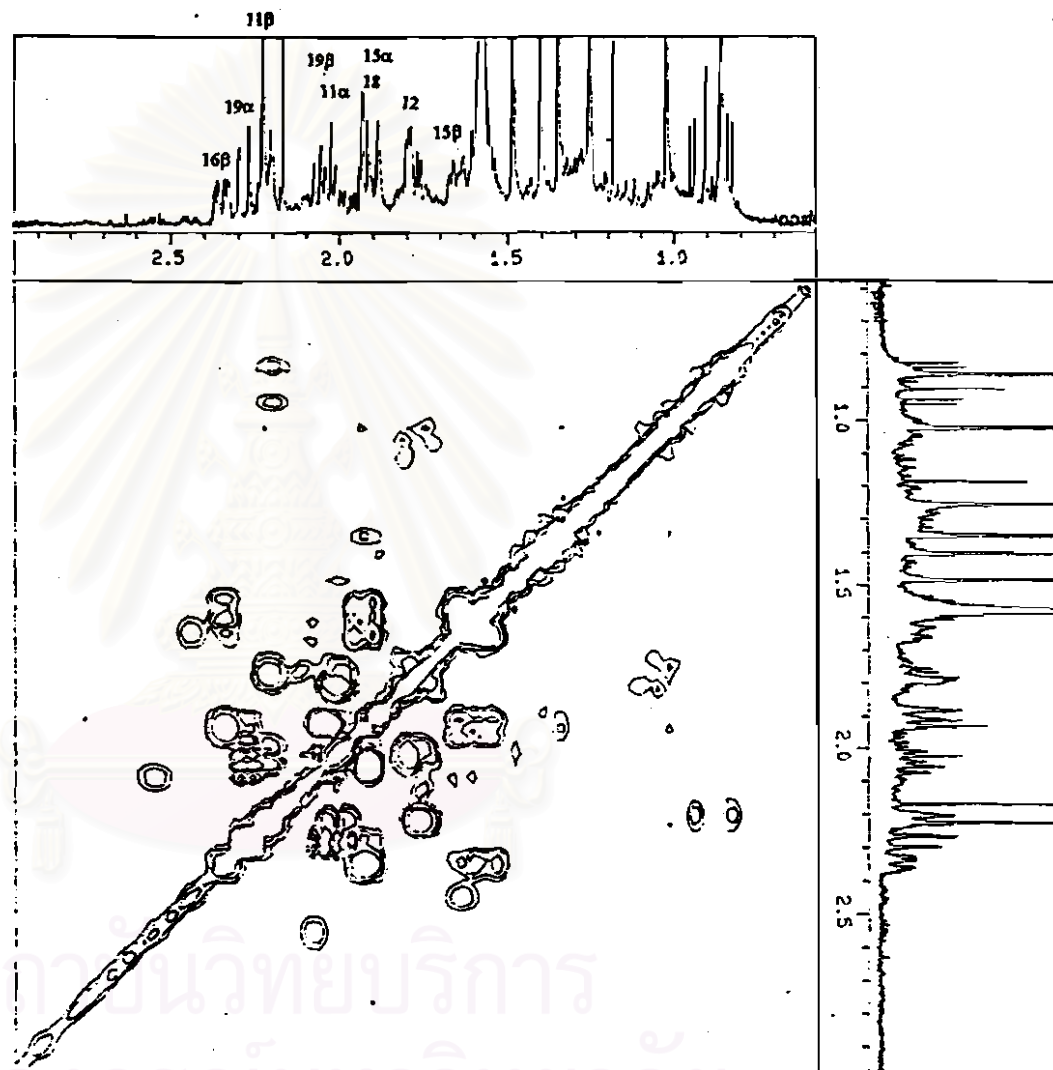
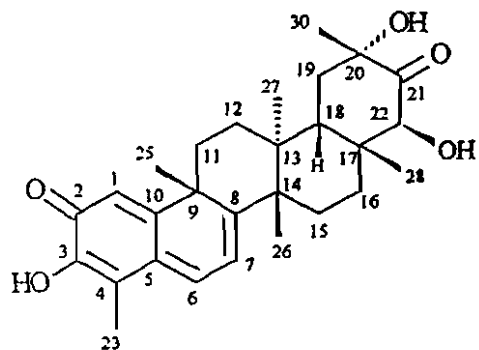


Figure 78. (b) Expanded ^1H - ^1H COSY spectrum of GS-Y2-1 (46) (in CDCl_3) in the range of 3.0-0.6 ppm.

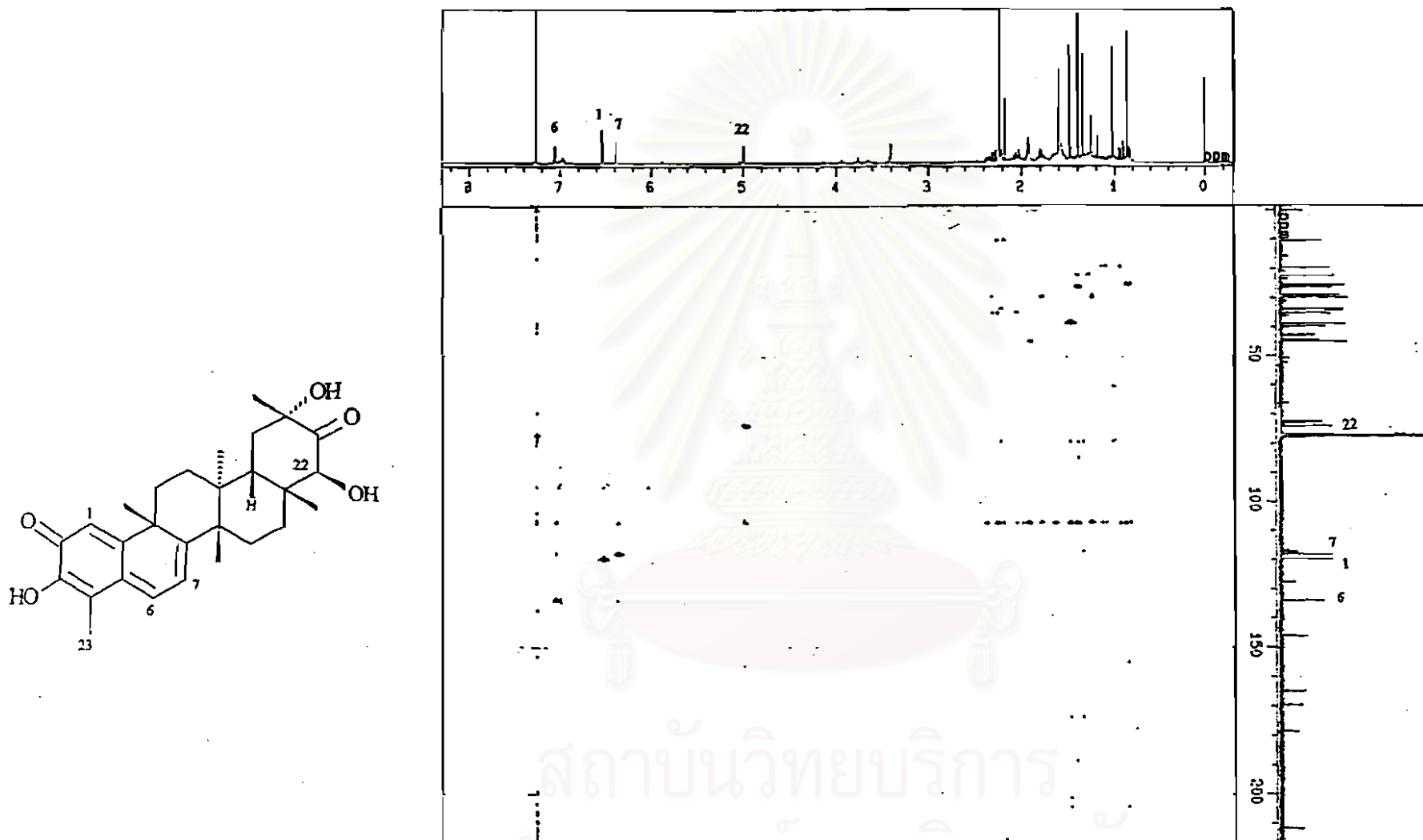
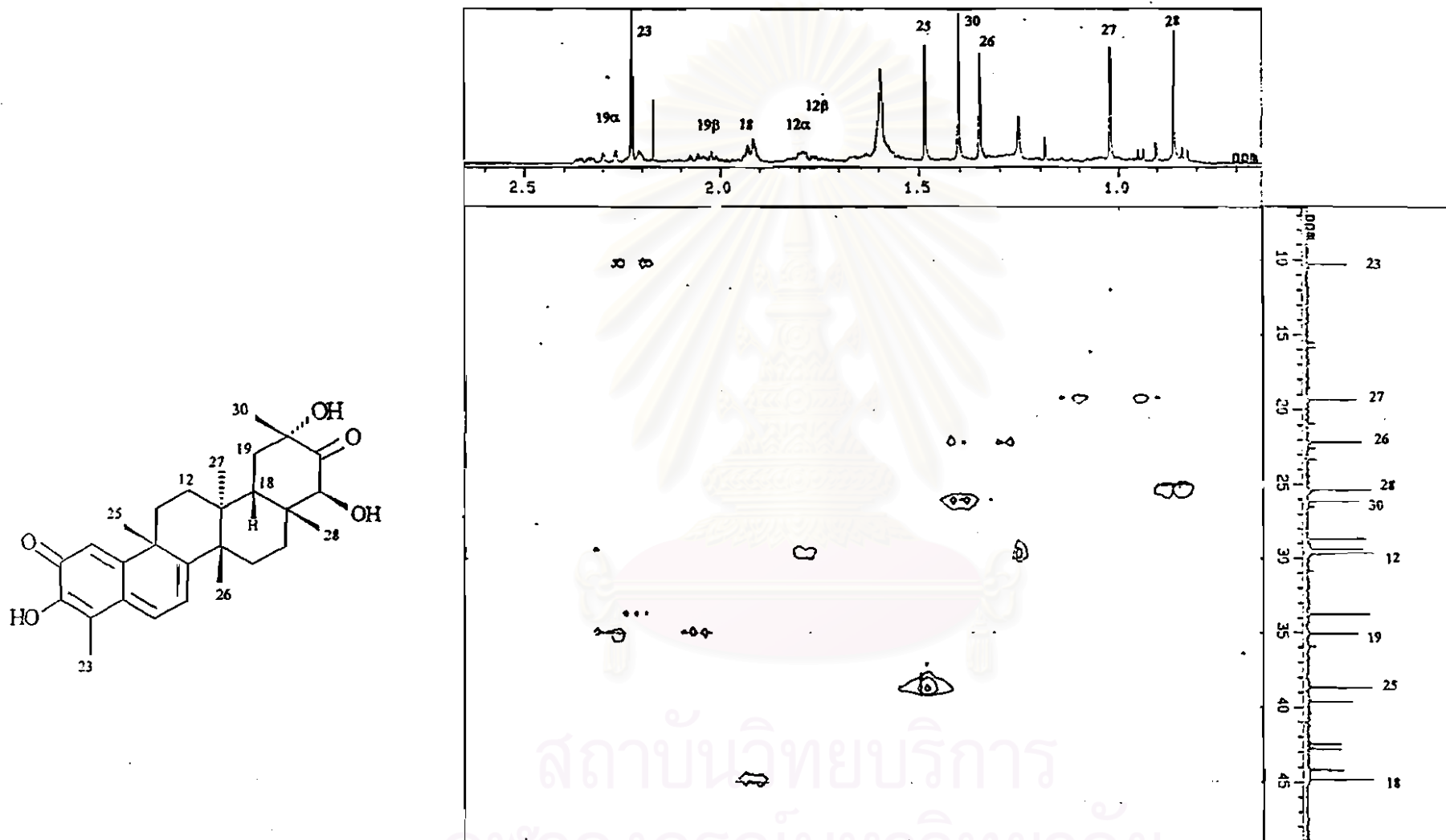


Figure 79. (a) HMQC spectrum of GS-Y2-1 (46) (in CDCl₃).



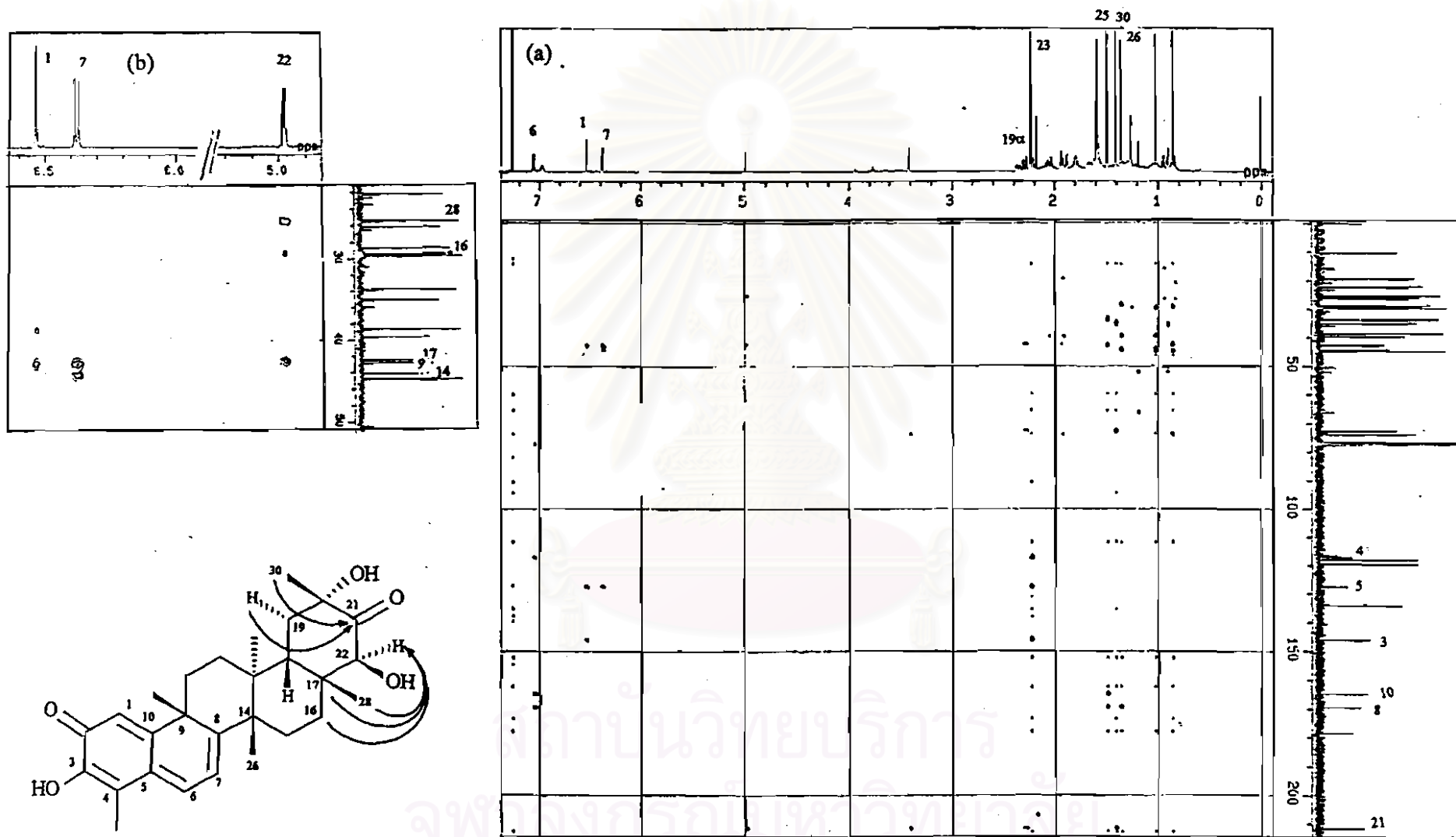


Figure 80. (a) HMBC spectrum of GS-Y2-1 (46) (in CDCl_3).

(b) Expanded HMBC spectrum of GS-Y2-1 (46) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 4.8-6.6 ppm and $\delta^{13}\text{C}$ 50-20 ppm.

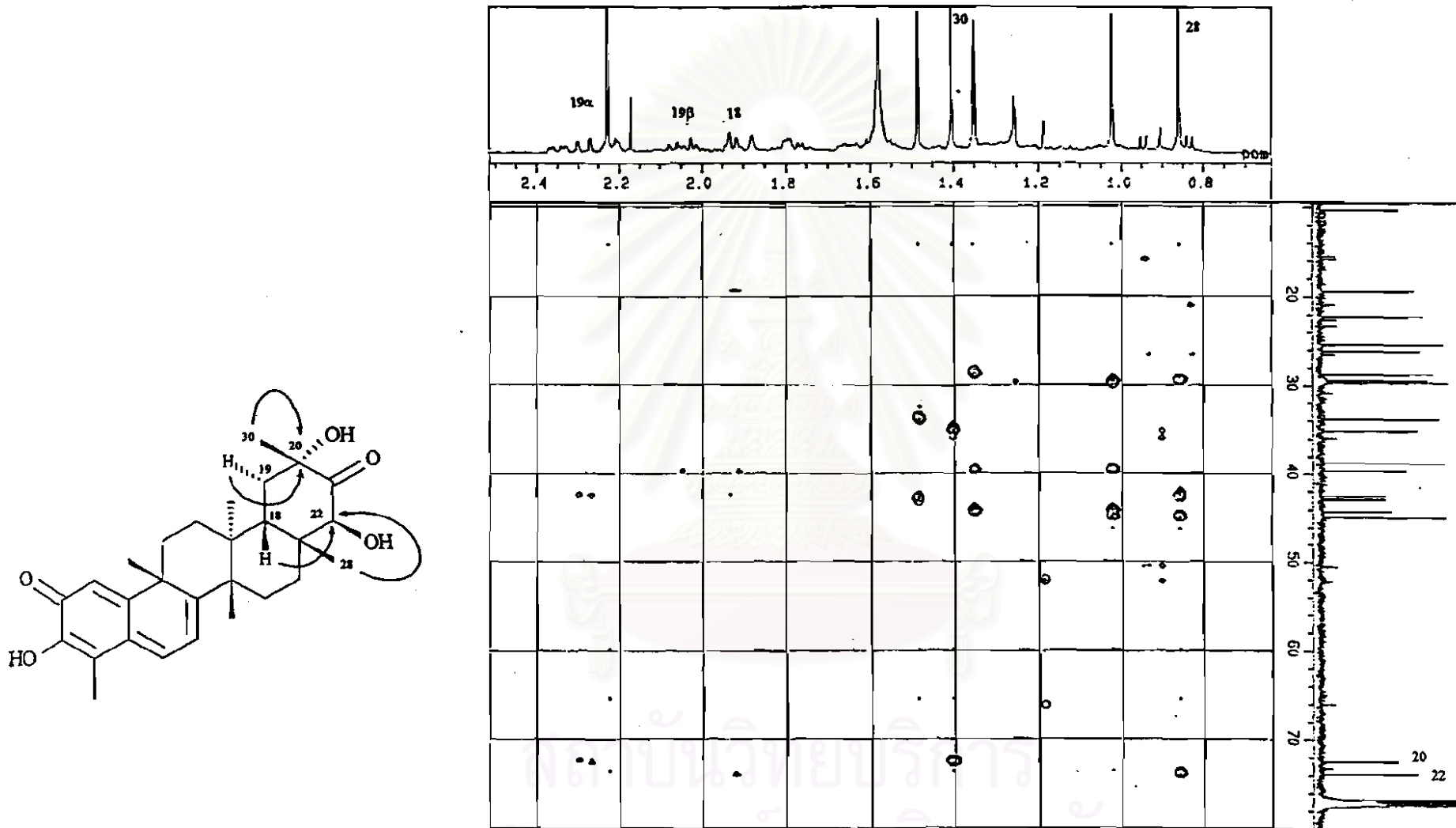


Figure 80. (c) Expanded HMBC spectrum of GS-Y2-1 (46) (in CDCl_3) in the ranges of δ ^1H 2.5-0.7 ppm and δ ^{13}C 80-10 ppm.

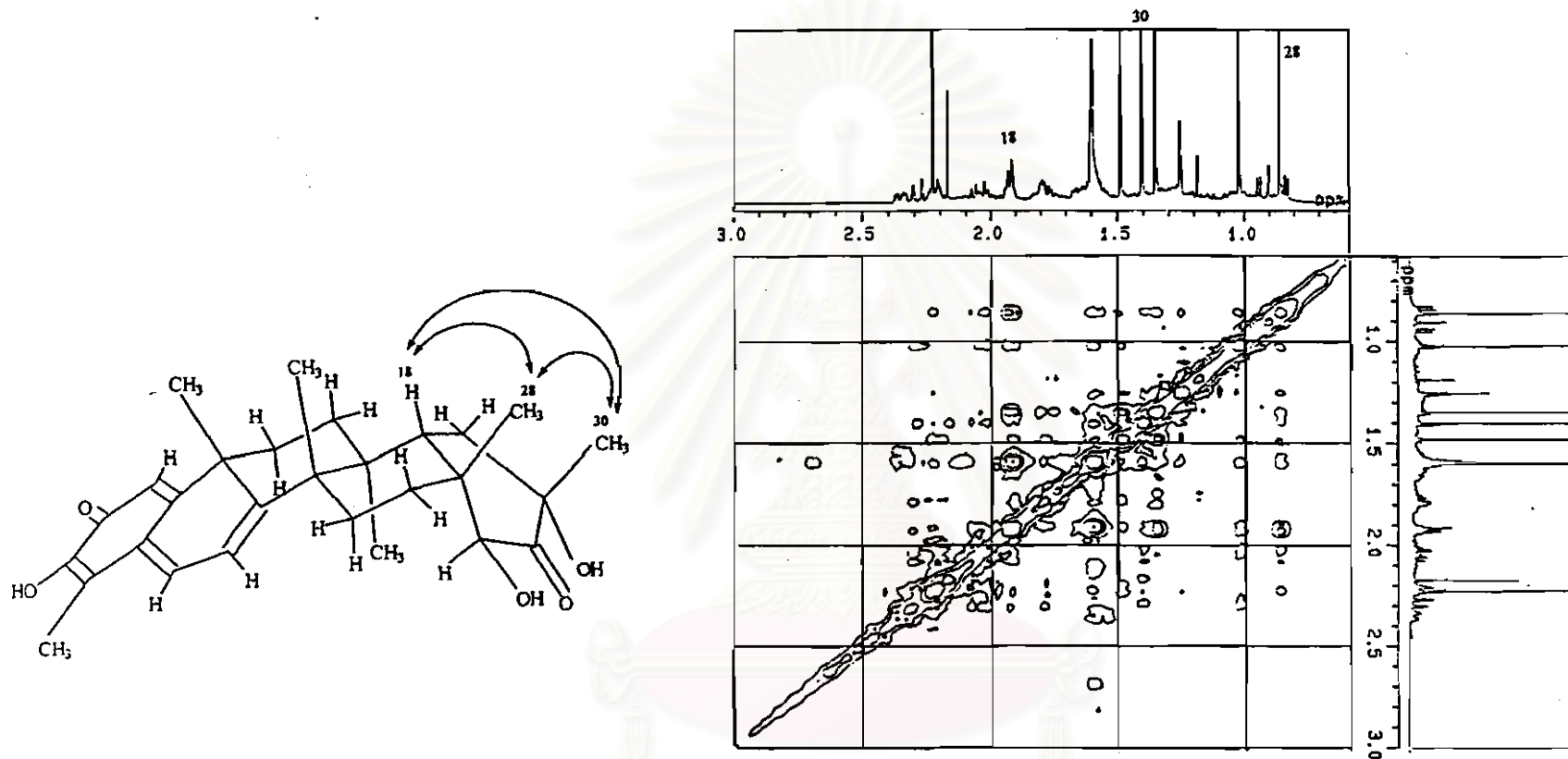


Figure 81. (a) Expanded NOESY spectrum of GS-Y2-1 (46) (in CDCl₃) in the range of δ 3.0-0.6 ppm .

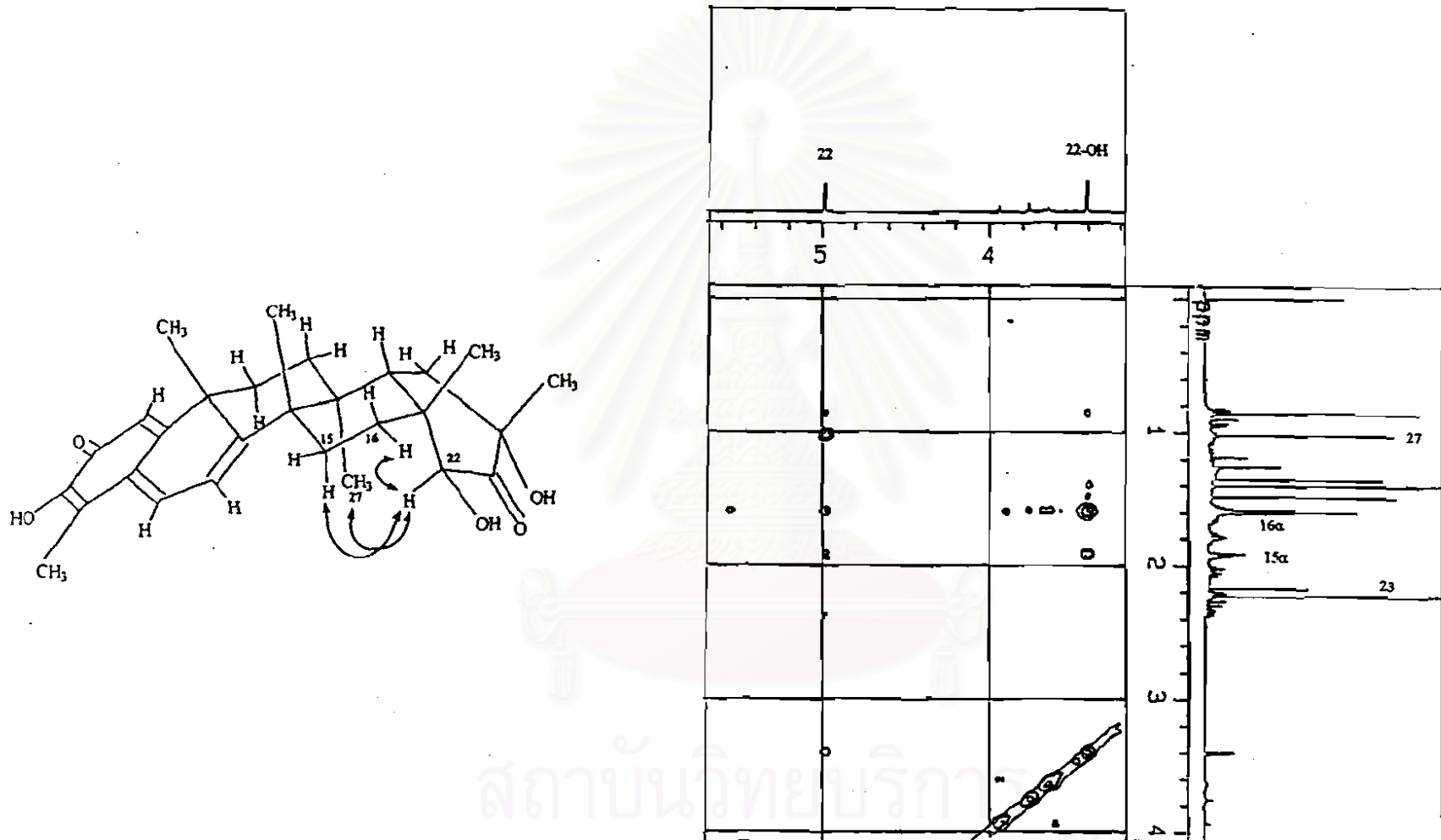


Figure 81. (b) Expanded NOESY spectrum of GS-Y2-1 (46) (in CDCl₃) between the ranges of δ 5.6-3.2 ppm and δ 4.0-0.0 ppm.

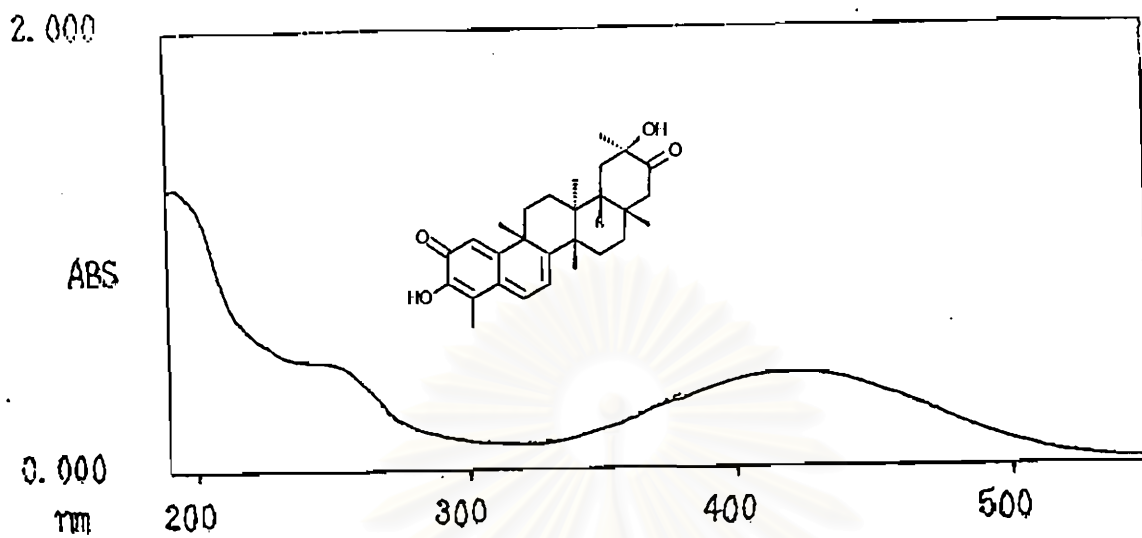


Figure 82. UV absorption spectrum of GS-Y2-2 (47) (in MeOH).

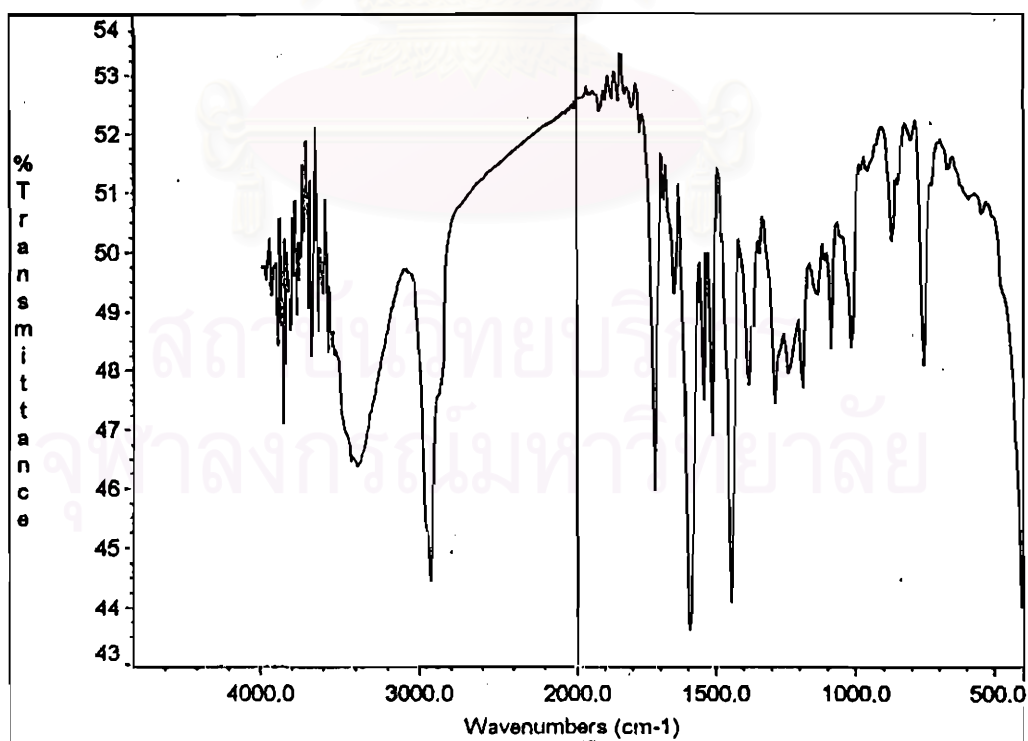


Figure 83. IR spectrum of GS-Y2-2 (47) (dry film).

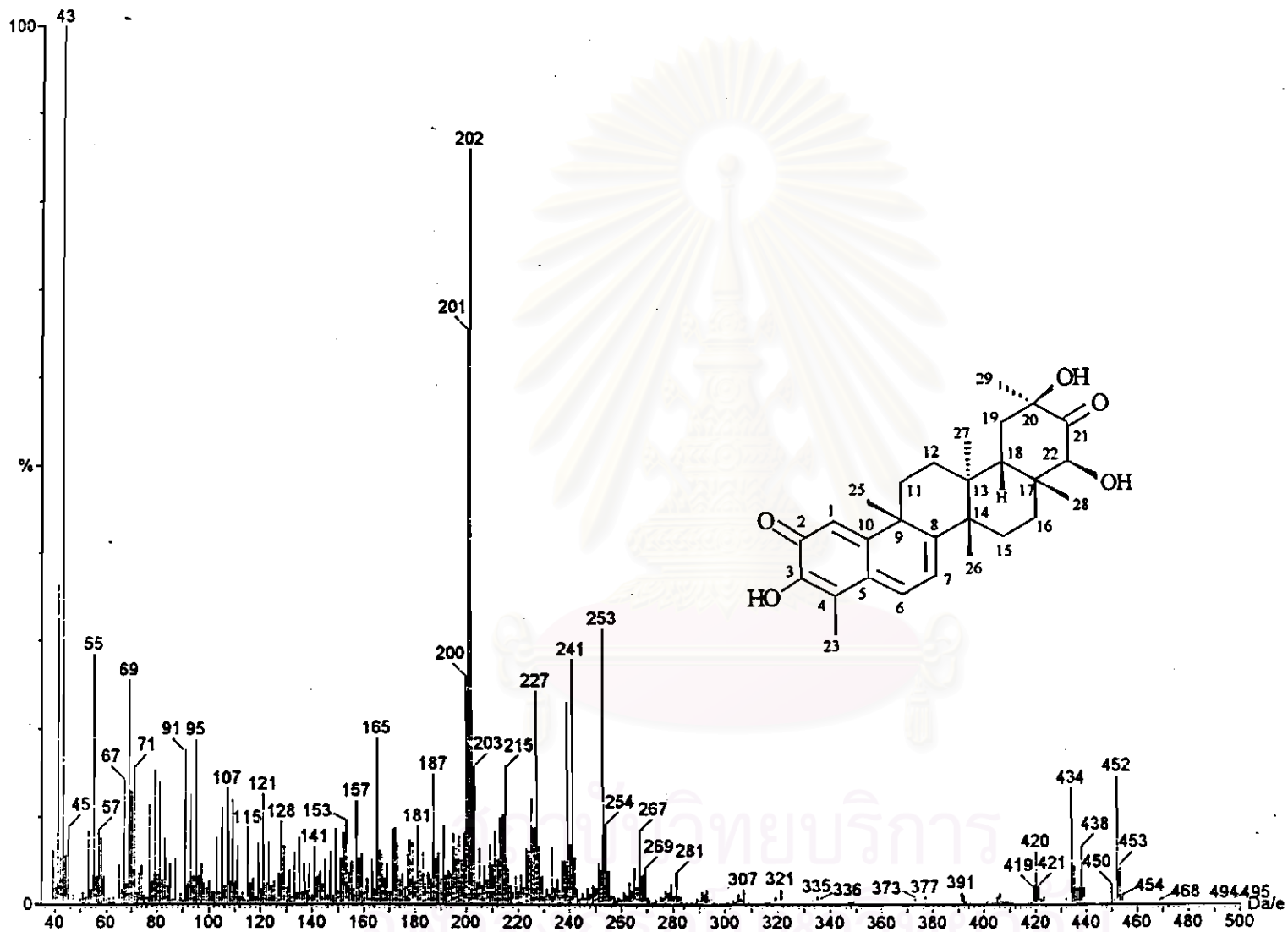


Figure 84. EIMS of GS-Y2-2 (47).

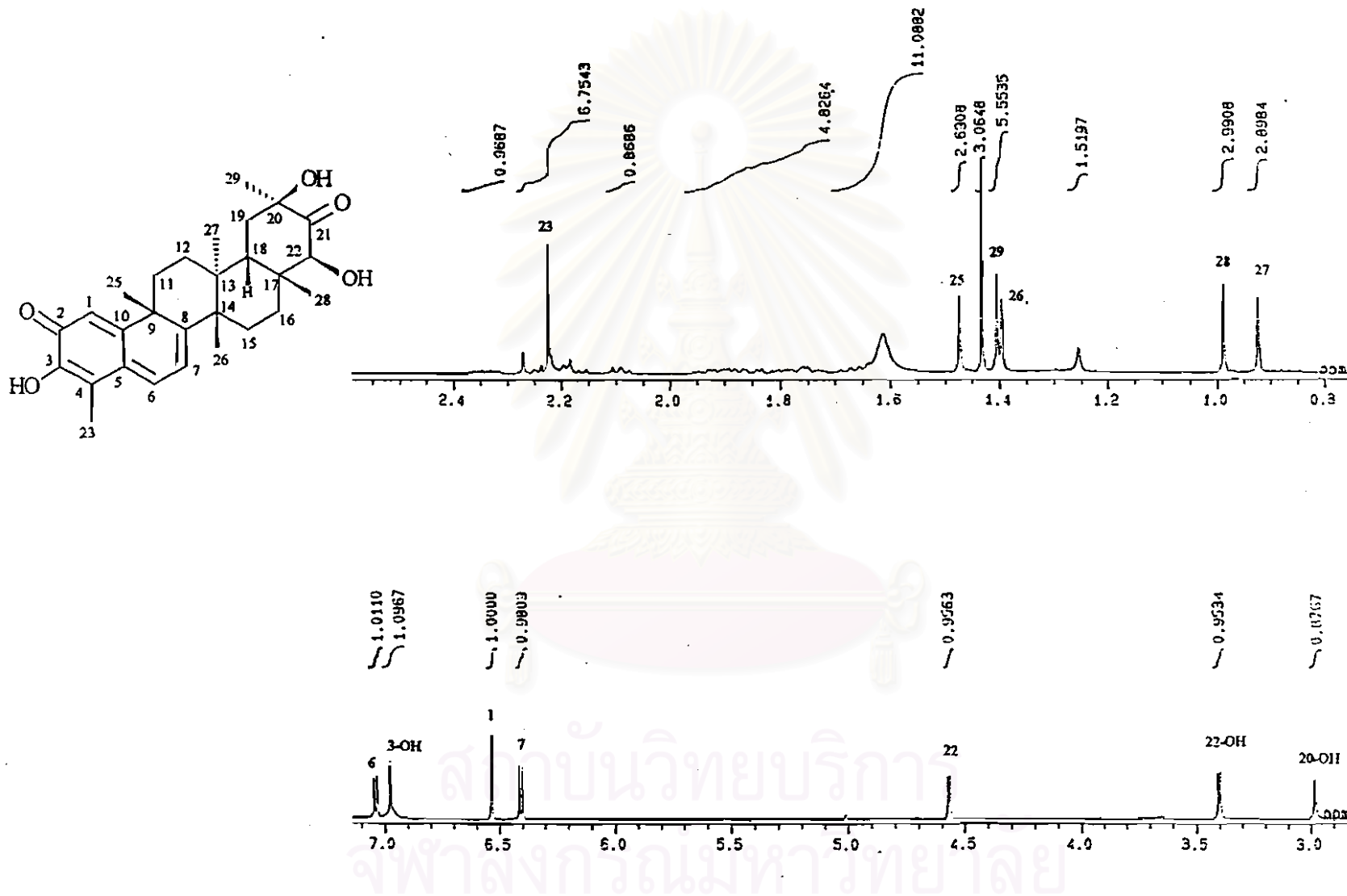


Figure 85. (a) ^1H NMR spectrum (500 MHz) of GS-Y2-2 (47) (in CDCl_3).

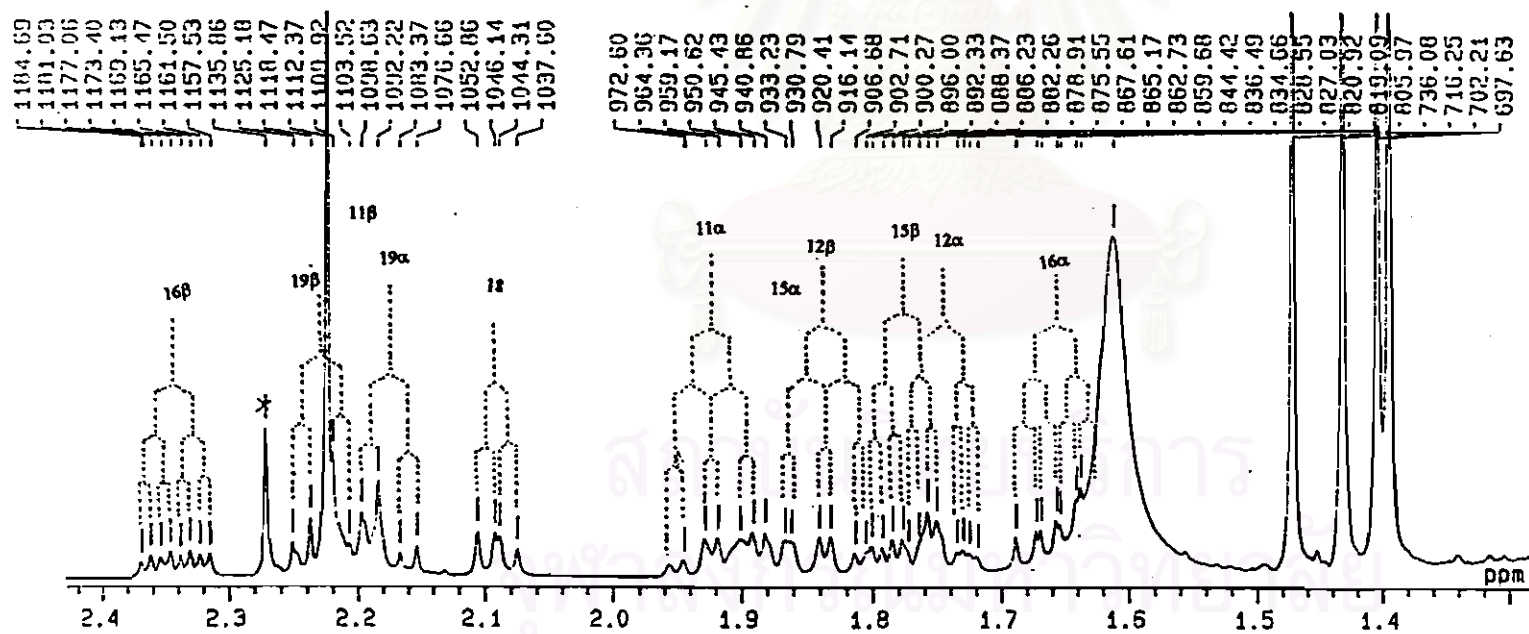
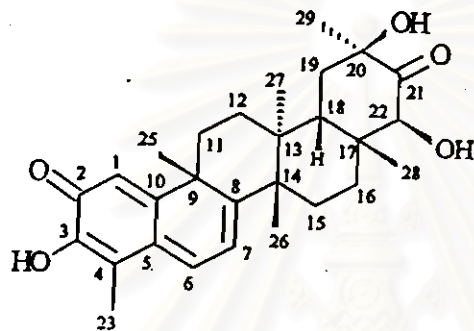


Figure 85. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-Y2-2 (47) (in CDCl_3) in the range of δ 2.42-1.30 ppm.

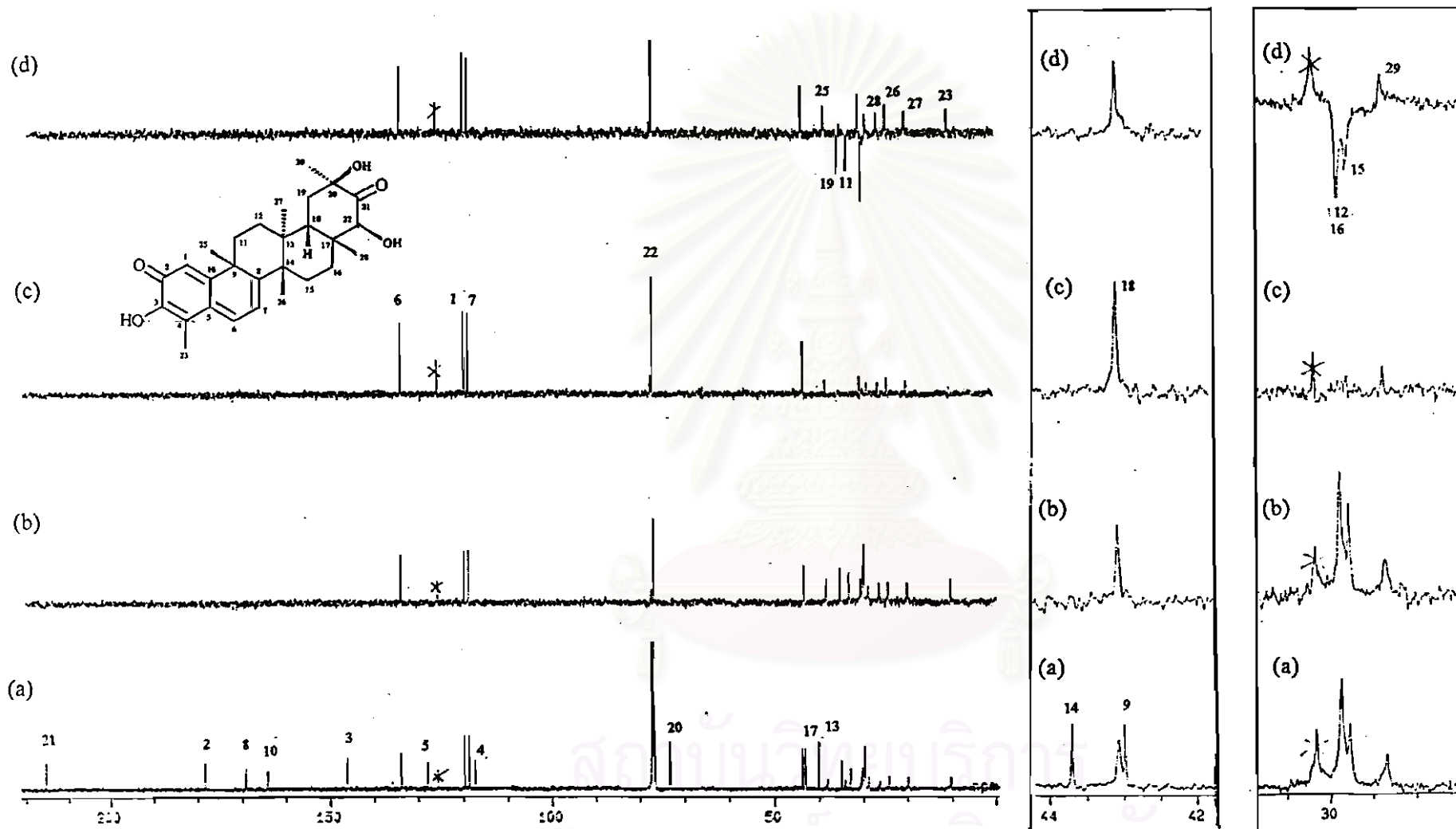


Figure 86. (a) ^{13}C NMR spectrum (125 MHz) of GS-Y2-2 (47) (in CDCl_3).
 (b) DEPT 45° spectrum.
 (c) DEPT 90° spectrum.
 (d) DEPT 135° spectrum.

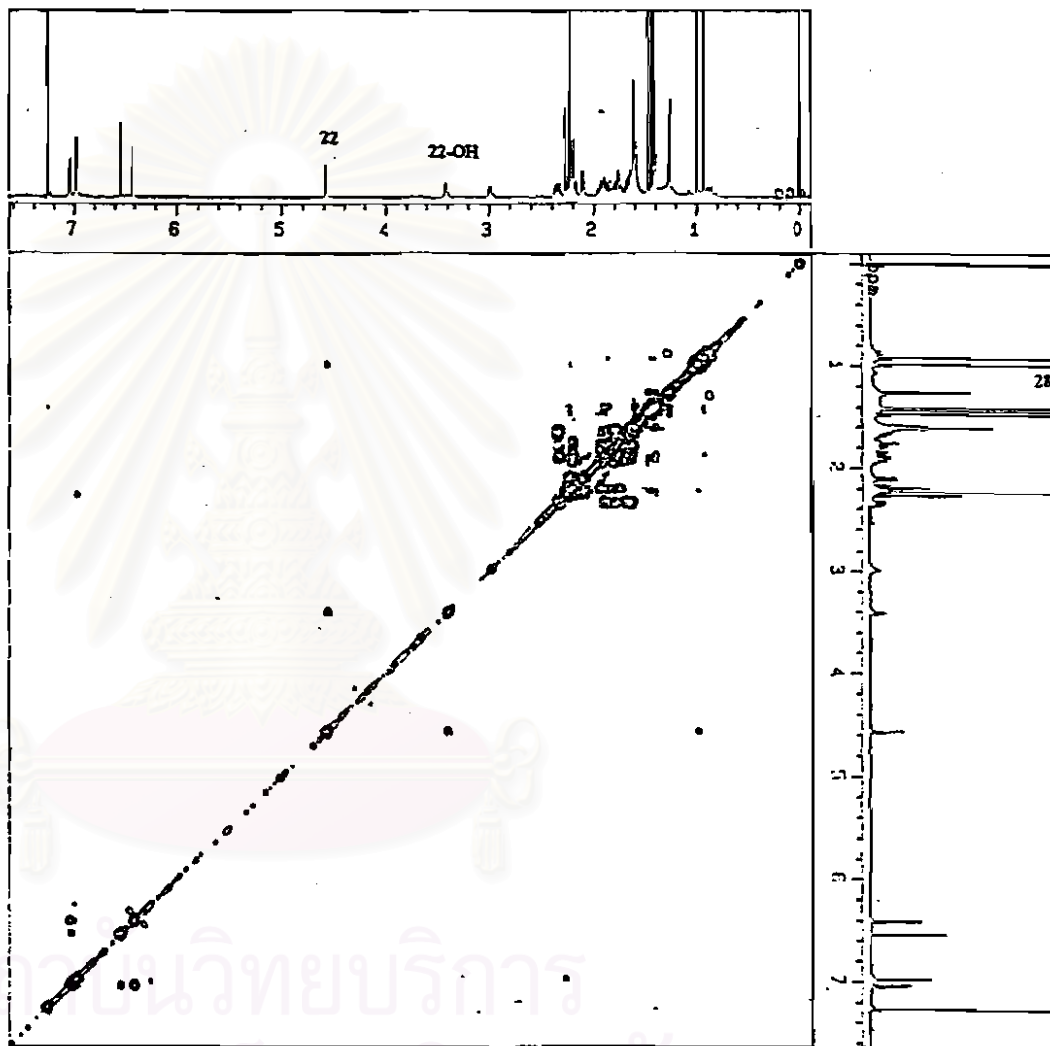
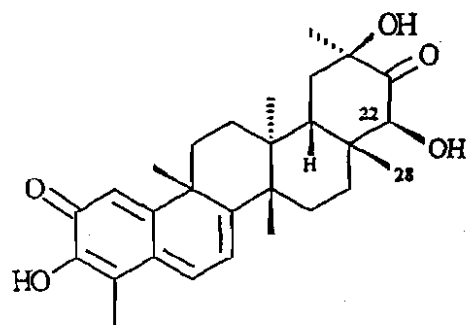


Figure 87. (a) ^1H - ^1H COSY spectrum of GS-Y2-2 (47) (in CDCl_3).

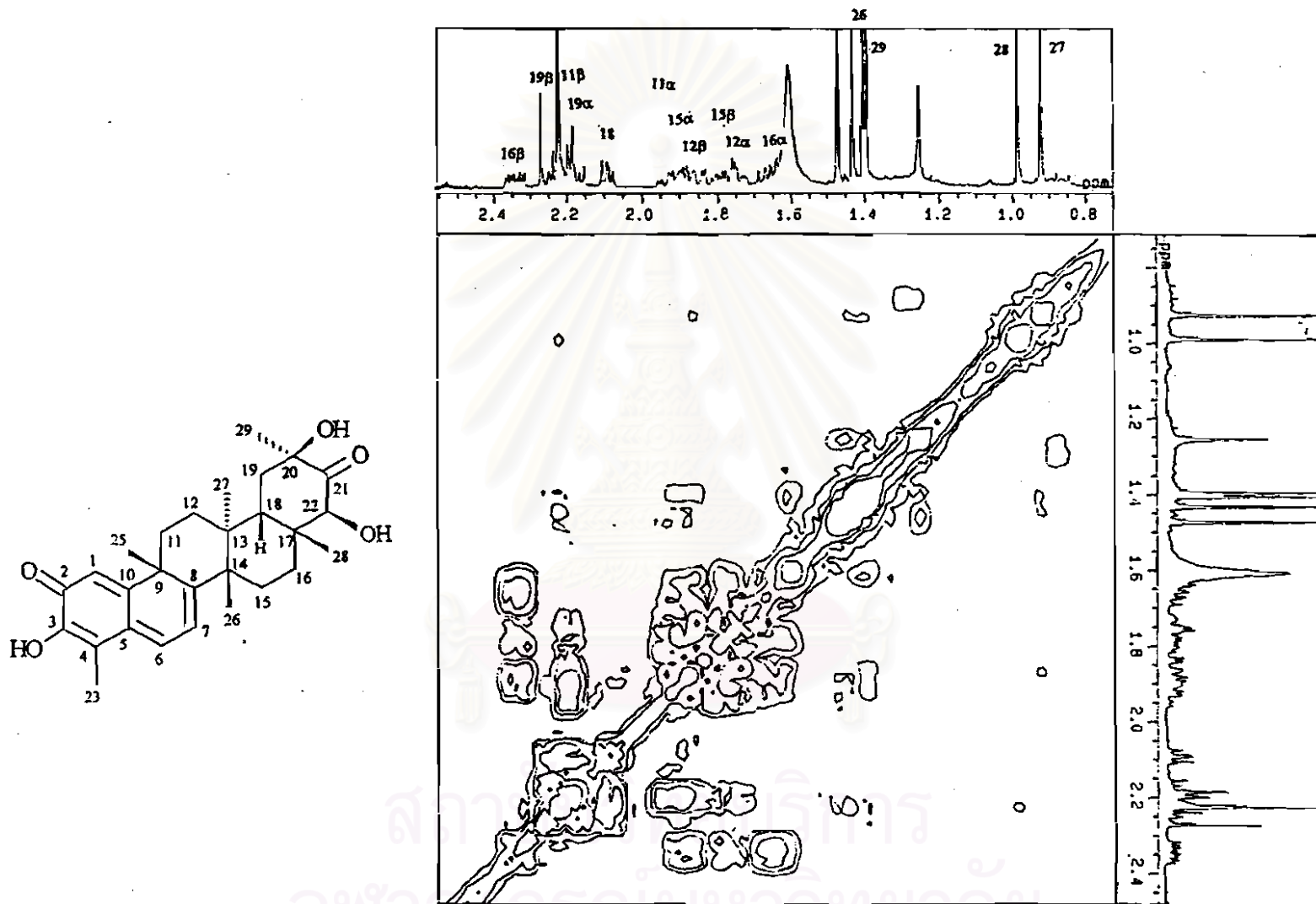


Figure 87. (b) Expanded ^1H - ^1H COSY spectrum of GS-Y2-2 (47) (in CDCl_3) in the range of 2.55-0.70 ppm.

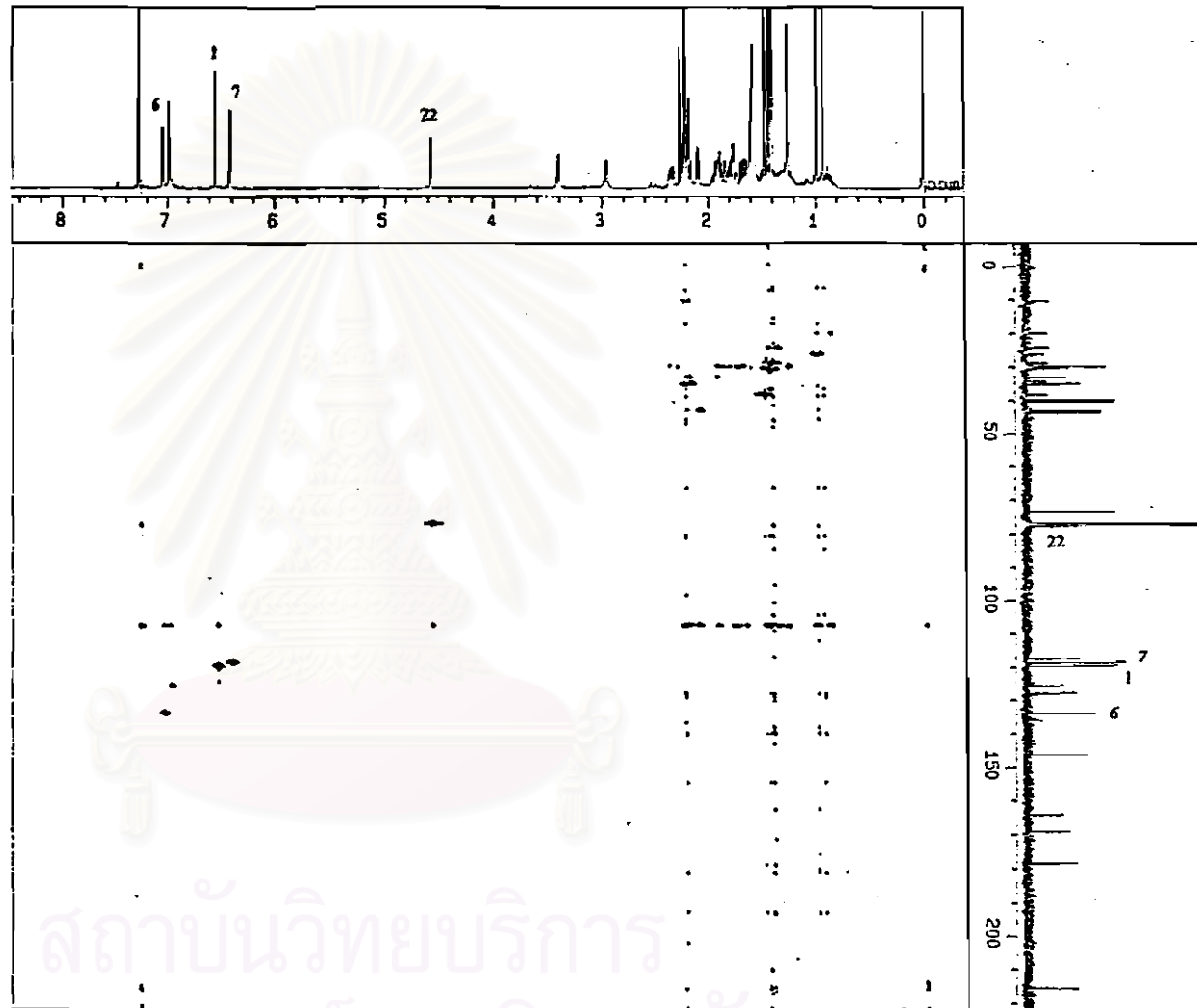
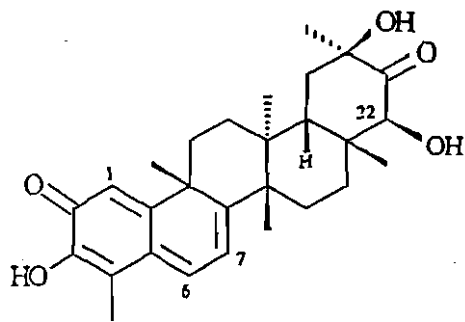
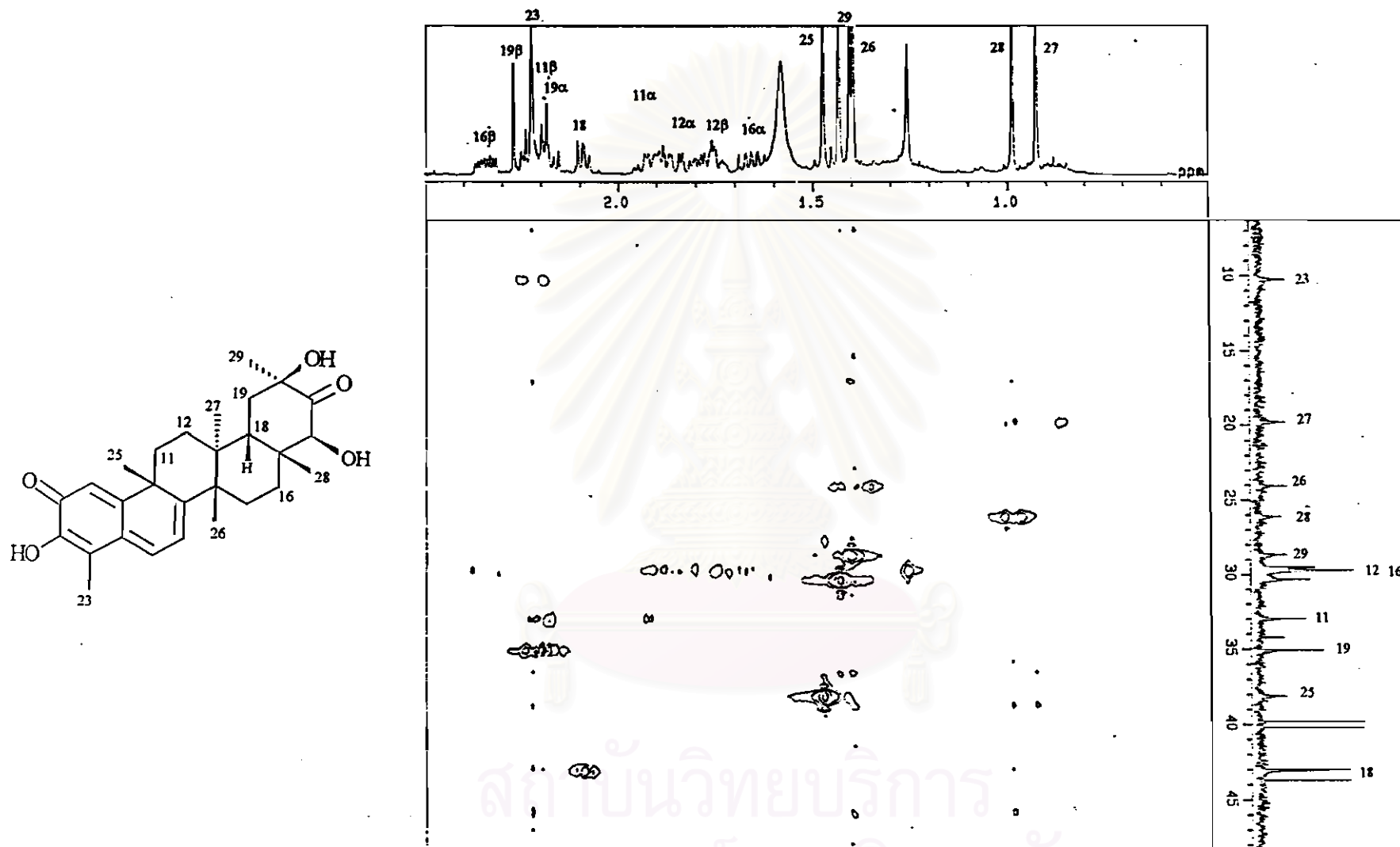


Figure 88. (a) HMQC spectrum of GS-Y2-2 (47) (in CDCl_3).



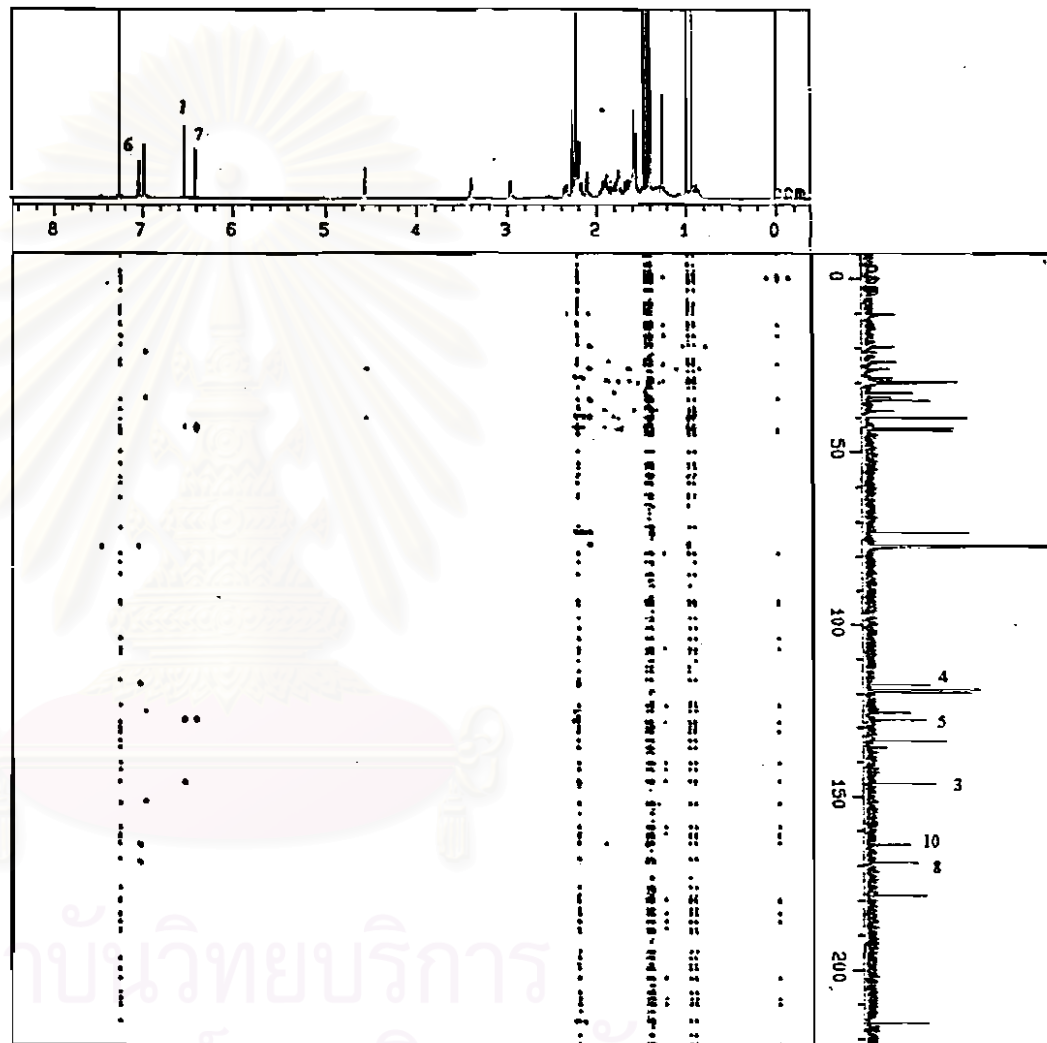
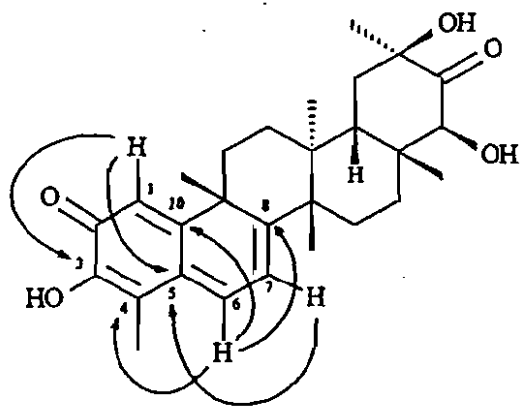


Figure 89. (a) HMBC spectrum of GS-Y2-2 (47) (in CDCl₃).

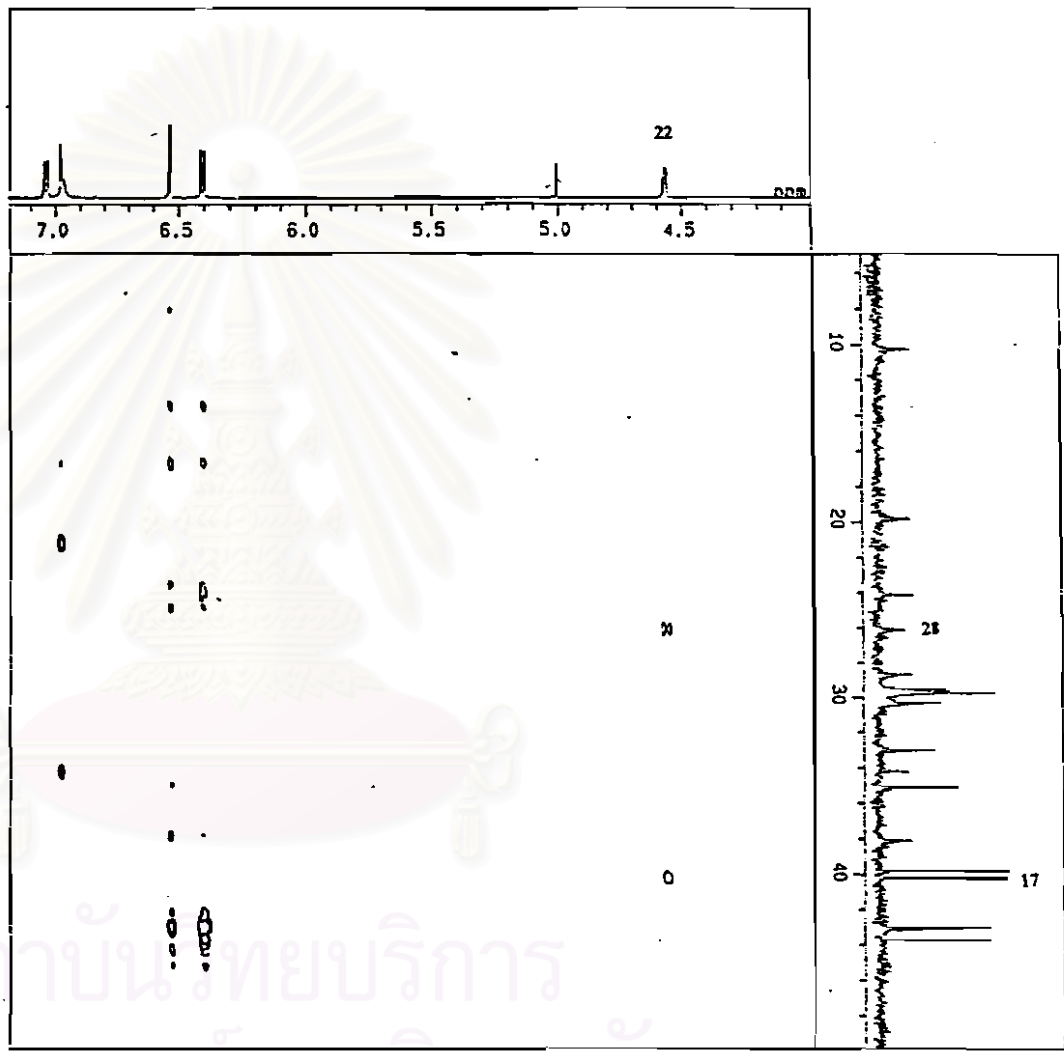
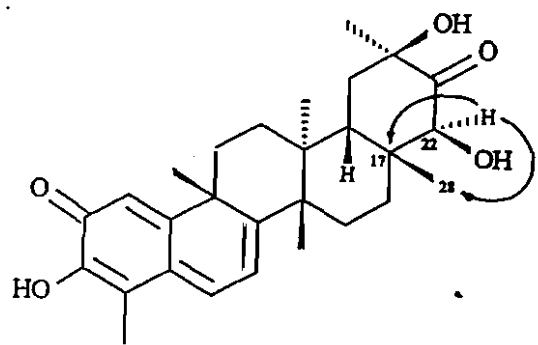


Figure 89. (b) Expanded HMBC spectrum of GS-Y2-2 (47) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 7.2-4.0 ppm and $\delta^{13}\text{C}$ 45-7 ppm.

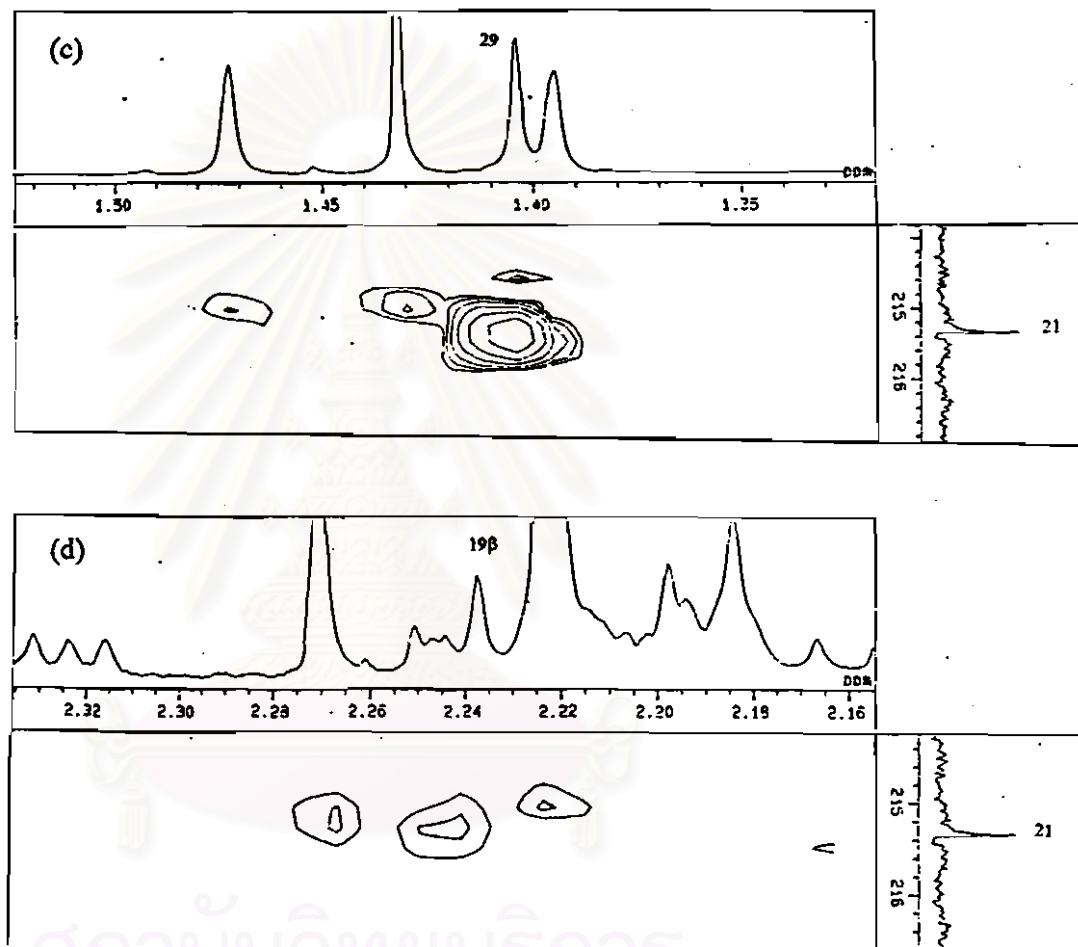
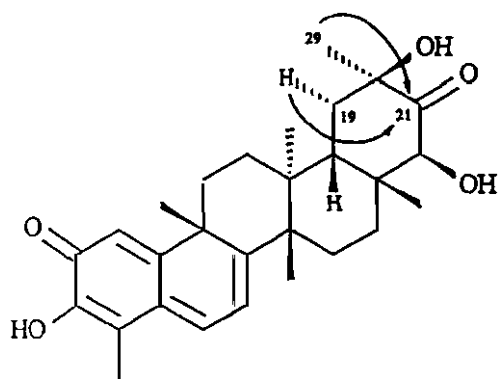


Figure 89. (c) Expanded HMBC spectrum of GS-Y2-2 (47) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 1.53-1.32 ppm and $\delta^{13}\text{C}$ 217-214 ppm.
 (d) Expanded HMBC spectrum of GS-Y2-2 (47) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 2.33-2.17 ppm and $\delta^{13}\text{C}$ 217-214 ppm.

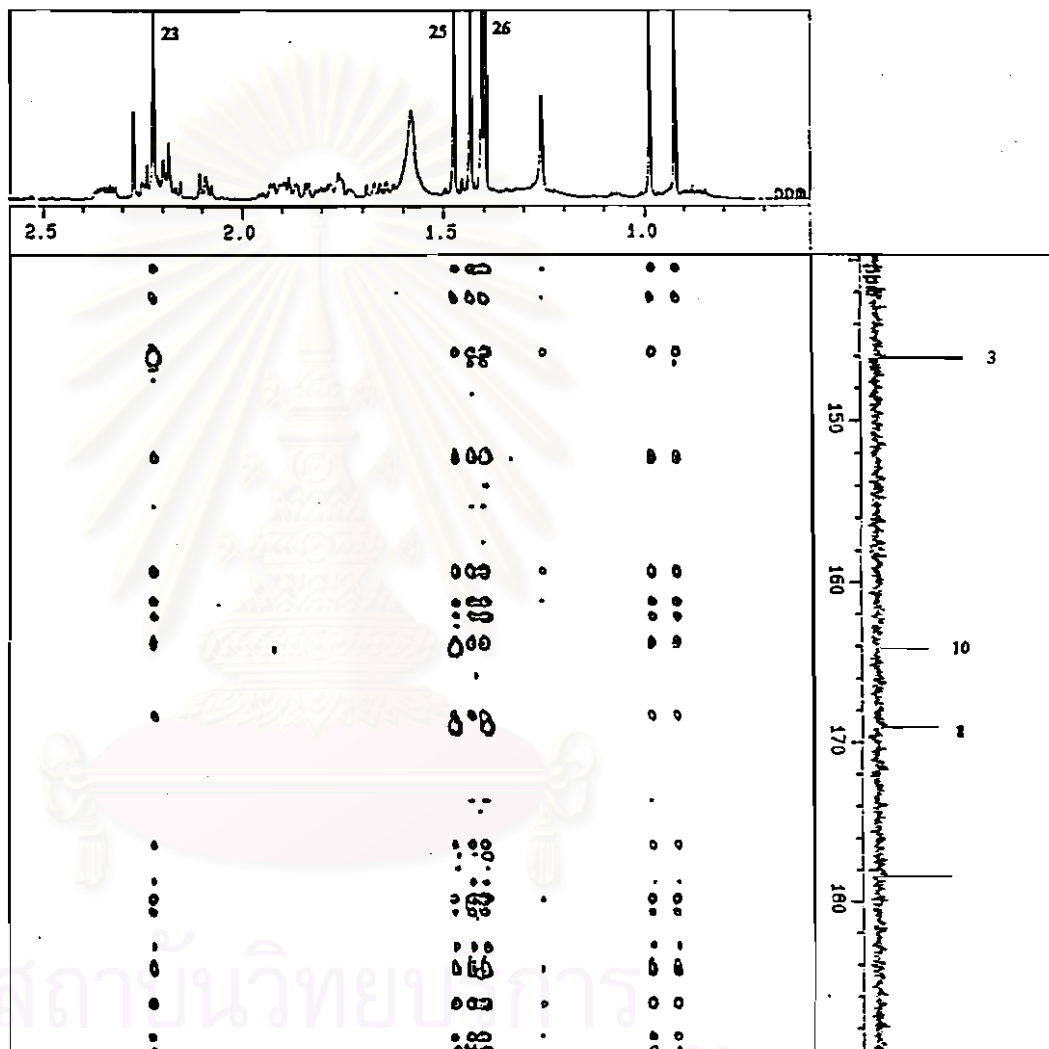
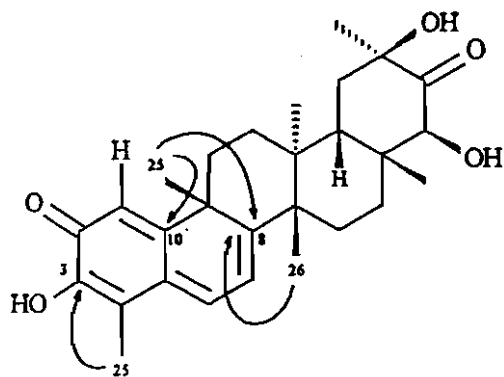


Figure 89. (e) Expanded HMBC spectrum of GS-Y2-2 (47) (in CDCl_3) in the ranges of δ ^1H 2.6-0.6 ppm and δ ^{13}C 190-140 ppm.

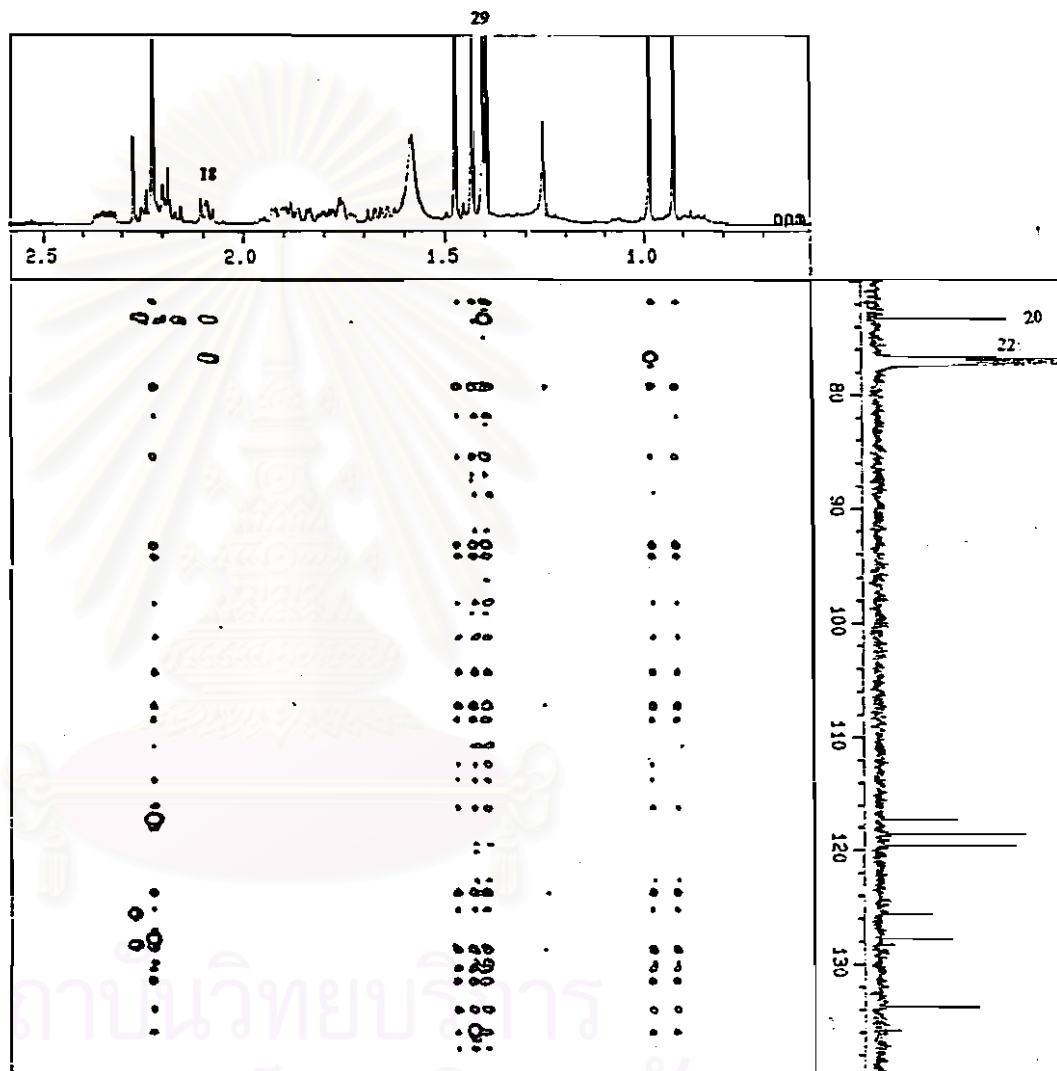
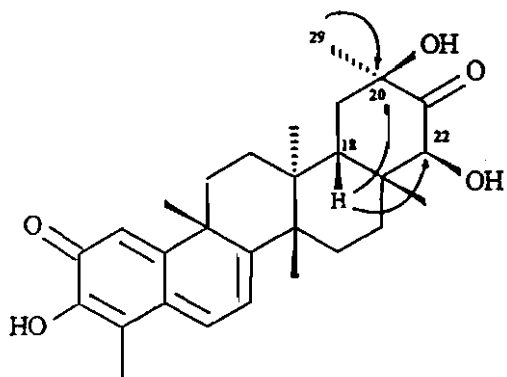
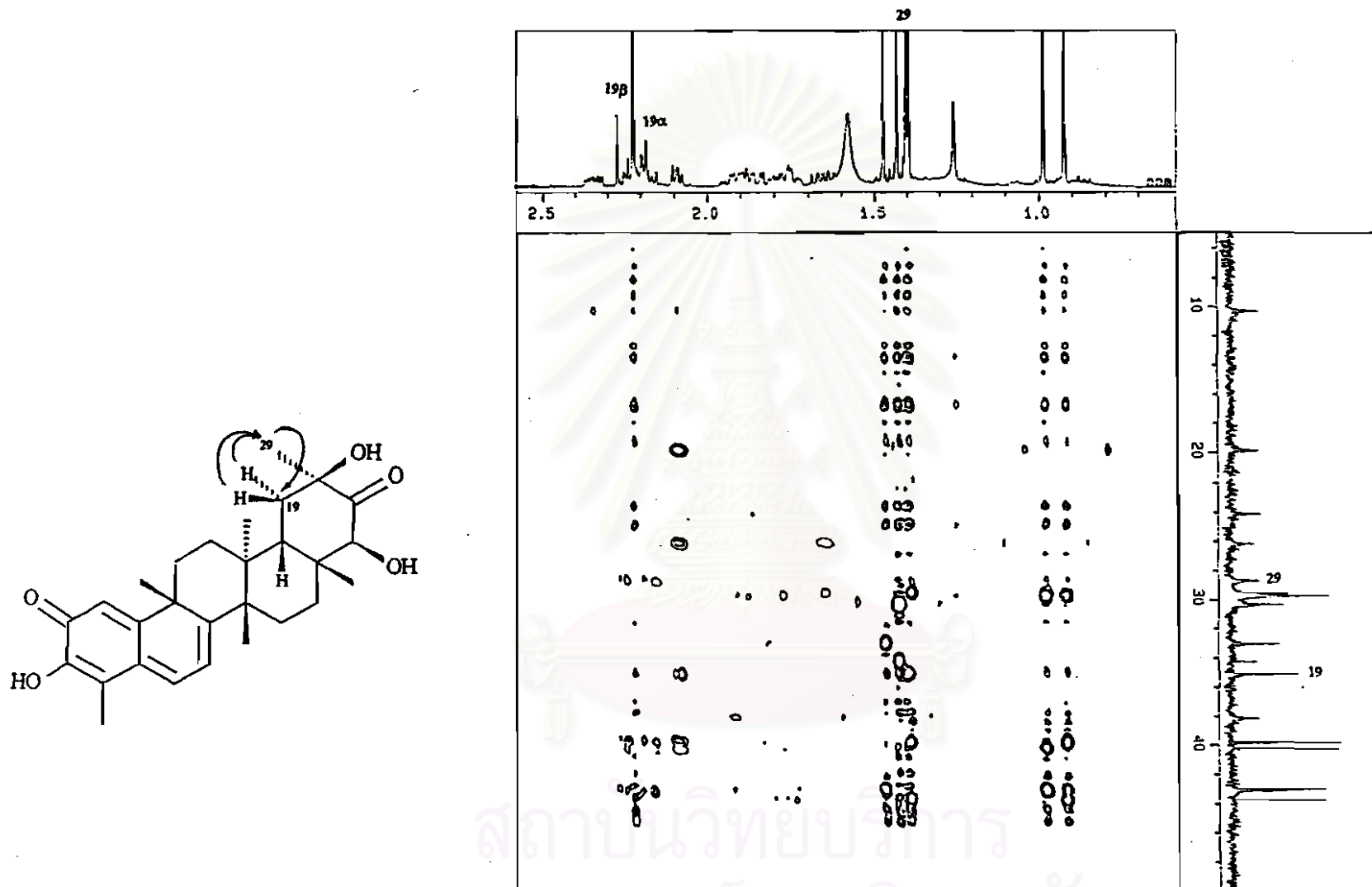


Figure 89. (f) Expanded HMBC spectrum of GS-Y2-2 (47) (in CDCl₃) in the ranges of δ ¹H 2.6-0.6 ppm and δ ¹³C 140-70 ppm.



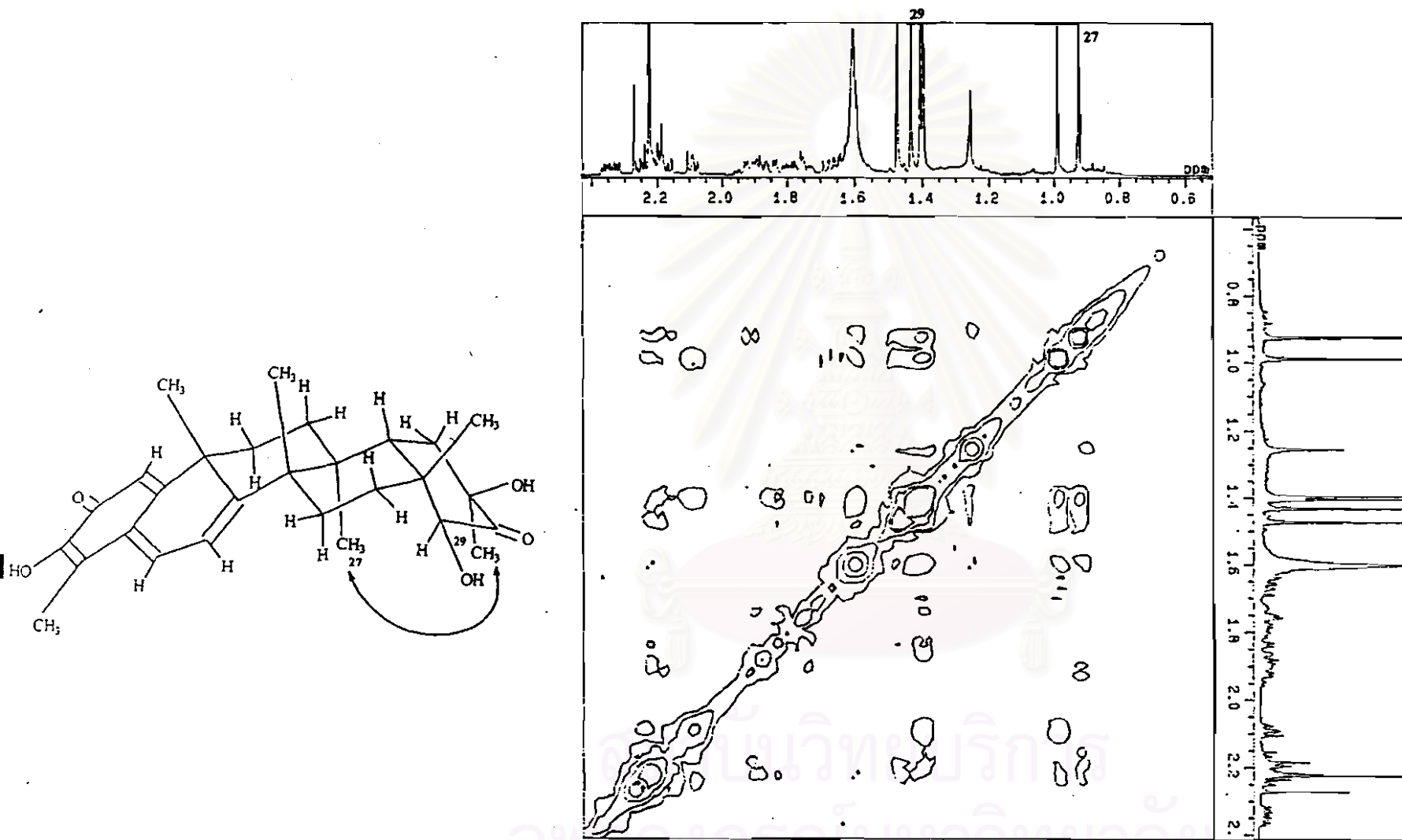


Figure 90. (a) NOESY spectrum of GS-Y2-2 (47) (in CDCl_3).

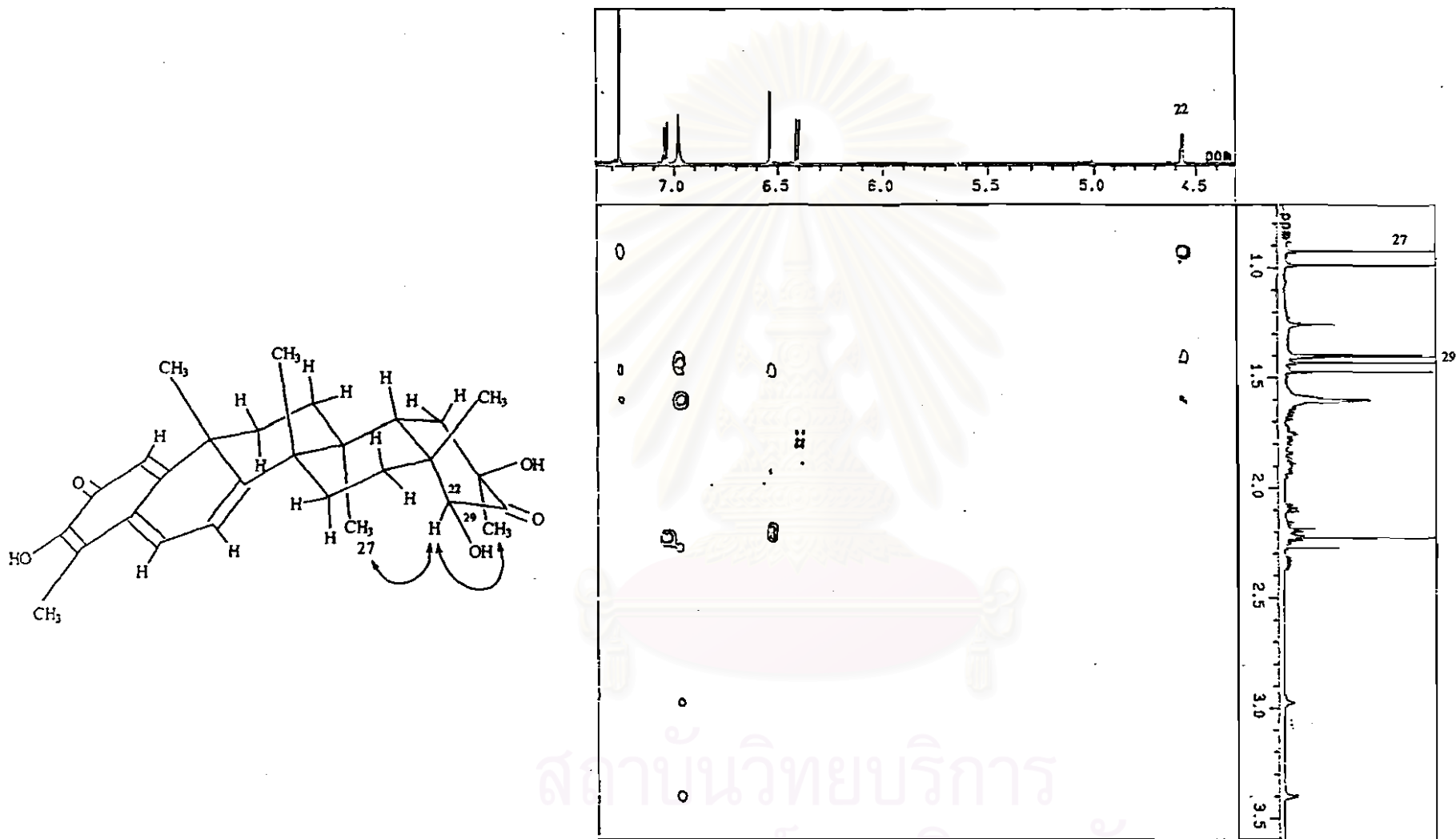


Figure 90. (b) Expanded NOESY spectrum of GS-Y2-2 (47) (in CDCl₃) between the ranges of δ 7.4-4.3 ppm and δ 3.6-0.7 ppm.

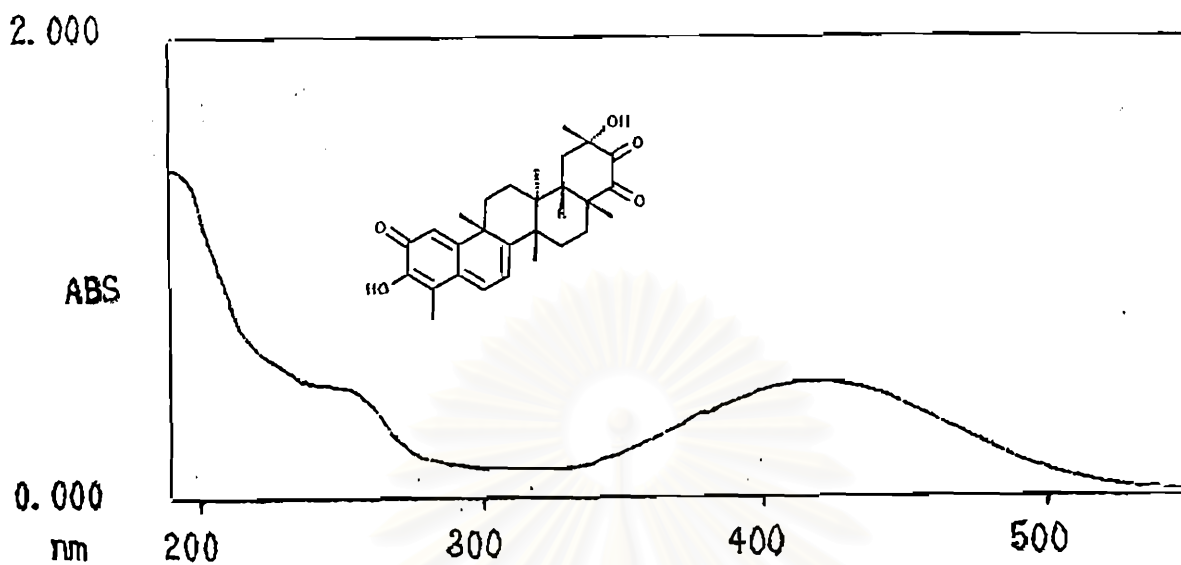


Figure 91. UV absorption spectrum of GS-Y2-4 (49) (in MeOH).

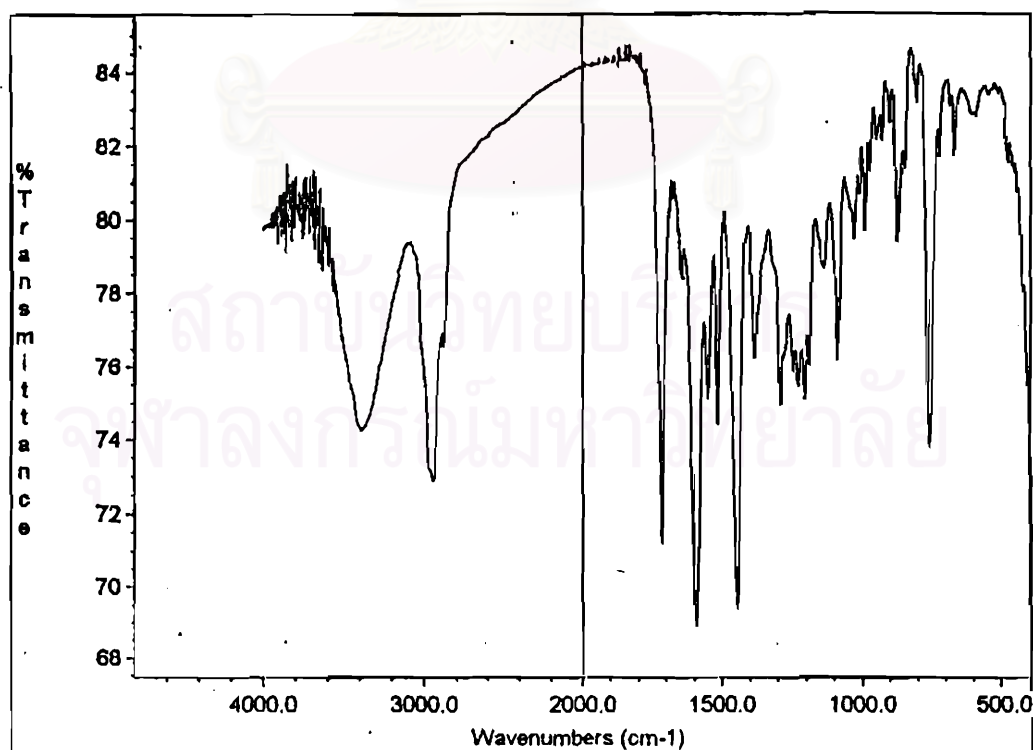
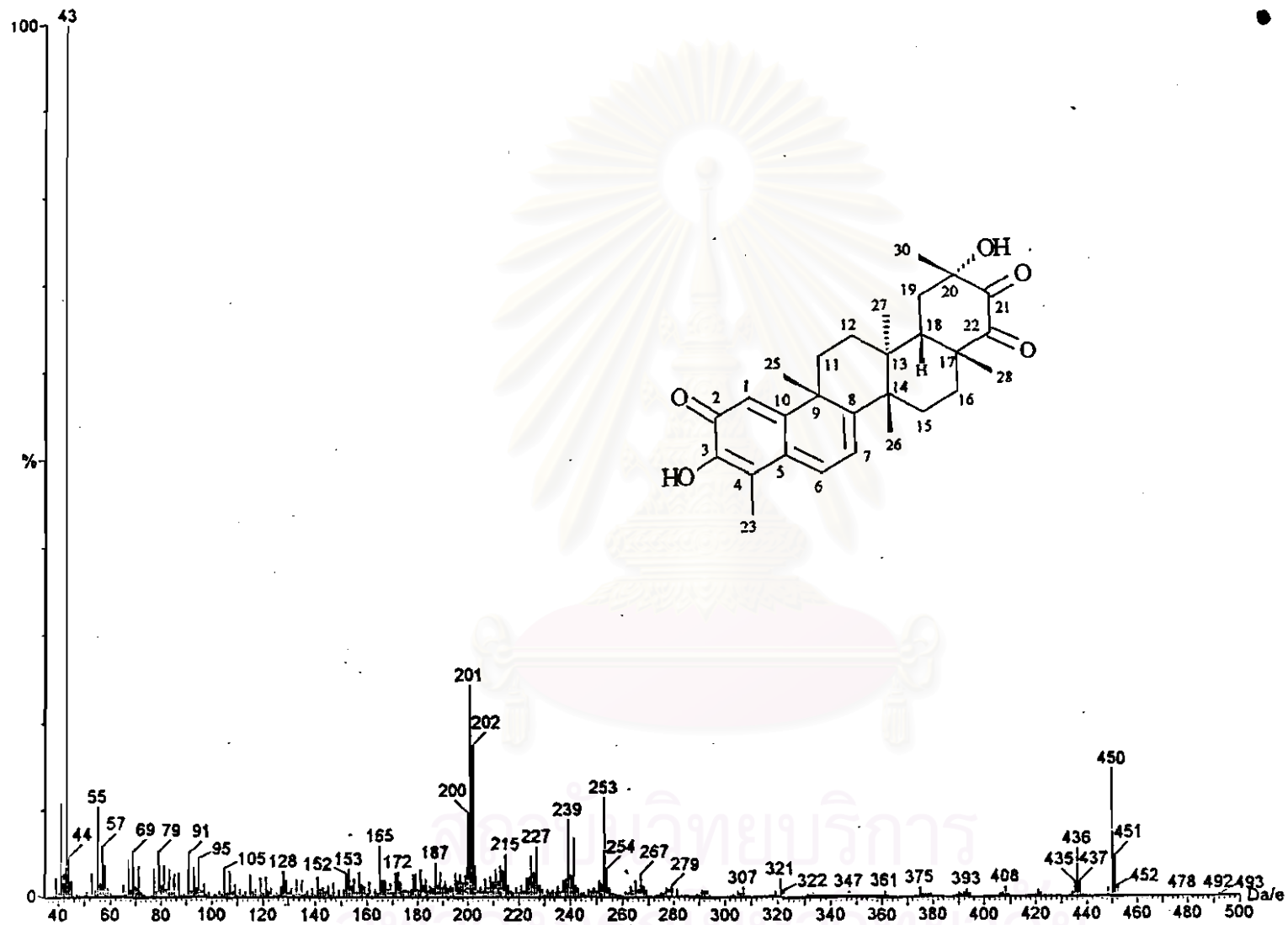


Figure 92. IR spectrum of GS-Y2-4 (49) (dry film).



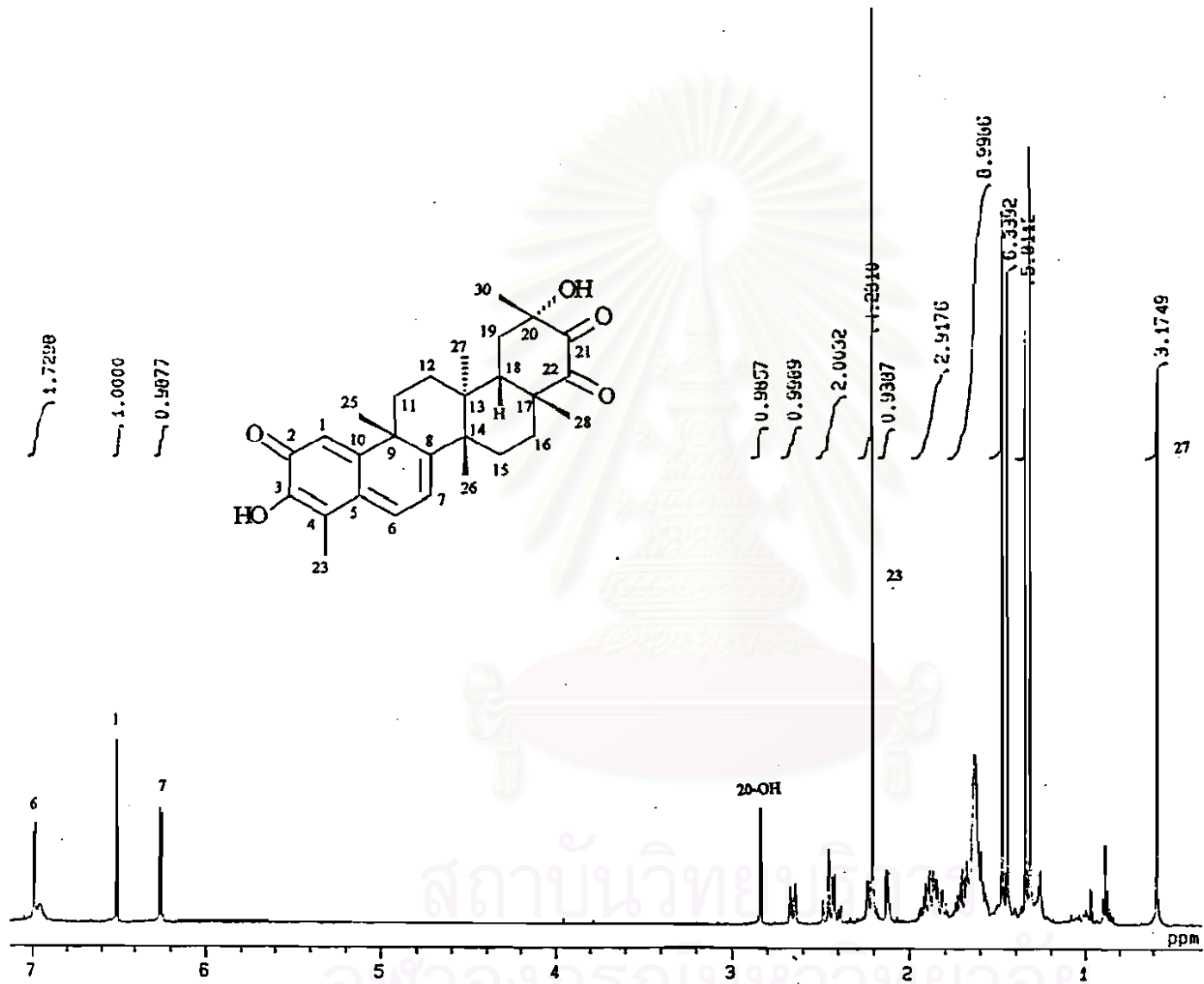


Figure 94. (a) ¹H NMR spectrum (500 MHz) of GS-Y2-4 (49) (in CDCl₃).

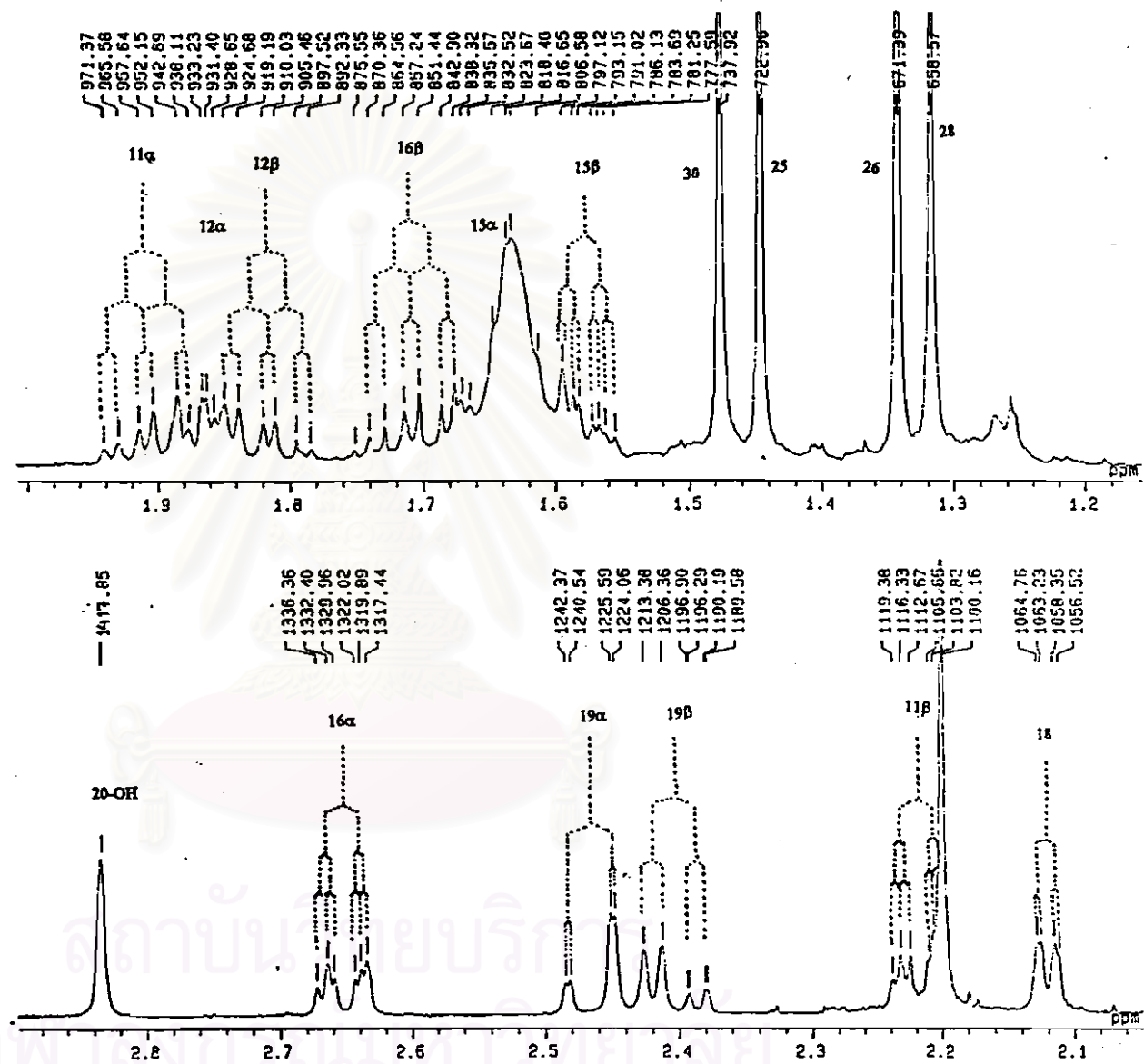
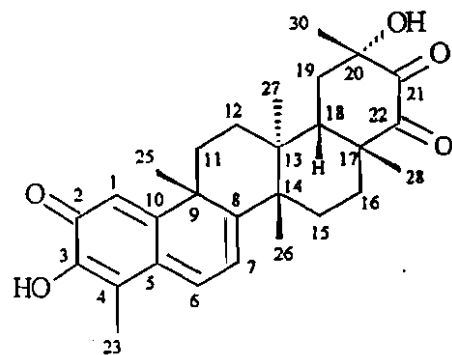


Figure 94. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-Y2-4 (49) (in CDCl_3) in the range of δ 2.9-1.2 ppm.

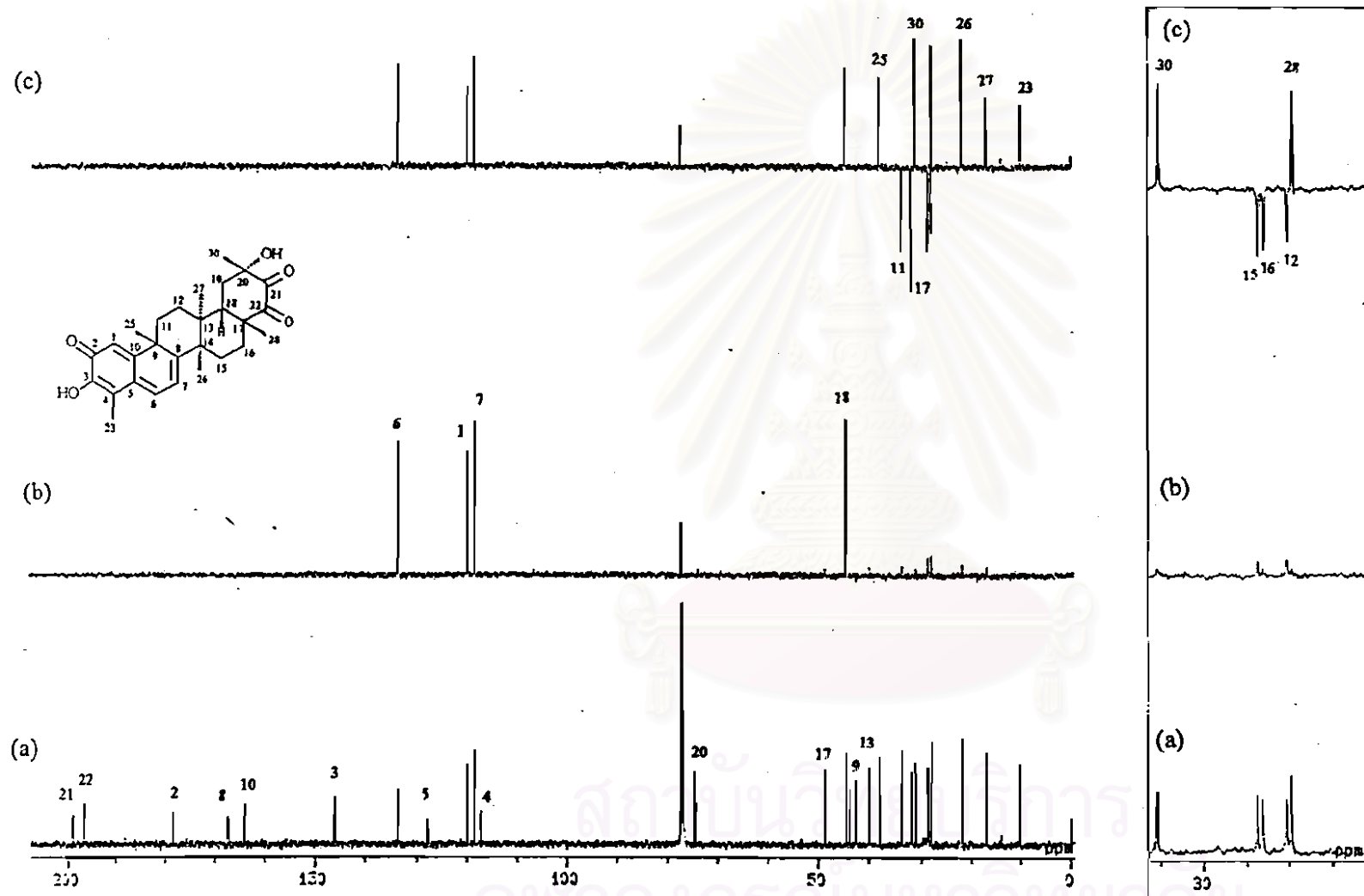


Figure 95. (a) ^{13}C NMR spectrum (125 MHz) of GS-Y2-4 (49) (in CDCl_3).
 (b) DEPT 90° spectrum.
 (c) DEPT 135° spectrum.

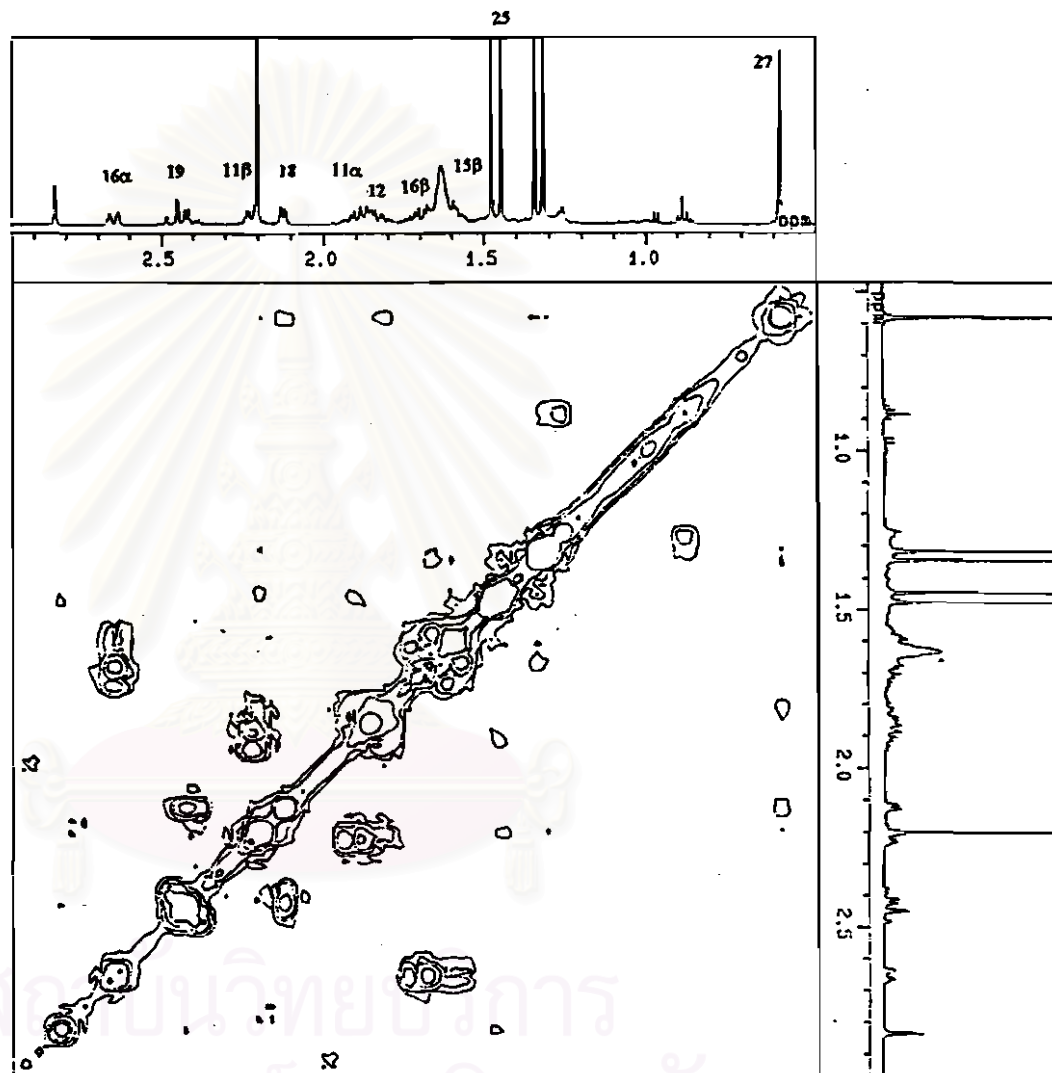
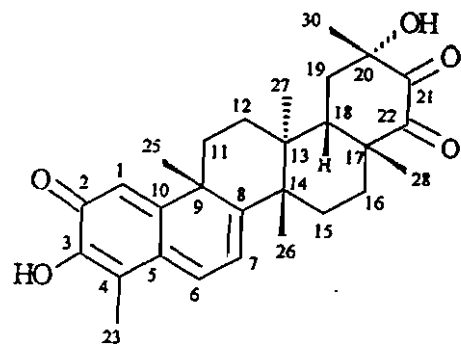


Figure 96. Expanded ^1H - ^1H COSY spectrum of GS-Y2-4 (49) (in CDCl_3) in the range of 2.6-0.0 ppm.

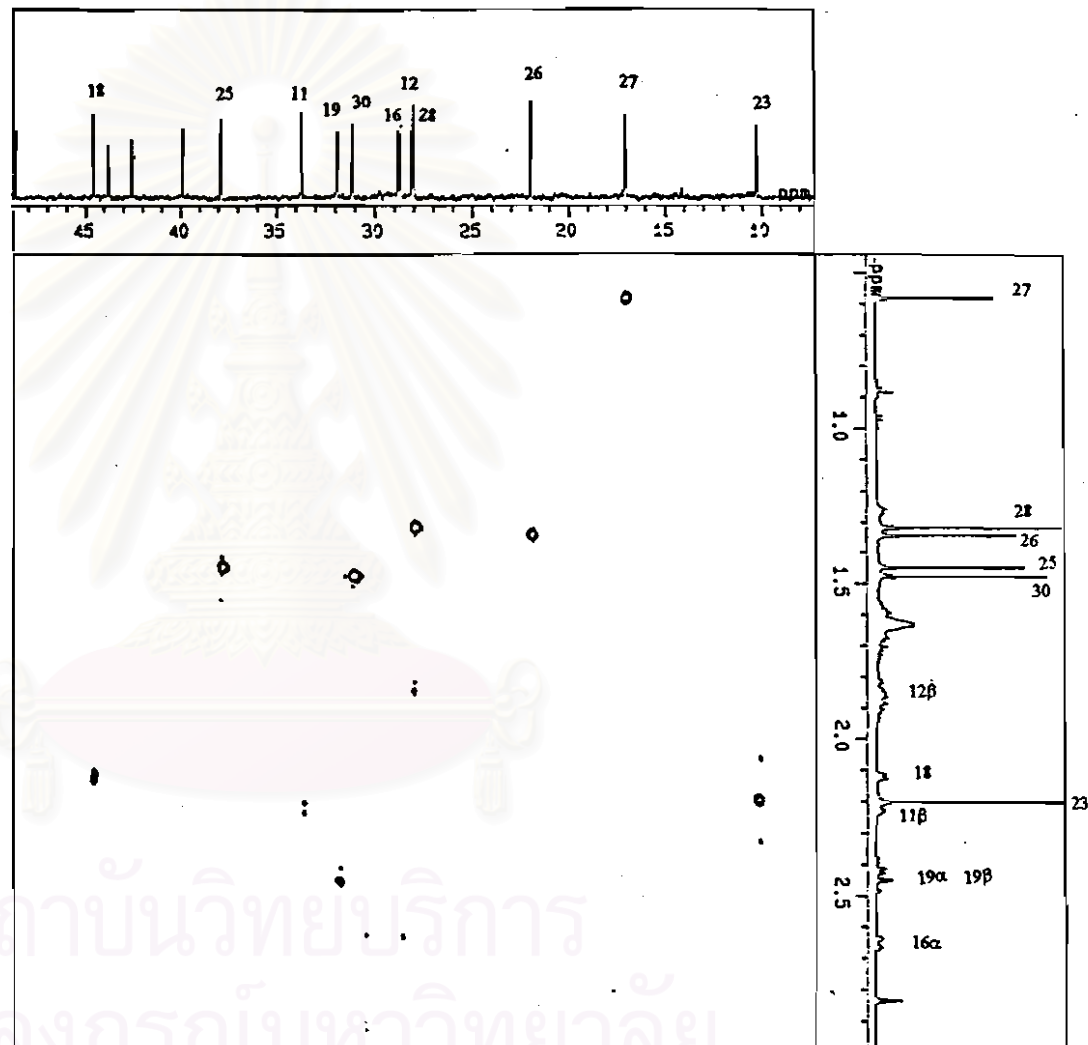
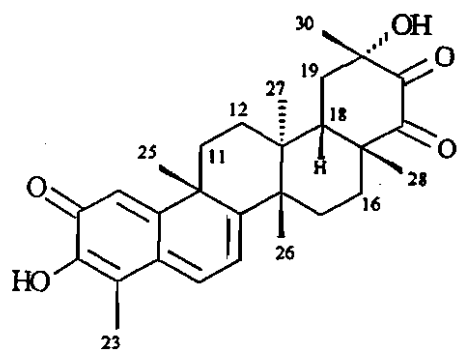


Figure 97. Expanded ^1H - ^{13}C COSY spectrum of GS-Y2-4 (49) (in CDCl_3) in the ranges of $\delta^{13}\text{C}$ 50-7 ppm and $\delta^1\text{H}$ 3.0-0.0 ppm.

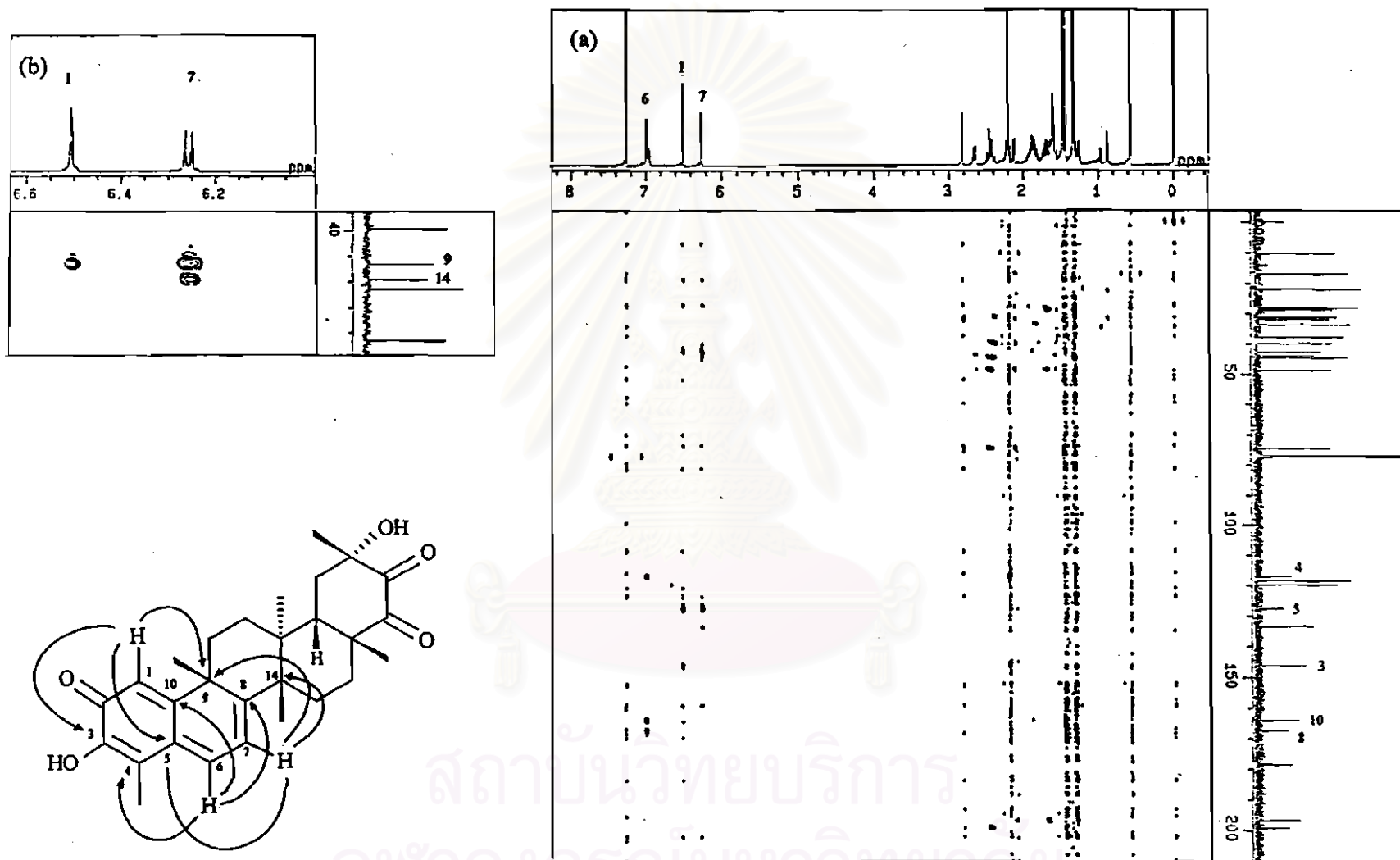


Figure 98. (a) HMBC spectrum of GS-Y2-4 (49) (in CDCl_3).

(b) Expanded HMBC spectrum of GS-Y2-4 (49) (in CDCl_3) in the ranges of δ ^1H 6.62-6.00 ppm and δ ^{13}C 50-38 ppm.

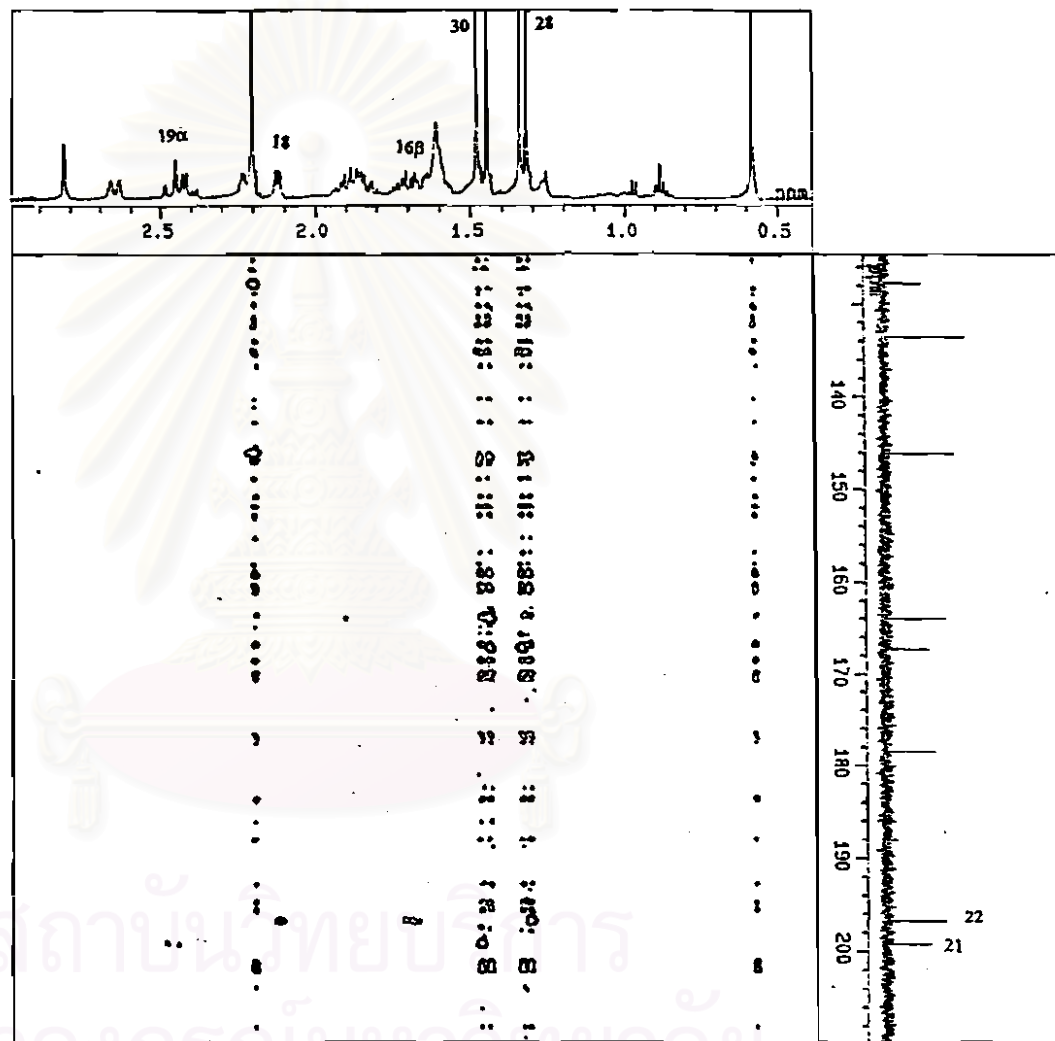
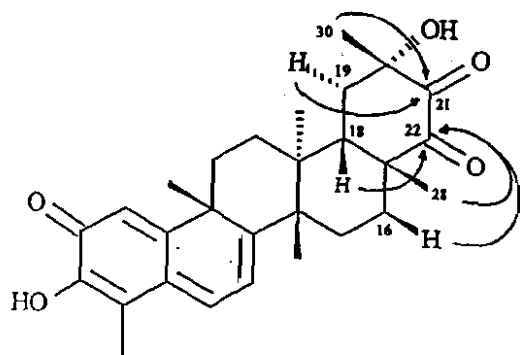


Figure 98. (c) Expanded HMBC spectrum of GS-Y2-4 (49) (in CDCl_3) in the ranges of δ ^1H 3.0-0.4 ppm and δ ^{13}C 210-124 ppm.

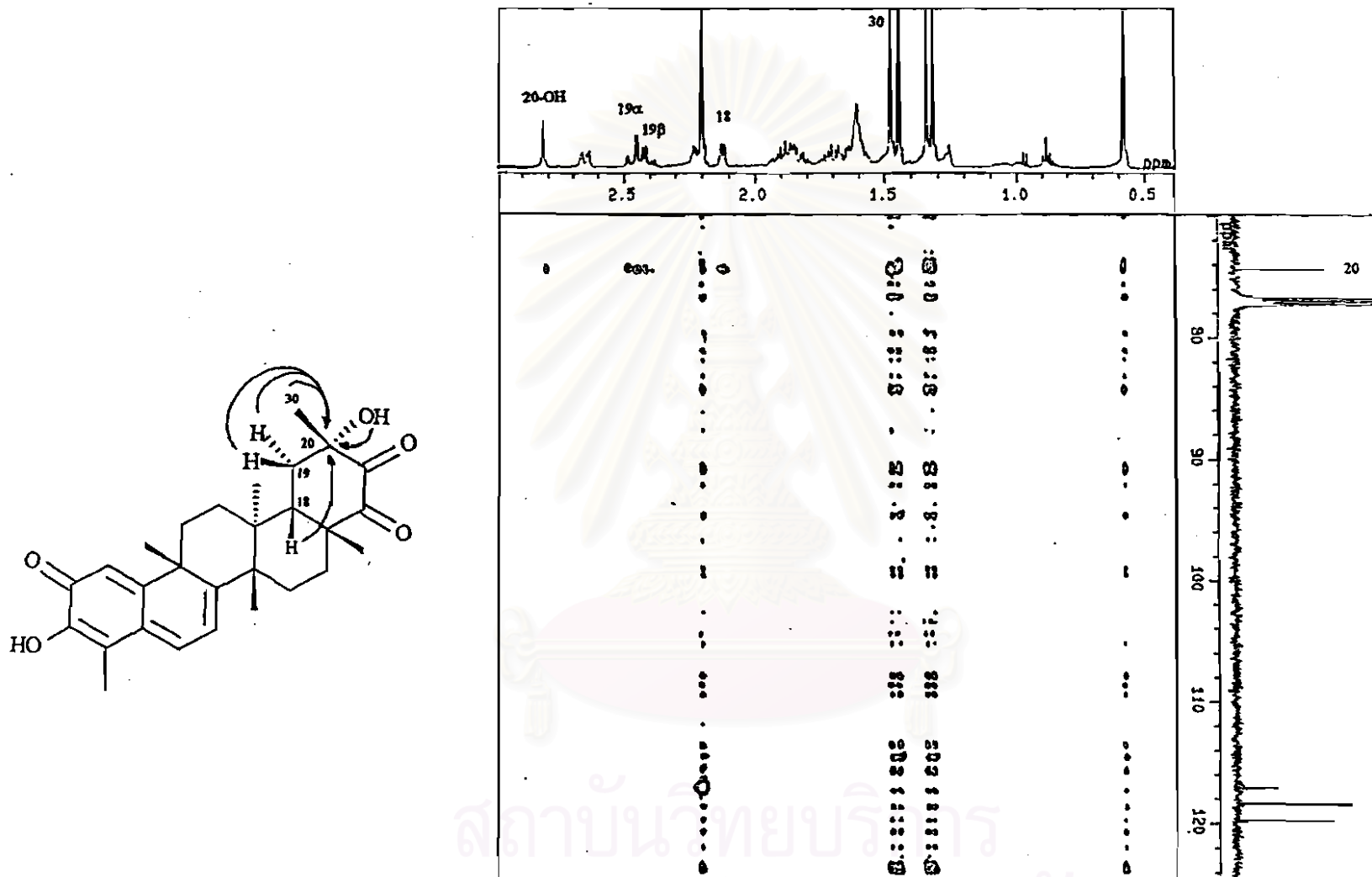


Figure 98. (d) Expanded HMBC spectrum of GS-Y2-4 (49) (in CDCl_3) in the ranges of δ ^1H 3.0-0.4 ppm and δ ^{13}C 124-70 ppm.

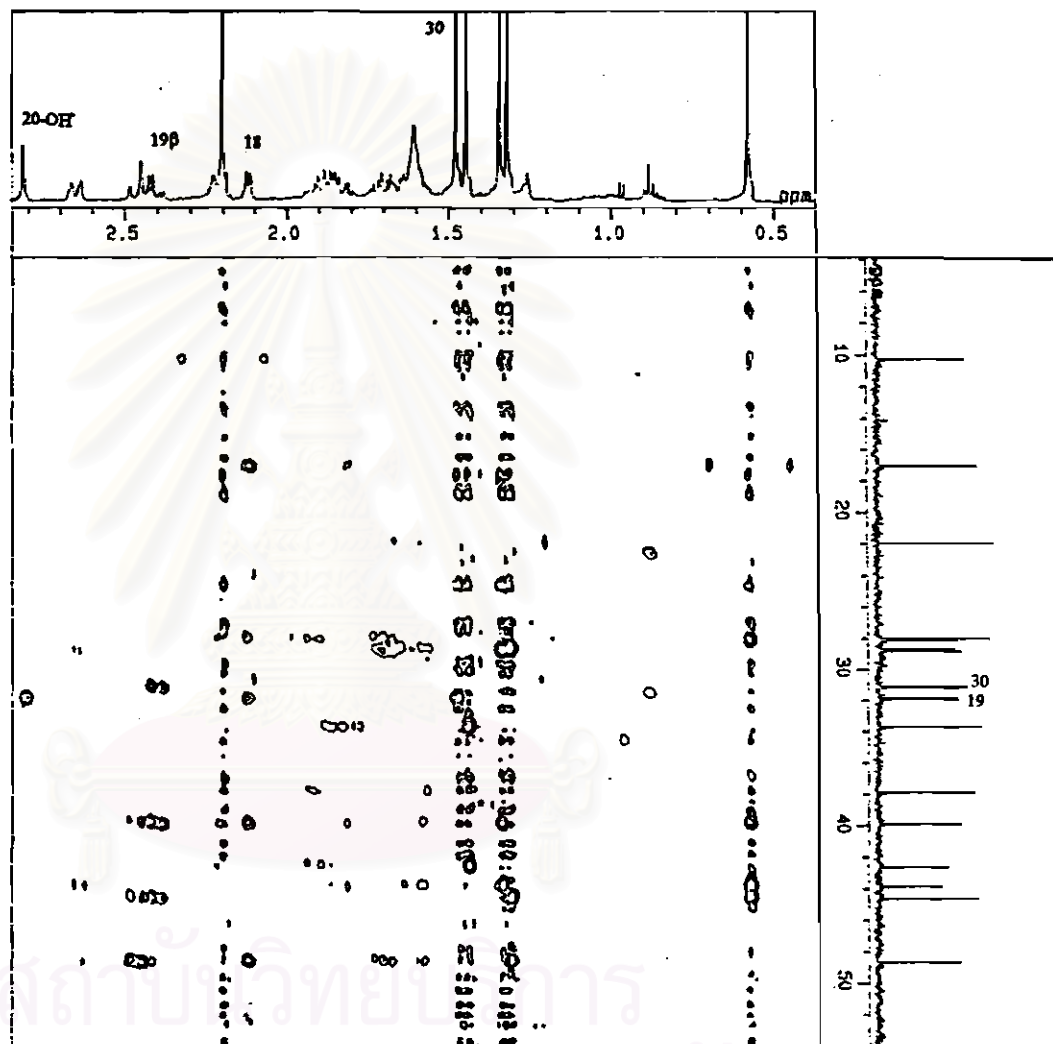
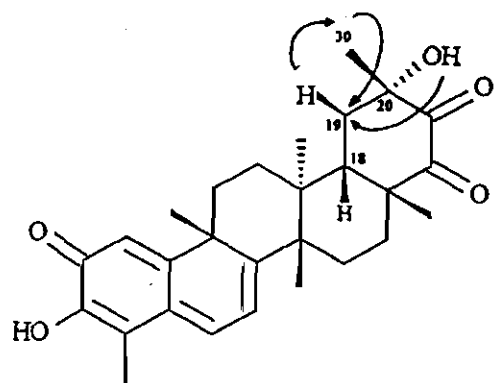


Figure 98. (e) Expanded HMBC spectrum of GS-Y2-4 (49) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 3.0-0.4 ppm and $\delta^{13}\text{C}$ 54-4 ppm.

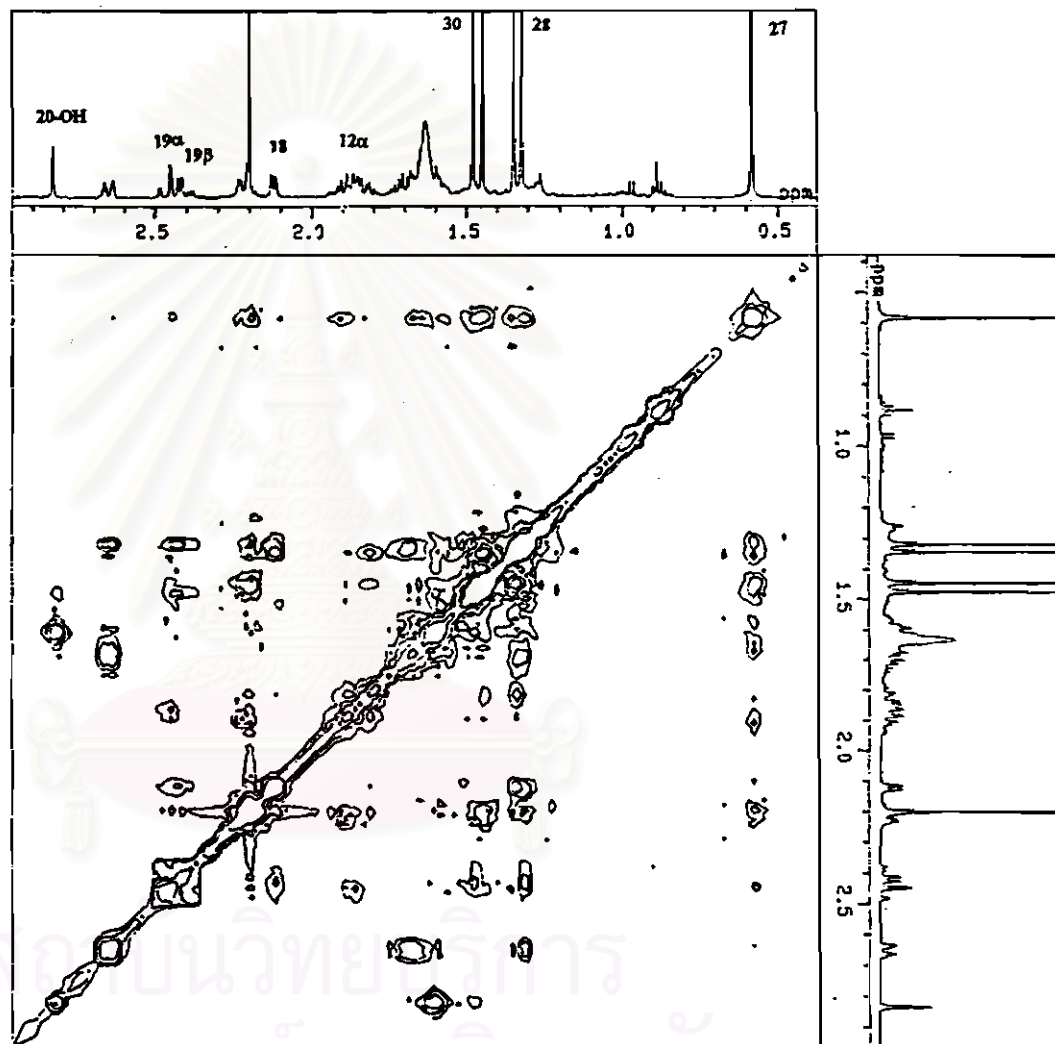
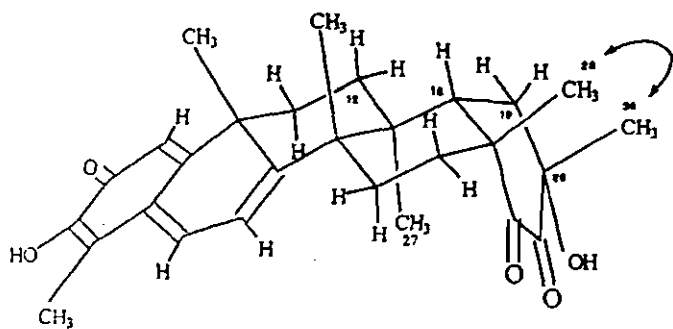


Figure 99. Expanded NOESY spectrum of GS-Y2-4 (49) (in CDCl_3) in the ranges of δ 3.0-0.4 ppm.

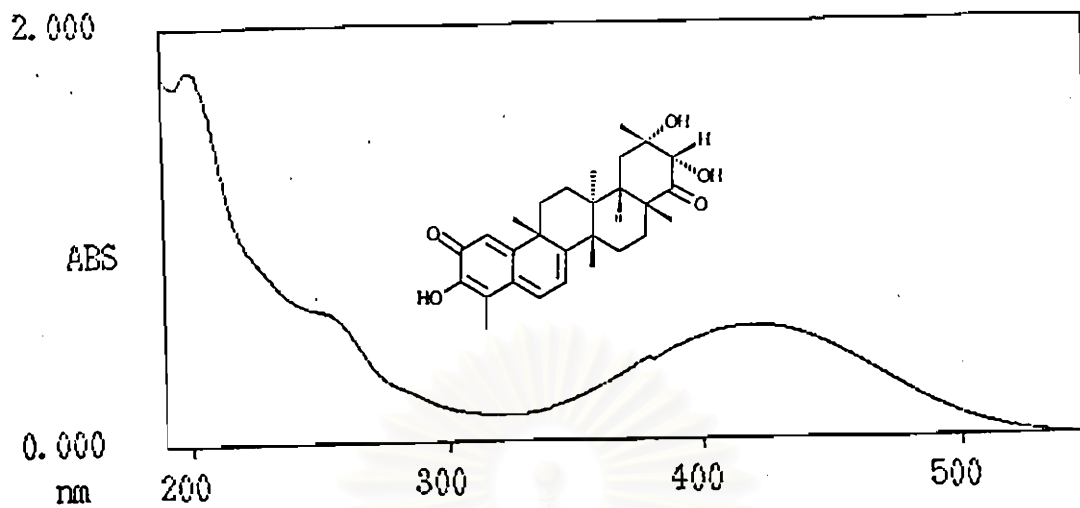


Figure 100. UV absorption spectrum of GS-Y2-5 (48) (in MeOH).

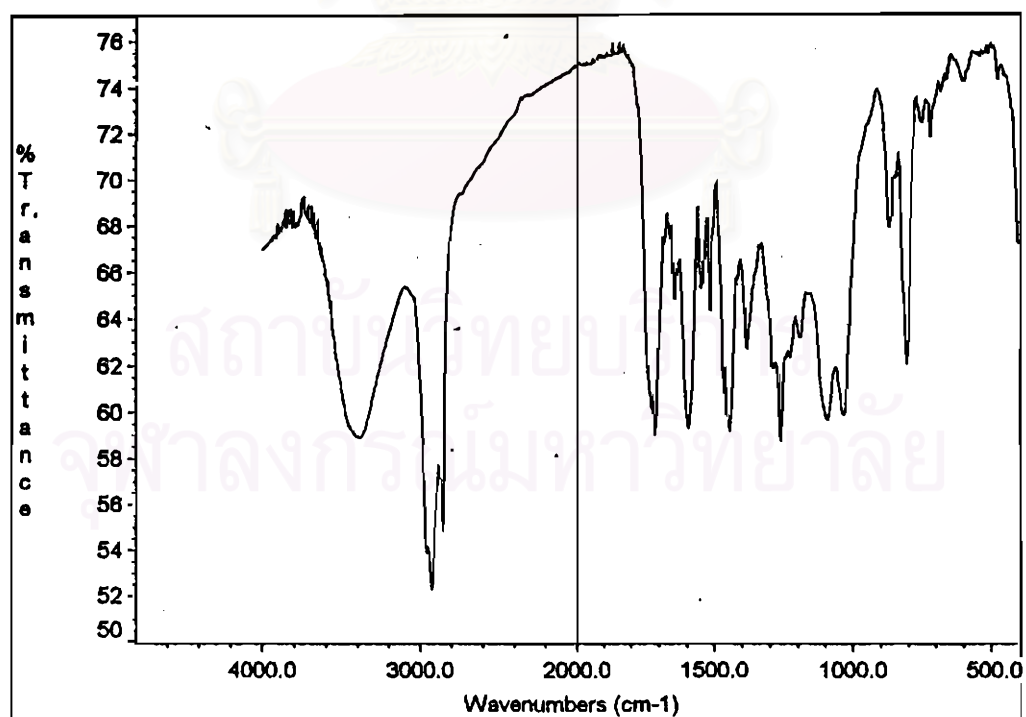


Figure 101. IR spectrum of GS-Y2-5 (48) (dry film).

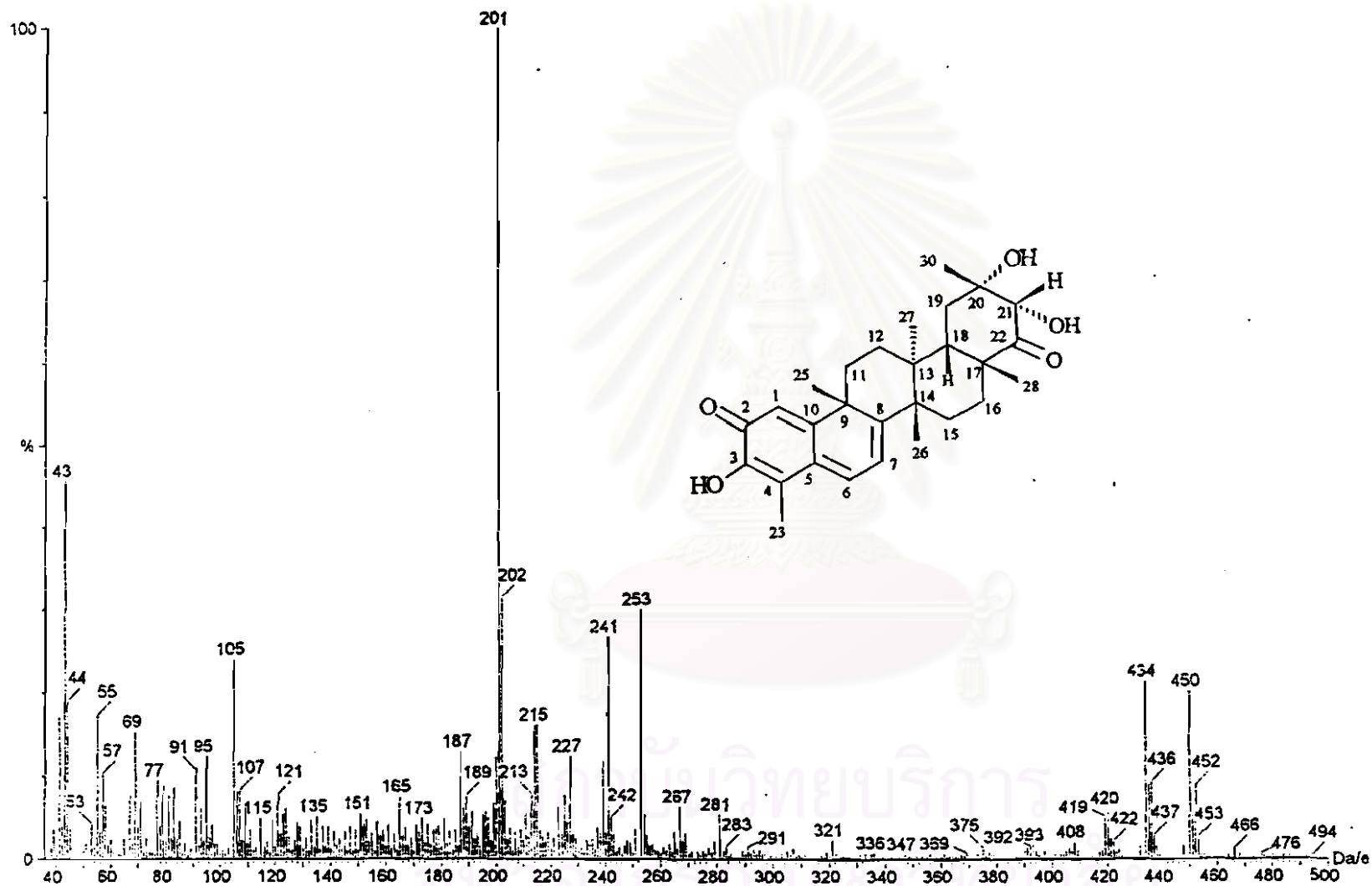


Figure 102. EIMS of GS-Y2-5 (48).

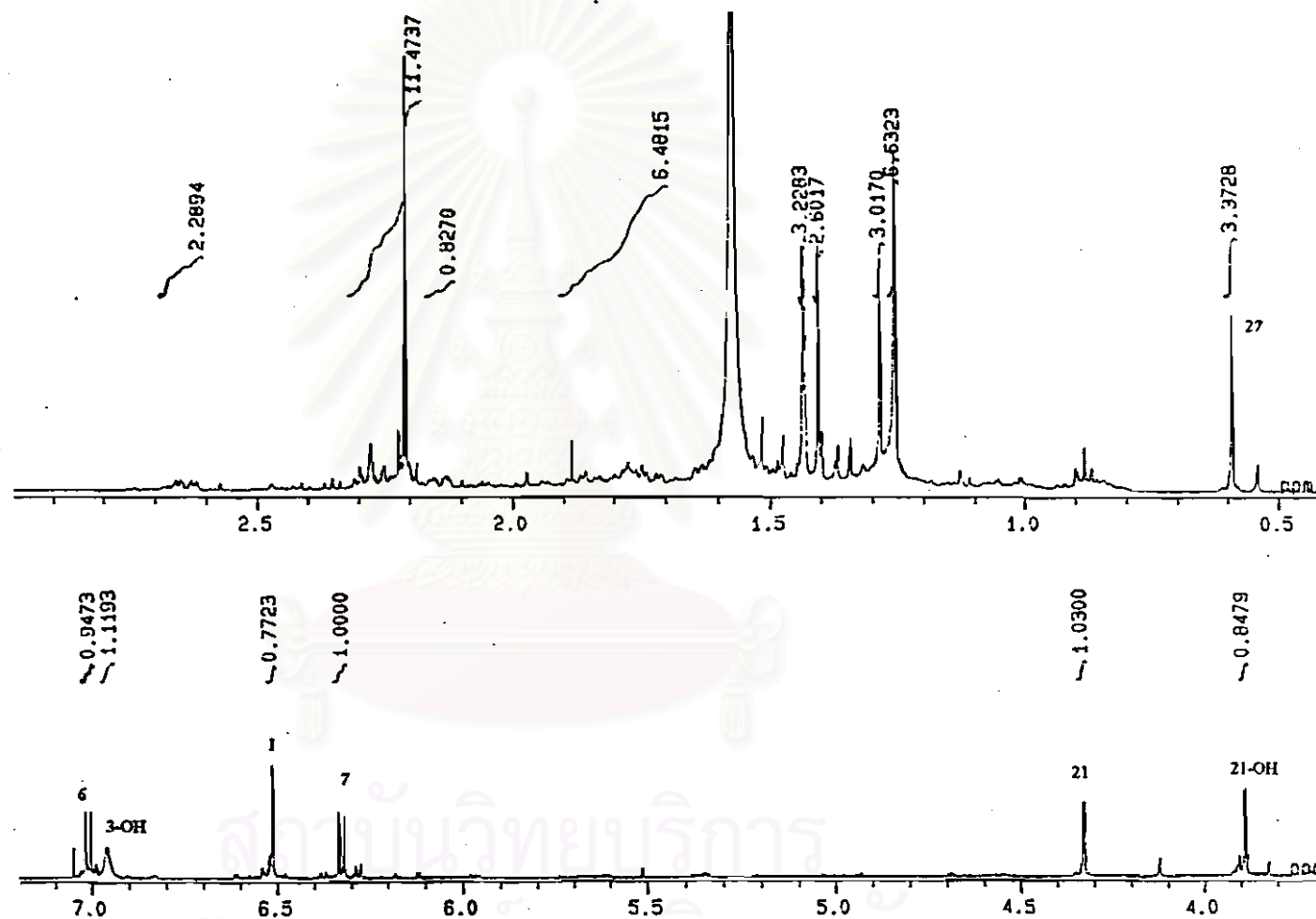
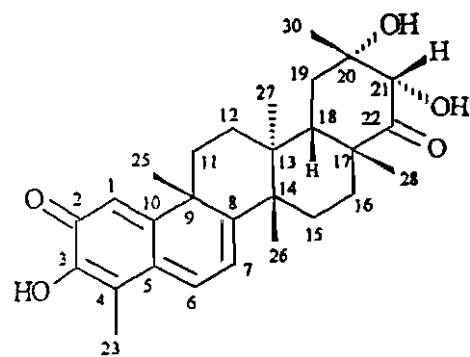


Figure 103. (a) ^1H NMR spectrum (500 MHz) of GS-Y2-5 (48) (in CDCl_3).

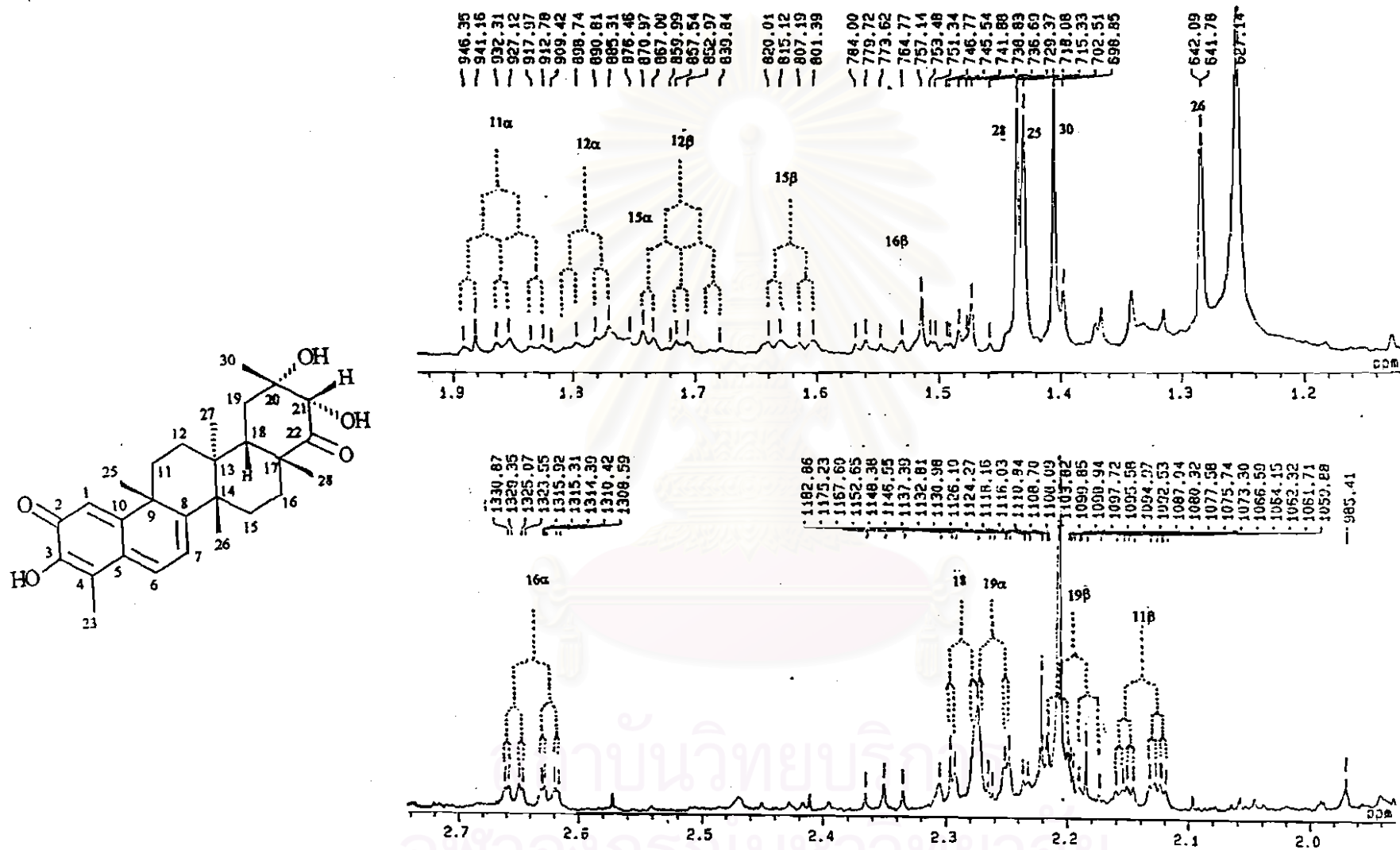


Figure 103. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-Y2-5 (48) (in CDCl_3) in the range of δ 2.74-1.12 ppm.

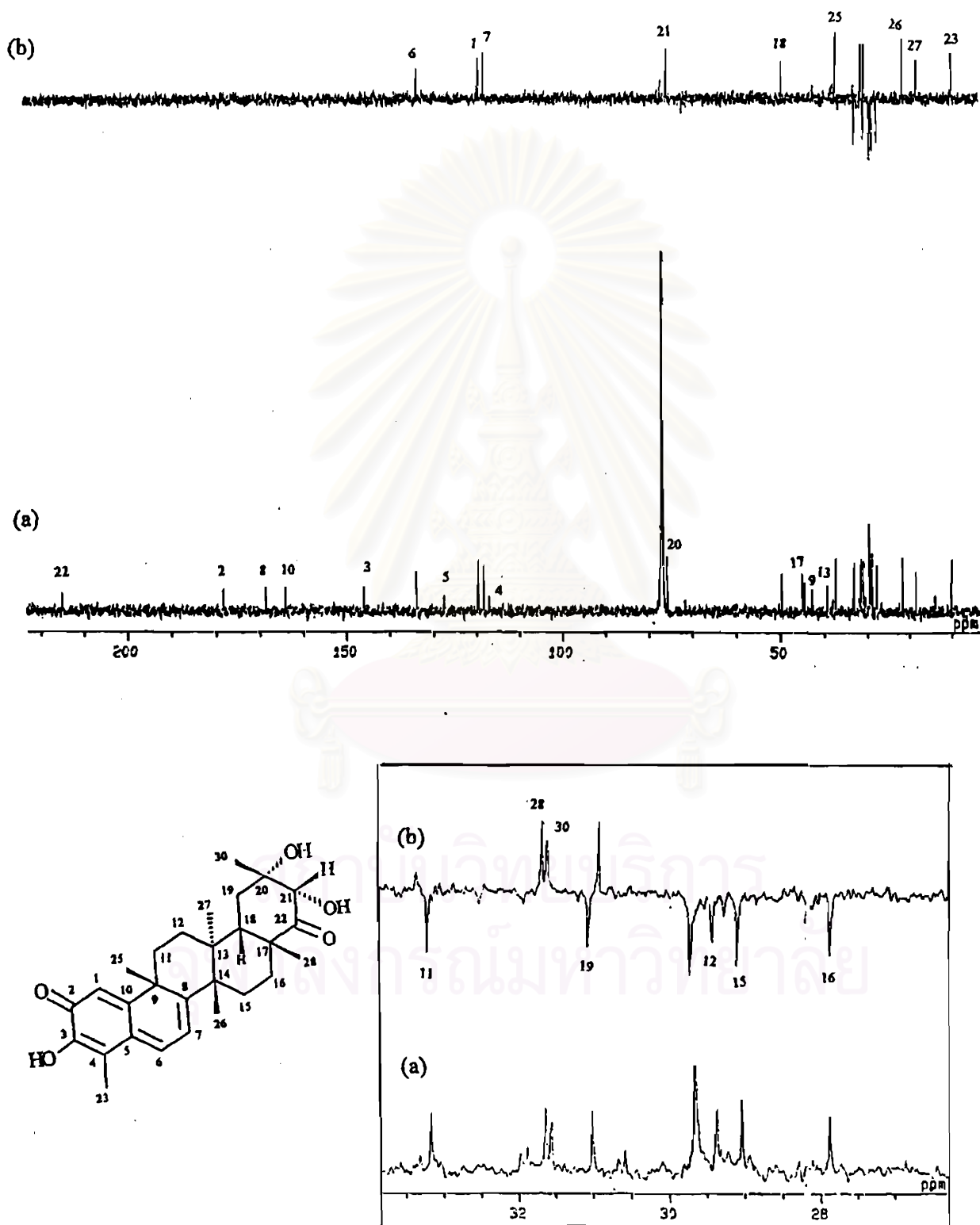


Figure 104. (a) ^{13}C NMR spectrum (125 MHz) of GS-Y2-5 (48) (in CDCl_3).
 (b) DEPT 135° spectrum.

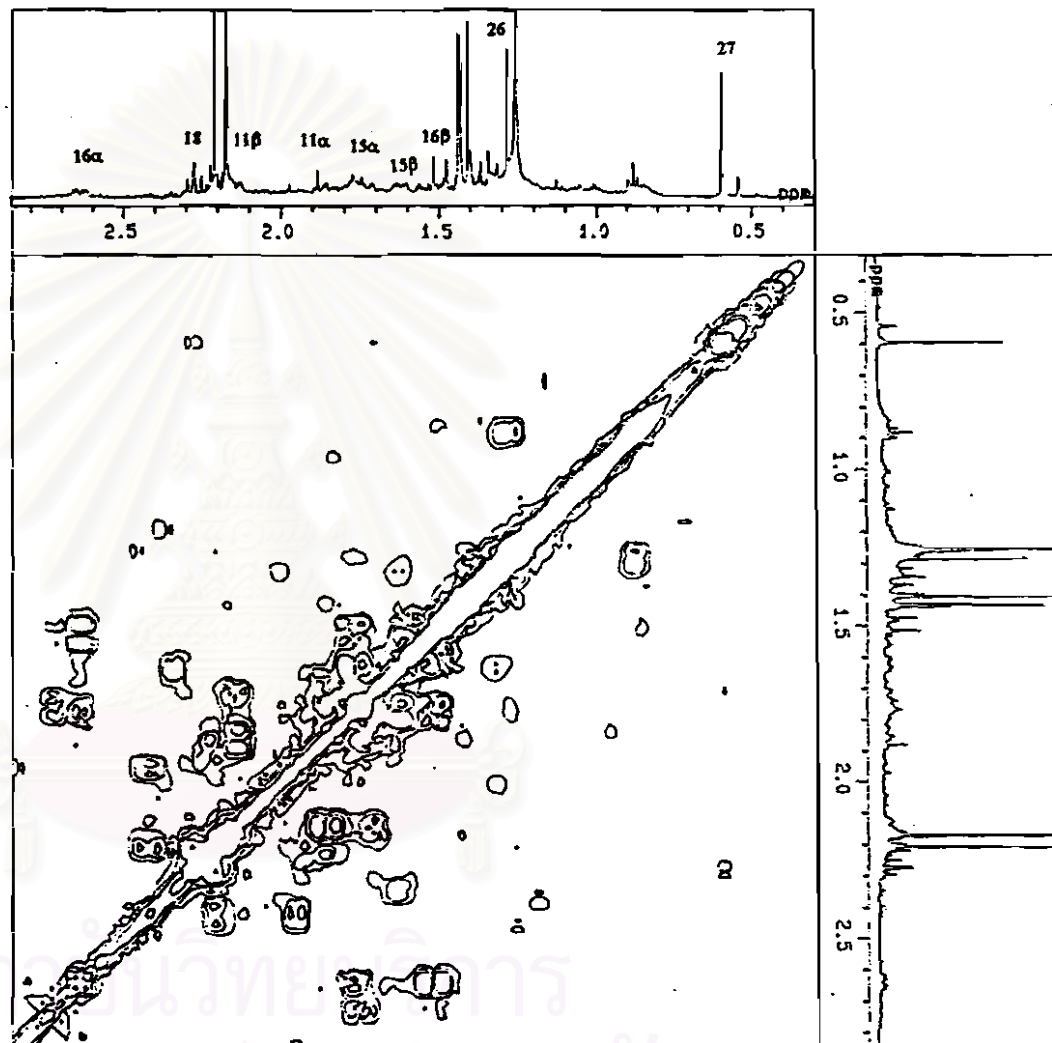
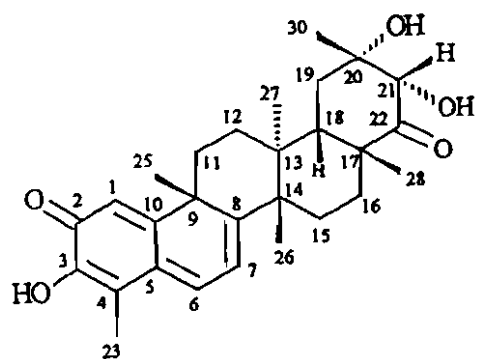


Figure 105. Expanded ^1H - ^1H COSY spectrum of GS-Y2-5 (48) (in CDCl_3) in the range of 2.9-0.3 ppm.

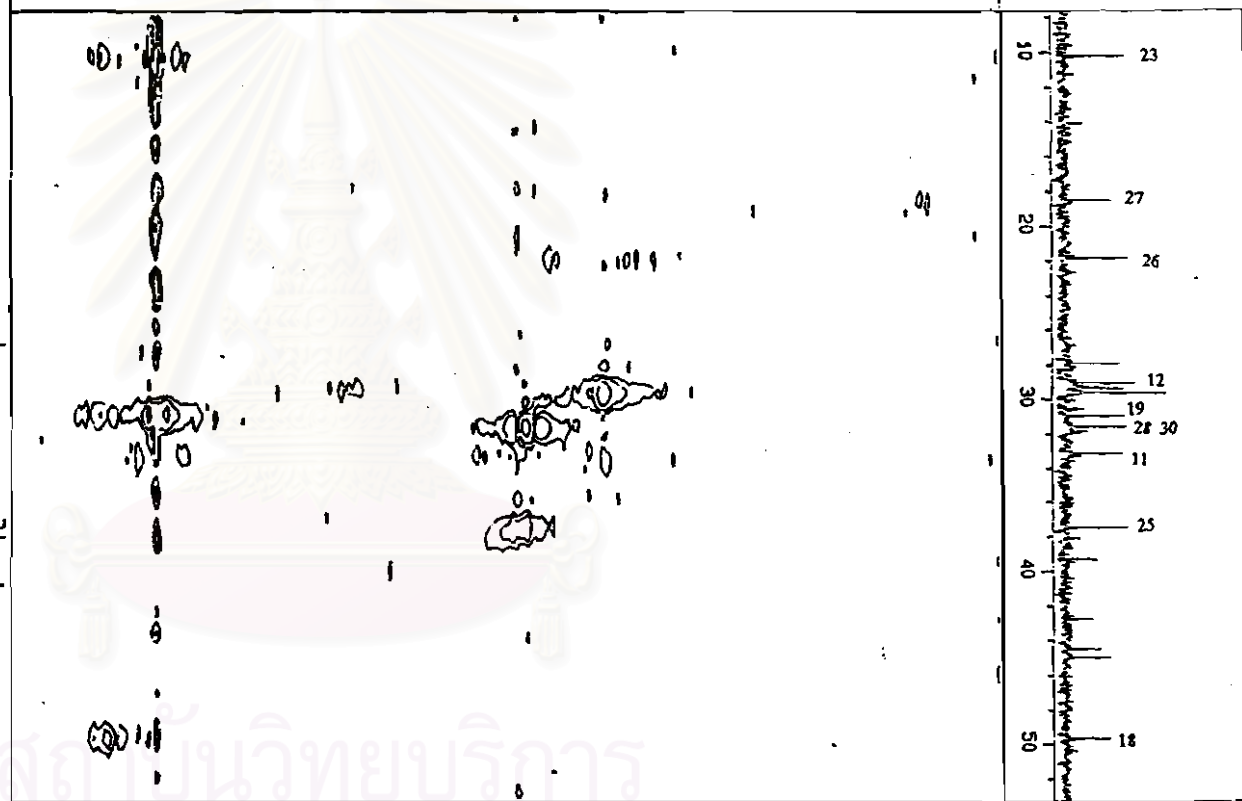
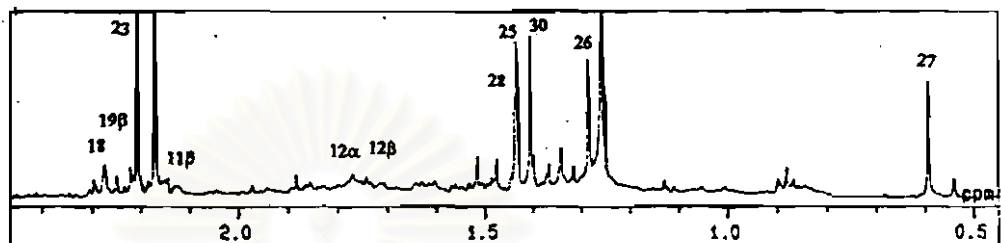
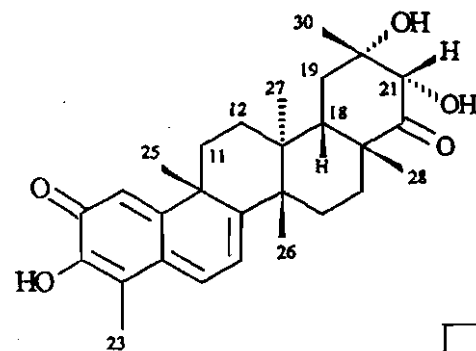


Figure 106. Expanded HMQC spectrum of GS-Y2-5 (48) (in CDCl_3) in the ranges of δ ^1H 3.0-0.4 ppm and δ ^{13}C 53-8 ppm.

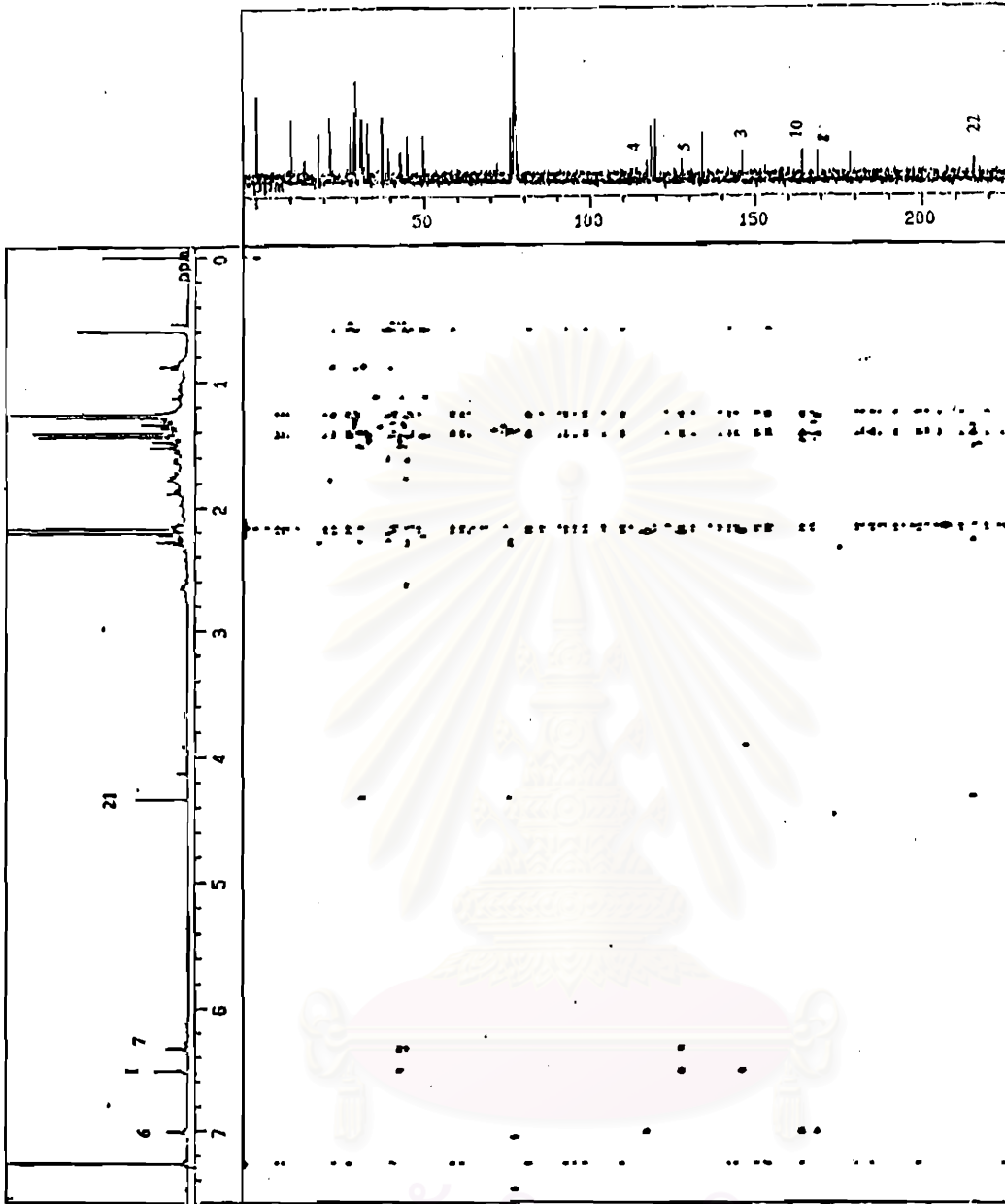
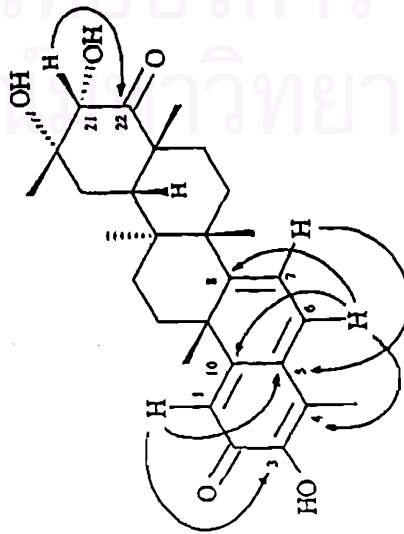


Figure 107. (a) HMBC spectrum of GS-Y2-5 (48) (in CDCl₃).



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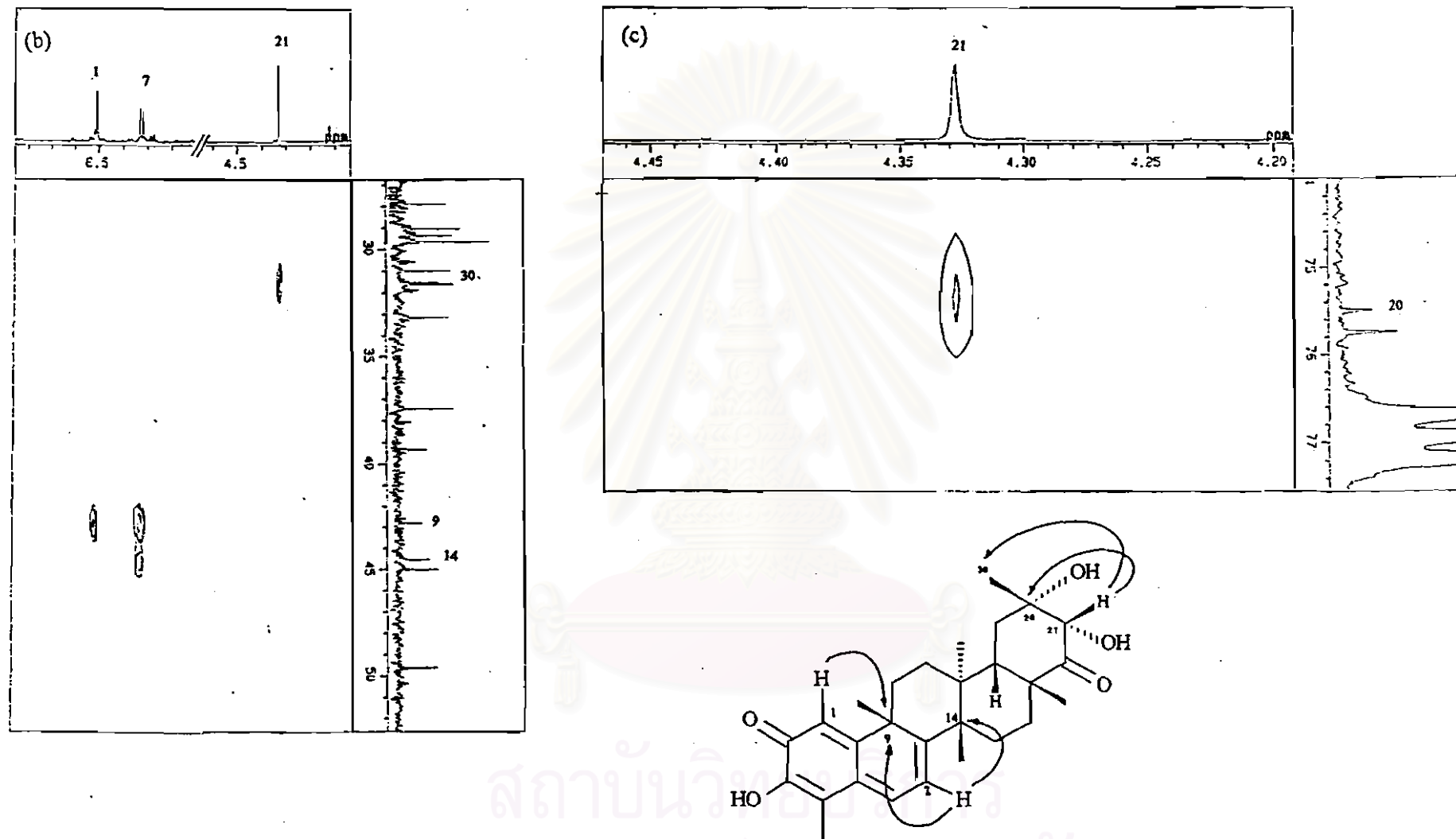


Figure 107. (b) Expanded HMBC spectrum of GS-Y2-5 (48) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 6.9-4.0 ppm and $\delta^{13}\text{C}$ 53-27 ppm.
 (c) Expanded HMBC spectrum of GS-Y2-5 (48) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 4.47-4.19 ppm and $\delta^{13}\text{C}$ 78-74 ppm.

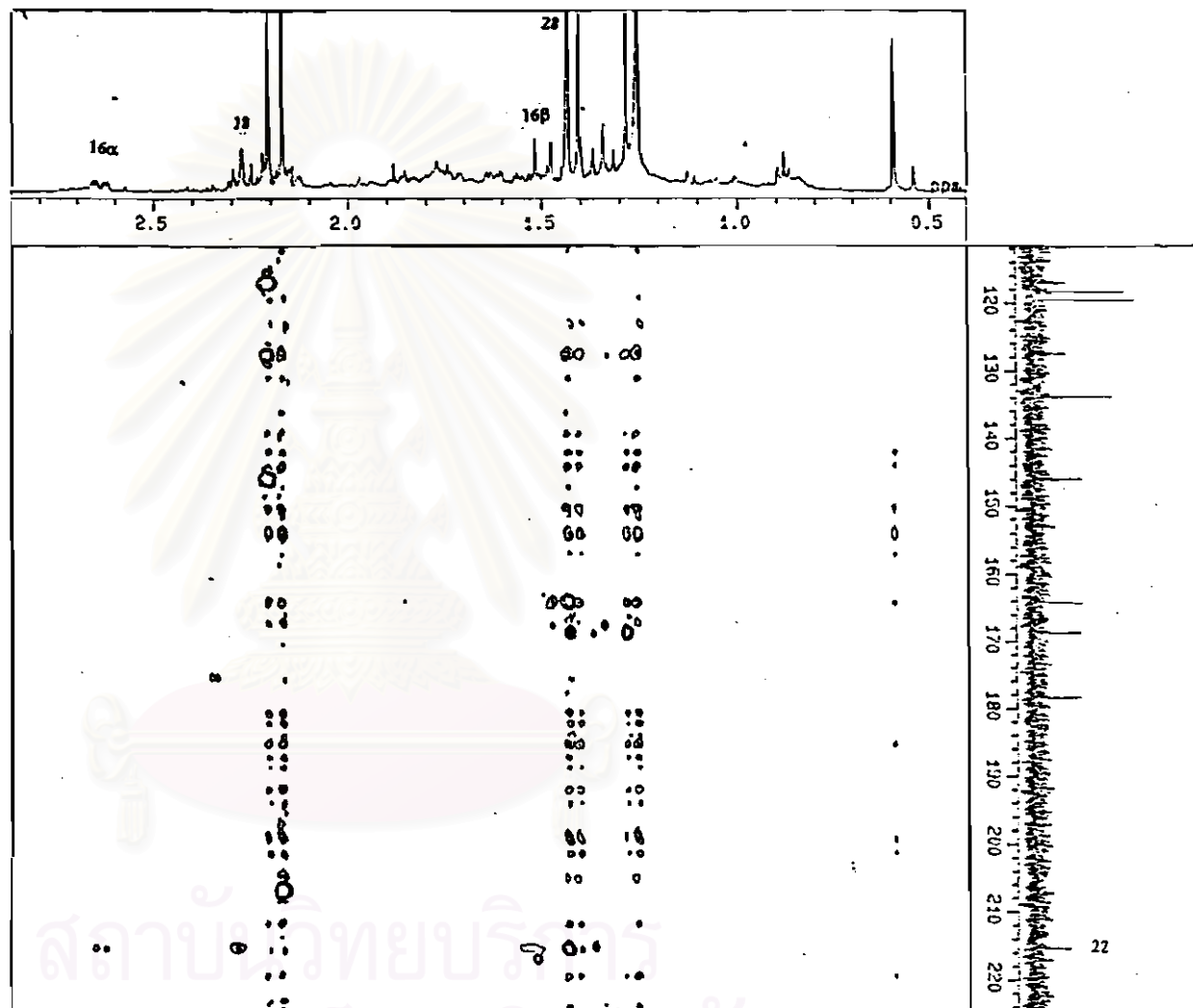
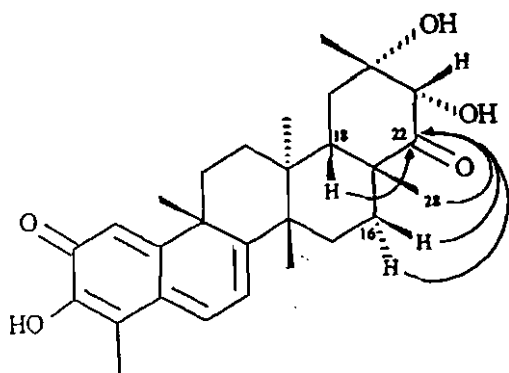
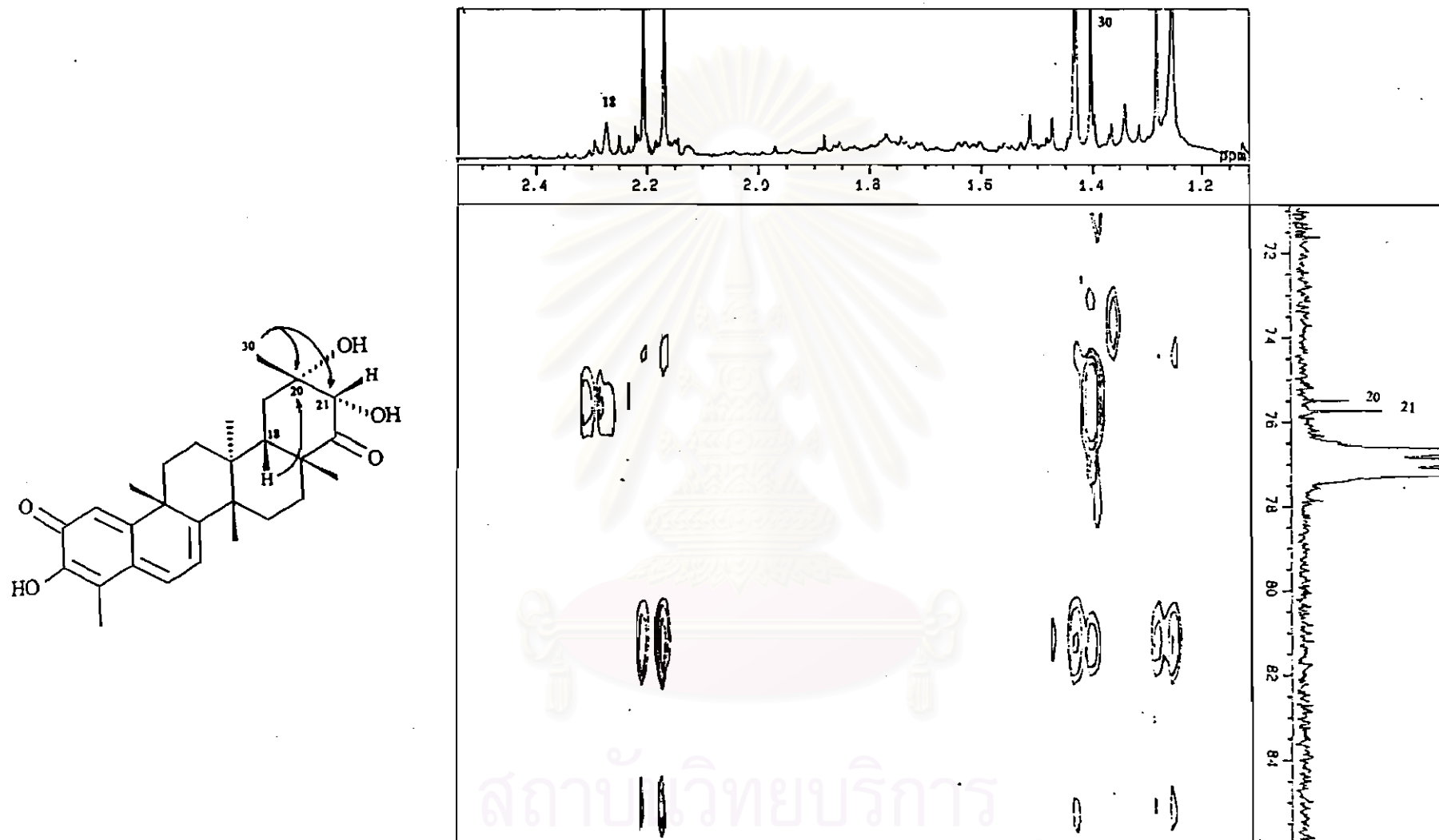


Figure 107. (d) Expanded HMBC spectrum of GS-Y2-5 (48) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 2.9-0.4 ppm and $\delta^{13}\text{C}$ 224-110 ppm .



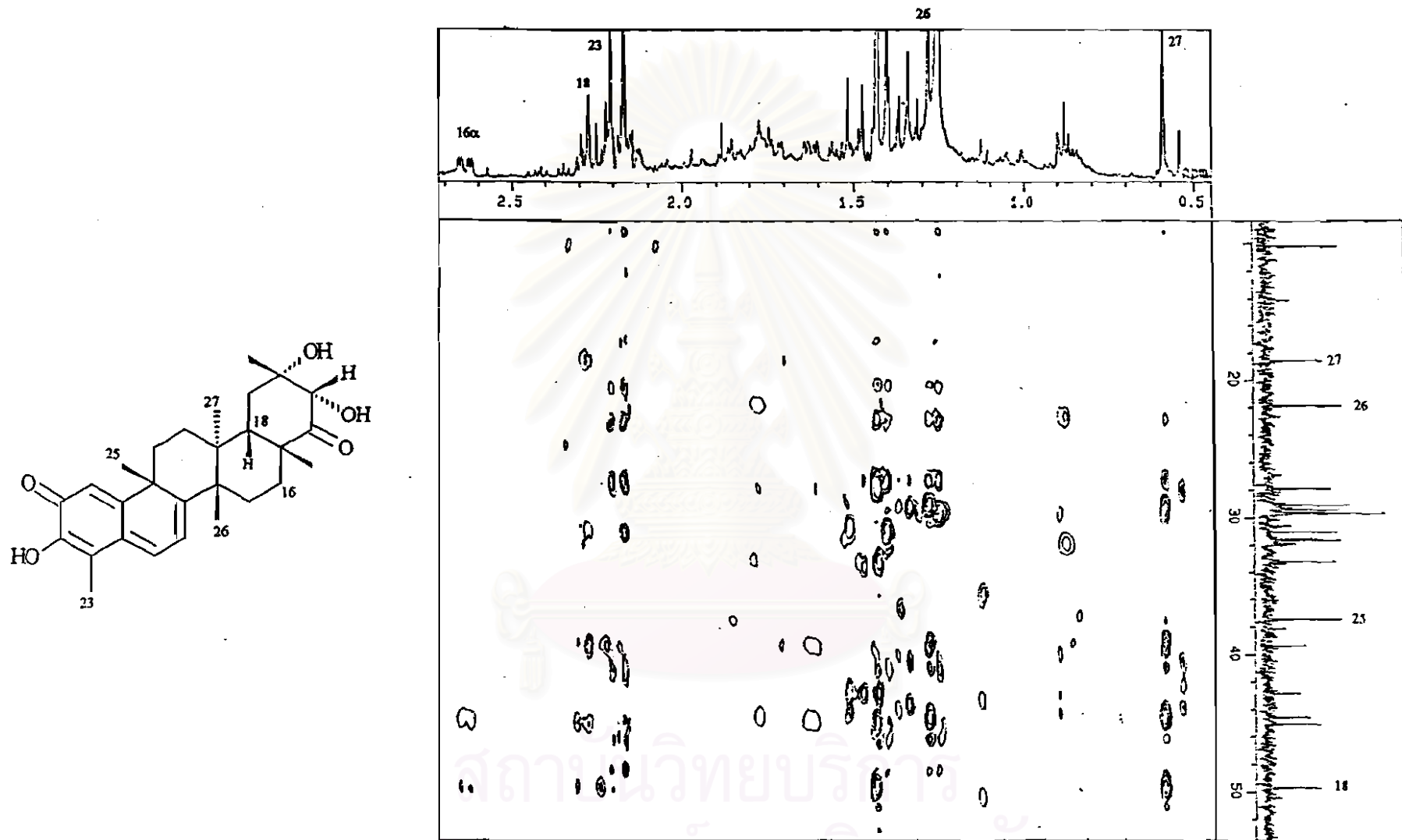


Figure 107. (f) Expanded HMBC spectrum of GS-Y2-5 (48) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 2.7-0.4 ppm and $\delta^{13}\text{C}$ 54-8 ppm.

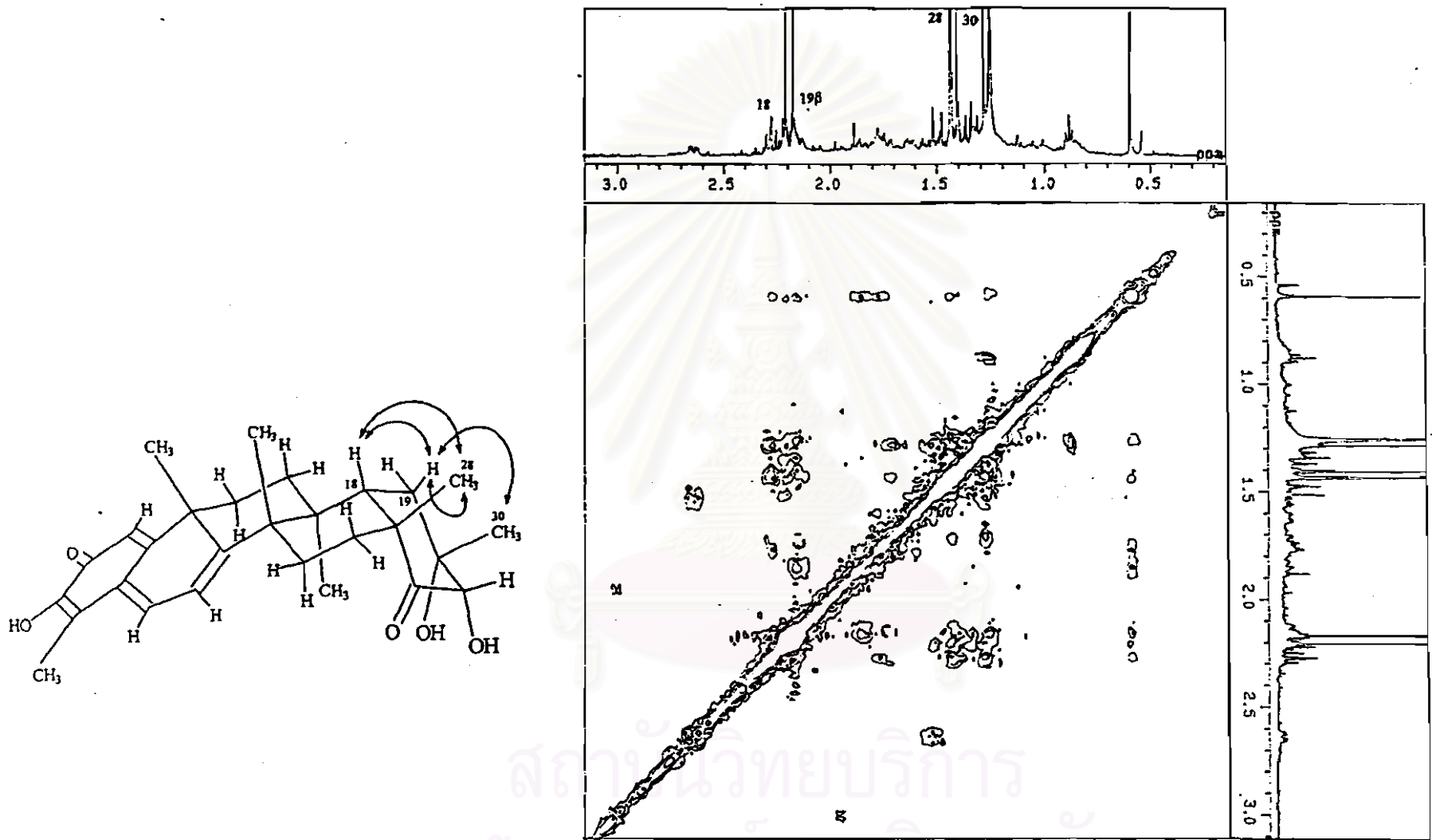


Figure 108. (a) Expanded NOESY spectrum of GS-Y2-5 (48) (in CDCl₃) in the ranges of δ 3.2-0.1 ppm.

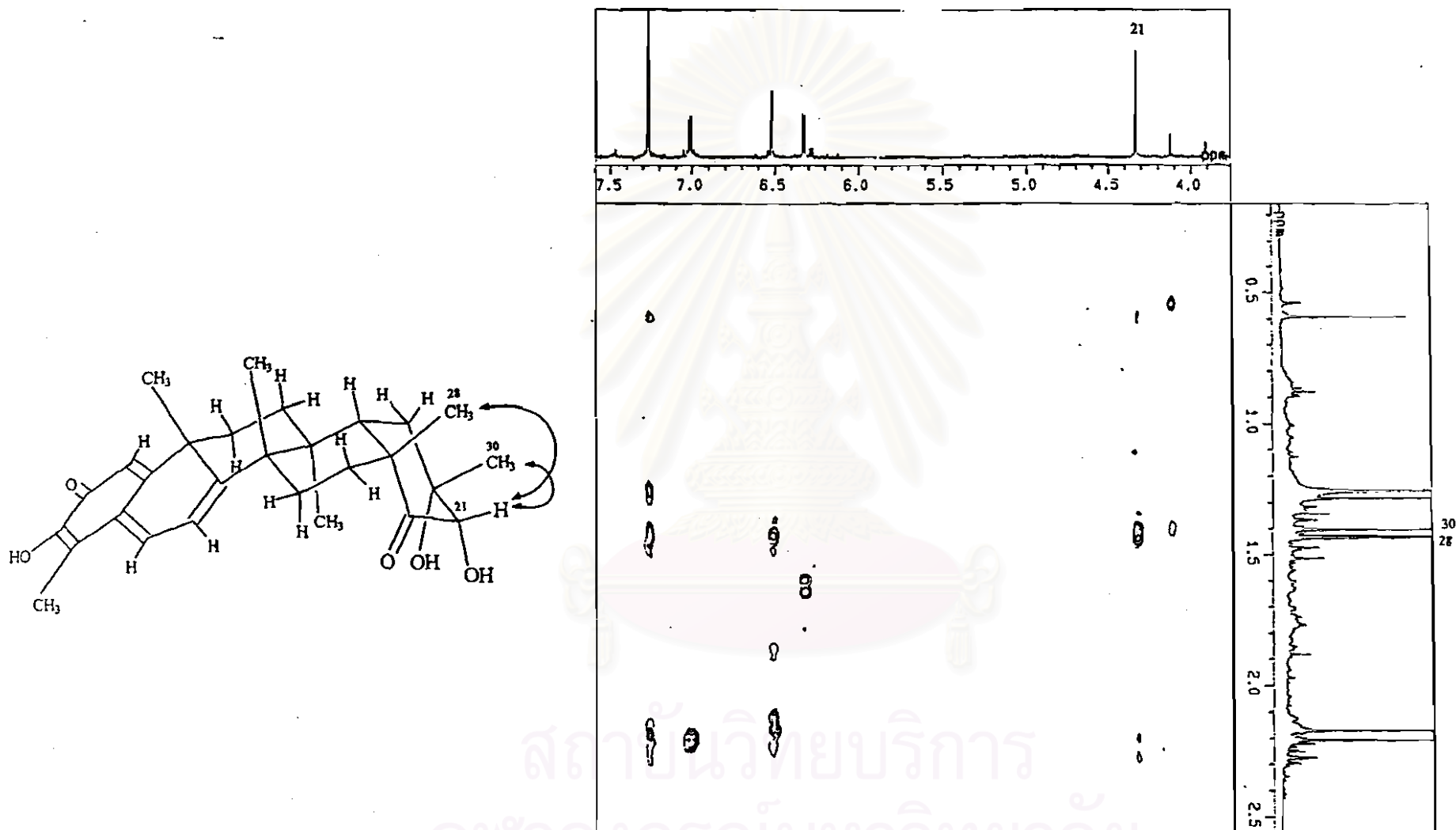


Figure 108. (b) Expanded NOESY spectrum of GS-Y2-5 (48) (in CDCl₃) between the ranges of δ 7.6-3.8 ppm and δ 2.6-0.1 ppm.

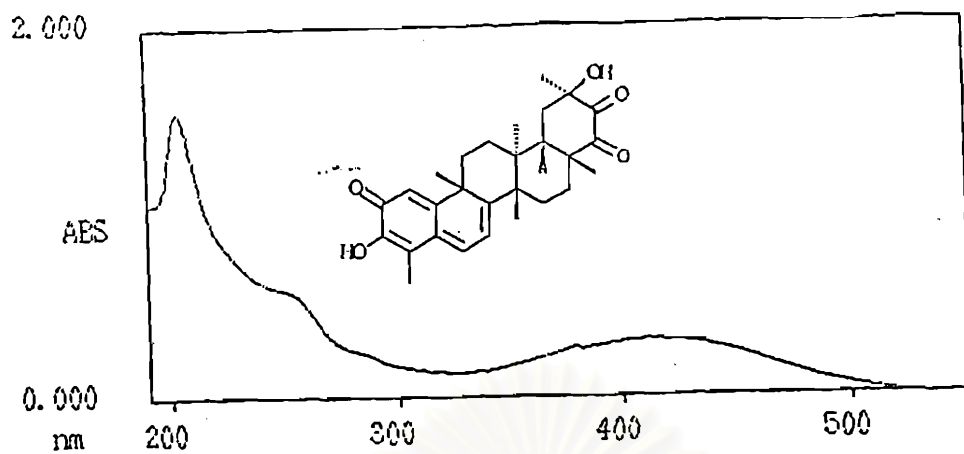


Figure 109. UV absorption spectrum of GS-Y2-6 (50) (in MeOH).

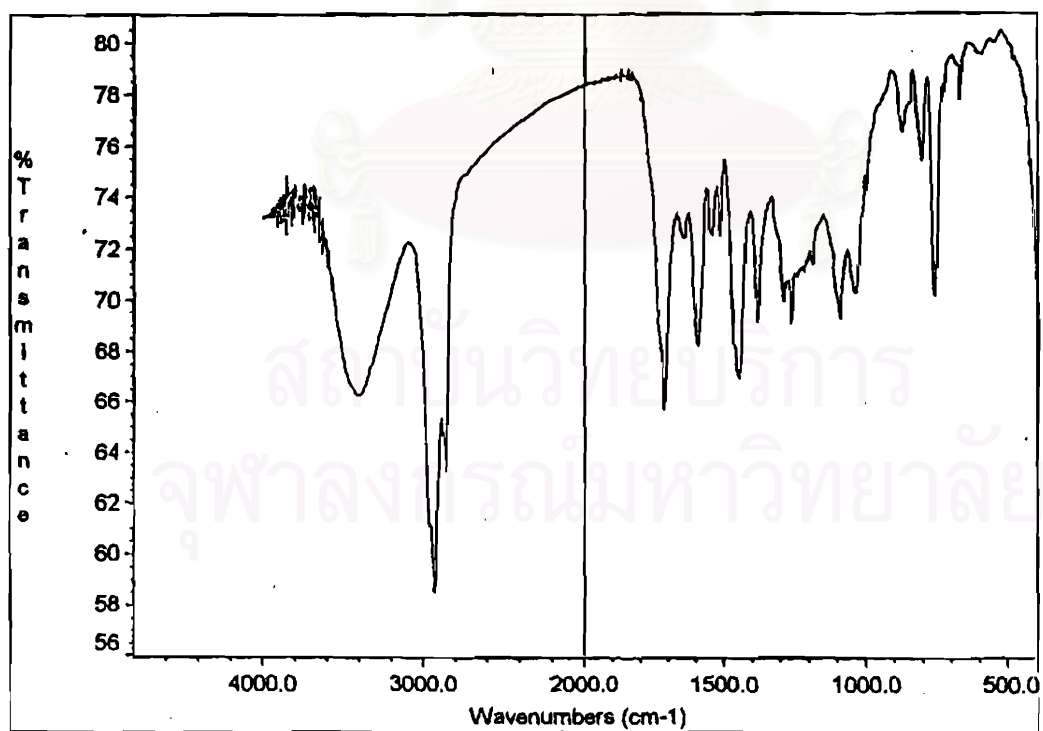


Figure 110. IR spectrum of GS-Y2-6 (50) (dry film).

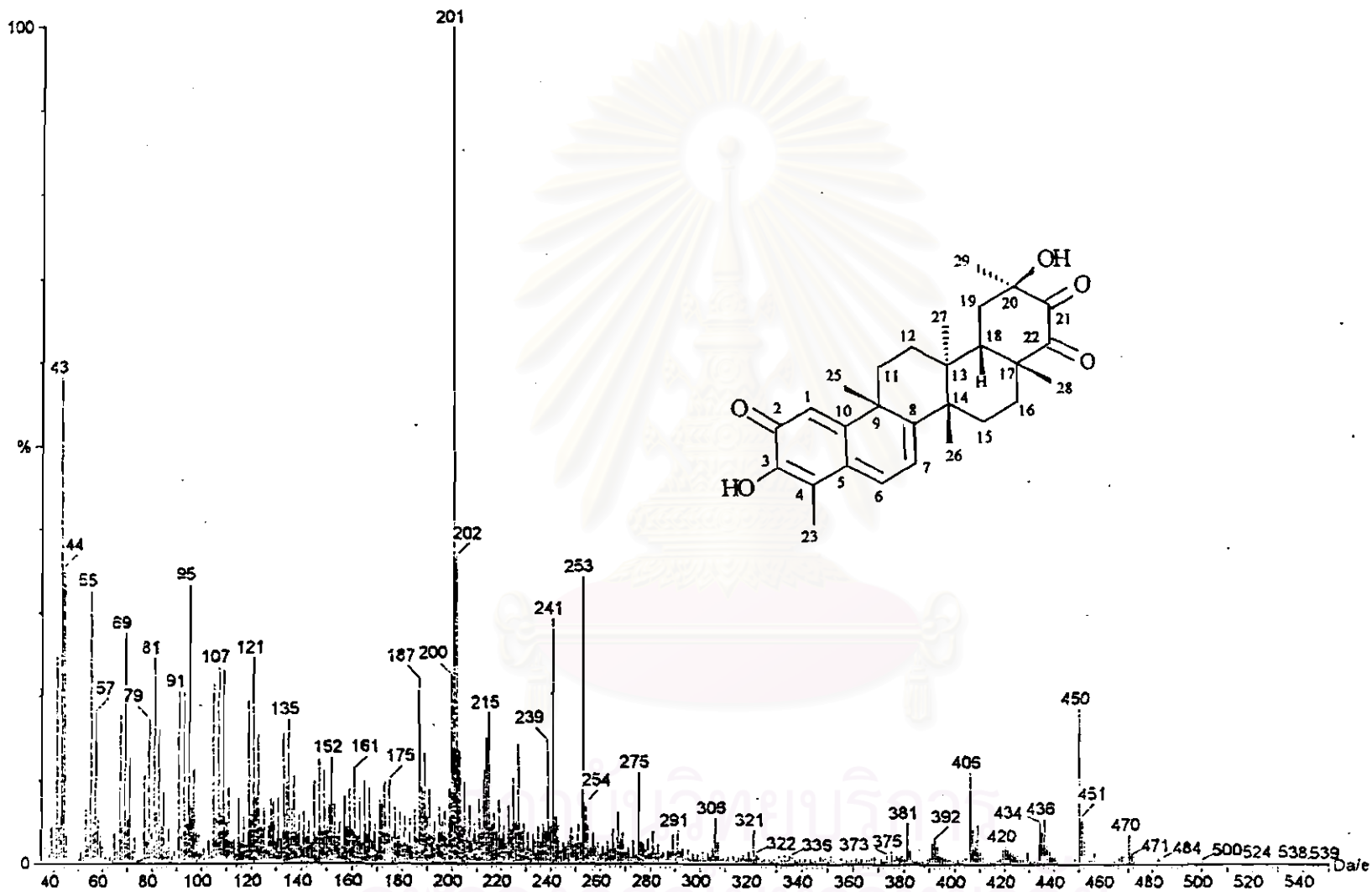


Figure 111. EIMS of GS-Y2-6 (50).

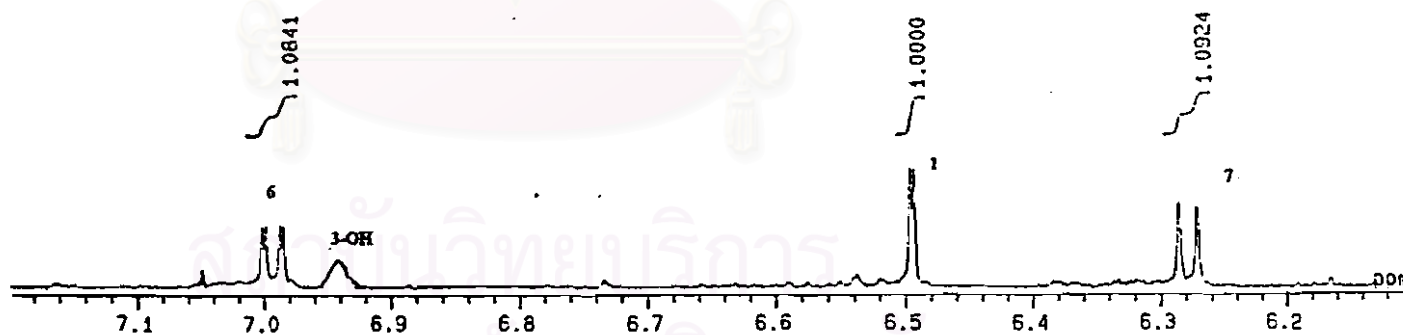
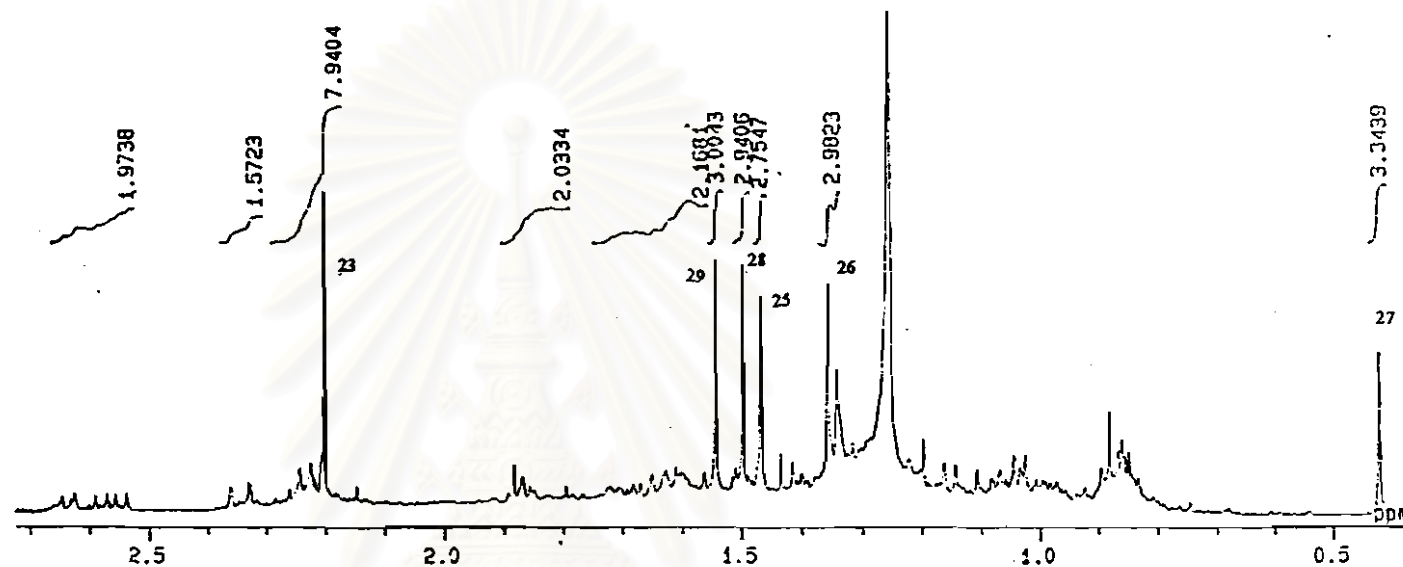
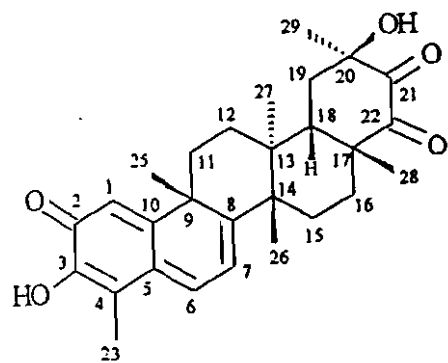


Figure 112. (a) ^1H NMR spectrum (500 MHz) of GS-Y2-6 (**50**) (in CDCl_3).

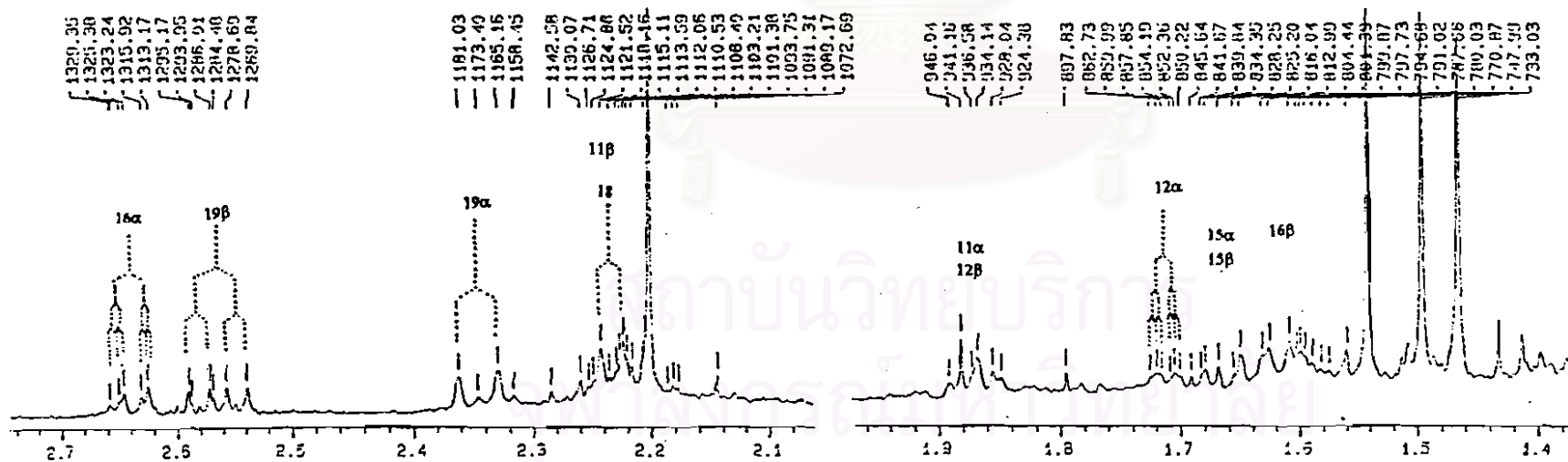
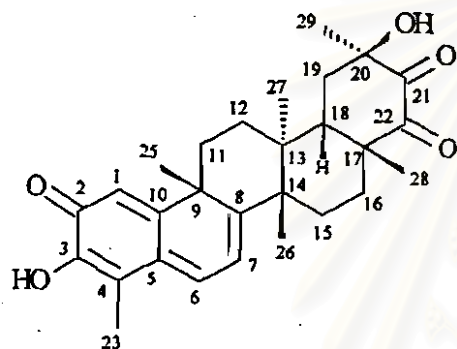


Figure 112. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-Y2-6 (50) (in CDCl_3) in the range of δ 2.74-1.38 ppm.

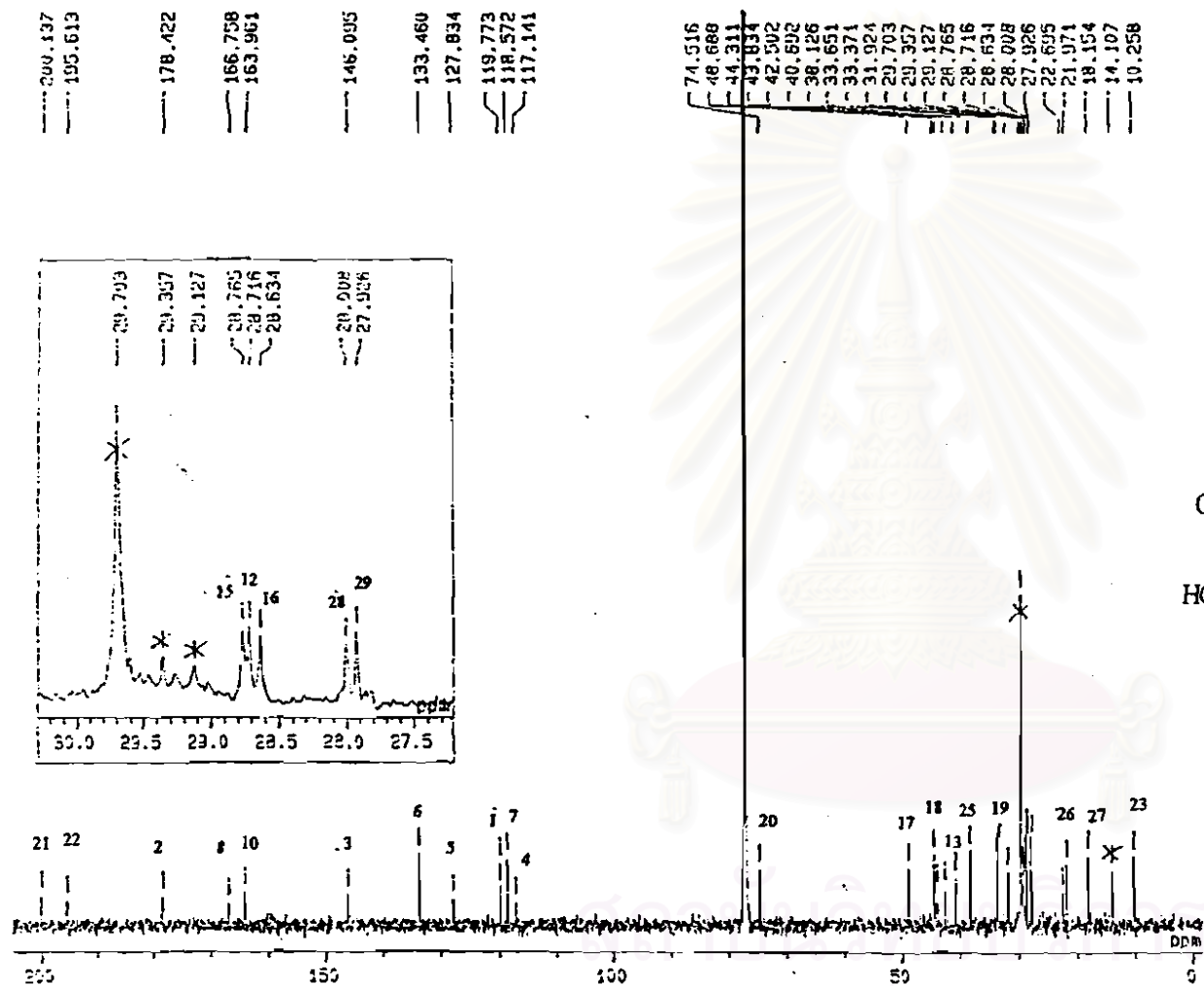


Figure 113. ^{13}C NMR spectrum (125 MHz) of GS-Y2-6 (50) (in CDCl_3).

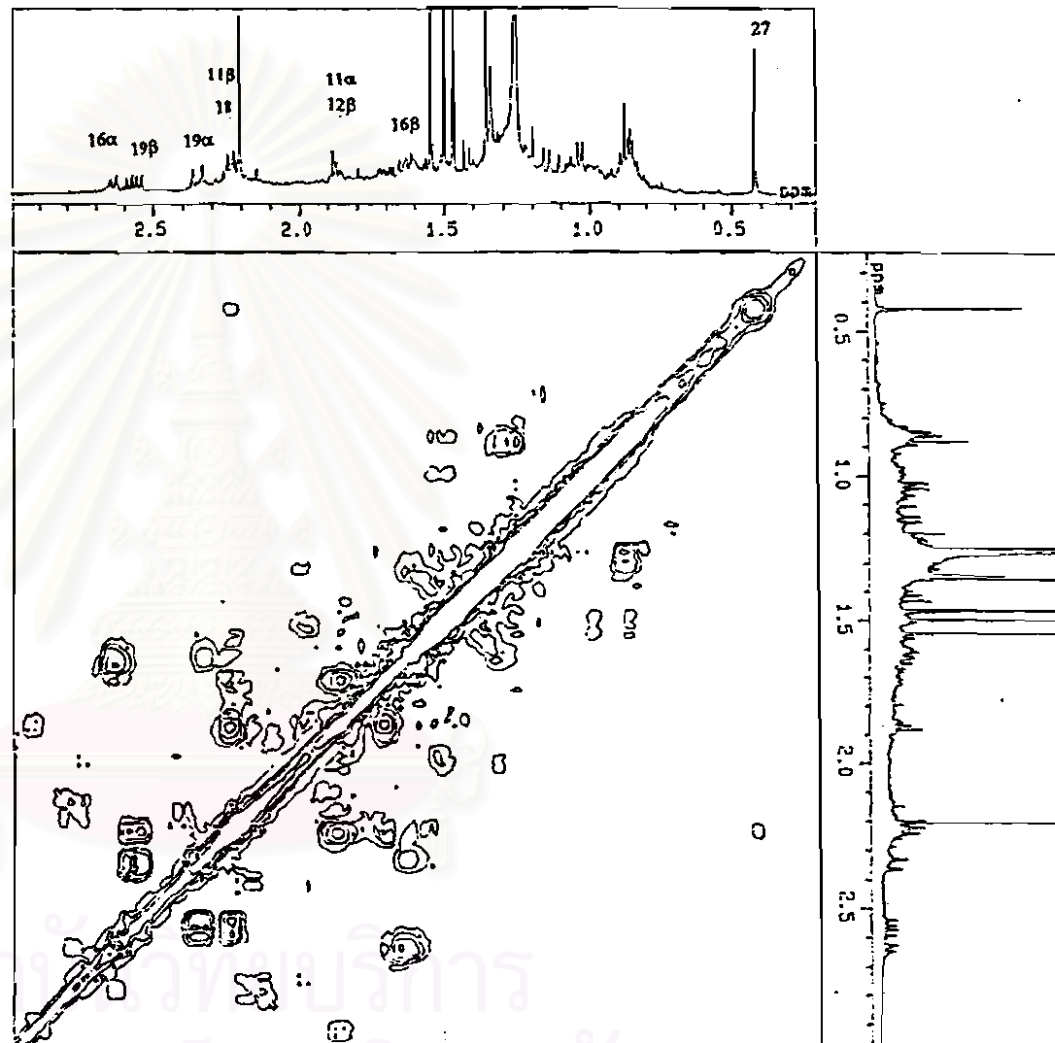
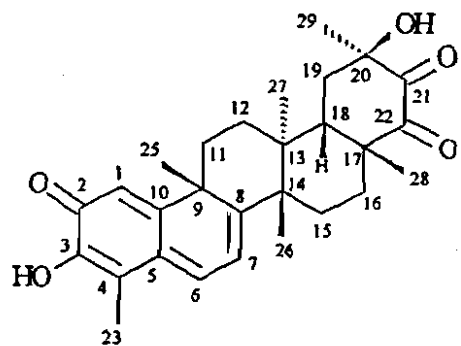


Figure 114. Expanded ^1H - ^1H COSY spectrum of GS-Y2-6 (50) (in CDCl_3) in the range of 3.0-0.2 ppm.

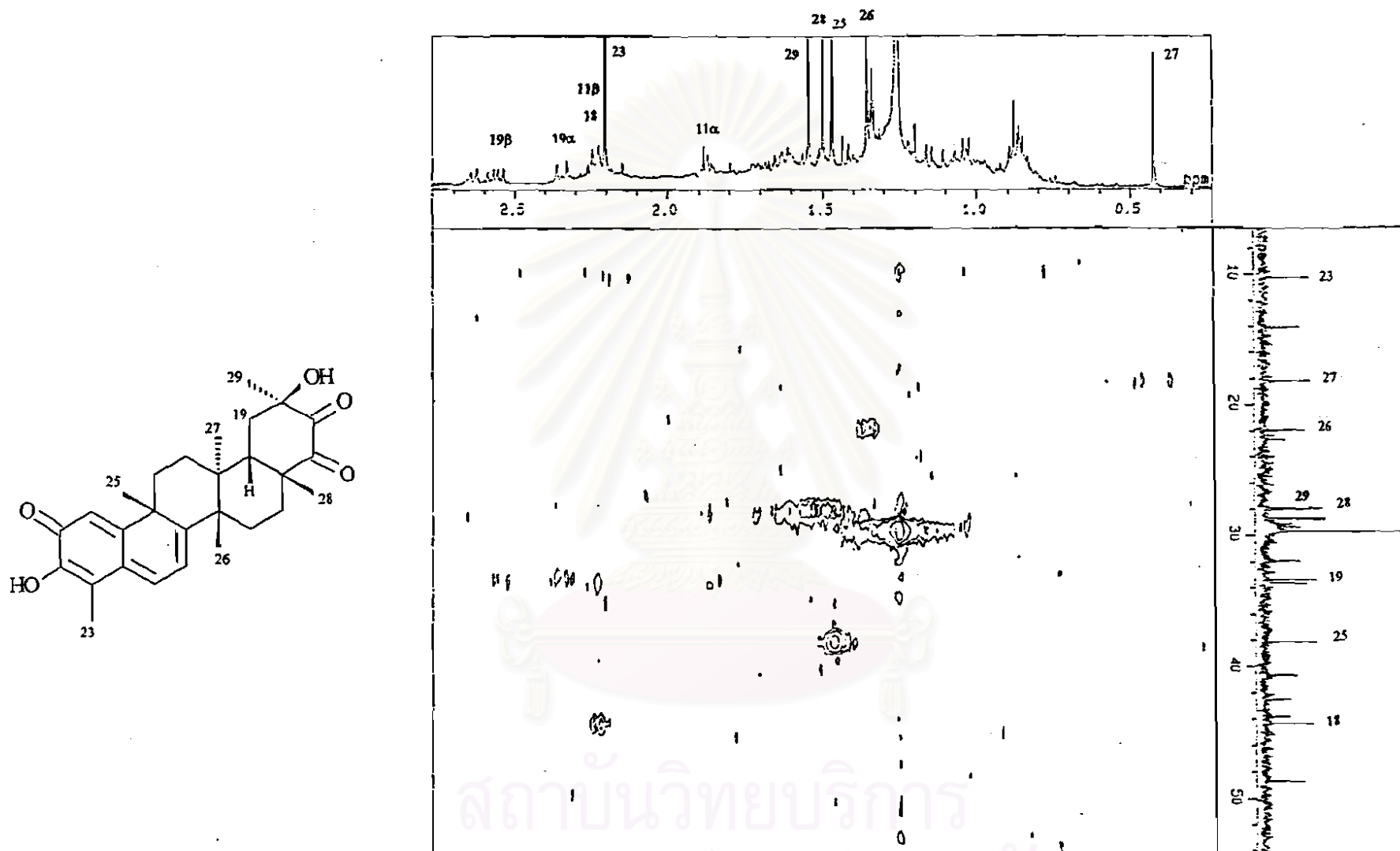


Figure 115. Expanded HMQC spectrum of GS-Y2-6 (50) (in CDCl₃) in the ranges of δ ¹H 2.8-0.2 ppm and δ ¹³C 54-7 ppm.

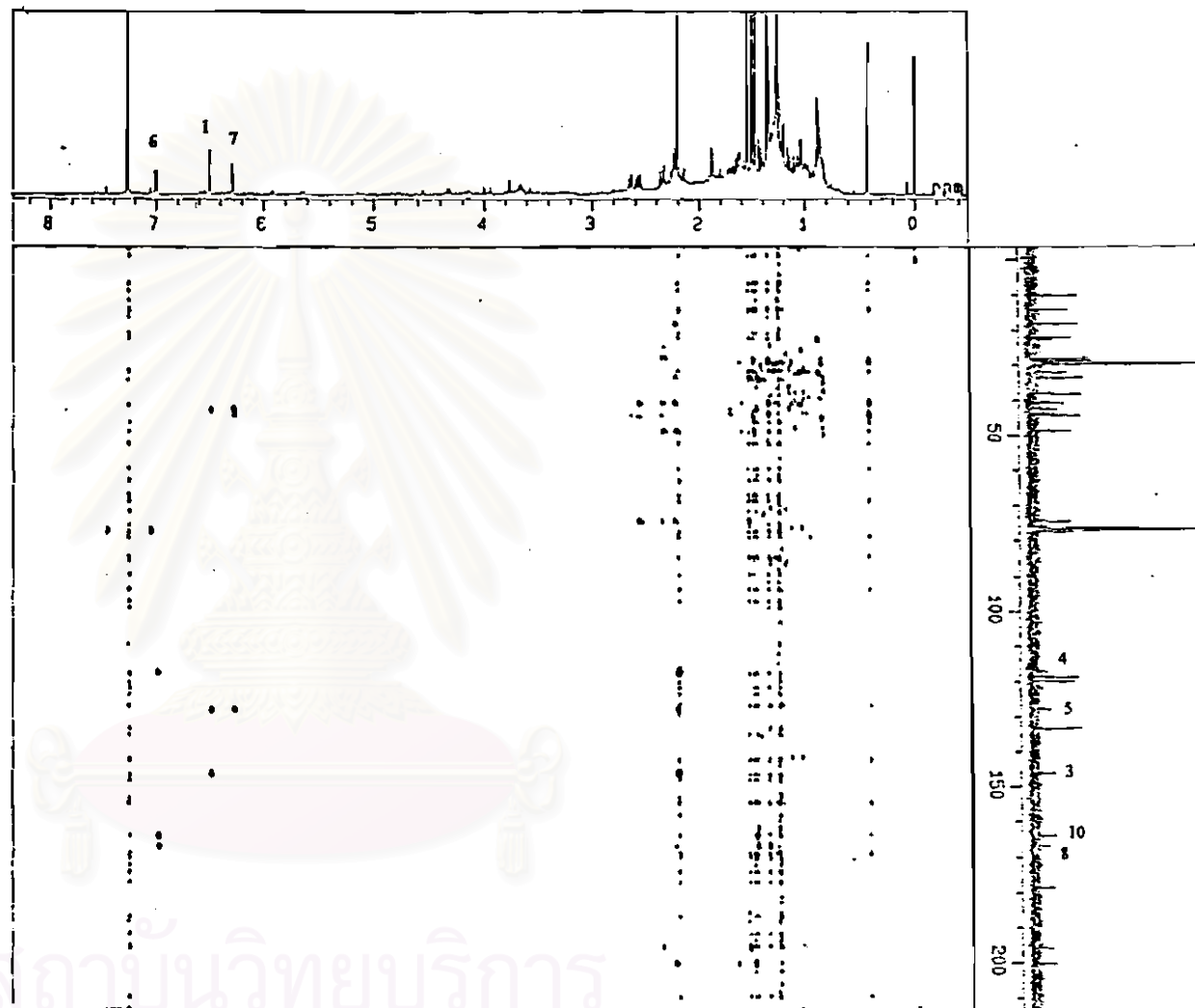
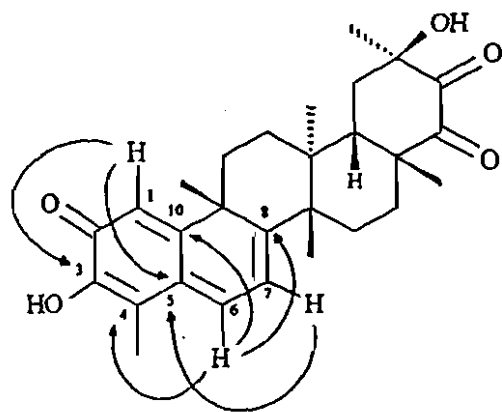


Figure 116. (a) HMBC spectrum of GS-Y2-6 (50) (in $CDCl_3$).

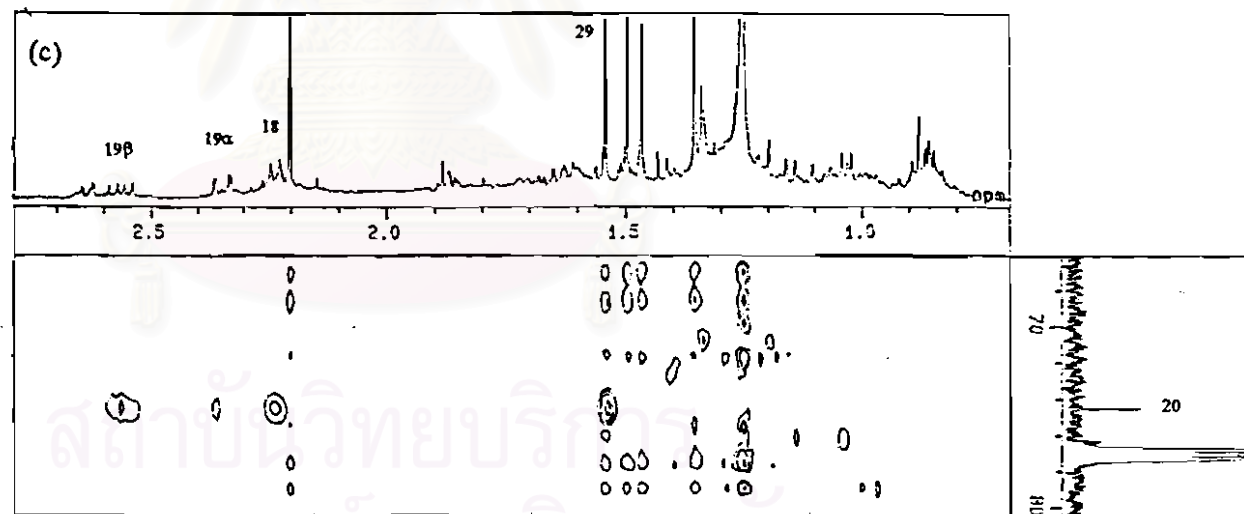
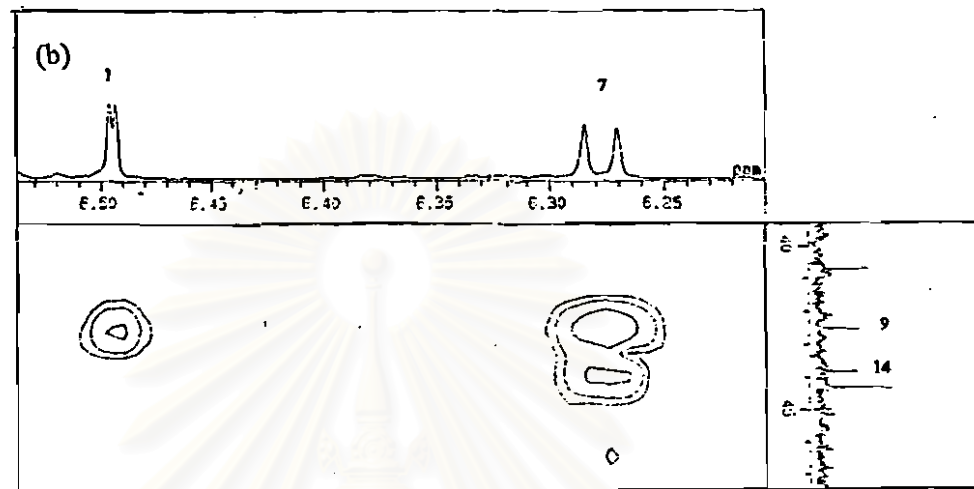
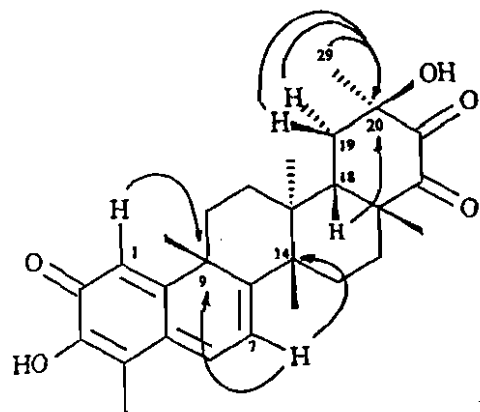


Figure 116. (b) Expanded HMBC spectrum of GS-Y2-6 (50) (in CDCl₃) in the ranges of δ ¹H 6.54-6.20 ppm and δ ¹³C 47-41 ppm. (c) Expanded HMBC spectrum of GS-Y2-6 (50) (in CDCl₃) in the ranges of δ ¹H 2.8-0.7 ppm and δ ¹³C 80-66 ppm.

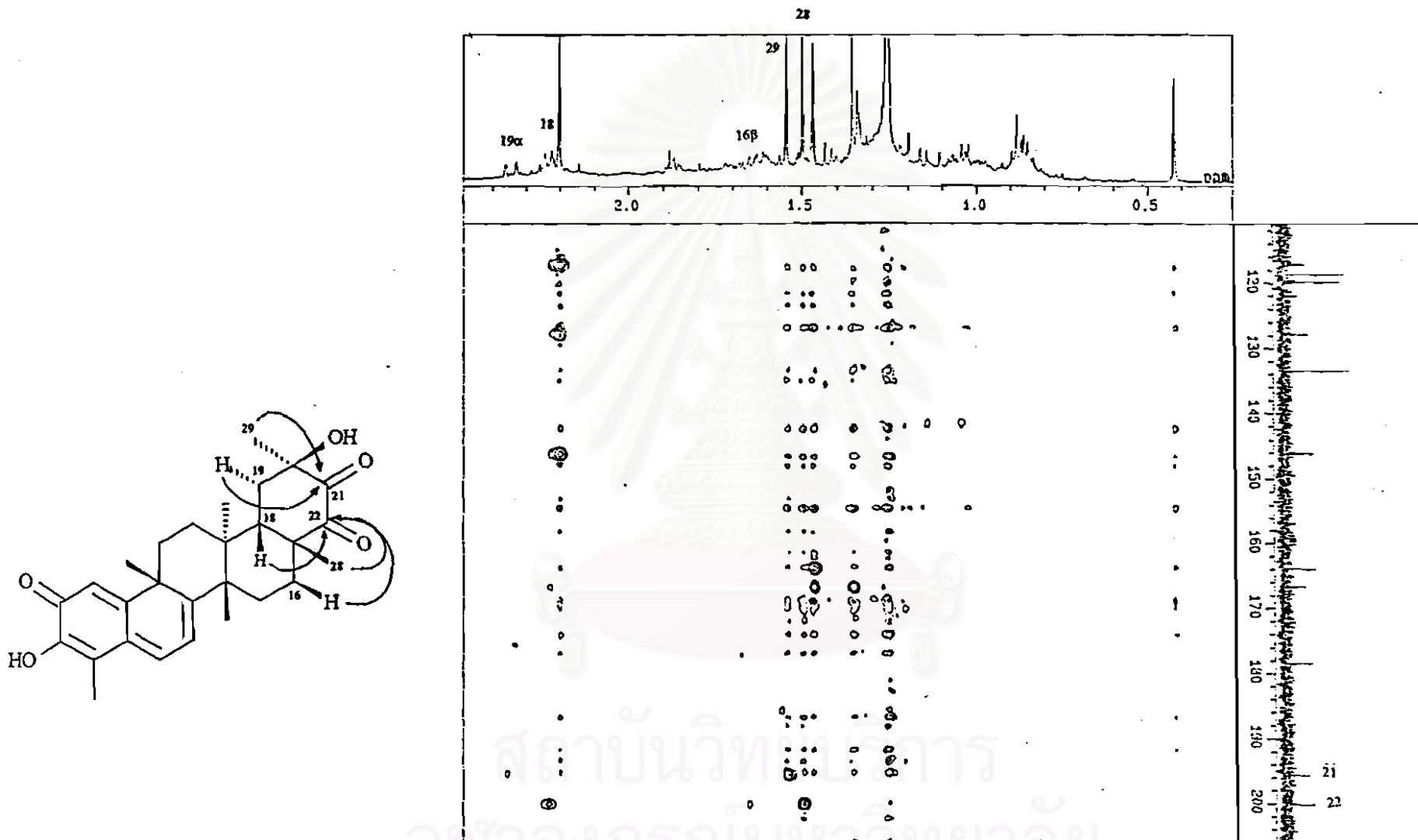


Figure I16. (d) Expanded HMBC spectrum of GS-Y2-6 (50) (in CDCl_3) in the ranges of δ ^1H 2.5-0.4 ppm and δ ^{13}C 206-110 ppm.

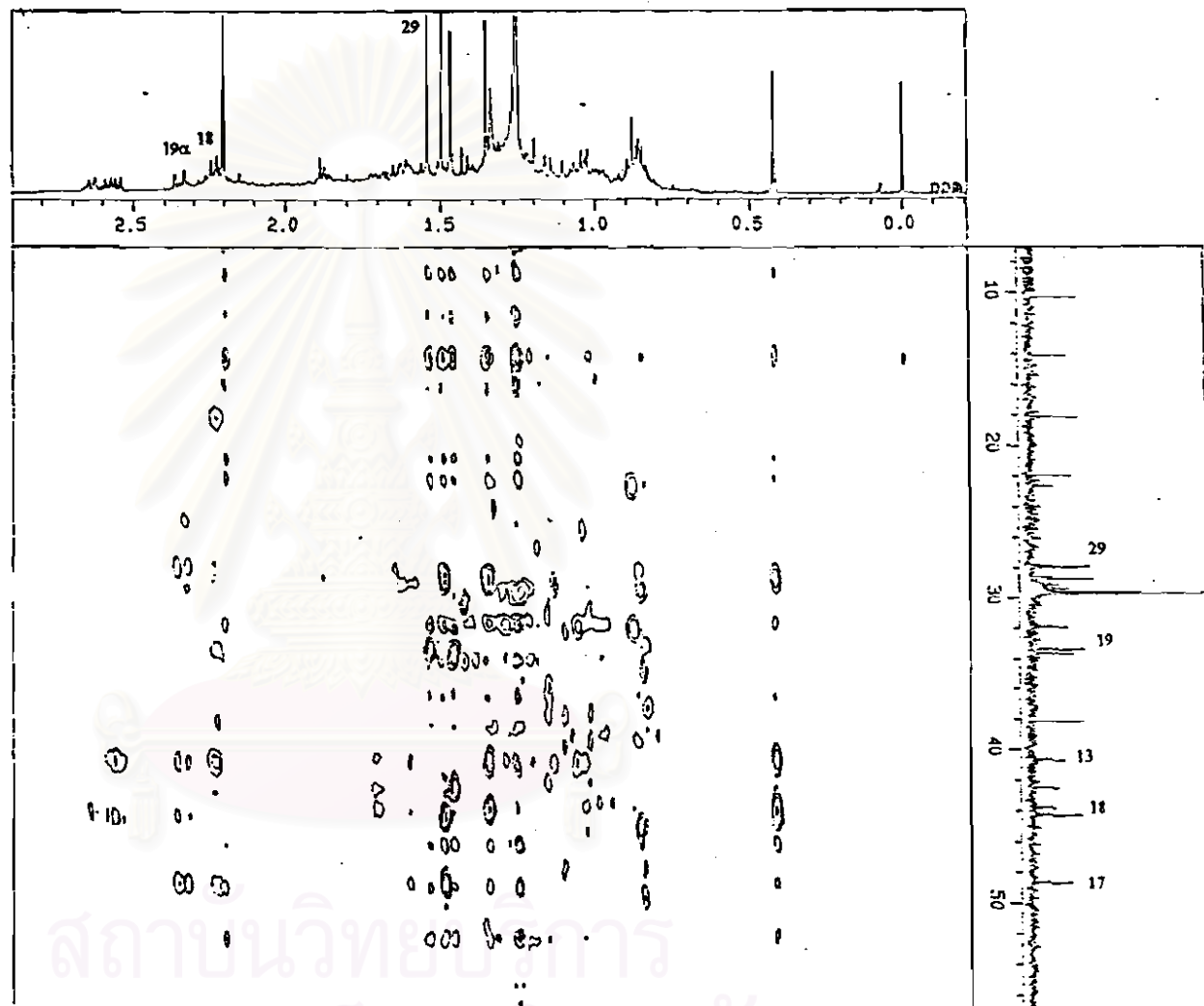
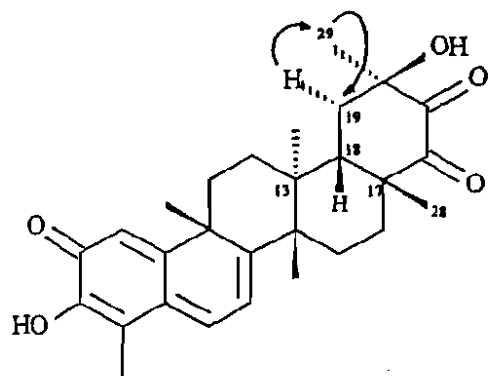


Figure 116. (e) Expanded HMBC spectrum of GS-Y2-6 (50) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 2.8-0.0 ppm and $\delta^{13}\text{C}$ 57-7 ppm.

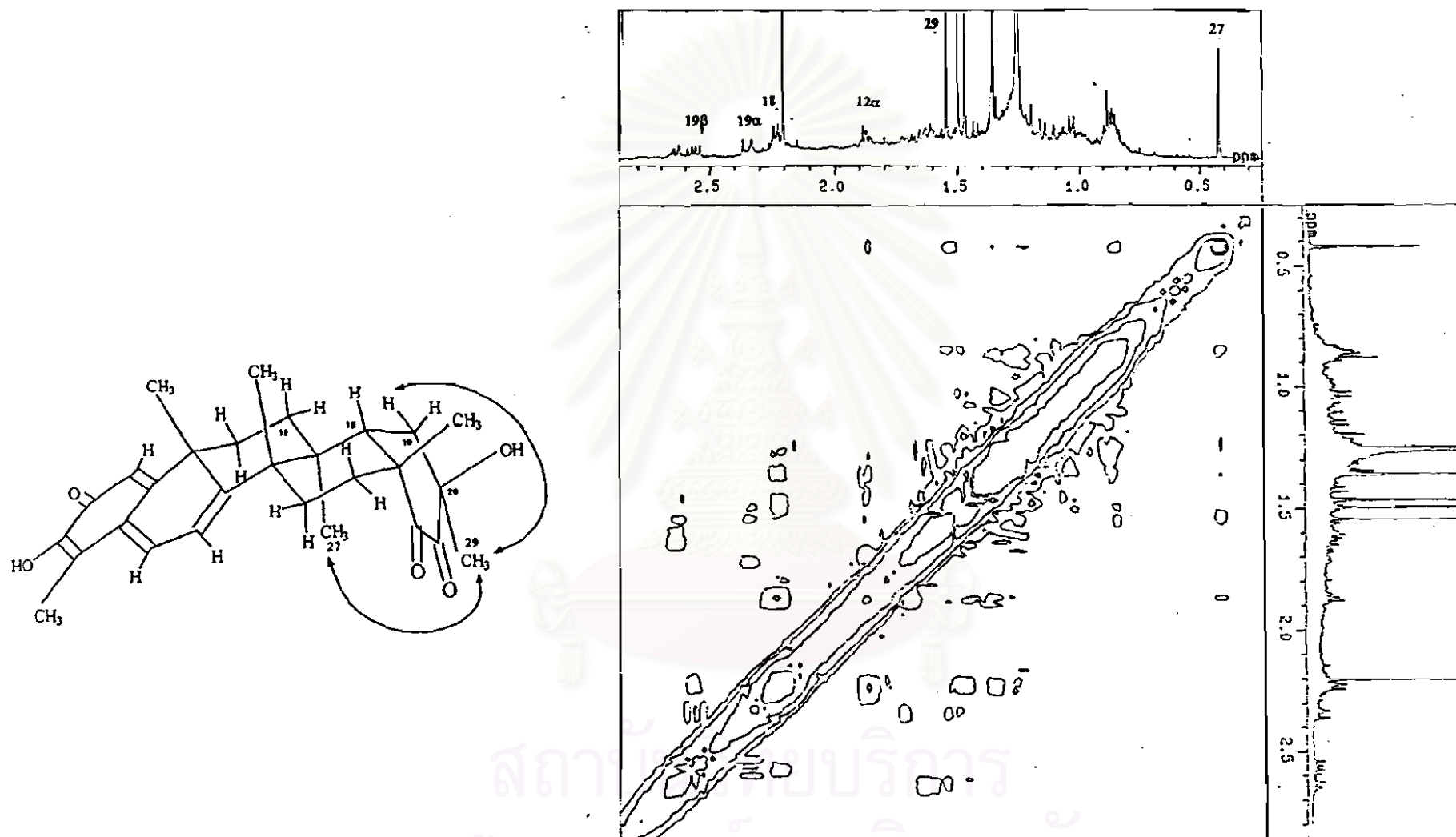


Figure 117. Expanded NOESY spectrum of GS-Y2-6 (50) (in CDCl₃) in the ranges of δ 2.9-0.3 ppm.

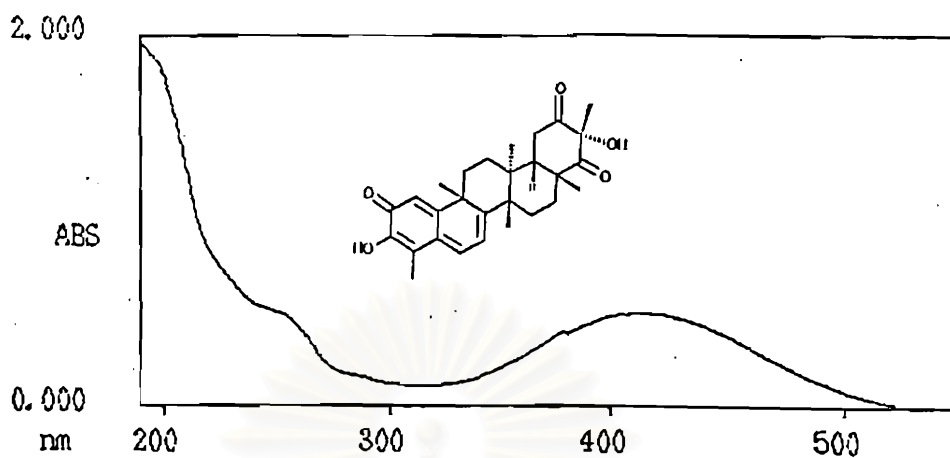


Figure 118. UV absorption spectrum of GS-Y3-2 (51) (in MeOH).

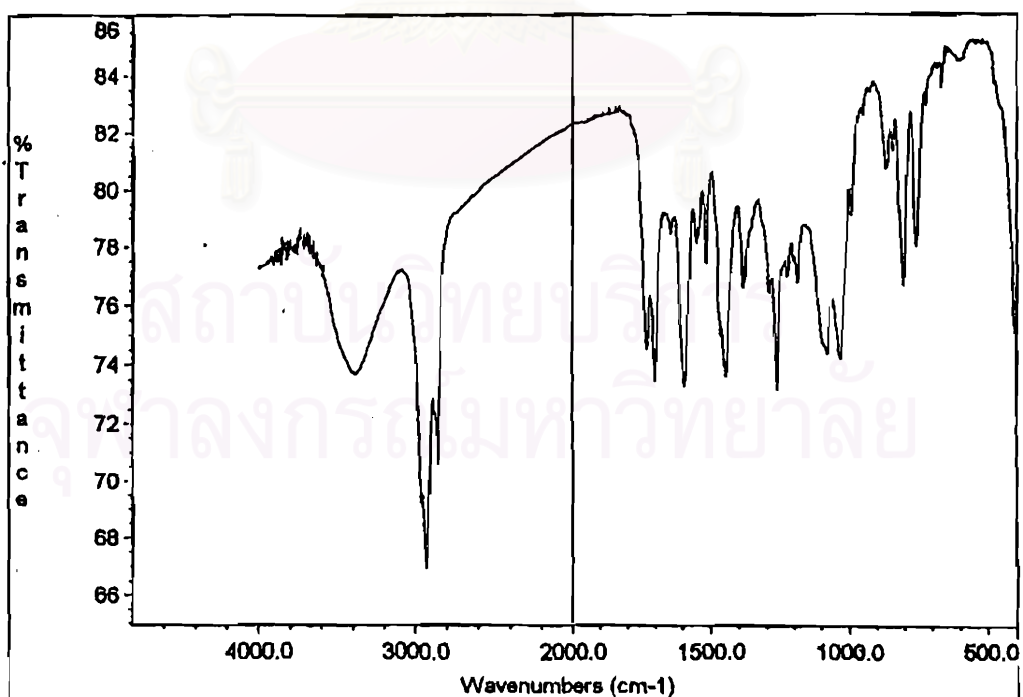


Figure 119. IR spectrum of GS-Y3-2 (51) (dry film).

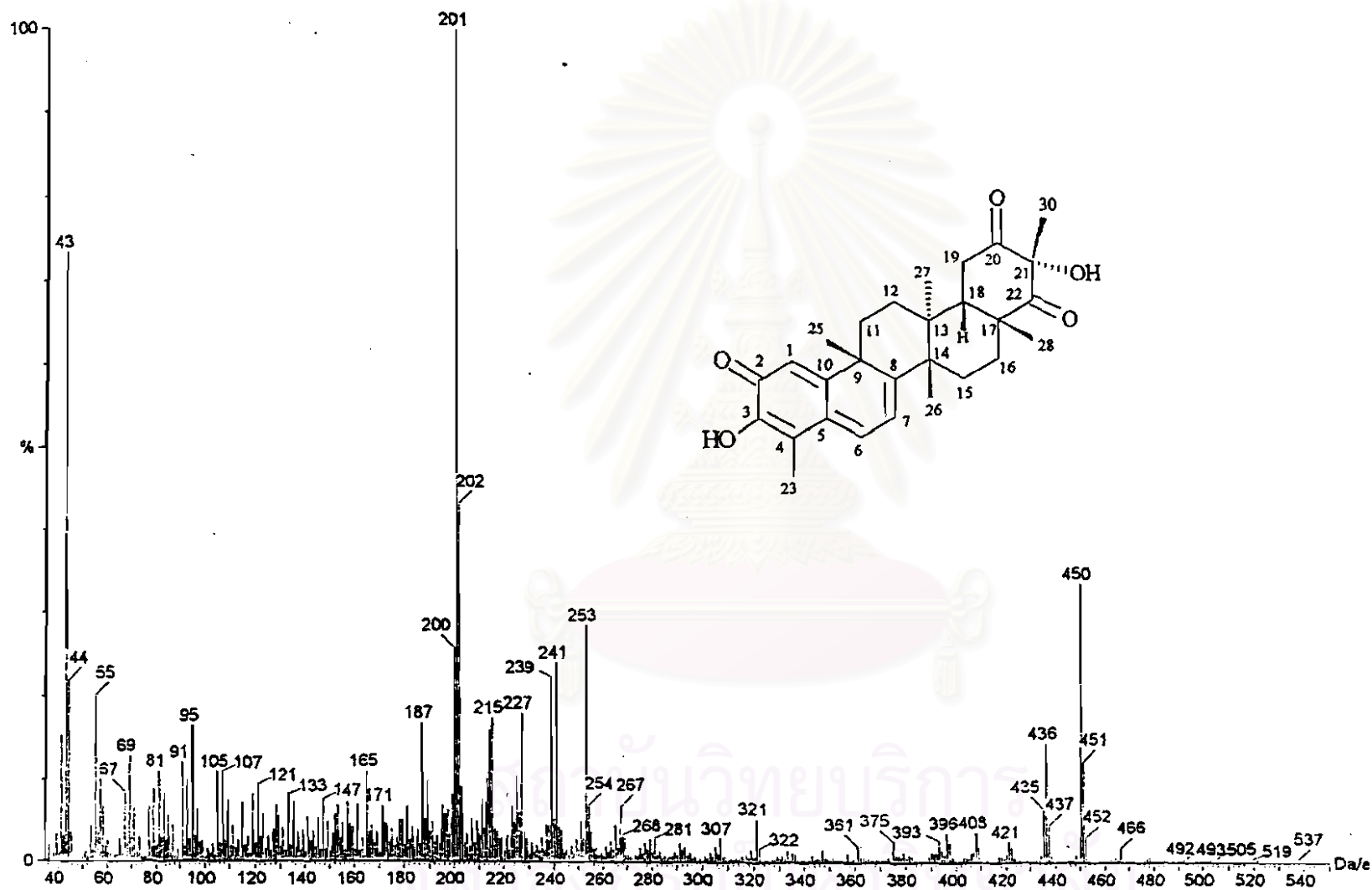


Figure 120. EIMS of GS-Y3-2 (51).

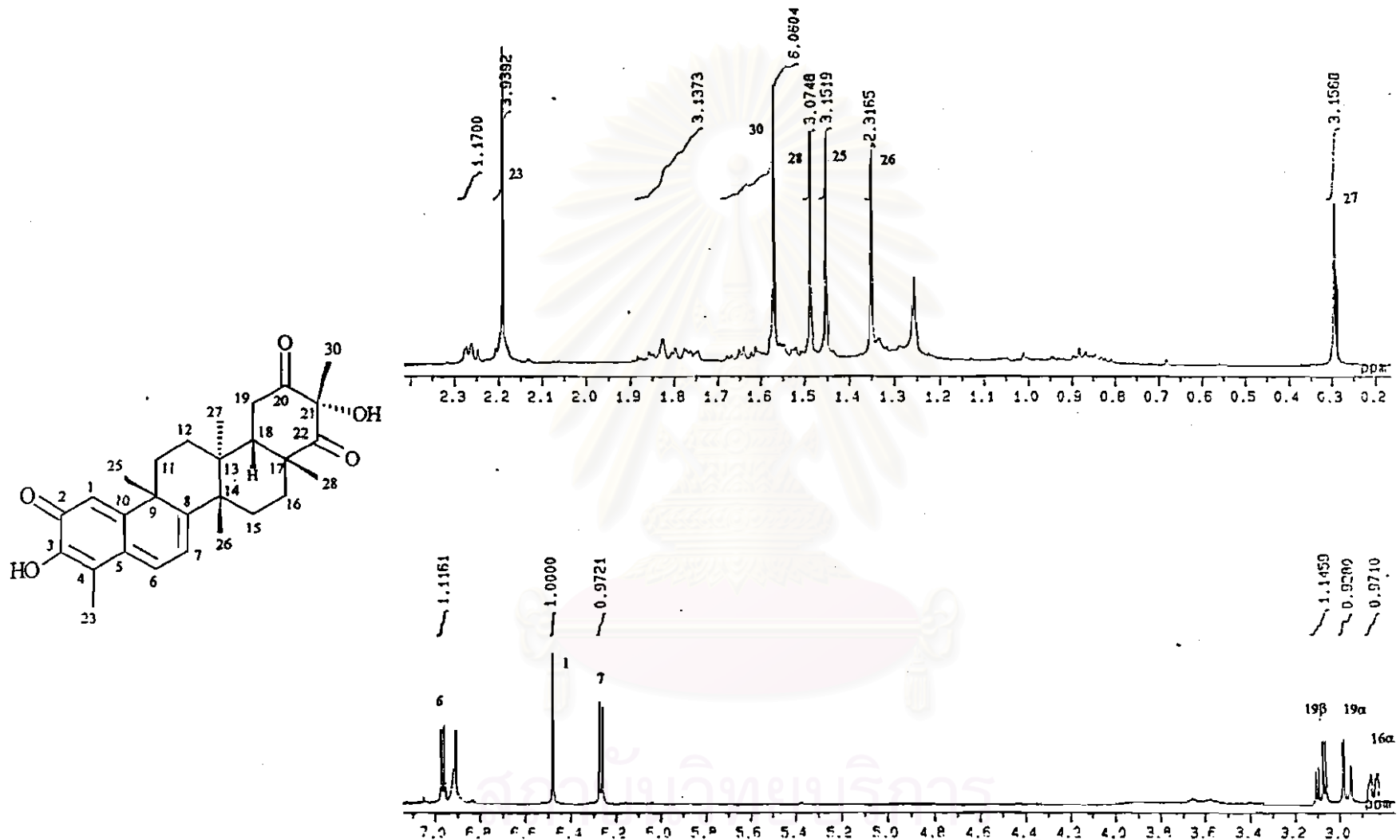


Figure 121. (a) ^1H NMR spectrum (500 MHz) of GS-Y3-2 (51) (in CDCl_3).

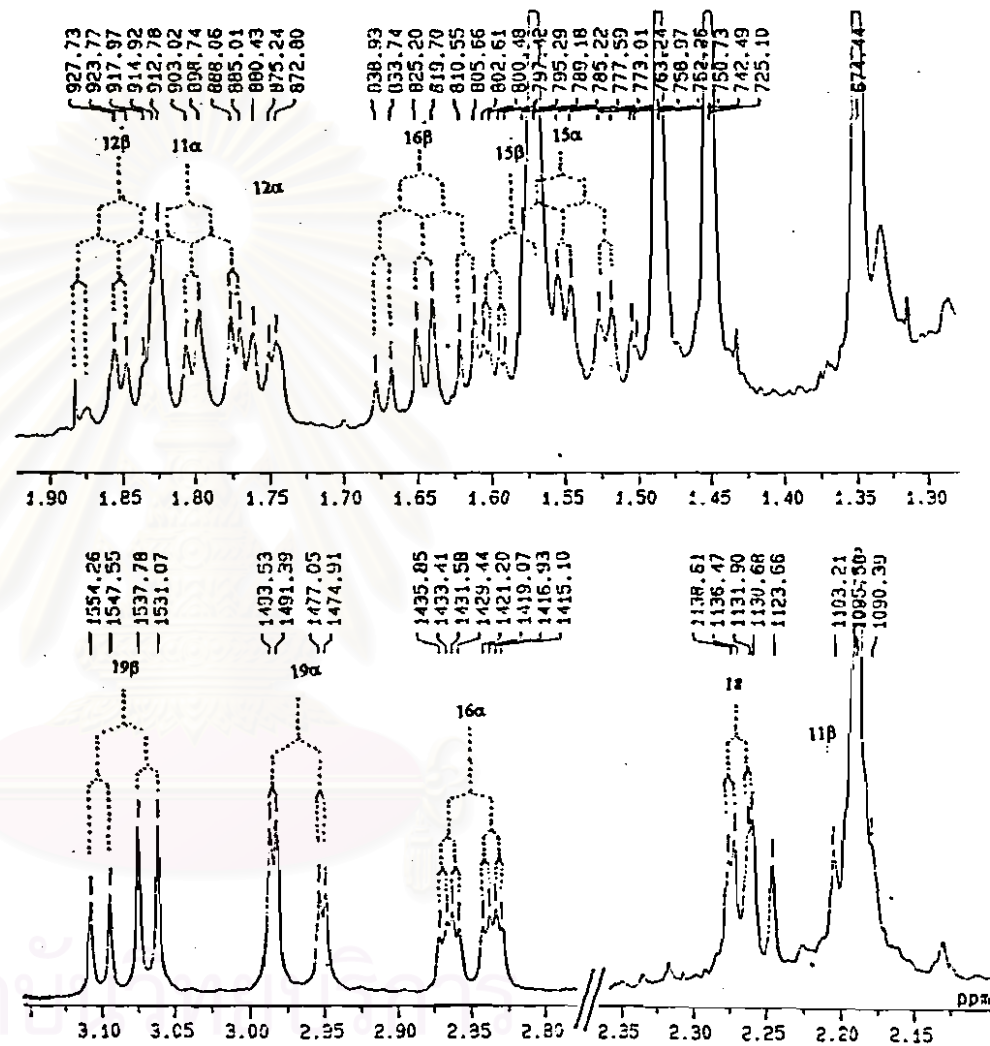
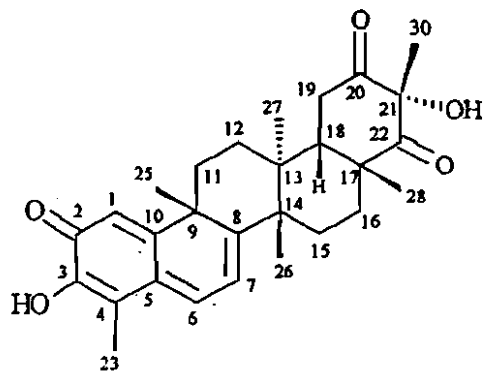


Figure 121. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-Y3-2 (51) (in CDCl_3) in the range of δ 3.15-1.30 ppm.

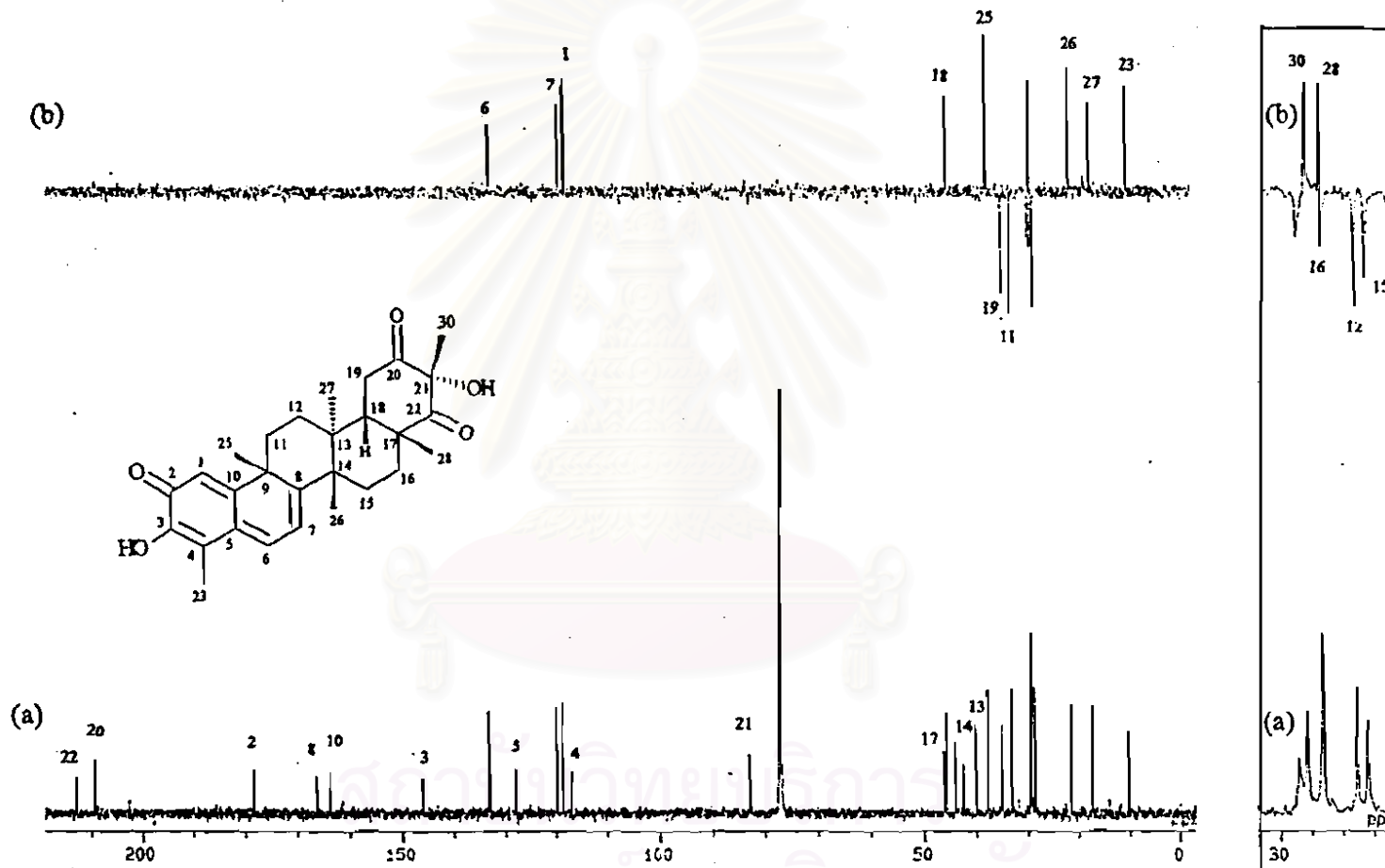


Figure 122. (a) ^{13}C NMR spectrum (125 MHz) of GS-Y3-2 (51) (in CDCl_3).
 (b) DEPT 135° spectrum.

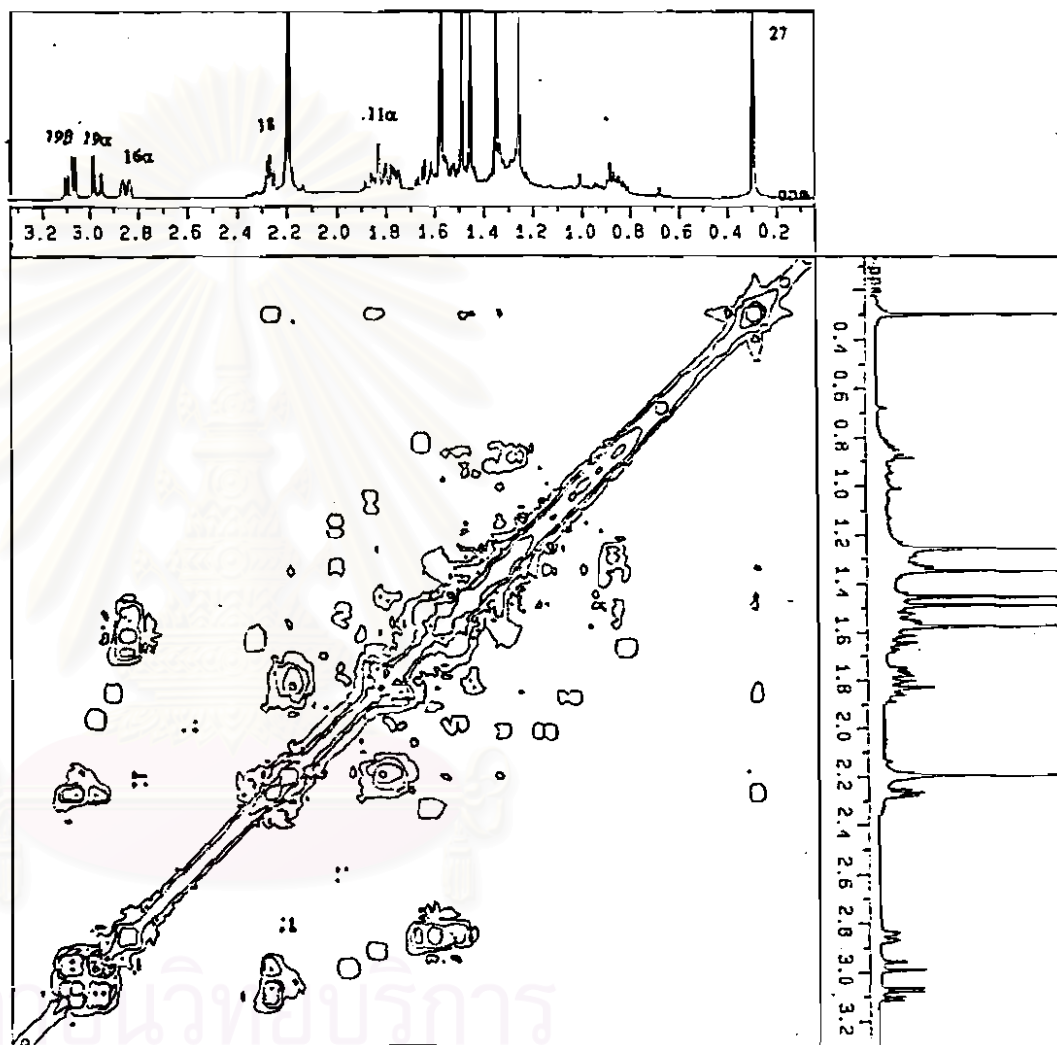
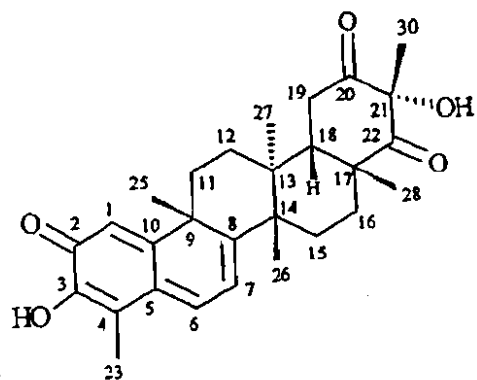


Figure 123. Expanded ^1H - ^1H COSY spectrum of GS-Y3-2 (51) (in CDCl_3) in the range of 3.3-0.0 ppm.

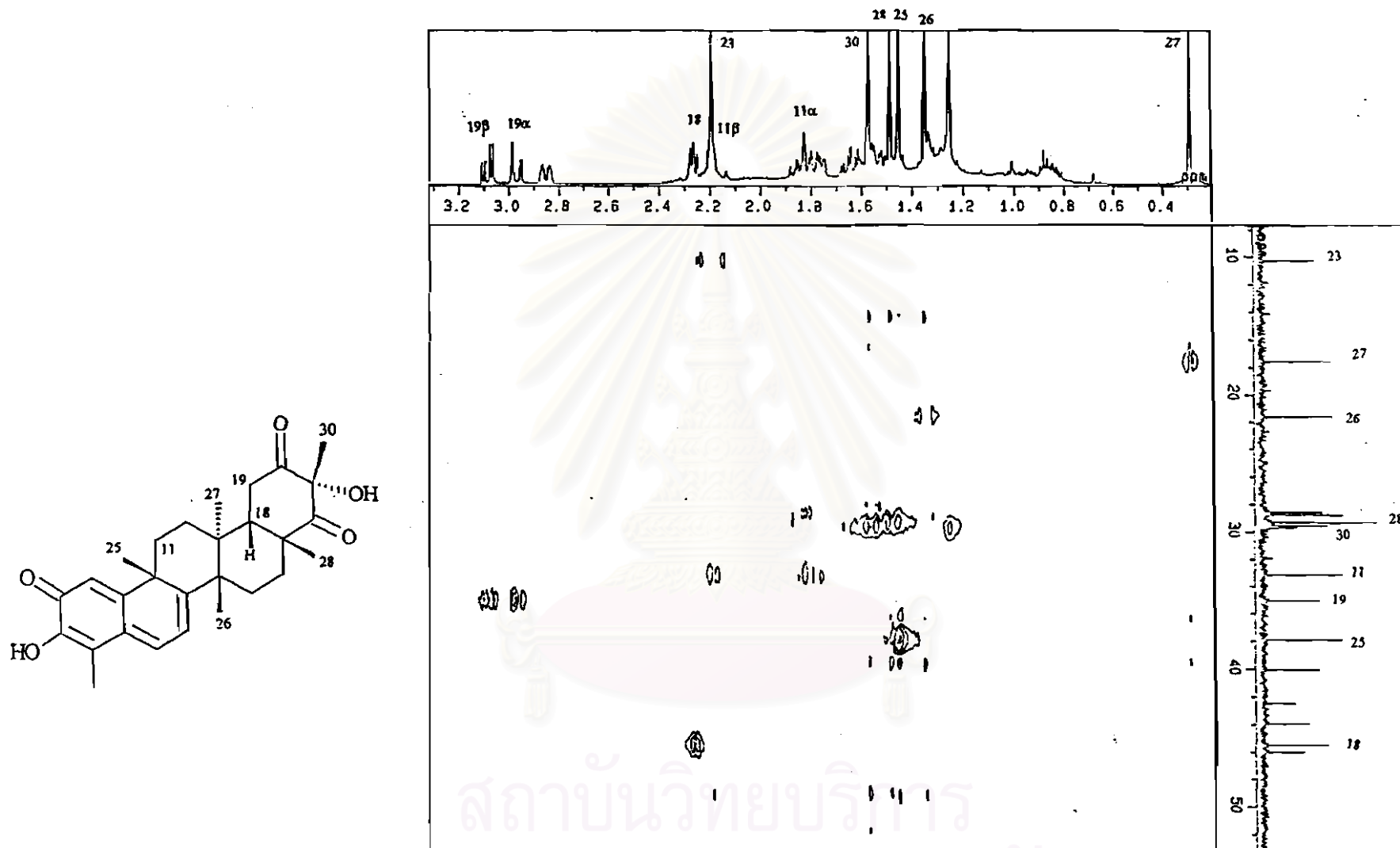


Figure 124. Expanded HMQC spectrum of GS-Y3-2 (51) (in CDCl₃) in the ranges of δ ¹H 3.3-0.2 ppm and δ ¹³C 52-8 ppm.

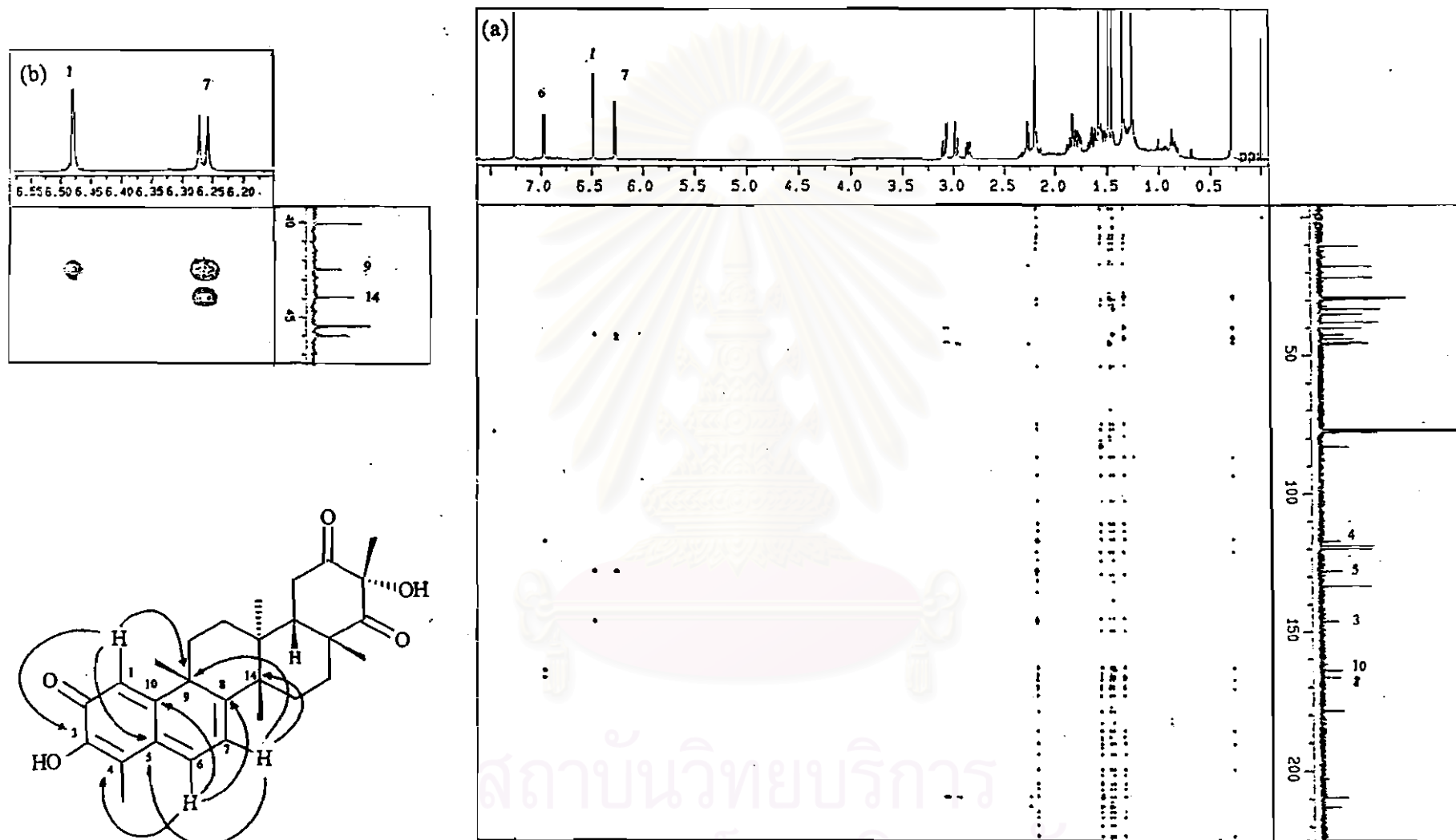


Figure 125. (a) HMBC spectrum of GS-Y3-2 (51) (in CDCl_3).

(b) Expanded HMBC spectrum of GS-Y3-2 (51) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 6.55-6.20 ppm and $\delta^{13}\text{C}$ 47-39 ppm.

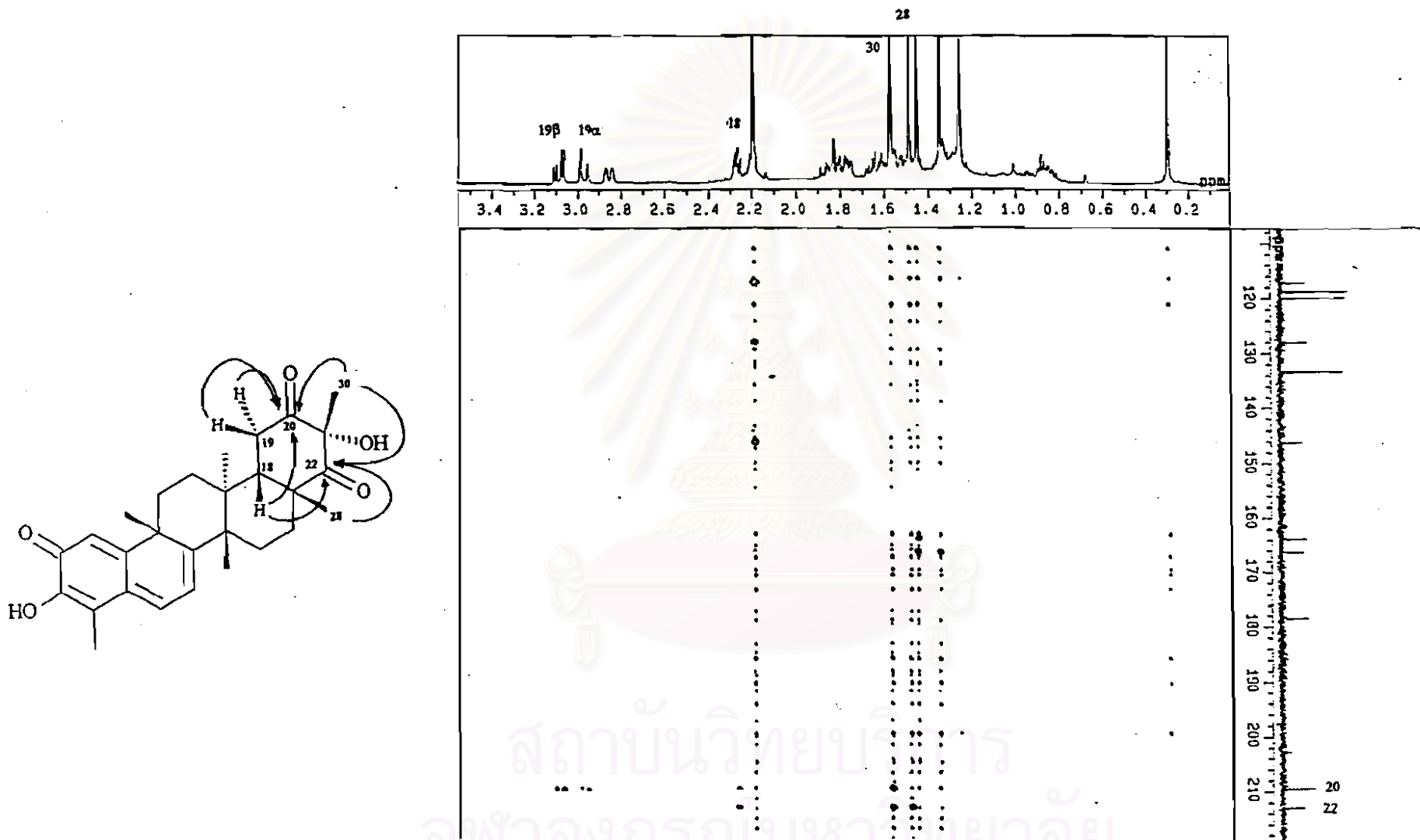


Figure 125. (c) Expanded HMBC spectrum of GS-Y3-2 (51) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 3.6-0.0 ppm and $\delta^{13}\text{C}$ 220-110 ppm.

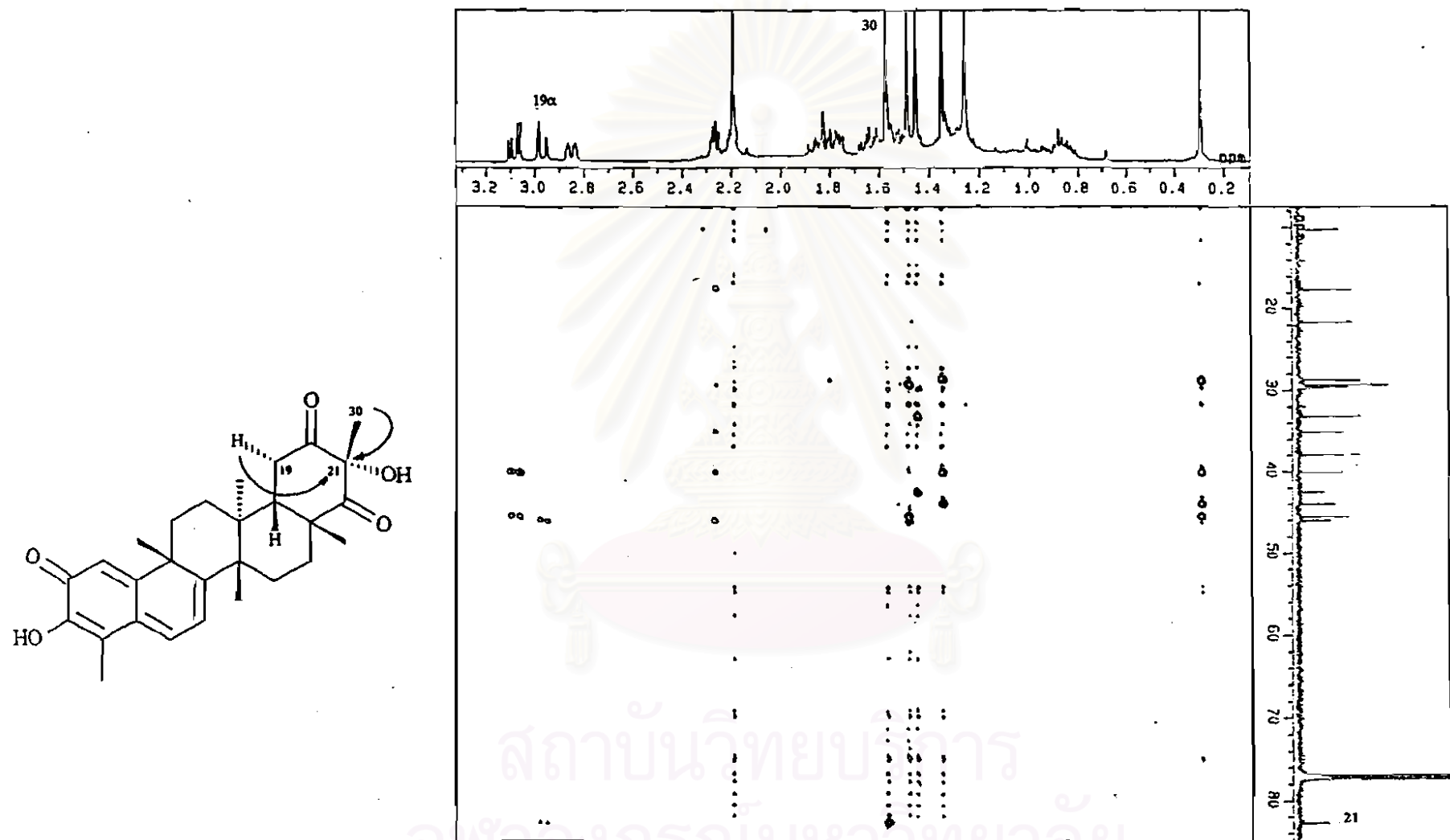


Figure 125. (d) Expanded HMBC spectrum of GS-Y3-2 (51) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 3.3-0.1 ppm and $\delta^{13}\text{C}$ 85-8 ppm.

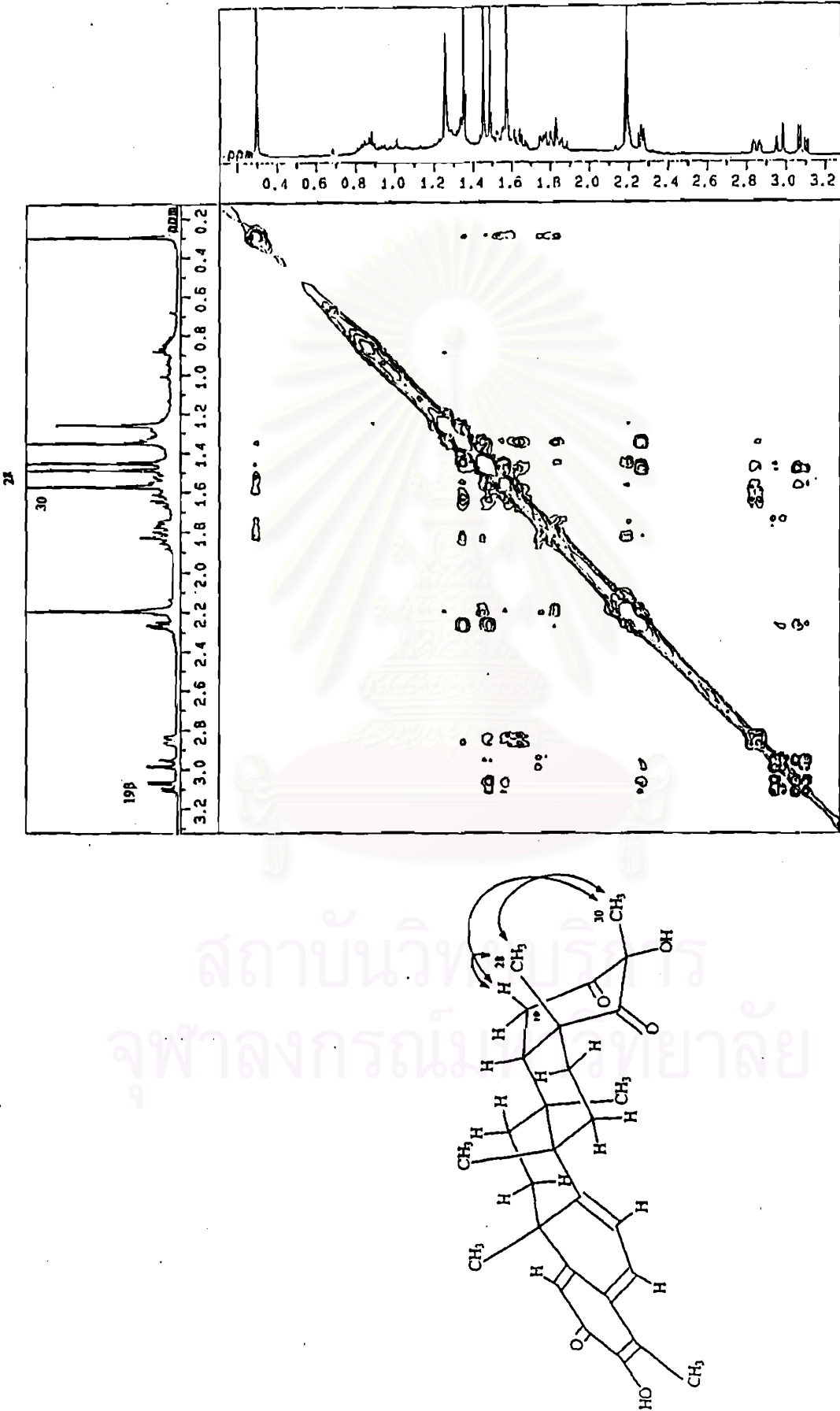


Figure 126. Expanded NOESY spectrum of GS-Y3-2 (51) (in CDCl₃) in the ranges of δ 3.3-0.2 ppm.

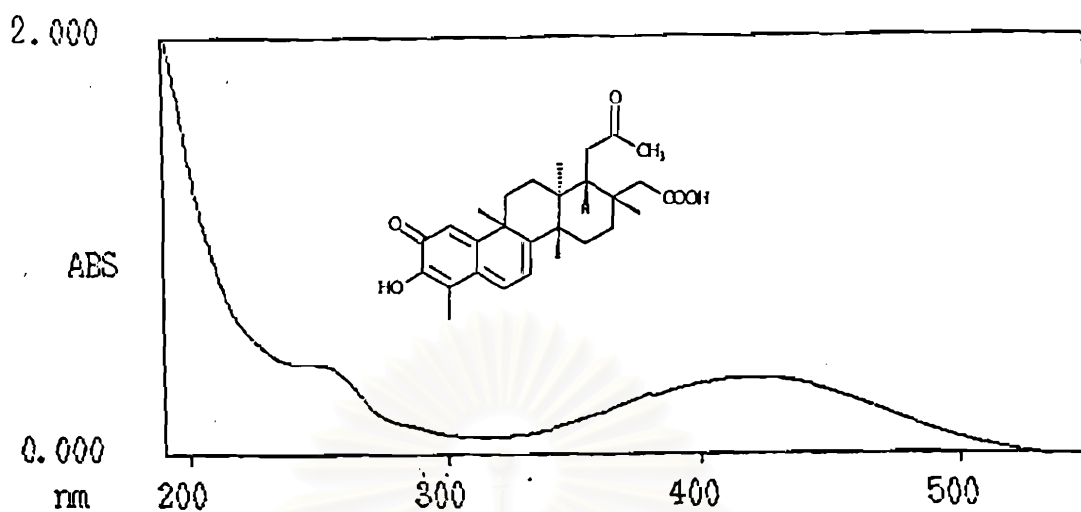


Figure 127. UV absorption spectrum of GS-Y4-1 (53) (in MeOH).

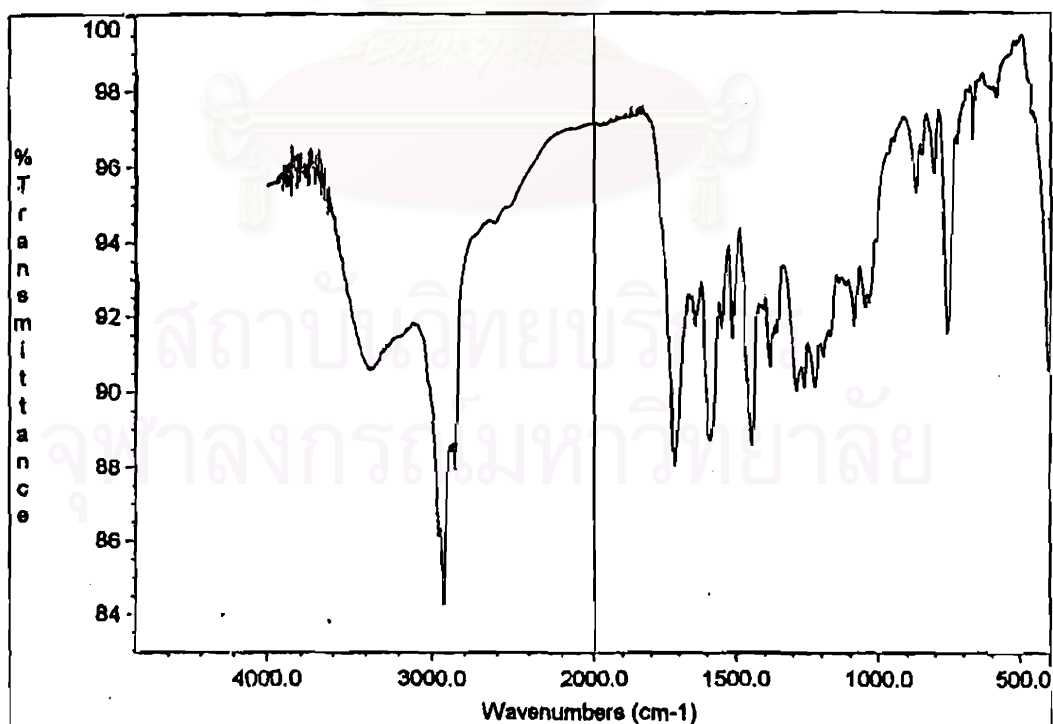


Figure 128. IR spectrum of GS-Y4-1 (53) (dry film).

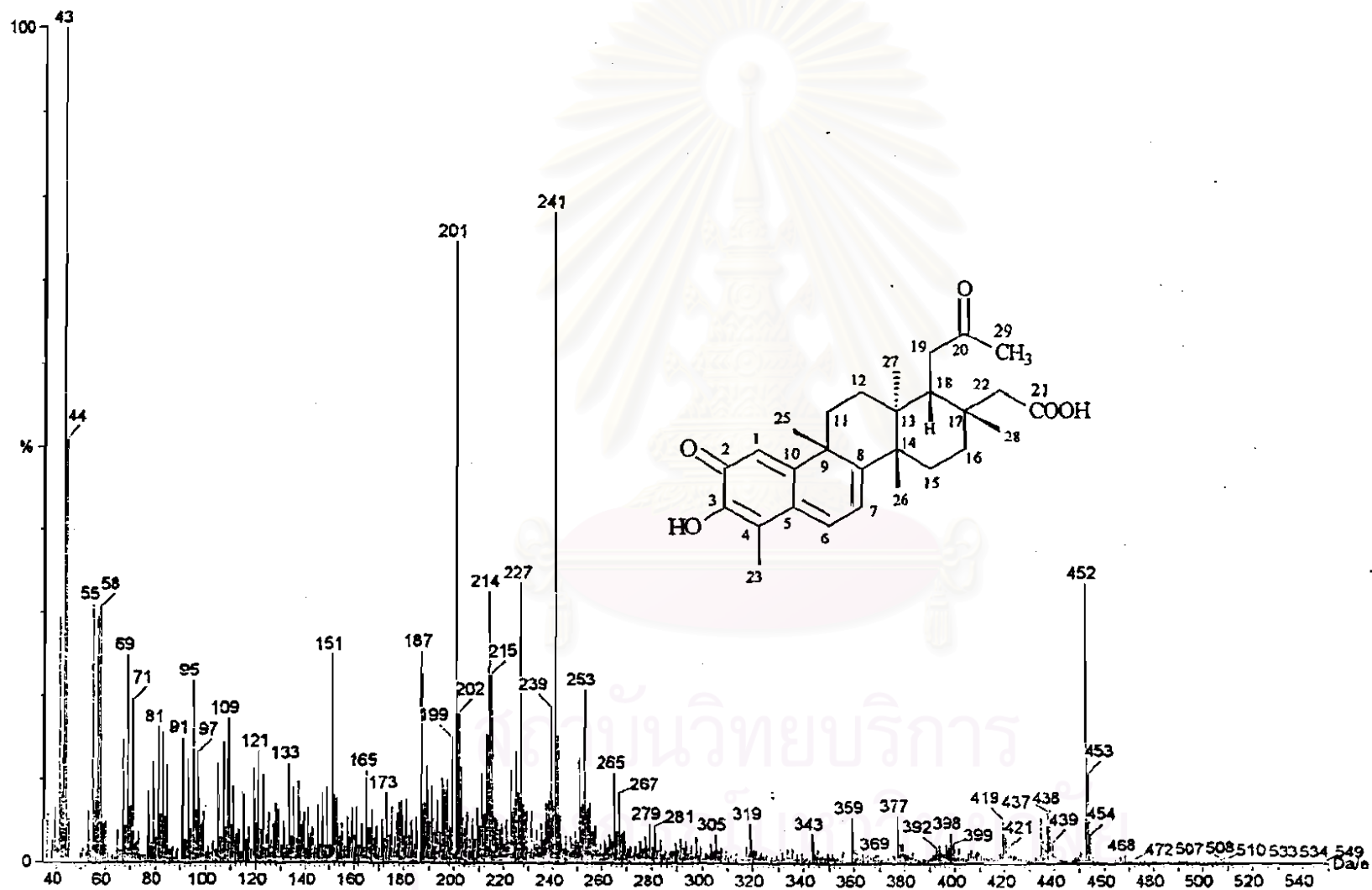


Figure 129. EIMS of GS-Y4-1 (53).

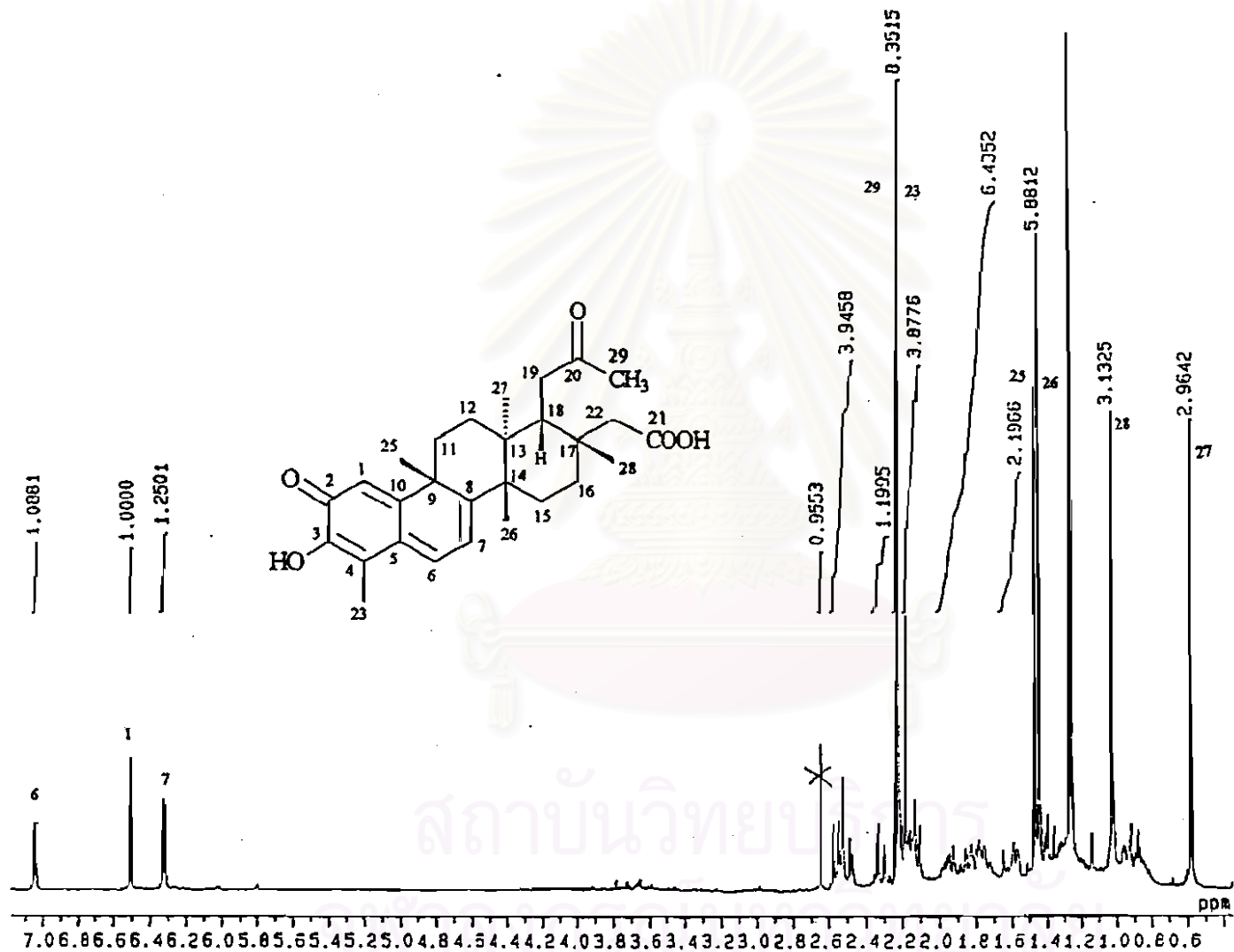


Figure 130. (a) ^1H NMR spectrum (500 MHz) of GS-Y4-1 (53) (in CDCl_3).

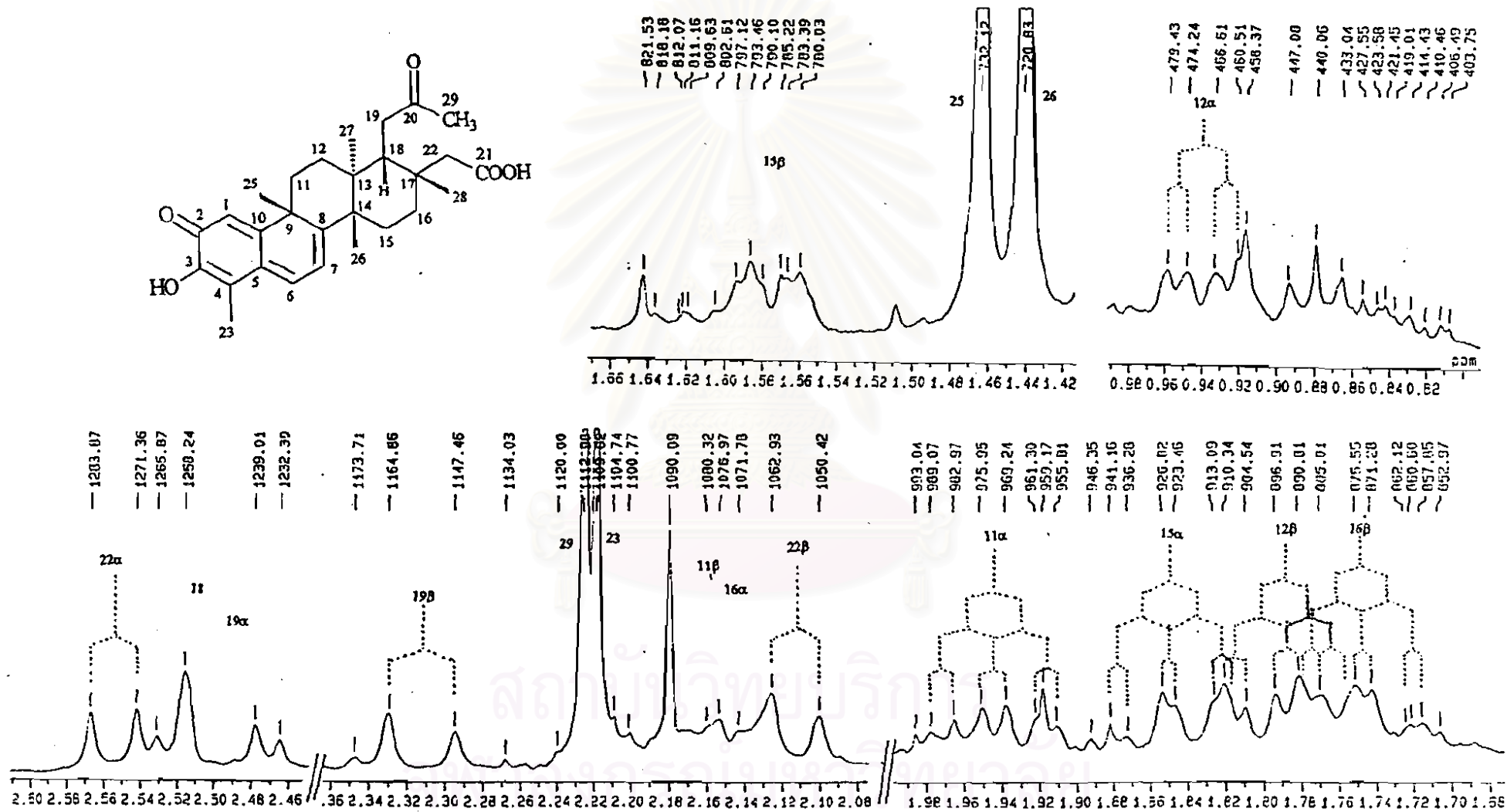


Figure 130. (b) Expanded ¹H NMR spectrum (500 MHz) of GS-Y4-1 (53) (in CDCl₃) in the range of δ 2.61-0.80 ppm.

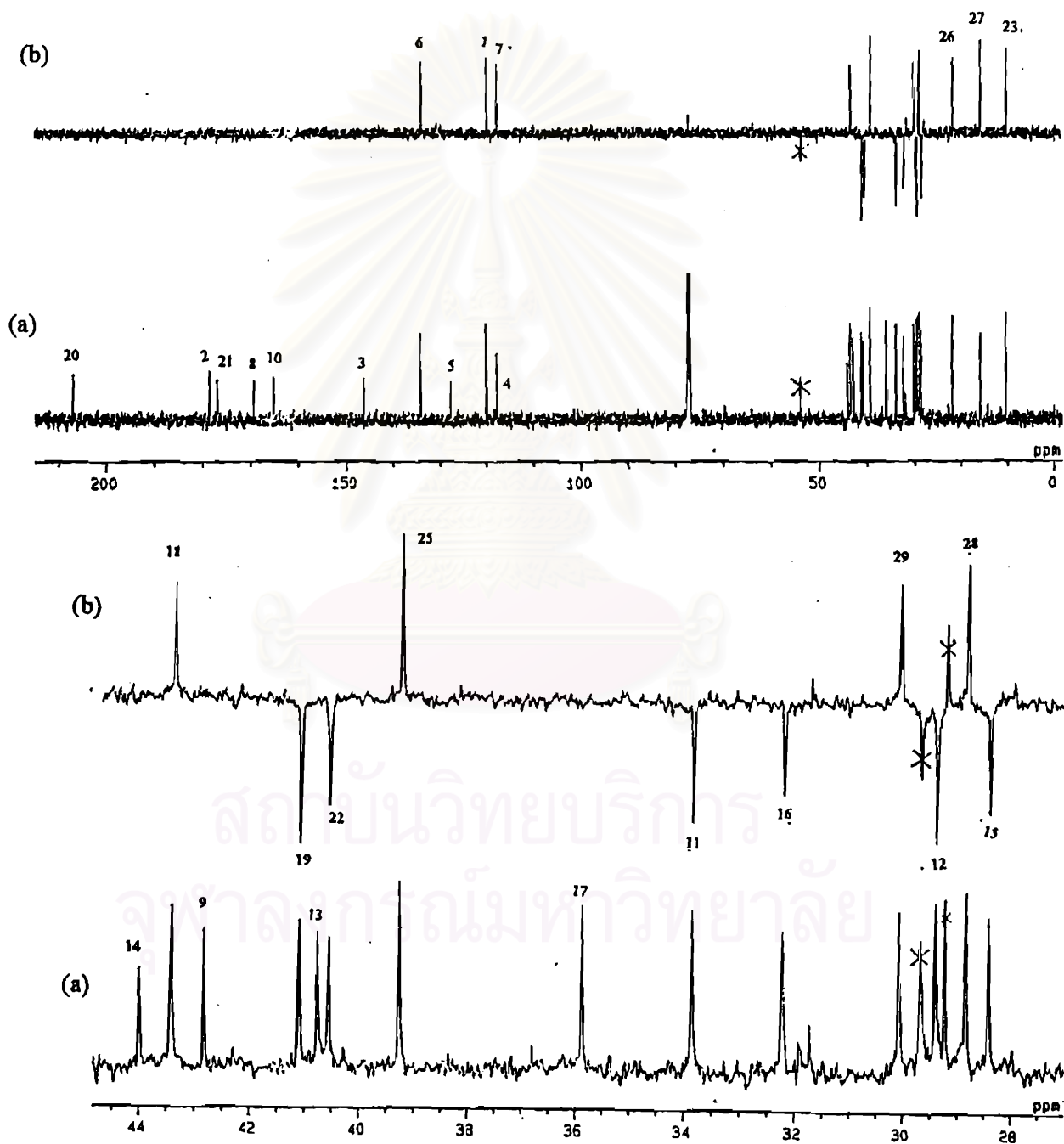
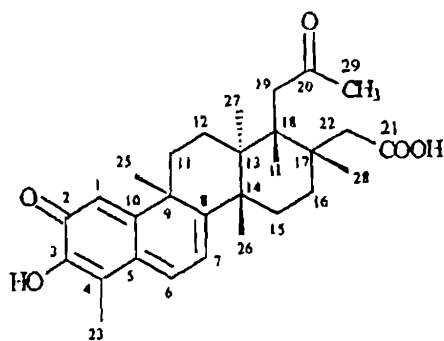


Figure 131. (a) ¹³C NMR spectrum (125 MHz) of GS-Y4-1 (53) (in CDCl₃).
 (b) DEPT 135° spectrum.

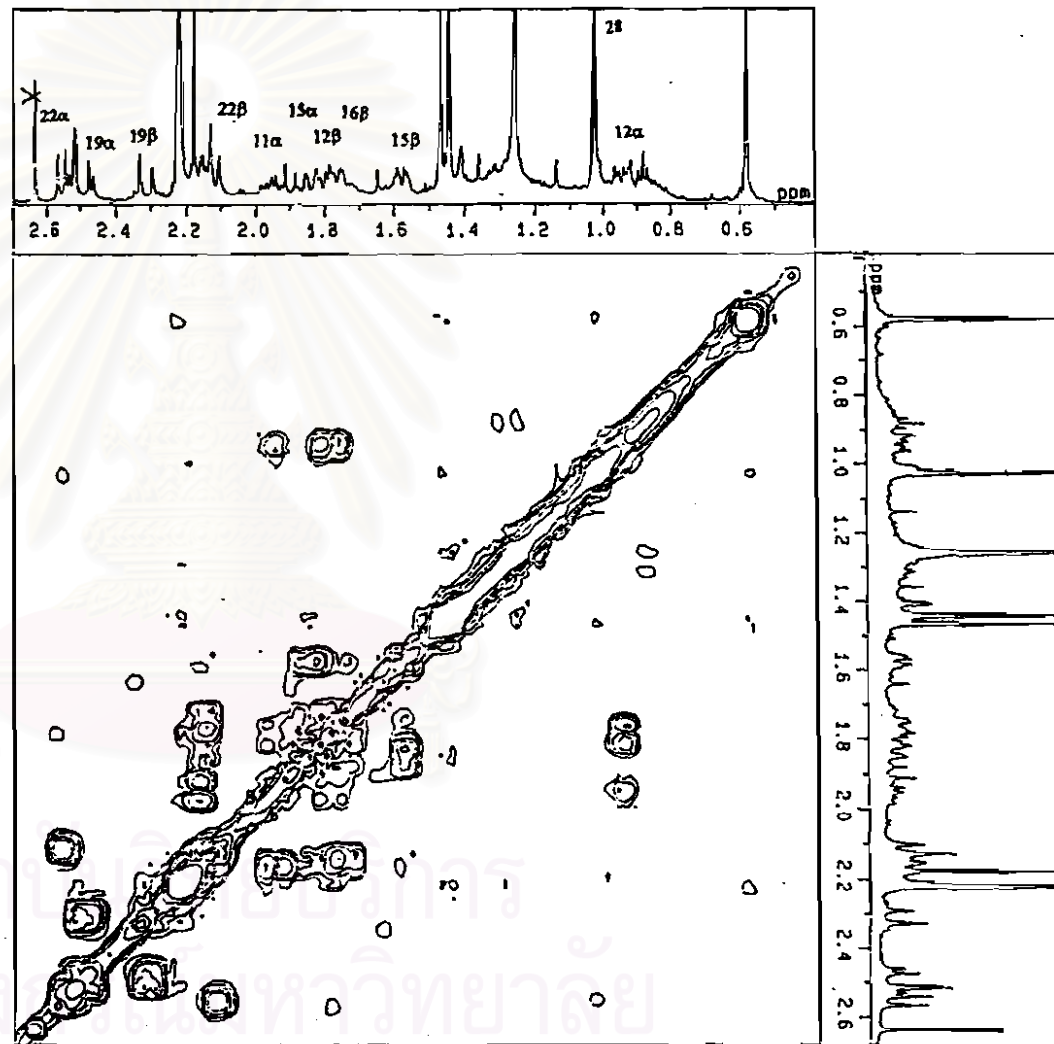
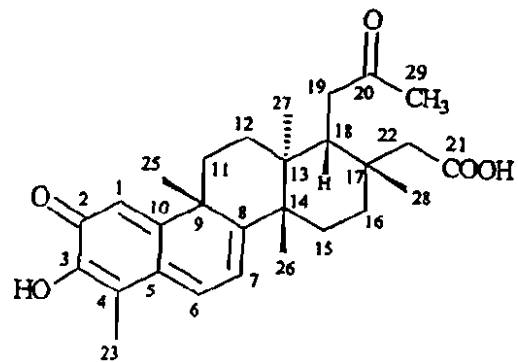


Figure 132. Expanded ^1H - ^1H COSY spectrum of GS-Y4-1 (53) (in CDCl_3) in the range of 2.7-0.4 ppm.

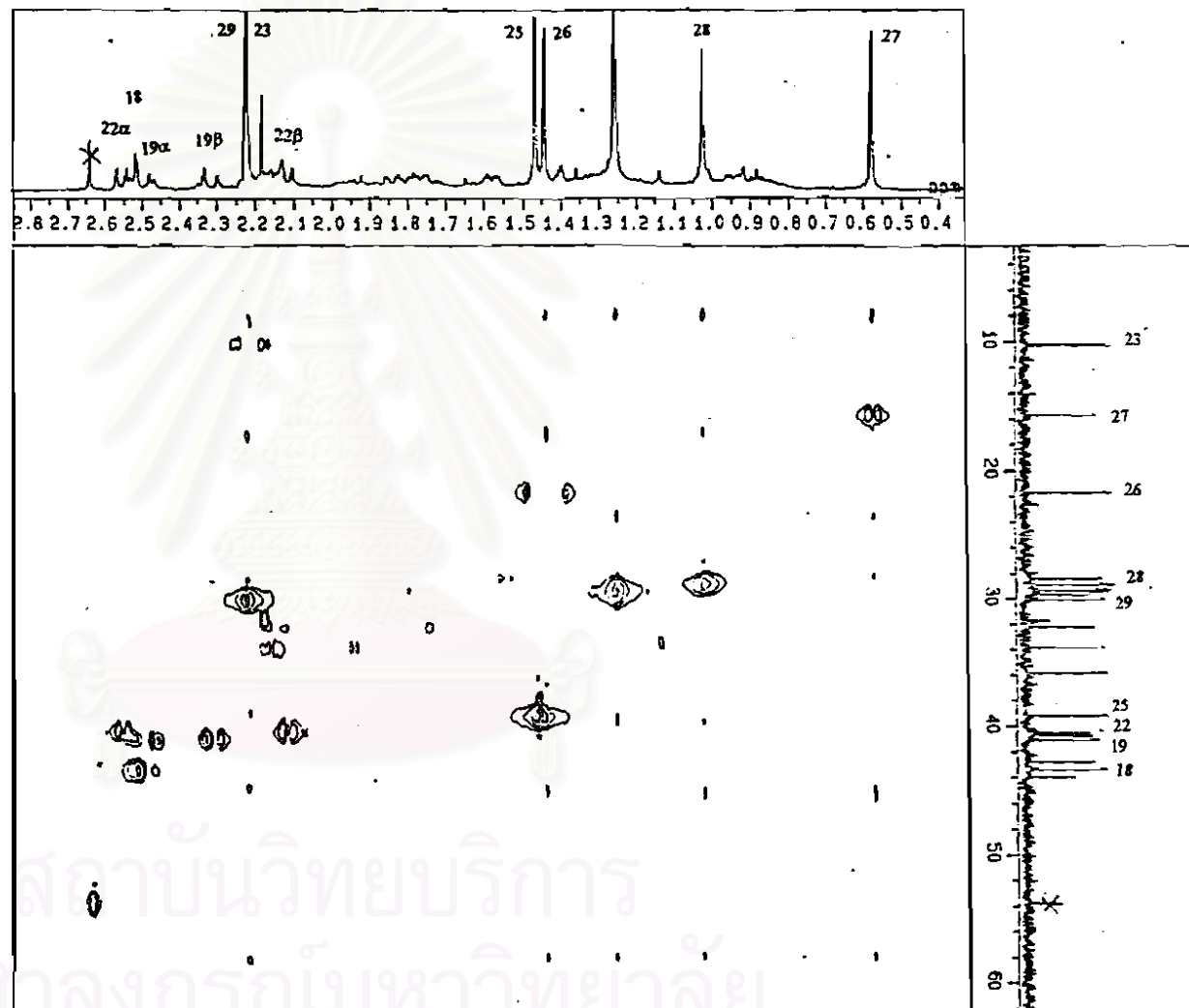
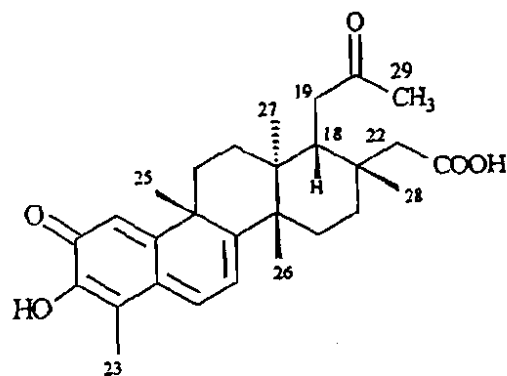


Figure 133. Expanded HMQC spectrum of GS-Y4-1 (53) (in CDCl₃) in the ranges of δ ¹H 2.9-0.3 ppm and δ ¹³C 62-2 ppm.

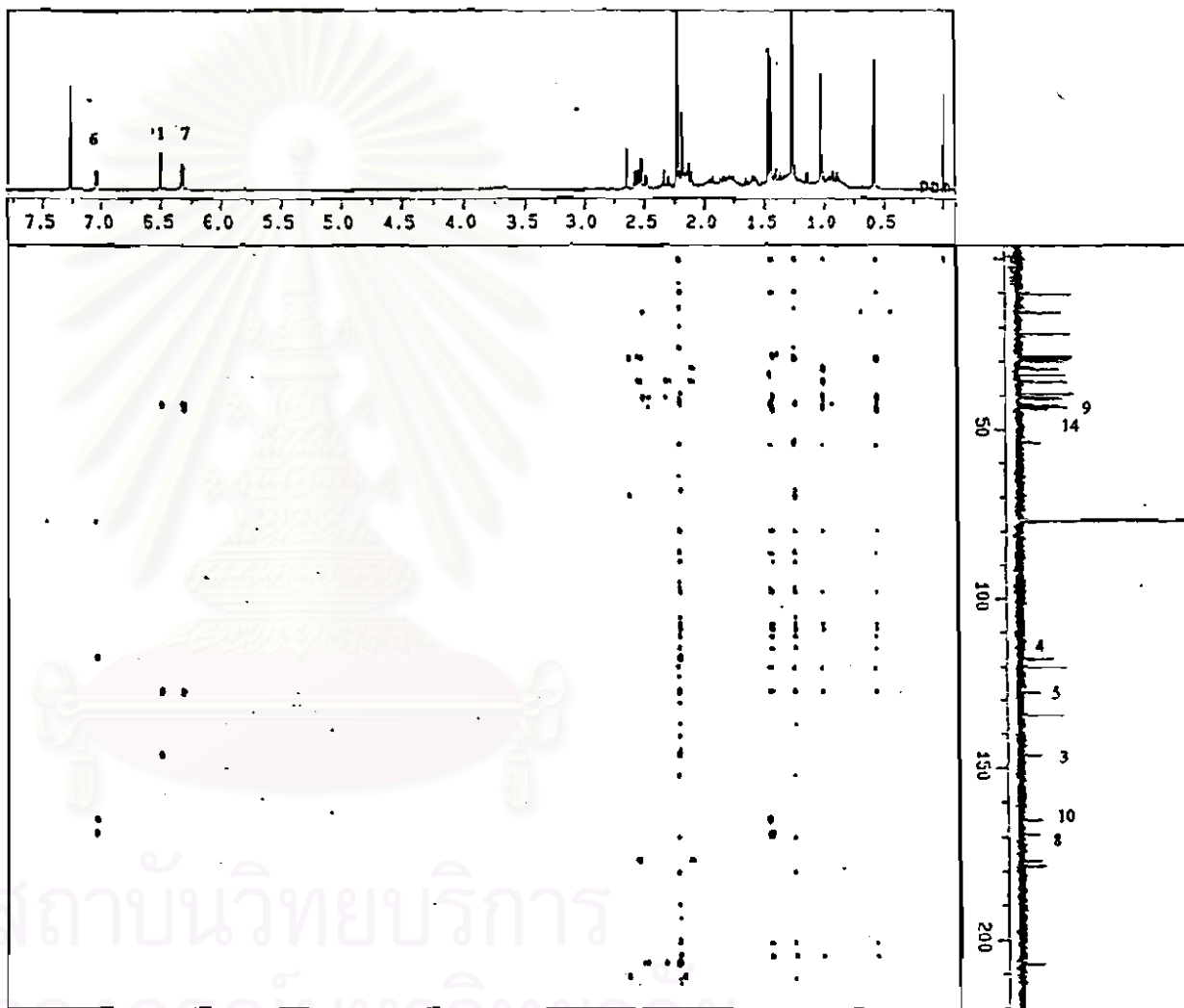
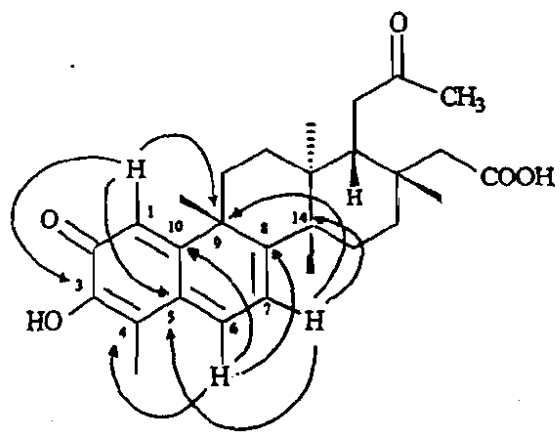


Figure 134. (a) HMBC spectrum of GS-Y4-1 (53) (in CDCl₃).

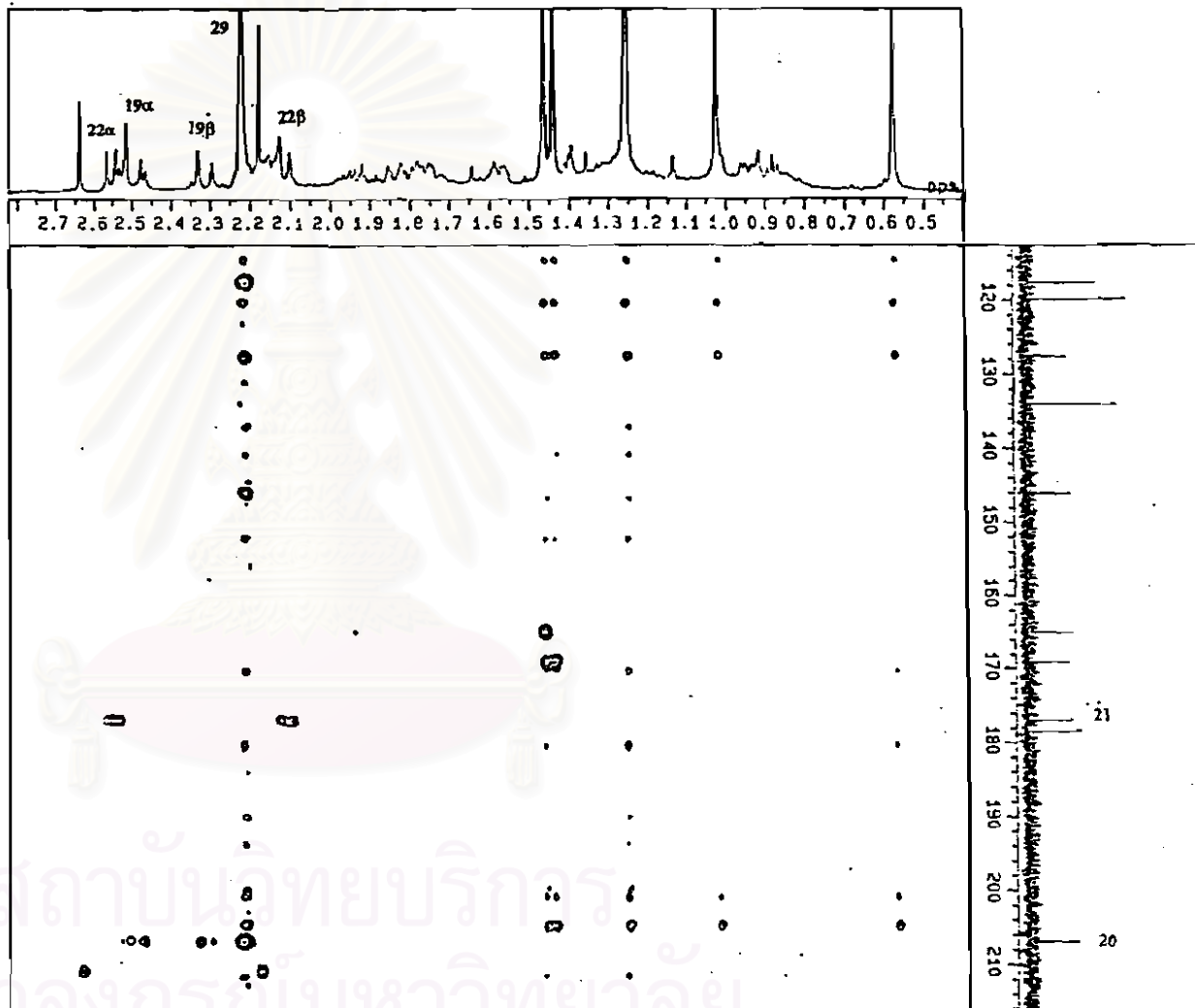
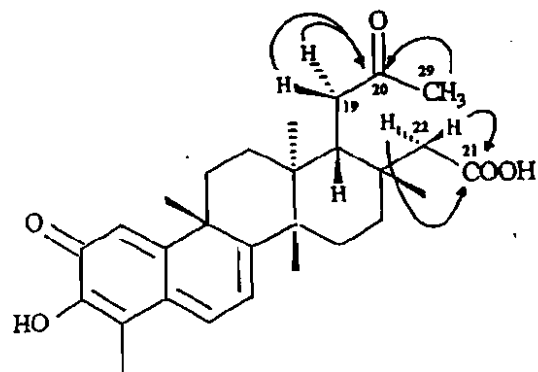


Figure 134. (b) Expanded HMBC spectrum of GS-Y4-1 (53) (in CDCl_3) in the ranges of $\delta^1\text{H}$ 2.8-0.4 ppm and $\delta^{13}\text{C}$ 216-112 ppm.

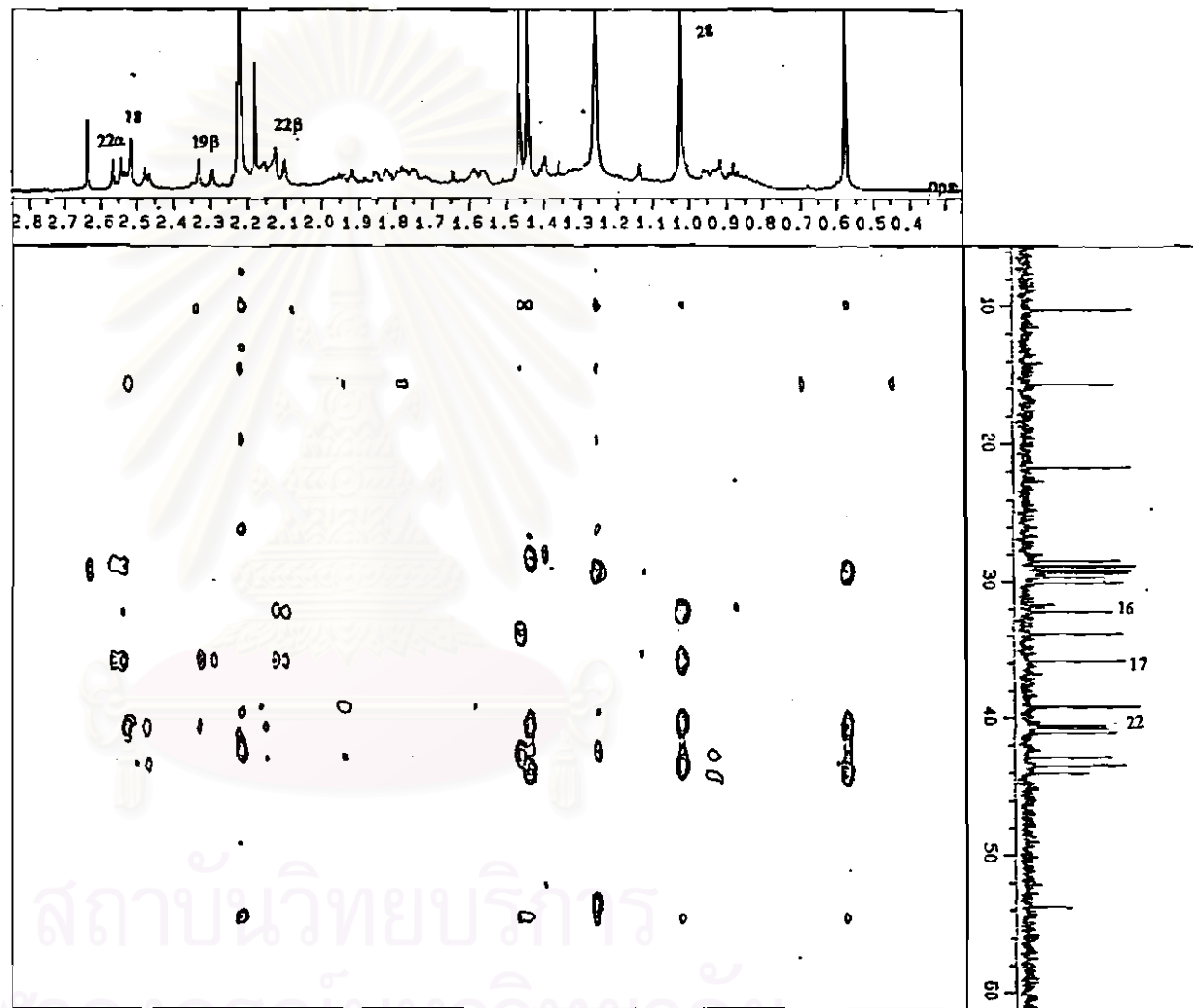
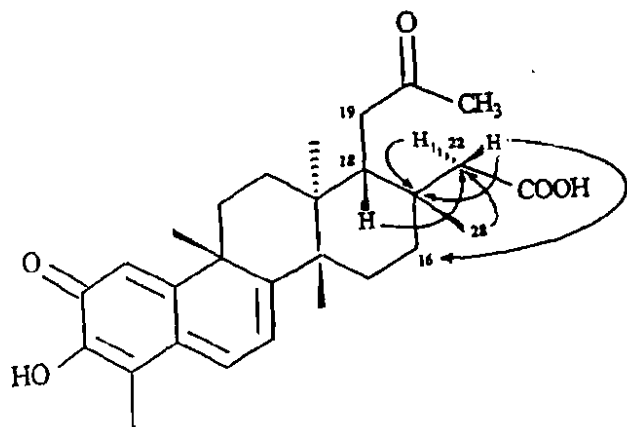


Figure 134. (c) Expanded HMBC spectrum of GS-Y4-1 (53) (in CDCl₃) in the ranges of δ ¹H 2.8-0.4 ppm and δ ¹³C 62-6 ppm.

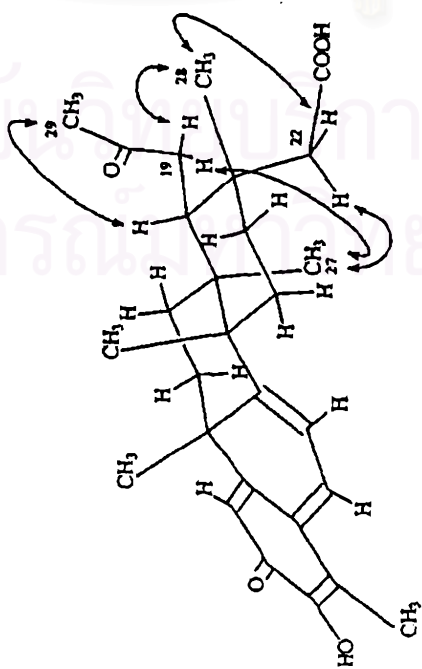
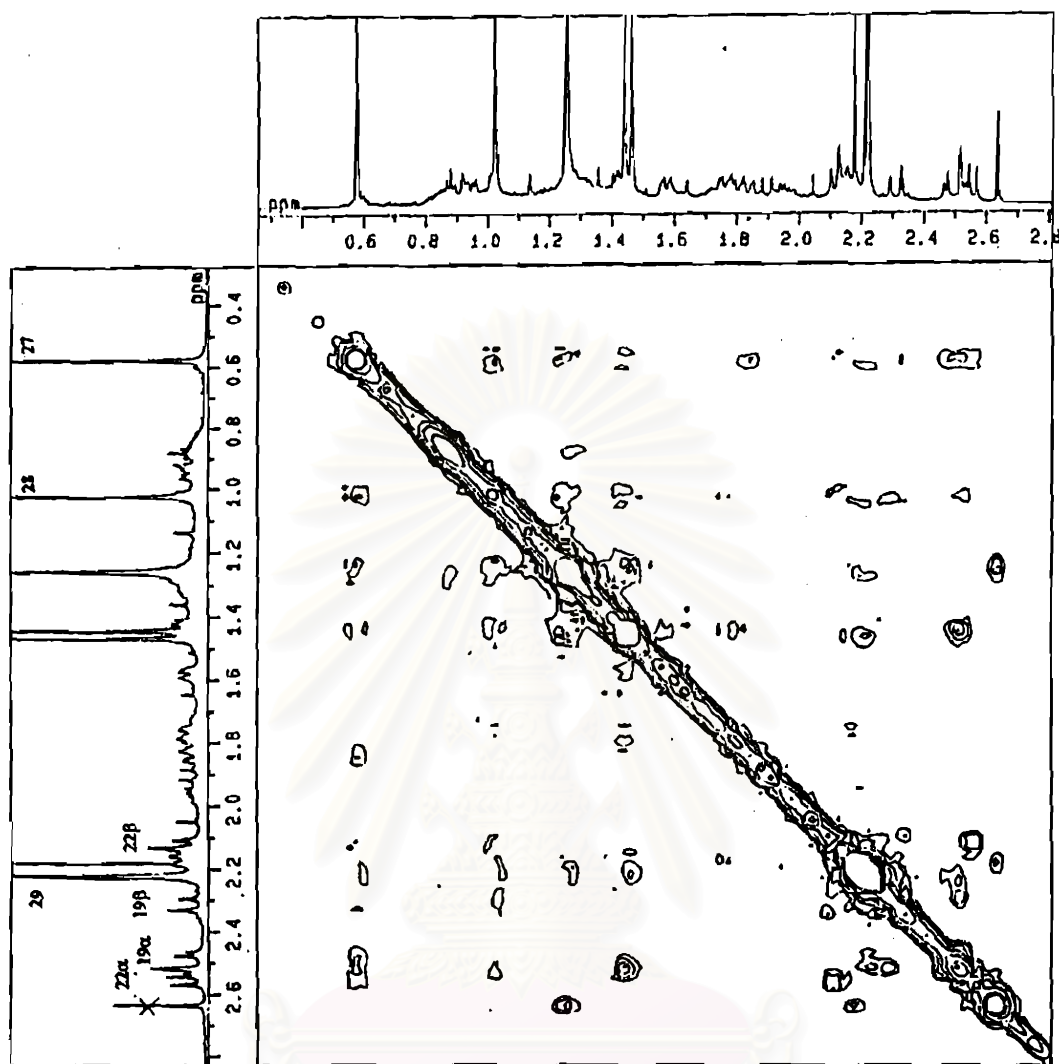


Figure 135. Expanded NOESY spectrum of GS-Y4-1 (53) (in CDCl_3) in the ranges of δ 2.8-0.4 ppm.

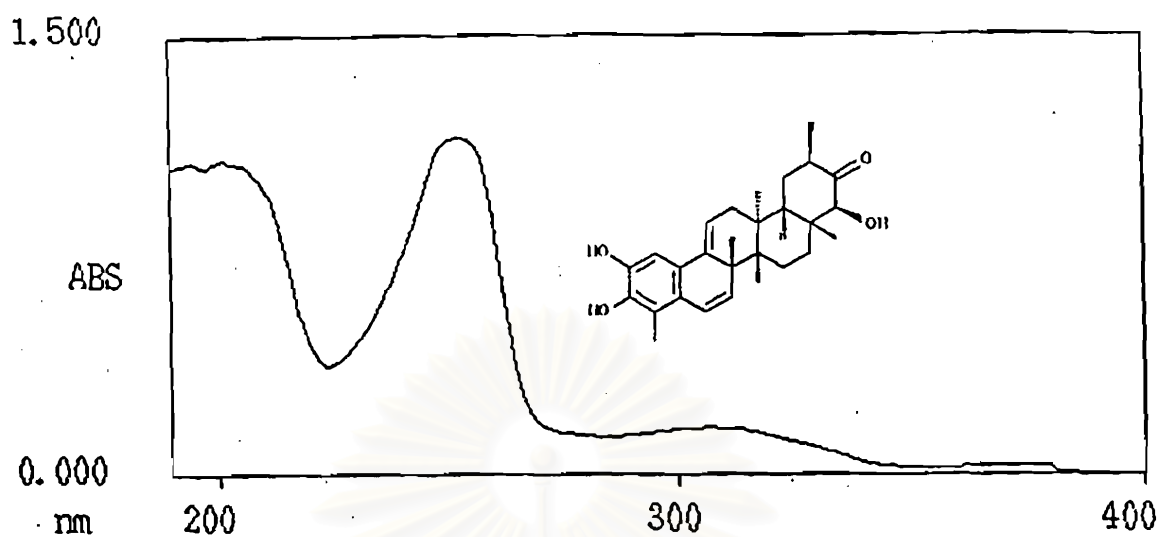


Figure 136. UV absorption spectrum of GS-T-1-ACID (54) (in MeOH).

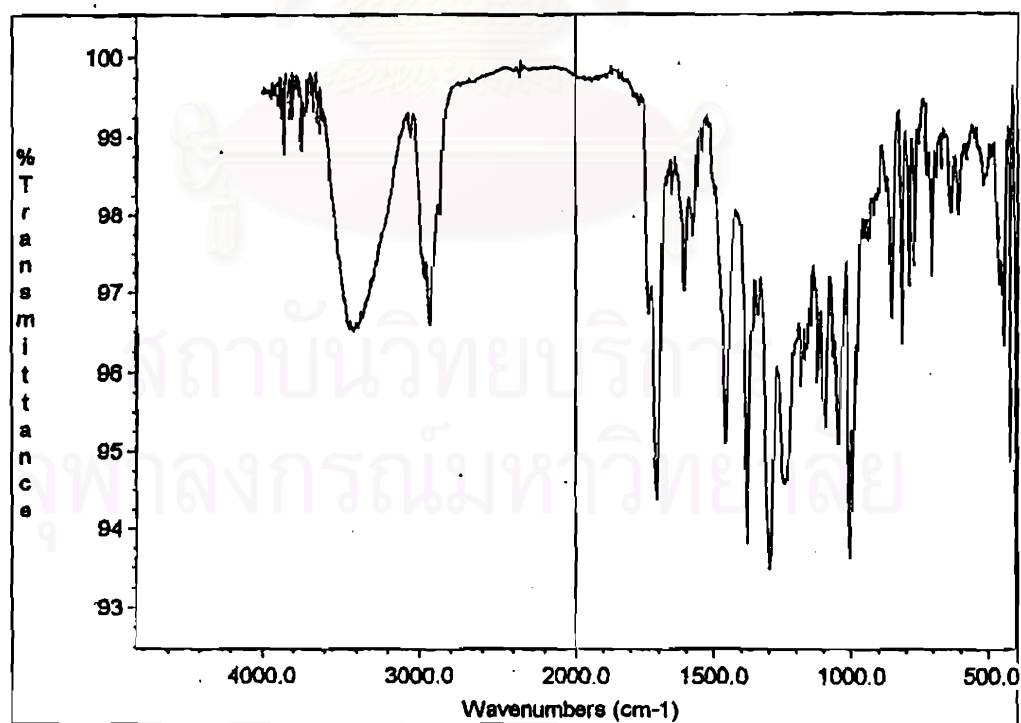


Figure 137. IR spectrum of GS-T-1-ACID (54) (dry film).

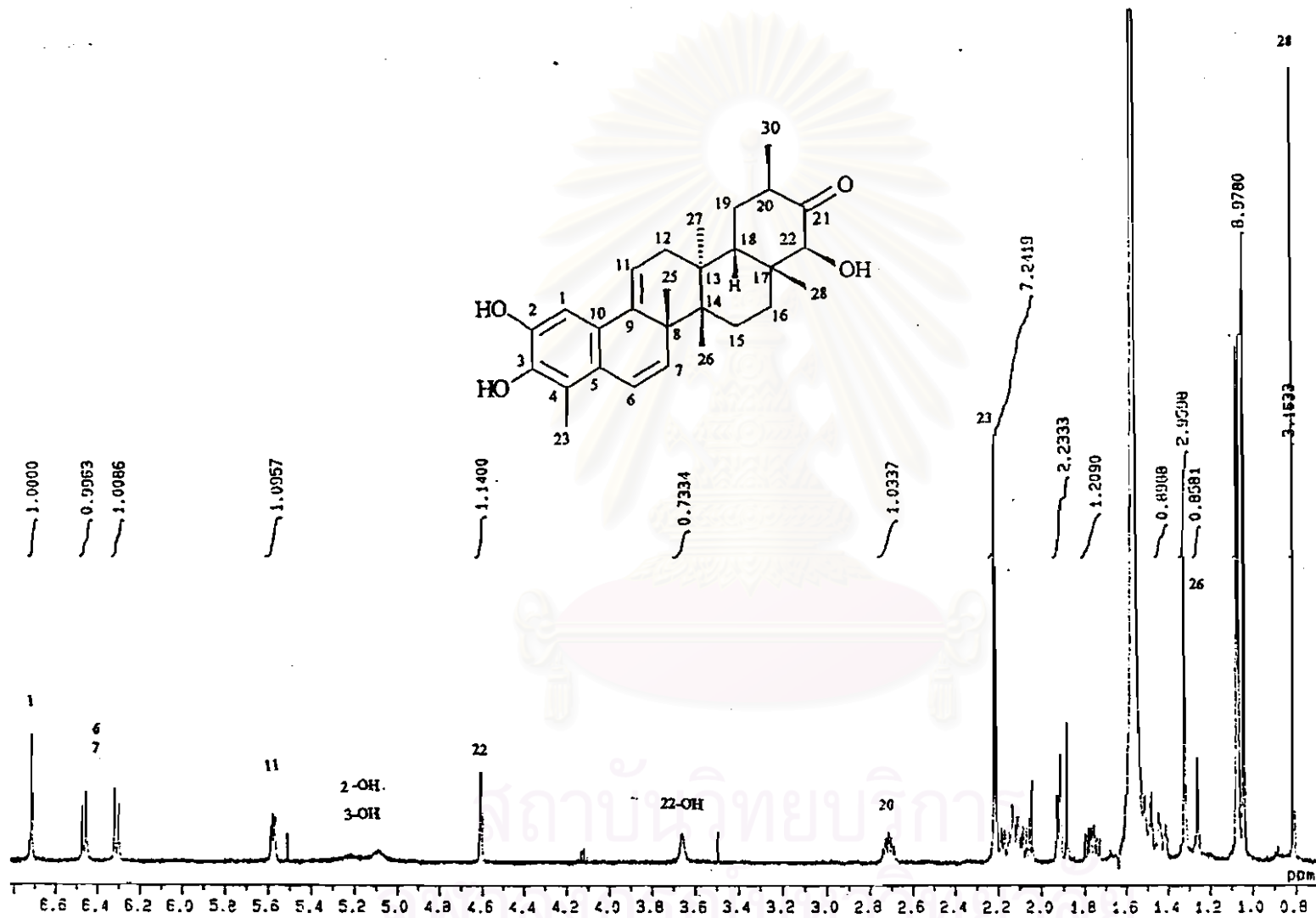


Figure 138. (a) ^1H NMR spectrum (500 MHz) of GS-T-1-ACID (54) (in CDCl_3).

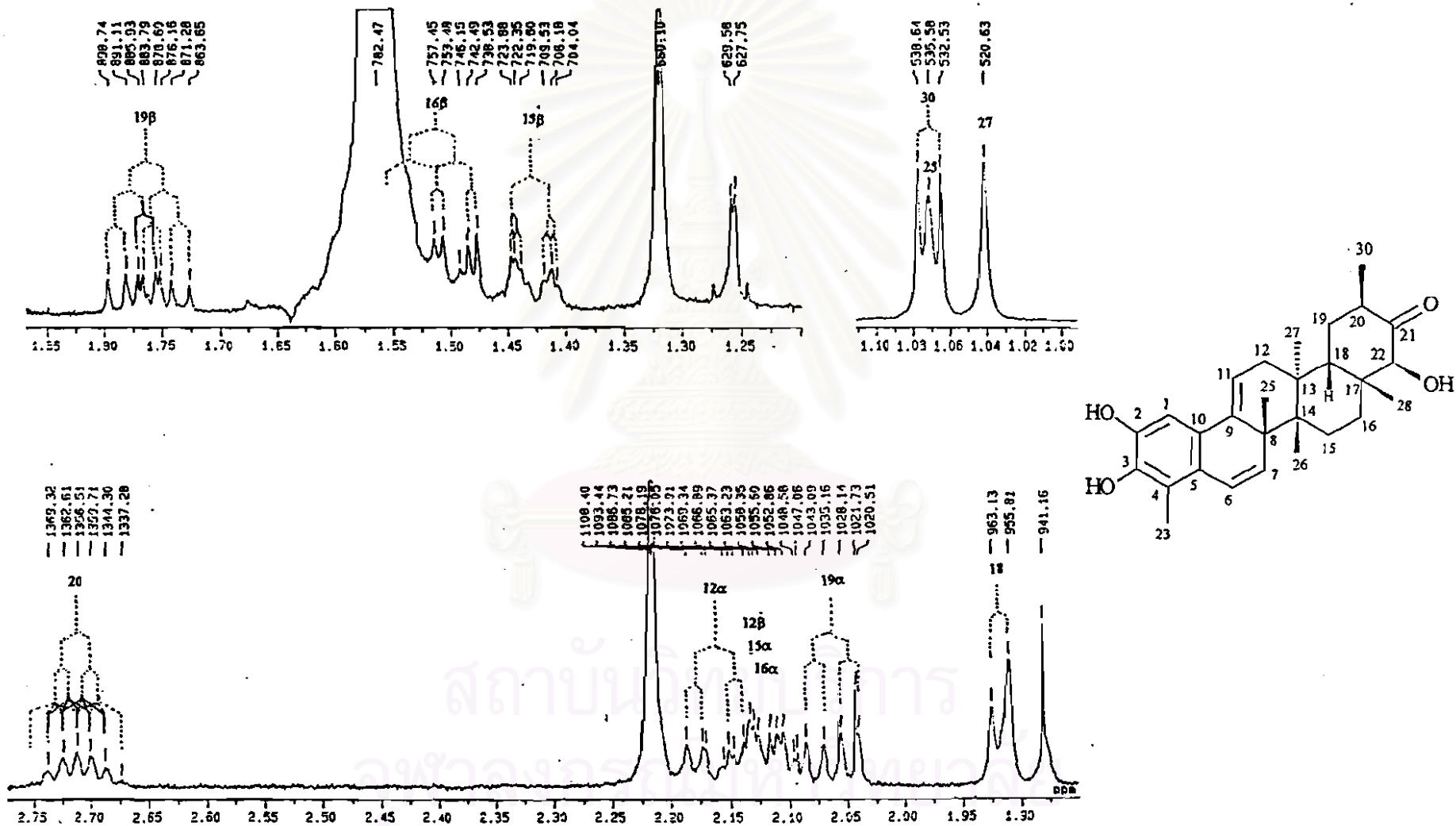


Figure 138. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-T-1-ACID (54) (in CDCl_3).

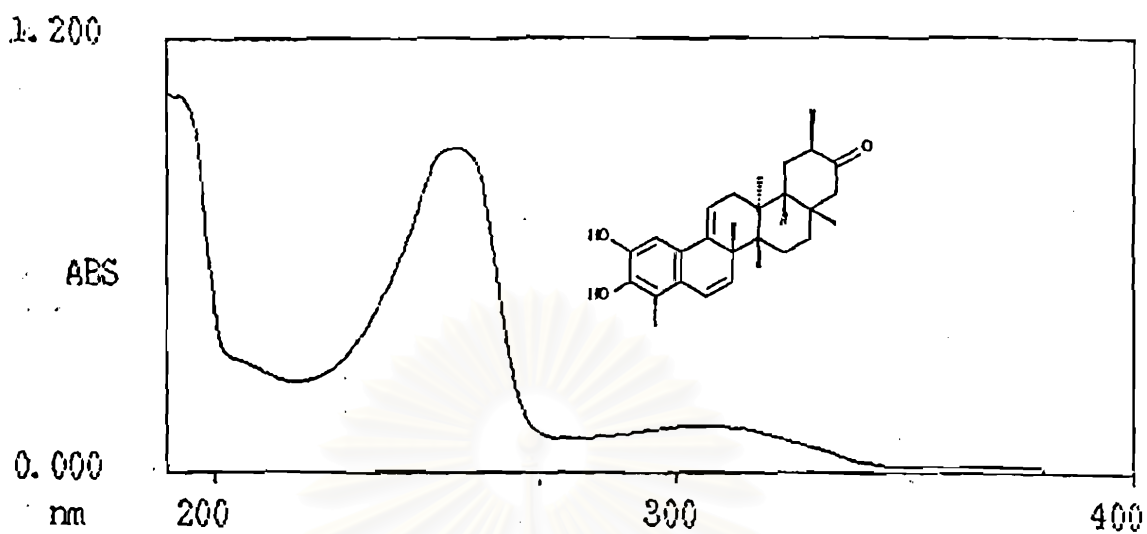


Figure 139. UV absorption spectrum of GS-T-2-ACID (55) (in MeOH).

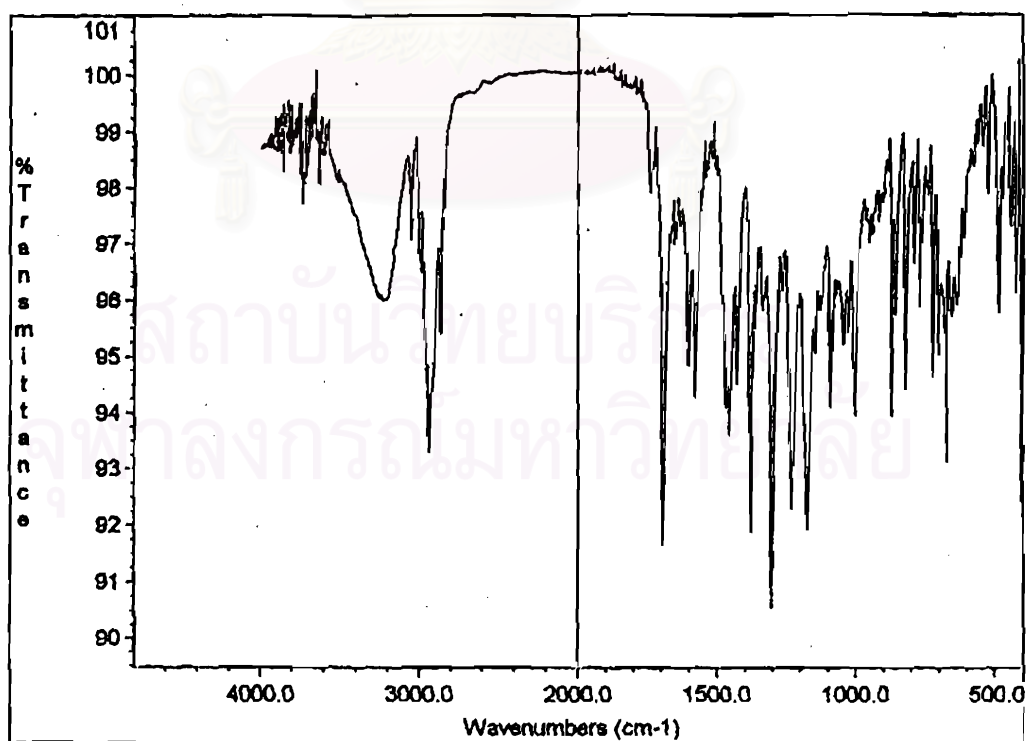


Figure 140. IR spectrum of GS-T-2-ACID (55) (dry film).

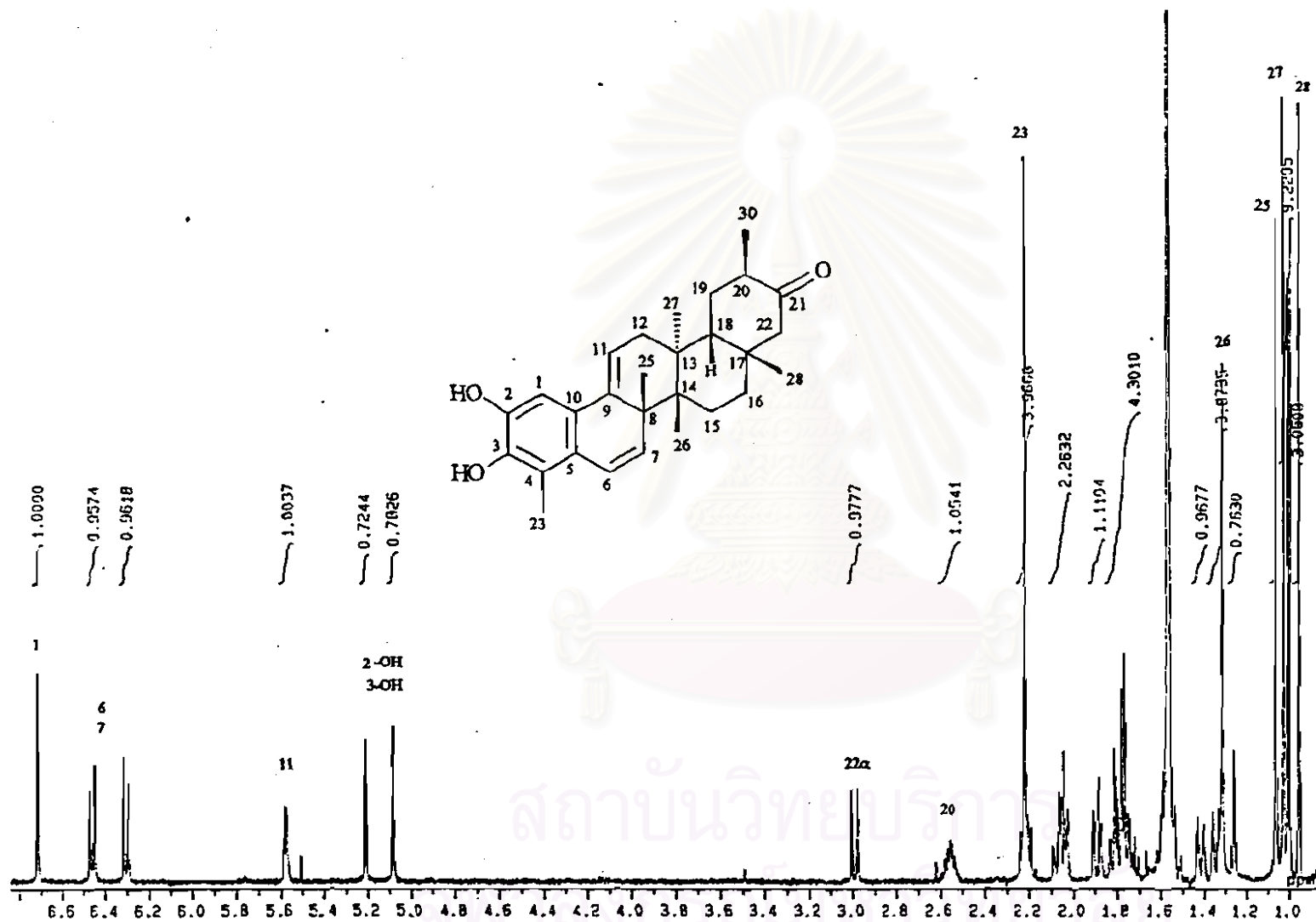


Figure 141. (a) ^1H NMR spectrum (500 MHz) of GS-T-2-ACID (55) (in CDCl_3).

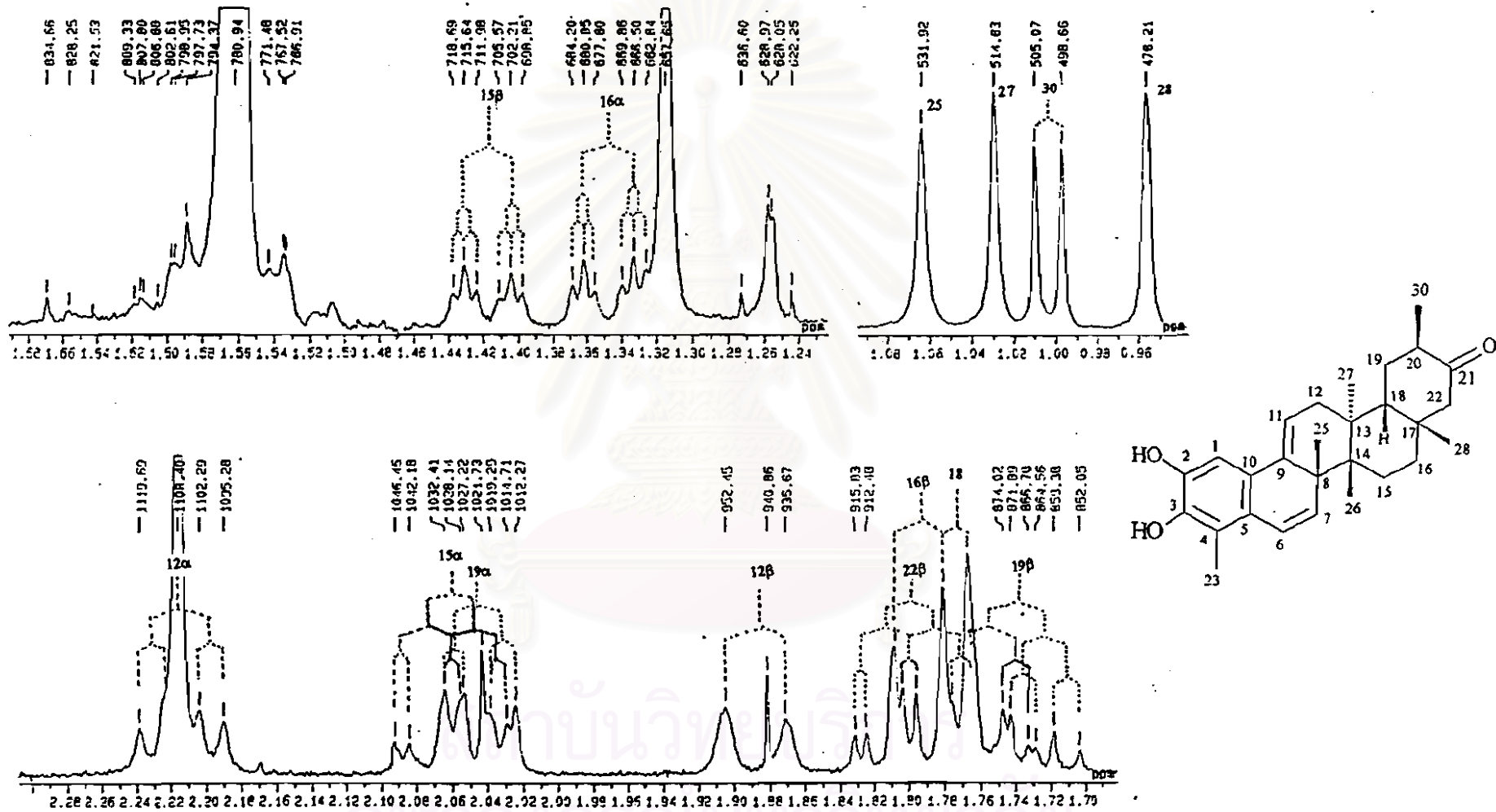


Figure 141. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-T-2-ACID (55) (in CDCl_3).

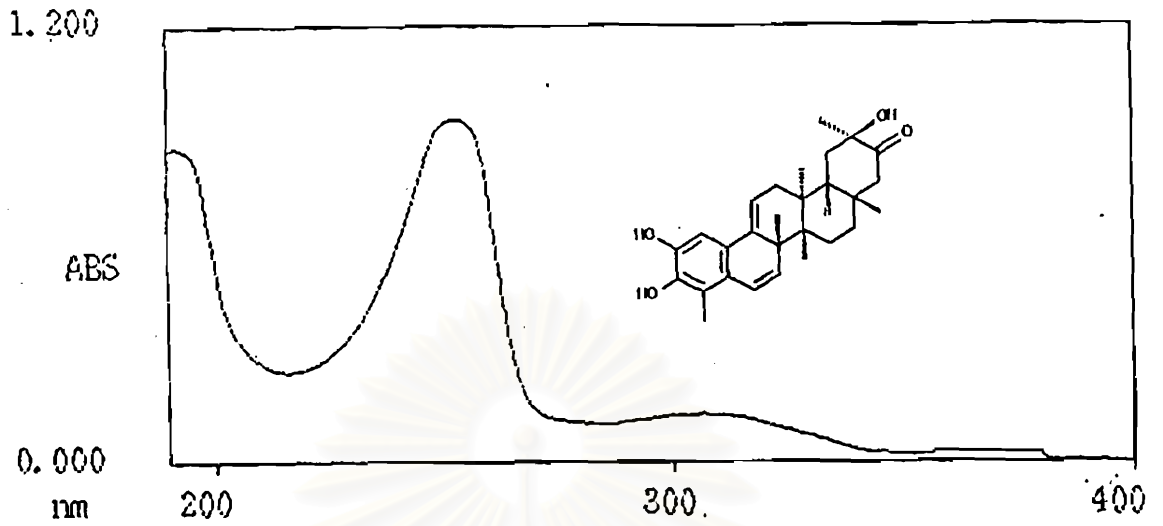


Figure 142. UV absorption spectrum of GS-Y1-1-ACID (56) (in MeOH).

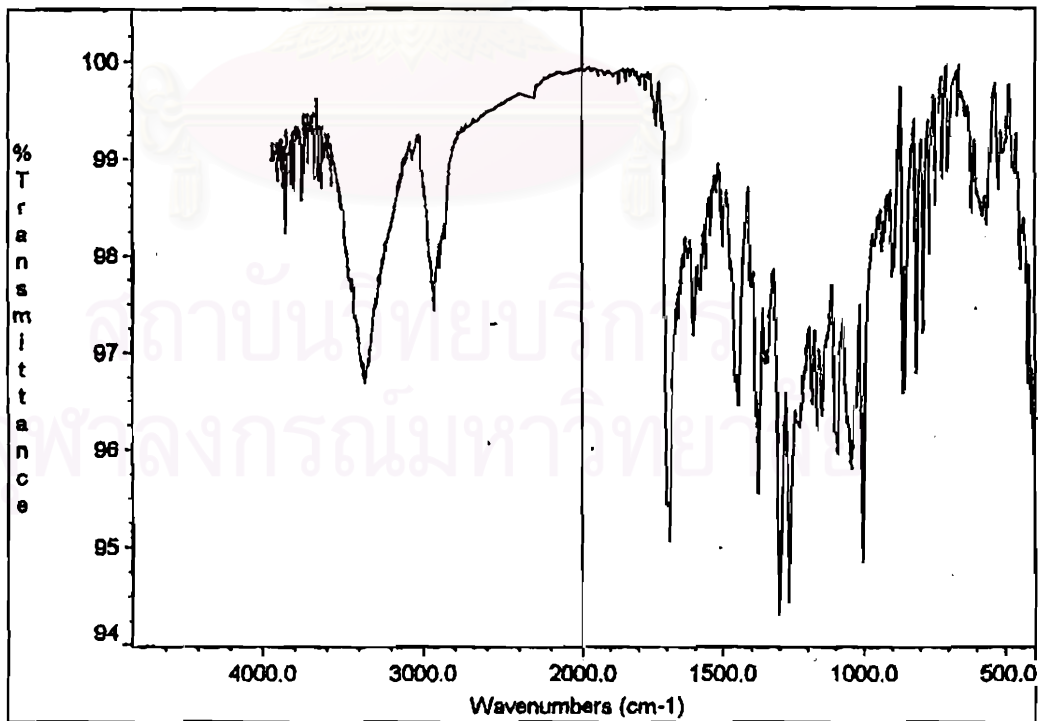


Figure 143. IR spectrum of GS-Y1-1-ACID (56) (dry film).

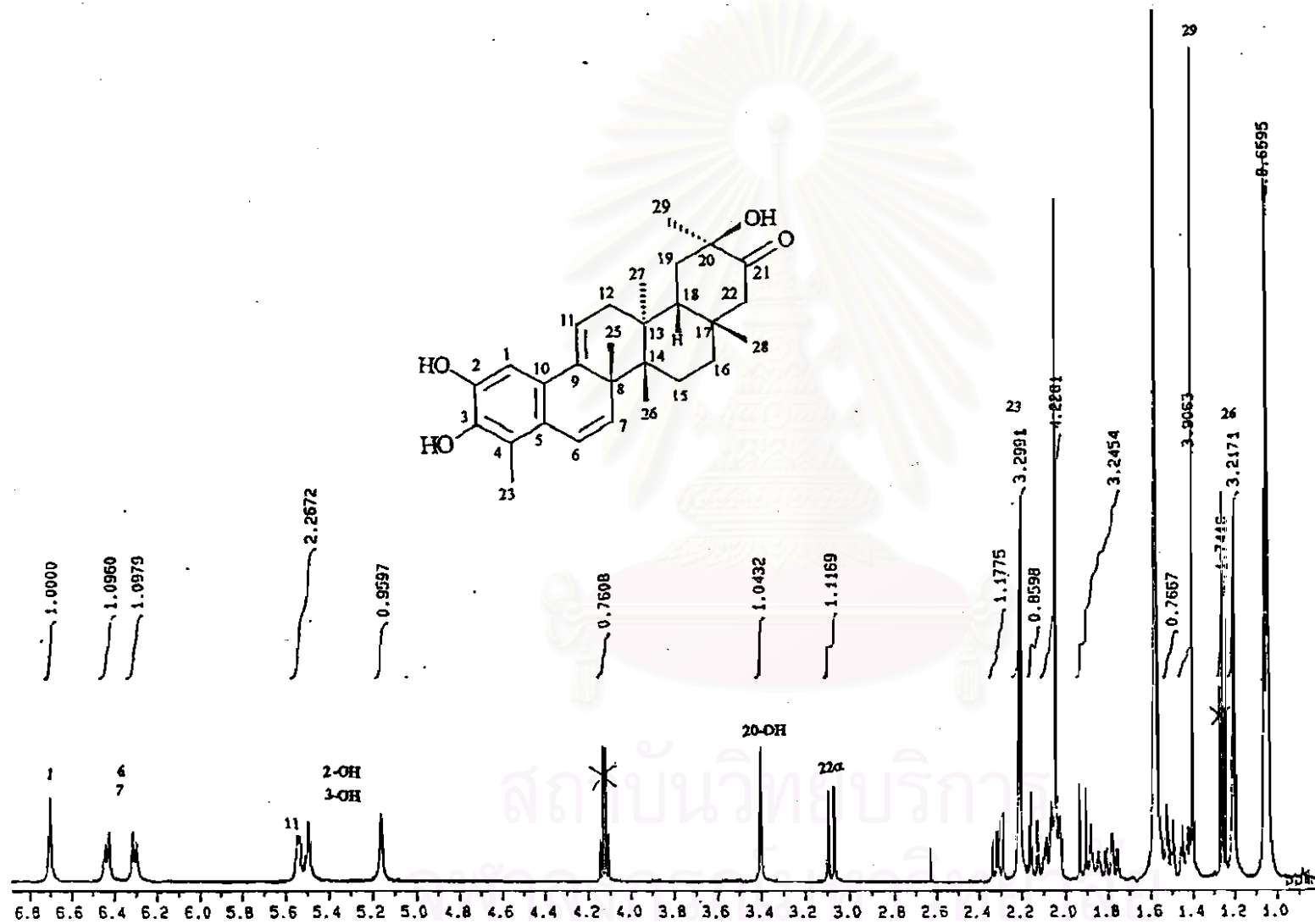


Figure 144. (a) ¹H NMR spectrum (500 MHz) of GS-Y1-1-ACID (56) (in CDCl₃).

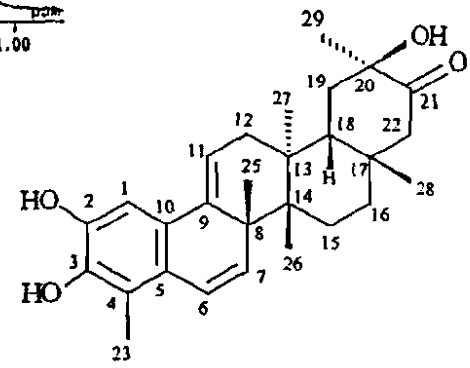
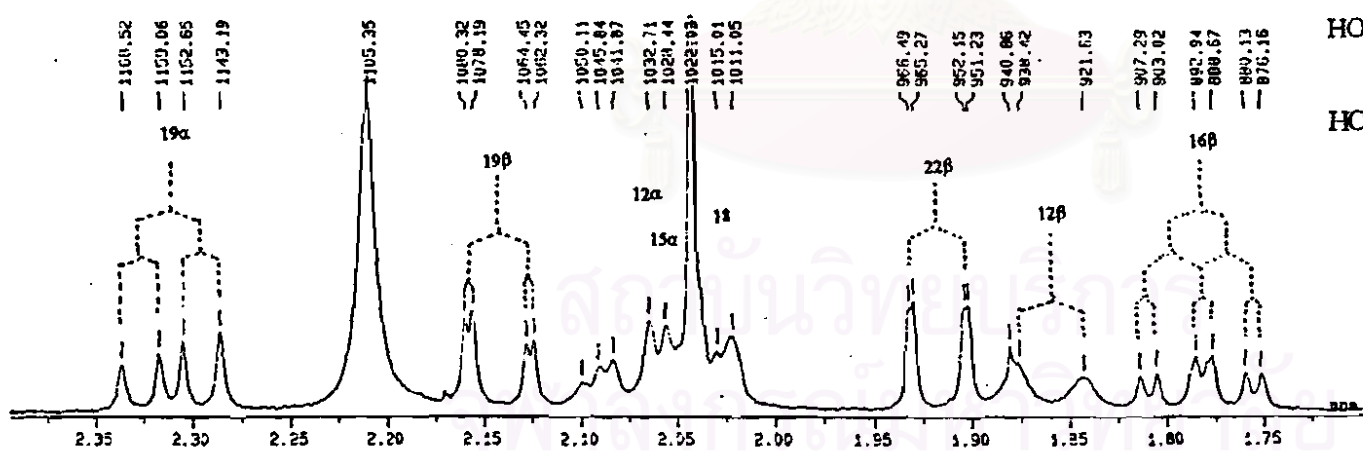
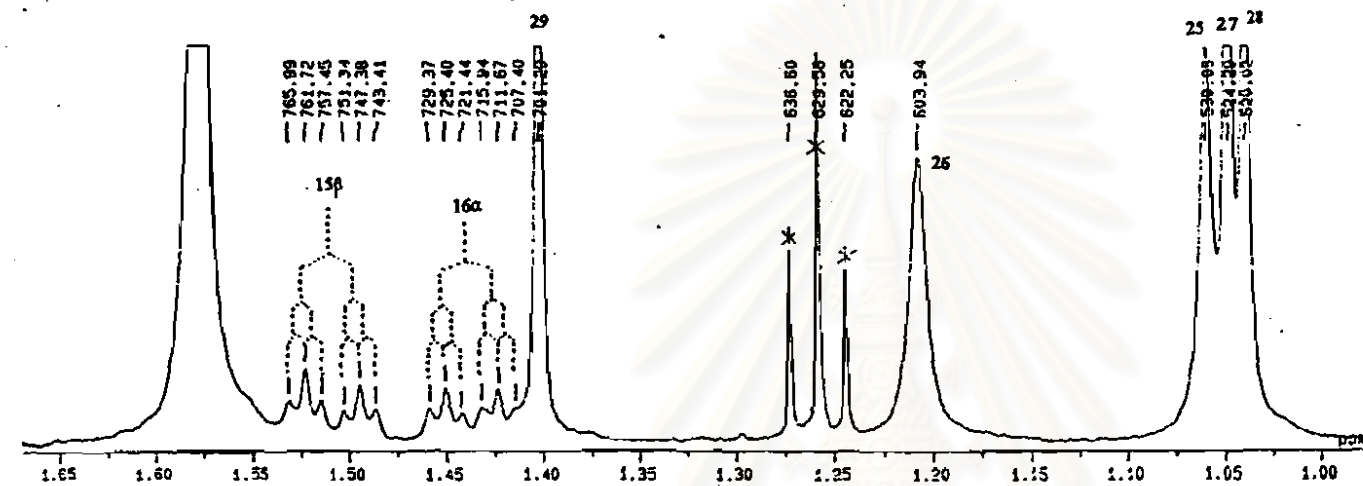


Figure 144. (b) Expanded ^1H NMR spectrum (500 MHz) of GS-Y1-1-ACID (56) (in CDCl_3).

VITA

Mr. Uthai Sotanaphun was born on January 3, 1965 in Bangkok, Thailand. He obtained a Bachelor of Science in Pharmacy, and a Master of Science in Pharmacy (Pharmaceutical Botany) in 1988 and 1990, respectively, from the Faculty of Pharmaceutical Sciences, Chulalongkorn University. At present he is a lecturer at the Department of Pharmacognosy, Faculty of Pharmacy, Silpakorn University.



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