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Supporting Information

Polymer-supported PPh_3 as a reusable organocatalyst for the Mukaiyama aldol reaction of aldehydes and imines

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General

All reactions were performed under an argon atmosphere using oven-dried glassware. Flash column chromatography was performed using silica gel Wakogel C-200. Preparative thin-layer chromatography was carried out on silica gel Wakogel B-5F. Dehydrate DMF, THF, toluene and CH_3CN were purchased from Wako Chemical. Other commercially available reagents was used as received without further purification. Yields refer to isolated compounds estimated to be >95% pure, as determined by ^1H NMR spectroscopy. IR spectra were recorded on a JUSCO FT/IR-430 spectrometer. ^1H and ^{13}C NMR spectra were determined for solutions in $CDCl_3$ with Me_4Si as internal standard on a Bruker Avance III instrument. HRMS data were measured on a JEOL JMS-700 mass spectrometer.

General procedure for PS-PPh_3 catalyzed Mukaiyama aldol reaction of aldehyde with silyl ketene acetals

To a solution of PS-PPh_3 (0.05mmol) in DMF (1 mL) was added aldehyde 1 (1.0 mmol) and silyl ketene acetal (1.25 mmol) at room temperature. After the reaction was complete (as determined by TLC), EtOAc (5 ml) was added to the mixture and PS-PPh_3 was separated by filtration. The filtrate was concentrated under vacuum and purified by column chromatography on silica gel (EtOAc:hexane = 1:3) to give the corresponding product. The recovered catalyst is reusable after washing (acetone, NH_4OH and water) and drying in vacuo.

General procedure for PS-PPh_3 catalyzed Mukaiyama aldol reaction of imine with silyl ketene acetals

To a solution of PS-PPh_3 (0.10 mmol) in DMF (1 mL) was added aldehyde 1 (1.0 mmol) and silyl ketene acetal (1.25 mmol) at room temperature or 30 °C. After the reaction was complete (as determined by TLC), EtOAc (15 ml) was added to the mixture and PS-PPh_3 was separated by filtration. The filtrate was washed with brine and water and dried over anhydrous Na_2SO_4, then evaporated. The crude mixture was purified by preparative TLC (EtOAc:hexane = 1:3) to afford the corresponding product.

Methyl 3-(4-methoxyphenyl)-2,2-dimethyl-3-trimethyl-silyloxypropionate (3a)[1]: Colorless oil; yield: 303 mg (94 %); ^1H NMR (500 MHz, CDCl3): δ 0.09 (s, 9H), 0.93 (s, 3H), 1.06 (s, 3H), 3.63 (s, 3H), 3.75 (s, 3H), 4.88 (s, 1H), 6.77 (d, J = 8.6 Hz, 5H), 7.13 (d, J = 8.6 Hz, 5H); ^{13}C NMR (125 MHz, CDCl3) δ =0.0, 19.1, 21.7, 49.1, 51.6, 55.2, 78.8, 112.8, 128.8, 133.0, 158.9, 177.4; HRMS (FAB): *m*/*z*: calcd for $C_{16}H_{27}O_4Si$: 323.1679; found: 323.1961 $[M + H]^+$.

Methyl 2,2-dimethyl-3-phenyl-3-trimethylsilyloxypropionate (3b)[2]: Colorless oil; yield: 255 mg (91 %); ^{1}H NMR (500 MHz, CDCl3): δ 0.04 (s, 9H), 0.97 (s, 3H), 1.11 (s, 3H), 3.66 (s, 3H), 4.96 (s, 1H), 4.92 (s, 1H), 7.22-7.32 (m, 5H); ^{13}C NMR (125 MHz, CDCl3) δ = 0.0, 19.0, 22.0, 49.1, 51.7, 79.2, 127.4, 127.8, 140.7, 177.3; HRMS (FAB): *m*/*z*: calcd for $C_{15}H_{25}O_3Si$: 281.1573; found: 281.1568 $[M + H]^+$.

Methyl 3-(4-chlorophenyl)-2,2-dimethyl-3-trimethylsilyloxy-propionate (3c)[2]: White solid; m.p. 53 °C; yield: 299 mg (95 %); ^{1}H NMR (500 MHz, CDCl3): δ 0.06 (s, 9H), 0.94 (s, 3H), 1.08 (s, 3H), 3.64 (s, 3H), 7.18 (d, *J* = 8.4 Hz, 5H), 7.23 (d, *J* = 8.6 Hz, 5H); ^{13}C NMR (125 MHz, CDCl3) δ = 0.0, 19.2, 21.4, 48.9, 51.7, 78.5, 127.6, 129.2, 133.1, 139.5, 177.0; HRMS (FAB): *m*/*z*: calcd for $C_{15}H_{24}ClO_3Si$: 315.1183; found: 315.1175 $[M + H]^+$.

Methyl 3-(4-methylphenyl)-2,2-dimethyl-3-trimethylsilyloxy-propionate (3d)[3]: Colorless oil; yield: 259 mg (88 %); ^{1}H NMR (500 MHz, CDCl3): δ 0.07 (s, 9H), 0.96 (s, 3H), 1.09 (s, 3H), 2.30 (s, 3H), 3.65 (s, 3H), 4.91 (s, 1H), 7.05 (d, *J* = 8.0 Hz, 5H), 7.13 (d, *J* = 8.0 Hz, 5H); ^{13}C NMR (125 MHz, CDCl3) δ = 0.0, 19.1, 21.1, 21.7, 49.0, 51.6, 79.0, 127.7, 128.1, 136.9, 137.8, 177.5; HRMS (FAB): *m*/*z*: calcd for $C_{16}H_{27}O_3Si$: 295.1729; found: 295.1727$[M + H]^+$.

Methyl 2,2-dimethyl-3-(4-Nitromethoxyphenyl)-3-trimethyl-silyloxypropionate (3e)[3]: White solid; m.p. 116 °C; yield: 275 mg (85 %); ^{1}H NMR (500 MHz, CDCl3): δ 0.04 (s, 9H), 0.97 (s, 3H), 1.11 (s, 3H), 3.65 (s, 3H), 5.03 (s, 1H), 7.43 (d, *J* = 8.5 Hz, 5H), 8.13 (d, *J* = 8.5 Hz, 5H); ^{13}C NMR (125 MHz, CDCl3) δ = 0.0, 19.7, 21.3, 49.1, 52.0, 78.3, 122.8, 128.5, 147.4, 148.7, 176.5.; HRMS (FAB): *m*/*z*: calcd for $C_{15}H_{24}NO_5Si$: 326.1424; found: 326.1417 $[M + H]^+$.

Methyl 3-[4-(dimethylamino)phenyl]-2,2-dimethyl-3-trimethylsilyloxypropionate (3f)[2]: White solid; m.p. 76 °C; yield: 291 mg (90 %); ^{1}H NMR (500 MHz, CDCl3): δ 0.08 (s, 9H), 0.94 (s, 3H), 1.07 (s, 3H), 2.92 (S, 6H), 3.64 (s, 3H), 4.86 (s, 1H), 6.55-6.70 (m, 2H), 7.05-7.15 (m, 2H); ^{13}C NMR (125 MHz, CDCl3) δ = 0.0, 18.9, 21.9, 40.7, 49.2, 51.7, 79.1, 111.4, 128.7, 149.8, 177.6; HRMS (FAB): *m*/*z*: calcd for $C_{17}H_{30}NO_3Si$: 324.1995; found: 324.2007 $[M + H]^+$..

Methyl 2,2-dimethyl-3-(naphthalene-1-yl)-3-trimethylsilyloxy-propionate (3g)[4]: Colorless oil; yield: 285 mg (86 %); ^{1}H NMR (500 MHz, CDCl3): δ -0.11 (s, 9H), 0.93 (s, 3H), 1.21 (s, 3H), 3.64 (s, 3H), 6.00 (s, 1H), 7.40-7.51 (m, 3H), 7.69 (d, *J* = 7.4 Hz, 1H), 7.76 (d, *J* = 8.2 Hz, 1H), 7.82 (d, *J* = 7.4 Hz, 1H), 8.15 (d, *J* = 8.2 Hz, 1H); ^{13}C NMR (125 MHz, CDCl3) δ = -0.1, 18.5, 23.0, 50.0, 51.8, 72.9, 123.2, 124.8, 125.0,

125.7, 127.0, 127.9, 128.8, 131.6, 133.2, 136.8, 177.5; HRMS (FAB): *m*/*z*: calcd for $C_{19}H_{27}O_3Si$: 331.1729; found: 331.1736 $[M + H]^+$.

Methyl 2,2-dimethyl-3-(naphthalene-2-yl)-3-trimethylsilyloxy-propionate (3h)[5]: White solid; m.p. 70 °C; yield: 315 mg (95 %); ^1H NMR (500 MHz, CDCl3): δ -0.05 (s, 9H), 1.02 (s, 3H), 1.15 (s, 3H), 3.67 (s, 3H), 5.13 (s, 1H), 7.40-7.47 (m, 3H), 7.67 (d, *J* = 4.4 Hz, 1H), 7.74 (d, *J* = 8.5 Hz, 1H), 7.81 (d, *J* = 7.4 Hz, 2H); ^{13}C NMR (125 MHz, CDCl3) δ = 0.0, 19.2, 21.8, 49.3, 51.7, 79.3, 125.7, 125.9, 126.1, 126.6, 127.0, 127.6, 128.0, 132.8, 133.0, 138.5, 177.3; HRMS (FAB): *m*/*z*: calcd for $C_{19}H_{27}O_3Si$: 331.1729; found: 331.1715 $[M + H]^+$.

Methyl (4*E*)-2,2-dimethyl-5-phenyl-3-trimethylsilyloxypent-4-enoate (3i)[3]: Colorless oil; yield: 285 mg (93 %); ^1H NMR (500 MHz, CDCl3): δ 0.00 (s, 9H), 1.02 (s, 3H), 1.11 (s, 3H), 3.59 (s, 3H), 4.40 (d, *J* = 7.0 Hz, 1H), 6.03 (dd, *J* = 7.0, 16.0 Hz, 1H), 6.41 (d, *J* = 16.0 Hz, 1H), 7.16 (d, *J* = 7.4 Hz, 1H), 7.24 (dd, *J* = 7.2, 7.5 Hz, 2H), 7.28 (d, *J* = 7.2 Hz, 2H); ^{13}C NMR (125 MHz, CDCl3) δ = 0.3, 19.8, 21.2, 48.5, 51.8, 78.5, 126.4, 127.6, 128.6, 128.8, 132.0, 136.8, 177.1; HRMS (FAB): *m*/*z*: calcd for $C_{17}H_{27}O_3Si$: 307.1729; found: 307.1740 $[M + H]^+$.

Methyl 2,2-dimethyl-5-phenyl-3-trimethylsilyloxypentanoate (3j)[3]: Colorless oil; yield: 268 mg (87 %); ^1H NMR (500 MHz, CDCl3): δ 0.14 (s, 9H), 1.08 (s, 3H), 1.16 (s, 3H), 1.61-1.66 (m, 2H), 2.40-2.55 (m, 2H), 3.64 (s, 3H), 3.97 (d, *J* = 12.0 Hz, 1H), 7.16-7.22 (m, 2H), 7.24-7.29 (m, 2H); ^{13}C NMR (125 MHz, CDCl3) δ =0.9, 20.3, 21.6, 33.5, 35.2, 48.4, 51.8, 77.5, 125.8, 128.3, 128.4, 142.2, 177.6; HRMS (FAB): *m*/*z*: calcd for $C_{17}H_{29}O_3Si$: 309.1886; found: 309.1876 $[M]^+$.

Methyl 2,2-dimethyl-3-trimethylsilyloxy-dodecanoate (3k)[2]: Colorless oil; yield: 288 mg (91 %); ^1H NMR (500 MHz, CDCl3): δ 0.09 (s, 9H), 0.85 (t, *J* = 8.1 Hz, 3H), 1.04 (s, 3H), 1.11 (s, 3H), 1.11-1.45 (m, 12H), 1.53-1.64 (m, 2H), 3.64 (s, 3H), 3.83 (d, *J* = 9.1 Hz, 1H); ^{13}C NMR (125 MHz, CDCl3) δ = 0.7, 14.1, 20.1, 21.6, 22.6, 27.0, 29.2, 29.5, 29.7, 31.8, 32.8, 48.2, 51.5, 77.7, 177.8; HRMS (FAB): *m*/*z*: calcd for $C_{17}H_{37}O_3Si$: 317.2512; found: 317.2523 $[M + H]^+$.

Methyl 3-(2-furyl)-2,2-dimethyl-3-trimethylsilyloxy-propionate (3l)[2]: Colorless oil; yield: 242 mg (84 %); ^1H NMR (500 MHz, CDCl3): δ 0.00 (s, 9H), 1.04 (s, 3H), 1.23 (s, 3H), 3.68 (s, 3H), 5.00 (s, 1H), 6.20 (d, *J* = 3.2 Hz, 1H), 6.31 (d, *J* = 3.2 Hz, 1H), 7.32-7.34 (m, 1H); ^{13}C NMR (125 MHz, CDCl3) δ = -0.3, 19.6,

21.2, 48.6, 51.8, 73.5, 107.9, 109.9, 141.5, 154.4, 176.8; HRMS (FAB): *m*/*z*: calcd for $C_{13}H_{23}O_4Si$: 271.1366; found: 271.1363 $[M + H]^+$.

E**thyl 3-3-hydroxy-3-phenylpropionate (5a)[3]:** Colorless oil; yield: 165 mg (85 %); ^1H NMR (500 MHz, CDCl3): δ 1.26 (t, *J* = 7.2 Hz, 3H), 2.70 (dd, *J* = 3.9, 16.4 Hz, 1H), 2.76 (dd, *J* = 9.0, 16.4 Hz, 1H), 3.30-3.34 (brs, 3H), 4.18 (q, *J* = 7.2 Hz, 2H), 5.13 (dd, *J* = 2.8, 8.8 Hz, 1H), 7.28-7.31 (m, 1H), 7.35-7.39 (m, 4H); ^{13}C NMR (125 MHz, CDCl3) δ = 14.1, 43.2, 60.9, 70.3, 125.6, 127.8, 128.5, 142.4, 172.4; HRMS (FAB): *m*/*z*: calcd for $C_{11}H_{15}O_3$: 195.1021; found: 195.1010 $[M + H]^+$.

Me**thyl 3-3-hydroxy-2-methyl-3-phenylpropionate (5b)[2]:** *syn* / *anti* mixture: Colorless oil; yield: 175 mg (90 %); HRMS (FAB): *m*/*z*: calcd for $C_{11}H_{15}O_3$: 195.1021; found: 195.1033 $[M + H]^+$. *syn* Isomer: ^1H NMR (500 MHz, CDCl3): δ 1.12 (d, *J* = 7.2 Hz, 3H), 2.78 (dq, *J* = 4.1, 7.2 Hz, 1H), 2.93-2.98 (brs, 3H), 3.67 (s, 3H), 5.10 (d, *J* = 4.0 Hz, 1H), 7.23-7.30 (m, 1H), 7.31-7.39 (m, 4H); ^{13}C NMR (125 MHz, CDCl3) δ = 10.6, 46.3, 51.8, 73.5, 125.9, 127.5, 128.2, 141.3, 176.2.; *anti* Isomer: ^1H NMR (500 MHz, CDCl3): δ 1.00 (d, *J* = 7.2 Hz, 3H), 2.83 (dq, *J* = 7.2, 8.4 Hz, 1H), 2.90-3.05 (brs, 3H), 3.72 (s, 3H), 4.74 (d, *J* = 8.4 Hz, 1H), 7.25-7.30 (m, 1H), 7.31-7.42 (m, 4H); ^{13}C NMR (125 MHz, CDCl3) δ = 14.4, 47.1, 51.8, 76.4, 126.6, 128.1, 128.5, 141.5, 176.3.

Methyl 4-chlorophenyl-2,2-Dimethyl-3-(tosylamino)propionate (7a)[6]: White solid; m.p. 145 °C; yield: 332 mg (84 %); ^1H NMR (500 MHz, CDCl3): δ 1.03 (s, 3H), 1.31 (s, 3H), 2.30 (s, 3H), 3.58 (s, 3H), 4.27 (d, *J* = 9.5 Hz, 1H), 6.13 (d, *J* = 9.5 Hz, 1H), 6.82 (d, *J* = 8.5 Hz, 2H), 6.94-7.00 (m, 4H), 7.35 (d, *J* = 8.5 Hz, 2H); ^{13}C NMR (125 MHz, CDCl3) δ = 21.3, 22.5, 24.9, 46.9, 52.2, 64.3, 126.8, 128.0, 129.1, 129.3, 135.7, 137.5, 143.0, 176.4; HRMS (FAB): *m*/*z*: calcd for $C_{19}H_{23}ClNO_4S$: 396.1036; found: 396.1022 $[M + H]^+$.

Methyl 2,2-dimethyl-3-phenyl-3-(tosylamino)propionate (7b)[6]: White solid; m.p. 130 °C; yield: 285 mg (82 %); ^1H NMR (500 MHz, CDCl3): δ 1.08 (s, 3H), 1.26 (s, 3H), 2.24 (s, 3H), 3.60 (s, 3H), 4.38 (d, *J* = 9.9 Hz, 1H), 6.30 (d, *J* = 9.9 Hz, 1H), 6.88 (d, *J* = 7.0 Hz, 2H), 6.93 (d, *J* = 8.0 Hz, 2H), 9.68-7.10 (m, 5H), 7.39 (d, *J* = 8.0 Hz, 2H); ^{13}C NMR (125 MHz, CDCl3) δ = 21.2, 221., 24.2, 41.3, 52.0, 64.5, 126.7, 127.2, 127.7, 127.8, 128.9, 136.9, 137.4, 142.5, 176.4; HRMS (FAB): *m*/*z*: calcd for $C_{19}H_{24}NO_4S$: 362.1426; found: 362.1429 $[M + H]^+$.

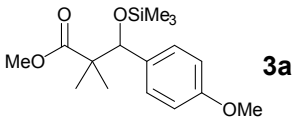
Methyl 2,2-dimethyl-3-(4-nitrophenyl)-3-(tosylamino)propionate (7c)[6]: White solid; m.p. 180 °C; yield: 365 mg (90 %); ^1H NMR (500 MHz, CDCl3): δ 1.05 (s, 3H), 1.33 (s, 3H), 2.26 (s, 3H), 3.59 (s, 3H), 4.39 (d,

J = 9.3 Hz, 1H), 6.30 (d, *J* = 9.3 Hz, 1H), 6.98 (d, *J* = 8.0 Hz, 2H), 7.12 (d, *J* = 8.5 Hz, 2H), 7.39 (d, *J* = 8.0 Hz, 2H), 7.88 (d, *J* = 8.5 Hz, 2H); ^{13}C NMR (125 MHz, CDCl3) δ = 21.4, 22.5, 24.9, 46.8, 52.4, 64.2, 123.0, 126.8, 129.0, 129.2, 137.3, 143.4, 144.7, 147.1, 176.1; HRMS (FAB): *m*/*z*: calcd for $C_{19}H_{23}N_2O_6S$: 407.1277; found: 407.1273 $[M + H]^+$.

Methyl 3-(4-methoxyphenyl)- 2,2-dimethyl-3-(tosylamino)propionate (7d)[6]: White solid; m.p. 114 °C; yield: 250 mg (64 %); ^{1}H NMR (500 MHz, CDCl3): δ 1.04 (s, 3H), 1.25 (s, 3H), 2.25 (s, 3H), 3.57 (s, 3H), 3.68 (s, 3H), 4.29 (d, *J* = 9.2 Hz, 1H), 6.12 (d, *J* = 9.2 Hz, 1H), 6.53 (d, *J* = 8.8 Hz, 2H), 6.78 (d, *J* = 8.5 Hz, 2H), 7.36 (d, *J* = 8.8 Hz, 2H), 7.81 (dd, *J* = 8.5, 8.8 Hz, 2H); ^{13}C NMR (125 MHz, CDCl3) δ = 21.5, 22.5, 24.6, 47.6, 52.2, 55.4, 64.3, 113.1, 126.9, 129.0, 129.1, 129.4, 137.7, 142.4, 158.8, 176.4; HRMS (FAB): *m*/*z*: calcd for $C_{20}H_{26}NO_5S$: 392.1532; found: 392.1540 $[M + H]^+$.

Methyl 3-[4-(dimethylamino)phenyl]-2,2-dimethyl-3-(tosylamino)propionate (7e)[6]: White solid; m.p. 155 °C; yield: 226 mg (56 %); ^{1}H NMR (500 MHz, CDCl3): δ 1.04 (s, 3H), 1.25 (s, 3H), 2.23 (s, 3H), 2.82 (s, 6H), 3.57 (s, 3H), 4.23 (d, *J* = 9.6 Hz, 1H), 5.99 (d, *J* = 9.6 Hz, 1H), 6.34 (d, *J* = 7.1 Hz, 2H), 6.68 (d, *J* = 8.6 Hz, 2H), 6.91 (d, *J* = 8.0 Hz, 2H), 7.34 (d, *J* = 8.6 Hz, 2H); ^{13}C NMR (125 MHz, CDCl3) δ = 21.3, 22.2, 24.5, 40.4, 47.3, 51.9, 64.4, 111.9, 126.9, 128.6, 128.8, 142.0, 149.7, 162.5, 176.8; HRMS (FAB): *m*/*z*: calcd for $C_{20}H_{26}NO_5S$: 392.1532; found: 392.1540 $[M + H]^+$.

Methyl 2,2-dimethyl-3-phenyl-3-(phenylamino)propionate (7f)[6]: Colorless oil; yield: 234 mg (82 %); ^{1}H NMR (500 MHz, CDCl3): δ 1.13 (s, 3H), 1.24 (s, 3H), 2.23 (s, 3H), 3.62 (s, 3H), 4.46 (s, 1H), 4.70 (br, 1H), 6.46 (d, *J* = 8.5 Hz, 2H), 6.56 (dd, *J* = 8.5, 8.8 Hz, 1H), 7.00 (d, *J* = 8.5, 8.8 Hz, 2H), 7.20-7.28 (m, 5H). ^{13}C NMR (125 MHz, CDCl3) δ = 20.7, 24.5, 47.0, 52.0, 64.3, 113.3, 117.2, 127.4, 128.0, 128.2, 129.0, 139.2, 146.9, 177.0; HRMS (FAB): *m*/*z*: calcd for $C_{18}H_{22}NO_2$: 284.1651; found: 286.1648 $[M + H]^+$



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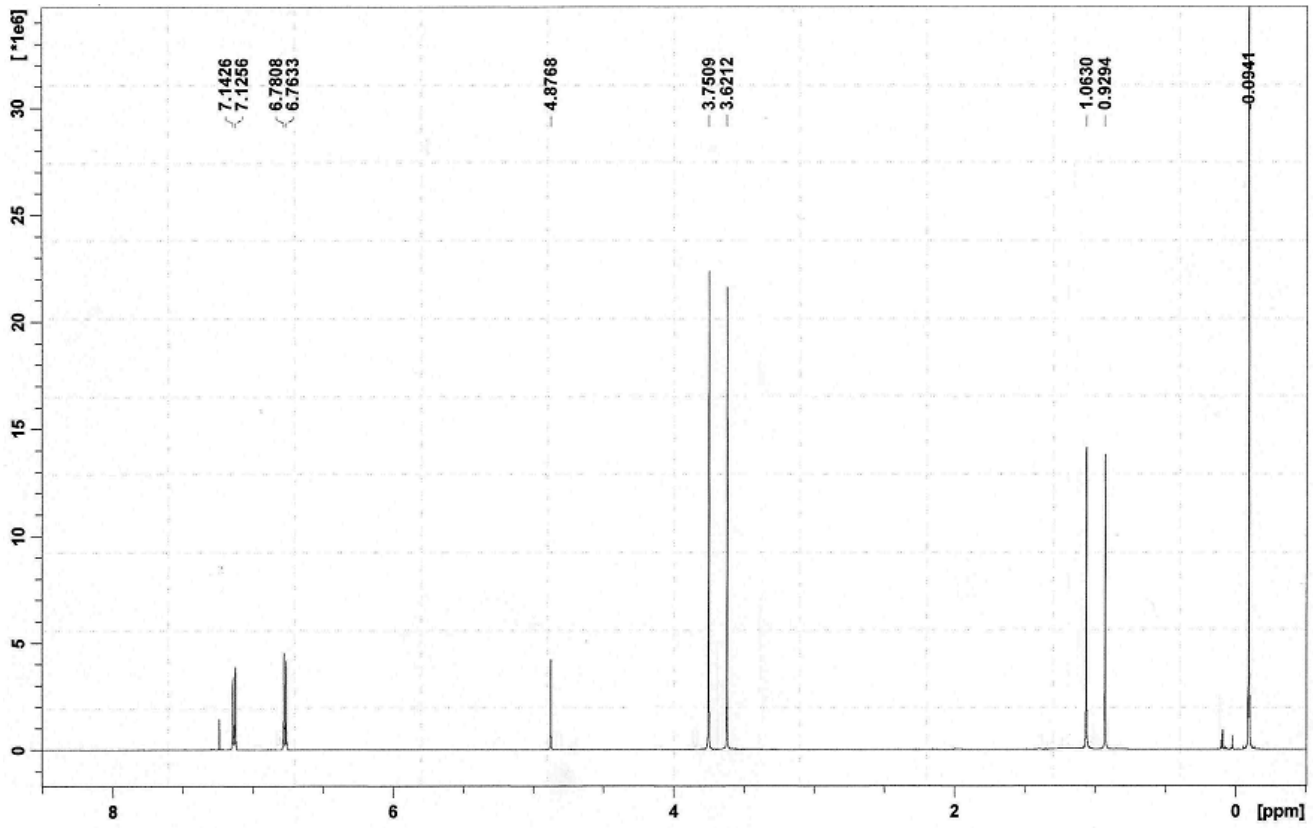
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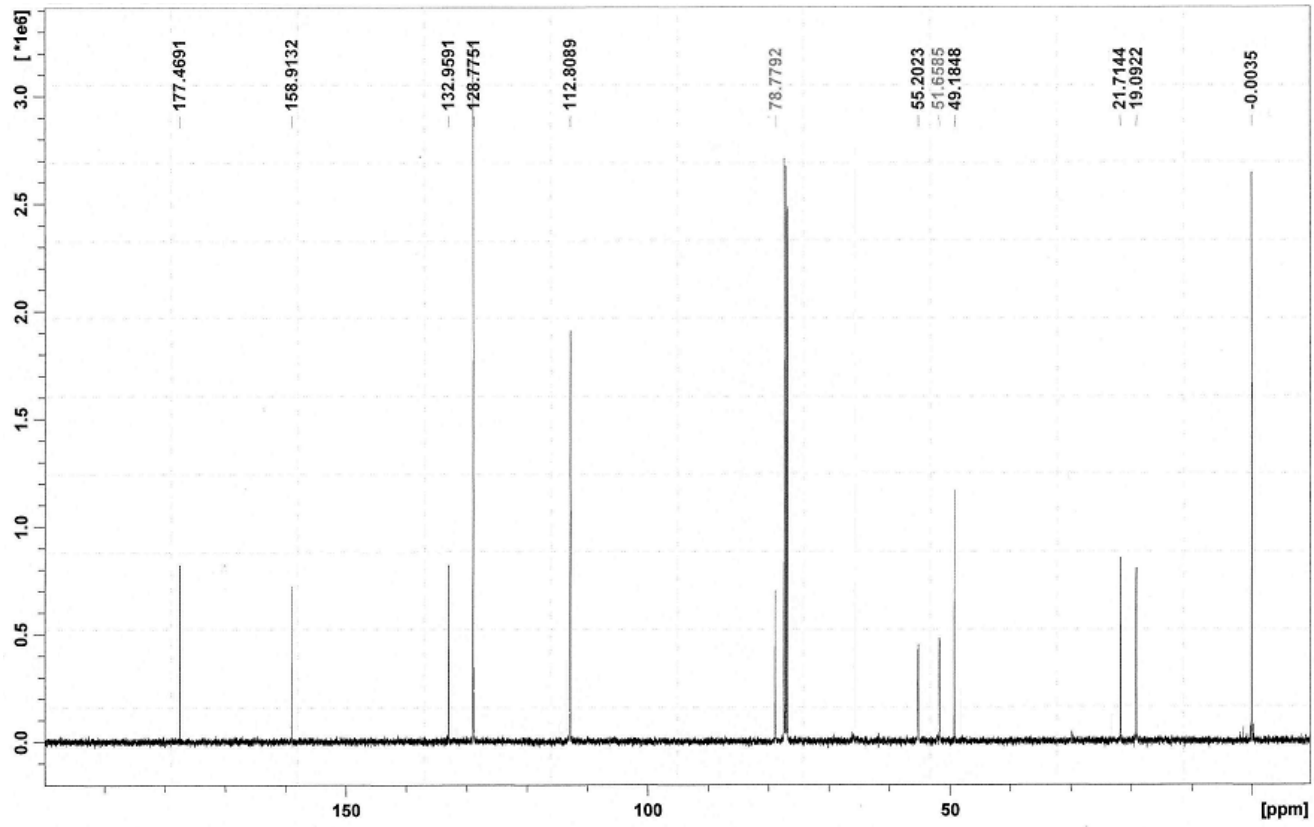
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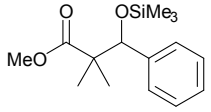
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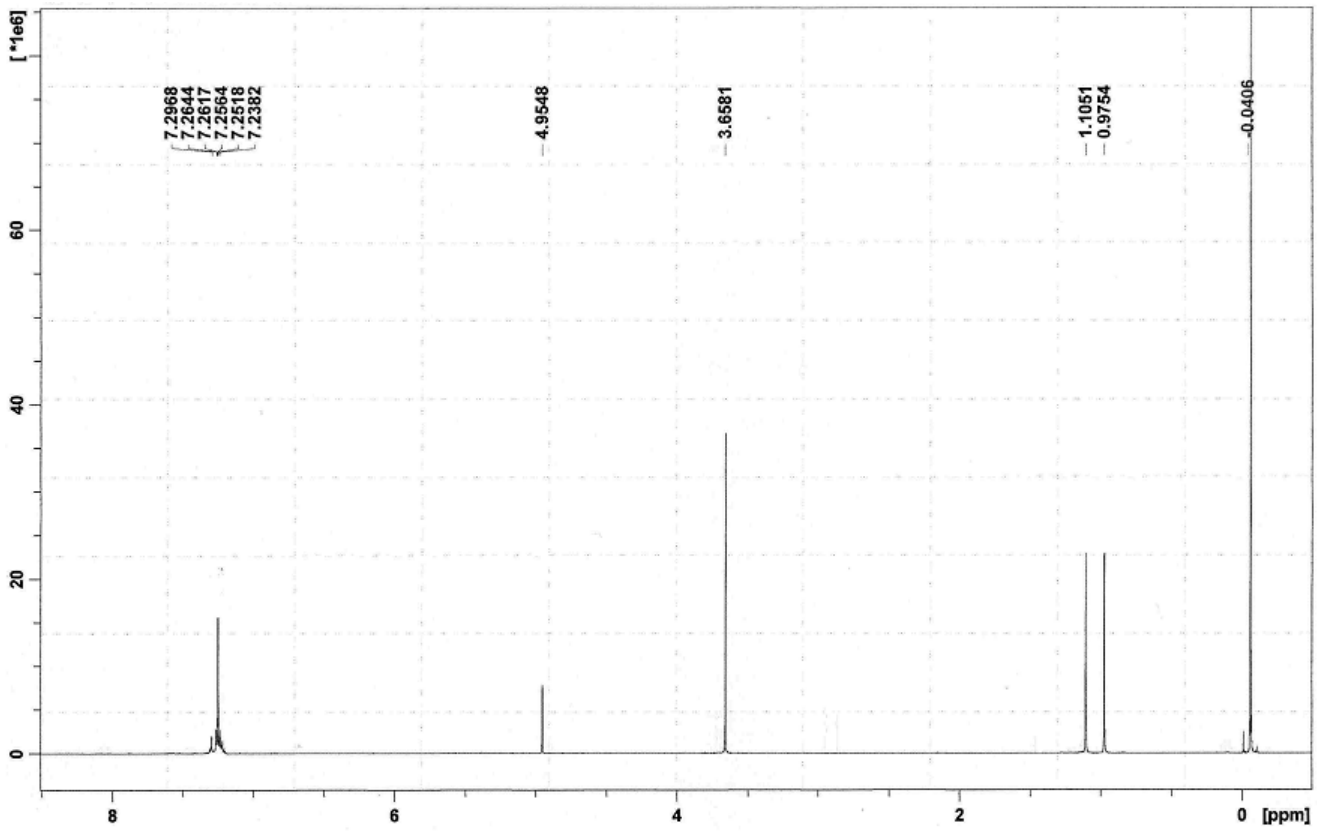
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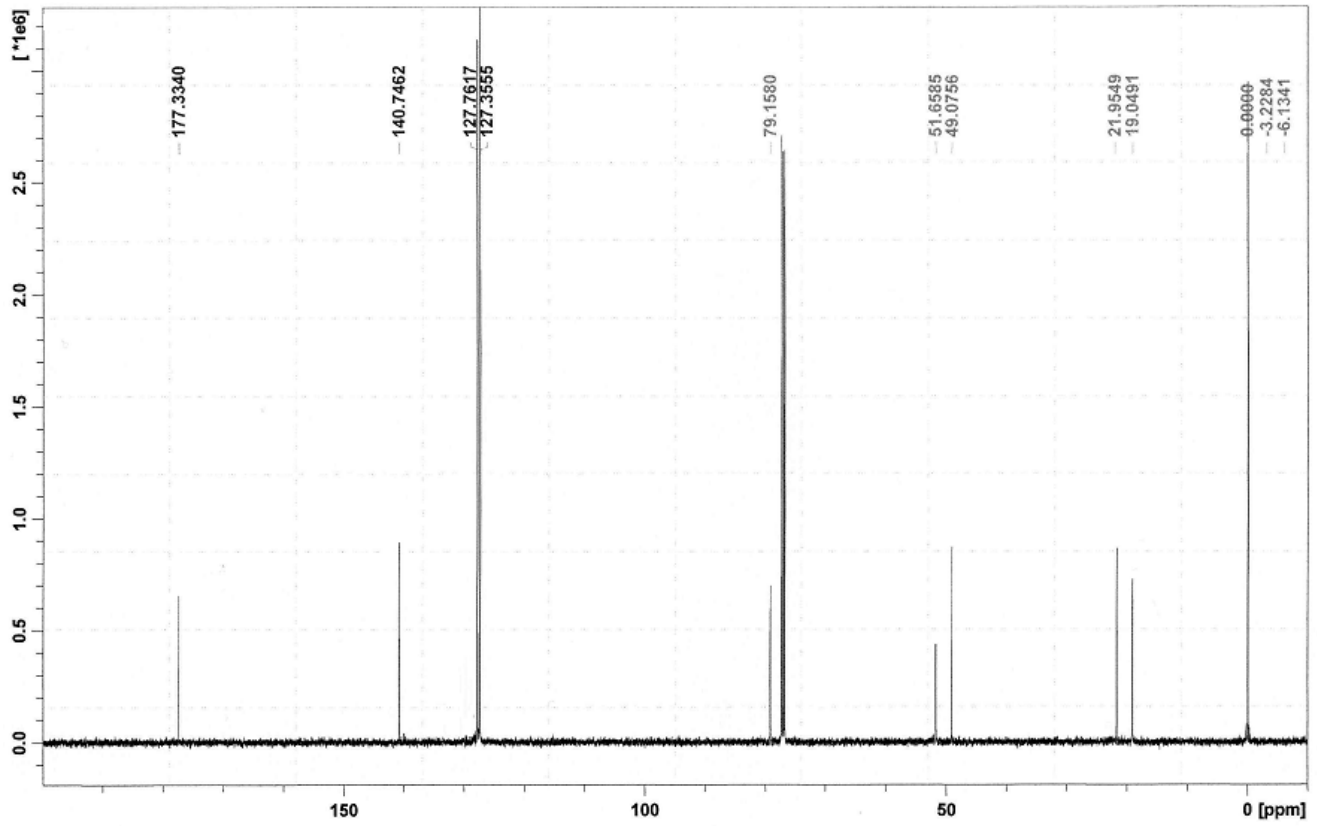
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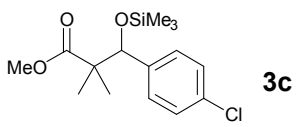
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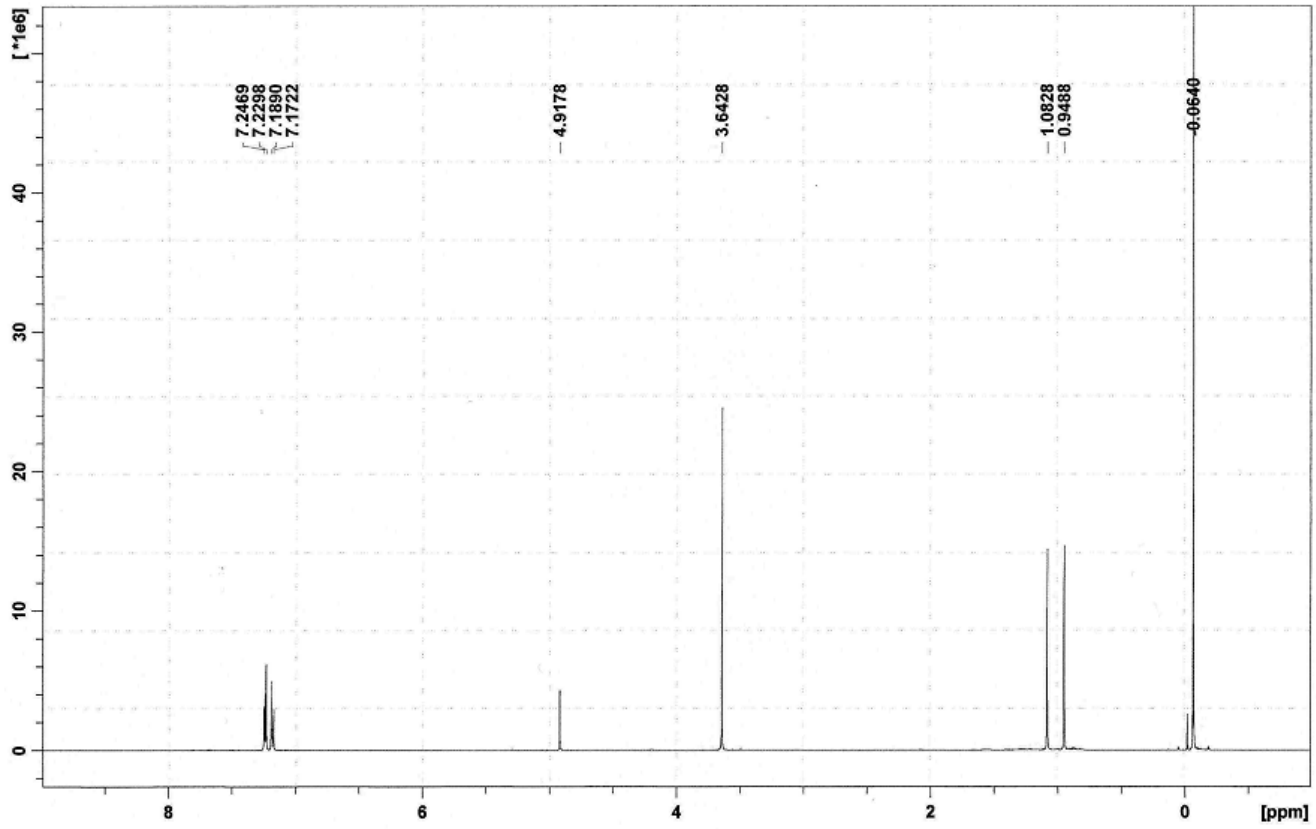
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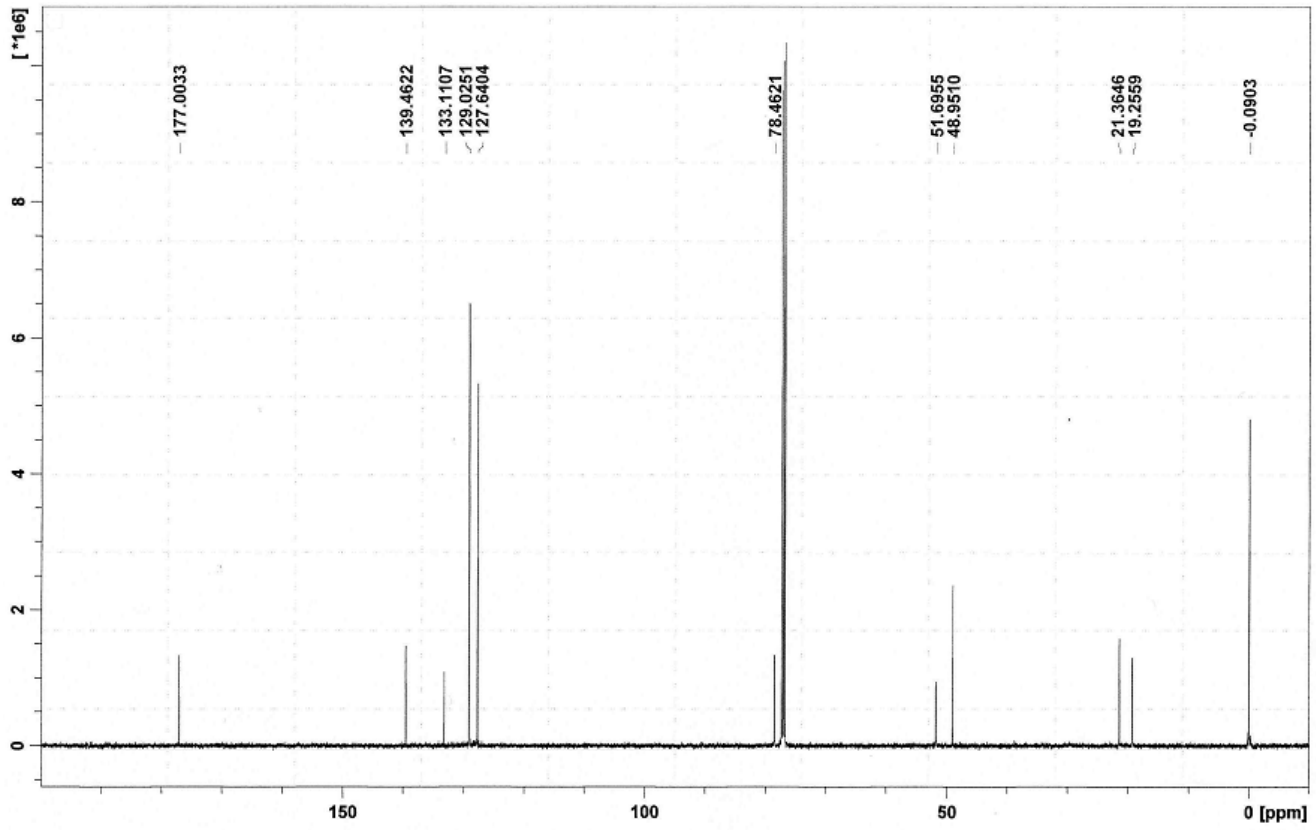
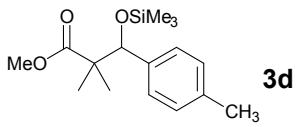
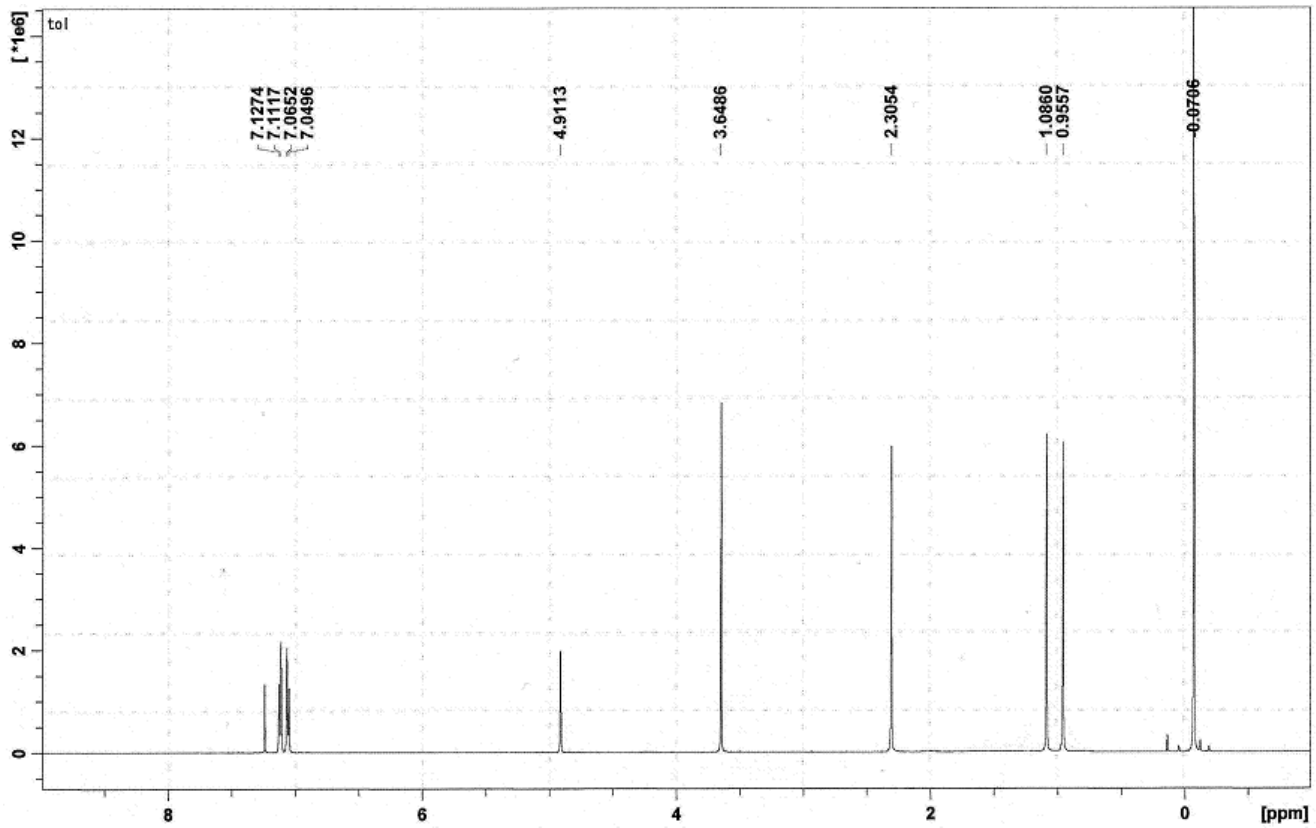
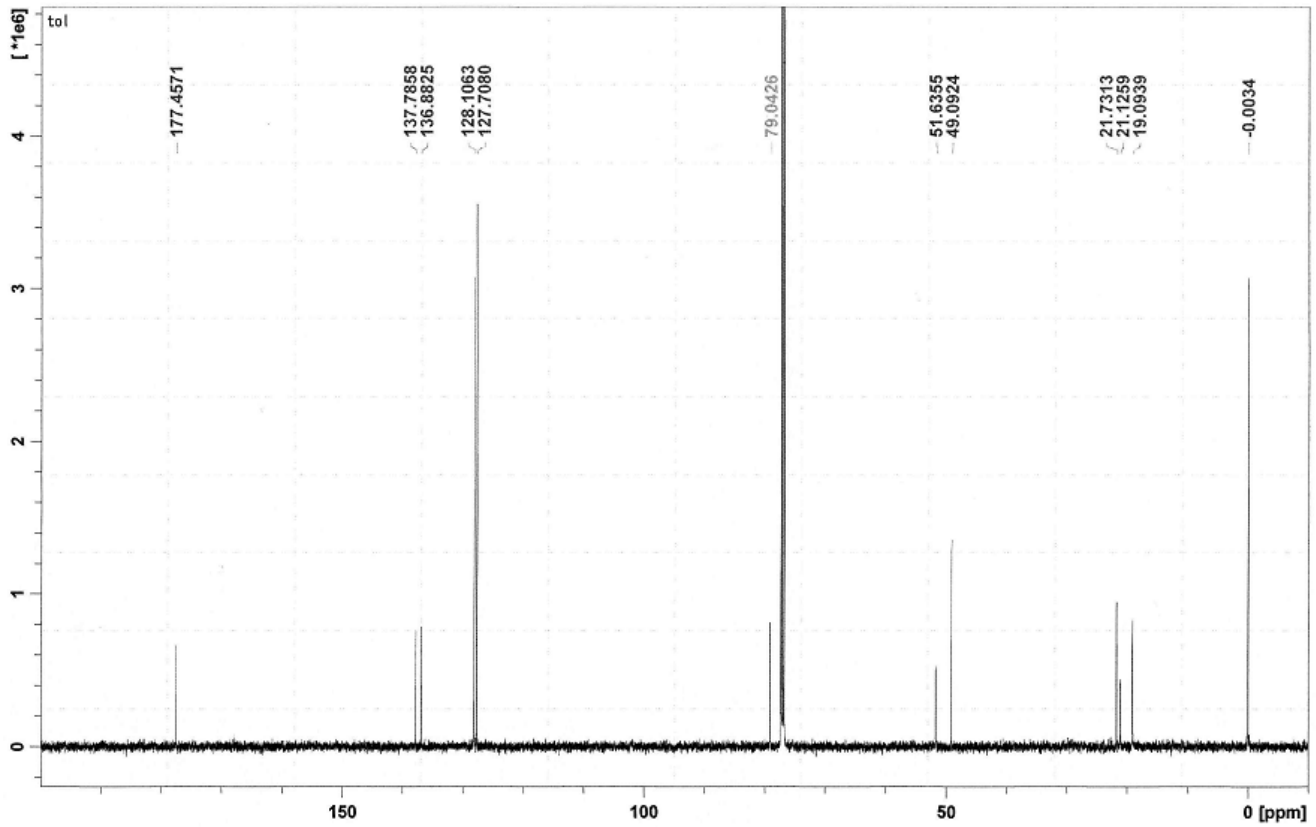
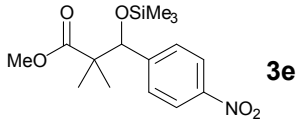

[*1e6]
177.0033
139.4622
133.1107
129.0251
127.6404
78.4621
51.6955
48.9510
21.3646
19.2559
-0.0903
[ppm]


O
OSiMe3
MeO
CH3

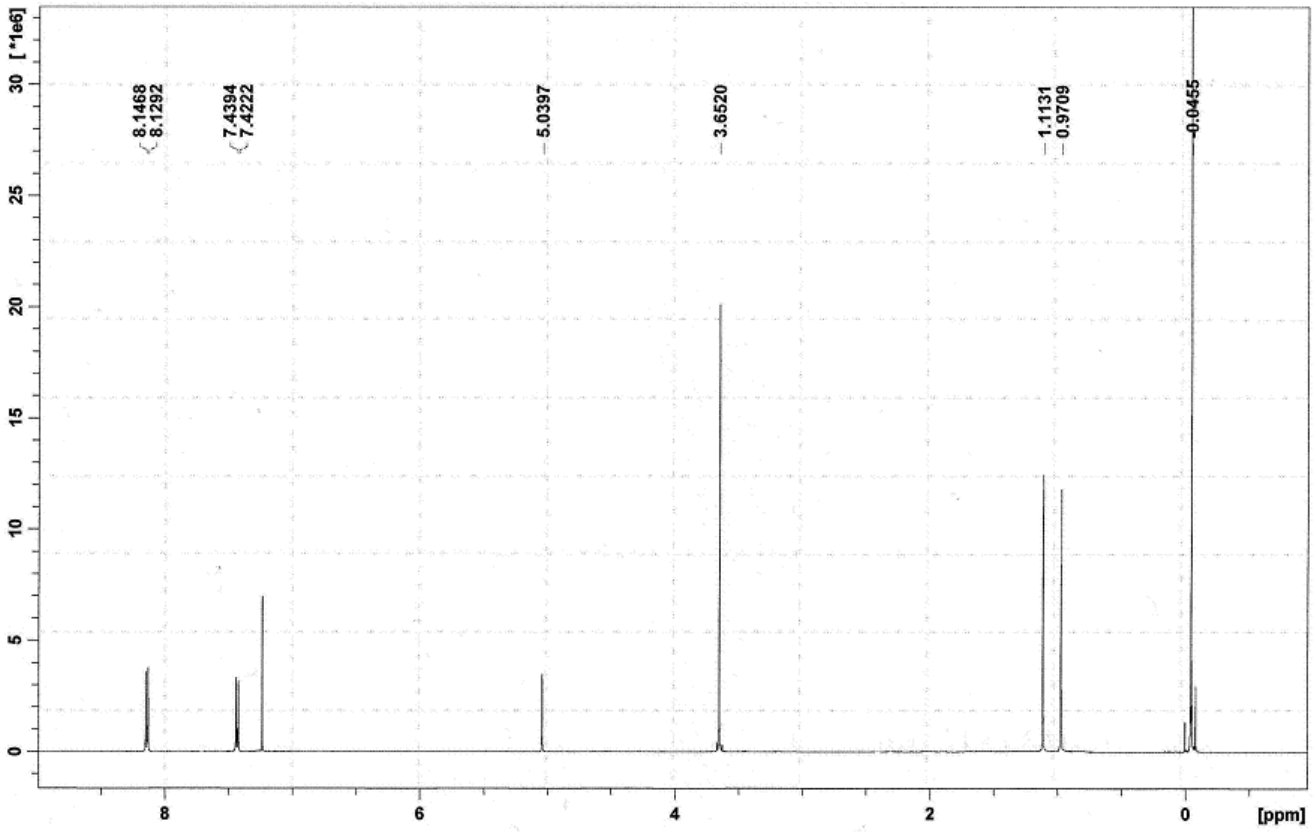
3d

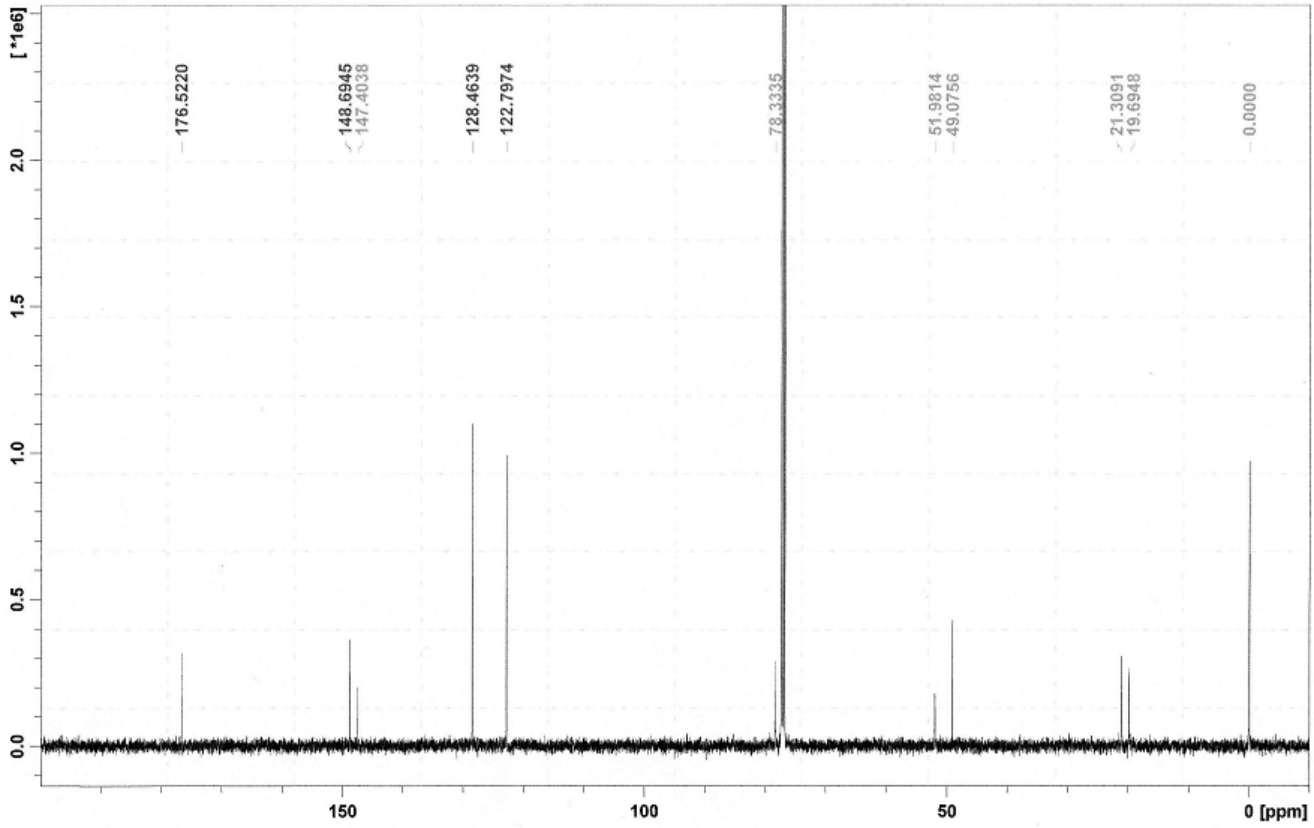

tol
[*1e6]
7.1274
7.1117
7.0652
7.0496
4.9113
3.6486
2.3054
1.0860
0.9557
0.0706
[ppm]

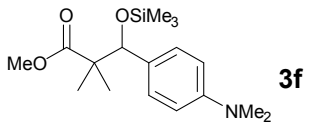

tol
[*1e6]
177.4571
137.7858
136.8825
128.1063
127.7080
79.0426
51.6355
49.0924
21.7313
21.1259
19.0939
0.0034
0 [ppm]


O
OSiMe3
MeO
NO2

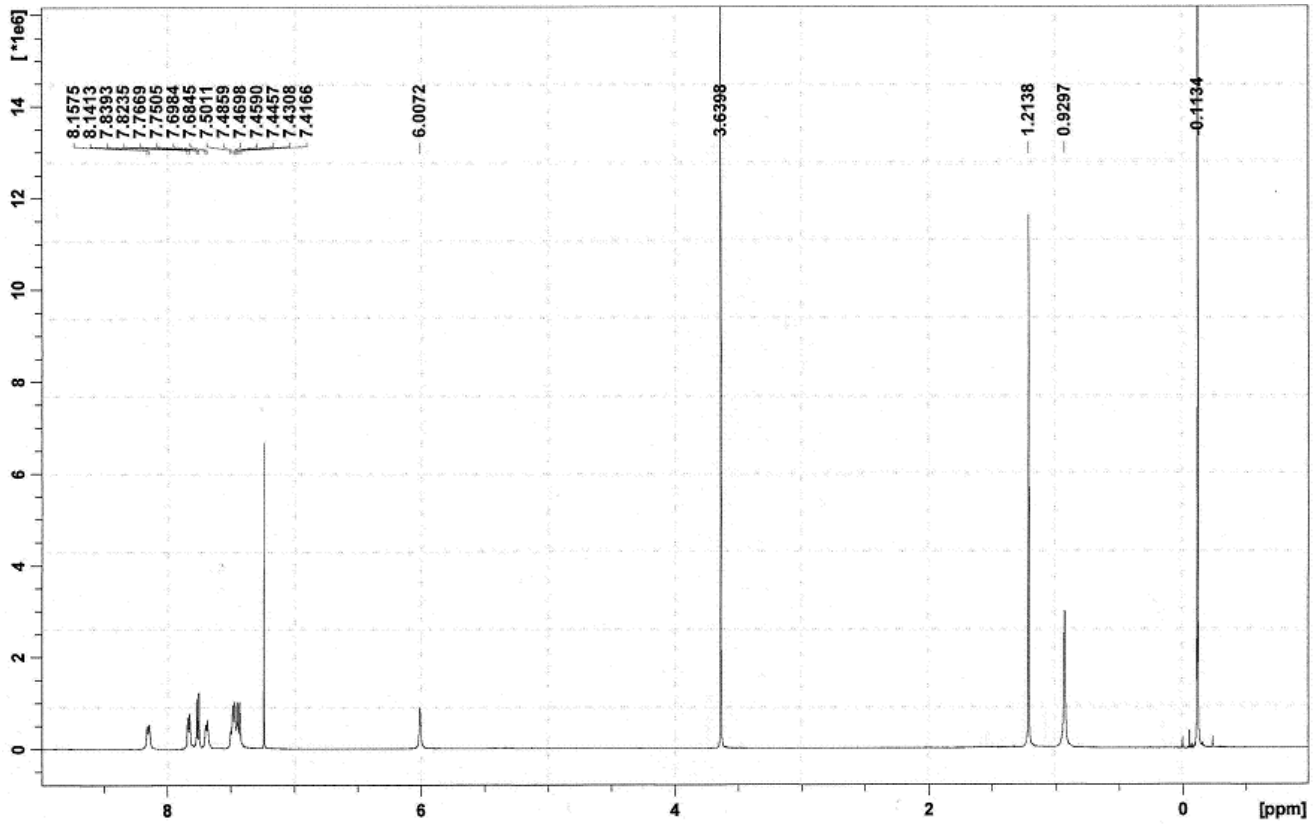
3e

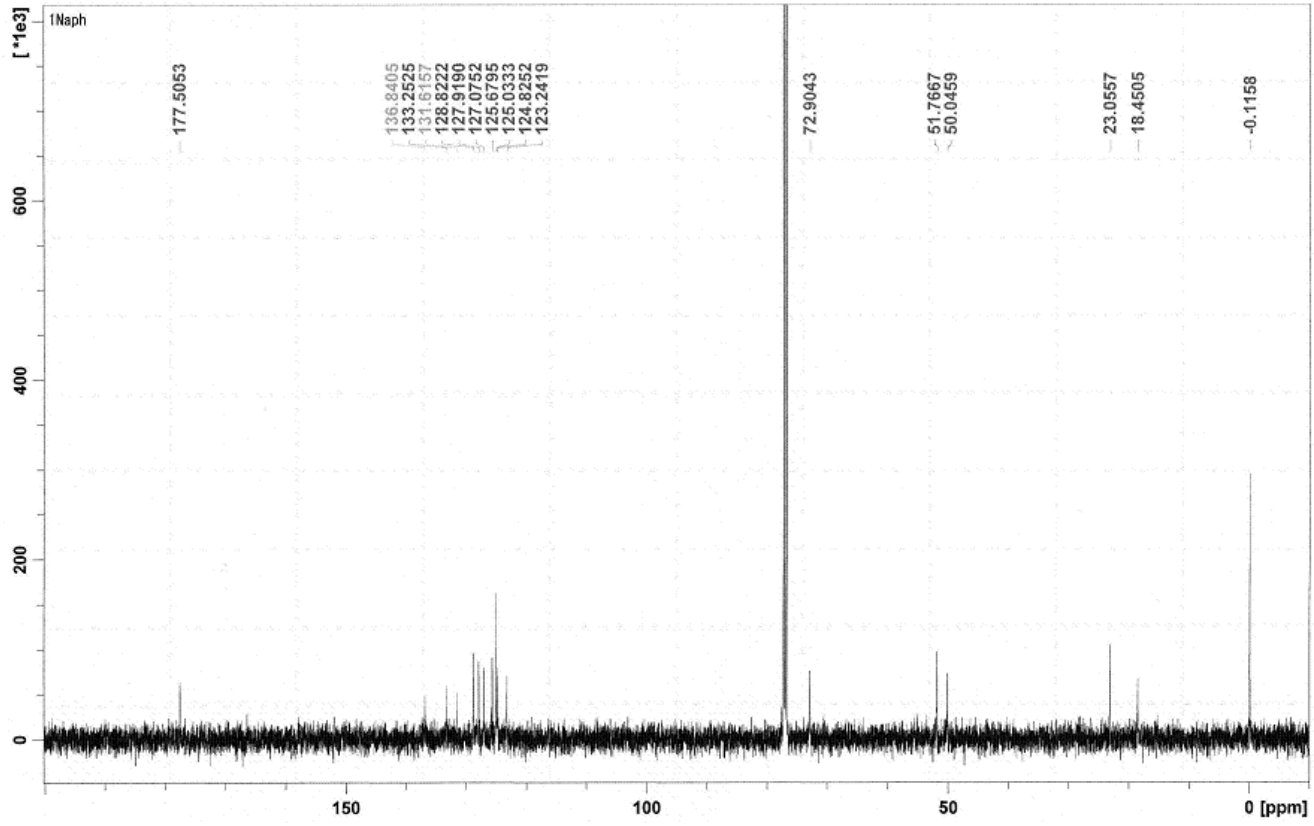

[*1e6]
8.1468
8.1292
7.4394
7.4222
5.0397
3.6520
1.1131
0.9709
0.0455
[ppm]

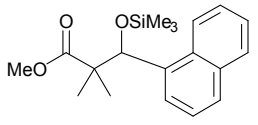

[*1e6]
176.5220
148.6945
147.4038
128.4639
122.7974
78.3335
51.9814
49.0756
21.3091
19.6948
0.0000
[ppm]


O
OSiMe3
MeO
NMe2

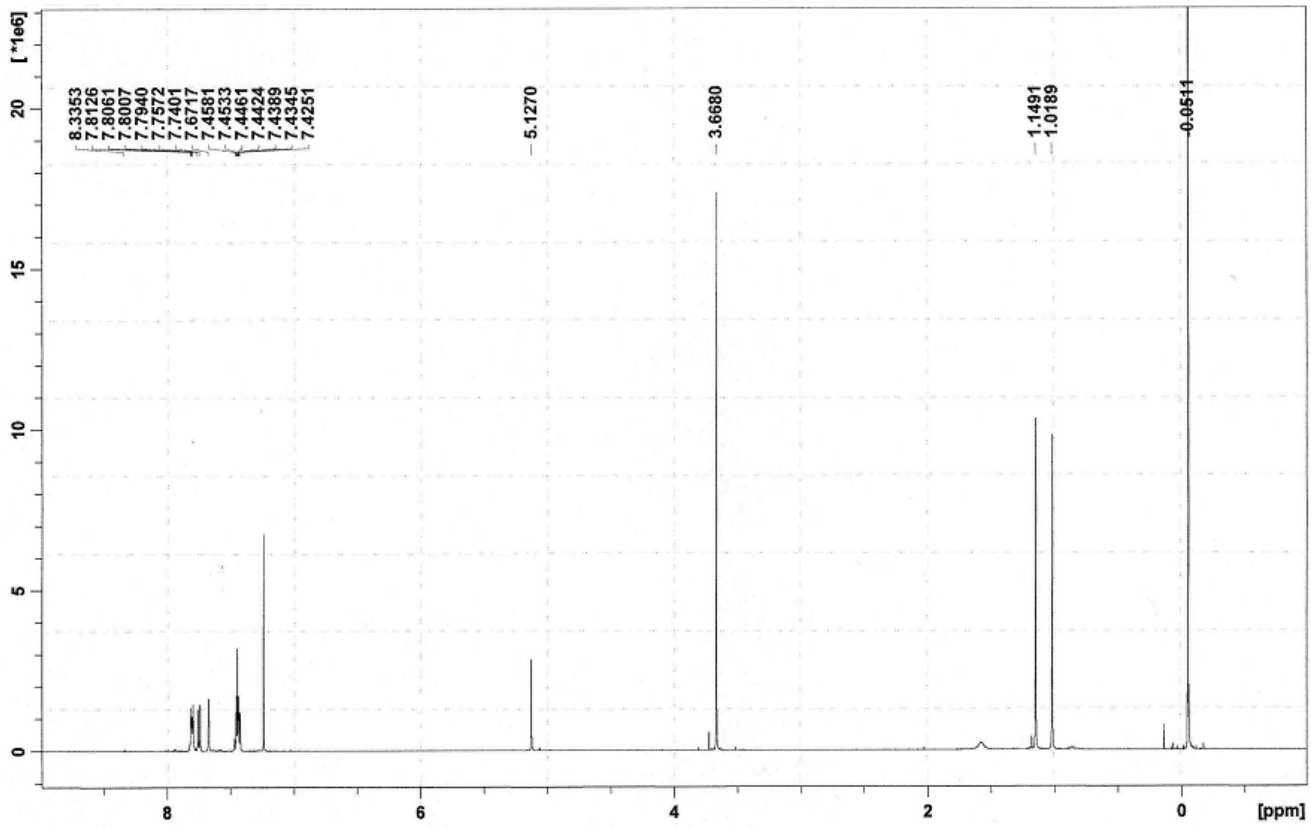
3f

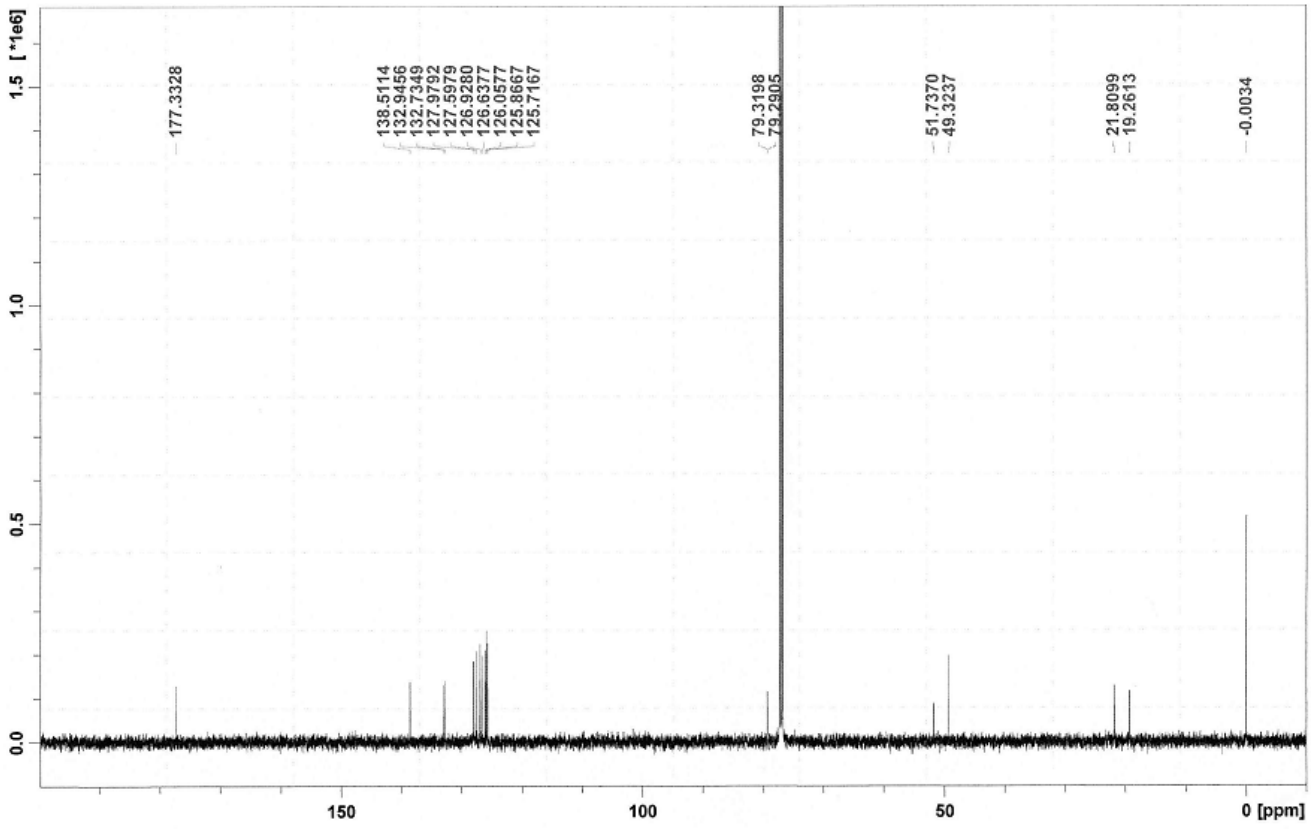

[*1e6]
8.1575
8.1413
7.8393
7.8235
7.7669
7.7505
7.6984
7.6845
7.5011
7.4859
7.4698
7.4590
7.4457
7.4308
7.4166
6.0072
3.6398
1.2138
0.9297
0.1134
[ppm]

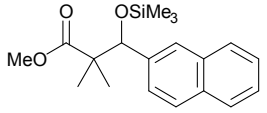

[*1e3]
1Naph
177.5053
136.8405
133.2525
131.6157
128.8222
127.9190
127.0752
125.6795
125.0333
124.8252
123.2419
72.9043
51.7667
50.0459
23.0557
18.4505
-0.1158
[ppm]


O
OSiMe3
MeO

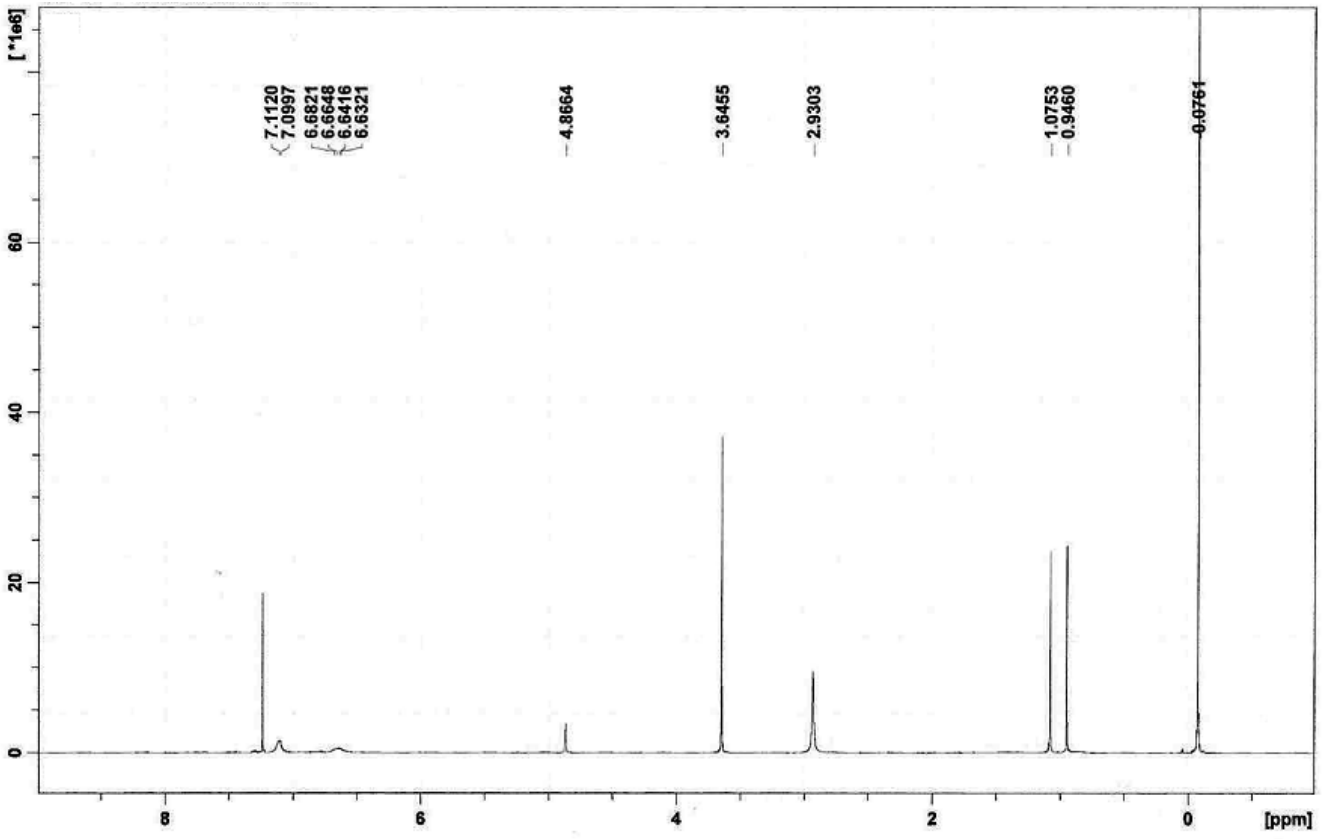
3g

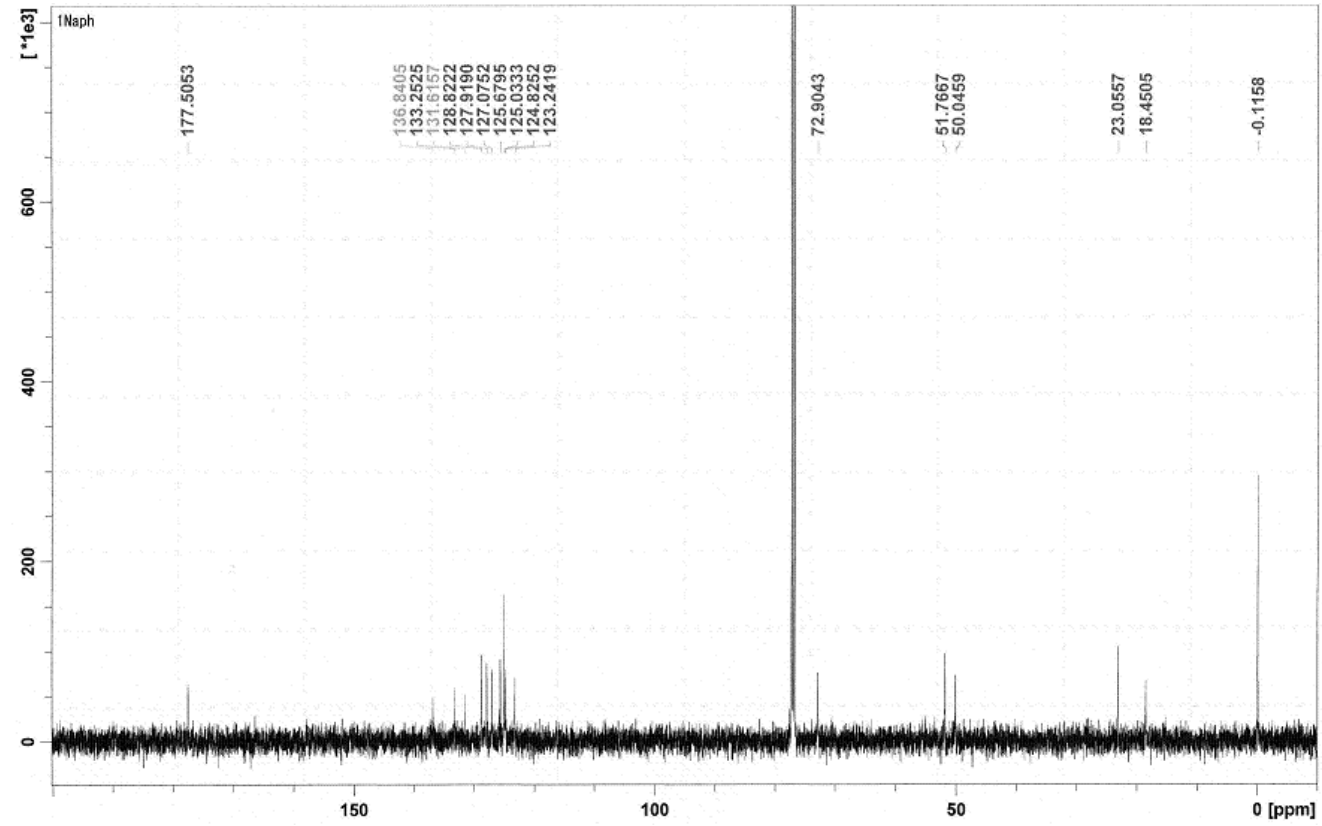

[*1e6]
20
15
10
5
0
8.3353
7.8126
7.8061
7.8007
7.7940
7.7572
7.7401
7.6717
7.4581
7.4533
7.4461
7.4424
7.4389
7.4345
7.4251
5.1270
3.6680
1.1491
1.0189
0.0511
8
6
4
2
0
[ppm]

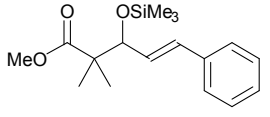

[*1e6]
1.5
1.0
0.5
0.0
177.3328
138.5114
132.9456
132.7349
127.9792
127.5979
126.9280
126.6377
126.0577
125.8667
125.7167
79.3198
79.2905
51.7370
49.3237
21.8099
19.2613
-0.0034
150
100
50
0 [ppm]


O
OSiMe3
MeO

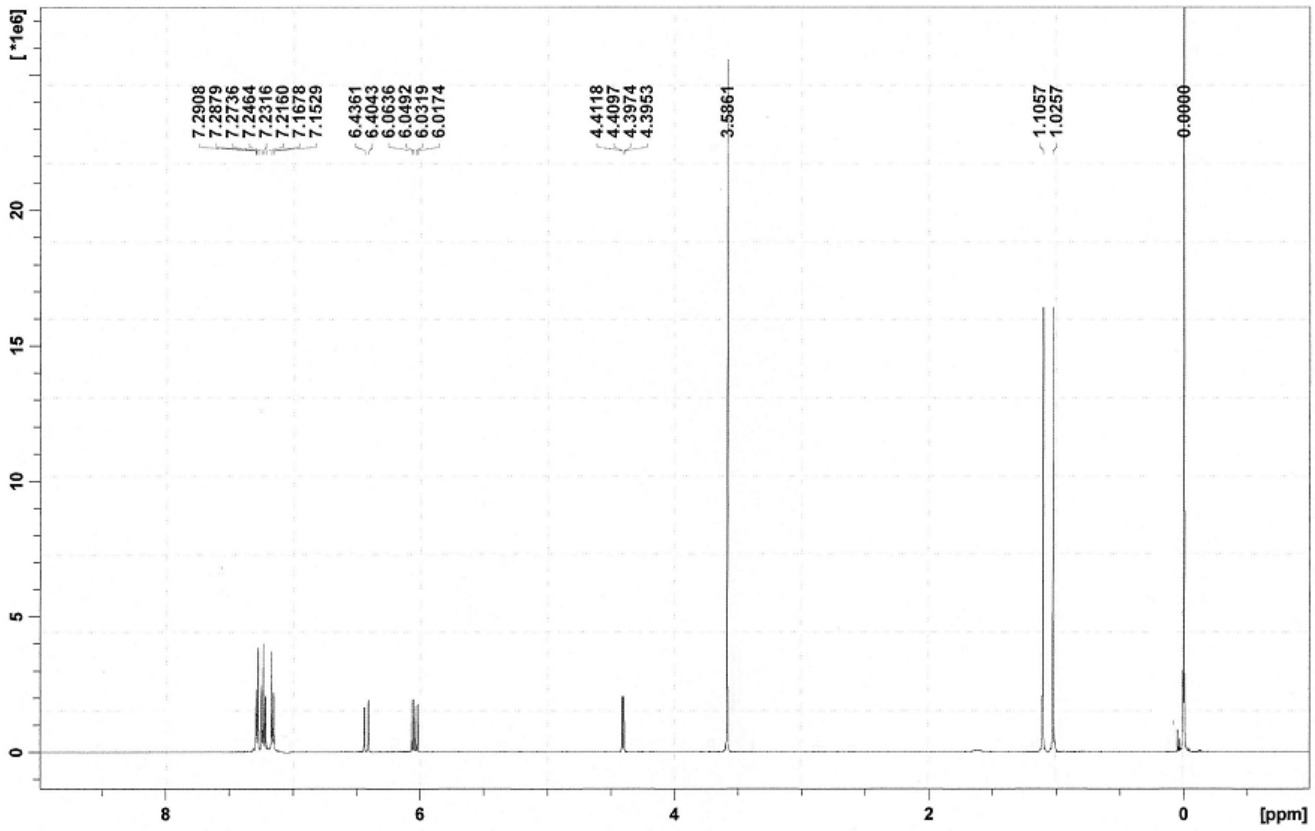
3h

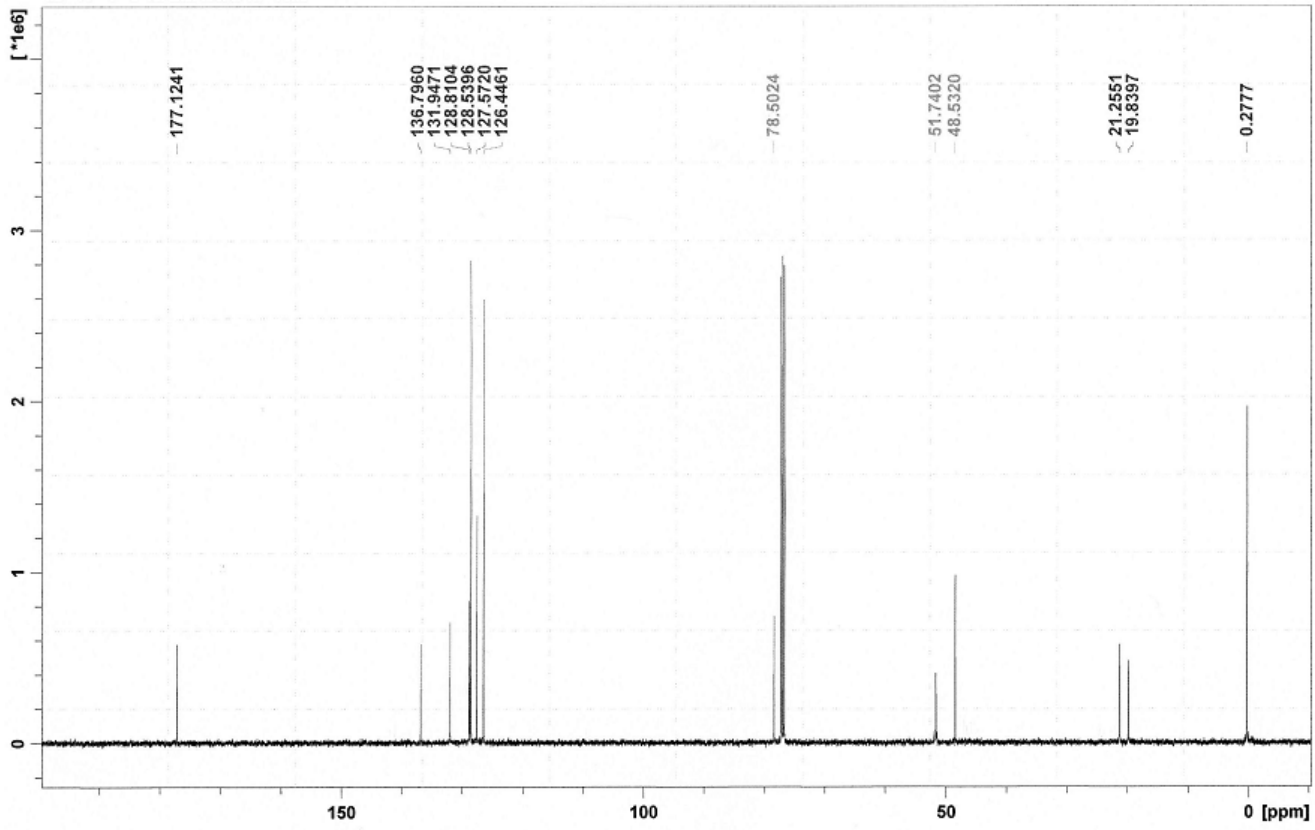

[*1e6]
7.1120
7.0997
6.6821
6.6648
6.6416
6.6321
4.8664
3.6455
2.9303
1.0753
0.9460
0.0761
[ppm]

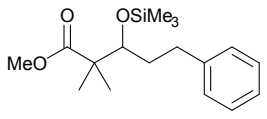

[*1e3]
1Naph
177.5053
136.8405
133.2525
131.6157
128.8222
127.9190
127.0752
125.6795
125.0333
124.8252
123.2419
72.9043
51.7667
50.0459
23.0557
18.4505
-0.1158
[ppm]


O
OSiMe3
MeO

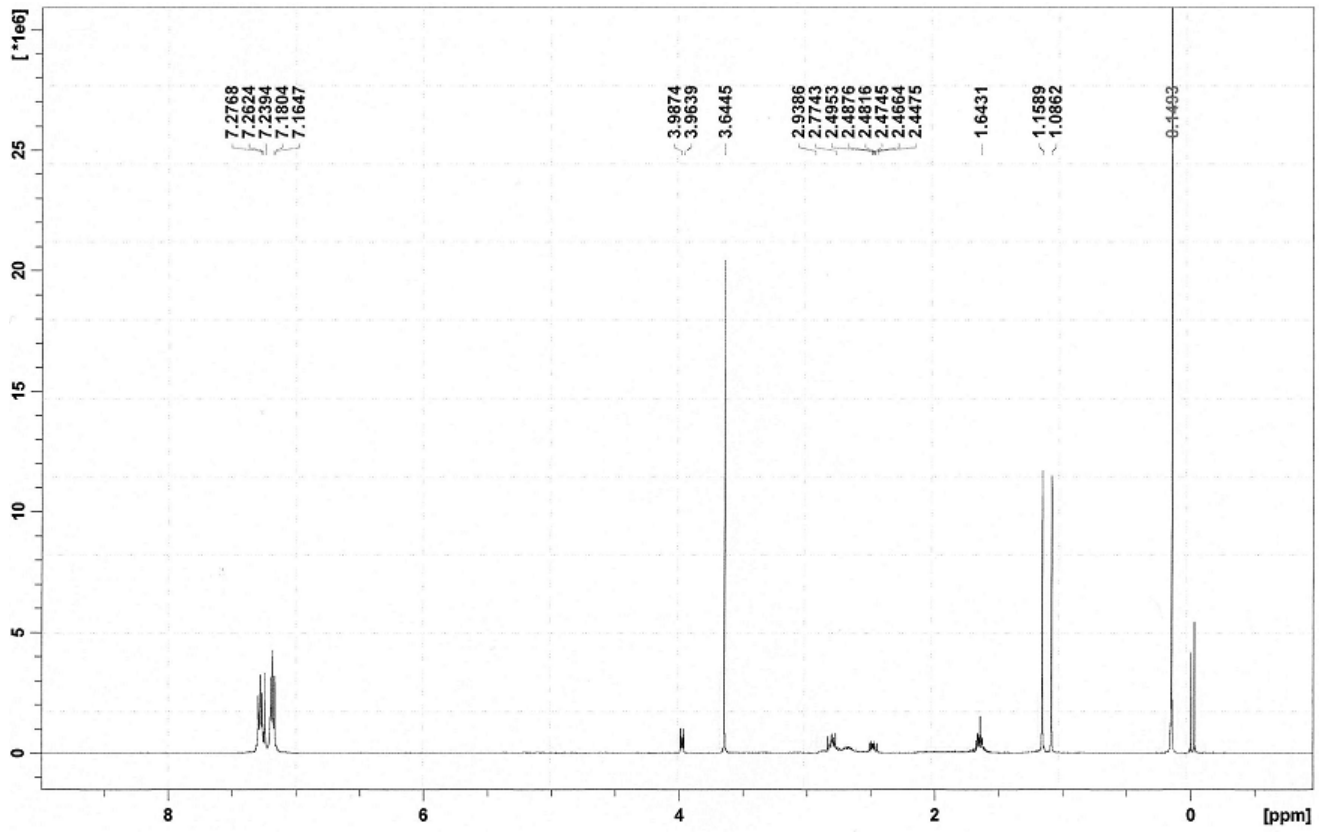
3i

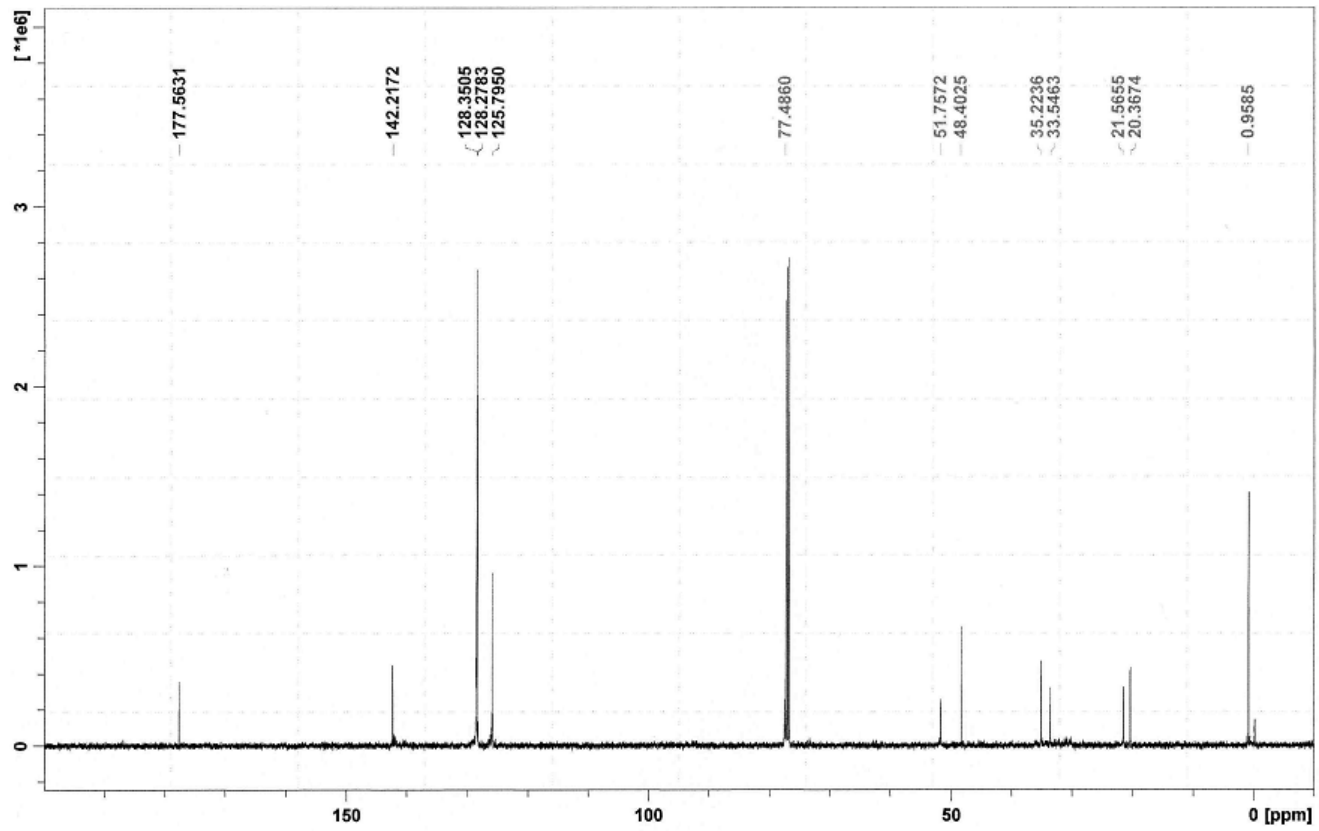

[*1e6]
7.2908
7.2879
7.2736
7.2464
7.2316
7.2160
7.1678
7.1529
6.4361
6.4043
6.0636
6.0492
6.0319
6.0174
4.4118
4.4097
4.3974
4.3953
3.5861
1.1057
1.0257
0.0000
[ppm]

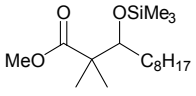

[*1e6]
177.1241
136.7960
131.9471
128.8104
128.5396
127.5720
126.4461
78.5024
51.7402
48.5320
21.2551
19.8397
0.2777
[ppm]


O
OSiMe3
MeO

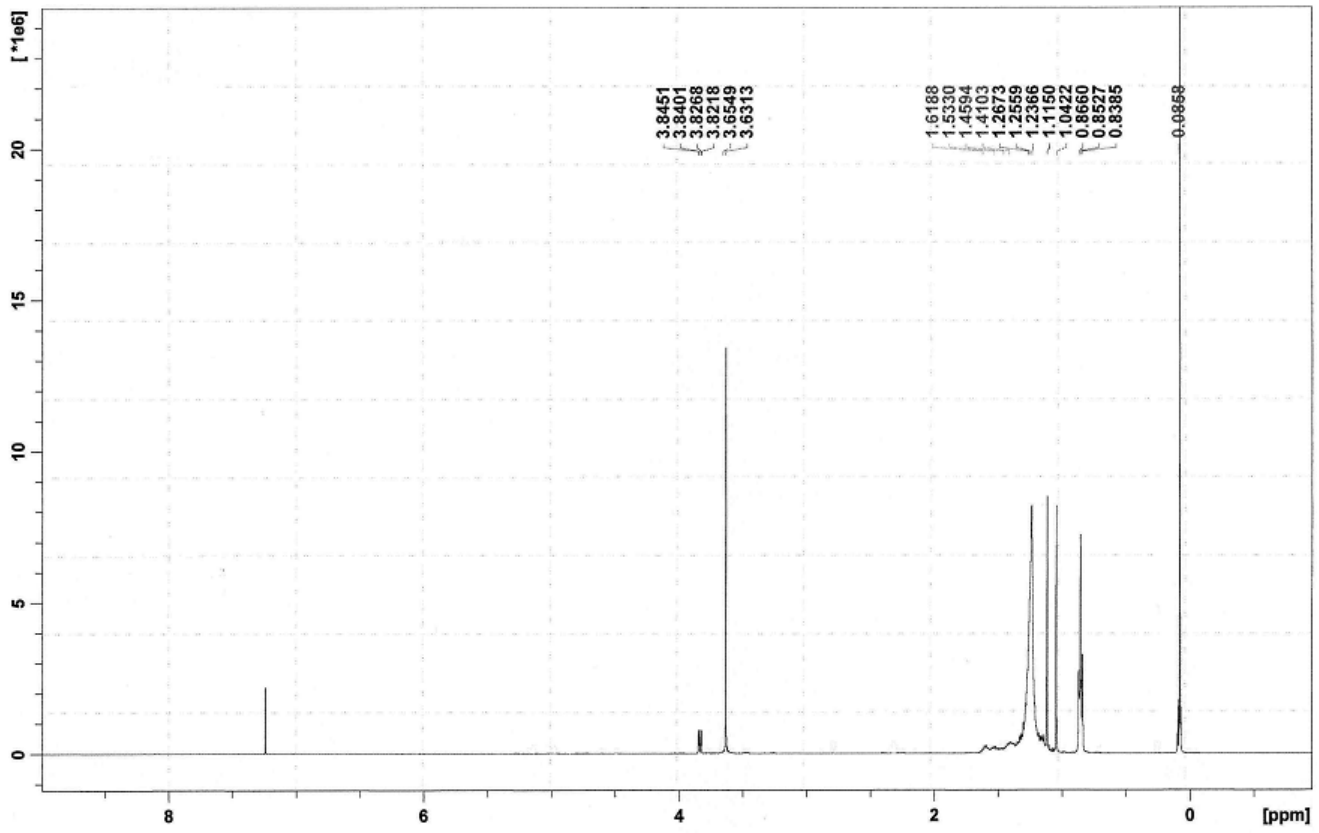
3j

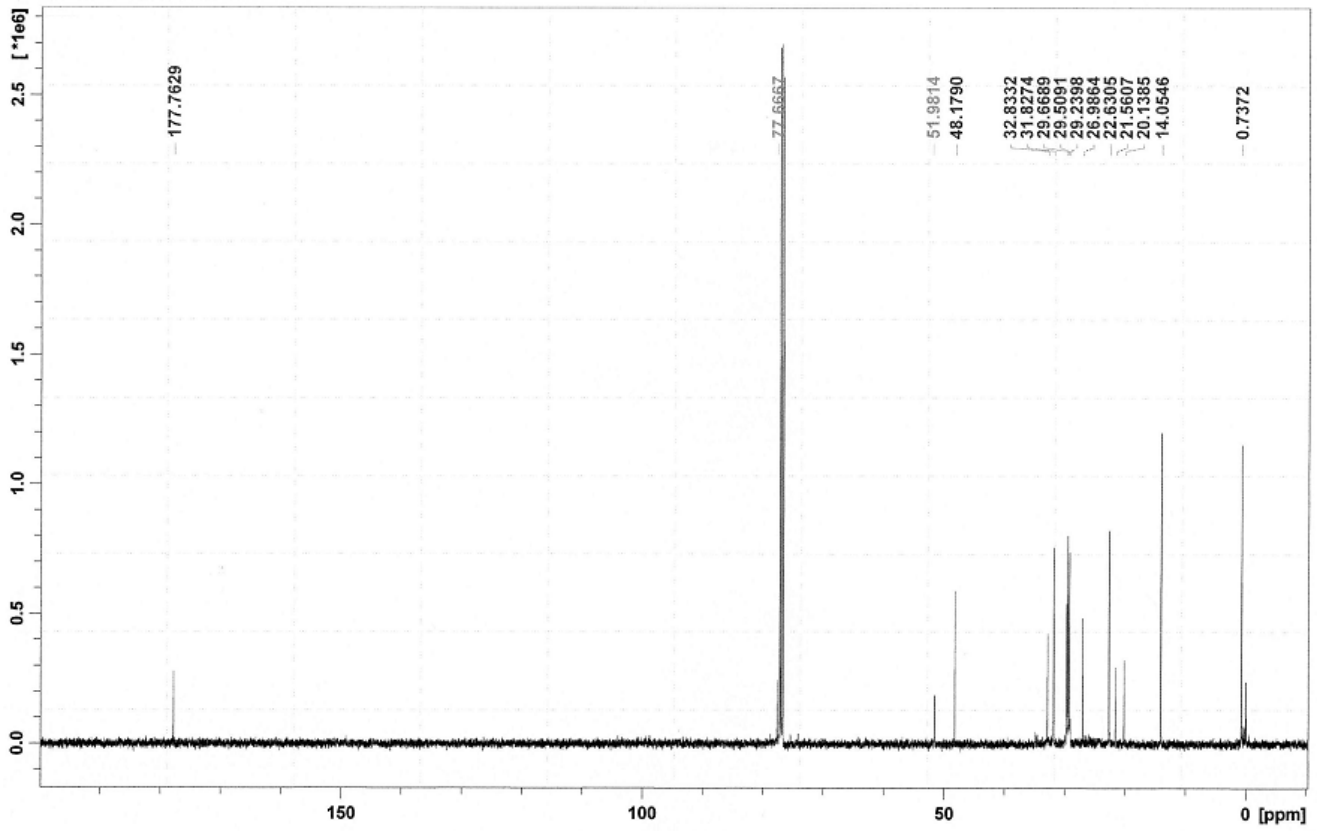

[*1e6]
7.2768
7.2624
7.2394
7.1804
7.1647
3.9874
3.9639
3.6445
2.9386
2.7743
2.4953
2.4876
2.4816
2.4745
2.4664
2.4475
1.6431
1.1589
1.0862
0.1493
[ppm]

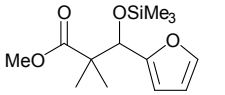

[*1e6]
177.5631
142.2172
128.3505
128.2783
125.7950
77.4860
51.7572
48.4025
35.2236
33.5463
21.5655
20.3674
0.9585
[ppm]


O
OSiMe3
MeO
C8H17

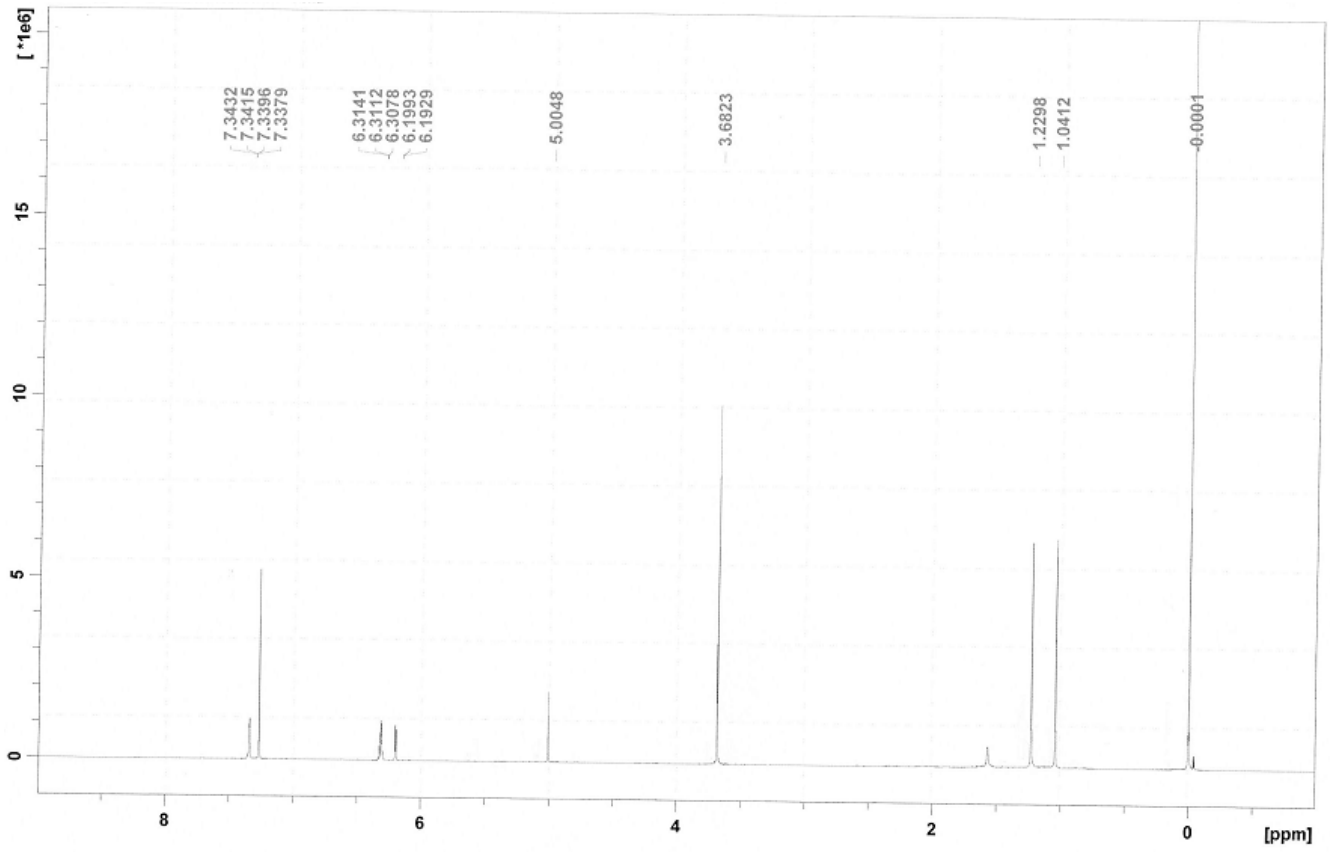
3k

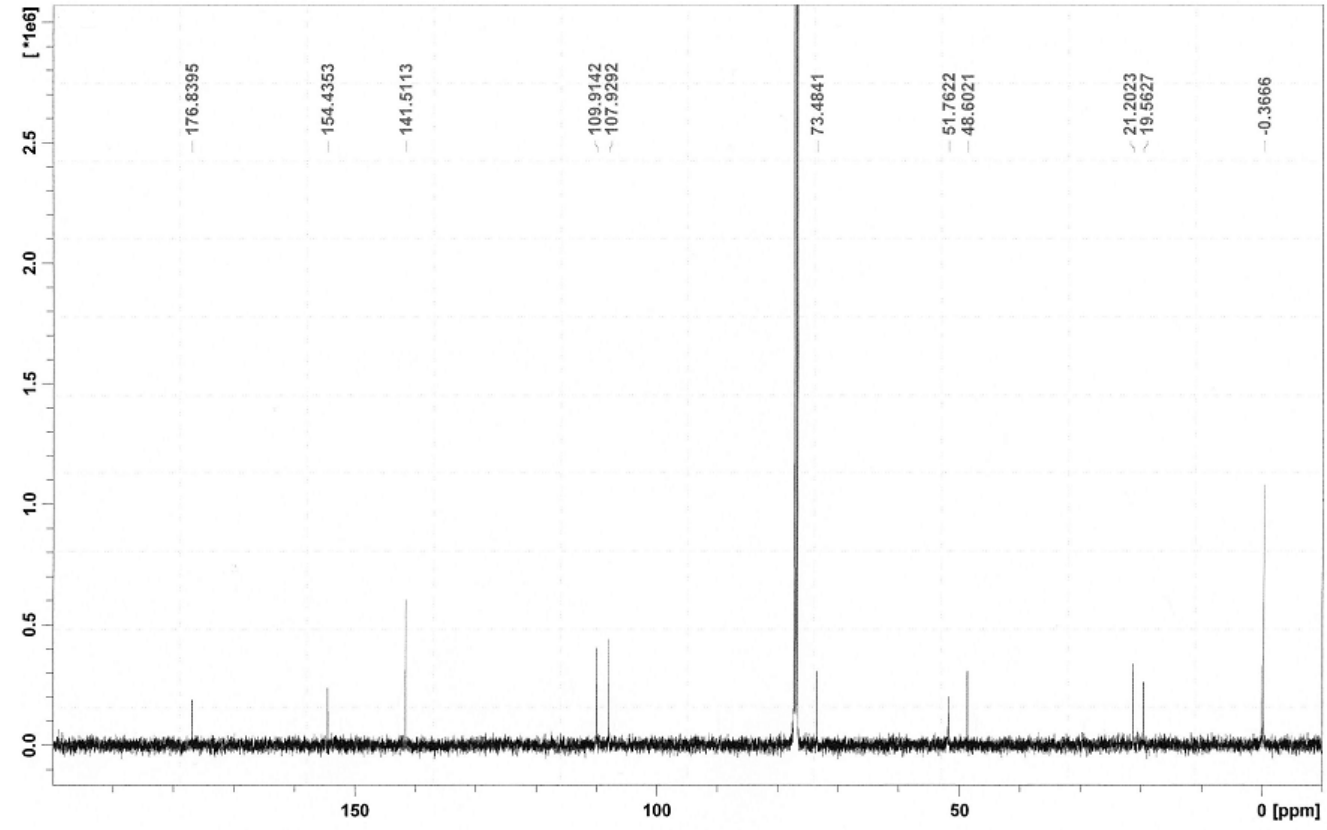

[*1e6]
20
15
10
5
0
3.8451
3.8401
3.8268
3.8218
3.6549
3.6313
1.6188
1.5330
1.4594
1.4103
1.2673
1.2559
1.2366
1.1150
1.0422
0.8660
0.8527
0.8385
0.0868
8
6
4
2
0
[ppm]

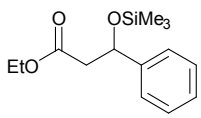

[*1e6]
2.5
2.0
1.5
1.0
0.5
0.0
177.7629
77.6667
51.9814
48.1790
32.8332
31.8274
29.6689
29.5091
29.2398
26.9864
22.6305
21.5607
20.1385
14.0546
0.7372
150
100
50
0 [ppm]


O
OSiMe3
MeO
O

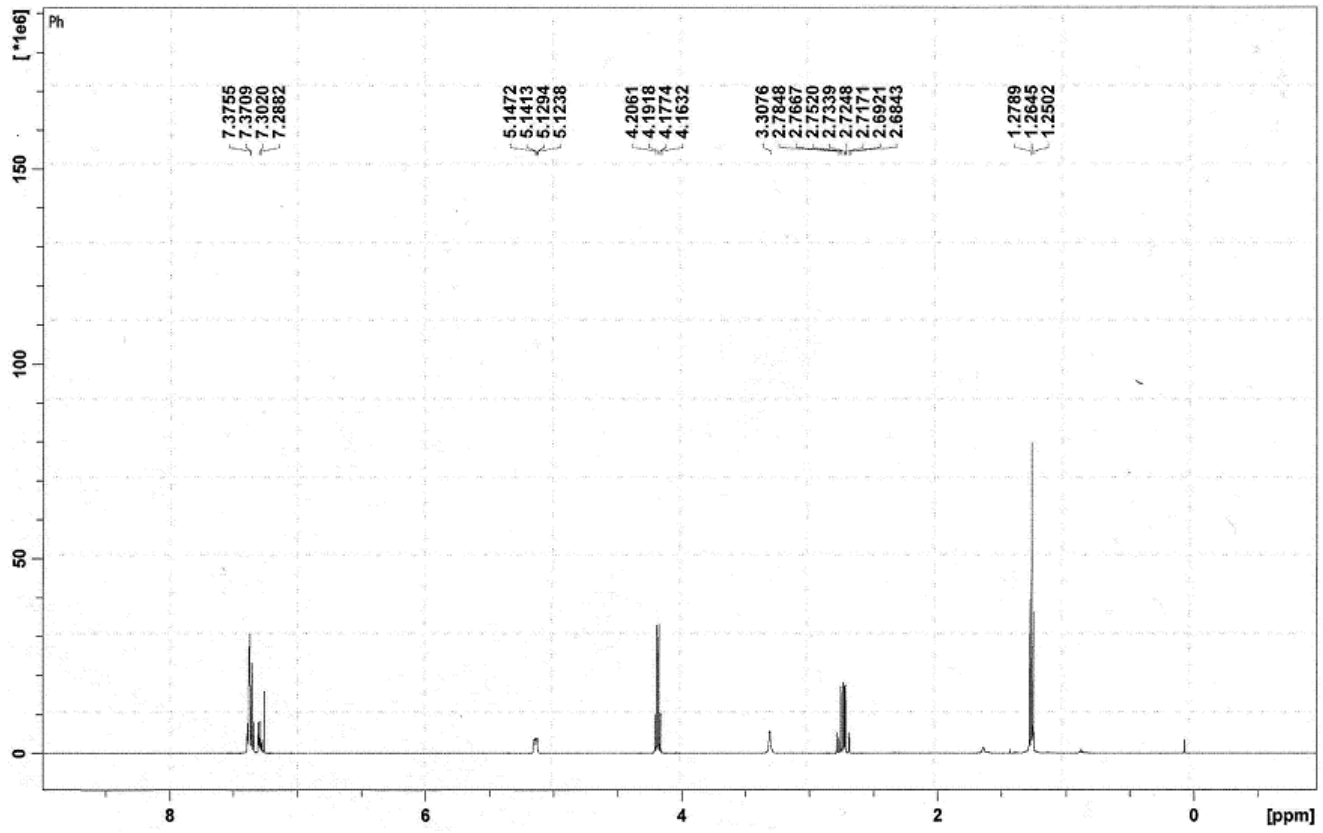
3l

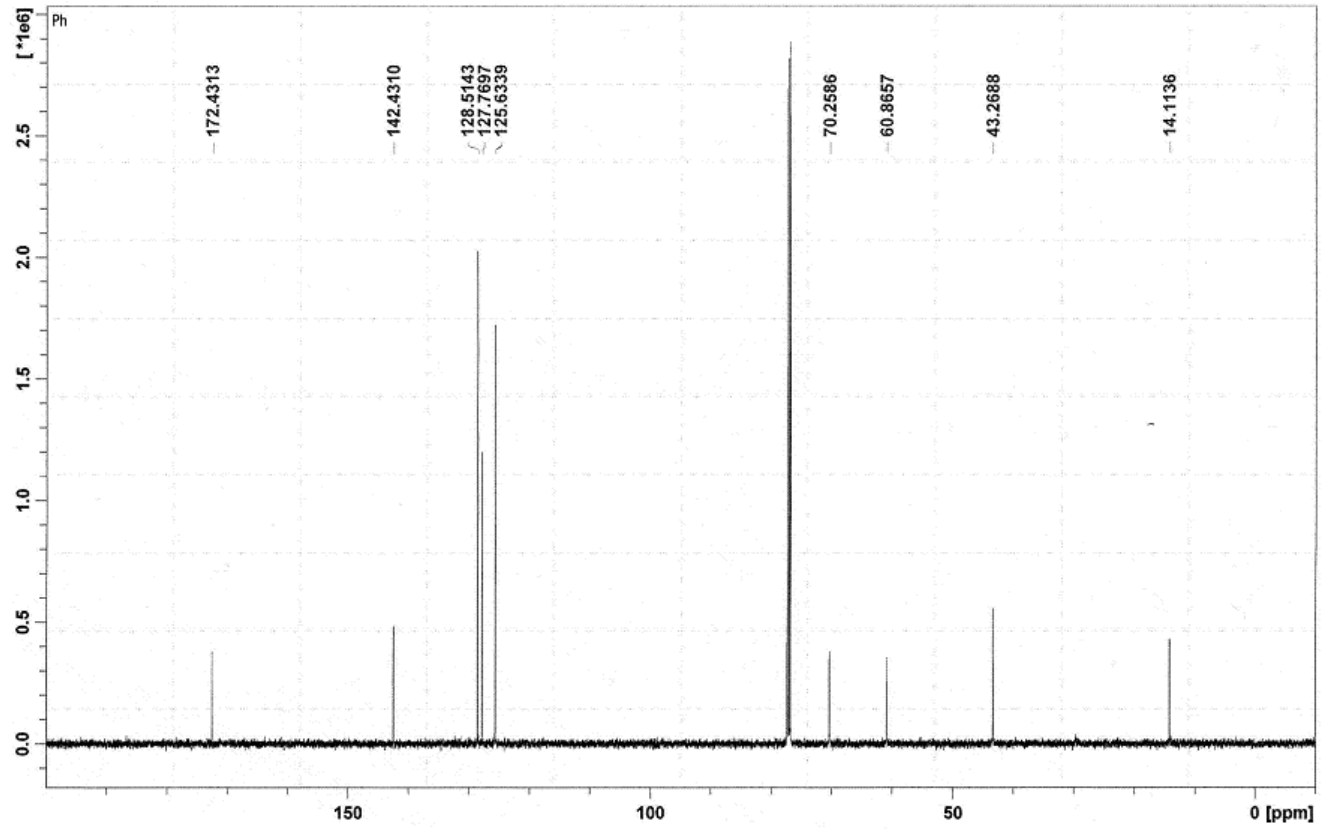

[*1e6]
7.3432
7.3415
7.3396
7.3379
6.3141
6.3112
6.3078
6.1993
6.1929
5.0048
3.6823
1.2298
1.0412
0.0001
[ppm]

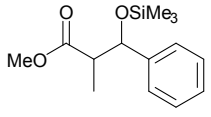

[*1e6]
176.8395
154.4353
141.5113
109.9142
107.9292
73.4841
51.7622
48.6021
21.2023
19.5627
-0.3666
[ppm]


O
OSiMe3
EtO

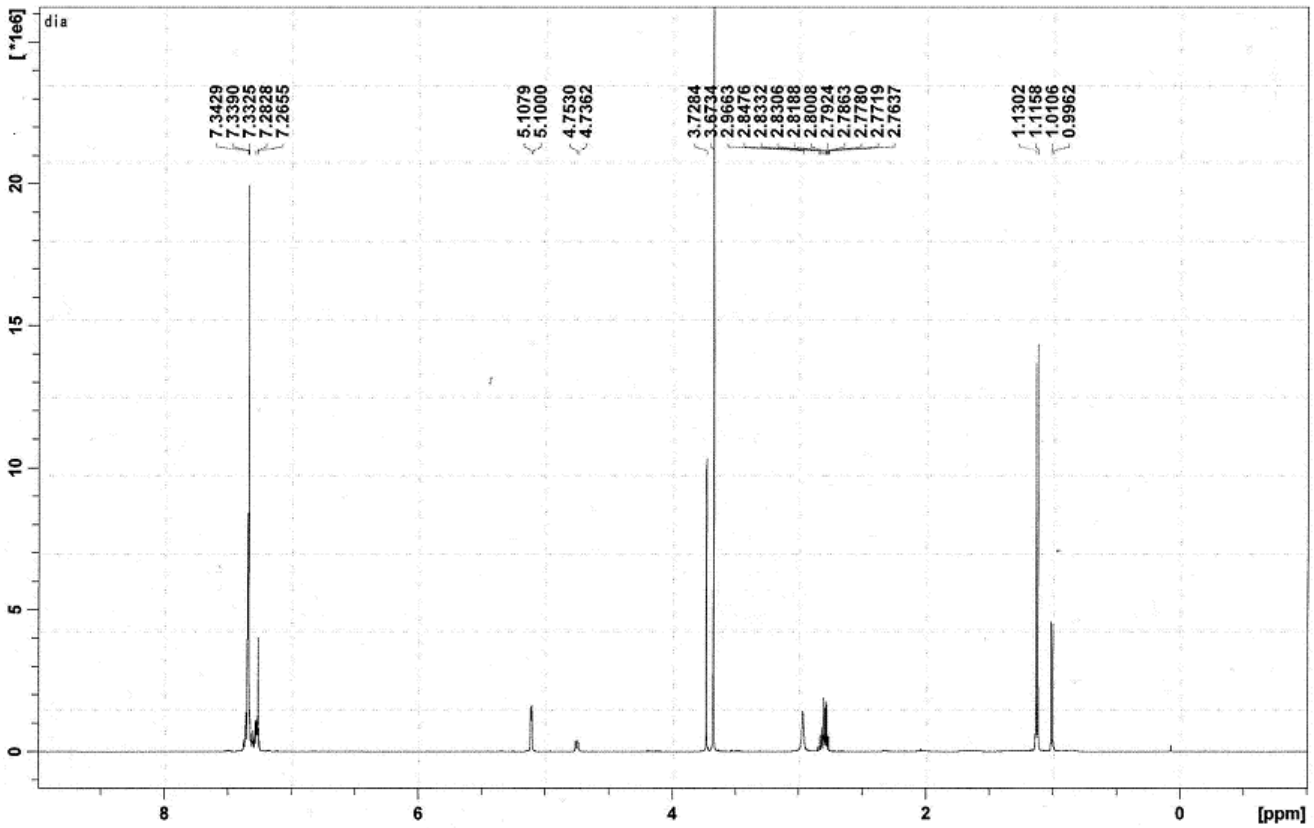
5a

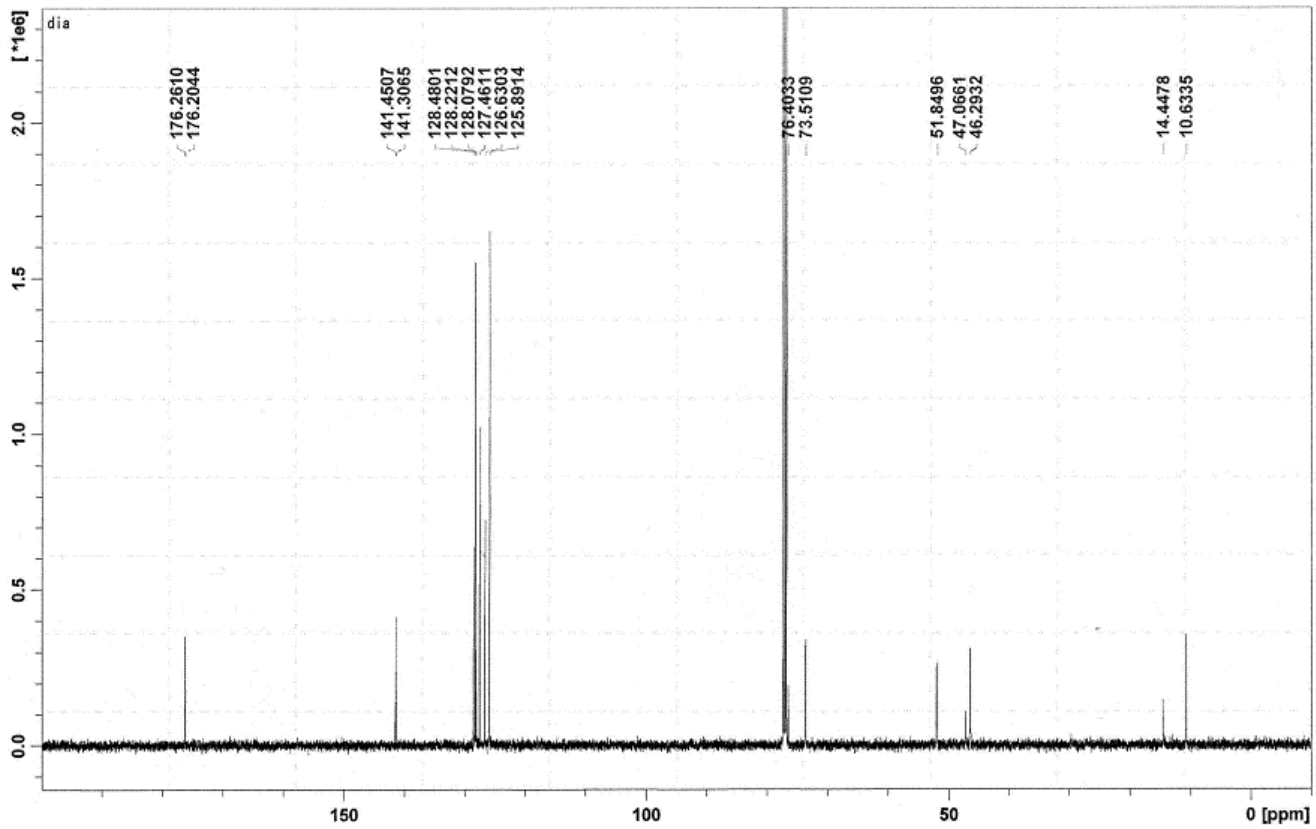

Ph
[*1e6]
7.3755
7.3709
7.3020
7.2882
5.1472
5.1413
5.1294
5.1238
4.2061
4.1918
4.1774
4.1632
3.3076
2.7848
2.7667
2.7520
2.7339
2.7248
2.7171
2.6921
2.6843
1.2789
1.2645
1.2502
[ppm]

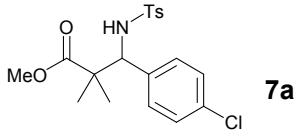

Ph
[*1e6]
172.4313
142.4310
128.5143
127.7697
125.6339
70.2586
60.8657
43.2688
14.1136
[ppm]


O
OSiMe3
MeO

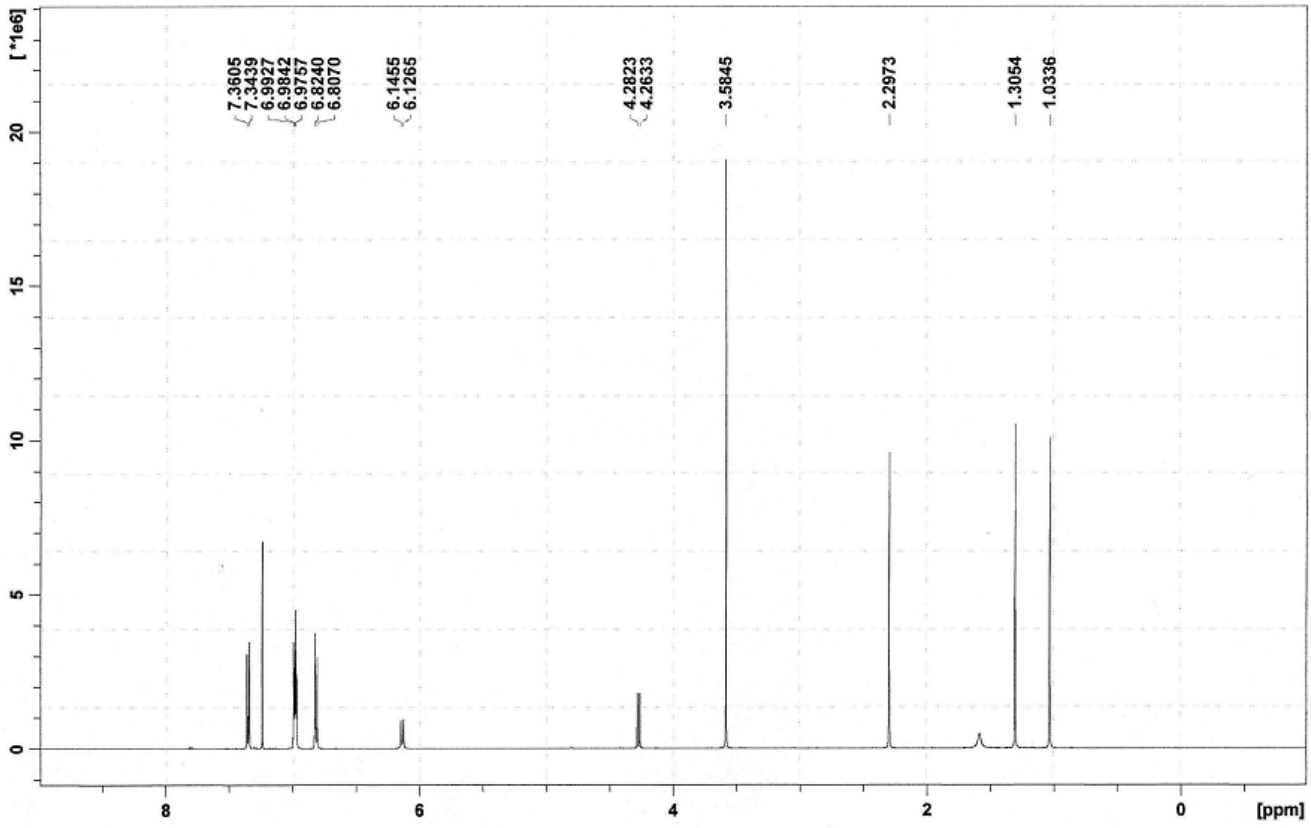
5b

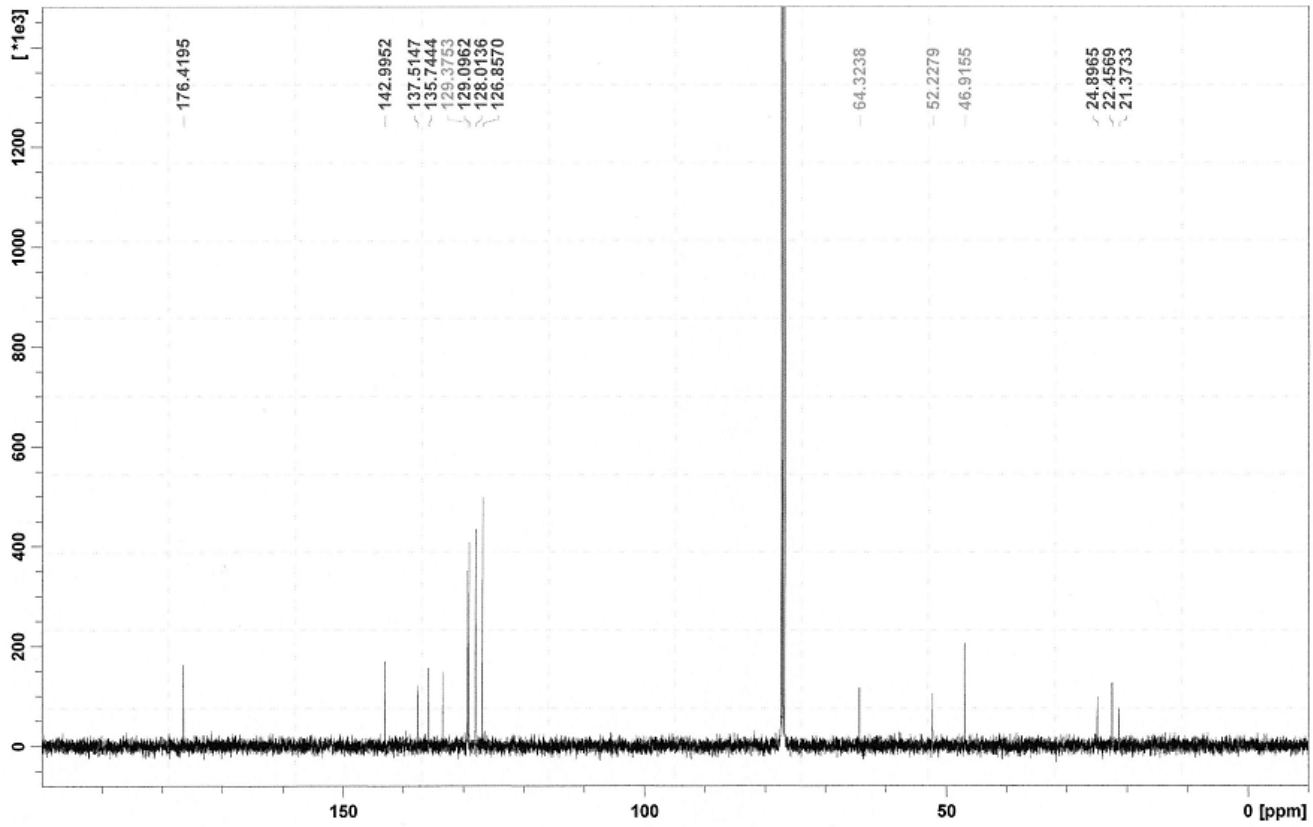

dia
[*1e6]
7.3429
7.3390
7.3325
7.2828
7.2655
5.1079
5.1000
4.7530
4.7362
3.7284
3.6734
2.9663
2.8476
2.8332
2.8306
2.8188
2.8008
2.7924
2.7863
2.7780
2.7719
2.7637
1.1302
1.1158
1.0106
0.9962
[ppm]

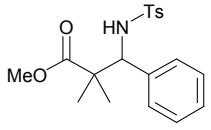

dia
[*1e6]
176.2610
176.2044
141.4507
141.3065
128.4801
128.2212
128.0792
127.4611
126.6303
125.8914
76.4033
73.5109
51.8496
47.0661
46.2932
14.4478
10.6335
[ppm]


O
HN
Ts
MeO
Cl

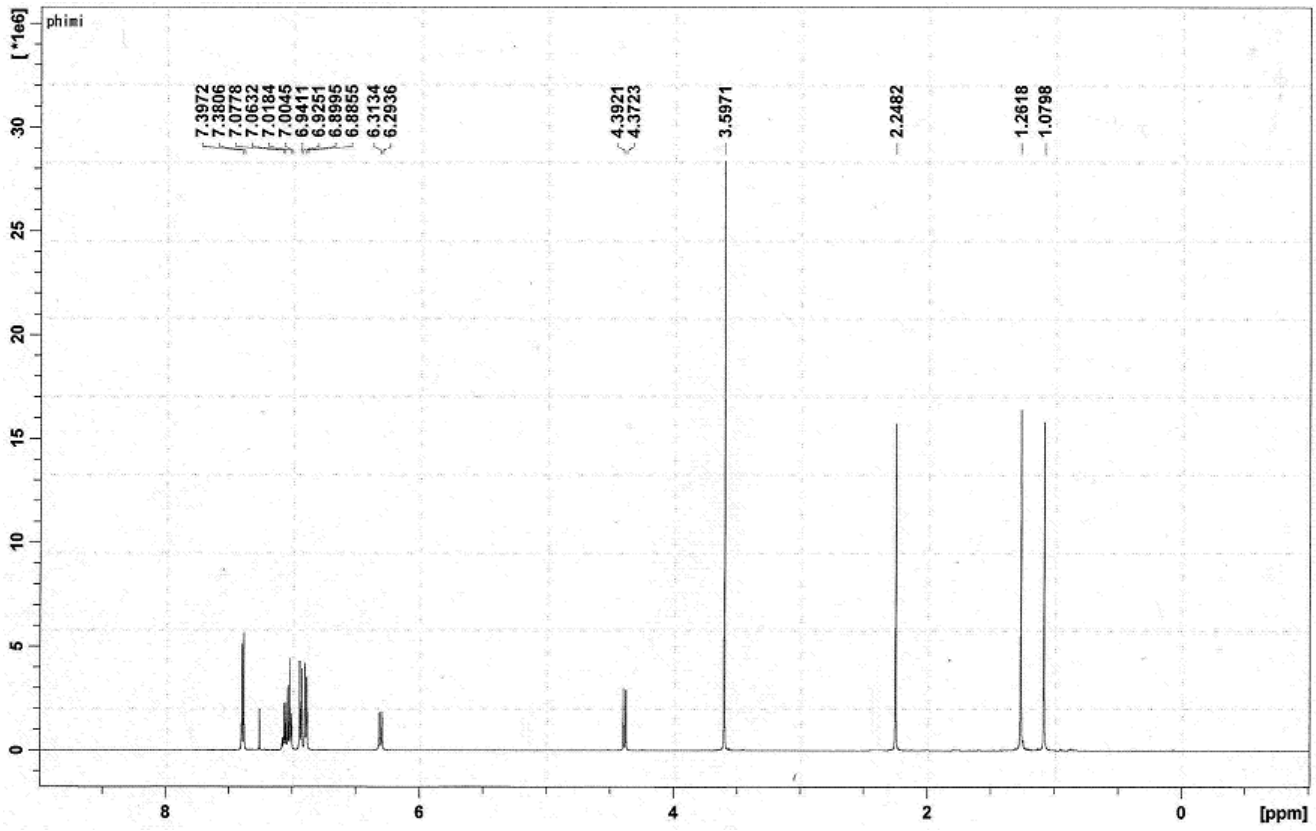
7a

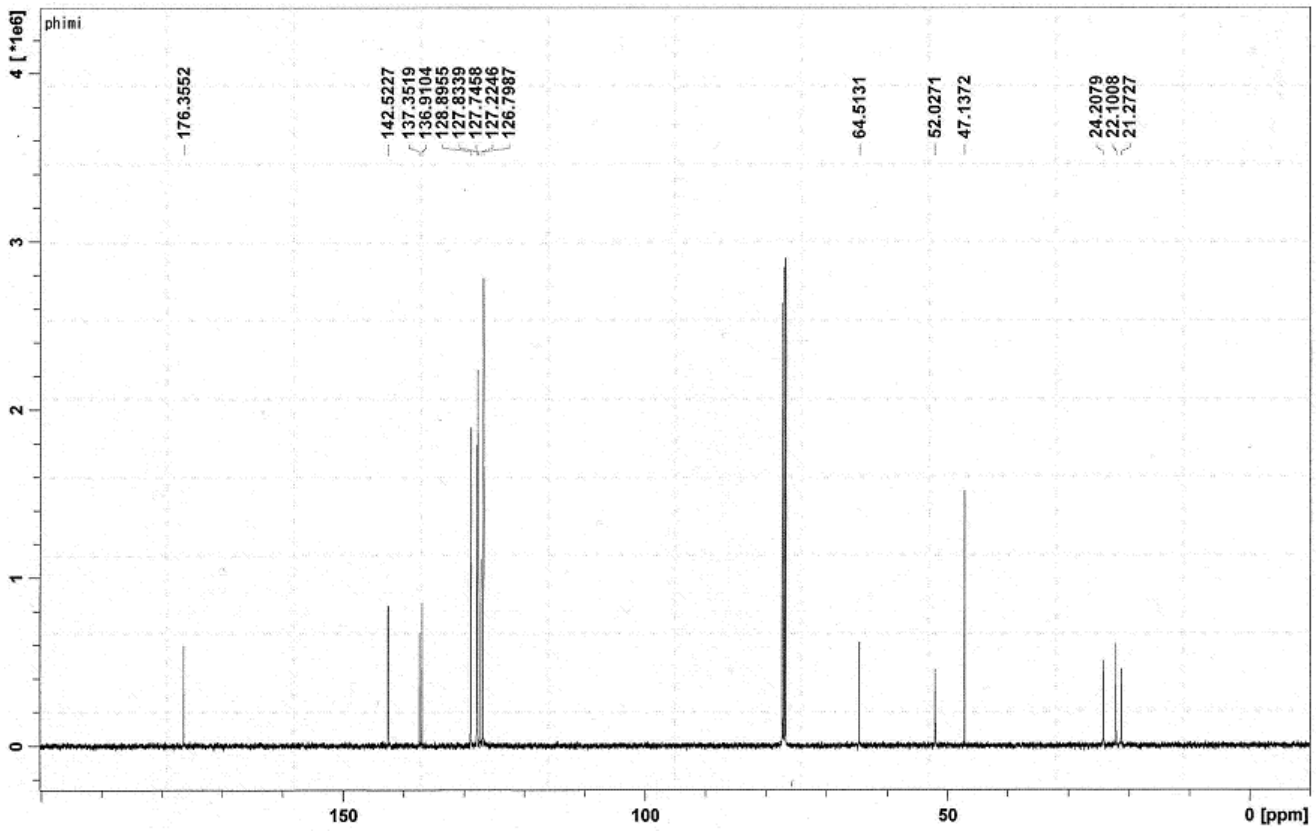

[*1e6]
7.3605
7.3439
6.9927
6.9842
6.9757
6.8240
6.8070
6.1455
6.1265
4.2823
4.2633
3.5845
2.2973
1.3054
1.0336
[ppm]

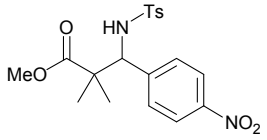

[*1e3]
176.4195
142.9952
137.5147
135.7444
129.3753
129.0962
128.0136
126.8570
64.3238
52.2279
46.9155
24.8965
22.4569
21.3733
[ppm]


O
HN
Ts
MeO

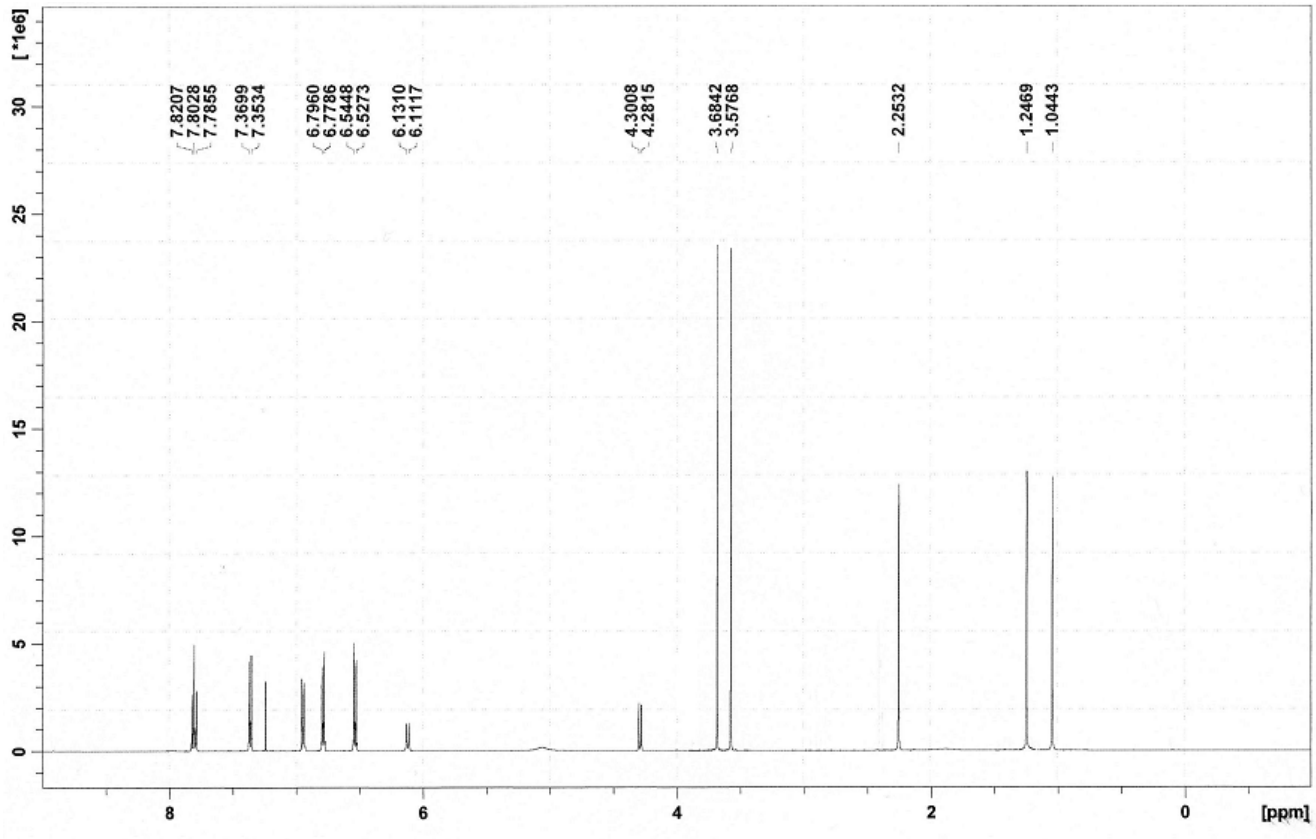
7b

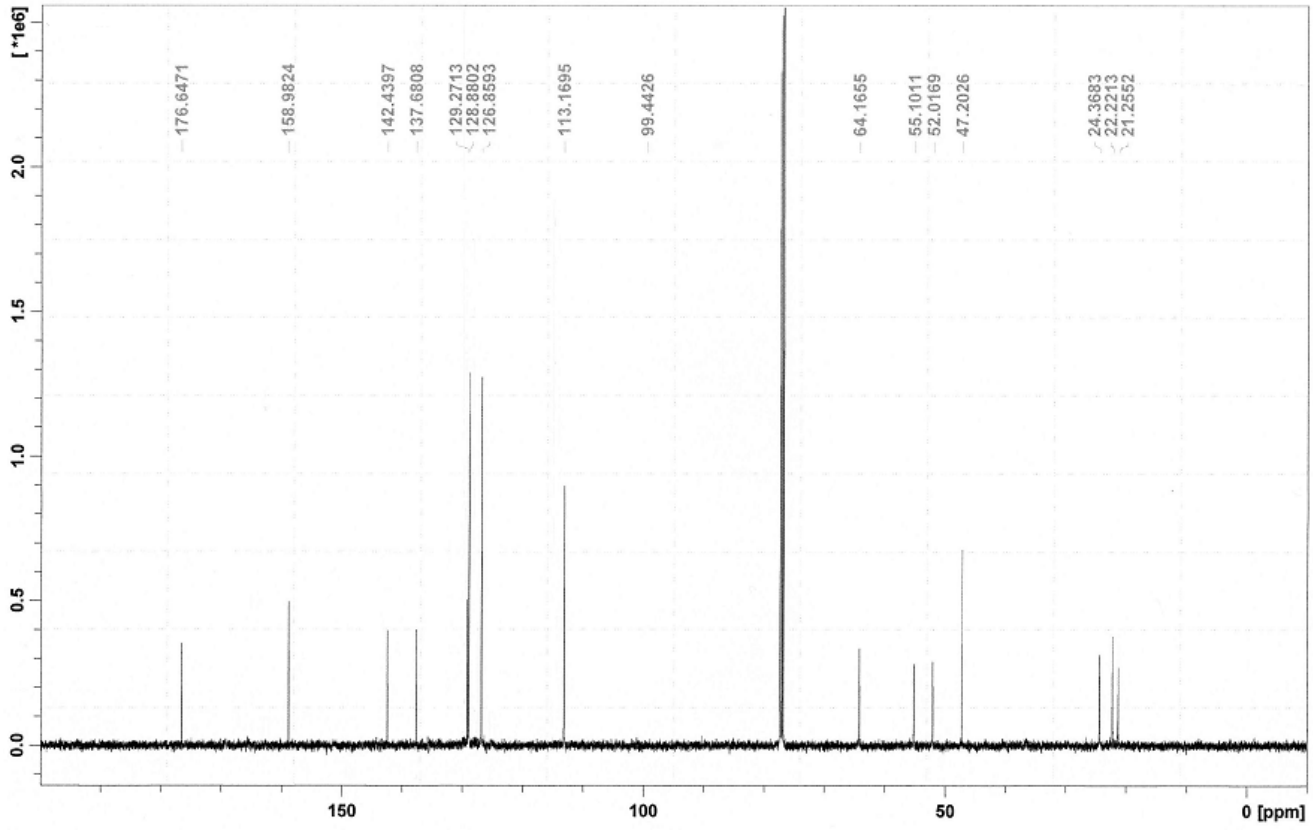

phimi
[*1e6]
7.3972
7.3806
7.0778
7.0632
7.0184
7.0045
6.9411
6.9251
6.8995
6.8855
6.3134
6.2936
4.3921
4.3723
3.5971
2.2482
1.2618
1.0798
[ppm]


phimi
4 [*1e6]
176.3552
142.5227
137.3519
136.9104
128.8955
127.8339
127.7458
127.2246
126.7987
64.5131
52.0271
47.1372
24.2079
22.1008
21.2727
0 [ppm]


O
HN
Ts
MeO
NO2

7c


[*1e6]
7.8207
7.8028
7.7855
7.3699
7.3534
6.7960
6.7786
6.5448
6.5273
6.1310
6.1117
4.3008
4.2815
3.6842
3.5768
2.2532
1.2469
1.0443
[ppm]


[*1e6]
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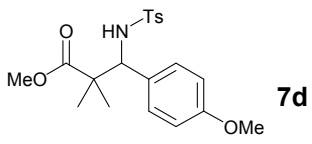
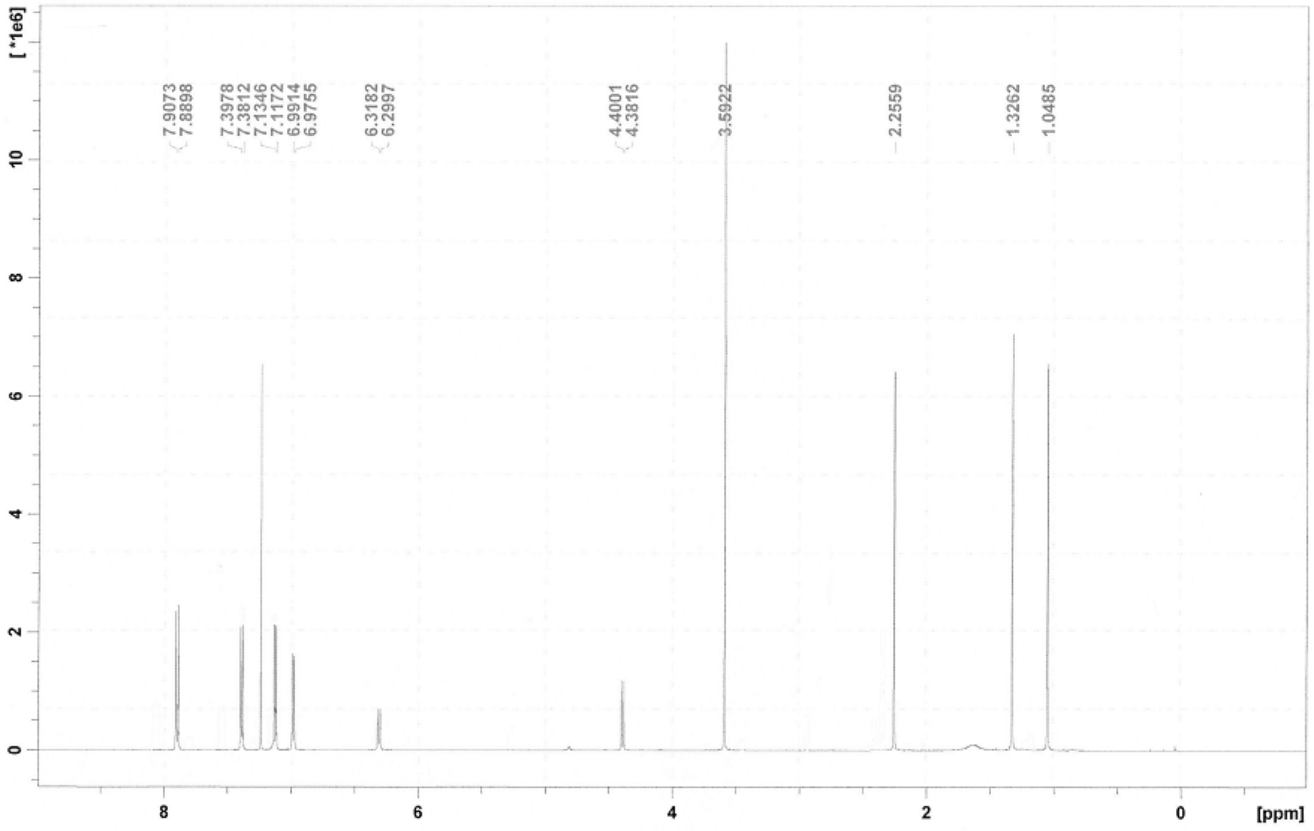
137.6808
129.2713
128.8802
126.8593
113.1695
99.4426
64.1655
55.1011
52.0169
47.2026
24.3683
22.2213
21.2552
0 [ppm]


O
HN
Ts
MeO
OMe

7d


[*1e6]
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7.3812
7.1346
7.1172
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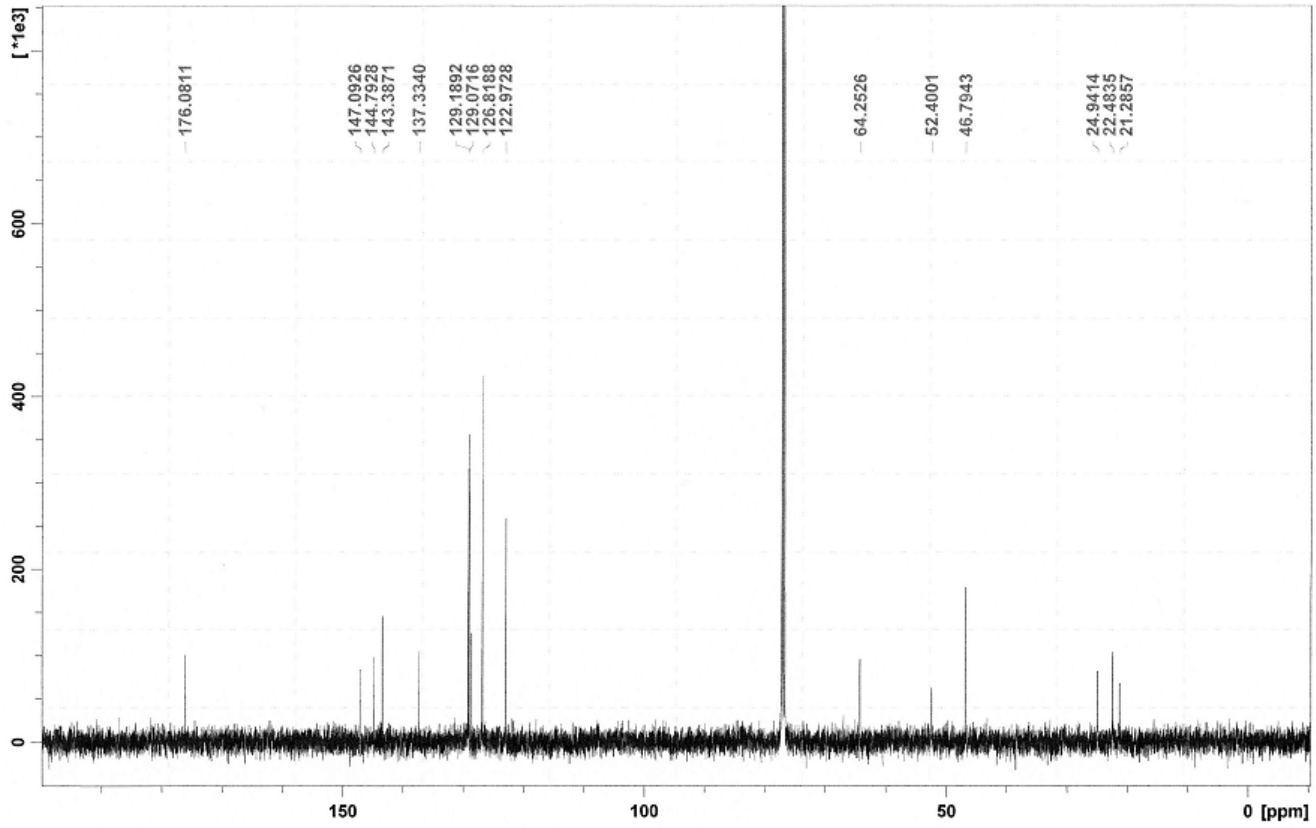
6.2997
4.4001
4.3816
3.5922
2.2559
1.3262
1.0485
[ppm]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144.7928
143.3871
137.3340
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129.0716
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122.9728
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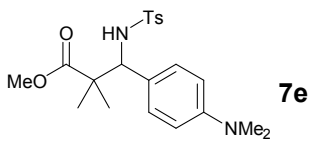
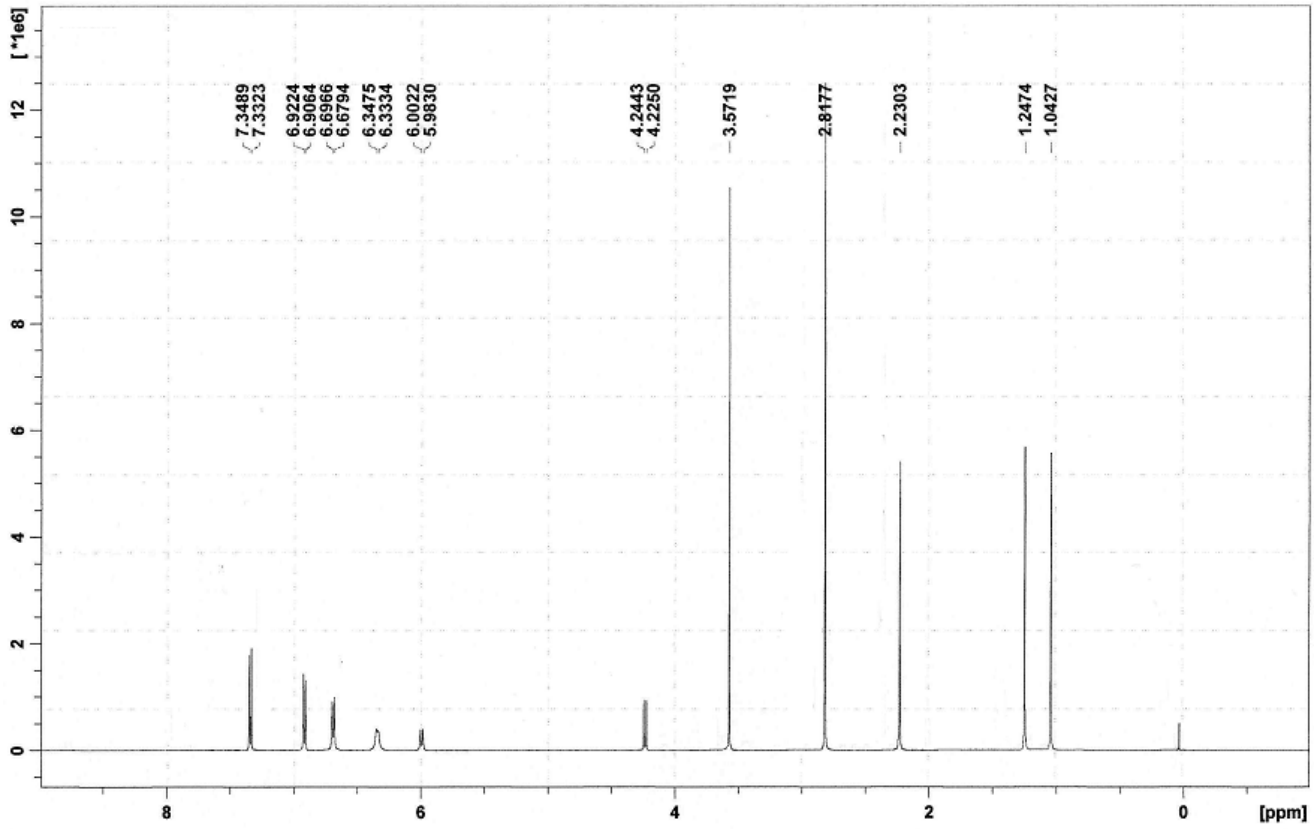
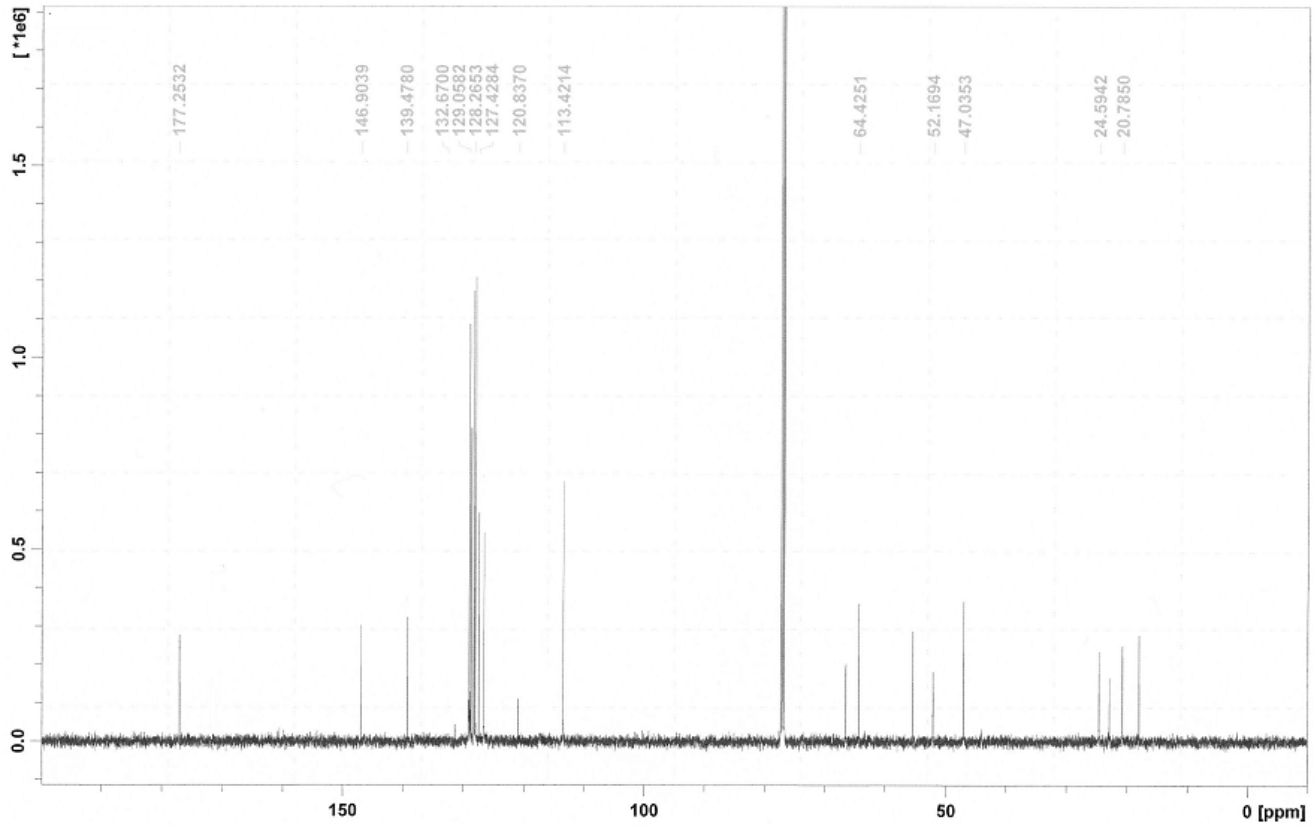
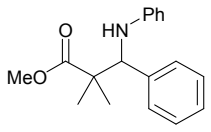
46.7943
24.9414
22.4835
21.2857
0 [ppm]


O
HN
Ts
MeO
NMe2

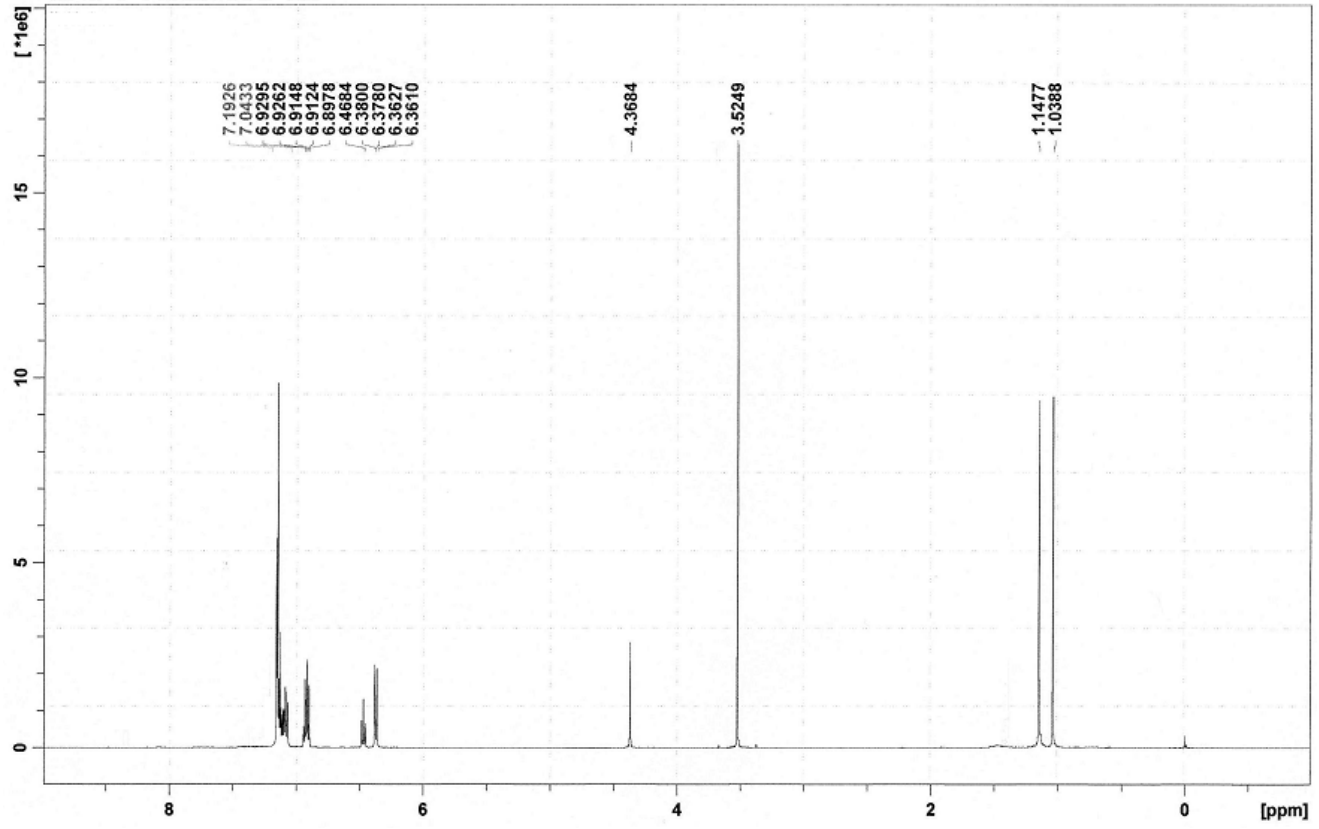
7e

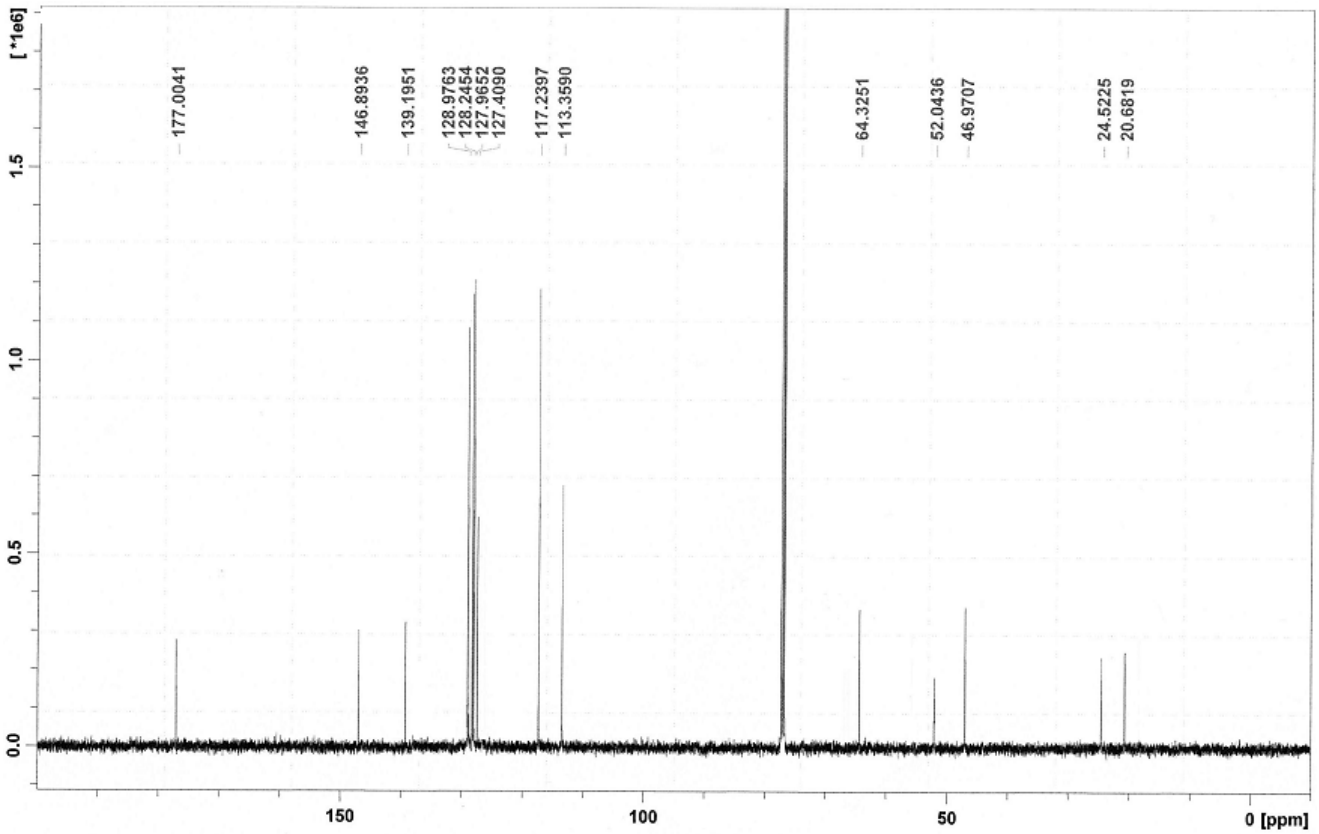

[*1e6]
7.3489
7.3323
6.9224
6.9064
6.6966
6.6794
6.3475
6.3334
6.0022
5.9830
4.2443
4.2250
3.5719
2.8177
2.2303
1.2474
1.0427
[ppm]


[*1e6]
177.2532
146.9039
139.4780
132.6700
129.0582
128.2653
127.4284
120.8370
113.4214
64.4251
52.1694
47.0353
24.5942
20.7850
0 [ppm]


O
HN
Ph
MeO

7f





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