Supporting Material

Application of the Excited State *meta*-Effect in Photolabile Protecting Group Design

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Experimental Procedures

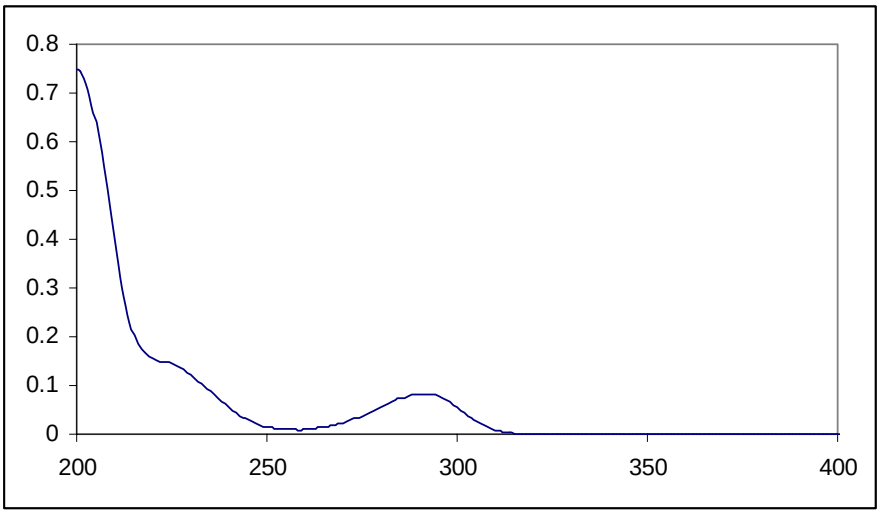
General Procedures. All organic solutions were concentrated by rotary evaporation under reduced pressure. Flash column chromatography was performed employing 230-400 mesh silica gel. Thin-layer chromatography was performed using plates pre-coated to a depth of 0.25mm with 230-400 mesh silica gel impregnated with a fluorescent indicator. All chemicals and solvents were obtained from commercial vendors and used without further purification. Infrared spectra were obtained using a Bruker Vector 22. Data were presented as frequency of absorption (cm^{-1}). UV-visible spectra were obtained using a Varian Cary 100 Bio UV-visible spectrophotometer, with the sample concentration of $2.0x10^{-5}$ M and light path length of 1 cm. ^{1}H and ^{13}C NMR spectra were recorded on a Bruker 300 and Bruker 400 NMR spectrometer, chemical shifts are expressed in parts per million (δ scale) downfield from tetramethylsilane and are referenced to residual protium in the NMR solvent ($CHCl_3$: δ 7.26). Data were presented as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet and /or multiple resonances), coupling constant in Hertz (Hz), integration. Photolysis was with 450W medium pressure mercury lamp without exclusion of air.

Preparation of 3,5-dimethoxysalicylic alcohol (2). 3,5-dimethoxybenzoic acid (3.643g, 20 mmol) with 0.1ml of concentrated H_2SO_4 in 60 ml of MeOH was refluxed for 24 h. The solution was concentrated and neutralized with $NaHCO_3$ (*aq.*). The aqueous layer was extracted with Ethyl acetate (50 ml x2) and the combined organic layers were dried over Na_2SO_4, filtered and concentrated to afford methyl 3,5-dimethoxybenzoate (3.761g, 92%) which was used directly for the next step without further purification.

Methyl 3,5-dimethoxybenzoate(3.924 g, 20 mmol) in 200 ml of MeCN was treated with NBS(3.916g, 22 mmol) at 0°C, and then stirred at R.T. for 3h. The reaction was quenched with $Na_2S_2O_3$ (aq.) and concentrated to remove MeCN. The residue was extracted with Ethyl acetate (50 mlx2) and the organic layers were combined and washed by saturated NH_4Cl and brine, dried over Na_2SO_4, filtered and concentrated. The residue was purified with flash chromatography (petroleum ether/Ethyl acetate = 7/1, Rf = 0.3) to provid methyl 2-bromo-3,5-dimethoxybenzoate (**11**) (4.402g, 80%).

11 (4.13 g, 15 mmol), K_2CO_3 (10.37 g, 75 mmol) and Bu_4NBr (97 mg, 0.3 mmol) in 20 ml of water were refluxed for 9h. Pyridine (2.43 ml, 30 mmol) and Cu powder (190 mg, 3mmol) were added and the reflux continued for 13 h. The reaction mixture was cooled down, poured into ice-cooled water and acidified with HCl to pH = 1~2. The aqueous was extracted with Ethyl acetate (50x3), dried over Na_2SO_4, filtered and concentrated. The crude 3,5-dimethoxysalicylic acid was dissolved in 30 ml of THF and treated with $LiAlH_4$(1.14g, 30 mmol) in 20 ml of THF under N_2. The reaction mixture was stirred at R.T. for 2 h and then poured into ice-water and acidified with HCl to pH = 3~4. The mixture was extracted with Ethyl acetate (30 mlx2), washed with saturated $NaHCO_3$ aq. and brine, dried over Na_2SO_4, filtered and concentrated. The residue was

purified with flash chromatography (petroleum ether/Ethyl acetate = 3/2, Rf = 0.26) to provide 1.36 g of pure **2** (49%). ^{1}H NMR ($CDCl_3$, 400 MHz) δ 6.39 (d, *J* = 2.8 Hz, 1 H), 6.36 (d, *J* = 2.8 Hz, 1 H), 6.28 (s, 1 H), 4.67 (s, 2 H), 3.77 (s, 3 H), 3.71 (s, 3 H), 3.37 (s, 1 H); ^{13}C NMR($CDCl_3$, 100 MHz) δ 153.3, 147.7, 138.1, 126.8, 104.1, 99.2, 62.0, 56.4, 56.1; IR(neat) 3476, 3253, 3004, 2959, 2840, 1615, 1500, 1465, 1433, 1368, 1286, 1244; HRMS(FT-ICR) *m/e* calcd. for ($M + H^+$) 185.0814, found 185.0812. UV of **2** (in general, the sample concentration is $2.0x10^{-5}$ M and light path length is 1 cm):



Preparation of 8. A solution of $Et_2O{\cdot}BF_3$(2.86 ml, 22.6 mmol) in 10 ml of THF was added drop wise to a solution of 2-hydroxy-5-methoxybenzoic acid (2.536 g, 15.1 mmol) and $NaBH_4$ (1.155 g, 30.5 mmol) in 40 ml of THF and refluxed for 11 h. The reaction mixture was cooled, poured into 80 ml of water and extracted with Ethyl acetate (70 mlx2), dried over Na_2SO_4, filtered and concentrated. The residue was purified with flash chromatography (Hexanes/Ethyl acetate = 2/1, Rf 0.2) to provide 5-methoxysalicylic alcohol (1.573g, 68%).

5-methoxysalicylic alcohol (0.462 g, 3 mmol), 3-Phenylpropionaldehyde (**1a**) (0.278 ml, 2 mmol) and p-TsOH (38 mg, 0.2 mmol) in 8 ml of DCM was stirred at R.T. for 24 h. The reaction mixture was concentrated and directly purified with flash chromatography (petroleum ether/Ethyl acetate = 7/1, Rf = 0.45) to afford **8** (0.475g, 88%). ^{1}H NMR ($CDCl_3$, 300 MHz) δ 7.34-7.21 (m, 5 H), 6.83 (d, *J* = 9.0 Hz, 1 H), 6.74 (dd, *J* = 9.0, 3.0 Hz, 1 H), 6.51 (d, *J* = 3.0 Hz, 1 H), 5.00-4.94 (m, 2 H), 4.84 (d, *J* = 14.7 Hz, 1 H), 3.76 (s, 3 H), 2.88 (t, *J* = 7.8 Hz, 2 H), 2.20-2.14 (m, 2 H); ^{13}C NMR($CDCl_3$, 75 MHz) δ 154.3, 147.4, 141.8, 129.0, 128.9, 126.4, 121.9, 117.9, 114.4, 109.9, 99.4, 66.9, 56.1, 36.3, 30.3; IR(neat) 3031, 2953, 2929, 2863, 1600, 1497, 1454, 1372, 1323, 1259, 1223; HRMS(FT-ICR) *m/e* calcd. for ($M + H^+$) 271.1334, found 271.1330.

Preparation of 9. Salicylic alcohol (77 mg, 0.60 mmol), **1a** (0.0278 ml, 0.20 mmol) and $ZnCl_2$ (85 mg, 0.60 mmol) in 1 ml of benzene was stirred at 23°C for 18 h. The reaction mixture was concentrated and purified with flash chromatography (petroleum ether/Ethyl acetate = 20/1, Rf 0.39) to provide **9** (22 mg, 46%). ^{1}H NMR ($CDCl_3$, 300 MHz) δ 7.35-7.16 (m, 6 H), 7.00-6.88 (m, 3 H), 5.05-4.98 (m, 2 H), 4.88 (dd, *J* = 14.4,

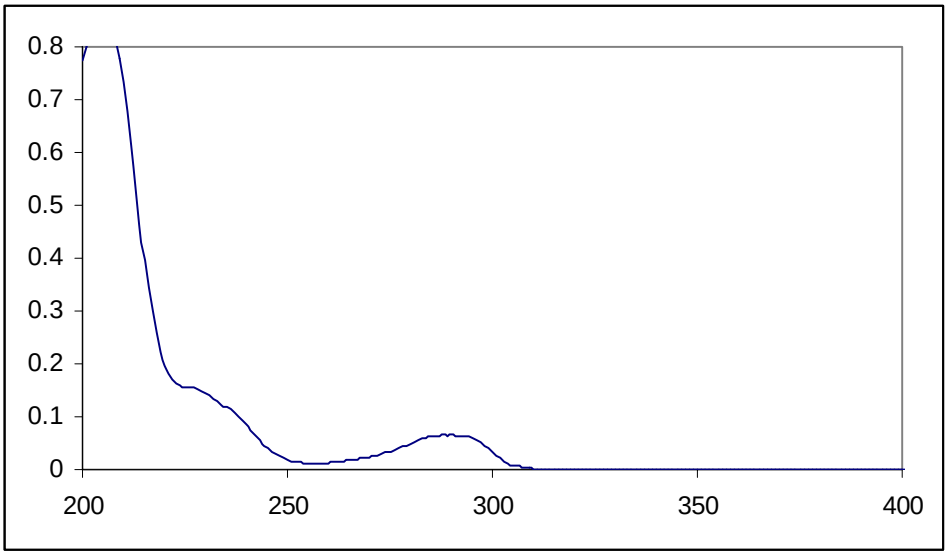
3.0 Hz, 1 H), 2..90 (t, *J* = 8.0 Hz, 2 H), 2.25-2.16 (m, 2 H); ^{13}C NMR ($CDCl_3$, 75 MHz) δ 153.0, 141.3, 128.51, 128.48, 128.0, 126.0, 124.9, 121.03, 120.97, 116.7, 99.0, 66.5, 35.9, 29.8; IR(neat) 3027, 2931, 2857, 1615, 1588, 1490, 1462, 1406, 1272, 1240; HRMS(FT-ICR) *m/e* calcd. for ($M + H^+$) 241.1229, found 241.1228.

Preparation of 12. 3,5-dimethoxysalicylic acid was reflux for 24 h in MeOH in the presence of H_2SO_4 (conc.). The reaction mixture was cooled and concentrated. Flash chromatography (petroleum ether/ethyl acetate = 7:1, Rf 0.37) afforded the methyl ester. The ester (213 mg, 1 mmol) in 3 ml of THF was treated with LiMe (3.6 ml, 1.4 M in Et_2O) and stirred at -78°C for 1.5 h. The reaction mixture was quenched with saturated NH_4Cl (aq.), extracted with ethyl acetate (15 ml x 2), dried over Na_2SO_4, filtered and concentrated. The residue was purified with flash chromatography (petroleum ether/ethyl acetate = 2:1, Rf 0.3) to provide the 3,5-dimethoxy-α,α-dimethylsalicylic alcohol (200mg, 94%). ^{1}H NMR ($CDCl_3$, 400 MHz) δ 6.89 (s, 1 H), 6.44 (d, *J* = 2.8 Hz, 1 H), 6.39 (d, *J* = 2.8 Hz, 1 H), 3.87 (s, 3 H), 3.77 (s, 3 H), 3.49 (s, 1 H), 1.63 (s, 6 H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 153.1, 148.2, 138.0, 133.3, 102.3, 98.4, 74.4, 56.5, 56.2, 30.0; IR (neat): 3421, 2975, 2838, 1602, 1491, 1460, 1430, 1375, 1324, 1204; HRMS(FT-ICR) *m/e* calcd. for ($M + H^+$) 213.1127, found 213.1128.

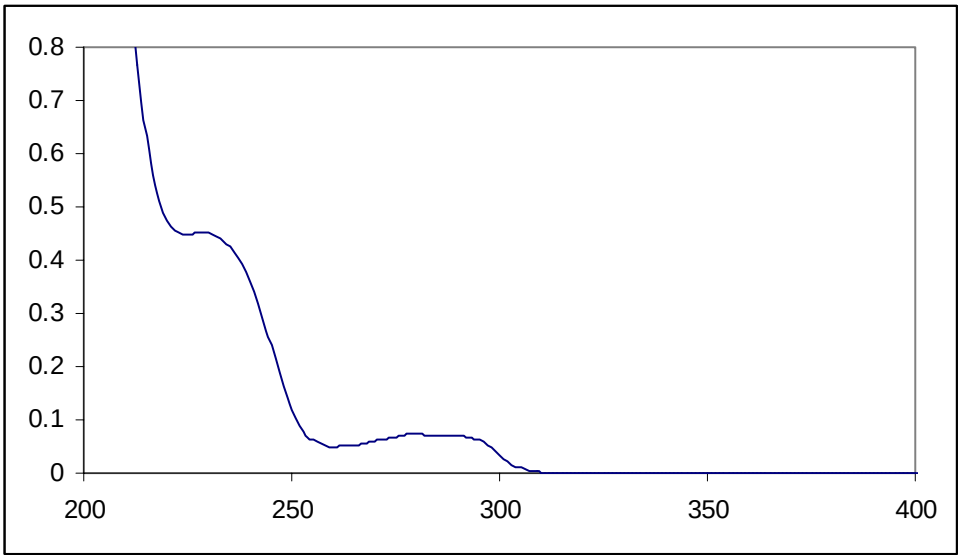
3,5-dimethoxy-α,α-dimethylsalicylic alcohol (33 mg, 0.15mmol), **1a** (0.014 ml 0.10 mmol), $ZnCl_2$ (28 mg) in 0.8 ml of MeCN were stirred at 23°C for 24 h. Flash chromatography (Hexanes/ benzene = 2/3, Rf 0.17) afforded **12** (15mg, 46%). ^{1}H NMR ($CDCl_3$, 300 MHz) δ 7.27-7.18 (m, 5 H), 6.37 (d, *J* = 2.4 Hz, 1 H), 6.15 (d, *J* = 2.7 Hz, 1 H), 5.01 (dd, *J* = 6.3, 4.2 Hz, 1 H), 3.85 (s, 3 H), 3.77 (s, 3 H), 2.92-2.83 (m, 2 H), 2.30-2.20 (m, 2 H), 1.55(s, 6 H); ^{13}C NMR ($CDCl_3$, 100MHz) δ 154.1, 149.1, 141.7, 136.5, 131.2, 129.0, 128.7, 126.3, 100.9, 98.5, 94.6, 75.5, 56.4, 56.1, 36.0, 31.1, 30.4, 29.3; IR(neat): 2974, 2933, 1603, 1493, 1456, 1401, 1358, 1284, 1257, 1202; HRMS(FT-ICR) *m/e* calcd. for ($M + H^+$) 329.1753, found 329.1751.

General Procedure of Preparation of 3a, 3b, 3c, 3d, 3e, and 3f. 2 (28mg, 0.15 mmol) was added to a flame dry flask under Ar, followed by 1.0 ml of freshly distilled toluene and cooled to 0°C. The carbonyl compound (0.10 mmol), p-TsOH (0.4 mg, 0.002 mmol) and P_2O_5 (30 mg) was added and stirred at 0°C. When the carbonyl compound was consumed, the reaction was poured into saturated $NaHCO_3$ (aq.) and extracted with Ethyl acetate (15 mlx2), dried over Na_2SO_4, filtered and concentrated. The residue was purified with flash chromatography.

3a, 92%, Rf 0.27 (petroleum ether/ethyl acetate = 7/1); ^{1}H NMR ($CDCl_3$, 400 MHz) δ 7.30-7.19 (m, 5 H), 6.38 (d, *J* = 2.7 Hz, 1 H), 6.07 (d, *J* = 2.7 Hz, 1 H), 4.97-4.95 (m, 2 H), 4.82 (d, *J* = 14.7 Hz, 1 H), 3.85 (s, 3 H), 3.74 (s, 3 H), 2.91-2.84 (m, 2 H), 2.24-2.20 (m, 2 H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 154.0, 148.8, 141.2, 136.8, 128.5, 128.4, 125.9, 121.6, 99.2, 99.1, 98.8, 66.4, 56.0, 55.6, 35.6, 29.9; IR (neat): 3059, 3026, 3002, 2933, 2841, 1606, 1499, 1455, 1404, 1369, 1282, 1225; HRMS(FT-ICR) *m/e* calcd. for ($M + H^+$) 301.1440, found 301.1438. UV of **3a**:

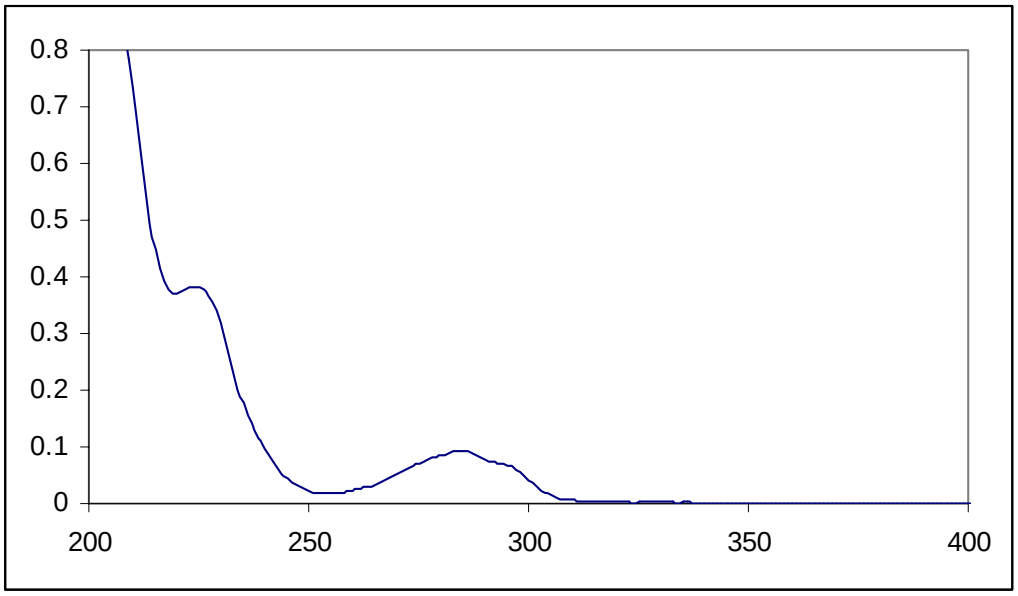


3b, 99%, Rf 0.5 (petroleum ether/ethyl acetate = 5/1); ^{1}H NMR ($CDCl_3$, 300 MHz) δ 7.58 (d, *J* = 8.6 Hz, 2 H), 7.34 (t, *J* = 7.6 Hz, 2 H), 7.11 (t, *J* = 7.3 Hz, 1 H), 7.05-7.00 (m, 4 H), 6.41 (d, *J* = 2.4 Hz, 1 H), 6.12 (d, *J* = 2.3 Hz, 1 H), 5.93 (s, 1 H), 5.16 (d, *J* = 14.8 Hz, 1 H), 4.94 (d, *J* = 15.0 Hz, 1 H), 3.84 (s, 3 H), 3.76 (s, 3 H); ^{13}C NMR ($CDCl_3$, 75 MHz) δ 158.6, 157.4, 154.7, 149.5, 137.3, 132.4, 130.2, 128.8, 123.9, 121.9, 119.5, 119.1, 99.5, 99.4, 99.3, 67.1, 56.4, 56.1; IR (neat): 2997, 2958, 2840, 1610, 1592, 1494, 1457, 1387, 1367, 1336, 1283, 1241; HRMS(FT-ICR) *m/e* calcd. for ($M + H^+$) 365.1389, found 365.1383. UV of **3b**:

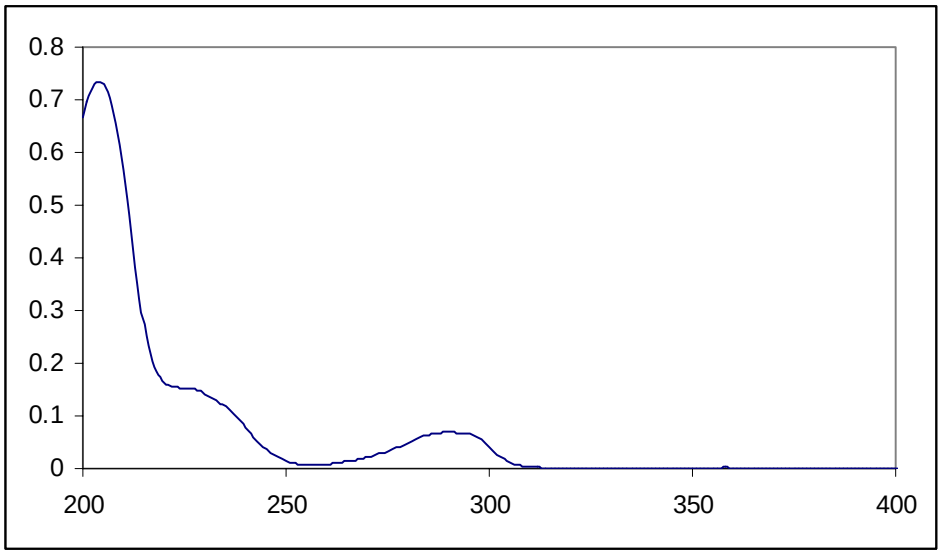


3c, 93%, Rf 0.43 (petroleum ether/ethyl acetate = 5/1); ^{1}H NMR ($CDCl_3$, 300 MHz) δ 7.04 (d, *J* = 8.6 Hz, 2 H), 6.74 (d, *J* = 8.6 Hz, 2 H), 6.32 (d, *J* = 2.7 Hz, 1 H), 6.01 (d, *J* = 2.5 Hz, 1 H), 4.78 (d, *J* = 15.2 Hz, 1 H), 4.72 (d, *J* = 15.1 Hz, 1 H), 3.77 (s, 3 H), 3.71 (s, 3 H), 3.68 (s, 3 H), 2.68 (t, *J* = 8.6 Hz, 2 H), 2.14-2.00 (m, 2 H), 1.51 (s, 3 H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 156.7, 152.4, 148.3, 133.7, 132.8, 128.2, 119.0, 112.7, 99.6, 98.0, 97.9, 59.8, 55.0, 54.6, 54.2, 38.6, 27.7, 21.3; IR (neat): 2939, 2837, 2730, 1700,

1609, 1584, 1495, 1453, 1372, 1245, 1201; HRMS(FT-ICR) *m/e* calcd. for (M + H^+) 345.1702, found 345.1700. UV of **3c**:

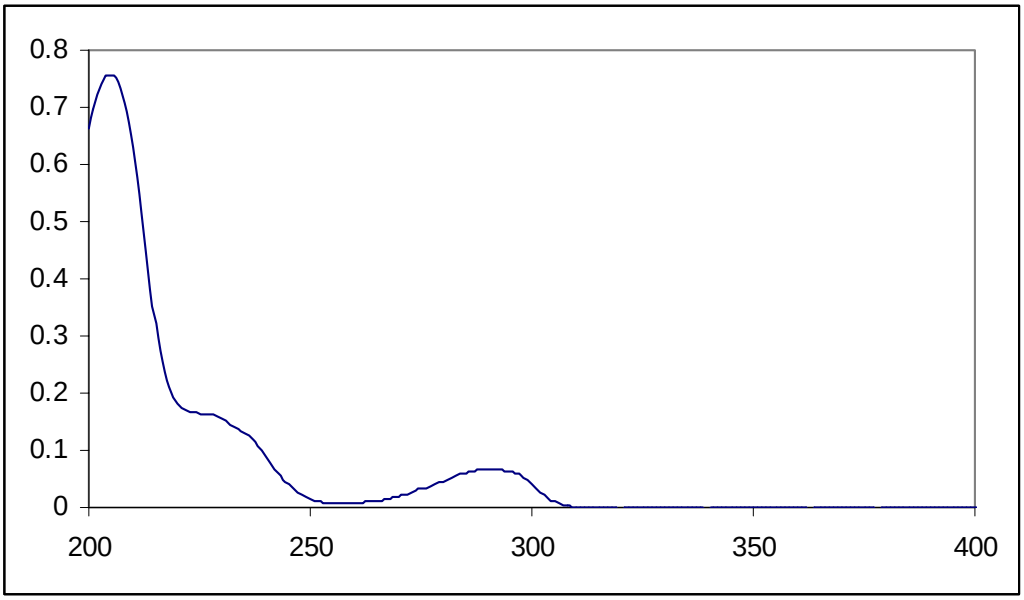


3d, 91%, Rf 0.27 (petroleum ether/ethyl acetate = 20/1); ^{1}H NMR ($CDCl_3$, 300 MHz) δ 6.39 (d, *J* = 2.7 Hz, 1 H), 6.08 (d, *J* = 2.7 Hz, 1 H), 4.81 (d, *J* = 15.1 Hz, 1 H), 4.75 (d, *J* = 15.1 Hz, 1 H), 3.84 (s, 3 H), 3.75 (s, 3 H), 1.93-1.75 (m, 2 H), 1.52 (s, 3 H), 1.52-1.40 (m, 2 H), 1.31-1.20 (m, 28 H), 0.88 (t, *J* = 6.7 Hz, 3 H); ^{13}C NMR ($CDCl_3$, 75 MHz) δ 153.2, 149.2, 134.7, 120.0, 101.2, 98.74, 98.69, 60.7, 55.9, 55.6, 37.7, 31.9, 29.8, 29.71, 29.67, 29.6, 29.5, 29.4, 23.4, 22.7, 22.1, 14.2; IR (neat): 2916, 2848, 1603, 1496, 1462, 1363, 1280, 1245; HRMS(FT-ICR) *m/e* calcd. for (M + H^+) 449.3631, found 449.3642. UV of **3d**:



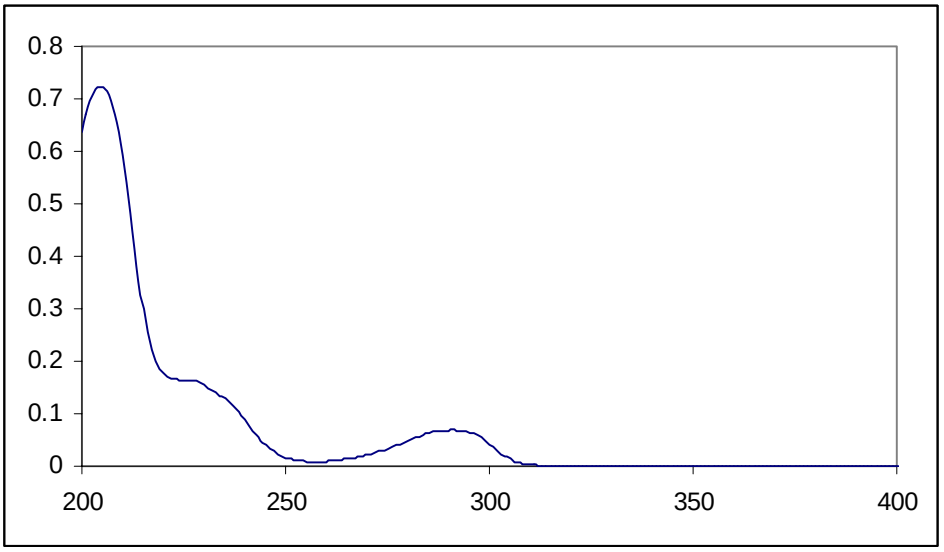
3e, 96%, Rf 0.4 (petroleum ether/ethyl acetate = 7/1); ^{1}H NMR ($CDCl_3$, 400 MHz) δ 6.38 (d, *J* = 2.8 Hz, 1 H), 6.07 (d, *J* = 2.8 Hz, 1 H), 4.78 (s, 2 H), 3.83 (s, 3 H), 3.74 (s, 3 H), 2.20 (s, 2 H), 2.12 (d, *J* = 12.5 Hz, 2 H), 2.02 (d, *J* = 11.9 Hz, 2 H), 1.89-1.85 (m, 2

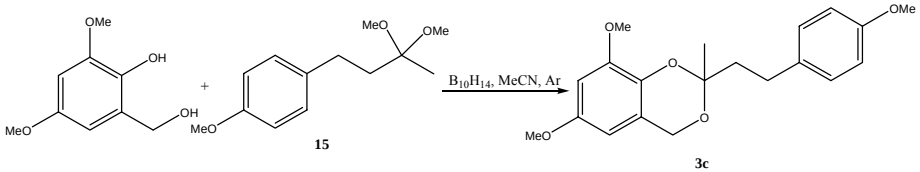
H), 1.71-1.63 (m, 6 H); ^{13}C NMR ($CDCl_3$, 100 MHz) δ 152.4, 148.6, 133.5, 120.1, 100.7, 98.0, 97.9, 58.8, 55.1, 54.6, 36.2, 32.8, 32.54, 32.46, 26.05, 26.03; IR (neat): 2910, 2854, 1610, 1498, 1452, 1363, 1283, 1239; HRMS(FT-ICR) *m/e* calcd. for (M + H^+) 317.1753, found 317.1749. UV of **3e**:



3f (isomer a+b = 93%), isomer a (28%), Rf 0.16 (petroleum ether/ ethyl acetate = 20/1); ^{1}H NMR ($CDCl_3$, 300 MHz) δ 6.39 (d, *J* = 2.6 Hz, 1 H), 6.06 (d, *J* = 2.7 Hz, 1 H), 4.82 (s, 2 H), 3.85 (s, 3 H), 3.75 (s, 3 H), 2.02-0.74 (m, 43 H), 0.65 (s, 3 H); ^{13}C NMR($CDCl_3$, 75 MHz) δ 153.3, 149.5, 134.5, 120.7, 99.8, 98.9, 98.7, 60.6, 56.4, 56.2, 56.1, 55.6, 53.7, 42.5, 41.7, 39.9, 39.5, 36.6, 36.1, 35.8, 35.7, 35.4, 34.7, 31.7, 28.7, 28.3, 28.2, 28.0, 24.2, 23.8, 22.9, 22.6, 21.2, 18.6, 12.1, 11.5; IR (neat): 2931, 2864, 1603, 1496, 1451, 1364, 1277, 1230; HRMS(FT-ICR) *m/e* calcd. for (M + H^+) 553.4257, found 553.4270.

Isomer b (65%), Rf 0.11 (petroleum ether/ ethyl acetate = 20/1); ^{1}H NMR ($CDCl_3$, 300 MHz) δ 6.38 (d, *J* = 2.7 Hz, 1 H), 6.07 (d, *J* = 2.7 Hz, 1 H), 4.74 (s, 2 H), 3.84 (s, 3 H), 3.74 (s, 3 H), 2.06-0.68 (m, 43 H), 0.64 (s, 3 H); ^{13}C NMR($CDCl_3$, 75 MHz) δ 153.2, 149.1, 134.8, 120.1, 100.5, 98.7, 98.6, 60.2, 56.4, 56.2, 55.9, 55.6, 53.9, 42.5, 42.2, 39.9, 39.5, 36.1, 35.82, 35.78, 35.4, 34.7, 31.9, 29.7, 29.2, 28.3, 28.0, 24.2, 23.8, 22.8, 22.6, 21.2, 18.6, 12.0, 11.8; IR (neat): 2933, 2867, 1610, 1498, 1465, 1373, 1228; HRMS(FT-ICR) *m/e* calcd. for (M + H^+) 553.4257, found 553.4262. UV of **3f**:





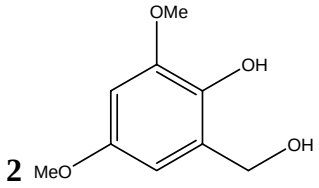
Preparation of 3c from dimethyl ketal. 2 (170 mg, 0.88 mmol), dimethyl ketal **15** (173 mg, 0.72 mmol) and $B_{10}H_{14}$ (3.6 mg) in 1.5 ml of freshly distilled MeCN was stirred at R. T. under Ar for 3.5 h. The reaction mixture was poured into saturated $NaHCO_3$ (aq.) and extracted with CH_2Cl_2 (50ml*2), dried over Na_2SO_4, filtered and concentrated. The residue was purified with flash chromatography (petroleum ether/ethyl acetate = 5/1, Rf 0.43) to afford **3c** (248 mg, 99%).

General procedures of photolysis. Ketal/acetal (0.20 mmol) in 200 ml of acetonitrile and 50 ml of water was irradiated a 450W medium pressure mercury lamp equipped with a Pyrex filter sleeve, without exclusion of air (for **1d** and **1f,** 240 ml of acetonitrile and 10 ml of water were used because of the solubility). The reaction mixture was then concentrated and the residue was purified with flash column chromatography. Carbonyl compounds **1a** and **1c** were further derivatized. The reaction solution was transferred to a 500 ml round bottom flask containing $HONH_3Cl$ (1.112 g, 16.0 mmol) and NaOAc (1.690 g, 19.2 mmol) and stirred at room temperature for 24 h. The reaction mixture was concentrated and extracted with CH_2Cl_2 (30 mlx2). The organic layers were combined, dried over Na_2SO_4, filtered and concentrated. The residue was purified with flash chromatography to provide the corresponding oximes. The yields of the obtained **1b** and **1e** were calculated the same way as in other cases and without any adjustment for their conversions.

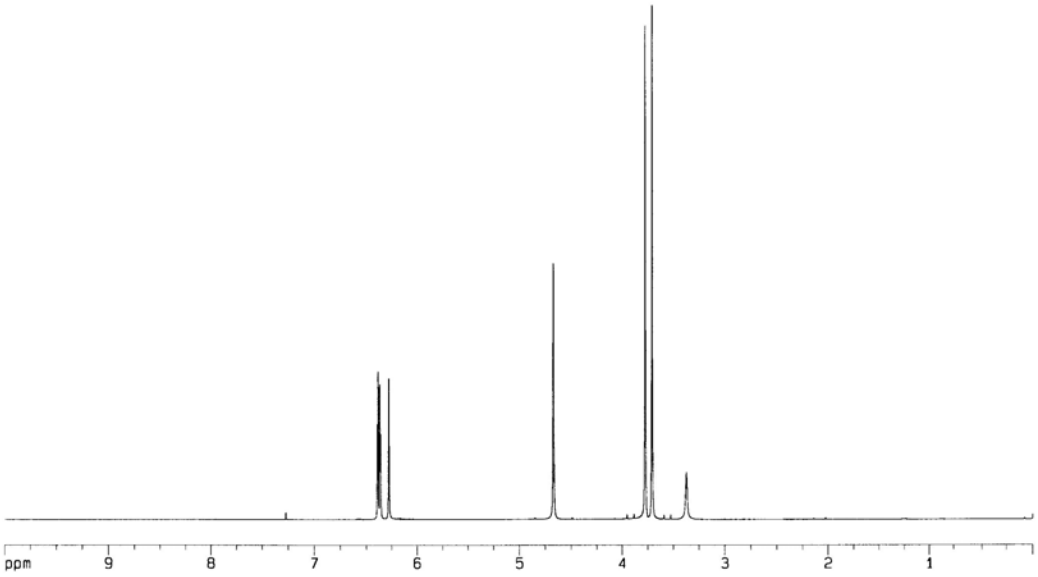
Stability of 3a under various conditions

entry	reagent[a]	solvent	conditions	**3a** (%)[d]
1	PhLi[b]	THF	-78°C, 2h	100
2	$LiAlH_4$[c]	THF	23°C, 24h	100
3	$NaBH_4$[c]	THF	23°C, 24h	100
4	t-BuOK	MeCN	23°C, 24h	100
		MeCN	Reflux, 2h	100
5	DDQ	MeCN	23°C, 24h	25
		MeCN	Reflux, 2h	0
6	TFA	MeCN	23°C, 24h	25
		MeCN	Reflux, 2h	0
7	p-TsOH·H_2O	MeCN	23°C, 24h	0
		MeCN	Reflux, 2h	0
8	HCl (37%)	MeCN	23°C, 24h	50
		MeCN	Reflux, 2h	0
9	CAN	MeCN	23°C, 24h	0
		MeCN	Reflux, 2h	0
10	AcOH	MeCN	23°C, 24h	100
		MeCN	Reflux, 2h	100

[a] **3a** (2mg) in 1.0ml MeCN treated with reagent (>20 eq.). [b] **3a**(0.05mmol) in 1.0ml dry THF treated with 0.4ml of PhLi (2.0M Bu_2O solution) under Ar. [c] **3a**(5mg) in 1ml THF as treated with reagent (>20eq.). [d] Yields determined by ^1H NMR of the crude reaction mixture.


OMe
OH
OH
MeO

2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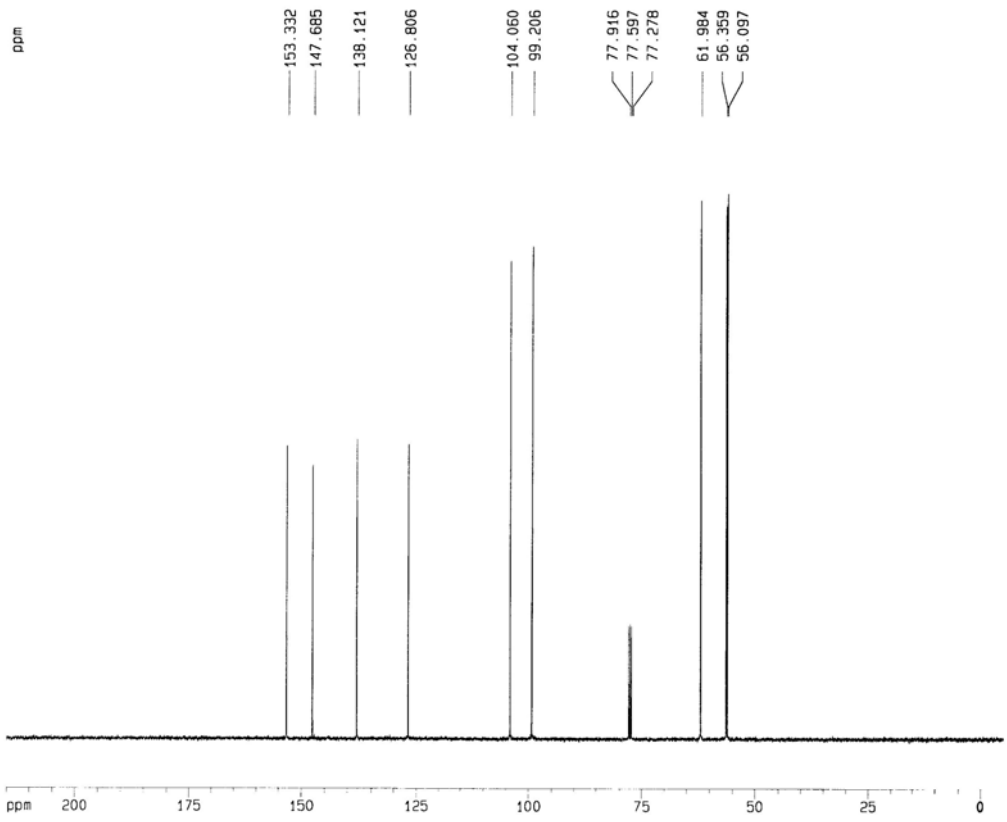
7
6
5
4
3
2
1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126.806
104.060
99.206
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77.278
61.984
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ppm
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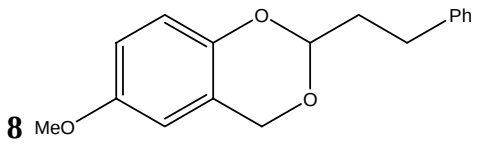
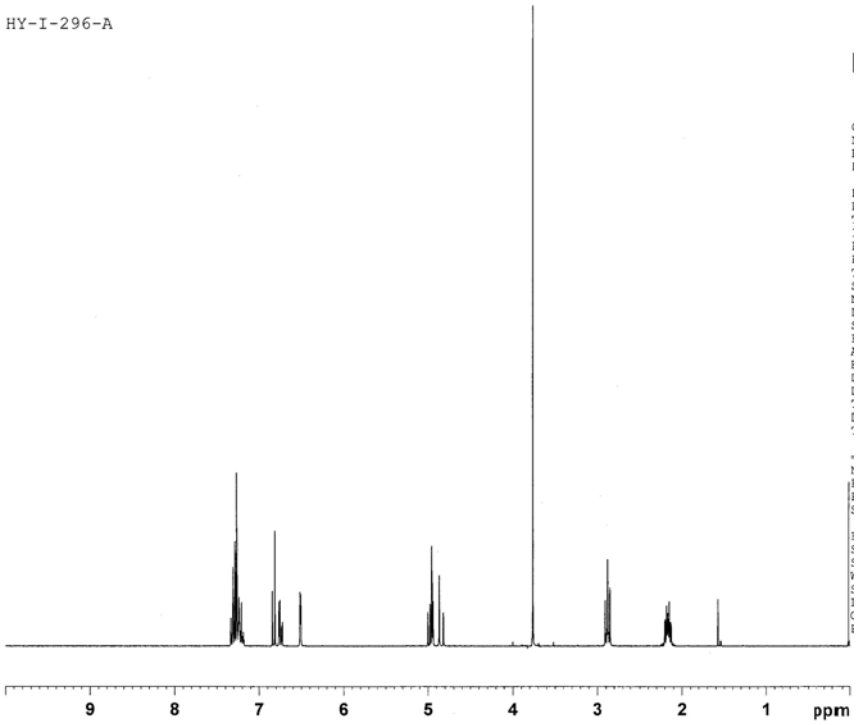
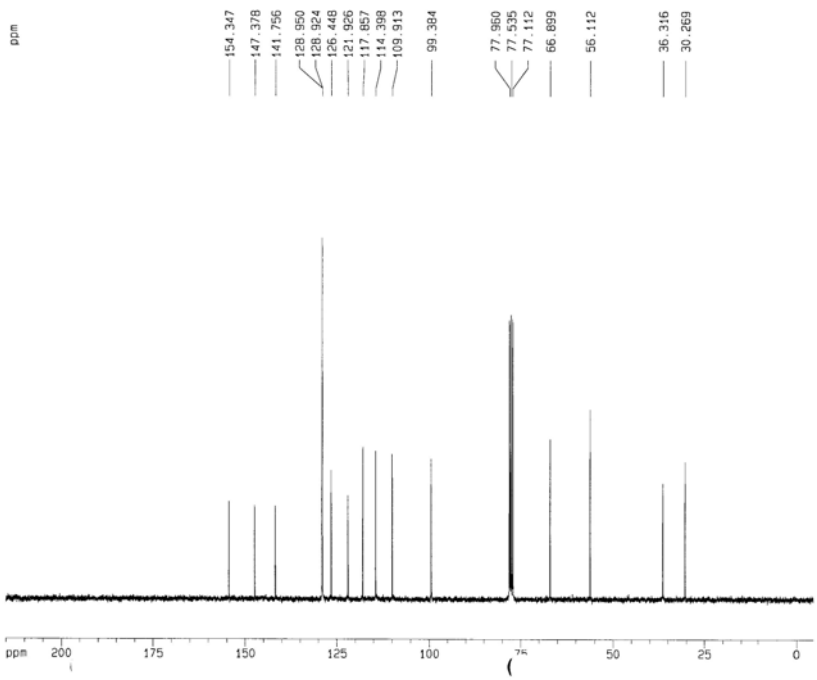
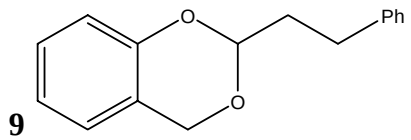
175
150
125
100
75
50
25
0


O
Ph
O
MeO

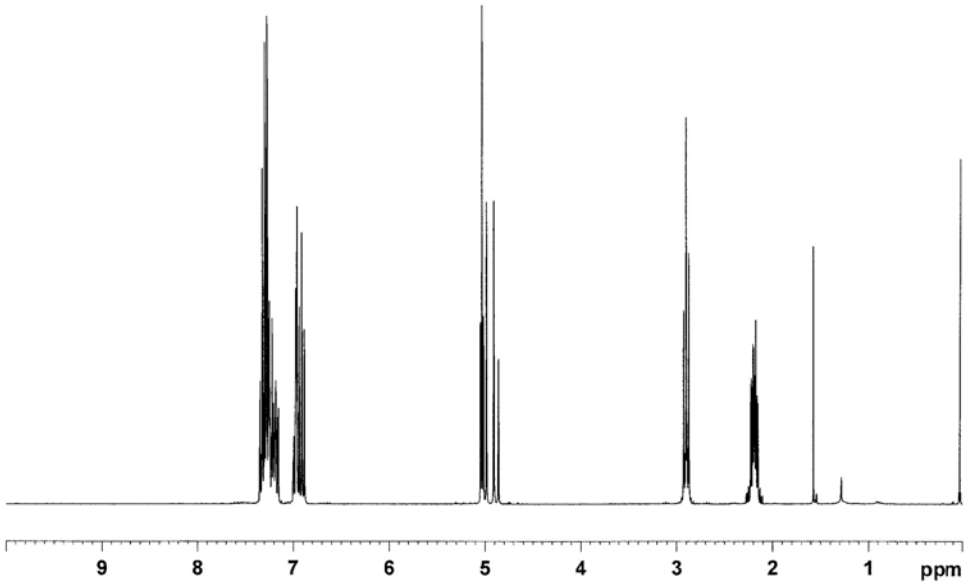
8

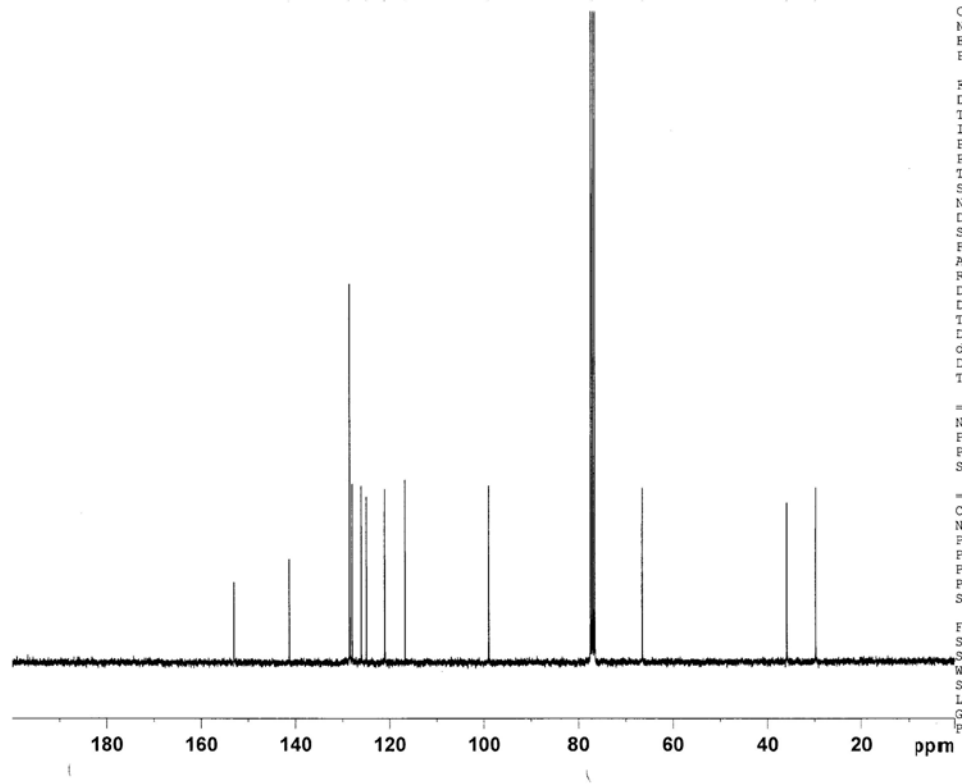

HY-I-296-A
9
8
7
6
5
4
3
2
1
ppm

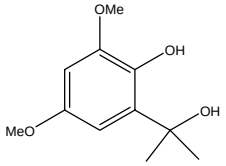

ppm
154.347
147.378
141.756
128.950
128.924
126.448
121.926
117.857
114.398
109.913
99.384
77.960
77.535
77.112
66.899
56.112
36.316
30.269
ppm
200
175
150
125
100
50
25
0

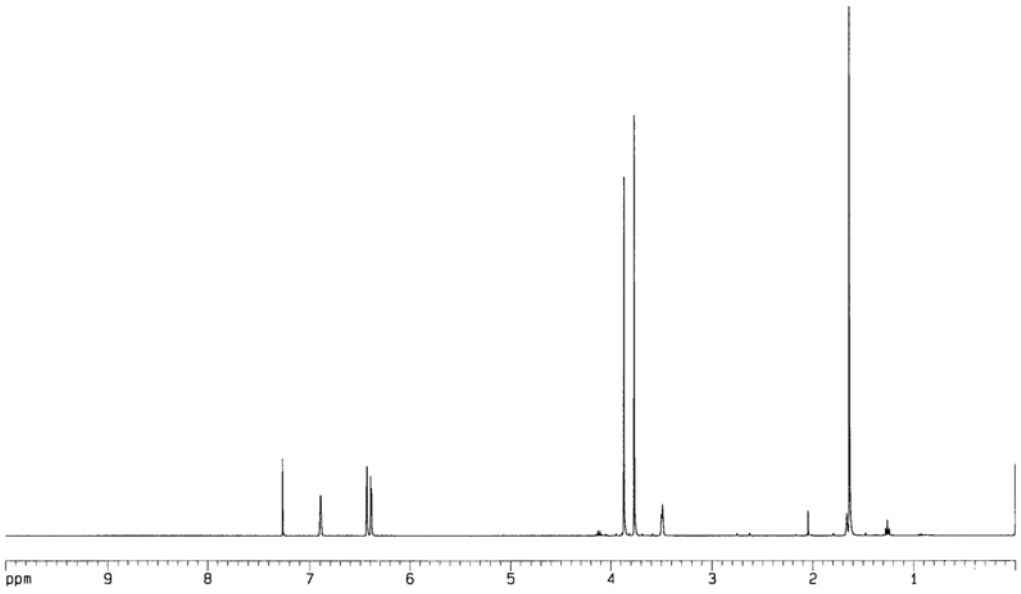


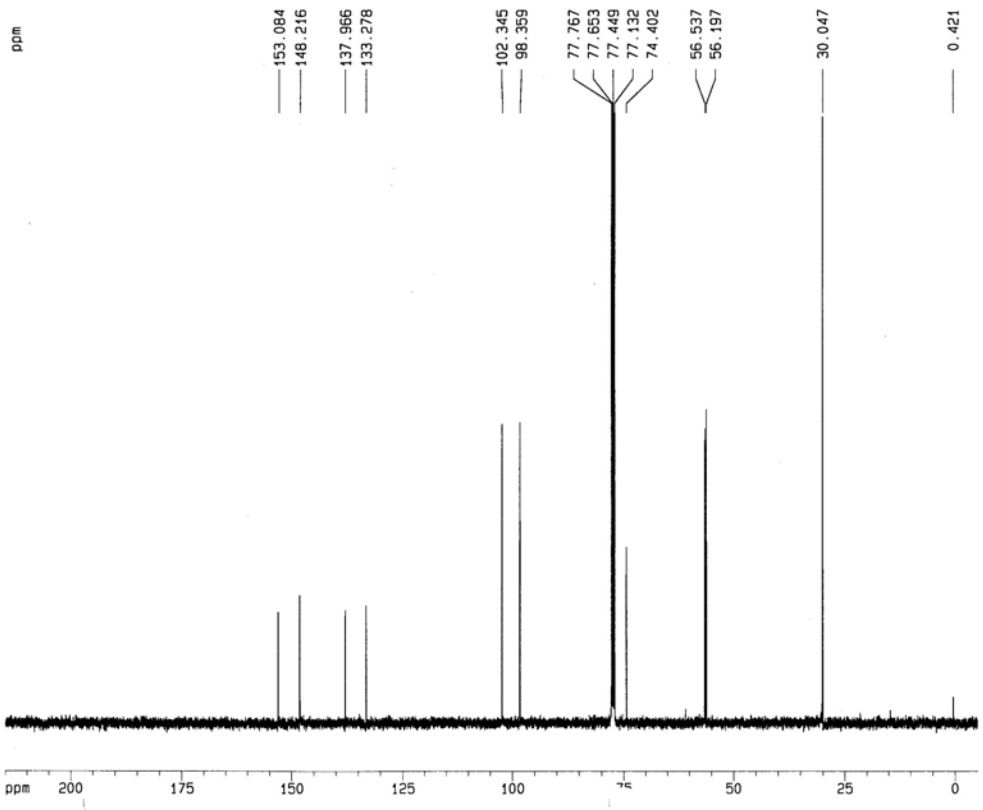
9

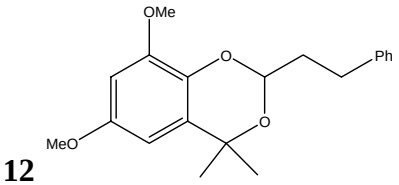




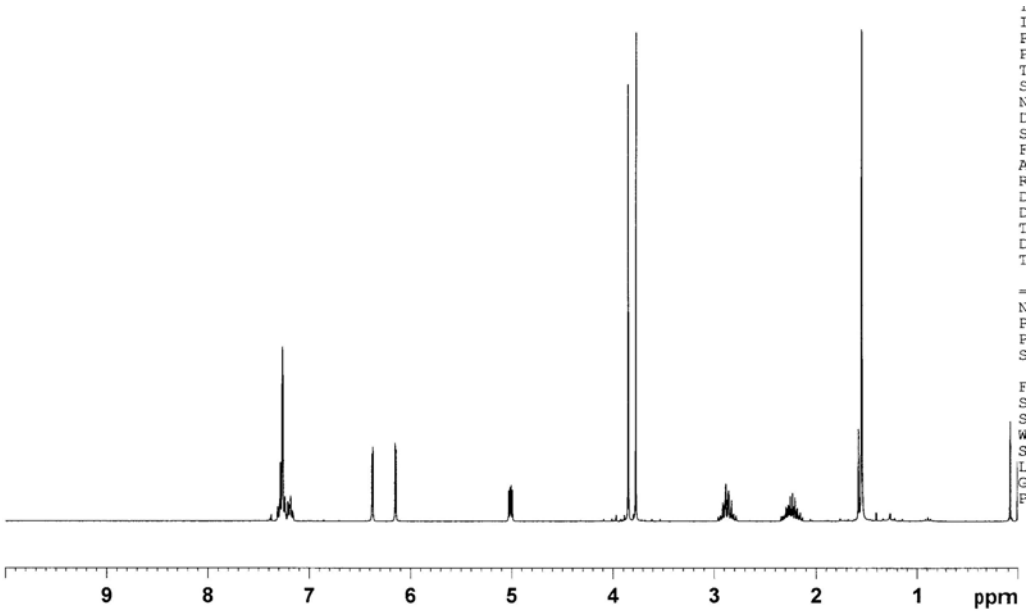

OMe
OH
OH
MeO

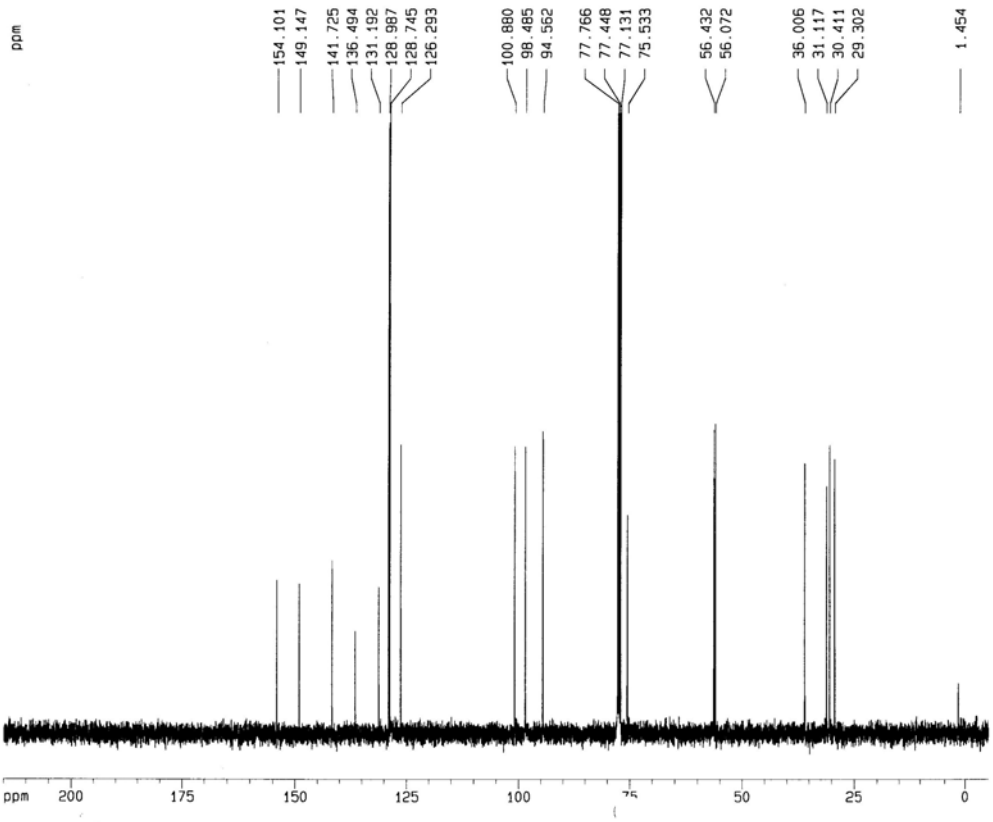

ppm
9
8
7
6
5
4
3
2
1

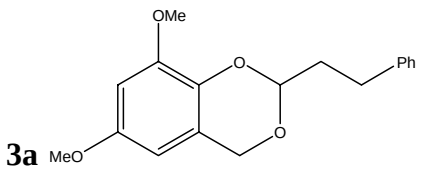

ppm
153.084
148.216
137.966
133.278
102.345
98.359
77.767
77.653
77.449
77.132
74.402
56.537
56.197
30.047
0.421
ppm
200
175
150
125
100
75
50
25
0


OMe
O
Ph
O
MeO

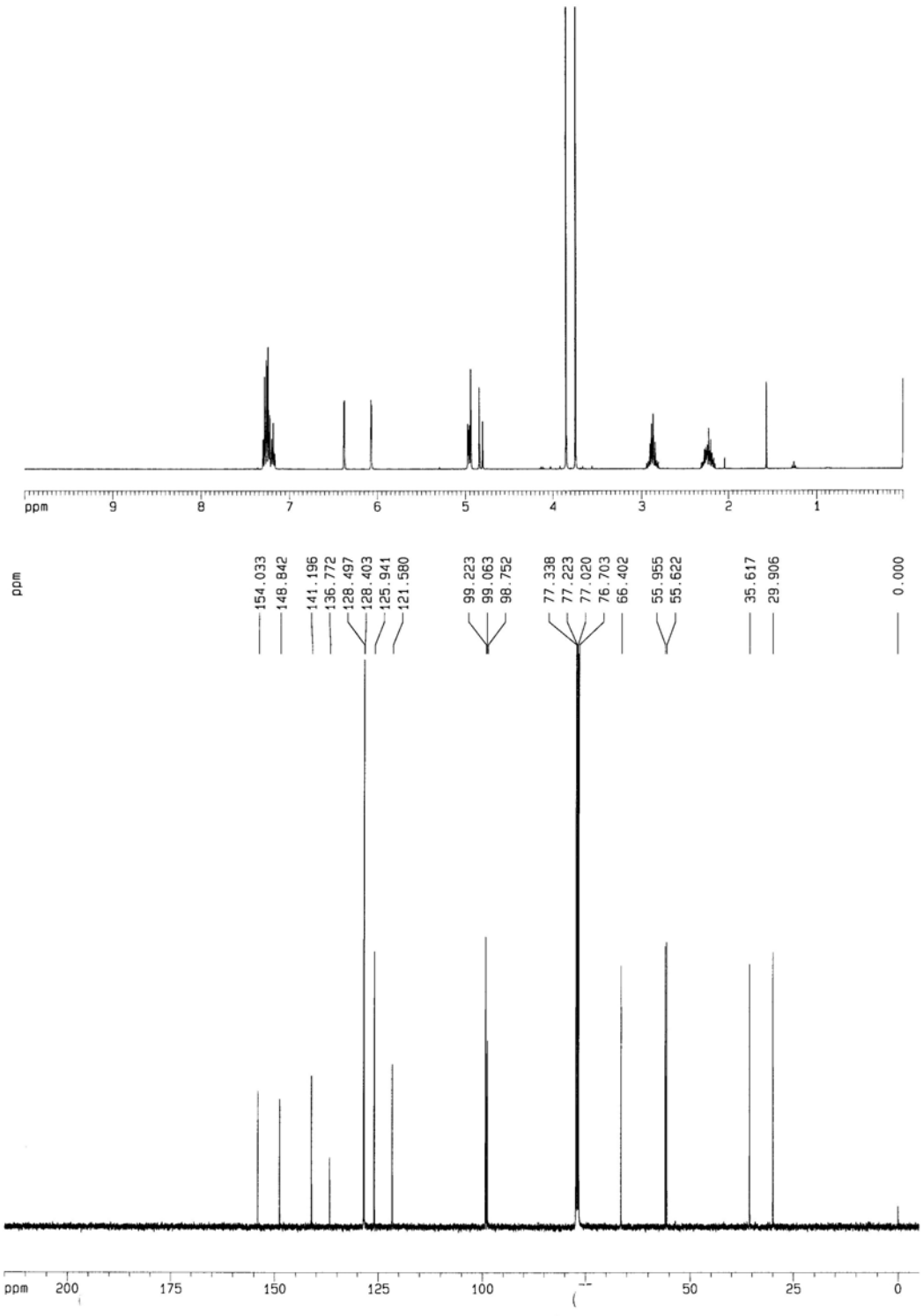
12

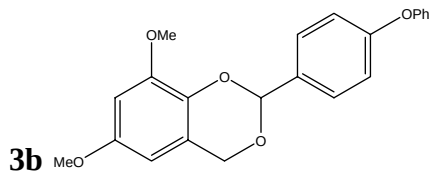

9
8
7
6
5
4
3
2
1
ppm


ppm
154.101
149.147
141.725
136.494
131.192
128.987
128.745
126.293
100.880
98.485
94.562
77.766
77.448
77.131
75.533
56.432
56.072
36.006
31.117
30.411
29.302
1.454
ppm
200
175
150
125
100
75
50
25
0

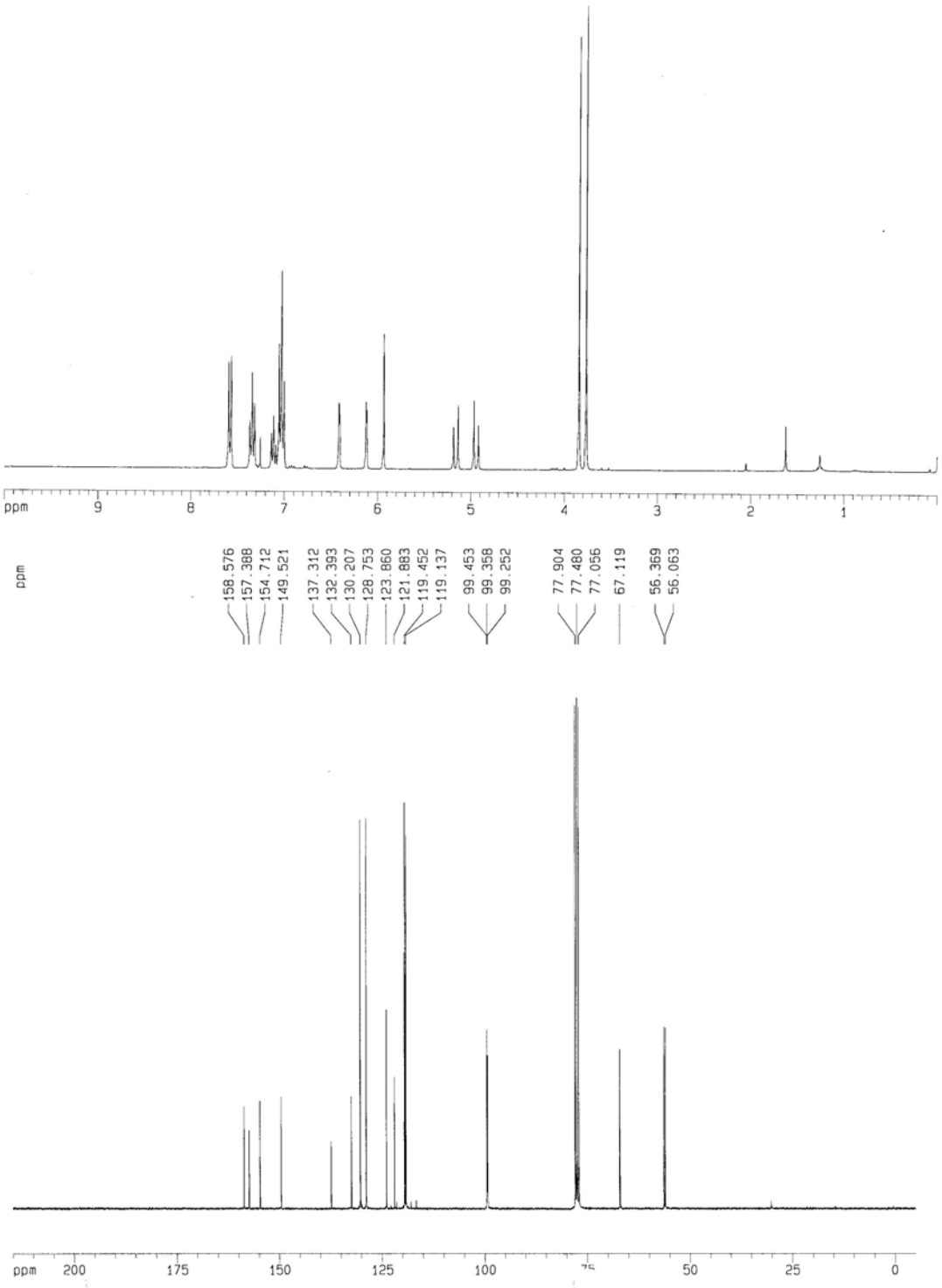

OMe
O
Ph
O
MeO

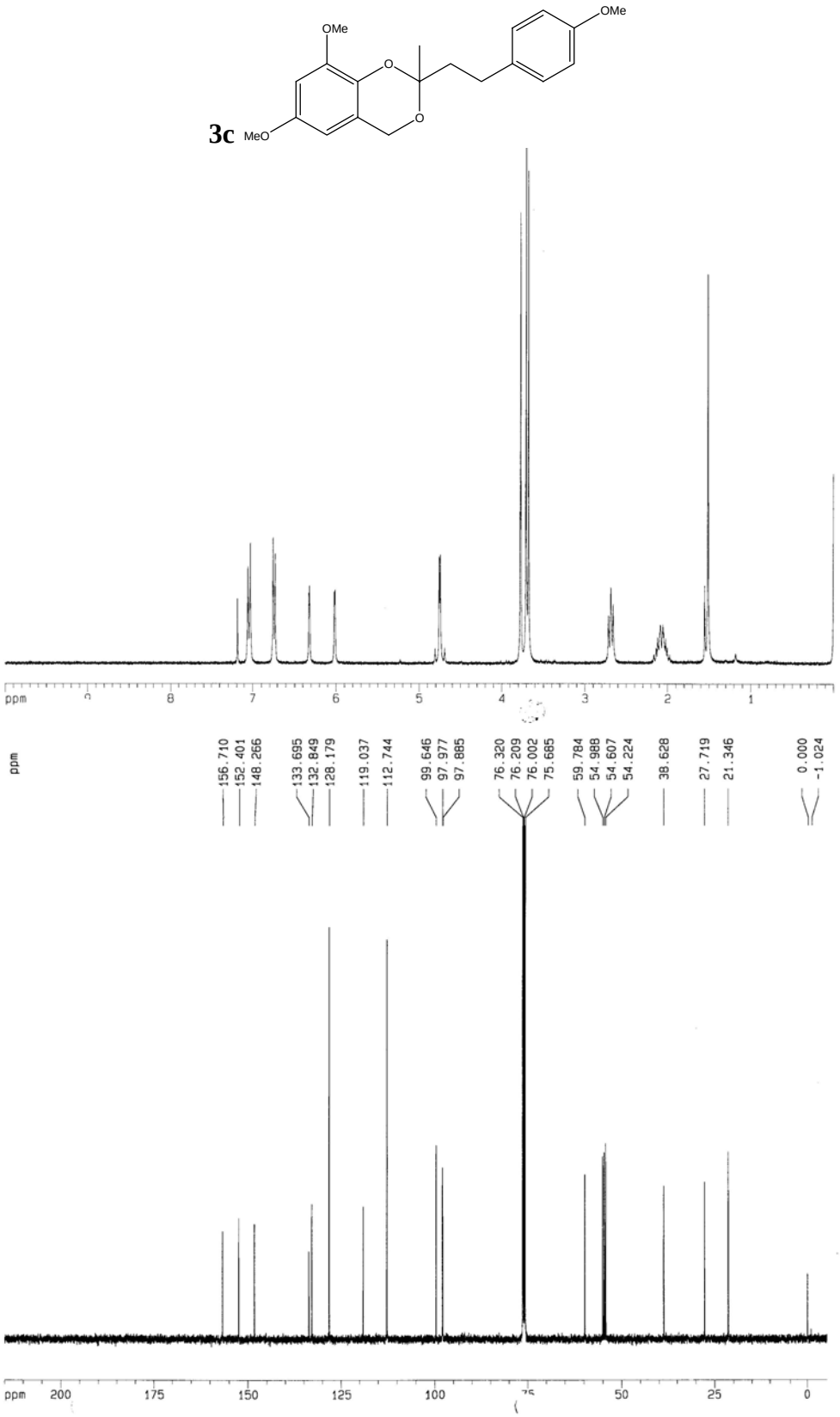
3a


ppm
9
8
7
6
5
4
3
2
1
ppm
154.033
148.842
141.196
136.772
128.497
128.403
125.941
121.580
99.223
99.063
98.752
77.338
77.223
77.020
76.703
66.402
55.955
55.622
35.617
29.906
0.000
ppm
200
175
150
125
100
50
25
0

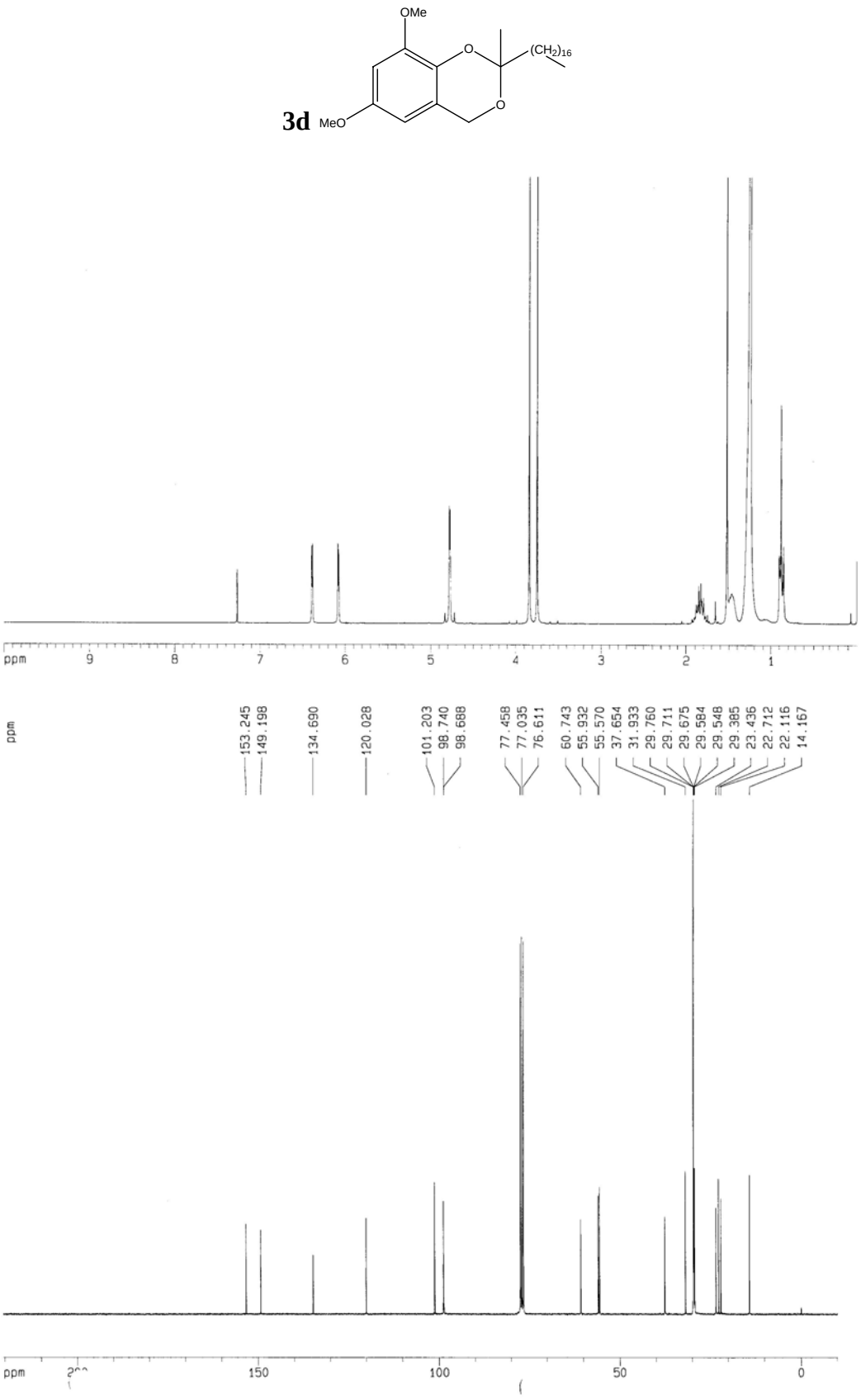

OMe
OPh
O
O
MeO

3b

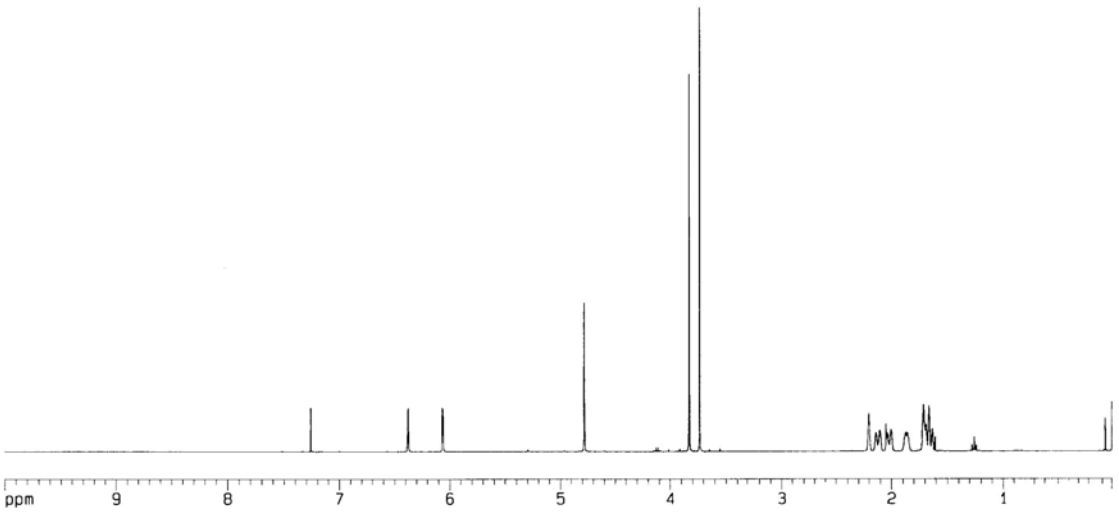

ppm
9
8
7
6
5
4
3
2
1
158.576
157.388
154.712
149.521
137.312
132.393
130.207
128.753
123.860
121.883
119.452
119.137
99.453
99.358
99.252
77.904
77.480
77.056
67.119
56.369
56.063
ppm
200
175
150
125
100
75
50
25
0

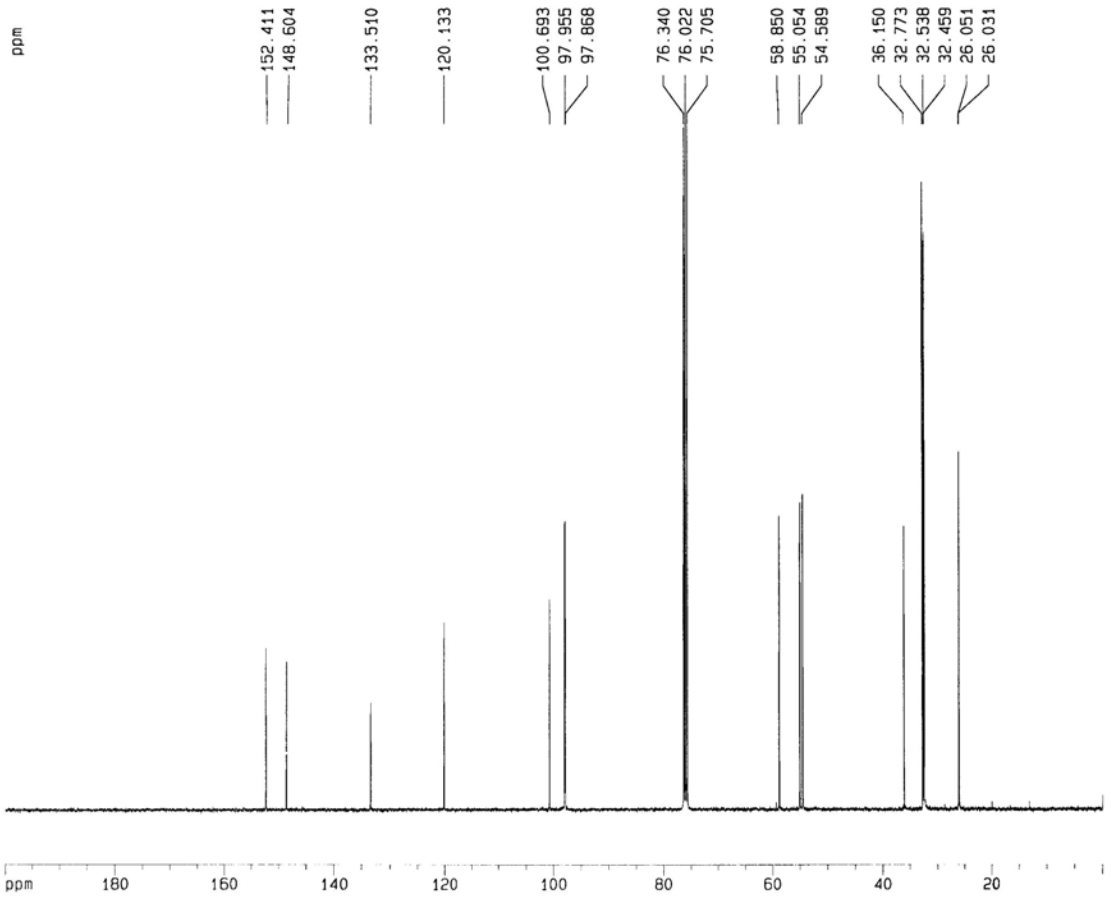

3c
OMe
OMe
MeO
O
O
O
ppm
8
7
6
5
4
3
2
1
ppm
156.710
152.401
148.266
133.695
132.849
128.179
119.037
112.744
99.646
97.977
97.885
76.320
76.209
76.002
75.685
59.784
54.988
54.607
54.224
38.628
27.719
21.346
0.000
-1.024
ppm
200
175
150
125
100
75
50
25
0

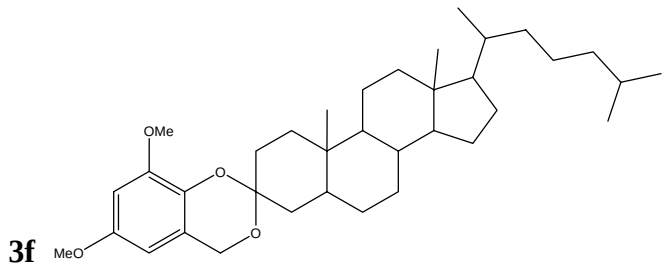
3d


OMe
O
(CH2)16
O
MeO
ppm
9
8
7
6
5
4
3
2
1
ppm
153.245
149.198
134.690
120.028
101.203
98.740
98.688
77.458
77.035
76.611
60.743
55.932
55.570
37.654
31.933
29.760
29.711
29.675
29.584
29.548
29.385
23.436
22.712
22.116
14.167
ppm
150
100
50
0

3e

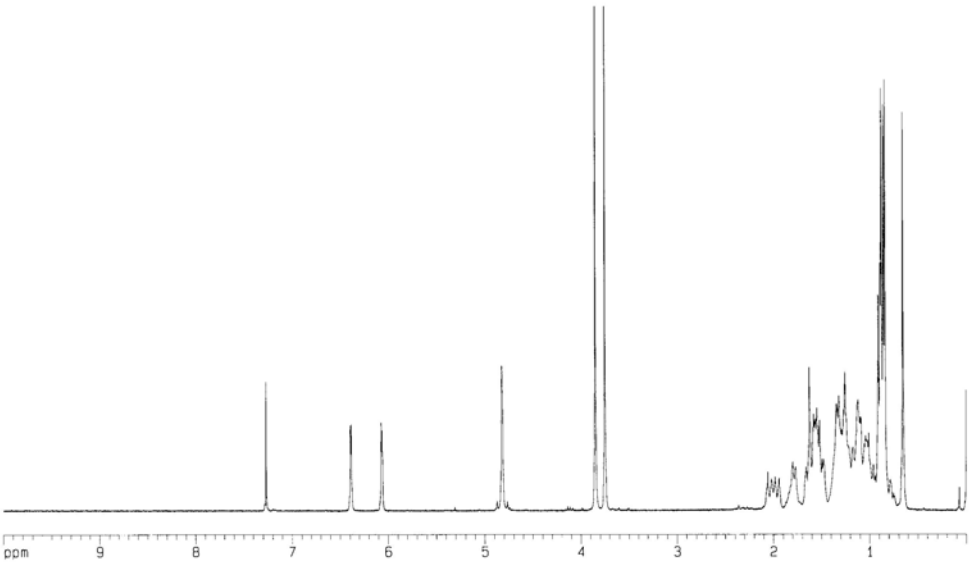

ppm
9
8
7
6
5
4
3
2
1

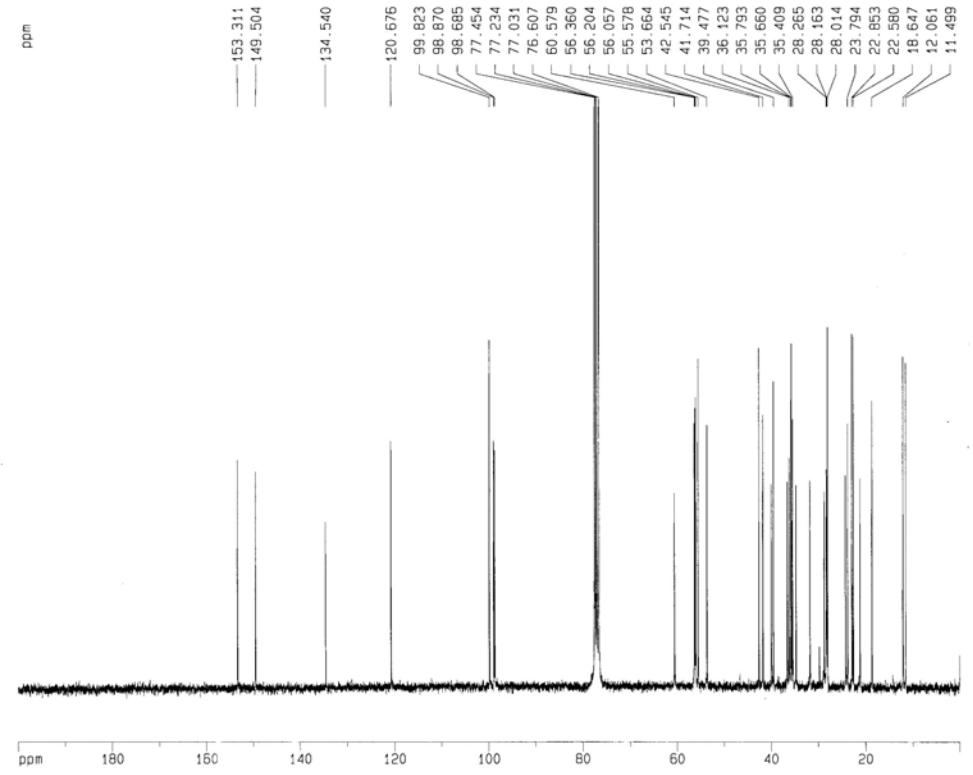

ppm
152.411
148.604
133.510
120.133
100.693
97.955
97.868
76.340
76.022
75.705
58.850
55.054
54.589
36.150
32.773
32.538
32.459
26.051
26.031
ppm
180
160
140
120
100
80
60
40
20


OMe
O
O
MeO

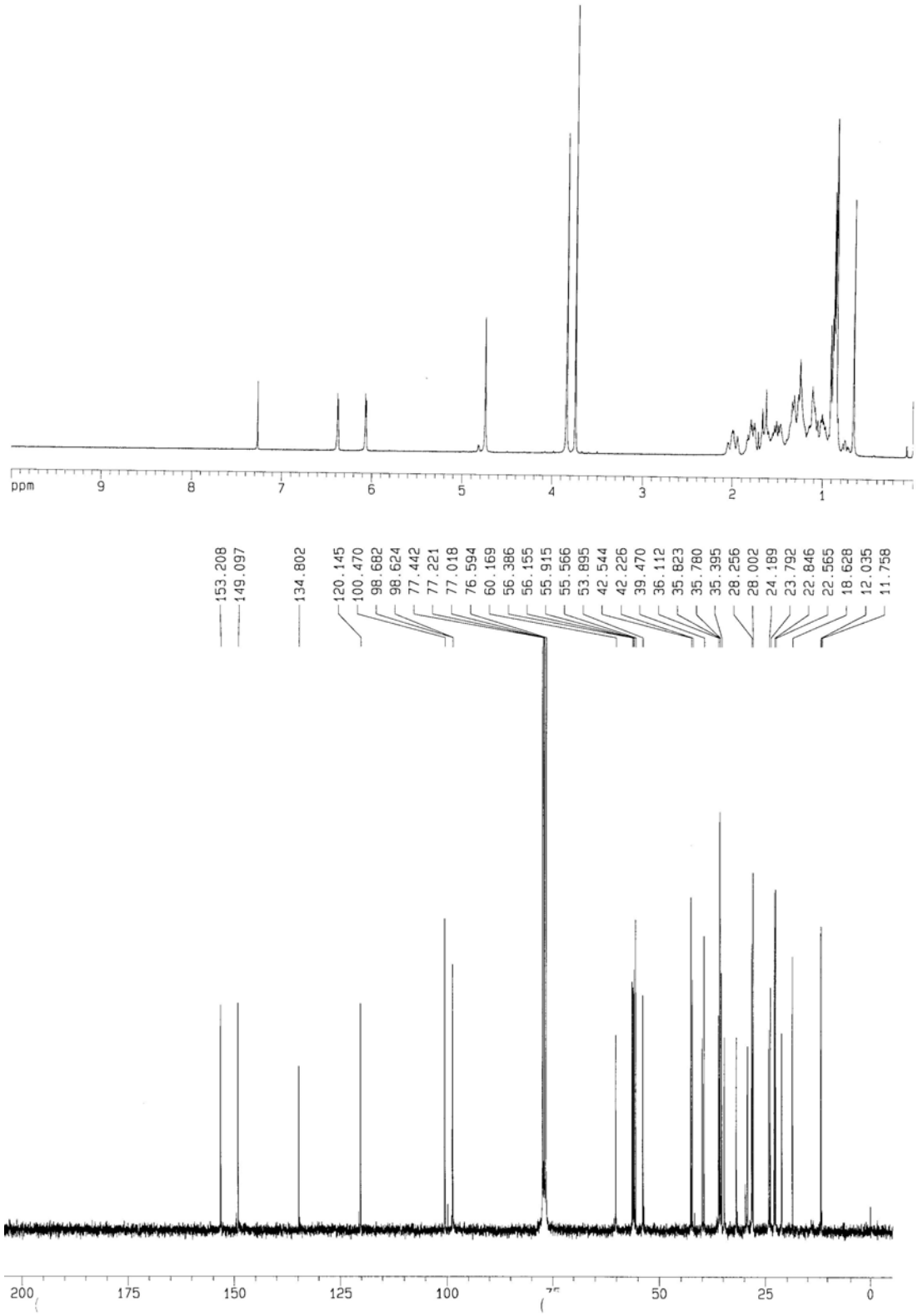
3f

Isomer a


ppm
9
8
7
6
5
4
3
2
1


ppm
153.311
149.504
134.540
120.676
99.823
98.870
98.685
77.454
77.234
77.031
76.607
60.579
56.360
56.204
56.057
55.578
53.664
42.545
41.714
39.477
36.123
35.793
35.660
35.409
28.265
28.163
28.014
23.794
22.853
22.580
18.647
12.061
11.499
ppm
180
160
140
120
100
80
60
40
20

Isomer b


ppm
9
8
7
6
5
4
3
2
1
153.208
149.097
134.802
120.145
100.470
98.682
98.624
77.442
77.221
77.018
76.594
60.169
56.386
56.155
55.915
55.566
53.895
42.544
42.226
39.470
36.112
35.823
35.780
35.395
28.256
28.002
24.189
23.792
22.846
22.565
18.628
12.035
11.758
200
175
150
125
100
50
25
0