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APPENDIX

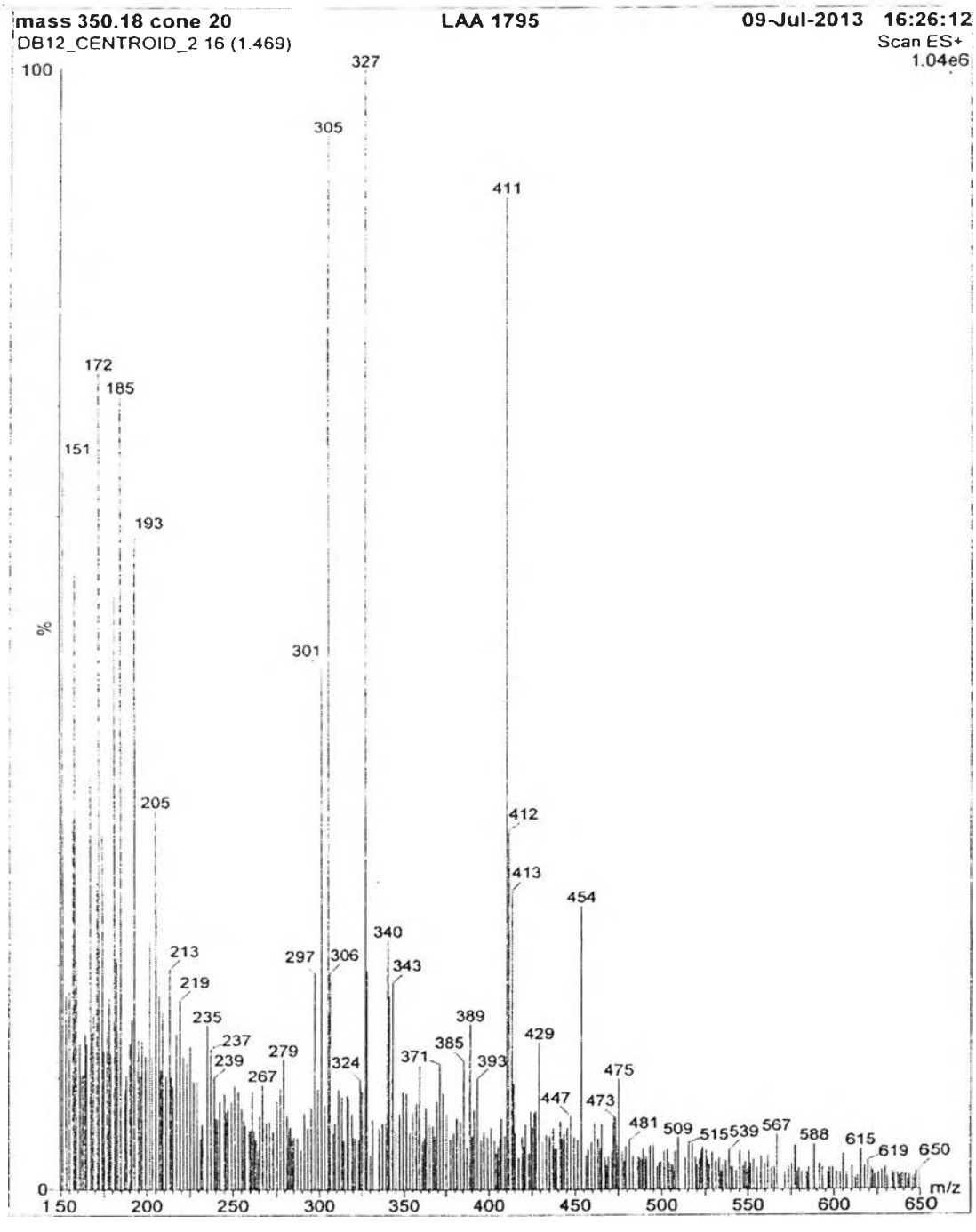

Figure 3 Mass spectrum of compound DB1

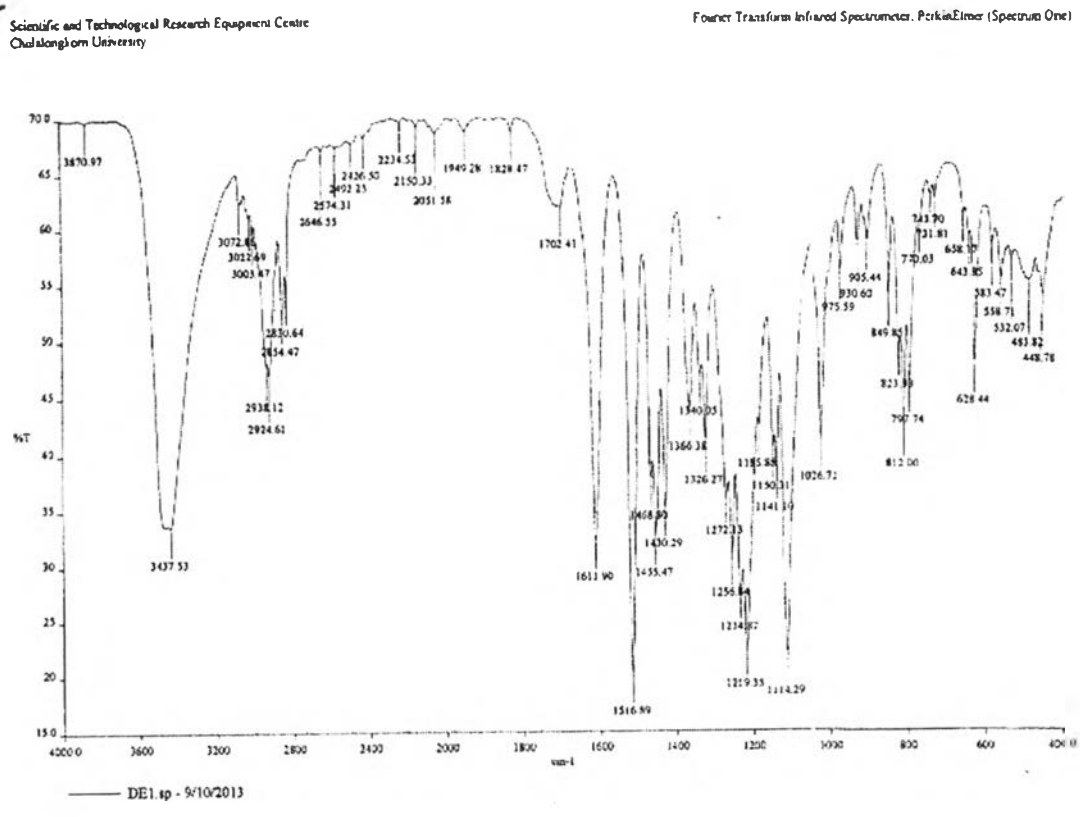

Figure 4 IR spectrum of compound DB1

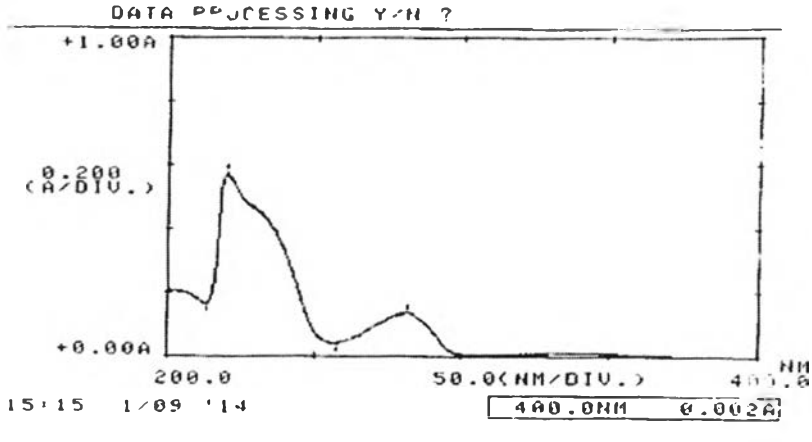

Figure 5 UV spectrum of compound DB1 (MeOH)

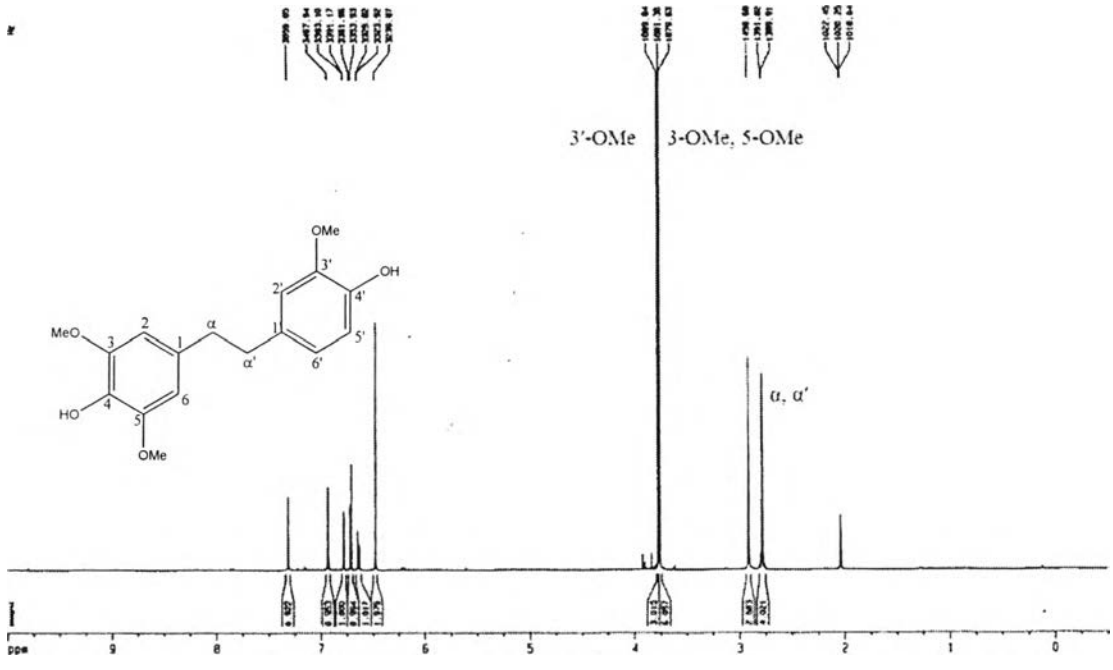

Figure 6a ^{1}H-NMR (500 MHz) spectrum of compound DB1 (acetone-d_6)

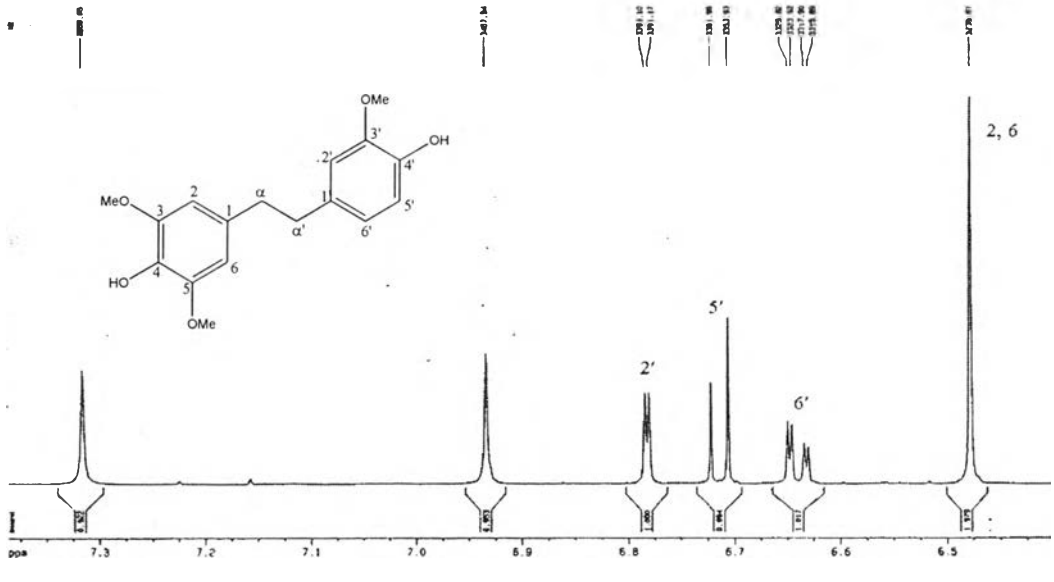

Figure 6b ^{1}H-NMR (500 MHz) spectrum of compound DB1 (acetone-d_6)

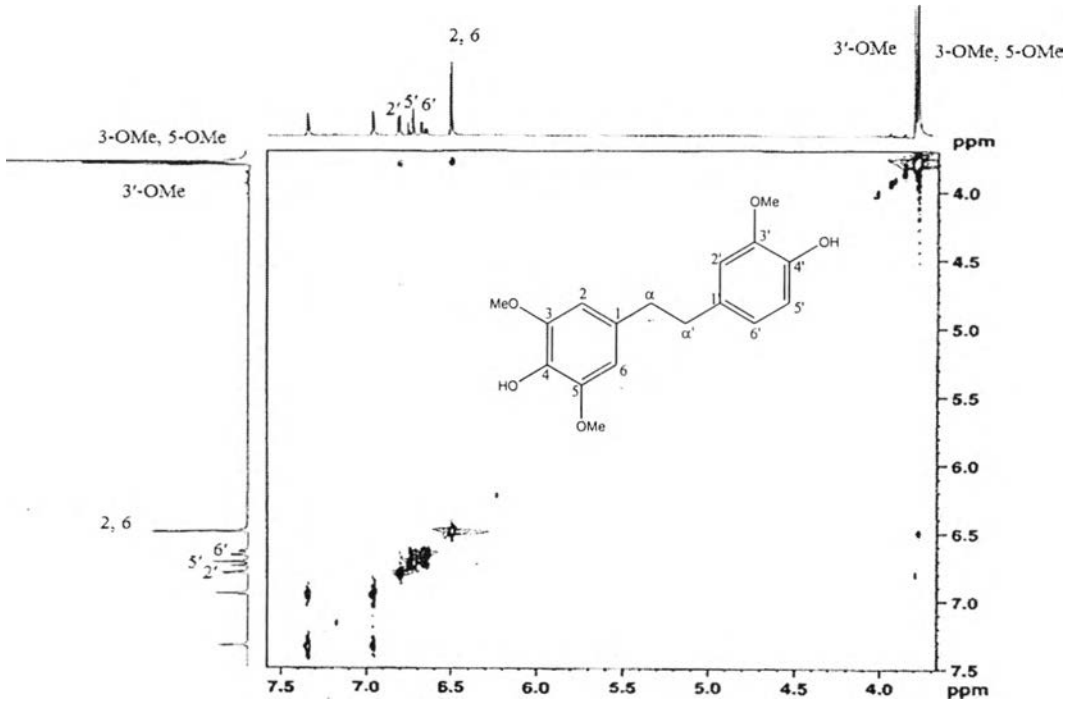

Figure 7 NOESY spectrum of compound DB1 (acetone-d_6)

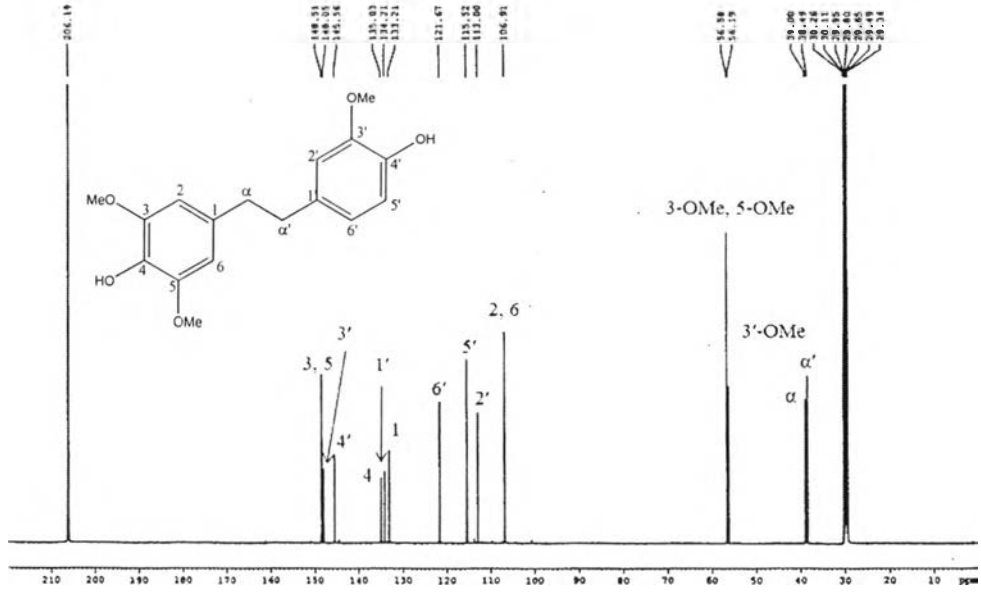

Figure 8 ^{13}C-NMR (125 MHz) spectrum of compound DB1 (acetone-d_6)

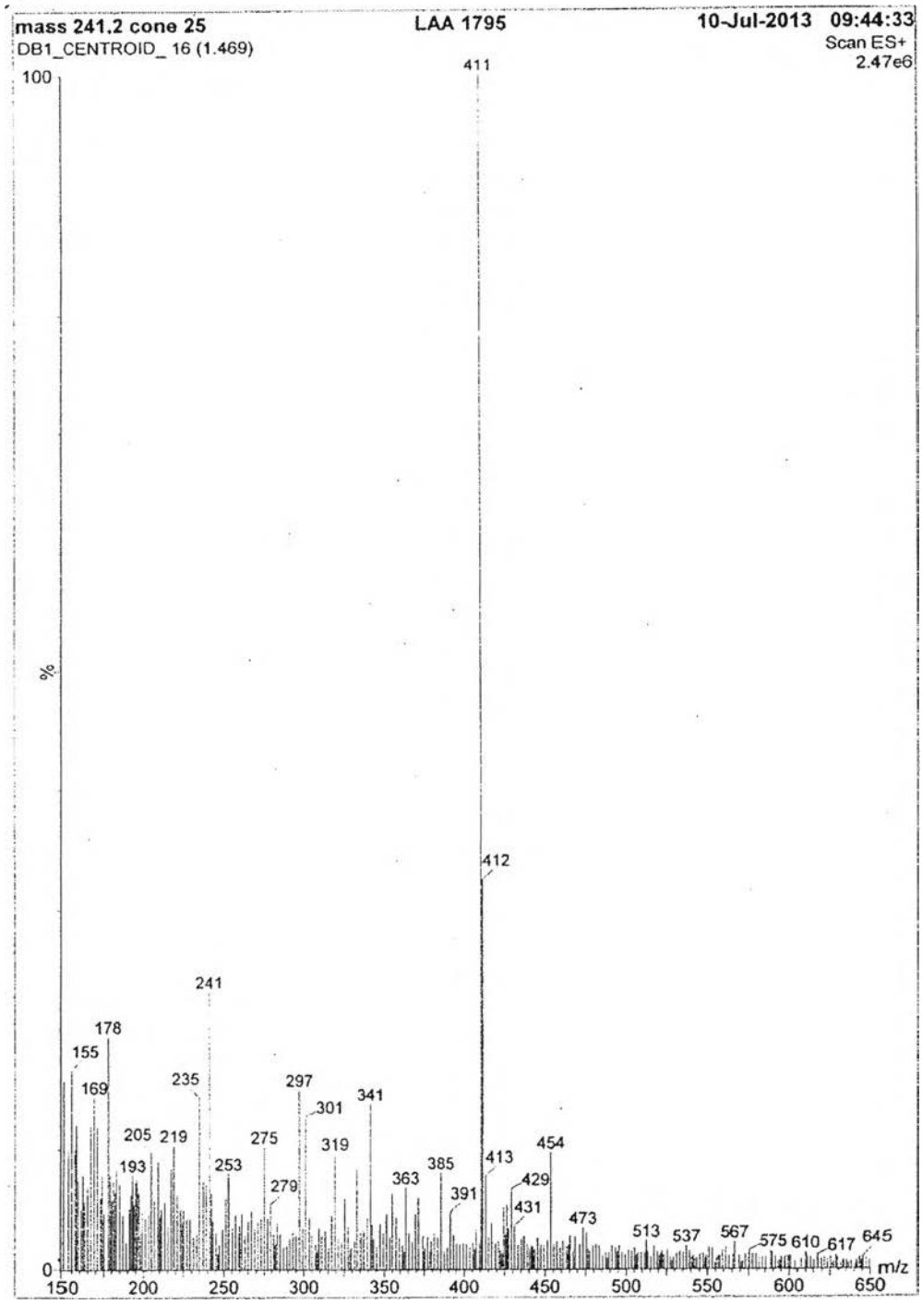

Figure 9 Mass spectrum of compound DB2

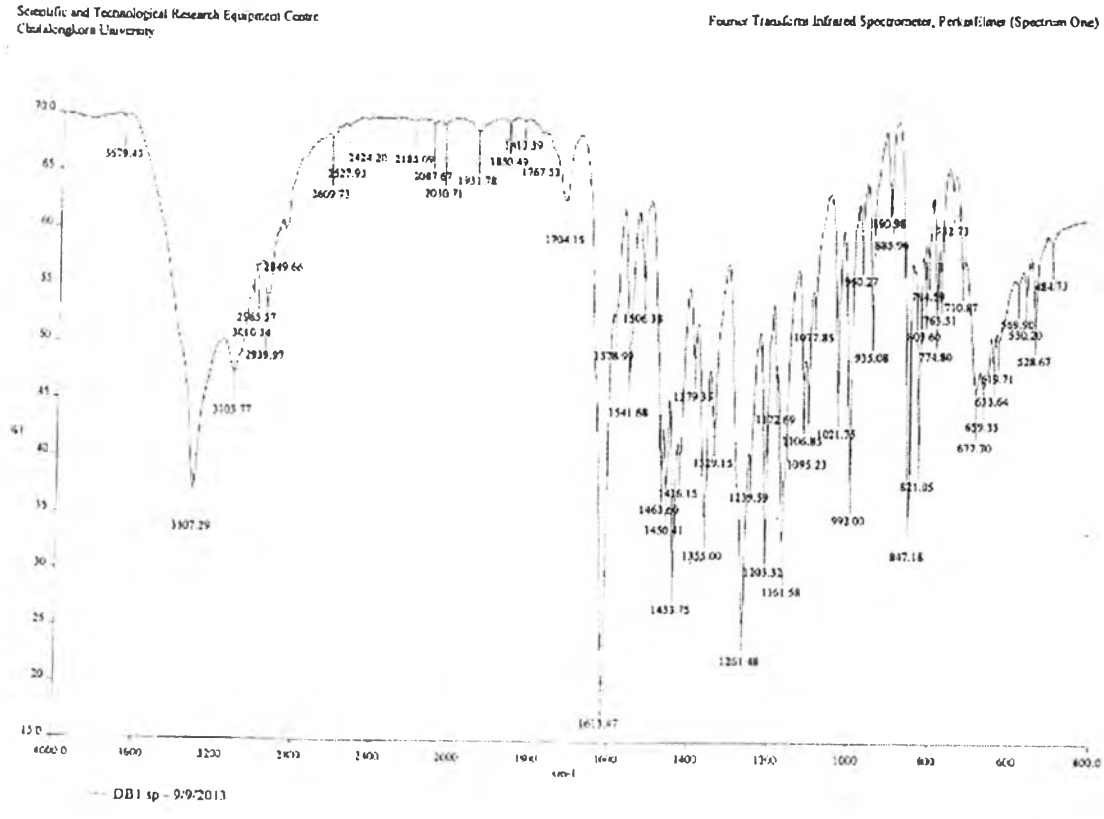

Figure 10 IR spectrum of compound DB2

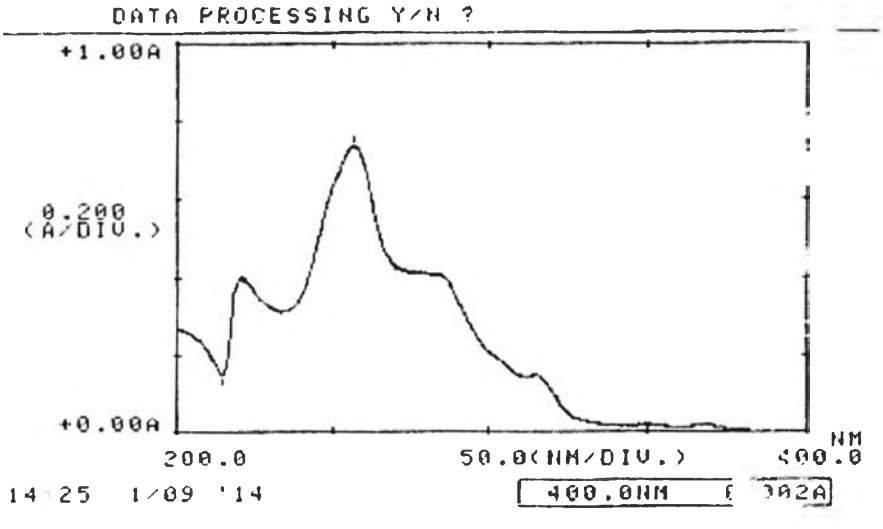

Figure 11 UV spectrum of compound DB2 (MeOH)

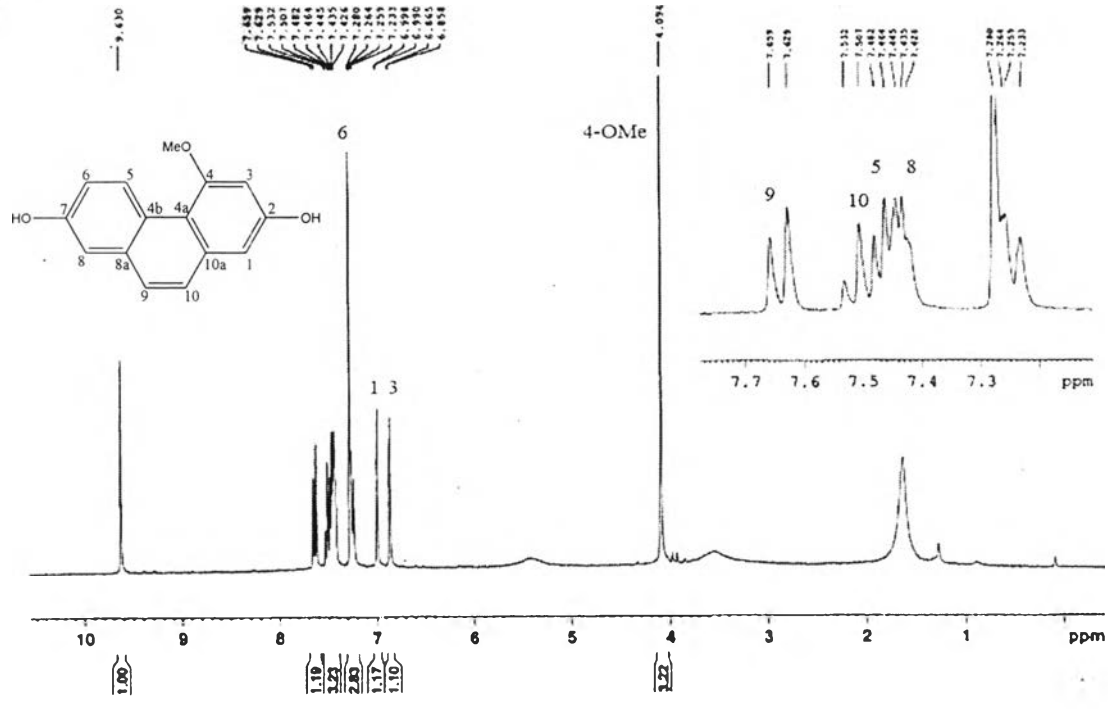

Figure 12 ^{1}H-NMR (300 MHz) spectrum of compound DB2 ($CDCl_3$)

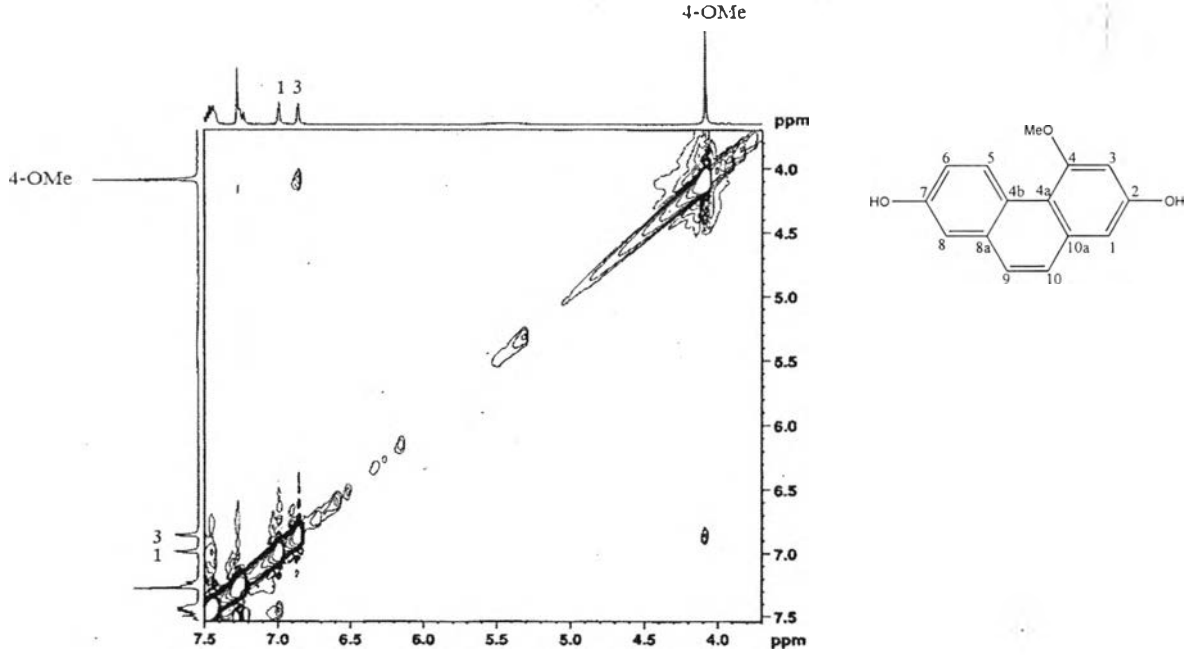

Figure 13 NOESY spectrum of compound DB2 ($CDCl_3$)

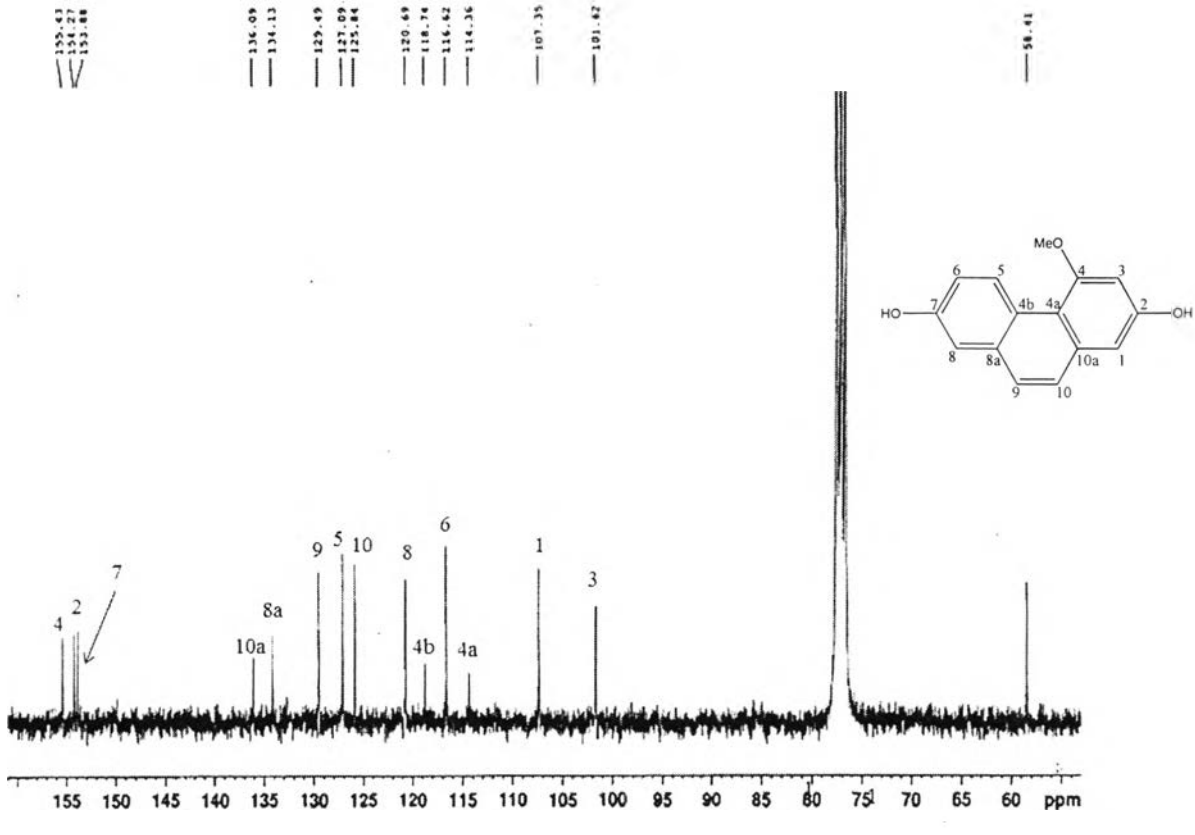

Figure 14 ^{13}C-NMR (75 MHz) spectrum of compound DB2 ($CDCl_3$)

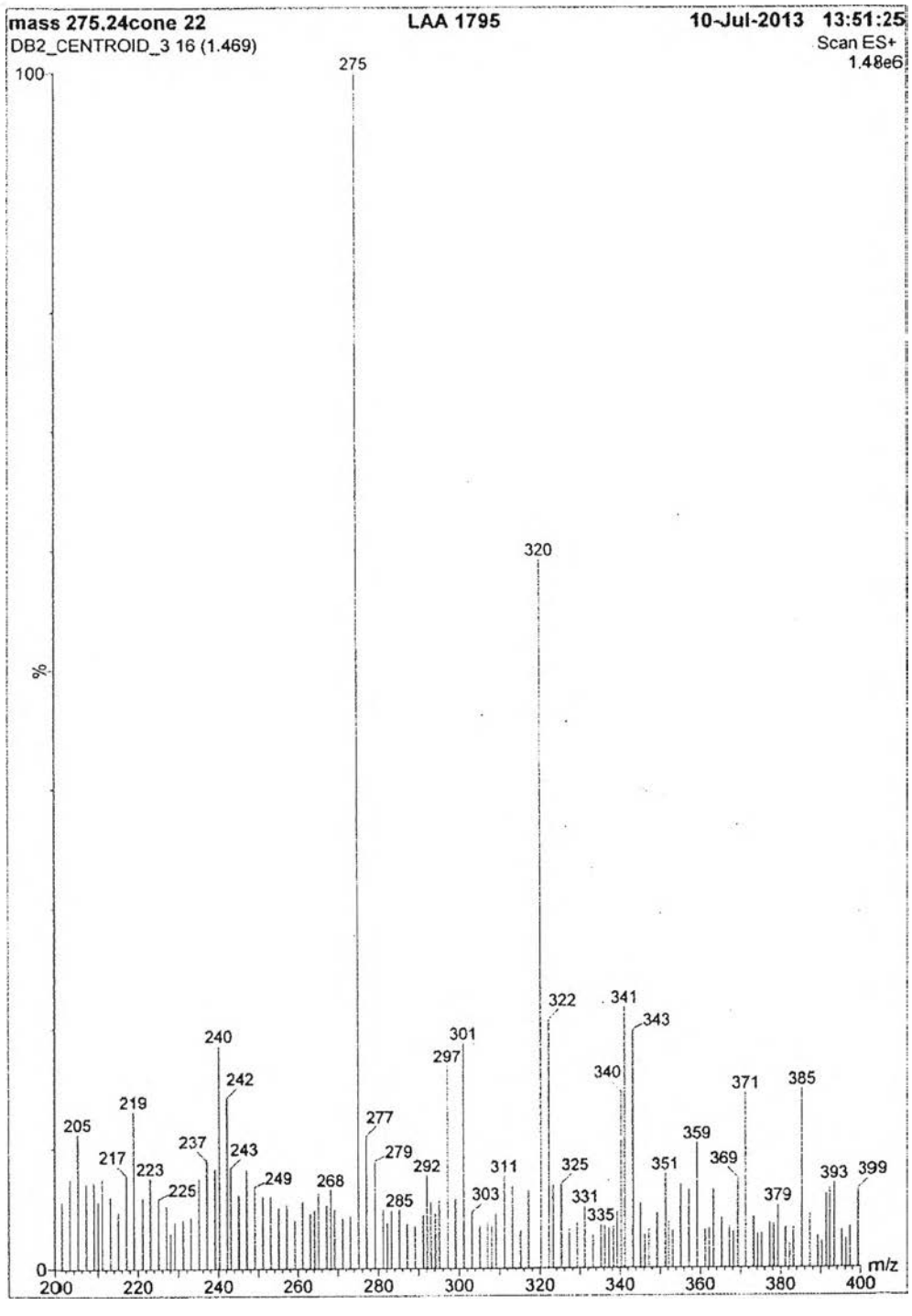

Figure 15 Mass spectrum of compound DB3

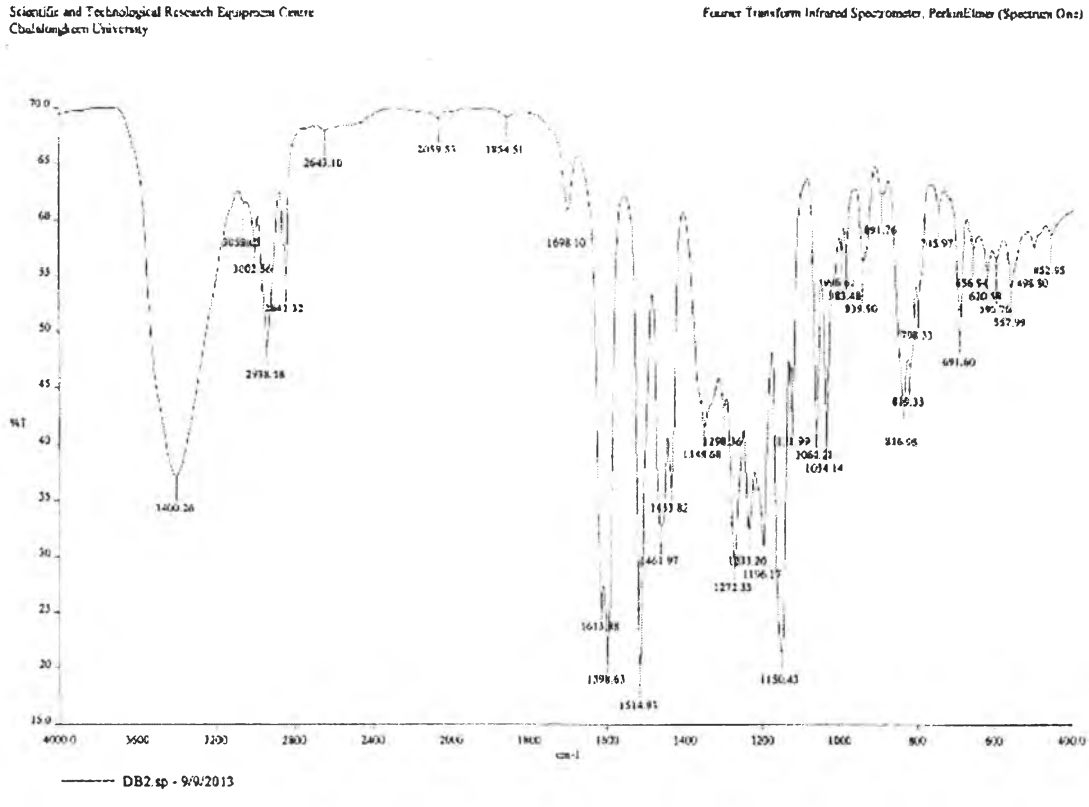

Figure 16 IR spectrum of compound DB3

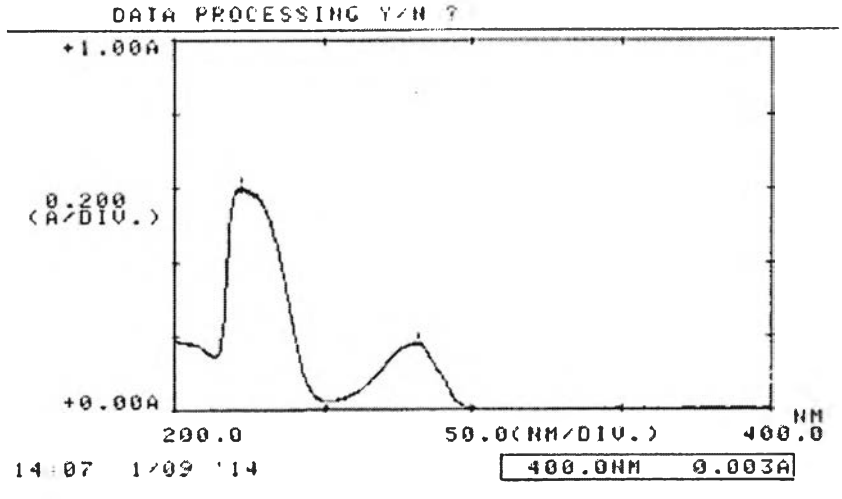

Figure 17 UV spectrum of compound DB3 (MeOH)

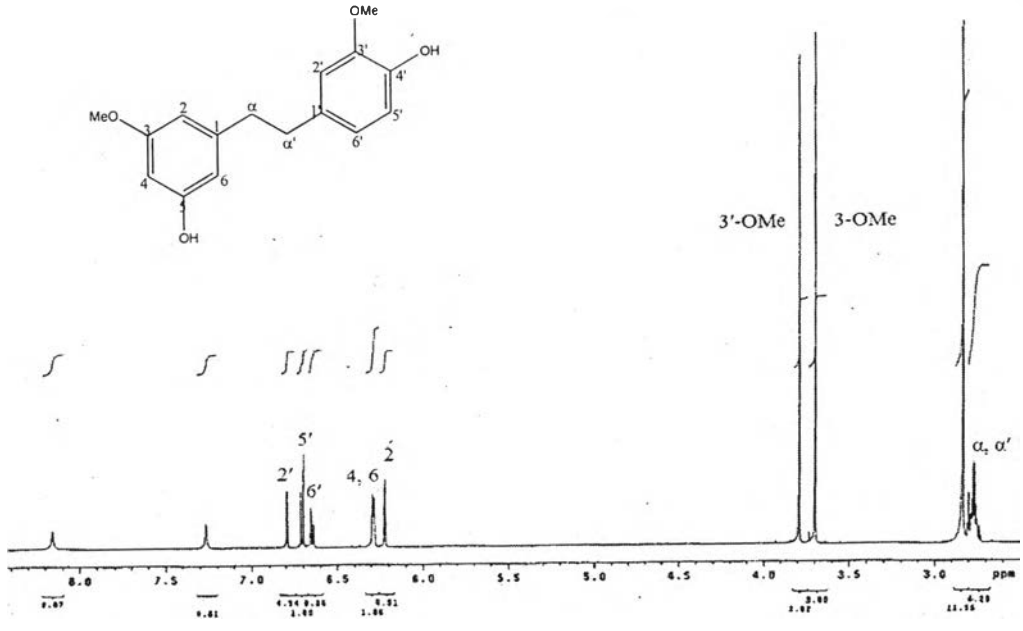

Figure 18a ^{1}H-NMR (500 MHz) spectrum of compound DB3 (acetone-d_6)

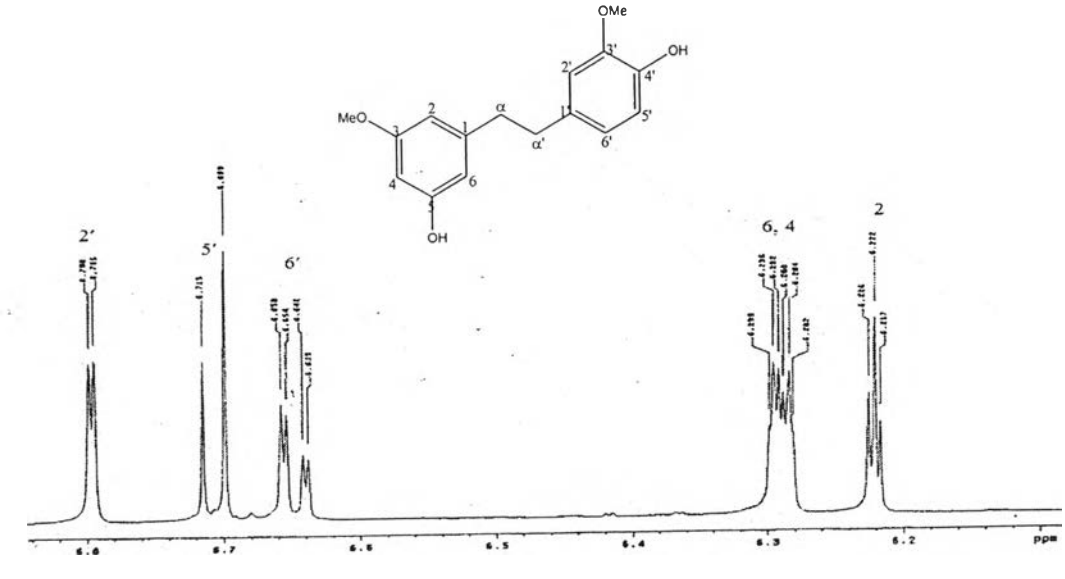

Figure 18b ^{1}H-NMR (500 MHz) spectrum of compound DB3 (acetone-d_6)

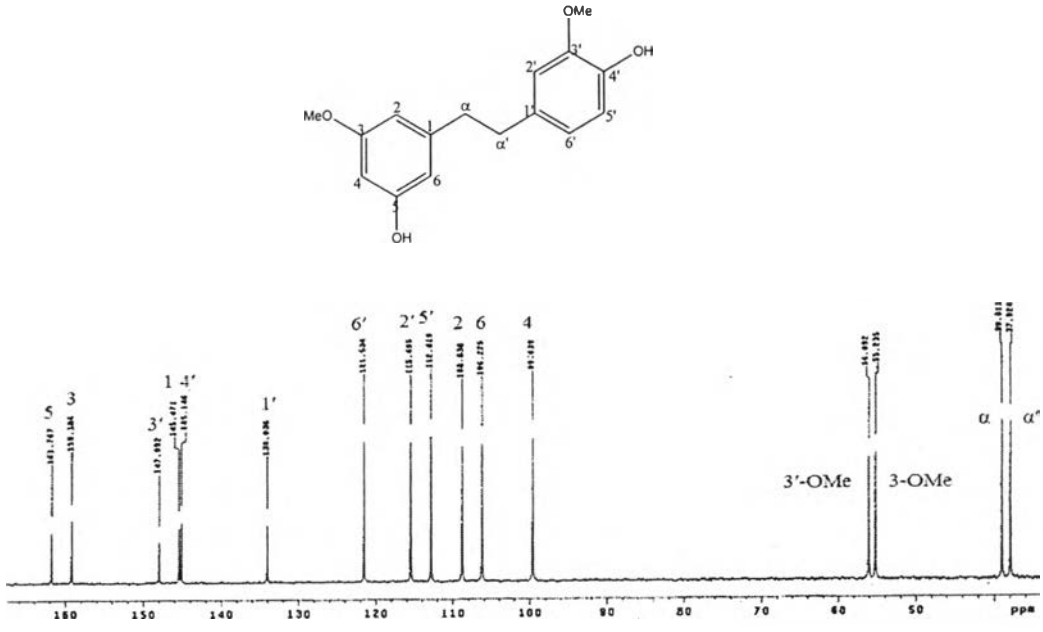

Figure 19 ^{13}C-NMR (125 MHz) spectrum of compound DB3 (acetone-d_6)

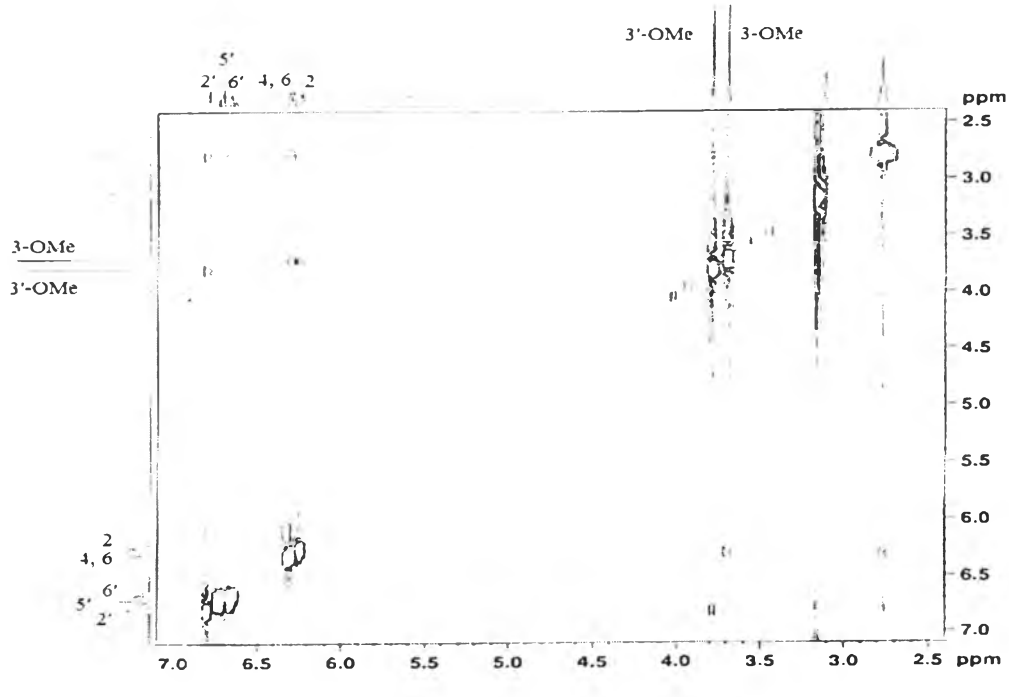

Figure 20 NOESY spectrum of compound DB3 (acetone-d_6)

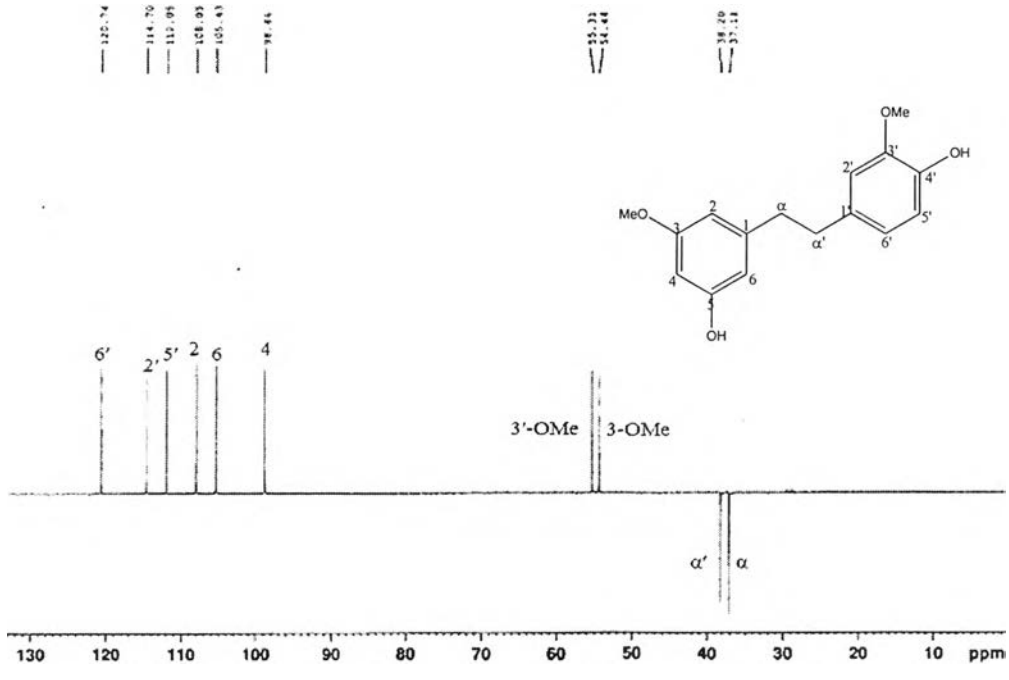

Figure 21 DEPT 135 spectrum of compound DB3 (acetone-d_6)

Mass Spectrum List Report

Analysis Info

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Method	MKE_tune_low_positive_20130204.m	Operator	Administrator
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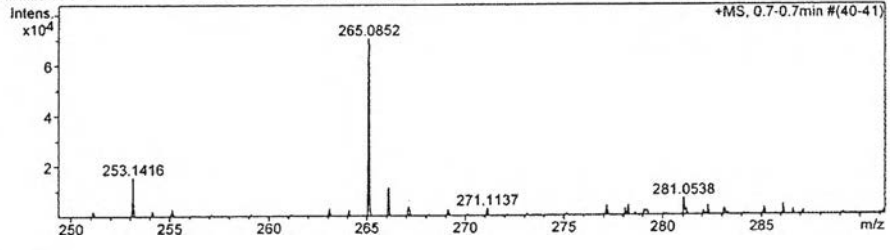
	CB9		

Acquisition Parameter

Source Type	ESI	Ion Polarity	Positive	Set Corrector Fill	75 V
Scan Range	n/a	Capillary Exit	150.0 V	Set Pulsar Pull	393 V
Scan Begin	50 m/z	Hexapole RF	90.0 V	Set Pulsar Push	380 V
Scan End	3000 m/z	Skimmer 1	45.5 V	Set Reflector	1300 V
		Hexapole 1	25.0 V	Set Flight Tube	9000 V
				Set Detector TOF	1910 V



#	m/z	I	I %	S/N	FWHM	Res.
1	251.1333	2164	3.1	27.1	0.0792	3172
2	253.1416	15573	22.1	193.0	0.0486	5214
3	254.1434	2339	3.3	28.9	0.0492	5161
4	255.1229	2622	3.7	32.2	0.0804	3173
5	263.0757	2854	4.1	33.7	0.0684	3843
6	264.0784	2238	3.2	26.3	0.0570	4631
7	265.0852	70394	100.0	823.1	0.0504	5262
8	266.0892	11075	15.7	128.9	0.0511	5207
9	267.1179	3636	5.2	42.1	0.0988	2703
10	269.1332	2451	3.5	28.1	0.0677	3974
11	271.1137	2813	4.0	32.0	0.0637	4254
12	277.1567	3800	5.4	42.0	0.0630	4401
13	278.2446	4155	5.9	45.7	0.0513	5423
14	279.1961	2180	3.1	23.9	0.1712	1630
15	281.0538	6781	9.6	73.6	0.0584	4809
16	282.2793	3762	5.3	40.6	0.0548	5150
17	283.1169	2420	3.4	26.0	0.1134	2497
18	284.1131	581	0.8	6.2	0.1020	2785
19	285.1351	2768	3.9	29.5	0.0770	3702
20	286.6148	2023	2.9	21.4	0.0494	5799
21	287.1147	1768	2.5	18.7	0.0791	3632

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Figure 22 Mass spectrum of compound DB4

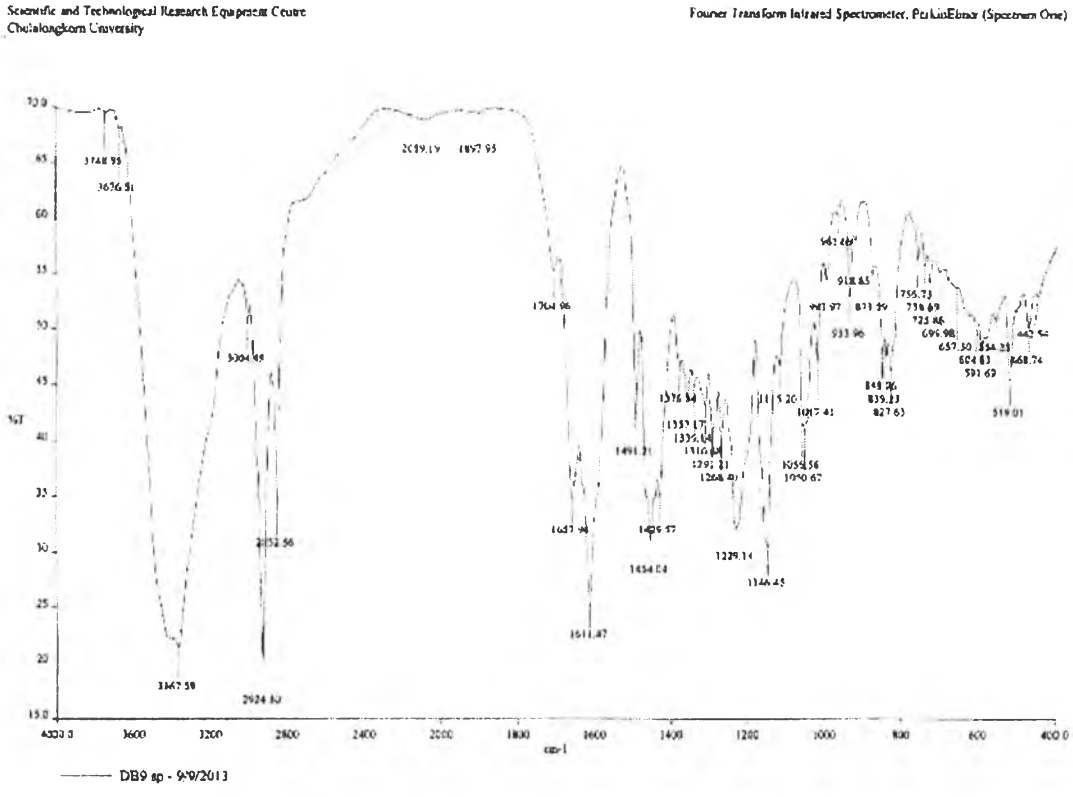


Figure 23 IR spectrum of compound DB4

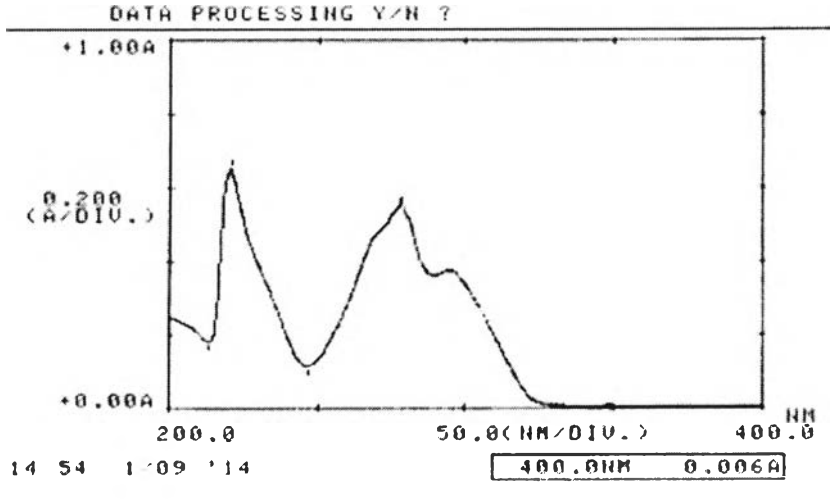


Figure 24 UV spectrum of compound DB4 (MeOH)

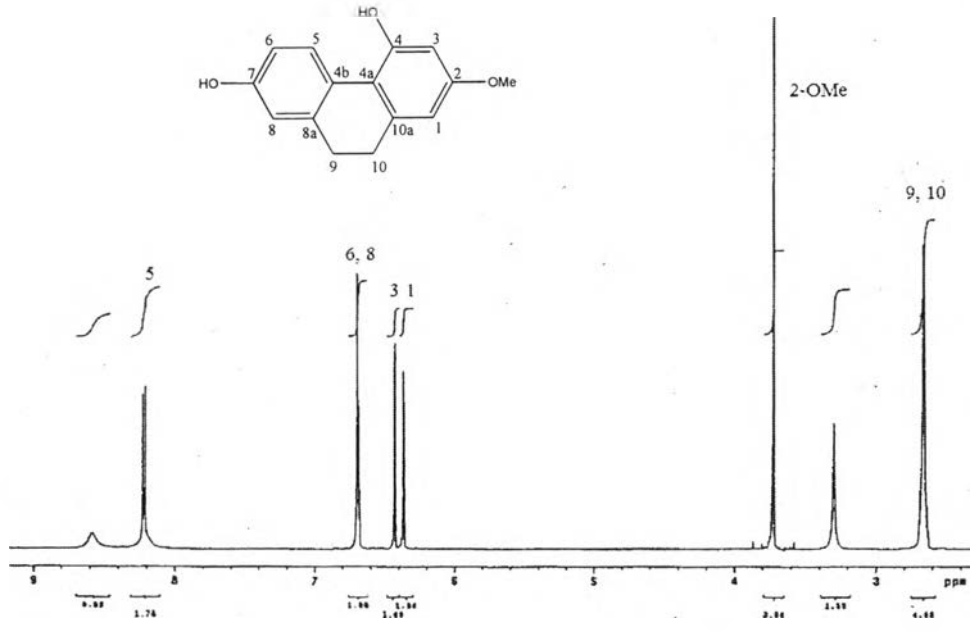


Figure 25a ^{1}H-NMR (500 MHz) spectrum of compound DB4 (acetone-d_6)

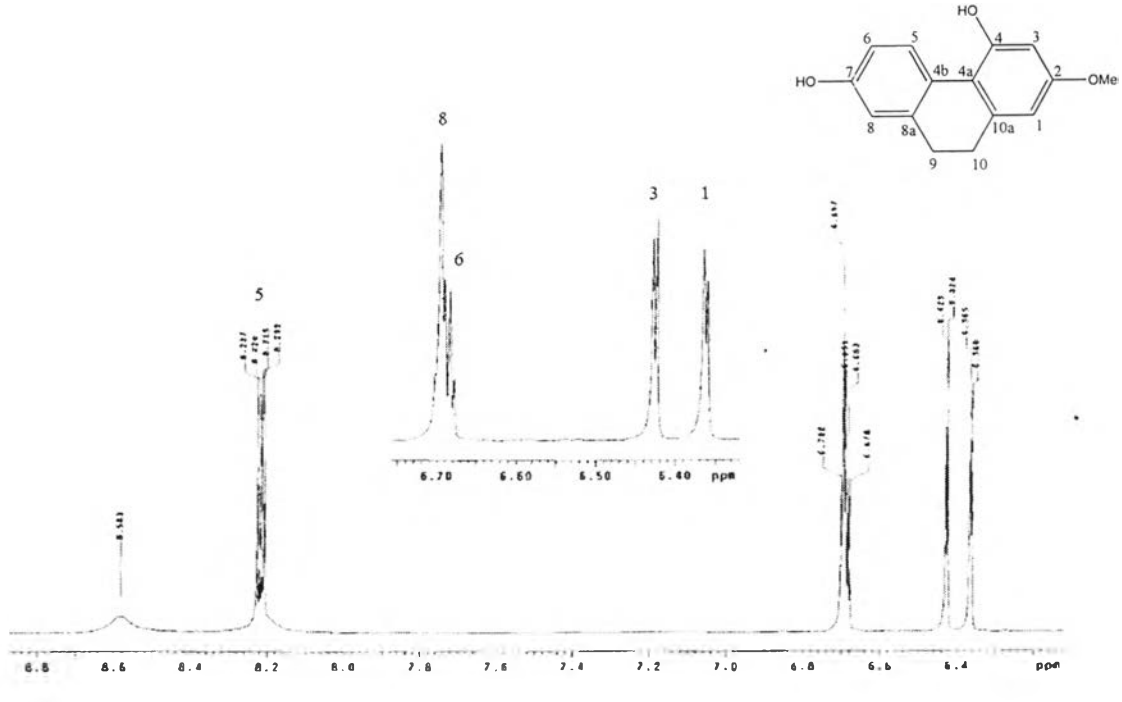


Figure 25b ^{1}H-NMR (500 MHz) spectrum of compound DB4 (acetone-d_6)

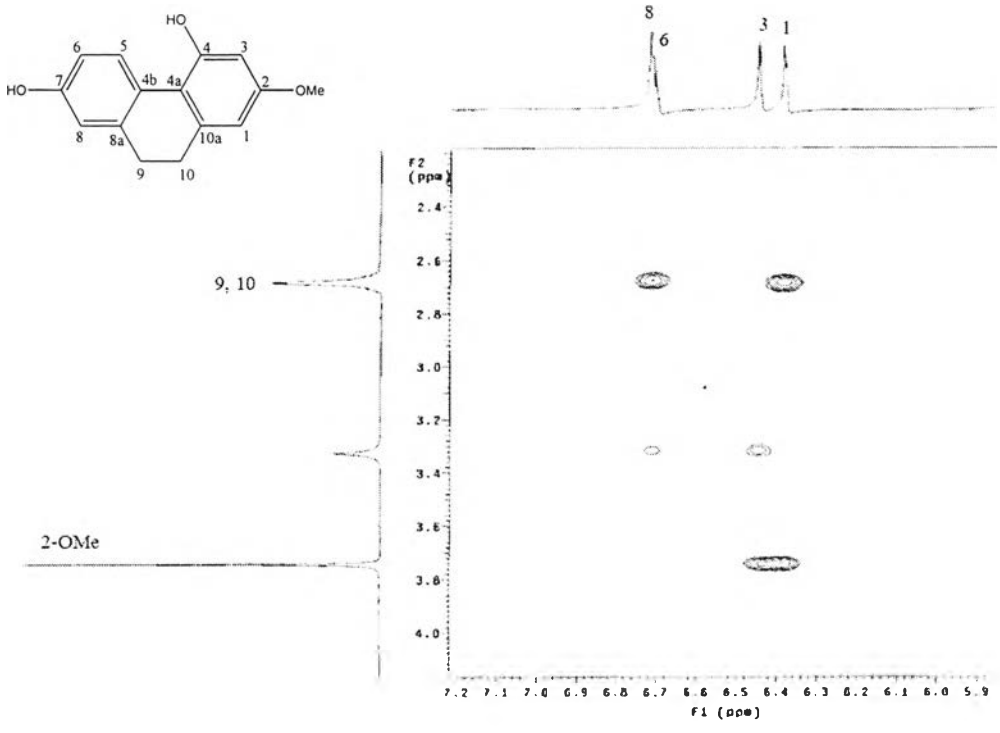


Figure 26a NOESY spectrum of compound DB4 (acetone-d_6)

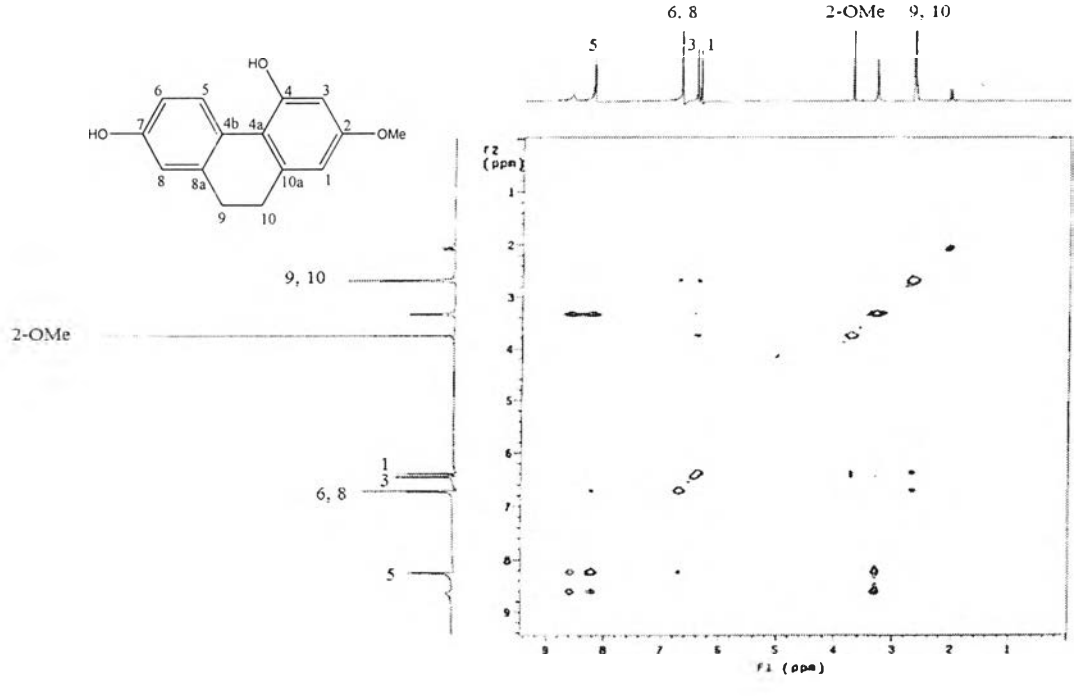


Figure 26b NOESY spectrum of compound DB4 (acetone-d_6)

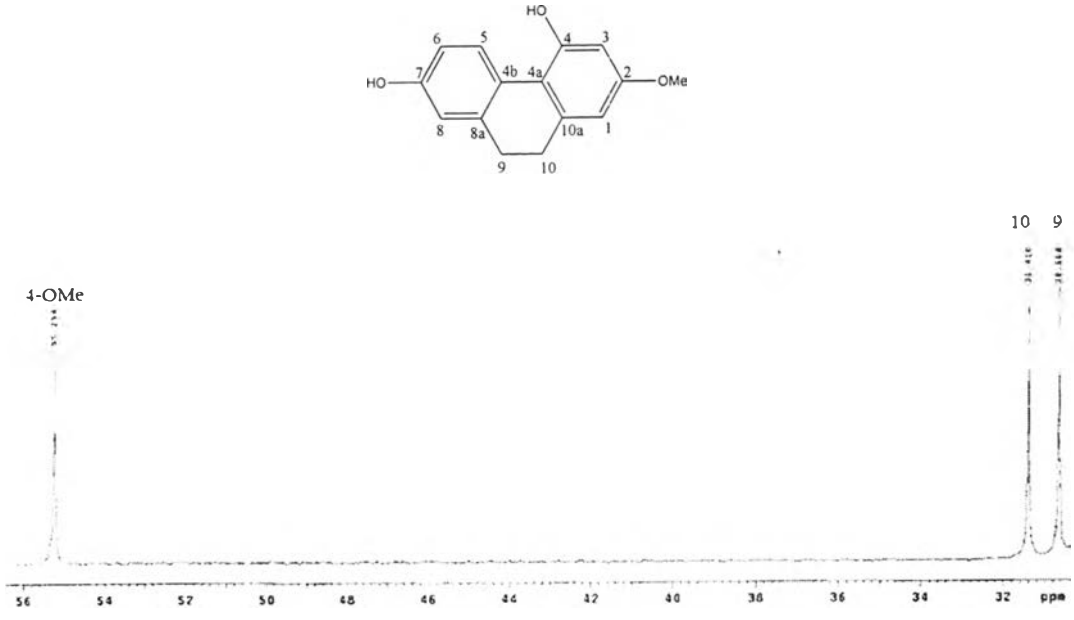


Figure 27a ^{13}C-NMR (125 MHz) spectrum of compound DB4 (acetone-d_6)

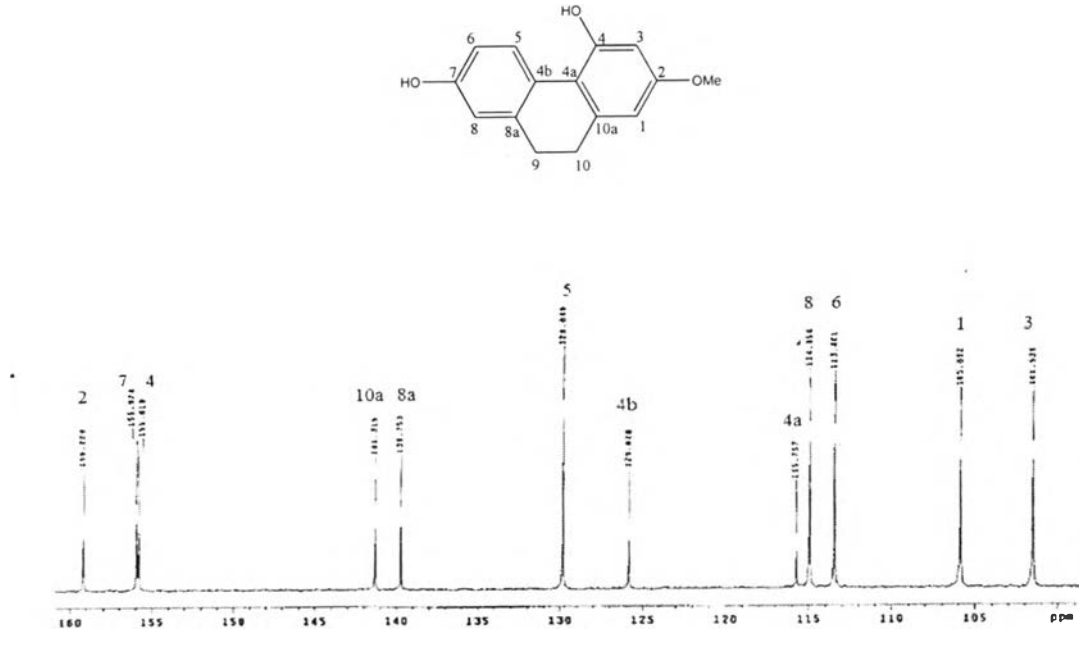


Figure 27b ^{13}C-NMR (125 MHz) spectrum of compound DB4 (acetone-d_6)

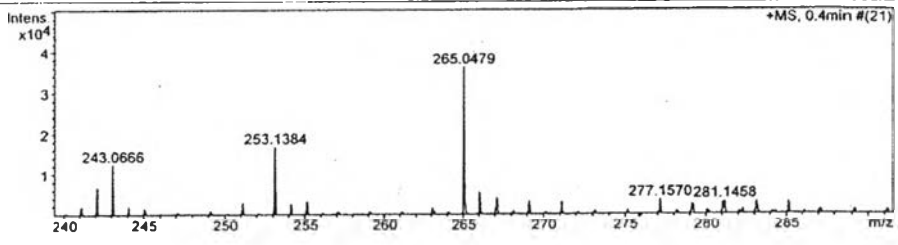
Mass Spectrum List Report

Analysis Info

Analysis Name	OSCUPK561120001.d	Acquisition Date	11/20/2013 9:31:43 AM
Method	MKE_tune_low_positive_20130204.m	Operator	Administrator
Sample Name	DB4	Instrument	micrOTOF 72
	CB4		

Acquisition Parameter

Source Type	ESI	Ion Polarity	Positive	Set Corrector Fill	75 V
Scan Range	n/a	Capillary Exit	150.0 V	Set Pulsar Pull	398 V
Scan Begin	50 m/z	Hexapole RF	90.0 V	Set Pulsar Push	380 V
Scan End	3000 m/z	Skimmer 1	45.5 V	Set Reflector	1300 V
		Hexapole 1	25.0 V	Set Flight Tube	9000 V
				Set Detector TOF	1910 V



#	m/z	I	I %	S/N	FWHM	Res.
1	149.0228	7106	1.3	226.1	0.0295	5051
2	231.1591	18949	3.6	330.7	0.0431	5362
3	242.0848	6833	1.3	112.3	0.0570	4249
4	243.0666	12483	2.4	204.3	0.0495	4913
5	253.1384	16821	3.2	261.8	0.0489	5181
6	265.0479	36185	6.9	532.4	0.0525	5052
7	297.0950	5548	1.1	70.7	0.1153	2576
8	301.1418	36083	6.8	454.7	0.0576	5230
9	302.1445	6195	1.2	77.4	0.0563	5371
10	304.2620	6793	1.3	84.2	0.0558	5452
11	313.1770	10574	2.0	126.8	0.0664	4714
12	337.1164	5690	1.1	62.3	0.1074	3139
13	353.1610	5933	1.1	63.6	0.1232	2866
14	393.3014	44287	8.4	466.7	0.0726	5417
15	394.3050	10433	2.0	109.3	0.0724	5448
16	413.2713	115671	22.0	1205.6	0.0766	5464
17	414.2744	28469	5.4	295.9	0.0748	5537
18	427.3787	5813	1.1	60.3	0.0777	5503
19	429.2444	7499	1.4	76.6	0.0878	4890
20	441.3006	16768	3.2	171.1	0.0839	5257
21	449.3665	526837	100.0	5378.8	0.0838	5359
22	450.3700	142769	27.1	1456.1	0.0798	5643
23	451.3698	22279	4.2	226.3	0.0815	5535
24	457.2603	13247	2.5	133.7	0.0950	4811
25	465.3414	17136	3.3	172.4	0.0853	5455
26	469.3343	12351	2.3	123.7	0.0885	5305
27	479.2513	6671	1.3	65.9	0.1093	4386
28	505.1720	9859	1.8	94.5	0.1050	4810
29	507.1153	8703	1.7	84.9	0.0932	5438
30	602.2428	9579	1.8	119.8	0.1096	5496

Figure 28 Mass spectrum of compound DB5

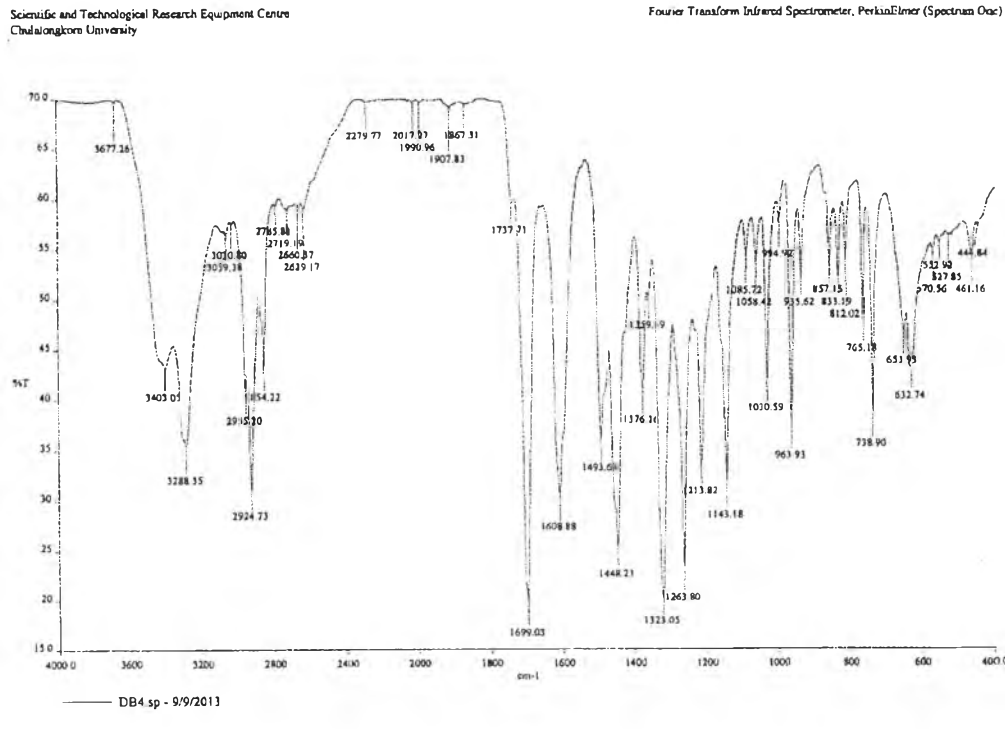


Figure 29 IR spectrum of compound DB5

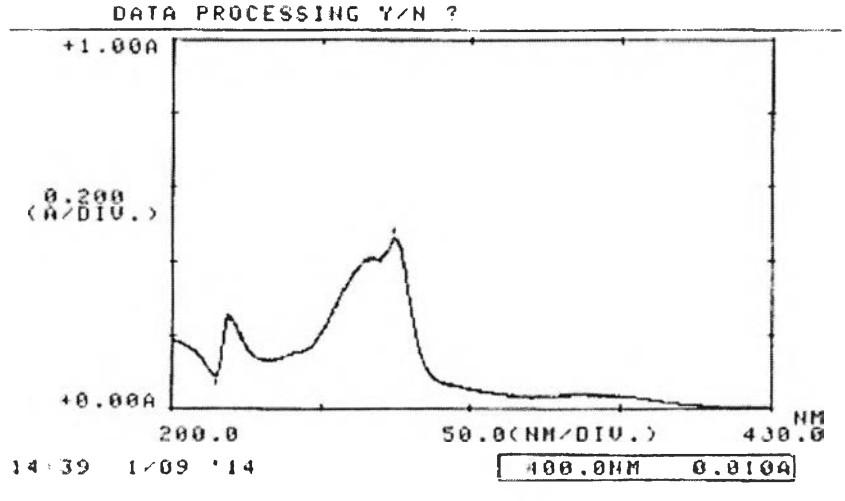


Figure 30 UV spectrum of compound DB5 (MeOH)

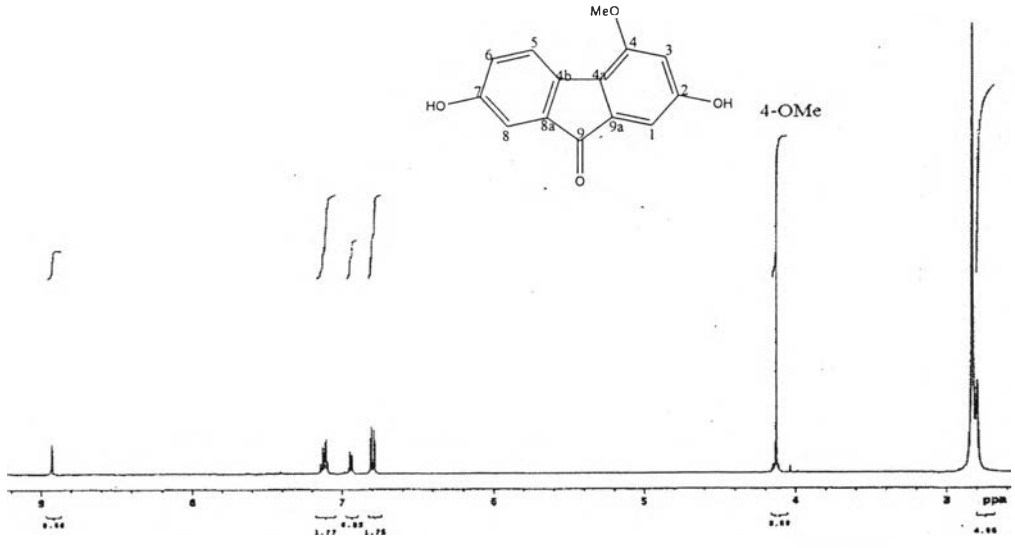
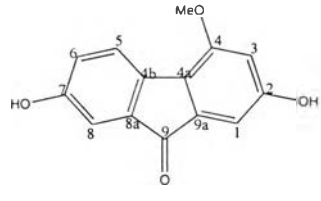


Figure 31a ^{1}H-NMR (500 MHz) spectrum of compound DB5 (acetone-d_6)



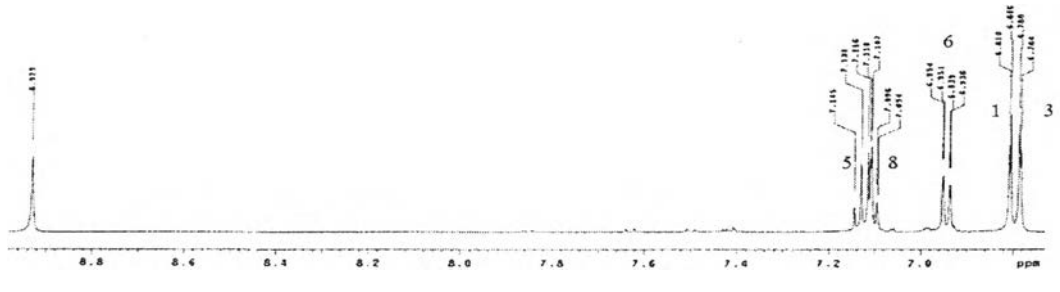


Figure 31b ^{1}H-NMR (500 MHz) spectrum of compound DB5 (acetone-d_6)

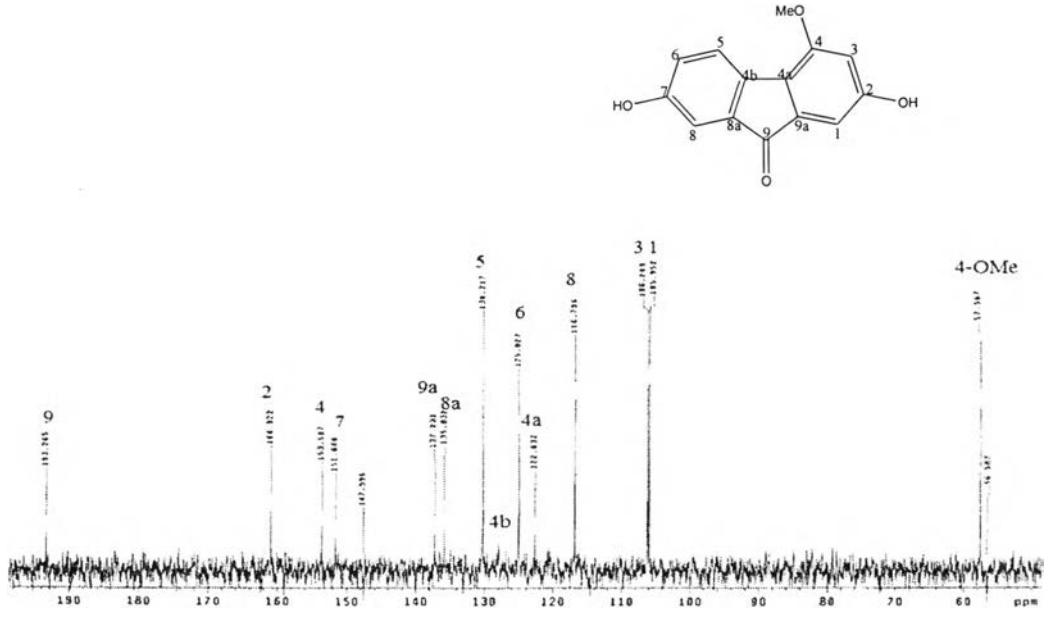


Figure 32 ^{13}C-NMR (125 MHz) spectrum of compound DB5 (acetone-d_6)

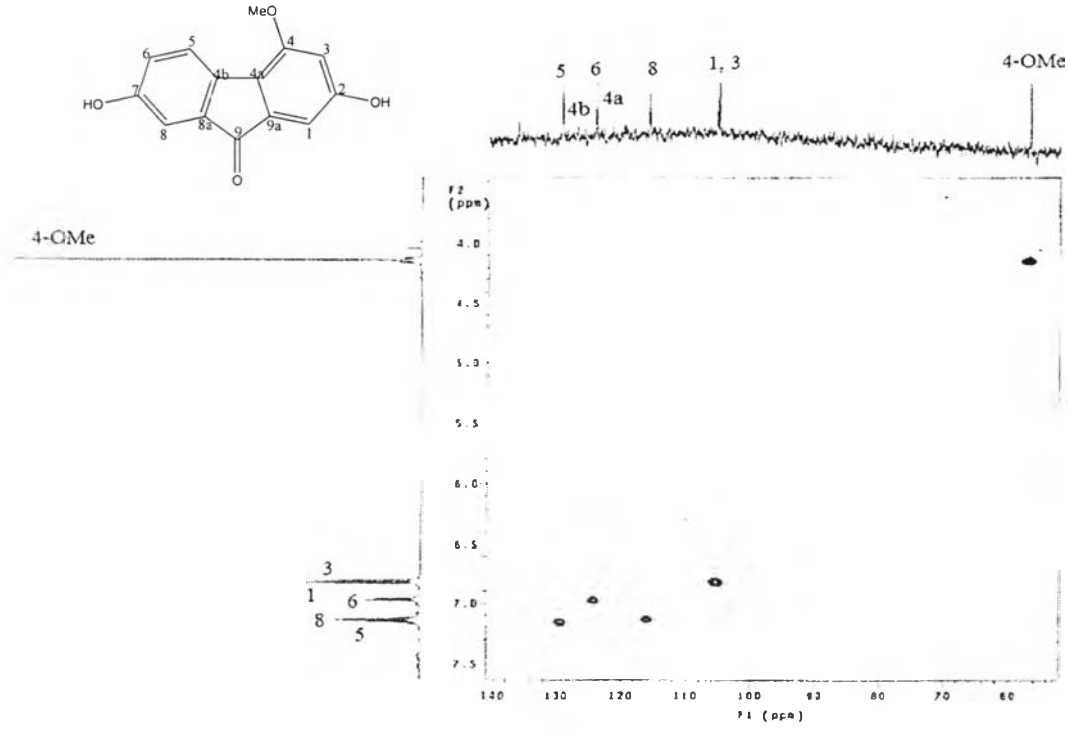


Figure 33a HSQC spectrum of compound DB5 (acetone-d_6)

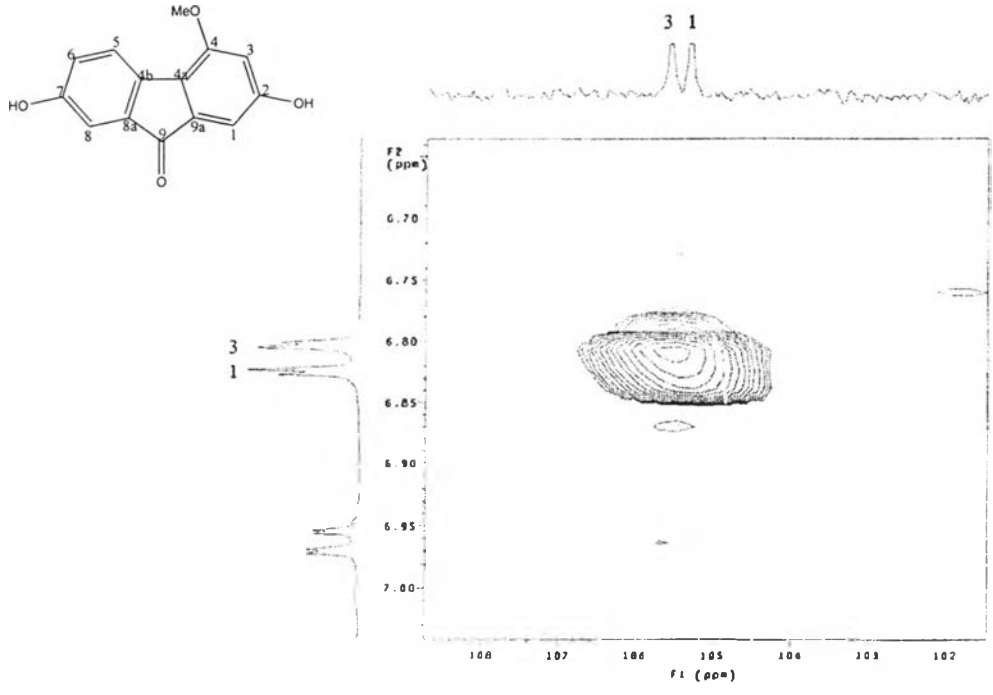


Figure 33b HSQC spectrum of compound DB5 (acetone-d_6)

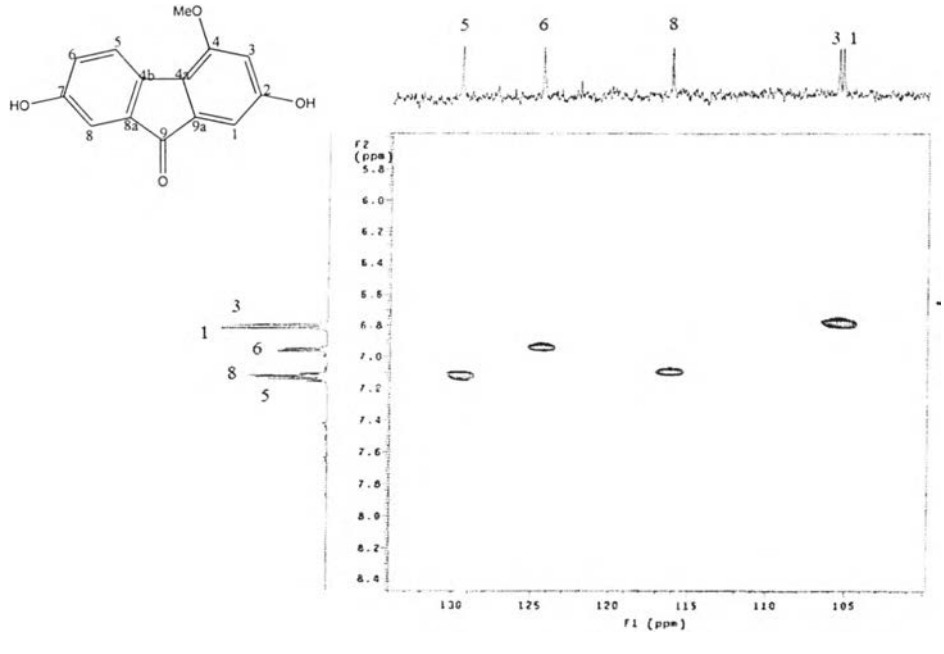


Figure 33c HSQC spectrum of compound DB5 (acetone-d_6)

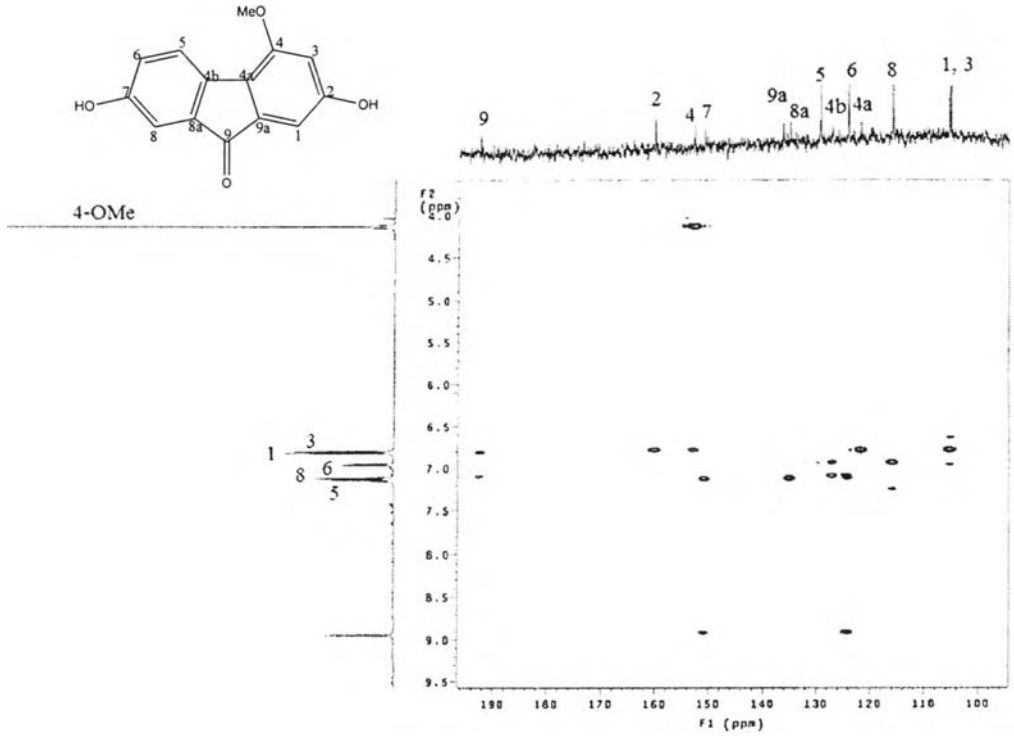


Figure 34 HMBC spectrum of compound DB5 (acetone-d_6)

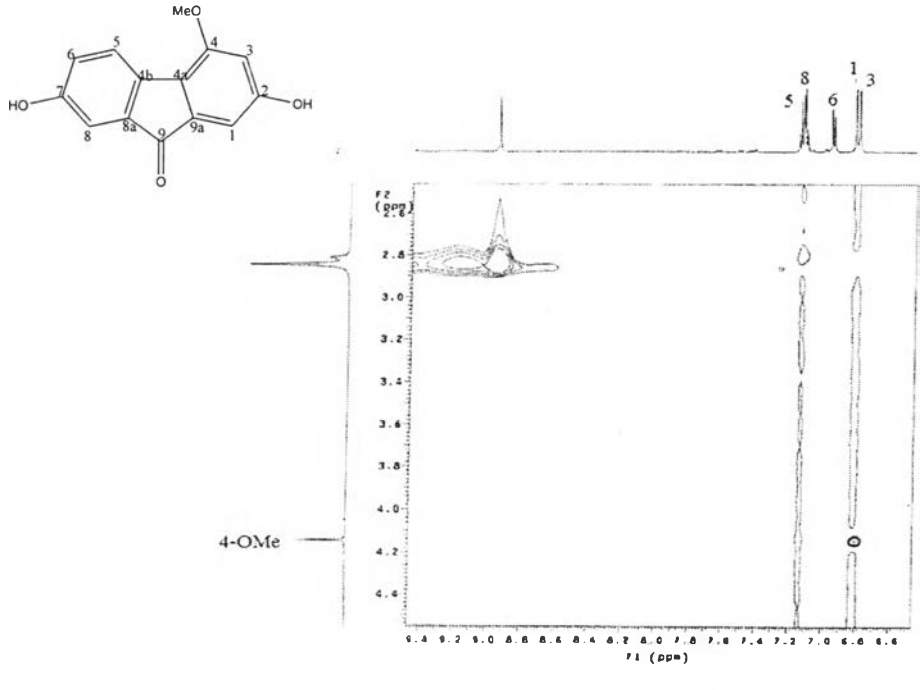


Figure 35 NOESY spectrum of compound DB5 (acetone-d_6)

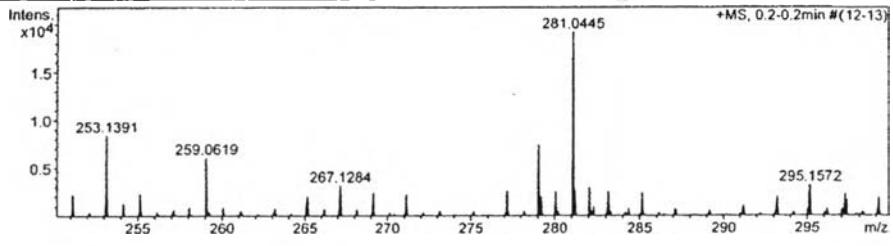
Mass Spectrum List Report

Analysis Info

Analysis Name	OSCUPK561120002.d	Acquisition Date	11/20/2013 9:37:13 AM
Method	MKE_tune_low_positive_20130204.m	Operator	Administrator
Sample Name	DB11	Instrument	micrOTOF 72
	CB11		

Acquisition Parameter

Source Type	ESI	Ion Polarity	Positive	Set Corrector Fill	75 V
Scan Range	n/a	Capillary Exit	150.0 V	Set Pulsar Pull	398 V
Scan Begin	50 m/z	Hexapole RF	90.0 V	Set Pulsar Push	380 V
Scan End	3000 m/z	Skimmer 1	45.5 V	Set Reflector	1300 V
		Hexapole 1	25.0 V	Set Flight Tube	9000 V
				Set Detector TOF	1910 V



#	m/z	I	I %	S/N	FWHM	Res.
1	231.1600	10835	5.8	201.5	0.0427	5415
2	253.1391	8444	4.5	140.2	0.0521	4860
3	259.0619	6116	3.3	98.6	0.0489	5301
4	279.0291	7408	3.9	109.1	0.0544	5132
5	281.0445	19244	10.3	281.5	0.0531	5289
6	301.1433	26455	14.1	356.4	0.0566	5324
7	302.1457	4620	2.5	61.7	0.0554	5454
8	313.1779	8091	4.3	103.8	0.0655	4783
9	347.9858	17674	9.4	205.5	0.0653	5328
10	349.9838	8519	4.5	98.8	0.0647	5411
11	352.0053	5629	3.0	65.1	0.0645	5456
12	393.0014	4925	2.6	56.4	0.0739	5318
13	393.3018	18970	10.1	219.2	0.0765	5144
14	394.3053	4804	2.6	55.0	0.0736	5356
15	397.9952	4801	2.6	54.9	0.0720	5529
16	400.3842	4710	2.5	53.8	0.0719	5565
17	413.2736	69861	37.2	807.2	0.0754	5482
18	414.2763	17182	9.2	197.9	0.0760	5450
19	429.2471	9018	4.8	103.2	0.0839	5116
20	441.3024	9631	5.1	110.1	0.0875	5041
21	449.3689	187688	100.0	2160.6	0.0824	5454
22	450.3719	49841	26.6	572.9	0.0790	5700
23	451.3697	9039	4.8	103.1	0.0832	5425
24	457.2643	22850	12.2	261.9	0.0948	4823
25	458.2679	6832	3.6	77.6	0.0959	4777
26	465.3430	12856	6.8	146.7	0.0896	5191
27	469.3341	5503	2.9	62.1	0.0916	5123
28	479.2532	4956	2.6	55.8	0.1141	4199
29	550.1385	5122	2.7	59.8	0.0948	5803
30	602.2478	6379	3.4	91.7	0.1067	5642

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Figure 36 Mass spectrum of compound DB6

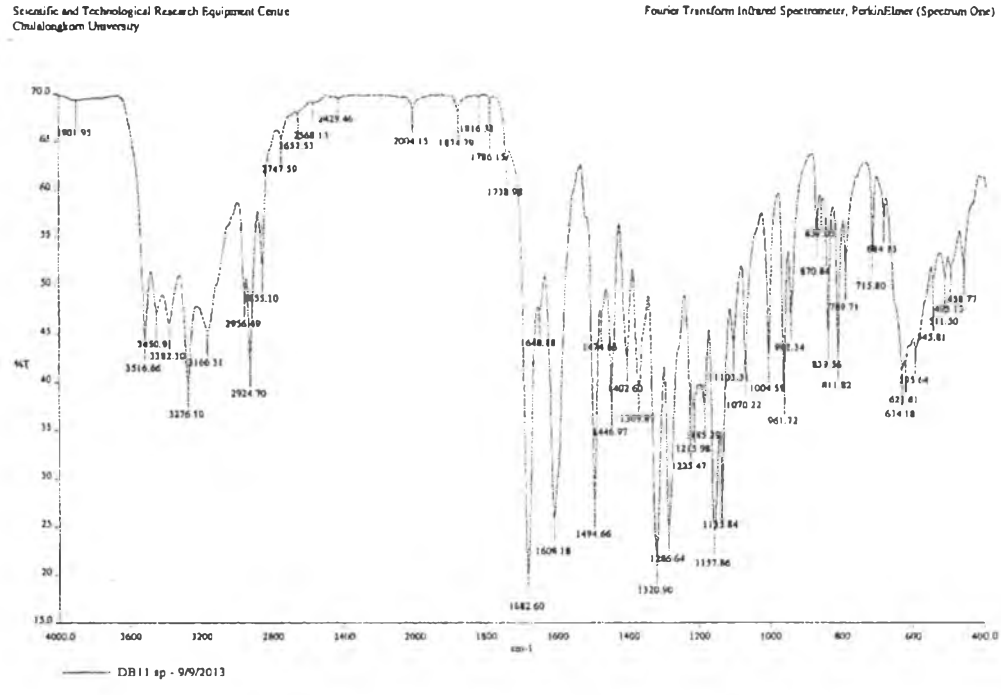


Figure 37 IR spectrum of compound DB6

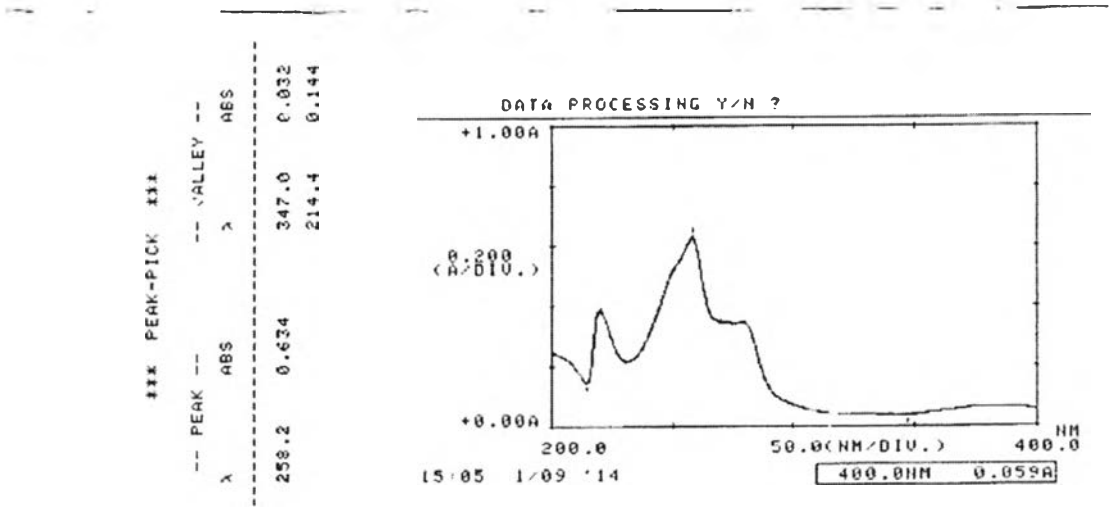


Figure 38 UV spectrum of compound DB6 (MeOH)

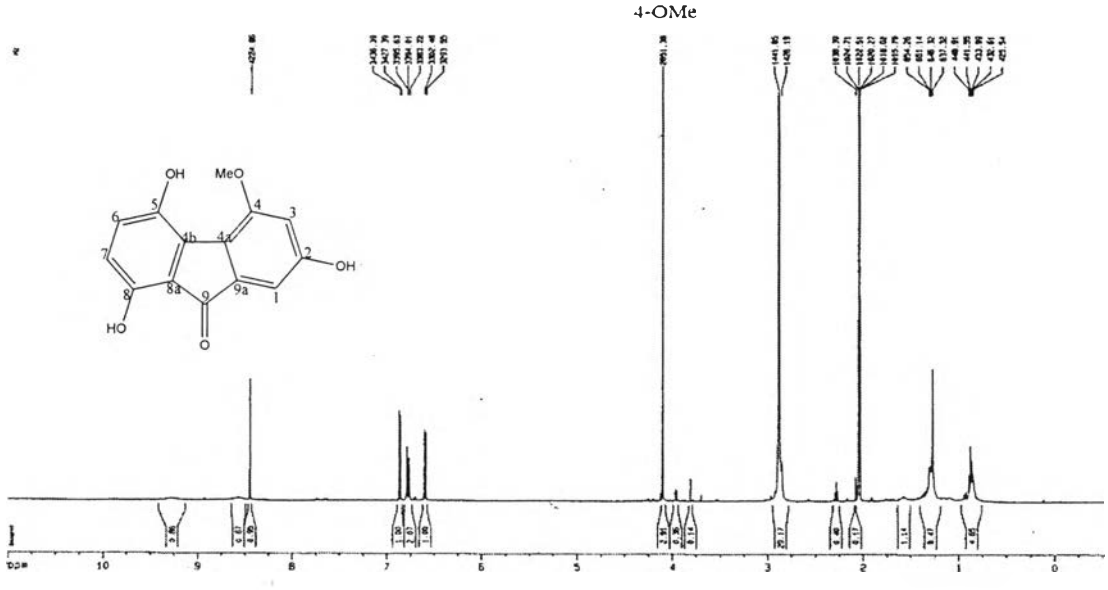


Figure 39a ^{1}H-NMR (500 MHz) spectrum of compound DB6 (acetone-d_6)

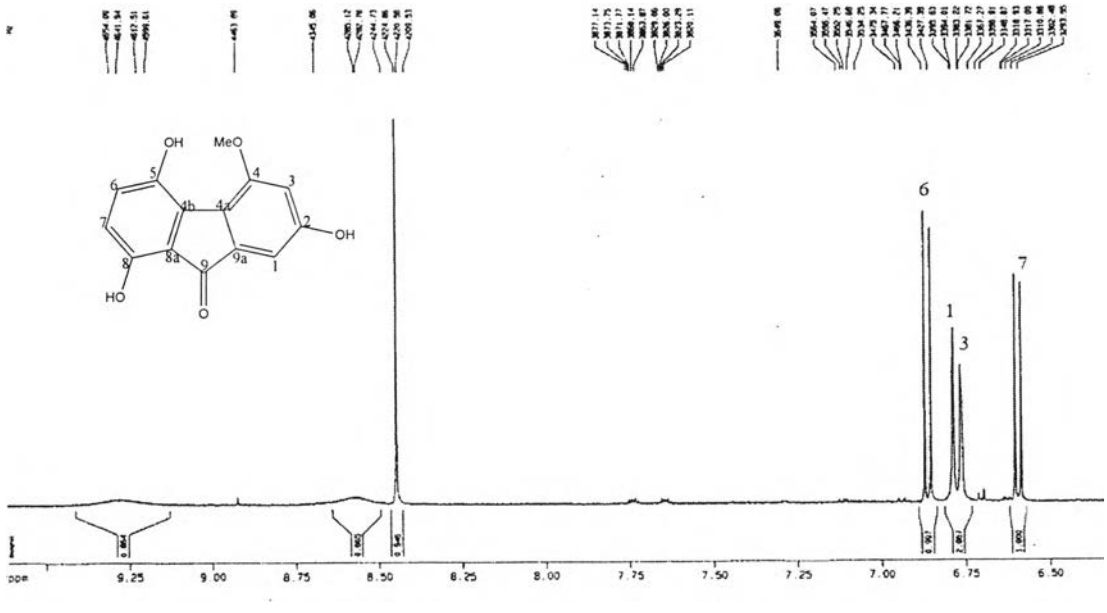


Figure 39b ^{1}H-NMR (500 MHz) spectrum of compound DB6 (acetone-d_6)

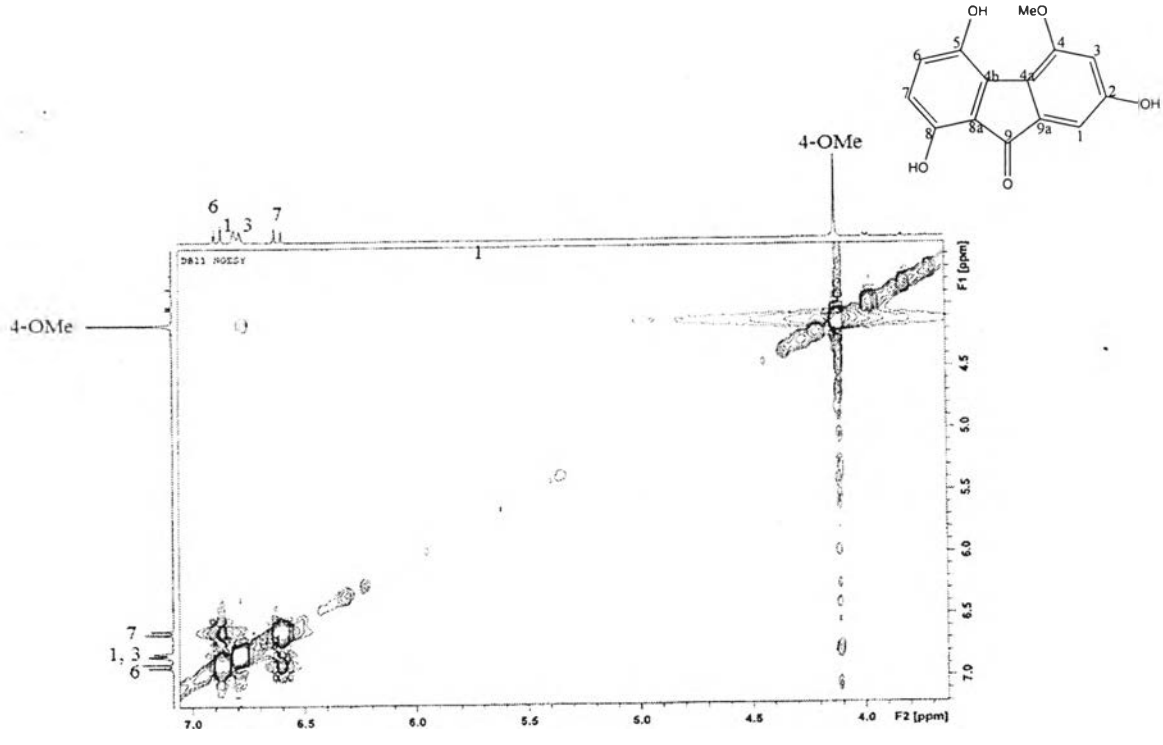


Figure 40 NOESY spectrum of compound DB6 (acetone-d_6)

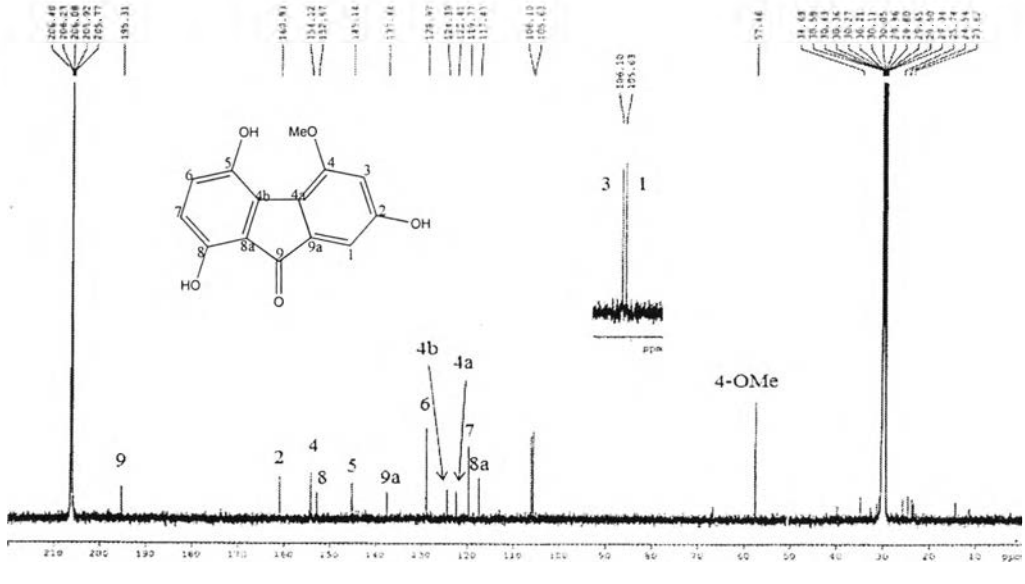


Figure 41 ^{13}C-NMR (125 MHz) spectrum of compound DB6 (acetone-d_6)

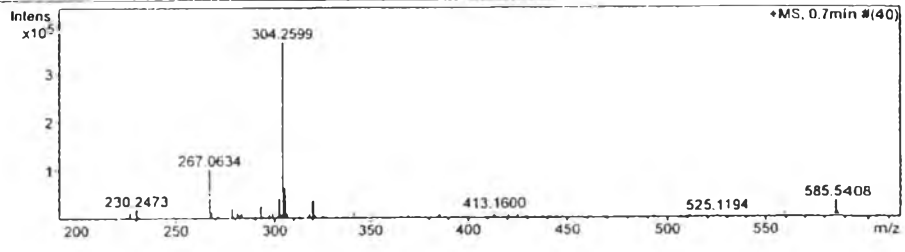
Mass Spectrum List Report

Analysis Info

Analysis Name	OSCUPK561112002.d	Acquisition Date	11/12/2013 12:33:53 PM
Method	MKE_tune_low_positive_20130204.m	Operator	Administrator
Sample Name	DB.14	Instrument	micrOTOF 72
	DB.14		

Acquisition Parameter

Source Type	ESI	Ion Polarity	Positive	Set Corrector Fill	75 V
Scan Range	n/a	Capillary Exit	120.0 V	Set Pulsar Pull	398 V
Scan Begin	50 m/z	Hexapole RF	90.0 V	Set Pulsar Push	380 V
Scan End	3000 m/z	Skimmer 1	45.5 V	Set Reflector	1300 V
		Hexapole 1	25.0 V	Set Flight Tube	9000 V
				Set Detector TOF	1910 V



#	m/z	I	I %	S/N	FWHM	Res.
1	139.0768	15699	4.3	204.6	0.0264	5278
2	185.1149	7724	2.1	82.5	0.0361	5135
3	227.0717	12615	3.5	114.1	0.0443	5130
4	230.2473	18380	5.1	184.5	0.0434	5301
5	267.0634	101754	28.0	804.8	0.0528	5054
6	268.0669	14704	4.0	115.7	0.0519	5160
7	278.2435	20762	5.7	158.3	0.0502	5538
8	281.0534	11135	3.1	84.0	0.0774	3631
9	282.2770	6720	1.8	50.4	0.0536	5266
10	283.0871	10789	3.0	80.9	0.0646	4385
11	293.0413	25095	6.9	183.1	0.0539	5441
12	297.2371	8754	2.4	62.9	0.0535	5554
13	299.0848	10257	2.8	73.3	0.0587	5091
14	302.2437	41161	11.3	292.6	0.0548	5516
15	303.2471	8026	2.2	56.6	0.0557	5440
16	304.2599	363761	100.0	2573.3	0.0565	5390
17	305.2631	63404	17.4	447.0	0.0556	5491
18	306.2690	11740	3.2	82.3	0.0573	5349
19	318.2371	10091	2.8	68.3	0.0619	5139
20	320.2443	37065	10.2	250.5	0.0636	5037
21	321.2462	7701	2.1	51.6	0.0639	5028
22	341.2644	10399	2.9	66.4	0.0636	5366
23	351.0846	8589	2.4	55.9	0.0629	5582
24	385.2910	8026	2.2	56.5	0.0717	5377
25	413.1600	12516	3.4	94.7	0.0737	5603
26	420.3457	6654	1.8	51.1	0.0714	5888
27	525.1194	6310	1.7	66.9	0.0938	5599
28	559.5207	8395	2.3	99.2	0.1048	5341
29	585.5408	33973	9.3	433.9	0.1186	4937
30	586.5450	12193	3.4	155.7	0.1218	4816

Figure 42 Mass spectrum of compound DB7

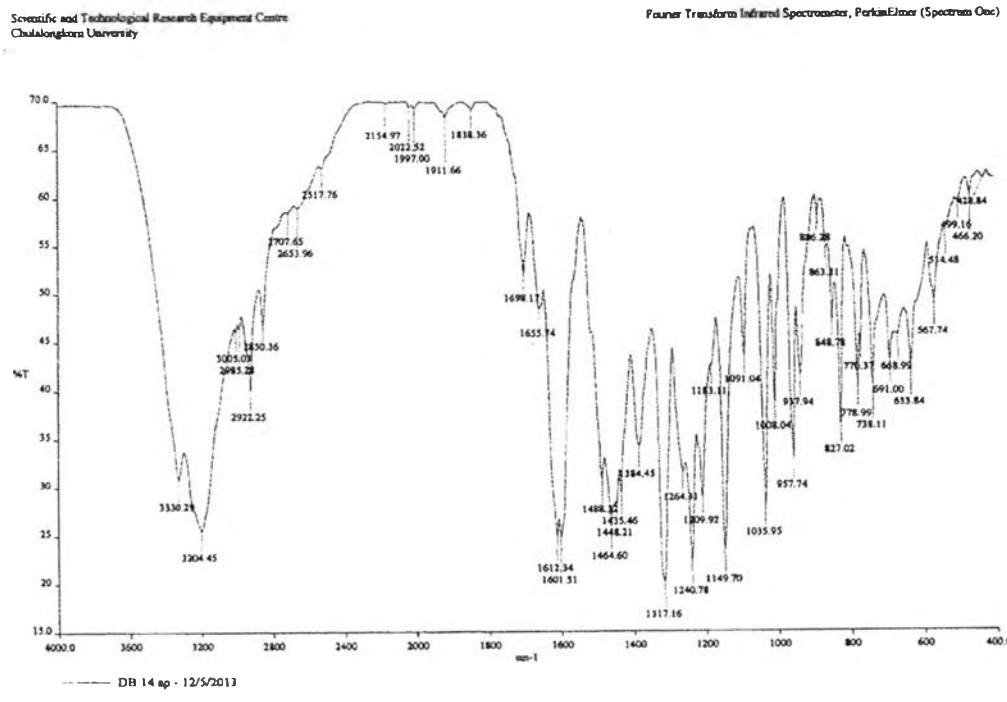


Figure 43 IR spectrum of compound DB7

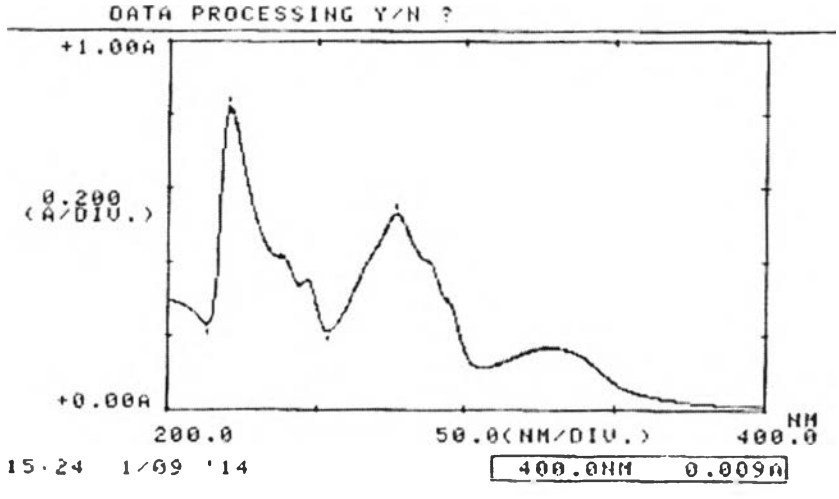


Figure 44 UV spectrum of compound DB7 (MeOH)

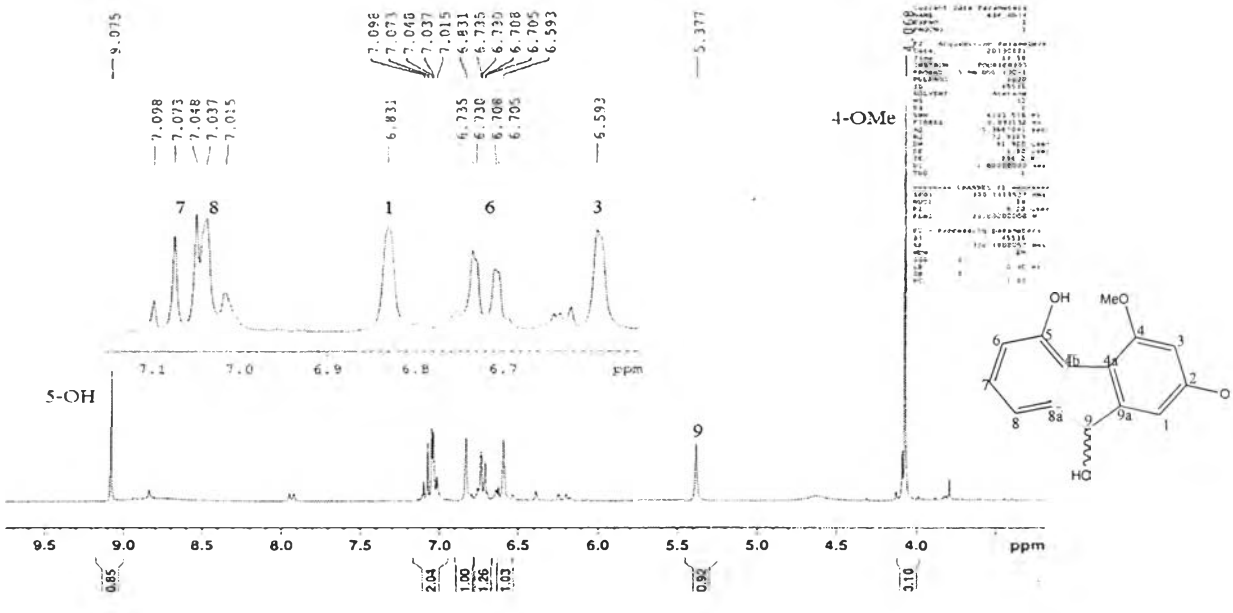


Figure 45 ^{1}H-NMR (300 MHz) spectrum of compound DB7 (acetone-d_6)

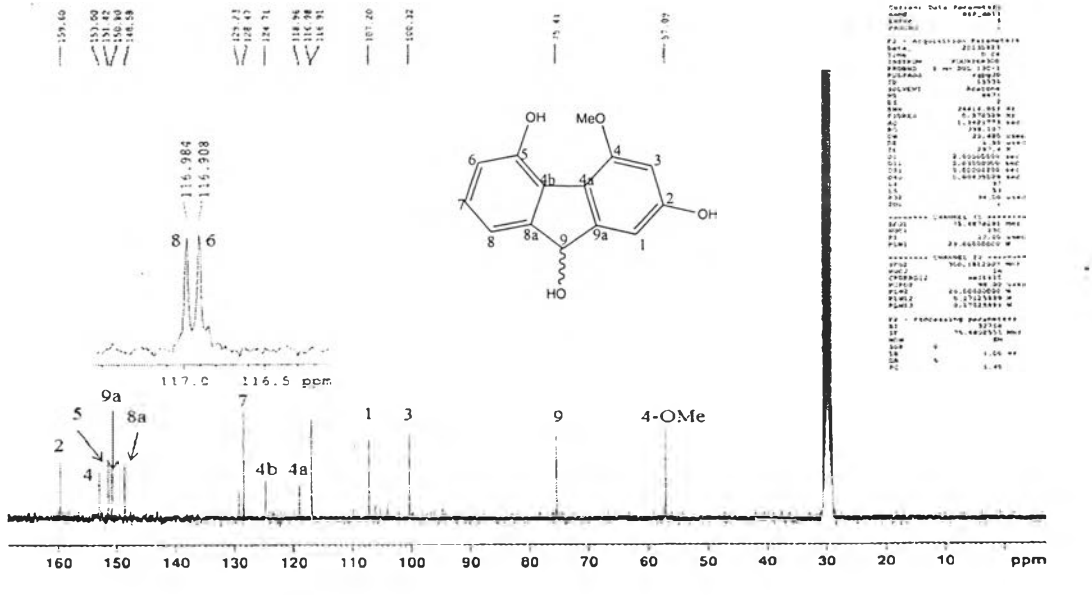


Figure 46 ^{13}C-NMR (75 MHz) spectrum of compound DB7 (acetone-d_6)

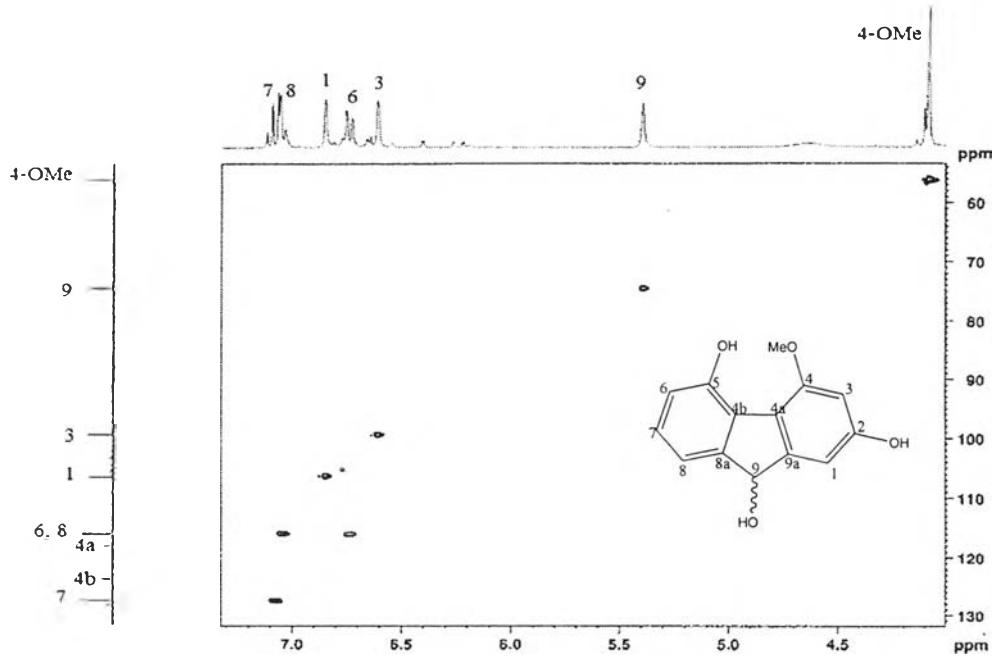


Figure 47 HSQC spectrum of compound DB7 (acetone-d_6)

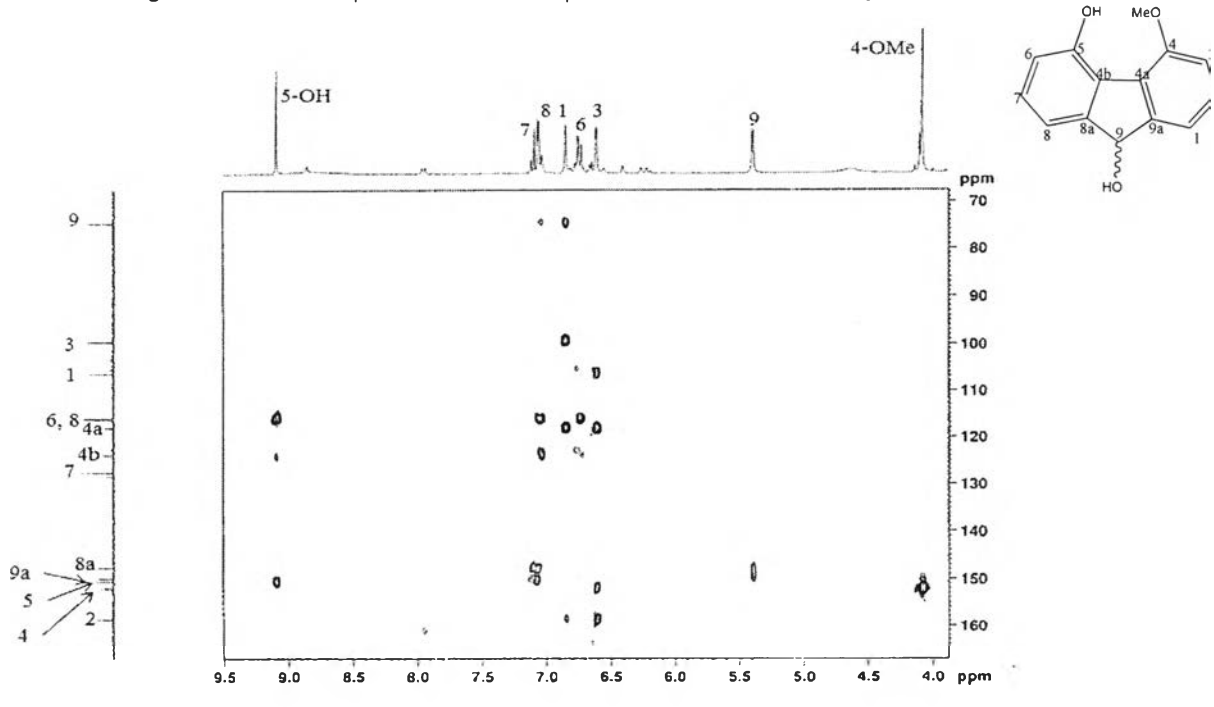


Figure 48 HMBC spectrum of compound DB7 (acetone-d_6)

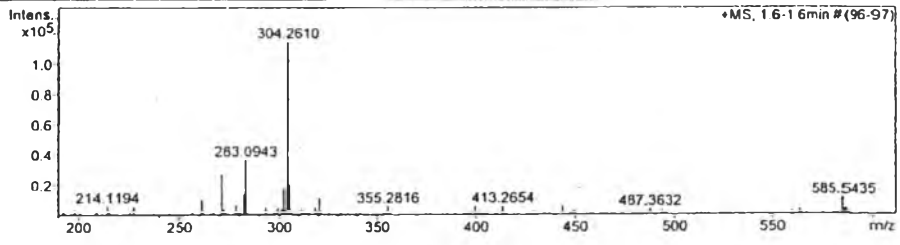
Mass Spectrum List Report

Analysis Info

Analysis Name	OSCUPK561112001.d	Acquisition Date	11/12/2013 12:28:09 PM
Method	MKE_tune_low_positive_20130204.m	Operator	Administrator
Sample Name	DB.13	Instrument	micrOTOF 72
	DB.13		

Acquisition Parameter

Source Type	ESI	Ion Polarity	Positive	Set Corrector Fill	75 V
Scan Range	n/a	Capillary Exit	120.0 V	Set Pulsar Pull	398 V
Scan Begin	50 m/z	Hexapole RF	90.0 V	Set Pulsar Push	380 V
Scan End	3000 m/z	Skimmer 1	45.5 V	Set Reflector	1300 V
		Hexapole 1	25.0 V	Set Flight Tube	9000 V
				Set Detector TOF	1910 V



#	m/z	I	I %	S/N	FWHM	Res.
1	153.0571	7524	6.6	103.4	0.0289	5303
2	185.1163	11723	10.2	144.4	0.0351	5275
3	198.0731	3691	3.2	43.4	0.0341	5803
4	214.1194	6210	5.4	69.7	0.0412	5198
5	227.0737	5776	5.0	62.3	0.0462	4915
6	261.1146	9961	8.7	98.1	0.0513	5091
7	271.0617	27125	23.7	261.0	0.0498	5447
8	272.0881	4350	3.8	41.4	0.0589	4621
9	278.2437	6805	5.9	64.0	0.0512	5439
10	282.2783	14498	12.6	135.4	0.0522	5409
11	283.0943	36726	32.0	343.0	0.0531	5332
12	284.0969	6210	5.4	57.5	0.0506	5614
13	293.0427	5352	4.7	48.4	0.0541	5420
14	299.0717	4946	4.3	44.0	0.0738	4051
15	301.1359	4665	4.1	41.3	0.0610	4937
16	302.2454	17598	15.3	156.6	0.0557	5427
17	303.2477	3757	3.3	33.0	0.0545	5560
18	304.2610	114680	100.0	1018.7	0.0542	5616
19	305.2640	20286	17.7	179.4	0.0568	5372
20	306.2709	4184	3.6	36.5	0.0576	5313
21	311.2528	4259	3.7	36.7	0.0561	5552
22	318.2393	5314	4.6	45.2	0.0634	5021
23	320.2482	11156	9.7	95.0	0.0647	4948
24	355.2816	6108	5.3	50.6	0.0647	5491
25	399.3075	5947	5.2	53.0	0.0782	5106
26	413.2654	6069	5.3	55.4	0.0858	4819
27	443.3374	5855	5.1	56.4	0.0822	5391
28	487.3632	3884	3.4	40.5	0.0971	5018
29	585.5435	11376	9.9	153.1	0.1181	4959
30	586.5485	4324	3.8	57.8	0.1207	4858

Figure 49 Mass spectrum of compound DB8

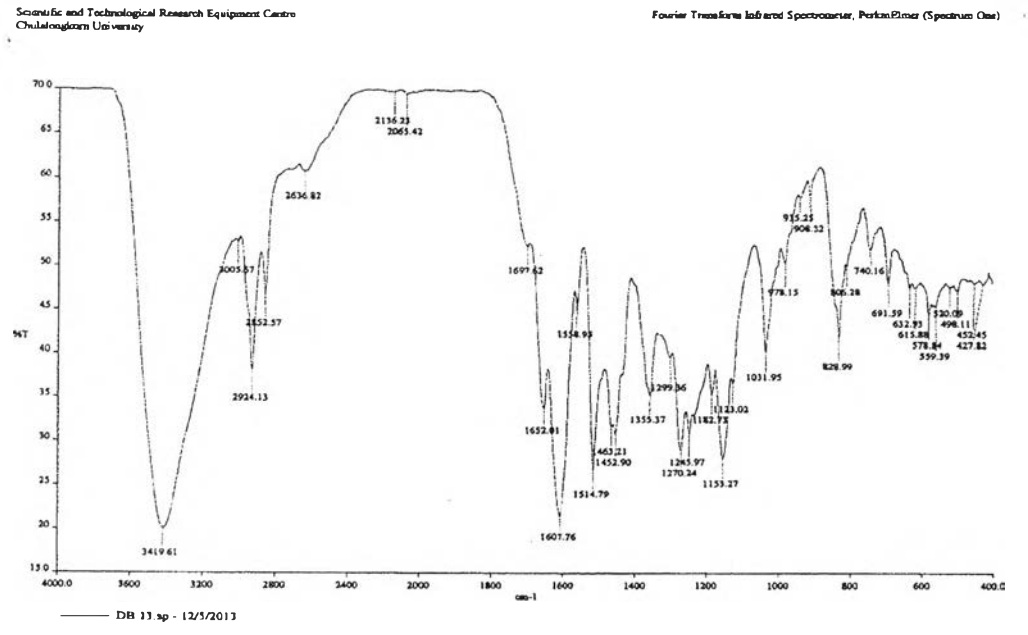


Figure 50 IR spectrum of compound DB8

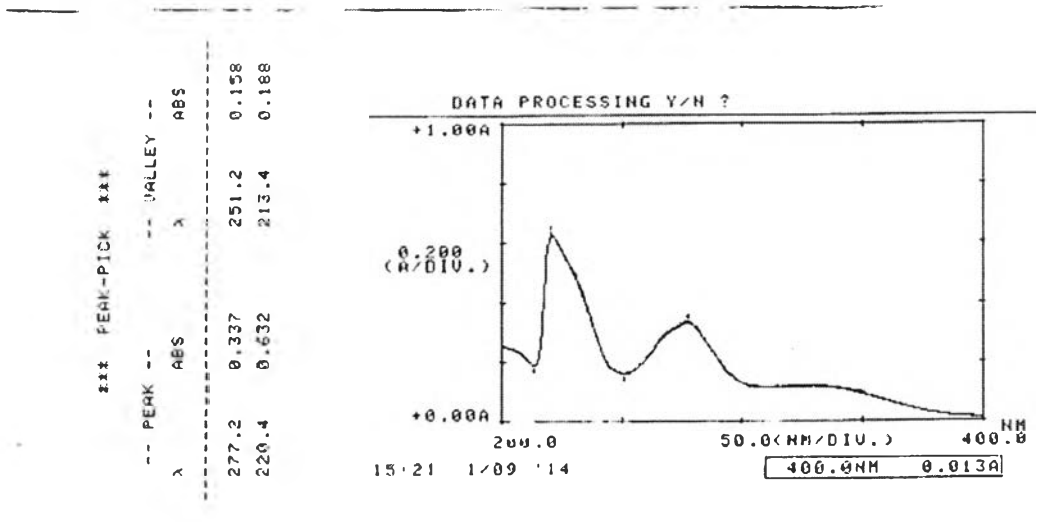


Figure 51 UV spectrum of compound DB8 (MeOH)

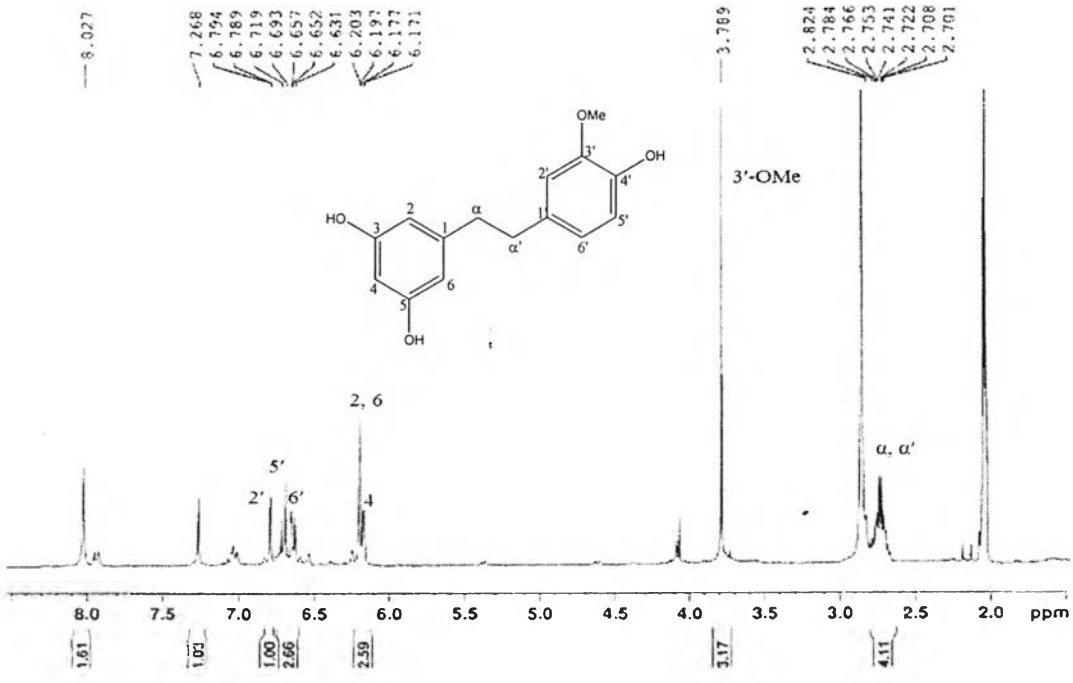


Figure 52 ^{1}H-NMR (300 MHz) spectrum of compound DB8 (acetone-d_6)

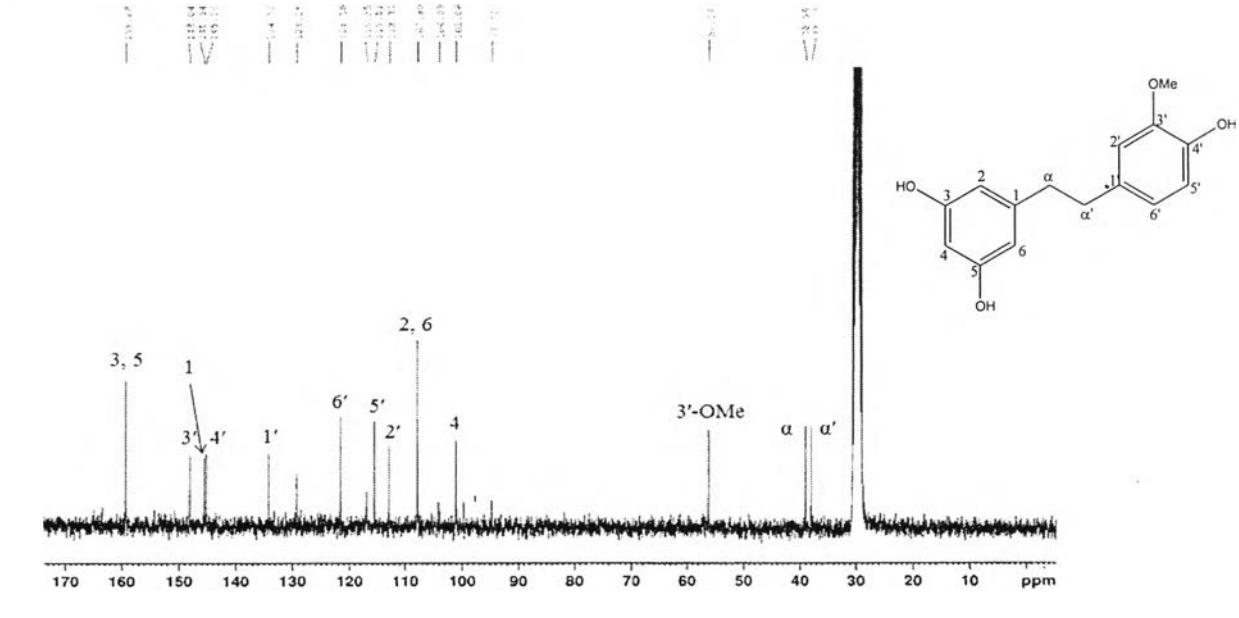


Figure 53 ^{13}C-NMR (75 MHz) spectrum of compound DB8 (acetone-d_6)

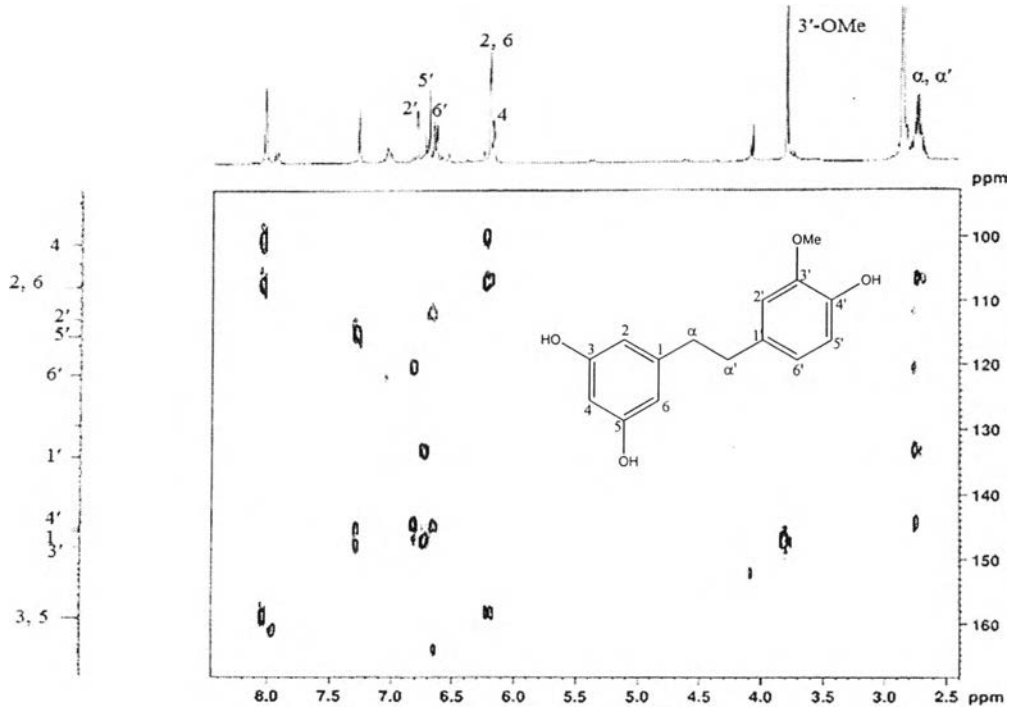


Figure 54 HMBC spectrum of compound DB8 (acetone-d_6)

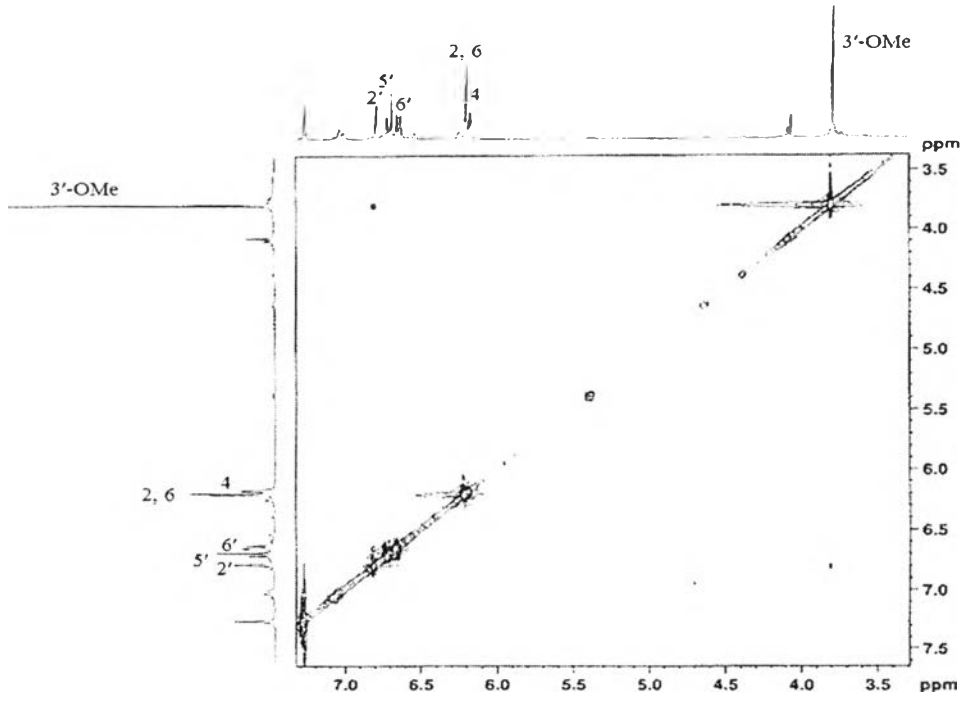


Figure 55 NOESY spectrum of compound DB8 (acetone-d_6)

VITA

Miss Pornprom Klongkumnuankarn was born on December 12, 1987 in Bangkok , Thailand. She received her B. Pharm. in 2012 from the Faculty of Pharmaceutical Sciences, Chulalongkorn University, Thailand.

Poster presentation

Pornprom Klongkumnuankarn, Boonchoo Sritularak and Kittisak Likhitwitayawuid. Cytotoxic constituents against KB cells from Dendrobium brymerianum. Proceedings of the Graduate Research Conference, March 28, 2014. Khon Kaen University, Khon Kaen, Thailand. p. 1533-1539.