# Supporting Information

# Convenient Access to Polysubstituted 1-Indanones by $Sc(OTf)_3$-Catalyzed Intramolecular Friedel-Crafts Acylation of Benzyl Meldrum's Acid Derivatives

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**General Methods.** All reactions were carried out in flame-dried glassware under a dry nitrogen atmosphere. Nitromethane, acetonitrile, dichloromethane, dichloroethane and diisopropylethylamine were distilled from $CaH_2$. $Sc(OTf)_3$ was dried under high vacuum for 30 minutes at 180 °C prior to use. Trimethyloxonium tetrafluoroborate (Meerwein's salt) was dried under high vacuum for 30 minutes at room temperature.

$^1H$ NMR spectra were referenced to residual $^1H$ shift in $CDCl_3$ (7.24 ppm). $CDCl_3$ (77.0 ppm) was used as the internal reference for $^{13}C$ NMR. The following abbreviations were used to explain the multiplicities: s = singlet, d = doublet, t = triplet, q = quartet, br s = broad singlet.

Reactions were monitored by thin-layer chromatography (TLC) on commercial silica pre-coated plates with a particle size of 60 Å. Developed plates were viewed by UV lamp (254 nm). Flash chromatography was performed using 230-400 mesh silica gel.

Melting points are uncorrected and were performed on solids obtained after concentration of column eluent, unless recrystallized from the solvent system indicated in parentheses.

**Experimental.**

**General Procedure A:** Benzyl Meldrum's acid derivative (1.0 mmol) and dry $Sc(OTf)_3$ (0.12 mmol) were combined in a round bottom flask equipped with a reflux condenser, magnetic stir bar and a rubber septum under a dry nitrogen atmosphere. Solvent (10 mL) was added via syringe and the resulting solution stirred at reflux. The reaction was monitored by TLC, and upon consumption of the starting material the crude reaction mixture was cooled to rt, then concentrated by rotary evaporator. The resultant yellow/brown oil was directly purified by flash chromatography on silica gel and eluted with the appropriate solvent system.

**General Procedure B:** Benzyl Meldrum's acid derivative (1.0 mmol) and trimethyloxonium tetrafluoroborate (1.35 mmol) were combined in a round bottom flask equipped with a reflux condenser, magnetic stir bar and a rubber septum under a dry nitrogen atmosphere. At 0 $^{\circ}C$, $CH_2Cl_2$ (10 mL) was added via syringe with stirring, followed by diisopropylethylamine (1.4 mmol). The resulting suspension was stirred for 30 minutes at 0 $^{\circ}C$ then heated at reflux until all starting material was consumed as observed by TLC. The crude reaction mixture was quenched with aqueous 10% HCl then diluted with additional $CH_2Cl_2$. The layers were partitioned and the aqueous phase was extracted with $CH_2Cl_2$ (3x). The combined organic fractions were dried over $MgSO_4$, then filtered and concentrated. The yellow oil was purified by flash chromatography on silica gel to provide the desired β-keto ester.

**5,7-Dimethoxy-1-indanone[1] (2a):** Prepared using procedure **A** in $CH_3CN$. Purified with 2:1 EtOAc:Hex; M.p. 98-99 $^{\circ}C$ (benzene/petroleum ether). Lit. 98-99 $^{\circ}C$; $^1H$ NMR ($CDCl_3$, 300 MHz) δ 6.42 (1H, br s), 6.24 (1H, br s), 3.85 (3H, s), 3.82 (3H, s), 2.94-2.98 (2H, m), 2.56-2.60 (2H, m); $^{13}C$ NMR ($CDCl_3$, 75 MHz) δ 203.3, 166.8, 160.3, 159.2, 119.3, 101.5, 97.3, 55.6, 36.8, 25.8. Anal. calcd. for $C_{11}H_{12}O_3$: C, 68.74; H, 6.29. Found: C, 69.03; H, 6.30.

**5,7-Dimethoxy-3-methyl-1-indanone (2b):** Prepared using procedure **A** in $CH_3CN$. Purified with 2:1 EtOAc:Hex; M.p. 61-62.5 $^{\circ}C$; $^1H$ NMR ($CDCl_3$, 300 MHz) δ 6.45 (1H,

br s), 6.27 (1H, br s), 3.87 (3H, s), 3.85 (3H, s), 3.22-3.28 (1H, m), 2.85 (1H, dd, $J$ = 18.5 Hz, 7.6 Hz), 2.21 (1H, dd, $J$ = 18.5 Hz, 3.5 Hz), 1.32 (3H, d, $J$ = 7.6 Hz); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 202.4, 167.0, 165.2, 159.0, 118.6, 100.4, 97.2, 55.7, 55.6, 45.9, 32.5, 21.3. Anal. calcd. for $C_{12}H_{14}O_3$: C, 69.88; H, 6.84. Found: C, 69.82; H, 6.73.

**5,7-Dimethoxy-3,3-dimethyl-1-indanone[2] (2c):** Prepared using procedure **A** in $CH_3CN$. Purified with 2:1 EtOAc:Hex; M.p. 92-94 °C ($Et_2O$). Lit. 95.5 °C (benzene); $^1$H NMR ($CDCl_3$, 300 MHz) δ 6.44 (1H, br s), 6.27 (1H, br s), 3.89 (3H, s), 3.87 (3H, s), 2.52 (2H, s), 1.34 (6H, s); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 201.6, 165.9, 167.0, 158.8, 117.5, 98.8, 96.9, 55.7, 55.6, 53.4, 37.9, 29.7. Anal. calcd. for $C_{13}H_{16}O_3$: C, 70.89; H, 7.32. Found: C, 70.87; H, 7.49.

**5,7-Dimethoxy-(3.3)-pentamethylene-1-indanone (2d):** Prepared using procedure **A** in $CH_3CN$. Purified with 1:1 EtOAc:Hex; M.p. 132-133 °C ($Et_2O$); $^1$H NMR ($CDCl_3$, 300 MHz) δ 6.45 (1H, d, $J$ = 1.8), 6.26 (1H, d, $J$ = 1.8), 3.88 (3H, s), 3.86 (3H, s), 2.51 (2H, s), 1.19-1.76 (10H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 201.9, 169.3, 166.9, 159.0, 117.8, 99.3, 97.2, 55.8, 55.7, 49.1, 42.7, 38.2, 25.4, 23.6. Anal. calcd. for $C_{16}H_{20}O_3$: C, 73.82; H, 7.74. Found: C, 73.93; H, 7.83.

**5,7-Dimethyl-1-indanone[3] (2e):** Prepared using procedure **A** in $CH_3NO_2$. Purified with 8:1 Hex:EtOAc; M.p. 75-76 °C ($MeOH/H_2O$). Lit. 76-77 °C; $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.05 (1H, s), 6.89 (1H, s), 2.98-3.02 (2H, m), 2.60-2.64 (2H, m), 2.57 (3H, s), 2.36 (3H, s); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 207.5, 156.5, 145.0, 138.5, 132.2, 130.3, 124.4, 36.1, 25.2, 21.8, 18.2. Anal. Calcd. for $C_{11}H_{12}O$: C, 82.46; H, 7.55. Found: C, 82.40; H, 7.36.

**5,7-Dimethyl-(3.3)-pentamethylene-1-indanone (2f):** Prepared using procedure **A** in $CH_3NO_2$. Purified with 10:1 Hex:EtOAc; M.p. 87.5-88.5 °C (Hex); $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.08 (1H, s), 6.89 (1H, s), 2.57 (3H, s), 2.52 (2H, s), 2.37 (3H, s), 1.23-1.77 (10H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 206.5, 165.6, 145.0, 138.2, 130.5, 121.7, 49.1,

42.1, 38.4, 25.6, 23.8, 22.0, 18.3. Anal. Calcd. for $C_{16}H_{20}O$: C, 84.16; H, 8.83. Found: C, 84.00; H, 9.12.

**5-Methoxy-1-indanone (4a)** and **7-Methoxy-1-indanone (5a):** Prepared using procedure **A** in $CH_3NO_2$. The resulting mixture of **4a** and **5a** was separated with 2:1 Hex:EtOAc; **(4a):** M.p. 108-109 °C (MeOH); $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.65-7.68 (1H, m), 6.87-6.89 (2H, m), 3.86 (3H, s), 3.07 (2H, m), 2.65 (2H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 205.3, 165.2, 158.2, 130.4, 125.3, 115.3, 109.7, 55.6, 36.4, 25.8. Anal. calcd. for $C_{10}H_{10}O_2$: C, 74.06; H, 6.21. Found: C, 73.90; H, 6.27. **(5a):** M.p. 96-97.5 °C; $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.50 (1H, t, *J* = 7.9 Hz), 6.99 (1H, d, *J* = 7.5 Hz), 6.76 (1H, d, *J* = 8.0), 3.93 (3H, s), 3.04-3.08 (2H, m), 2.63-2.68 (2H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 204.9, 158.1, 158.0, 136.4, 125.2, 118.4, 108.8, 55.7, 36.8, 25.5. HRMS (EI): *m/z* Calcd. for $C_{10}H_{10}O_2$ ($M^+$) 162.0681. Found 162.0685.

**5-Methoxy-(3.3)-pentamethylene-1-indanone (4b)** and **7-Methoxy-(3.3)-pentamethylene-1-indanone[4] (5b):** Prepared using procedure **A** in $CH_3NO_2$. The resulting mixture of **4b** and **5b** was separated with 3:1 Hex:EtOAc; **(4b):** M.p. 82-82.5 °C (Hex). Lit. 83.5-85 °C; $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.60 (1H, d, *J* = 9.0 Hz), 6.84-6.87 (2H, m), 3.86 (3H, s), 2.53 (2H, s), 1.26-1.77 (10H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 204.2, 167.1, 165.3, 128.8, 125.1, 115.1, 107.4, 55.6, 48.5, 42.9, 38.2, 25.4, 23.7. Anal. calcd. for $C_{15}H_{18}O_2$: C, 78.23; H, 7.88. Found: C, 78.38; H, 7.84. **(5b):** M.p. 94-96 °C. Lit. 97.5-99 °C ($Et_2O$); $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.52 (1H, t, *J* = 7.9 Hz), 7.02 (1H, d, *J* = 7.7), 6.55 (1H, d, *J* = 8.2), 3.92 (3H, s), 2.55 (2H, s), 1.25-1.77 (10H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 203.9, 167.0, 157.6, 136.5, 123.6, 115.6, 108.8, 55.8, 48.9, 42.5, 38.3, 25.5, 23.7. HRMS (EI): *m/z* Calcd. for $C_{15}H_{18}O_2$ ($M^+$): 230.1307. Found: 230.1304.

**5-Methyl-1-indanone (4c)** and **7-Methyl-1-indanone[5] (5c):** Prepared using procedure **A** in $CH_3NO_2$. The resulting mixture of **4c** and **5c** was separated with 10:1 Hex:EtOAc; **(4c):** M.p. 67-68 °C (petroleum ether). Lit. 68-69 °C; $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.62 (1H, d, *J* = 7.8), 7.25 (1H, br s), 7.15 (1H, d, *J* = 7.9 Hz), 3.04-3.08 (2H, m), 2.63-2.67

(2H, m), 2.41 (3H, s); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 206.6, 155.7, 145.7, 134.8, 128.5, 127.0, 123.5, 36.4, 25.6, 22.0. HRMS (EI): *m/z* Calcd. for $C_{10}H_{10}O$ ($M^+$): 146.0732. Found: 146.0732. **(5c):** M.p. 49-50 °C (petroleum ether). Lit. 52.5-53.5 °C; $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.38 (1H, t, *J* = 7.5 Hz), 7.23 (1H, d, *J* = 7.4 Hz), 7.04 (1H, d, *J* = 7.4 Hz), 3.01-3.05 (2H, m), 2.58-2.62 (2H, m), 2.59 (3H, s); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 207.8, 155.8, 138.6, 134.3, 133.8, 128.9, 123.9, 36.6, 25.2, 18.2. HRMS (EI): *m/z* Calcd. for $C_{10}H_{10}O$ ($M^+$): 146.0732. Found: 146.0728.

**5-Methyl-(3.3)-pentamethylene-1-indanone (4d)** and **7-Methyl-(3.3)-pentamethylene-1-indanone (5d):** Prepared using procedure **A** in $CH_3NO_2$. The resulting mixture of **4d** and **5d** was separated with 10:1 Hex:EtOAc; **(4d):** M.p. 77.5-78.5 °C; $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.58 (1H, d, *J* = 7.8 Hz), 7.27 (1H, s), 7.15 (1H, d, *J* = 7.8 Hz), 2.55 (2H, s), 2.43 (3H, s), 1.27-1.79 (10H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 205.6, 164.7, 145.9, 133.3, 128.8, 124.3, 123.2, 48.5, 42.9, 38.3, 25.5, 23.8, 22.2. HRMS (EI): *m/z* Calcd. for $C_{15}H_{18}O$ ($M^+$) 214.1358. Found 214.1354. **(5d):** Oil; $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.42 (1H, t, *J* = 7.5 Hz), 7.29 (1H, d, *J* = 7.7 Hz), 7.07 (1H, d, *J* = 7.3 Hz), 2.61 (3H, s), 2.53 (2H, s), 1.23-1.78 (10H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 207.1, 165.1 138.5, 134.0, 133.0, 129.3, 121.2, 48.9, 42.3, 38.5, 25.5, 23.8, 18.4. Anal. calcd. for $C_{15}H_{18}O$: C, 84.07; H, 8.47. Found: C, 84.19; H, 8.36.

**5-Chloro-(3.3)-pentamethylene-1-indanone (4e)** and **7-Chloro-(3.3)-pentamethylene-1-indanone (5e):** Prepared using procedure **A** in $CH_3NO_2$. The resulting mixture of **4e** and **5e** was separated with 3:1 $CH_2Cl_2$:Hex; **(4e):** M.p. 74-75 °C; $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.61 (1H, d, *J* = 8.2 Hz), 7.46 (1H, d, *J* = 1.6 Hz), 7.3 (1H, dd, *J* = 8.1Hz, 1.6 Hz), 2.57 (3H, s), 1.22-1.80 (10H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 204.5, 165.6, 141.2, 134.0, 128.3, 124.7, 124.4, 48.3, 43.2, 38.2, 25.3, 23.7. HRMS (EI): *m/z* Calcd. for $C_{14}H_{15}ClO$ ($M^+$) 234.0811. Found 234.0807. **(5e):** M.p. 159-160 °C (Hex); $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.48 (1H, t, *J* = 7.7 Hz), 7.38 (1H, d, *J* = 7.5 Hz), 7.27 (1H, d, *J* = 7.6 Hz), 2.60 (2H, s), 1.24-1.80 (10H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 202.8, 166.5, 135.1, 131.5, 131.3, 129.1, 122.4, 48.9, 42.3. 38.4, 25.4, 23.7. HRMS (EI): *m/z* Calcd. for $C_{14}H_{15}ClO$ ($M^+$) 234.0811. Found 234.0806.

**(3.3)-Pentamethylene-1-indanone[6] (4g):** Prepared using procedure **A** in $CH_3NO_2$. Purified with 7:1 Hex:EtOAc; Oil; Lit. M.p. 58-59 °C (petroleum ether); $^1$H NMR ($CDCl_3$, 300 MHz) δ 7.65 (1H, d, *J* = 7.7 Hz), 7.54 (1H, t, *J* = 7.1 Hz), 7.45 (1H, d, *J* = 7.7 Hz), 7.3 (1H, t, *J* = 7.4 Hz), 2.53 (3H, s), 1.20-1.75 (10H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 205.9, 164.0, 135.4, 134.7, 127.4, 123.8, 123.3, 48.2, 43.0, 38.2, 25.3, 23.7. Anal. calcd. for $C_{14}H_{16}O$: C, 83.96; H, 8.05. Found: C, 83.60; H, 8.12.

**5,7-Dimethoxy-1-indanone-2-carboxylic acid methyl ester[7] (6a):** Prepared using procedure **B**. Purified with 2:1 EtOAc:Hex; M.p. 103-104 °C. Lit. 104-105 °C (EtOAc/ $Et_2O$); $^1$H NMR ($CDCl_3$, 300 MHz) δ 6.48 (1H, br s), 6.28 (1H, br s), 3.88 (3H, s), 3.86 (3H, s), 3.74 (3H, s), 3.66 (1H, dd, *J* = 8.2 Hz, 3.8 Hz), 3.41 (1H, dd, *J* = 17.2 Hz, 3.4 Hz), 3.20 (1H, dd, *J* = 17.3 Hz, 8.3 Hz); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 195.1, 170.0, 167.6, 160.0, 158.8, 117.6, 101.6, 97.8, 55.8, 53.7, 52.7, 30.2. HRMS (EI): *m/z* Calcd. for $C_{13}H_{14}O_5$ ($M^+$) 250.0841. Found 250.0839.

**5,7-Dimethoxy-(3.3)-pentamethylene-1-indanone-2-carboxylic acid methyl ester (6b):** Prepared using procedure **B**. Purified with 1:1 Hex:EtOAc; M.p. 168-170 °C ($Et_2O$); $^1$H NMR ($CDCl_3$, 300 MHz) δ 6.46 (1H, d, *J* = 1.7 Hz), 6.28 (1H, d, *J* = 1.6 Hz), 3.88 (6H, s), 3.67 (3H, s), 3.56 (1H, s), 2.04-2.09 (1H, m), 1.16-1.77 (9H, m); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 196.0, 170.0, 168.3, 167.4, 159.6, 116.6, 99.4, 97.4, 64.1, 55.8, 55.7, 52.0, 46.6, 41.8, 31.9, 25.3, 23.6, 22.7. HRMS (EI): *m/z* Calcd. for $C_{18}H_{22}O_5$ ($M^+$): 318.1467. Found: 318.1470.

**5,7-Dimethoxy-2-methyl-1-indanone[8,9] (8):** Prepared using procedure **A** in $CH_3NO_2$. Purified with 1:1 Hex:EtOAc; M.p. 71.5-73 °C (Hex). Lit. 76-79 °C; $^1$H NMR ($CDCl_3$, 300 MHz) δ 6.44 (1H, br s), 6.28 (1H, br s), 3.88 (3H, s), 3.85 (3H, s), 3.21-3.29 (1H, m), 2.55-2.69 (2H, m), 1.25 (3H, d, *J* = 7.3 Hz); $^{13}$C NMR ($CDCl_3$, 75 MHz) δ 205.6, 166.9, 159.5, 158.6, 118.5, 101.5, 97.4, 55.7, 42.3, 35.0, 17.1. Anal. calcd. for $C_{12}H_{14}O_3$: C, 69.88; H, 6.84. Found: C, 69.58; H, 6.71.

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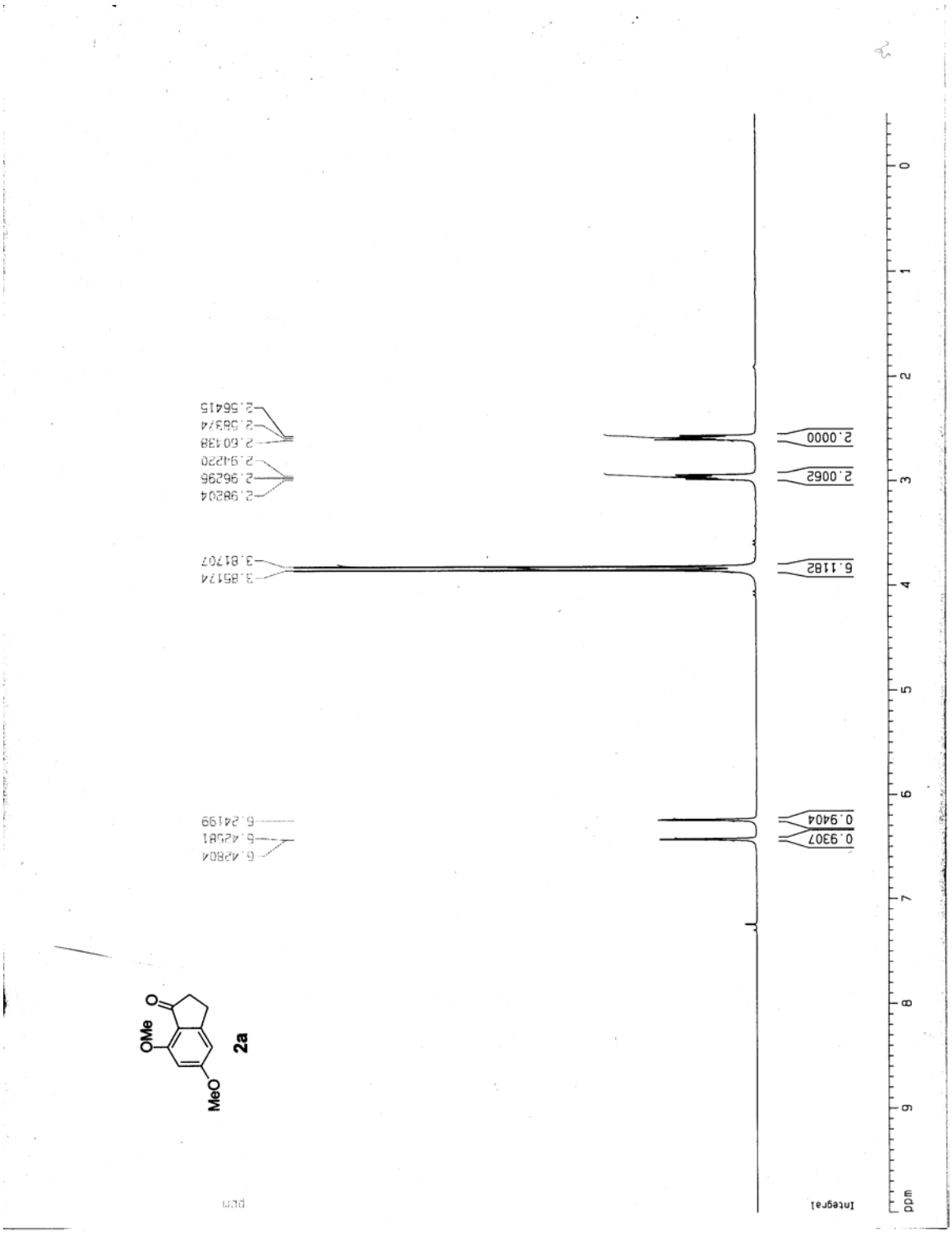
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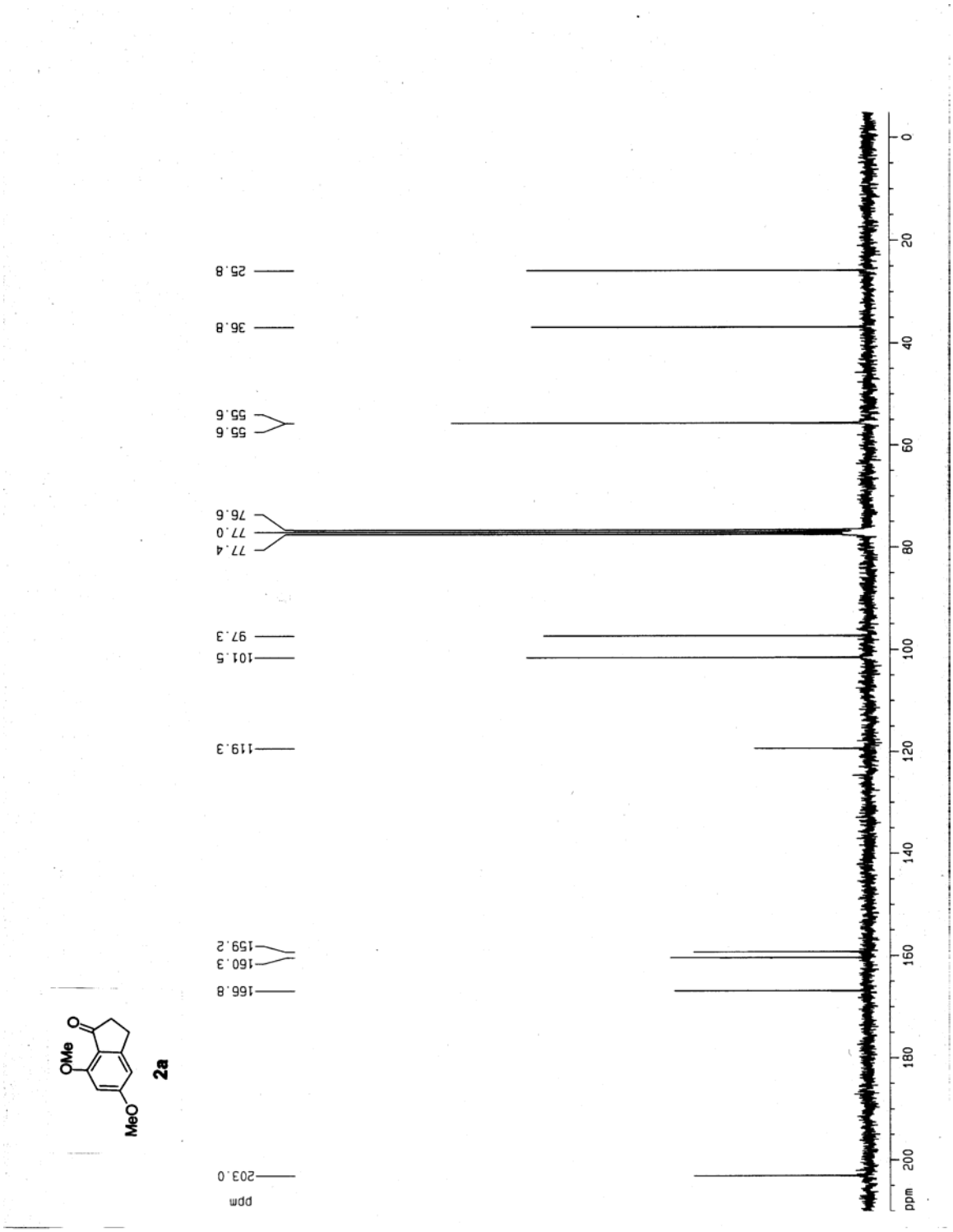
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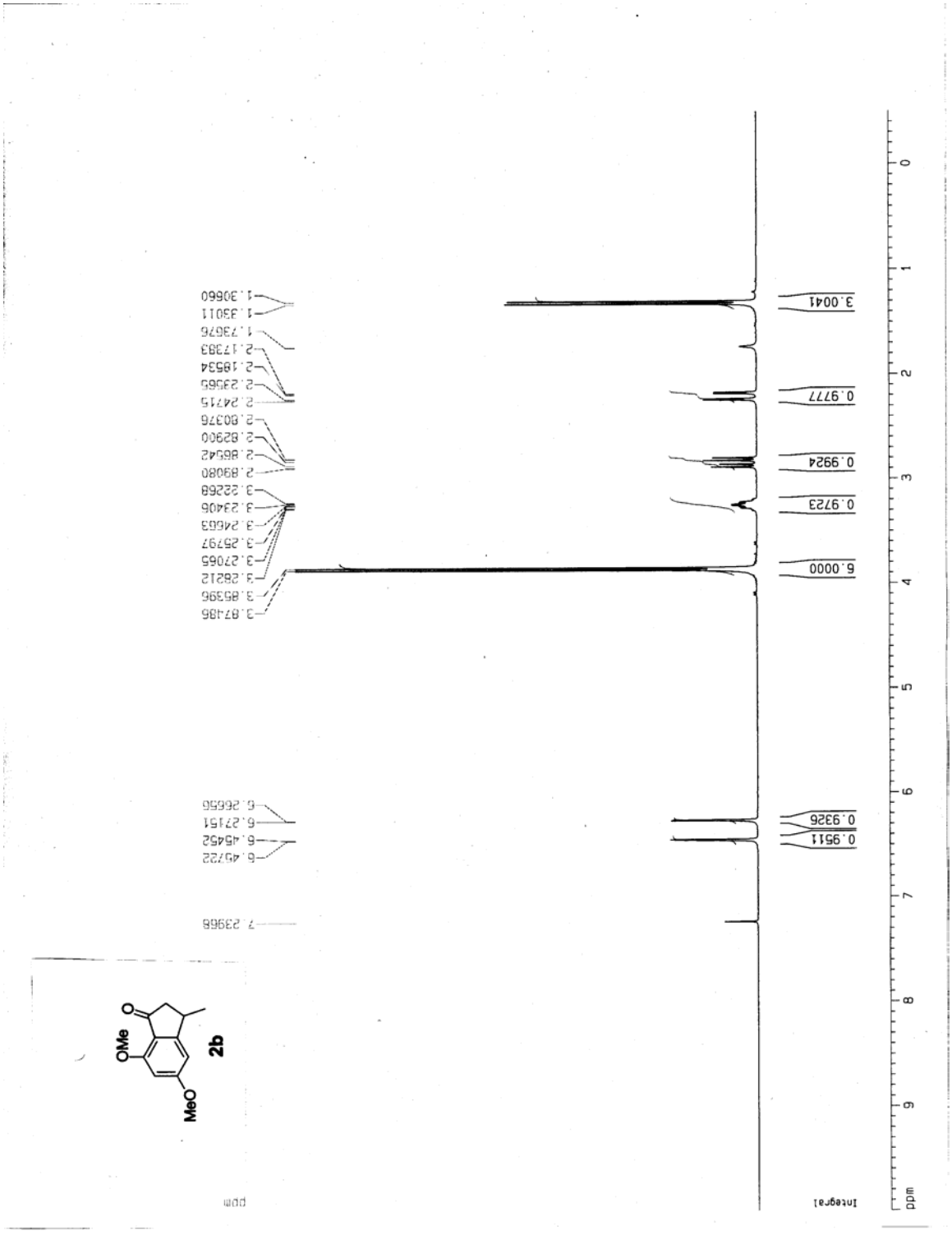
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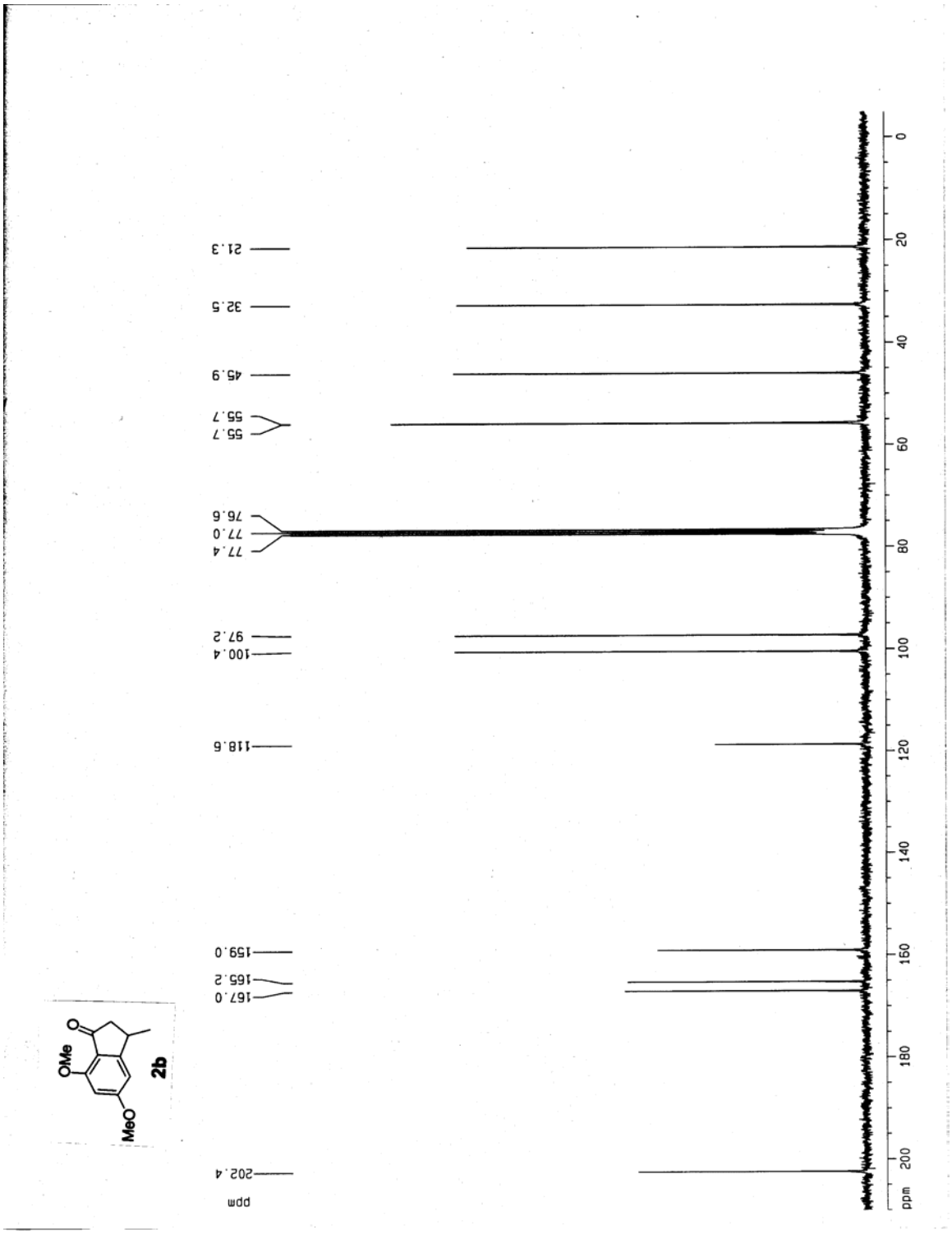
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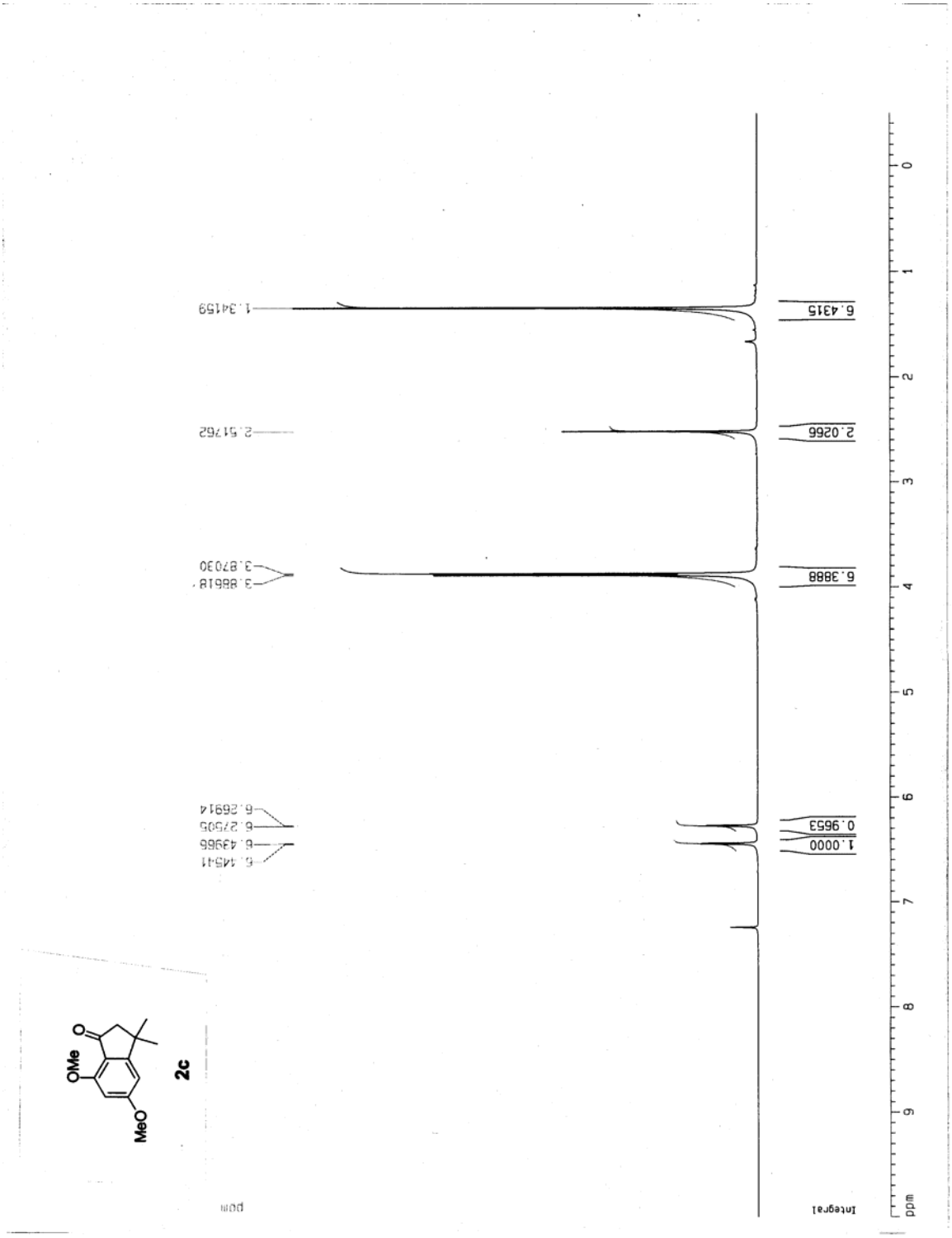
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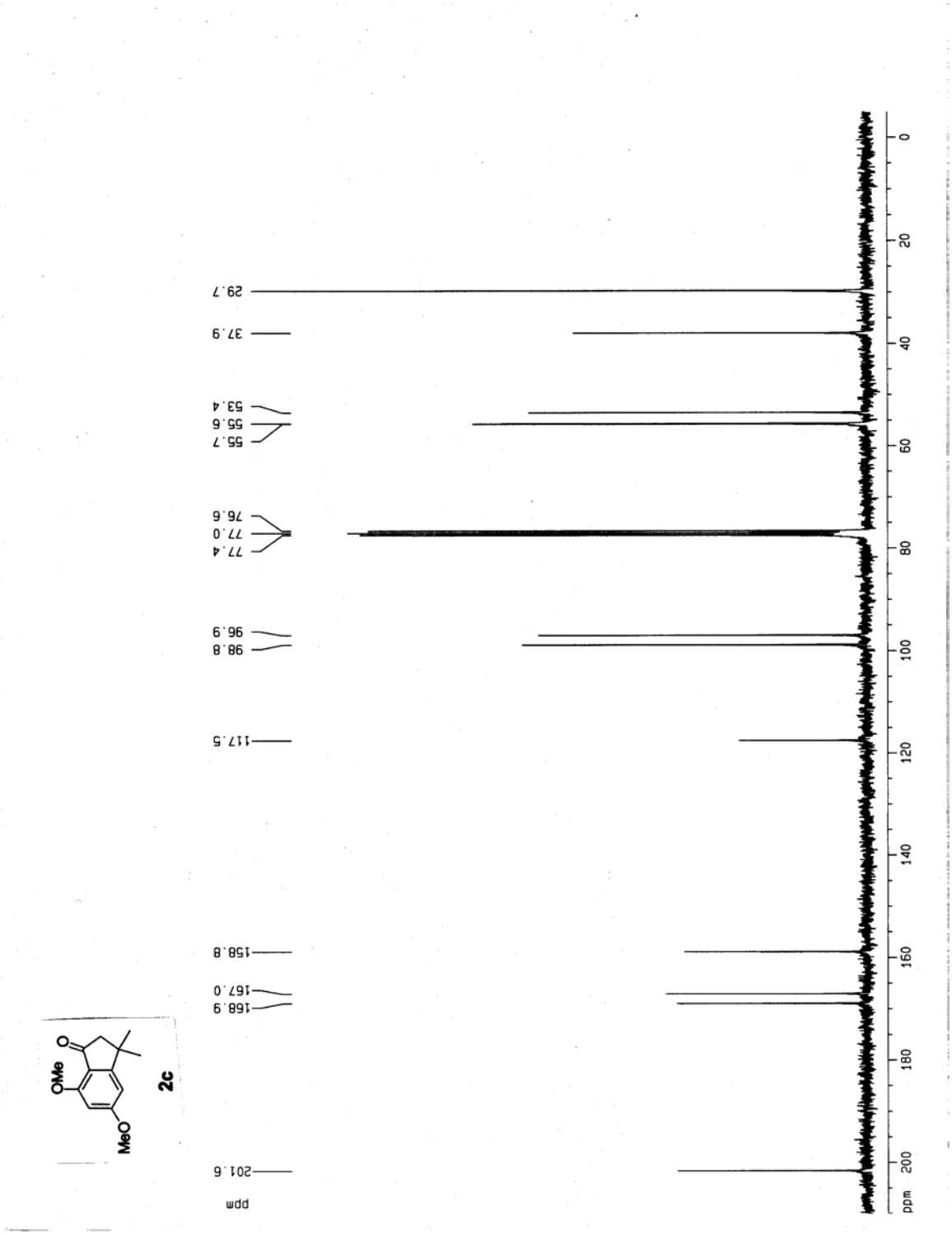
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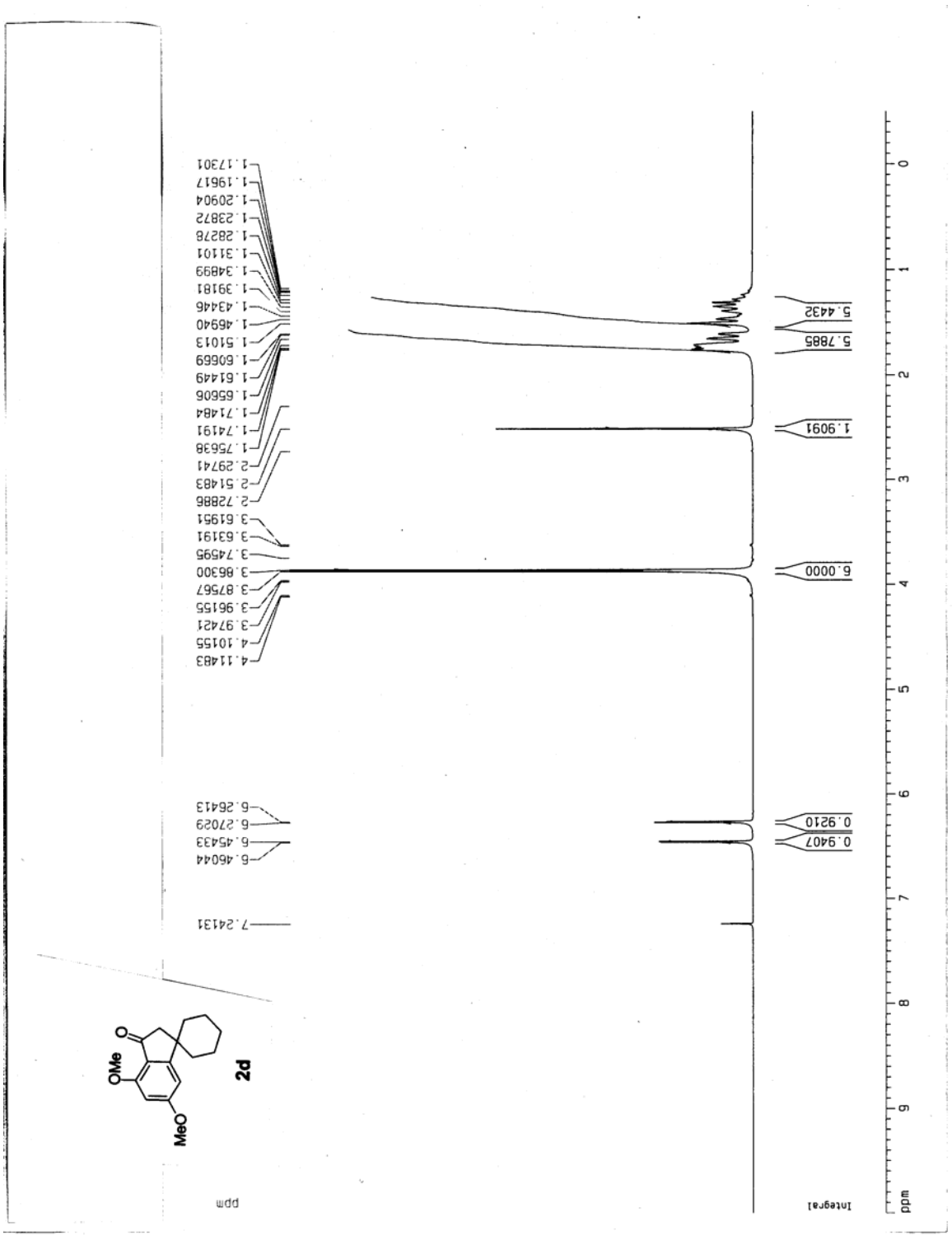
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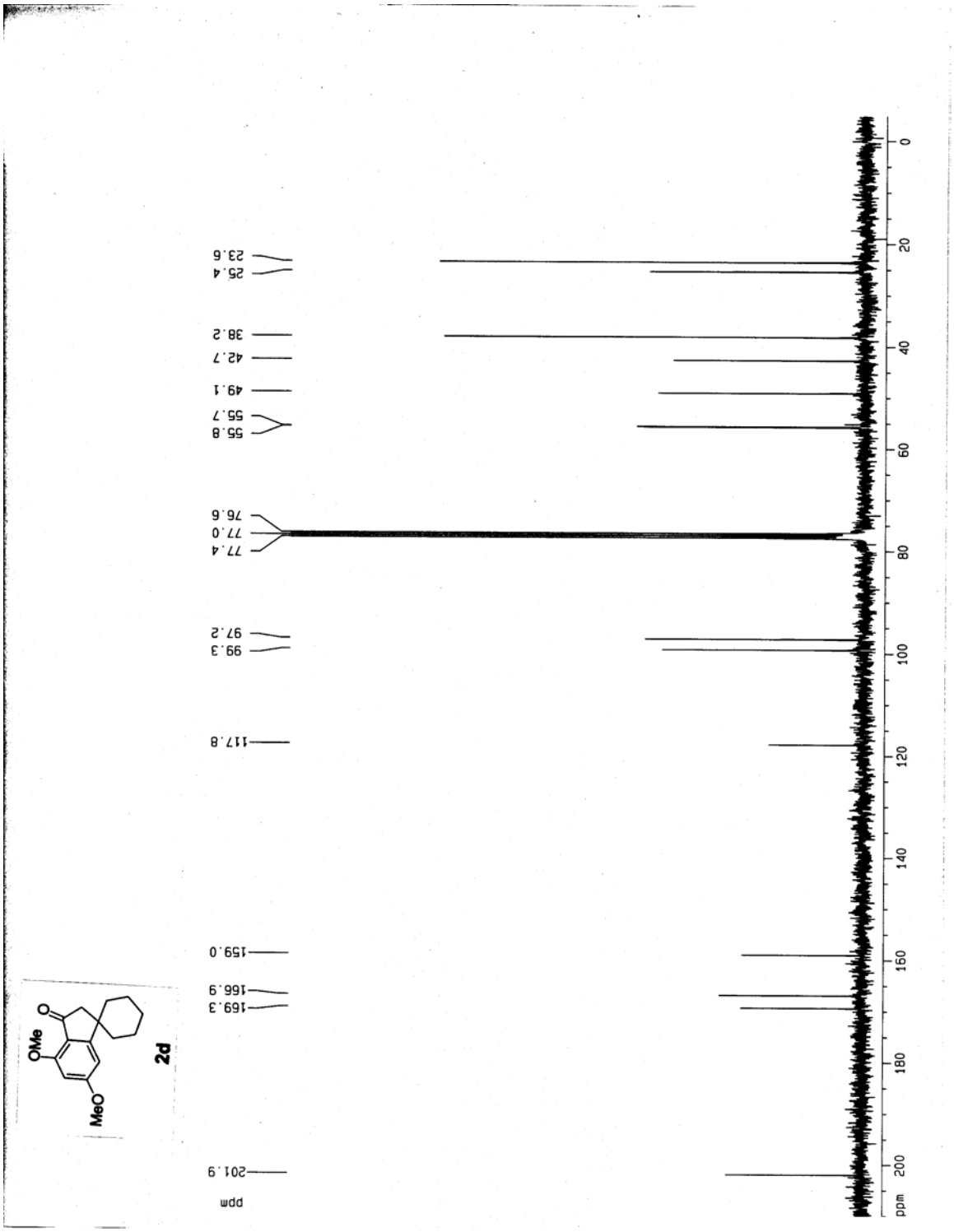
1.60669
1.61449
1.65606
1.71484
1.74191
1.75638
2.29741
2.51483
2.72886
3.61951
3.63191
3.74595
3.86300
3.87567
3.96155
3.97421
4.10155
4.11483
6.26413
6.27029
6.45433
6.46044
7.24131
5.4432
5.7885
1.9091
6.0000
0.9210
0.9407
Integral
ppm
OMe
MeO
O
2d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55.8
76.6
77.0
77.4
97.2
99.3
117.8
159.0
166.9
169.3
201.9
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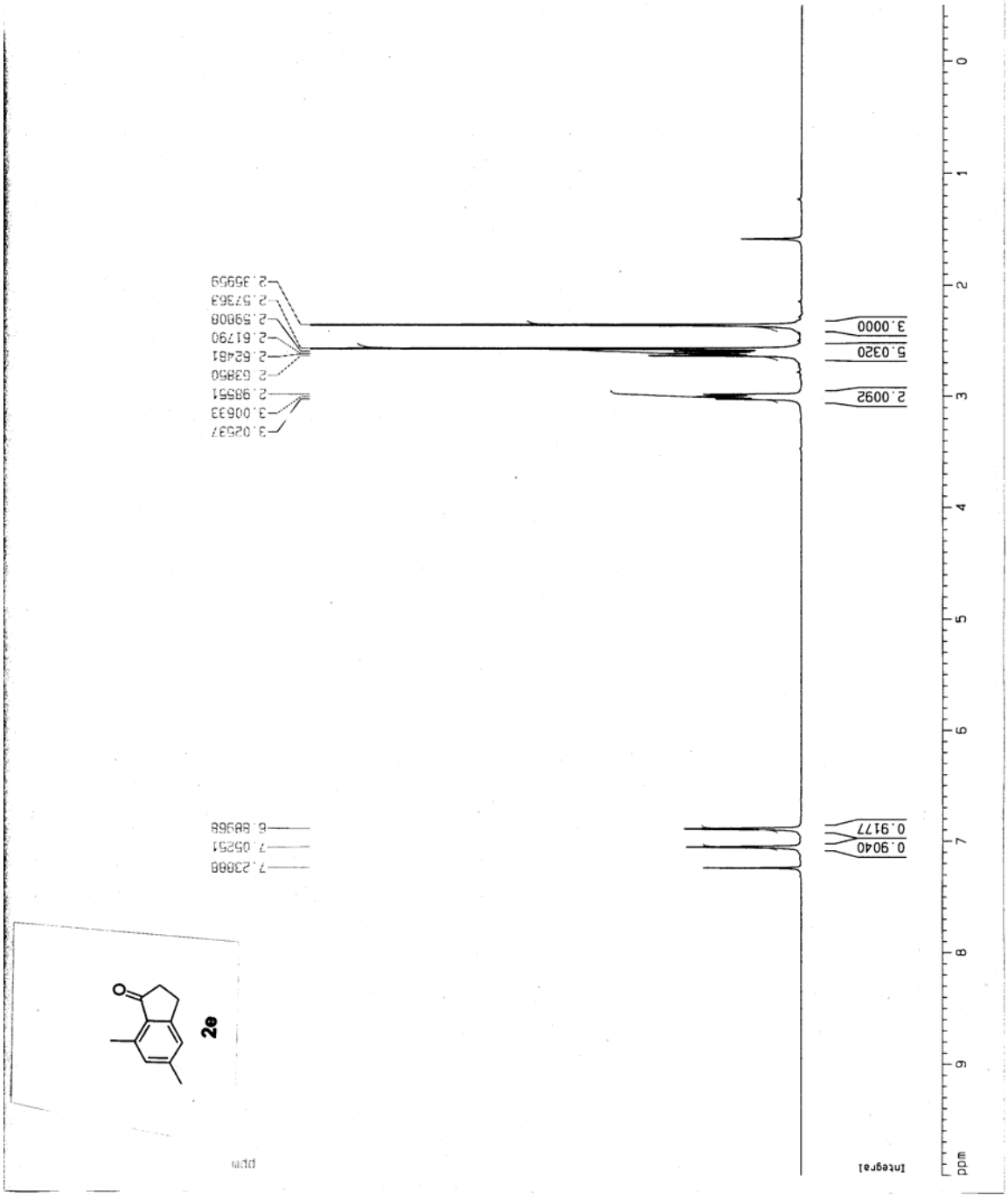
20
40
60
80
100
120
140
160
180
200
ppm
OMe
MeO
O
2d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0.9040
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5.0320
3.0000
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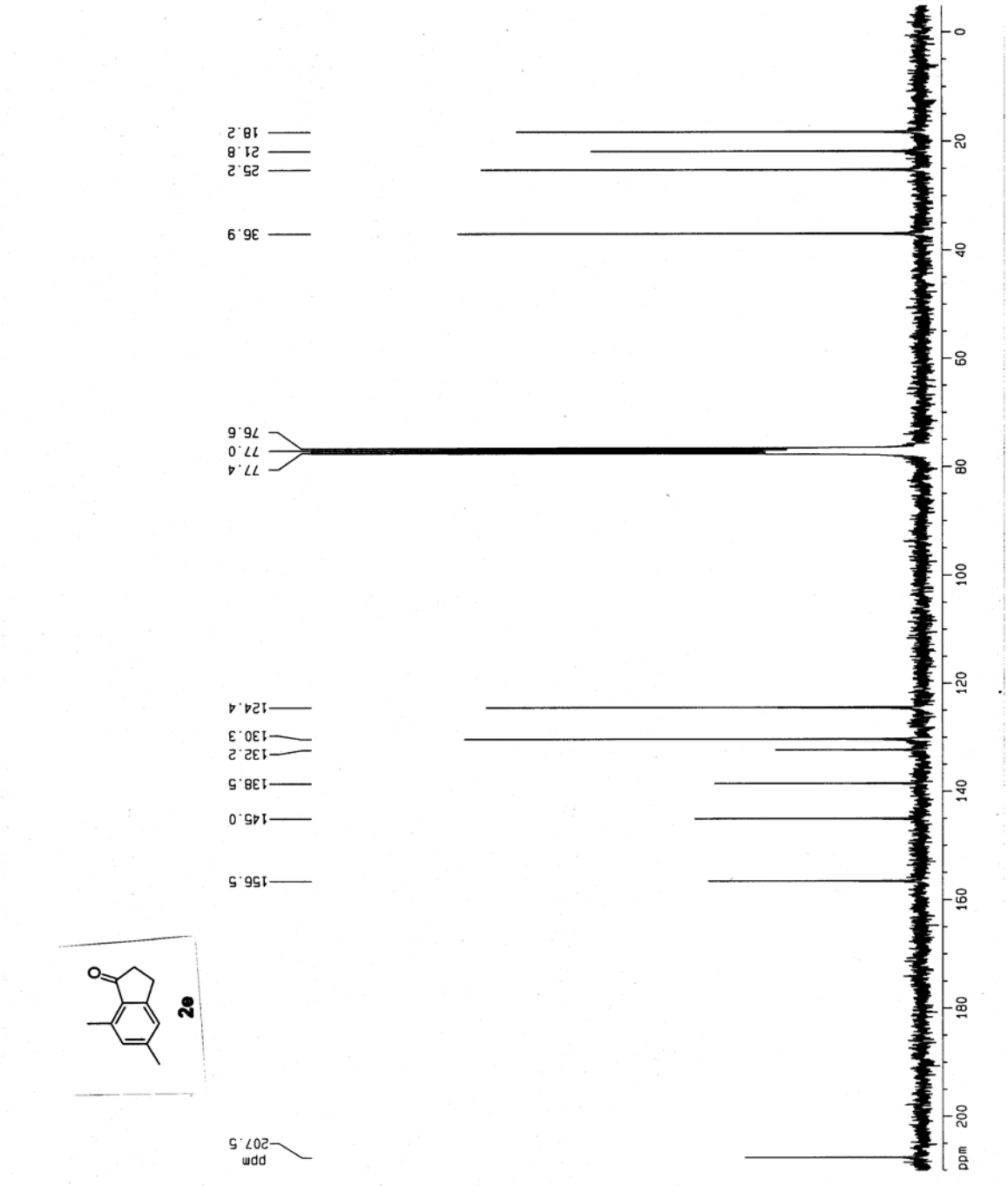
3.00633
2.98551
2.63850
2.62481
2.61790
2.59008
2.57363
2.35959
ppm
Integral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25.2
36.9
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77.0
77.4
124.4
130.3
132.2
138.5
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207.5
ppm
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60
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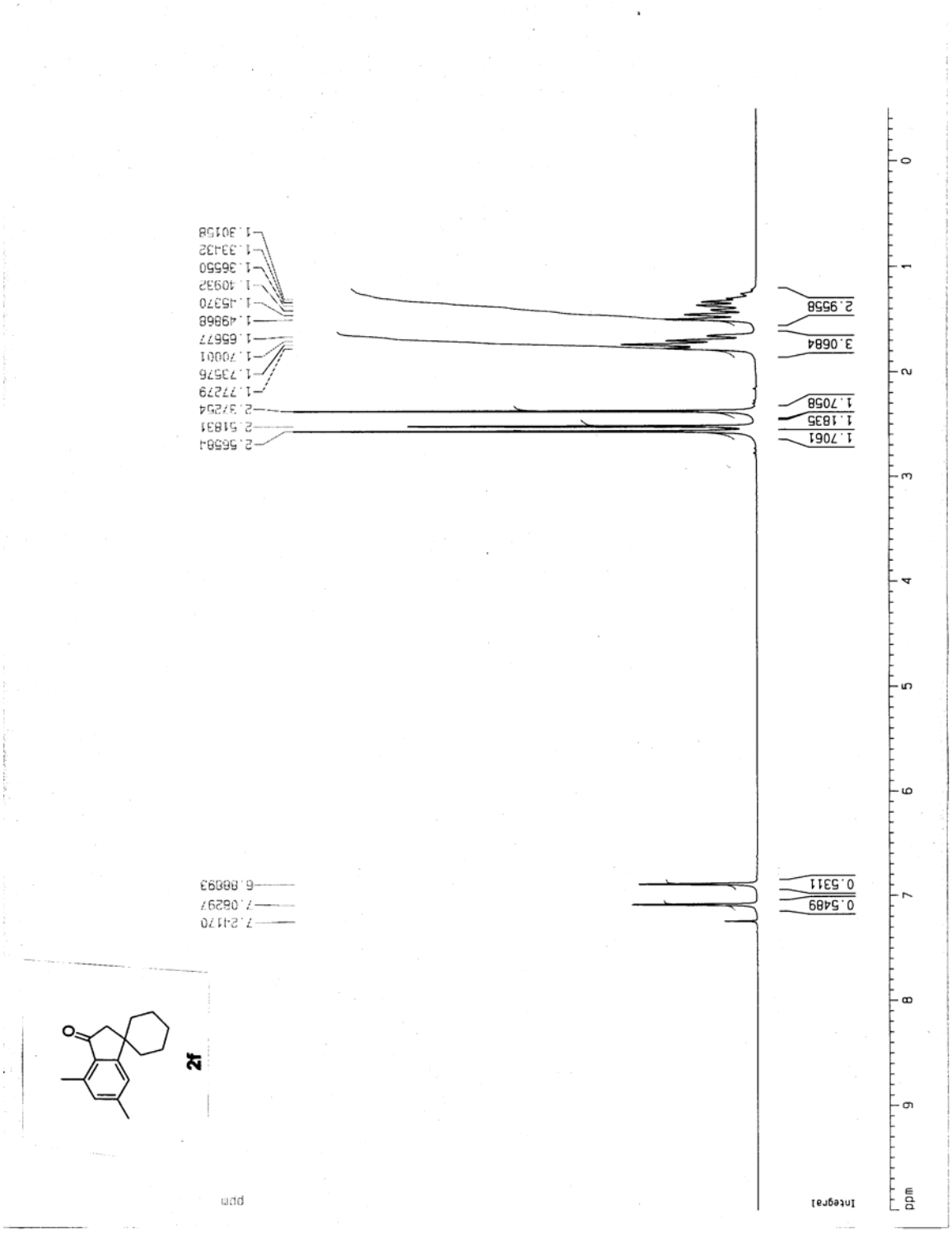
100
120
140
160
180
200
ppm
2e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2.37294
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1.73576
1.70001
1.65677
1.49868
1.45370
1.40932
1.36550
1.33432
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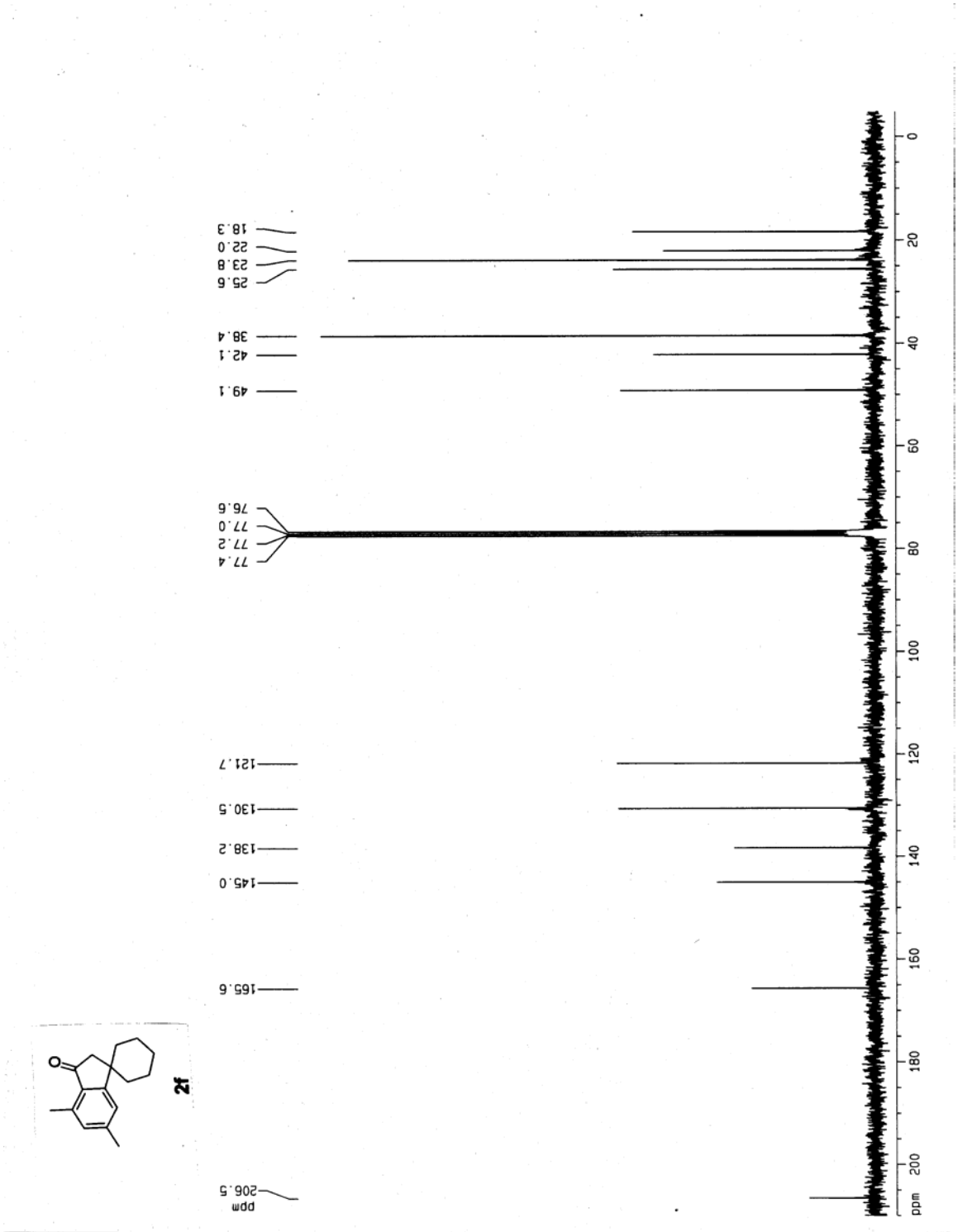
1.7061
1.1835
1.7058
3.0684
2.9558
Integral
ppm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22.0
23.8
25.6
38.4
42.1
49.1
76.6
77.0
77.2
77.4
121.7
130.5
138.2
145.0
165.6
206.5
ppm
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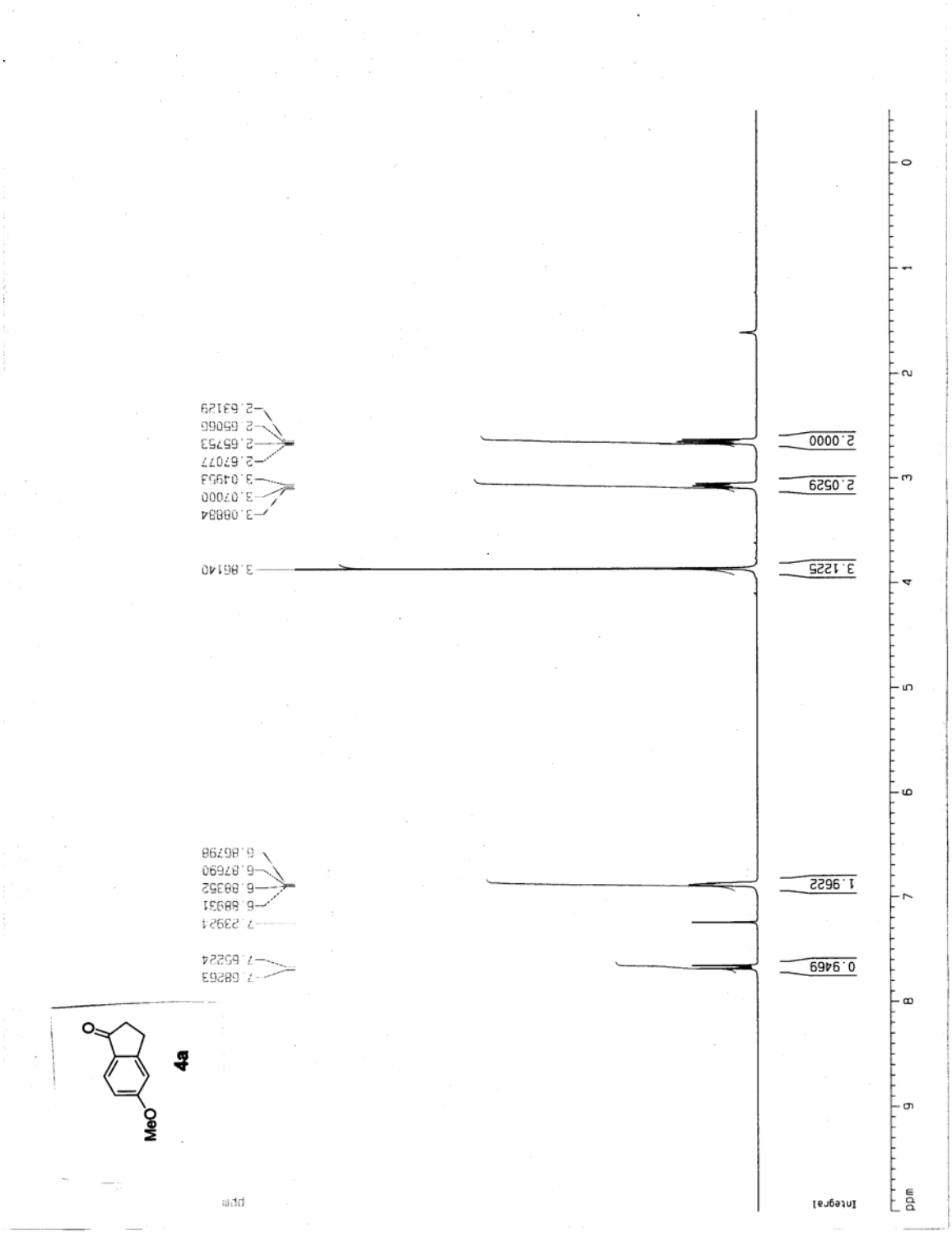
40
60
80
100
120
140
160
180
200
ppm
2f


4a
MeO
ppm
Integral
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2.0529
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3.1225
3.8614
7.6224
7.6263
7.2392
6.8798
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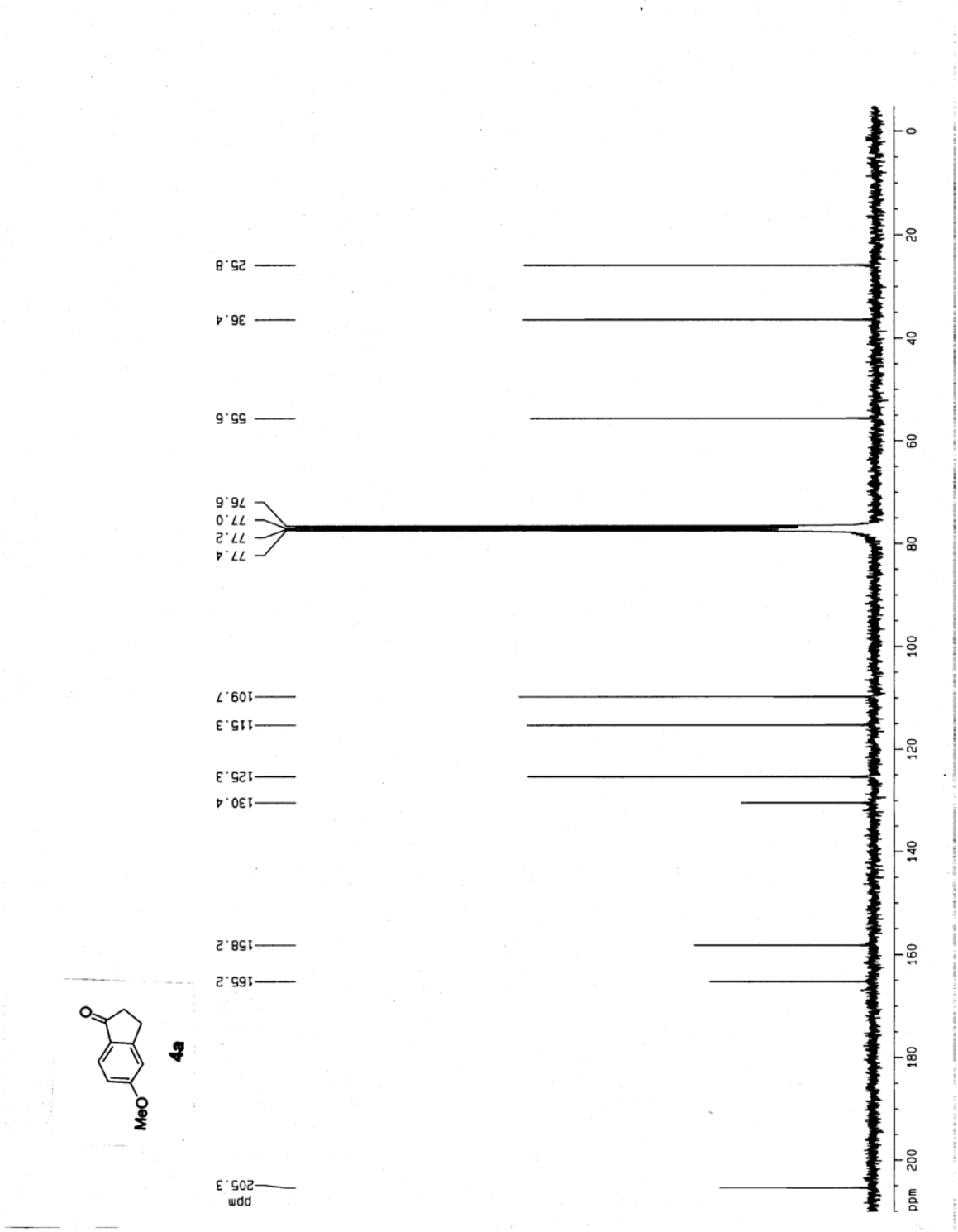
6.8893
3.0884
3.0700
3.0953
2.6707
2.6575
2.6506
2.6312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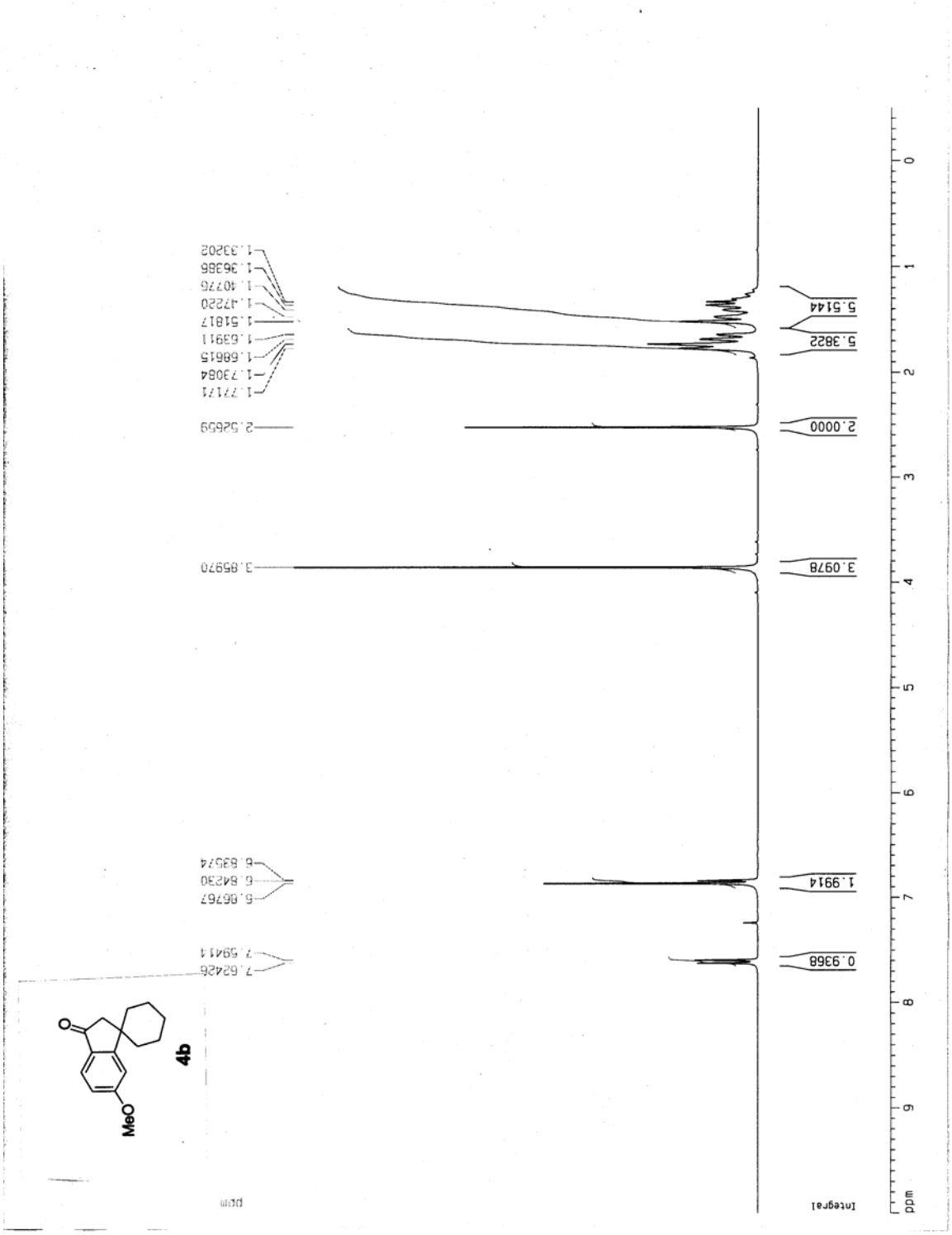
36.4
55.6
76.6
77.0
77.2
77.4
109.7
115.3
125.3
130.4
158.2
165.2
205.3
ppm
0
20
40
60
80
100
120
140
160
180
200
ppm
MeO
4a


4b
MeO
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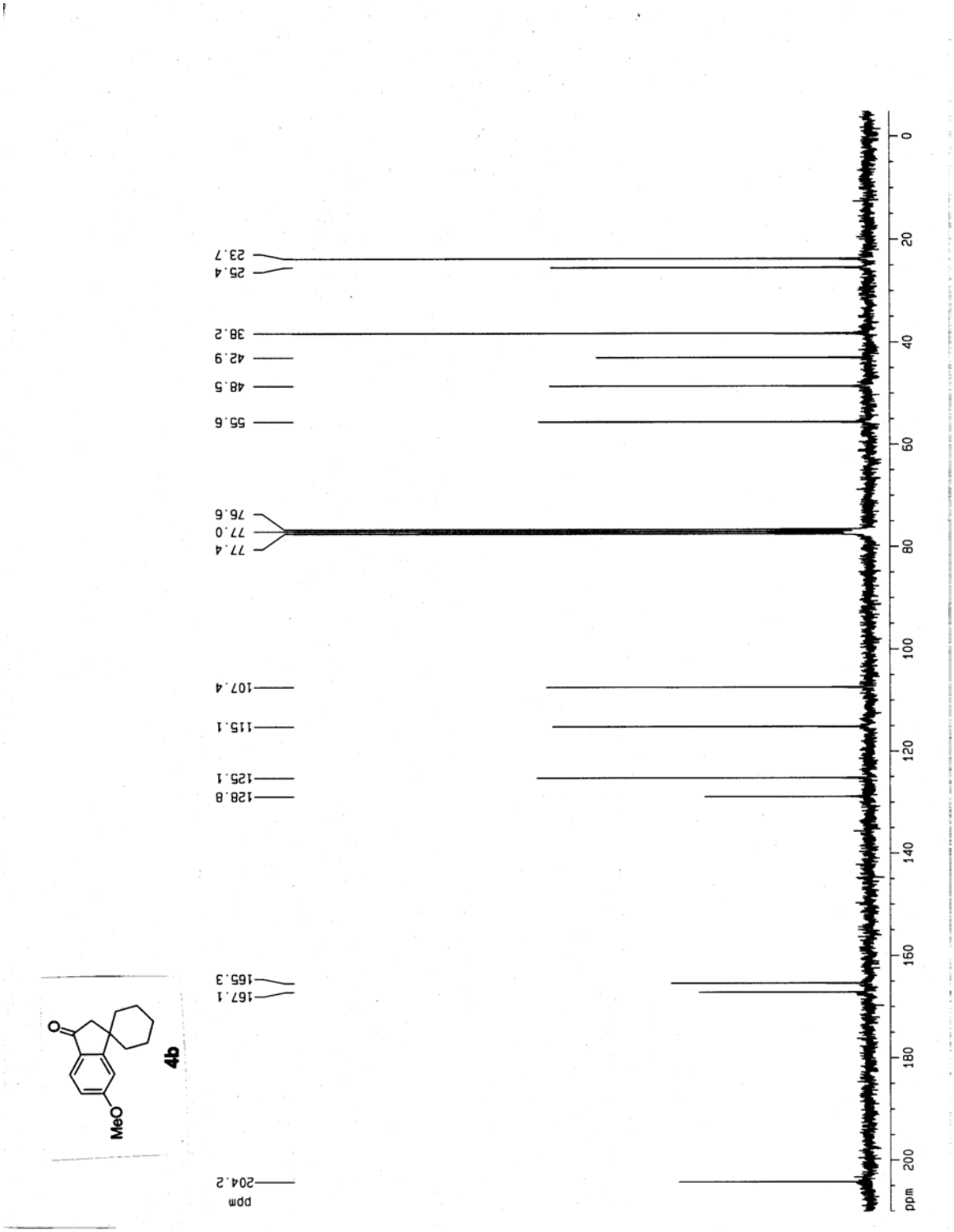
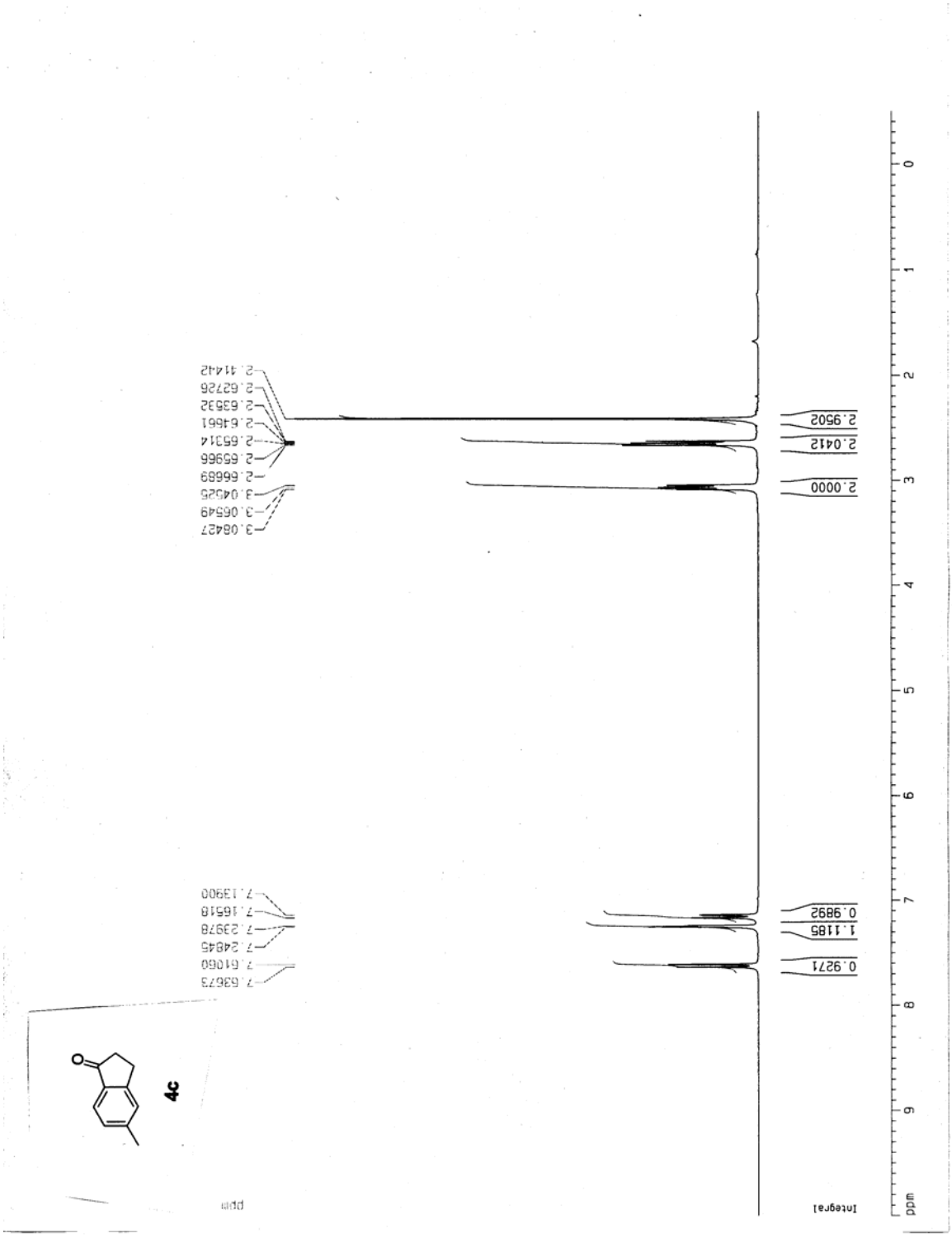
6.86767
6.84230
6.83574
3.85970
2.52659
1.77171
1.73084
1.68615
1.63911
1.51817
1.47220
1.40776
1.36386
1.33202
0.9368
1.9914
2.0000
3.0978
5.3822
5.5144
Integral
ppm


4b
MeO
204.2
167.1
165.3
128.8
125.1
115.1
107.4
77.4
77.0
76.6
55.6
48.5
42.9
38.2
25.4
23.7
ppm
0
20
40
60
80
100
120
140
160
180
200
ppm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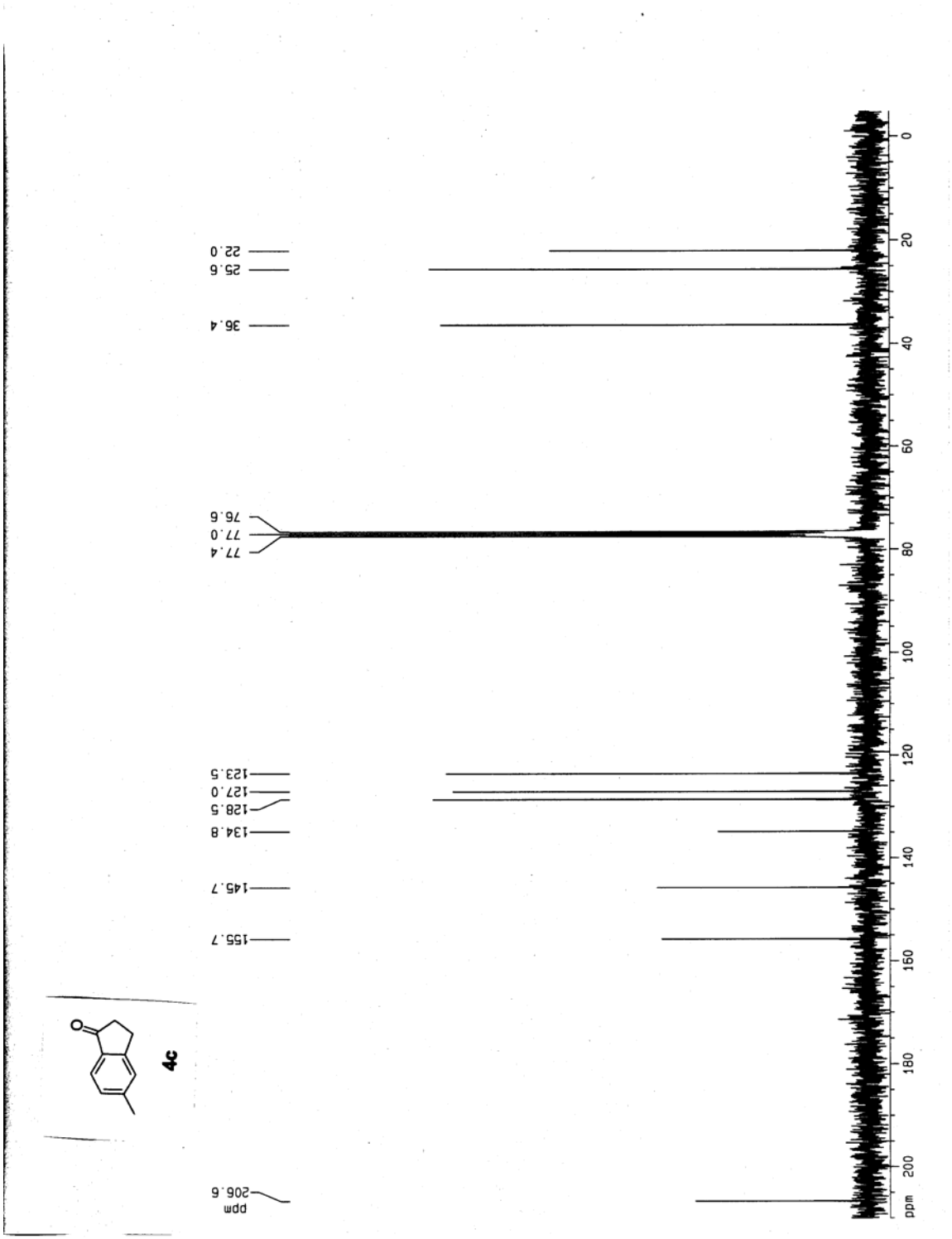
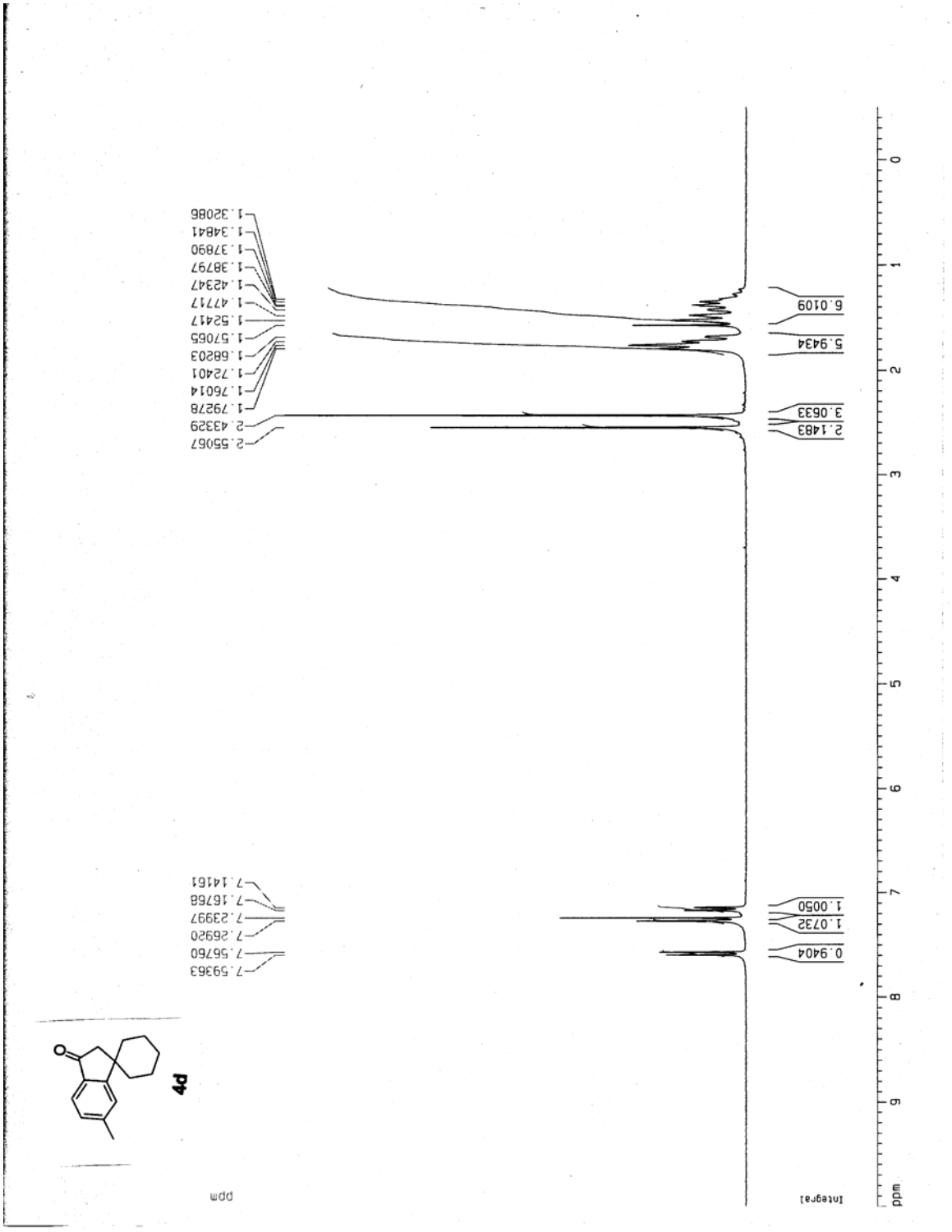
7.23978
7.16518
7.13900
3.08427
3.06549
3.04525
2.66689
2.65966
2.65314
2.64661
2.63532
2.62726
2.61442
0.9271
1.1185
0.9892
2.0000
2.0412
2.9502
Integral
ppm


4c
206.6
155.7
145.7
134.8
128.5
127.0
123.5
77.4
77.0
76.6
36.4
25.6
22.0
ppm
0
20
40
60
80
100
120
140
160
180
200
ppm


4d
ppm
Integral
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7.26920
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7.16768
7.14161
2.55067
2.43329
1.79278
1.76014
1.72401
1.68203
1.57065
1.52417
1.47717
1.42347
1.38797
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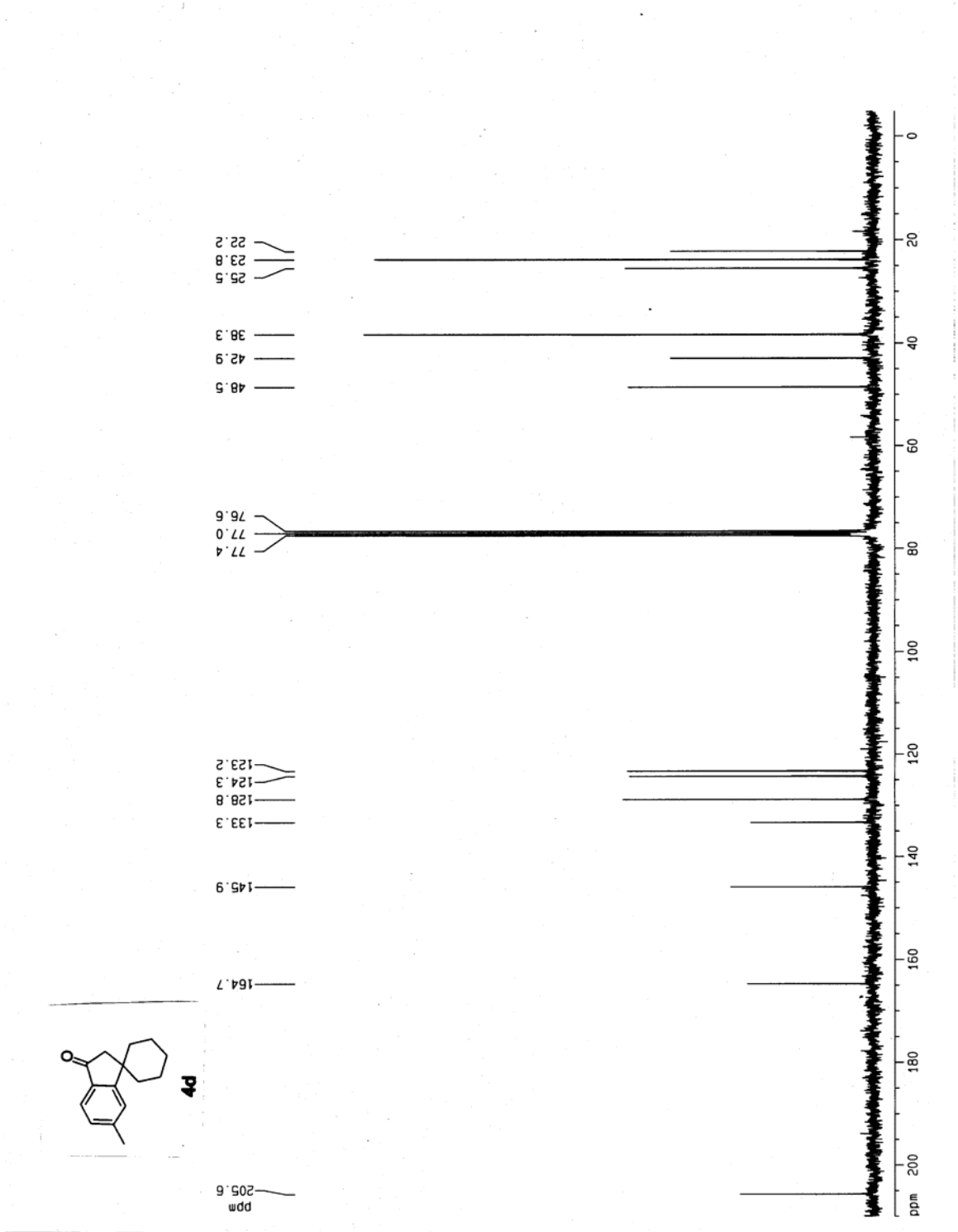
1.32086
0.9404
1.0732
1.0050
5.9434
6.0109
2.1483
3.0533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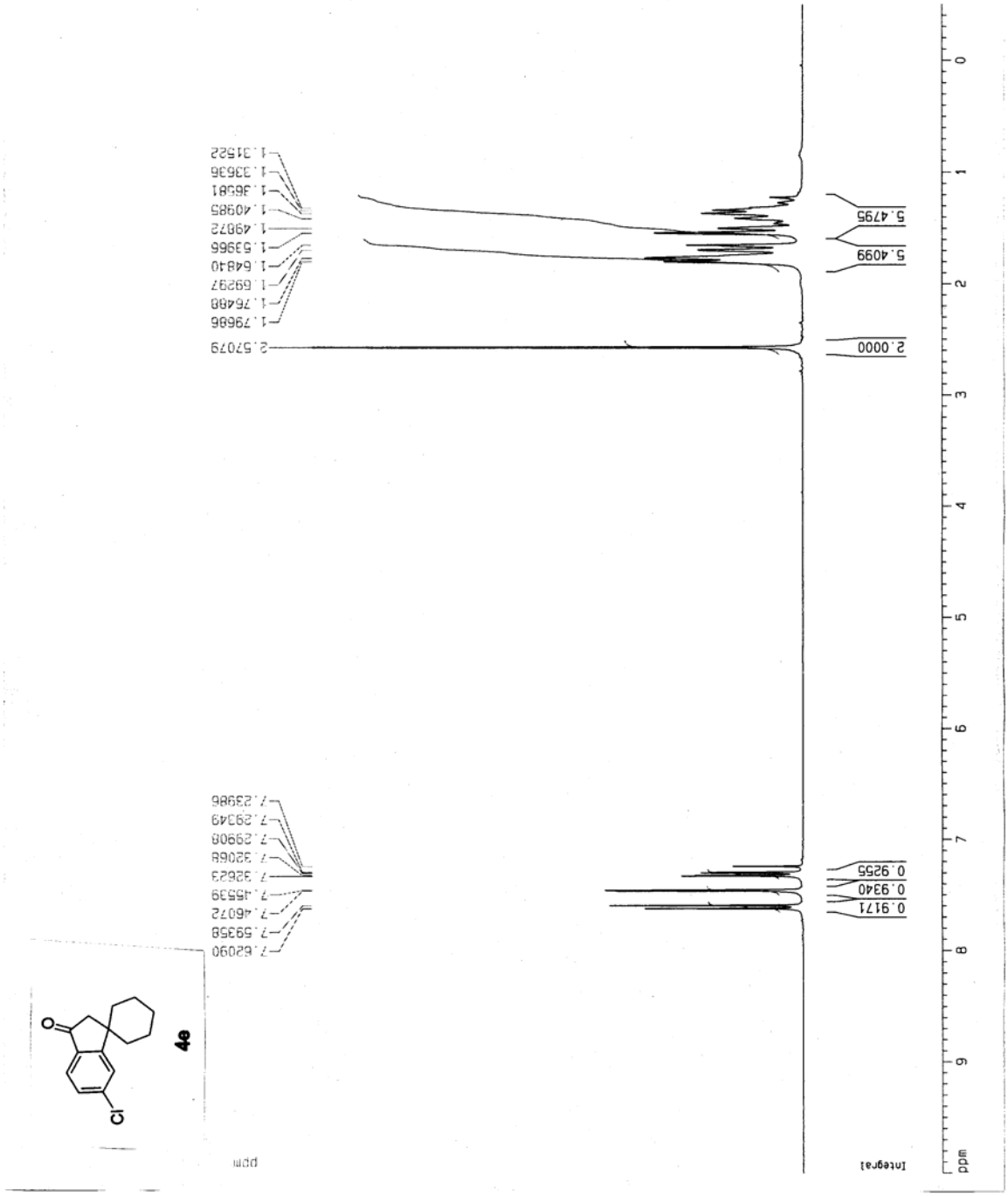
23.8
25.5
38.3
42.9
48.5
76.6
77.0
77.4
123.2
124.3
128.8
133.3
145.9
164.7
205.6
ppm
0
20
40
60
80
100
120
140
160
180
200
ppm
4d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Cl
O
ppm
Integral
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2.0000
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1.79686
1.76488
1.69297
1.64840
1.53966
1.49872
1.40985
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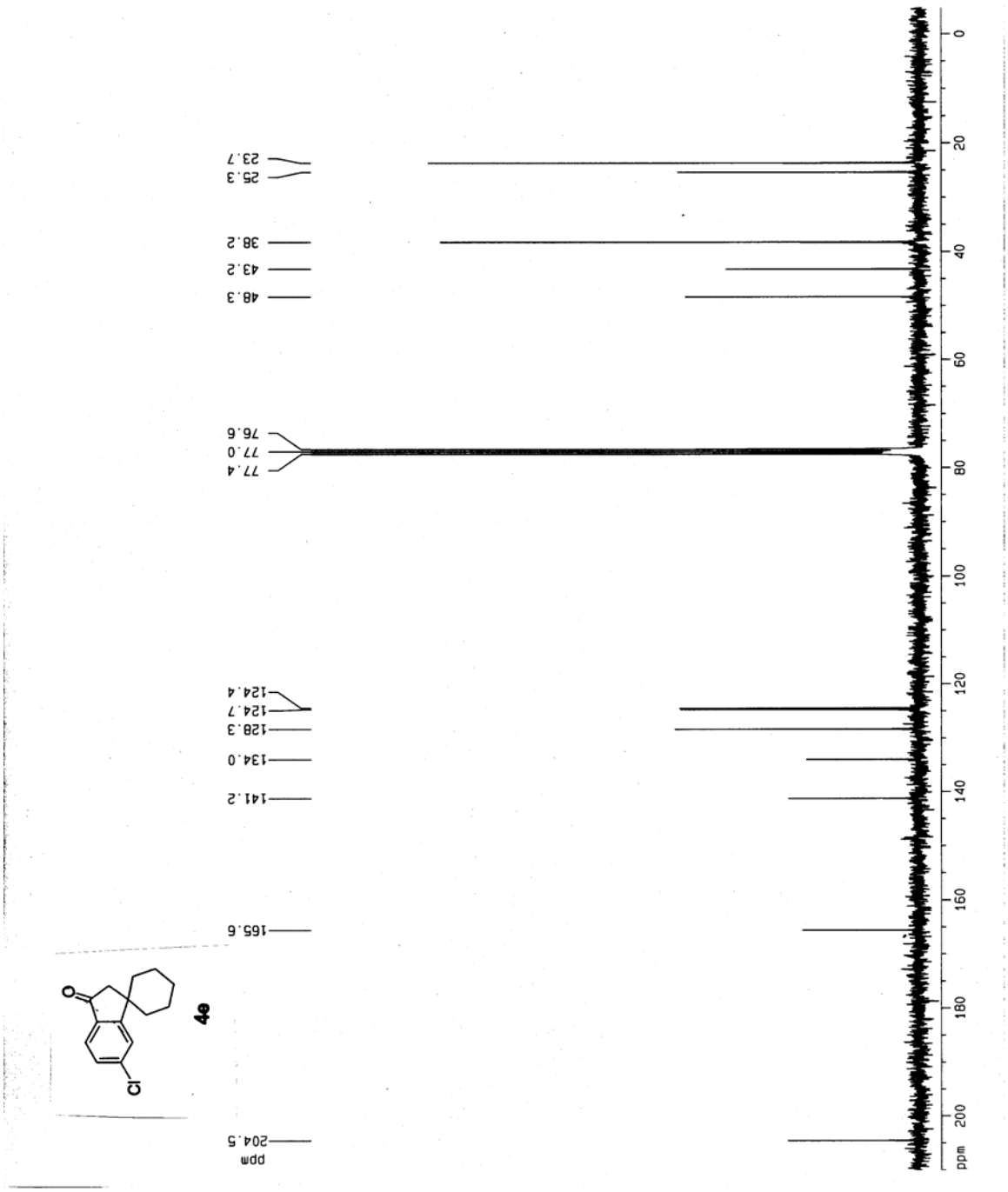
7.32068
7.29908
7.29349
7.23986


4g
Cl
O
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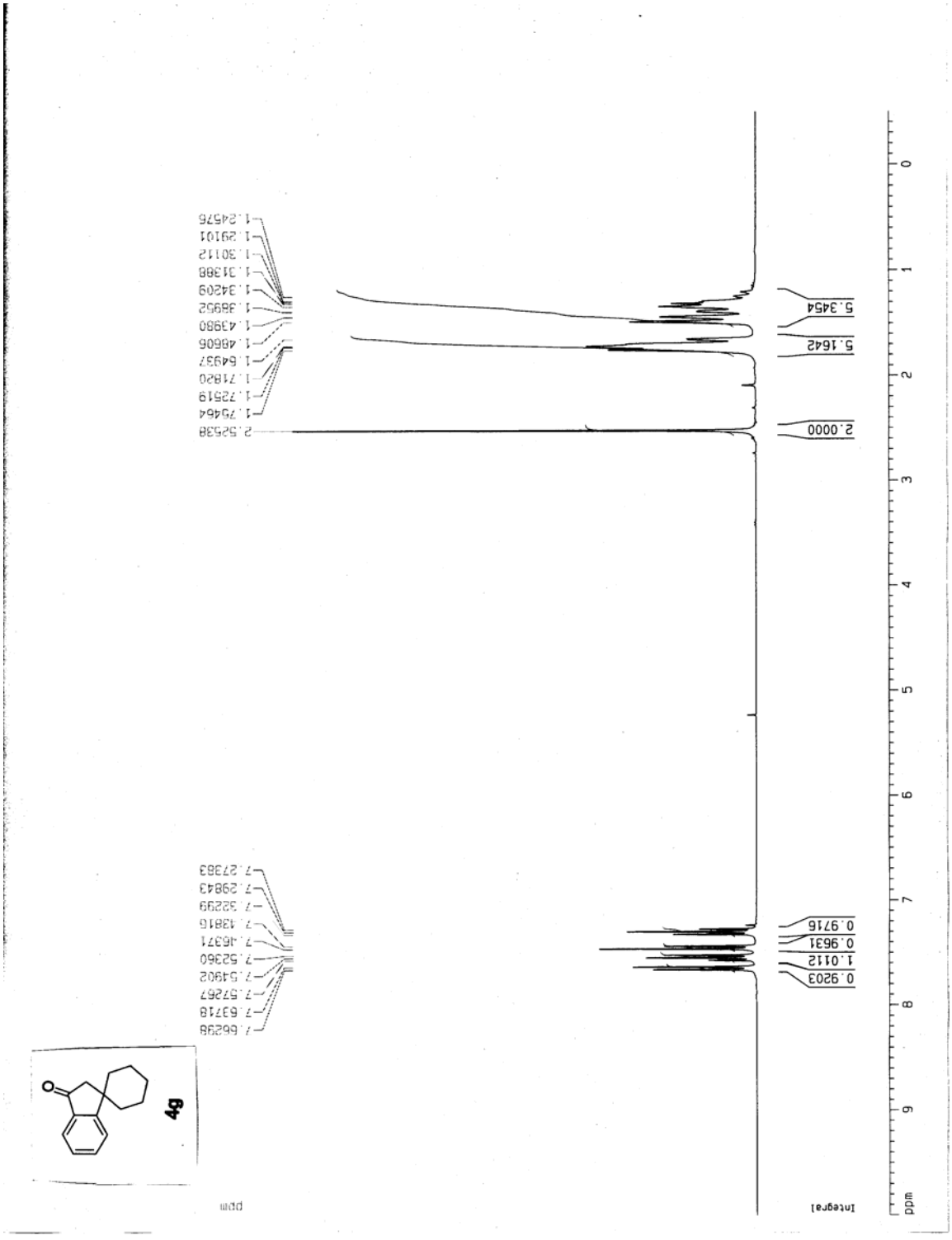
141.2
134.0
128.3
124.7
124.4
77.4
77.0
76.6
48.3
43.2
38.2
25.3
23.7
ppm
0
20
40
60
80
100
120
140
160
180
200
ppm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ppm
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2.0000
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1.72519
1.71820
1.64937
1.48606
1.43980
1.38902
1.34209
1.31388
1.30112
1.29101
1.24576
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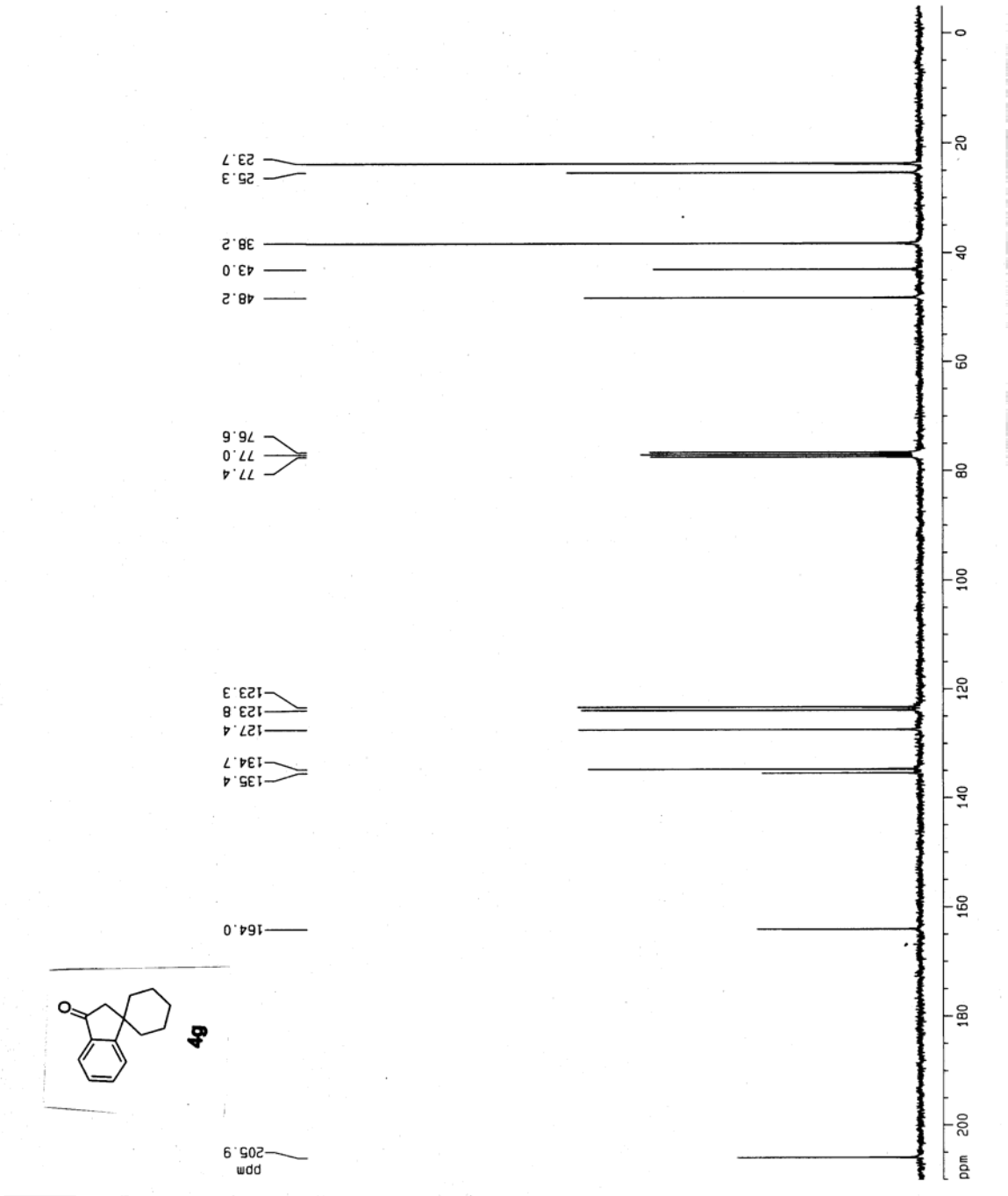
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25.3
38.2
43.0
48.2
76.6
77.0
77.4
123.3
123.8
127.4
134.7
135.4
164.0
205.9
ppm
0
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40
60
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100
120
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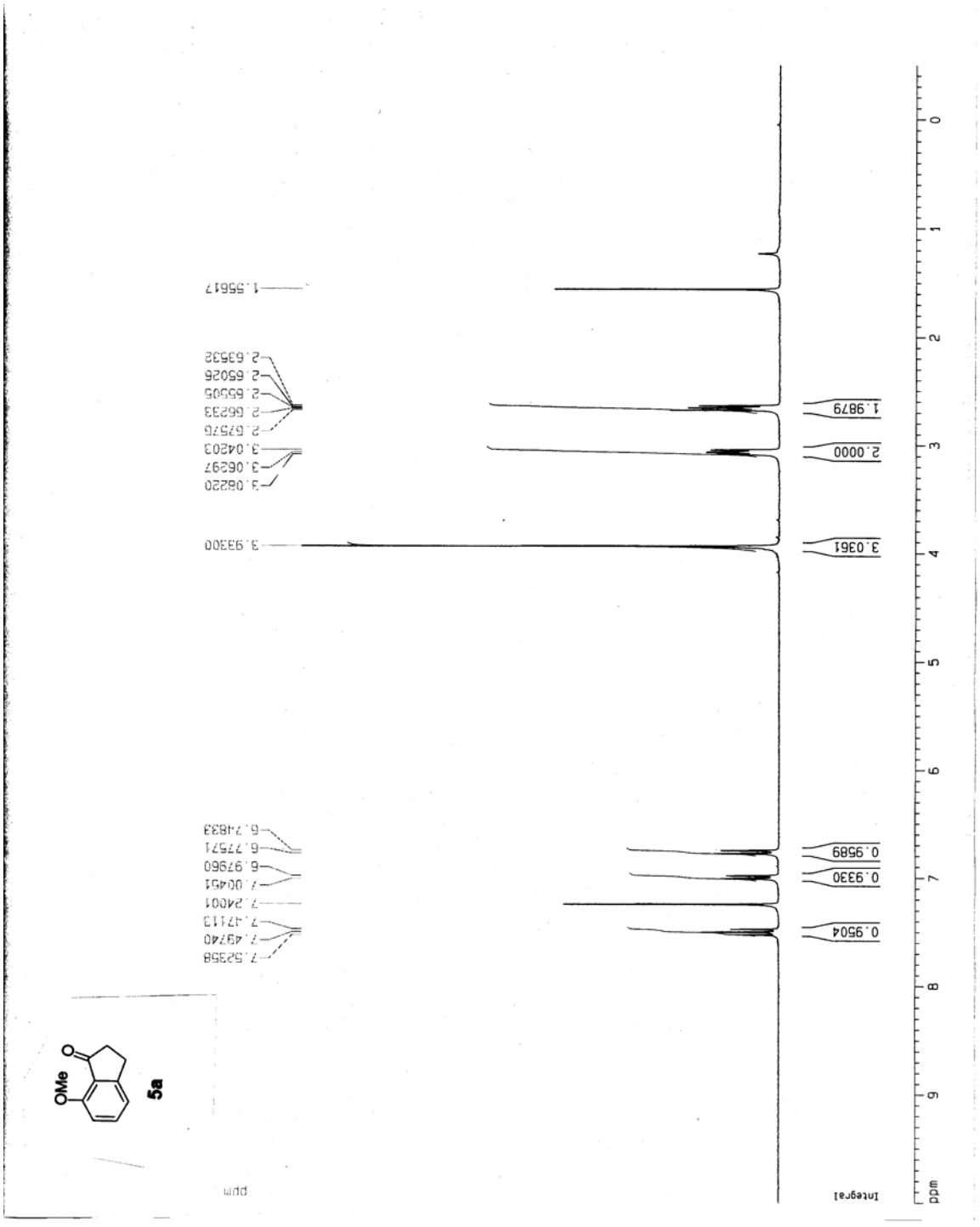
200
ppm
4g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3.08220
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6.77571
6.97960
7.00451
7.24001
7.47113
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0.9330
0.9589
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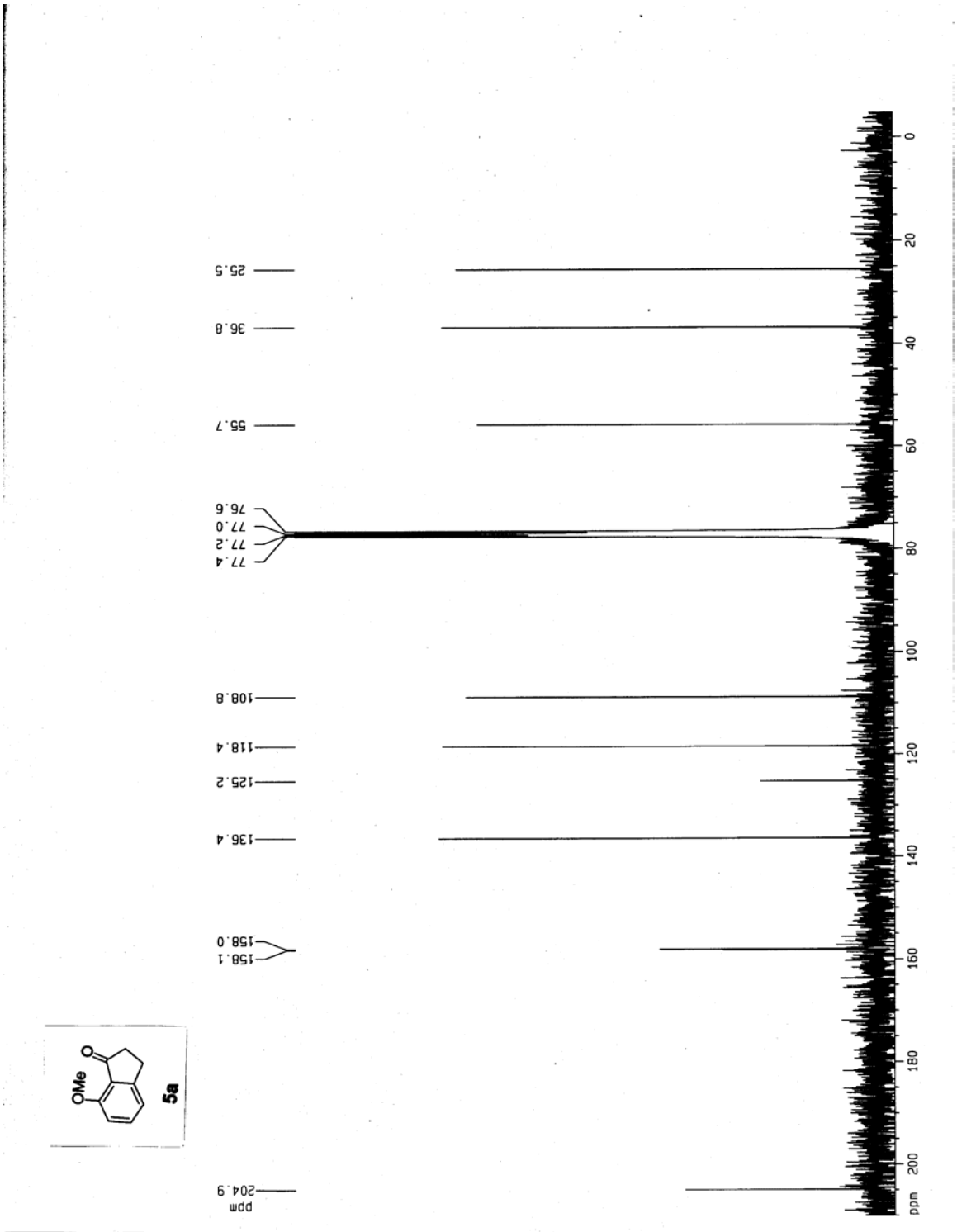
Integral
ppm
OMe
5a


OMe
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204.9
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158.0
136.4
125.2
118.4
108.8
77.4
77.2
77.0
76.6
55.7
36.8
25.5
ppm
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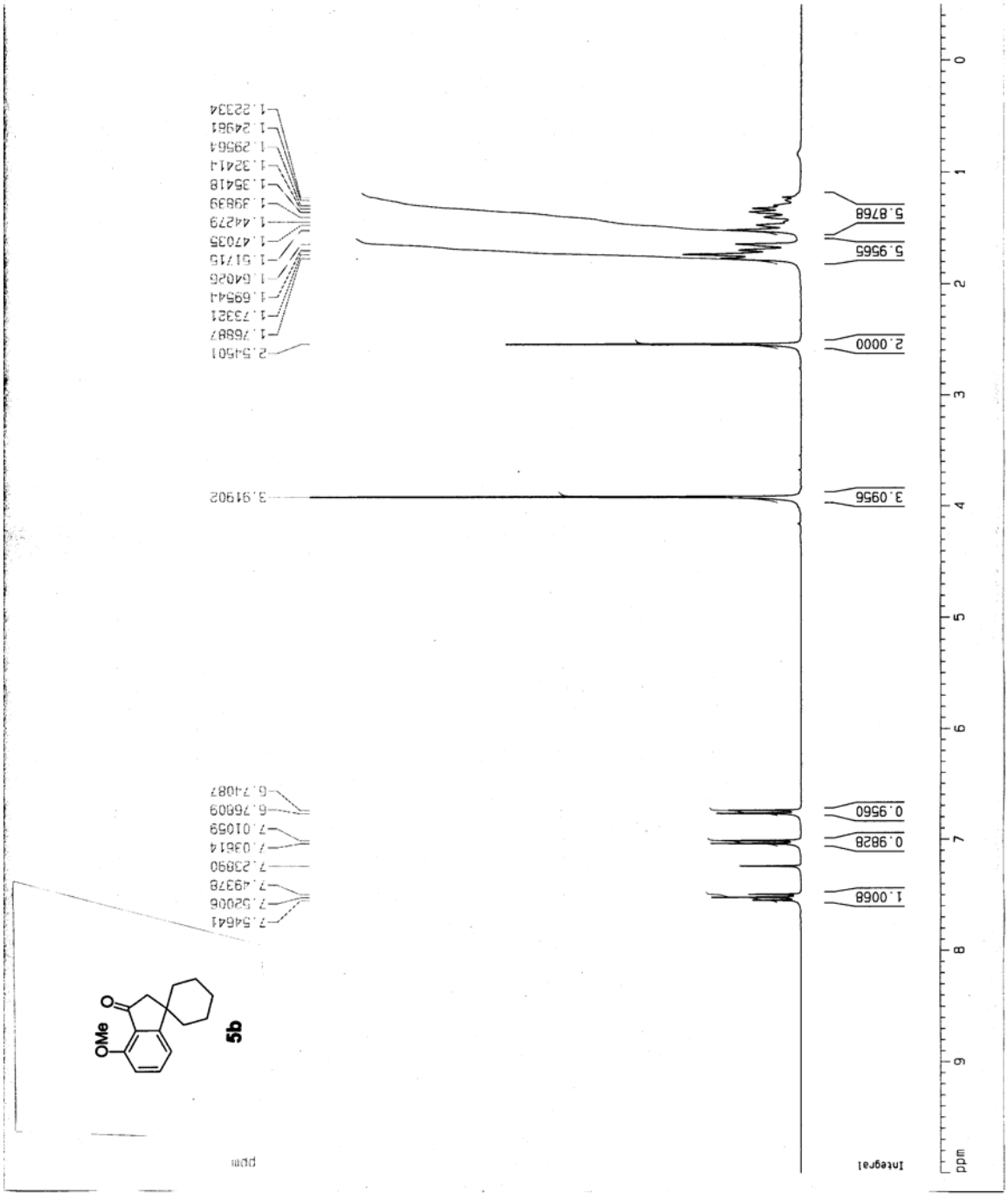
200
ppm


5b
OMe
O
ppm
Integral
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7.23990
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7.01059
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6.74087
3.91902
2.54501
1.76887
1.73321
1.69544
1.64026
1.51715
1.47035
1.44279
1.39839
1.35418
1.32414
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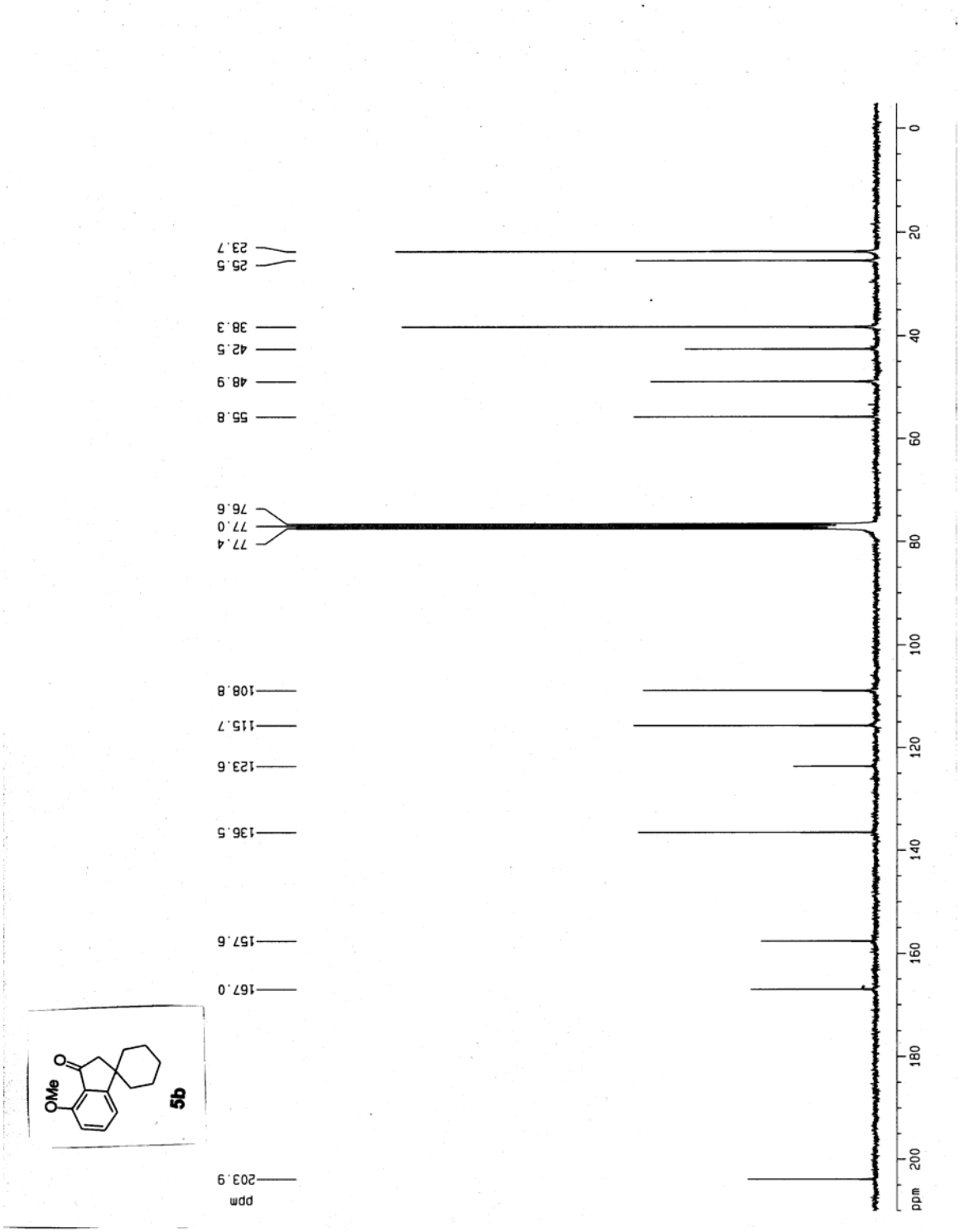
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38.3
42.5
48.9
55.8
76.6
77.0
77.4
108.8
115.7
123.6
136.5
157.6
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60
80
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160
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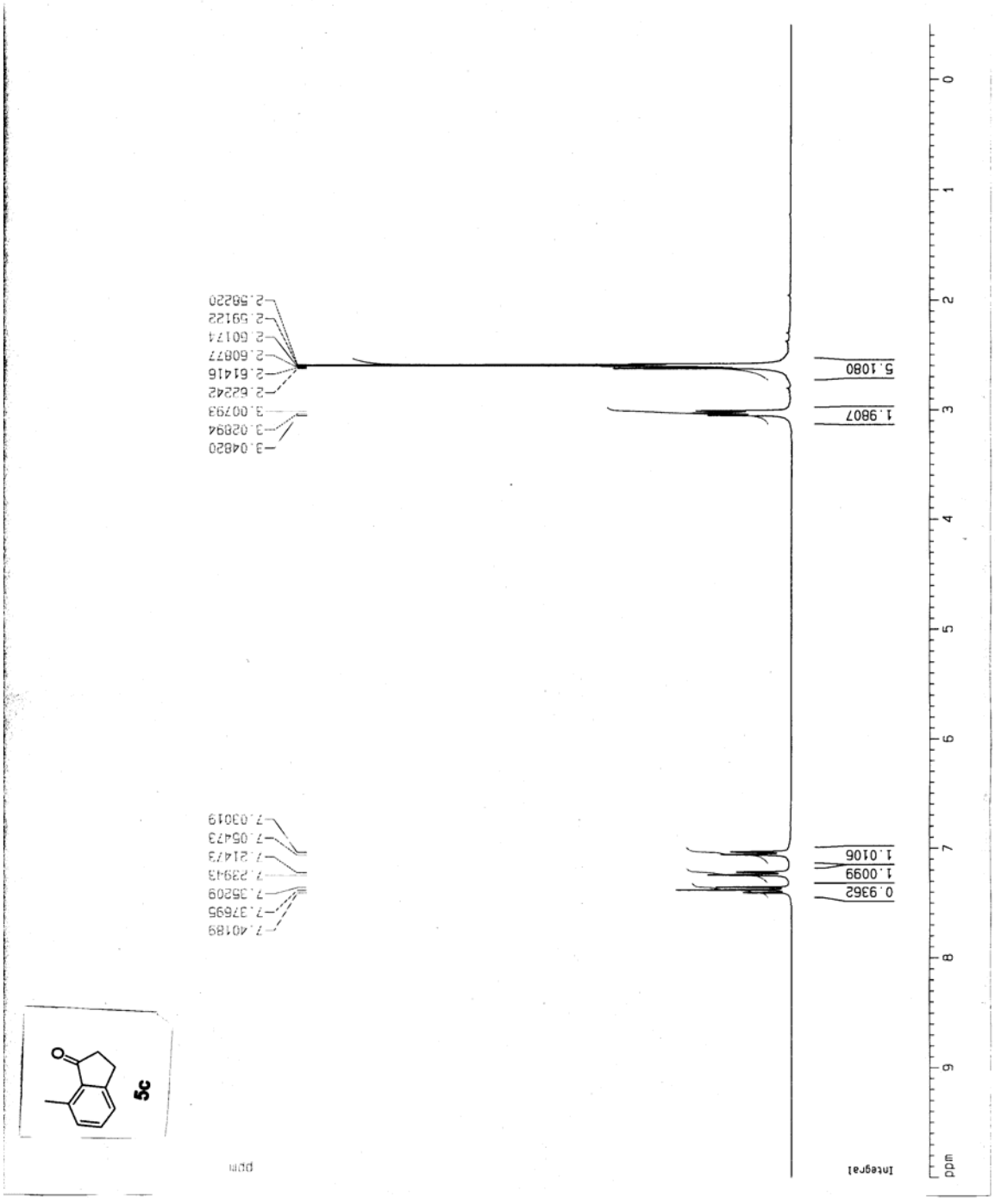
ppm
OMe
O
5b


5c
ppm
Integral
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7.03019
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3.02894
3.00793
2.62542
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2.60174
2.59122
2.58220
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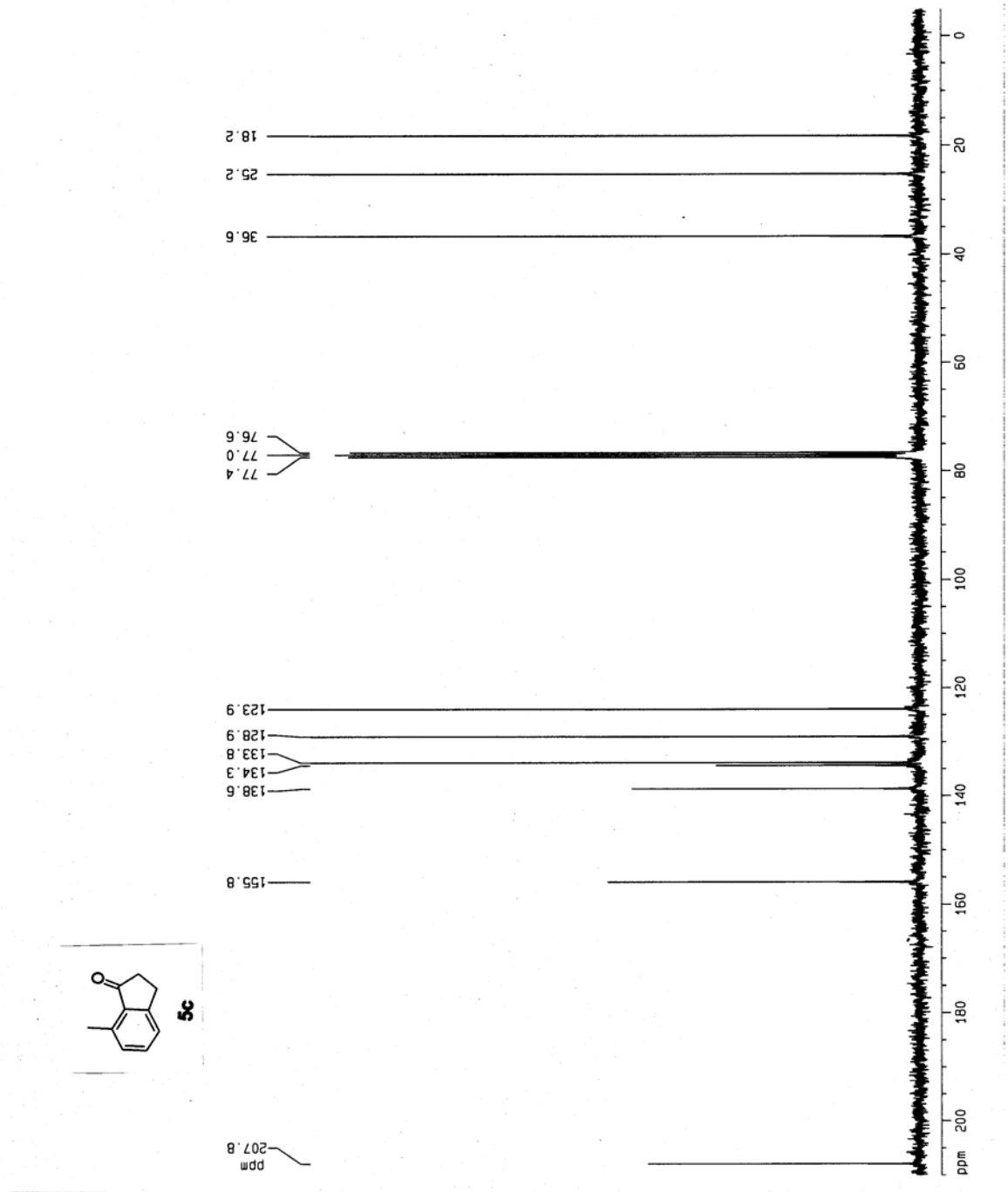
1.0099
1.0106
1.9807
5.1080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77.0
77.4
123.9
128.9
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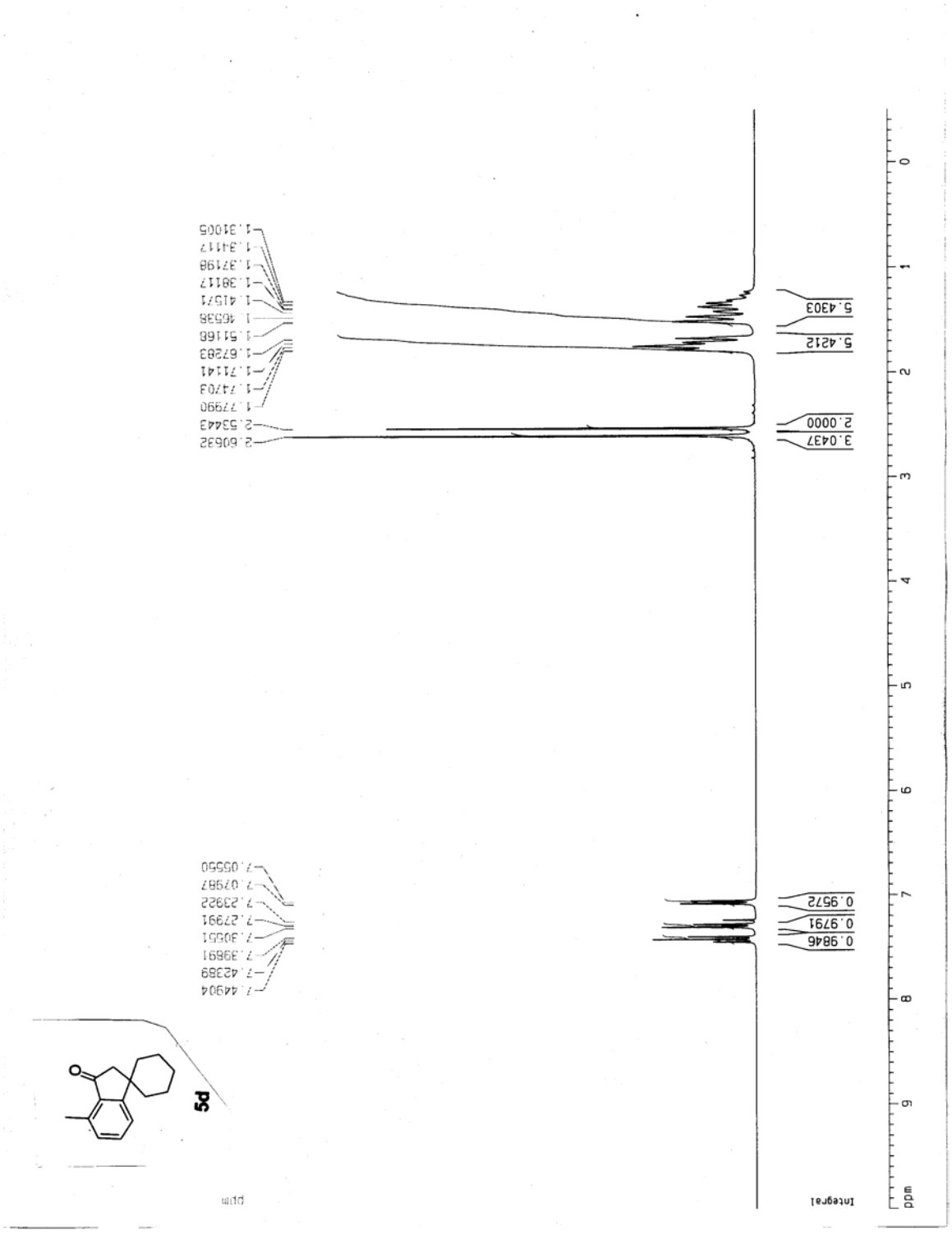
ppm
5c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7.05550
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1.38117
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1.46538
1.51168
1.67283
1.71141
1.74703
1.77990
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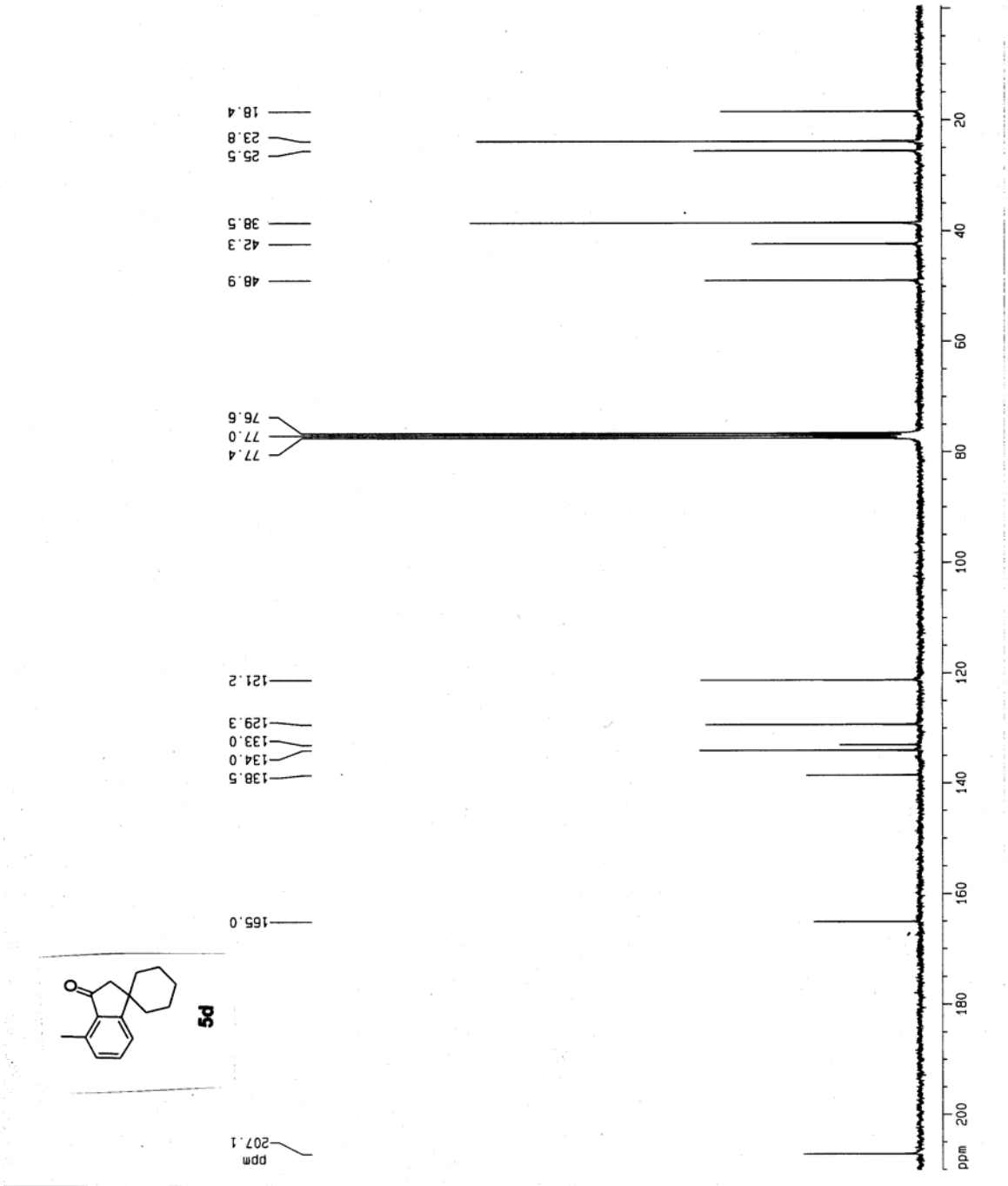
ppm
Integral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25.5
38.5
42.3
48.9
76.6
77.0
77.4
121.2
129.3
133.0
134.0
138.5
165.0
207.1
ppm
20
40
60
80
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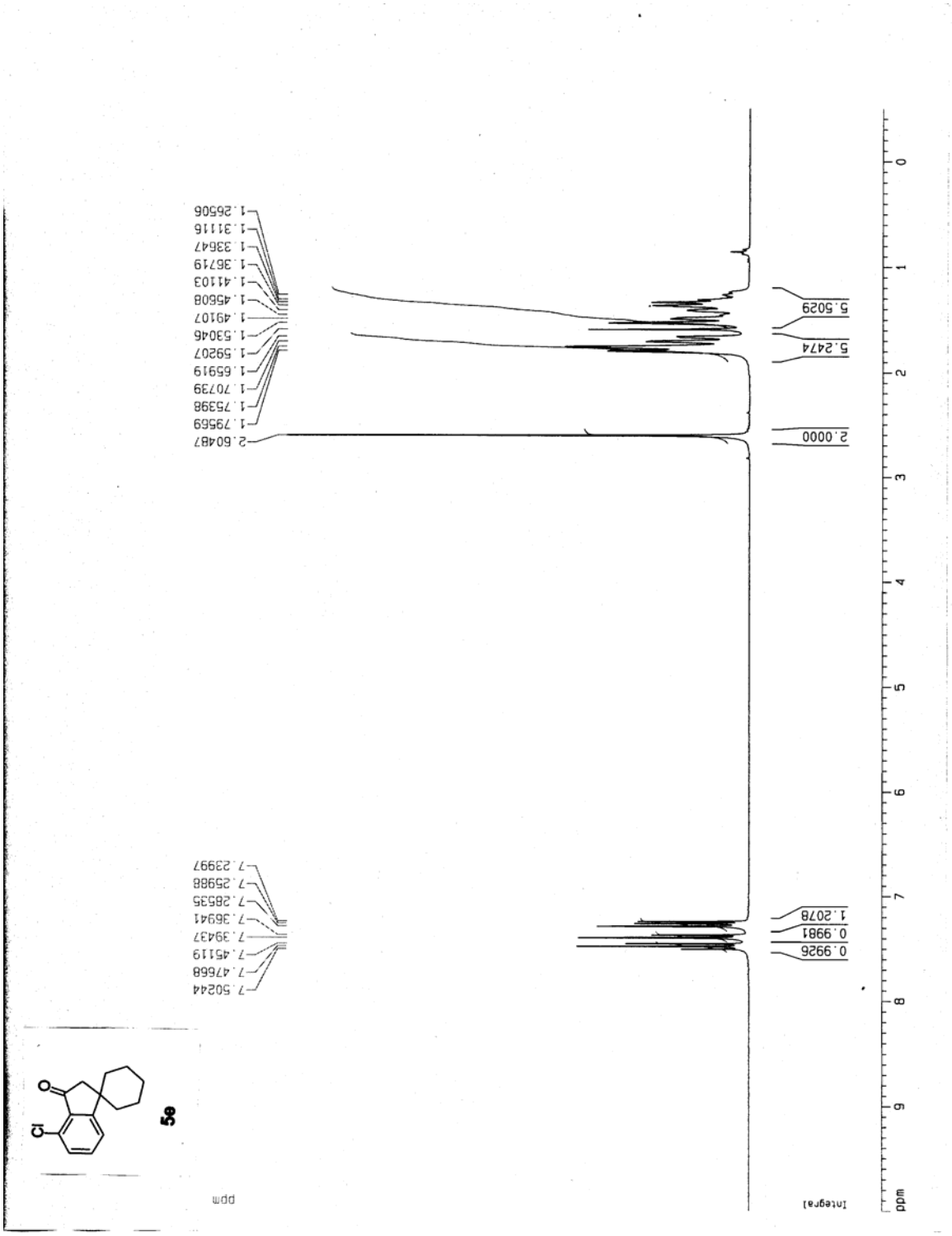
140
160
180
200
ppm
5d

5e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1.75398
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1.65919
1.59207
1.53046
1.49107
1.45608
1.41103
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1.33647
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5.5029
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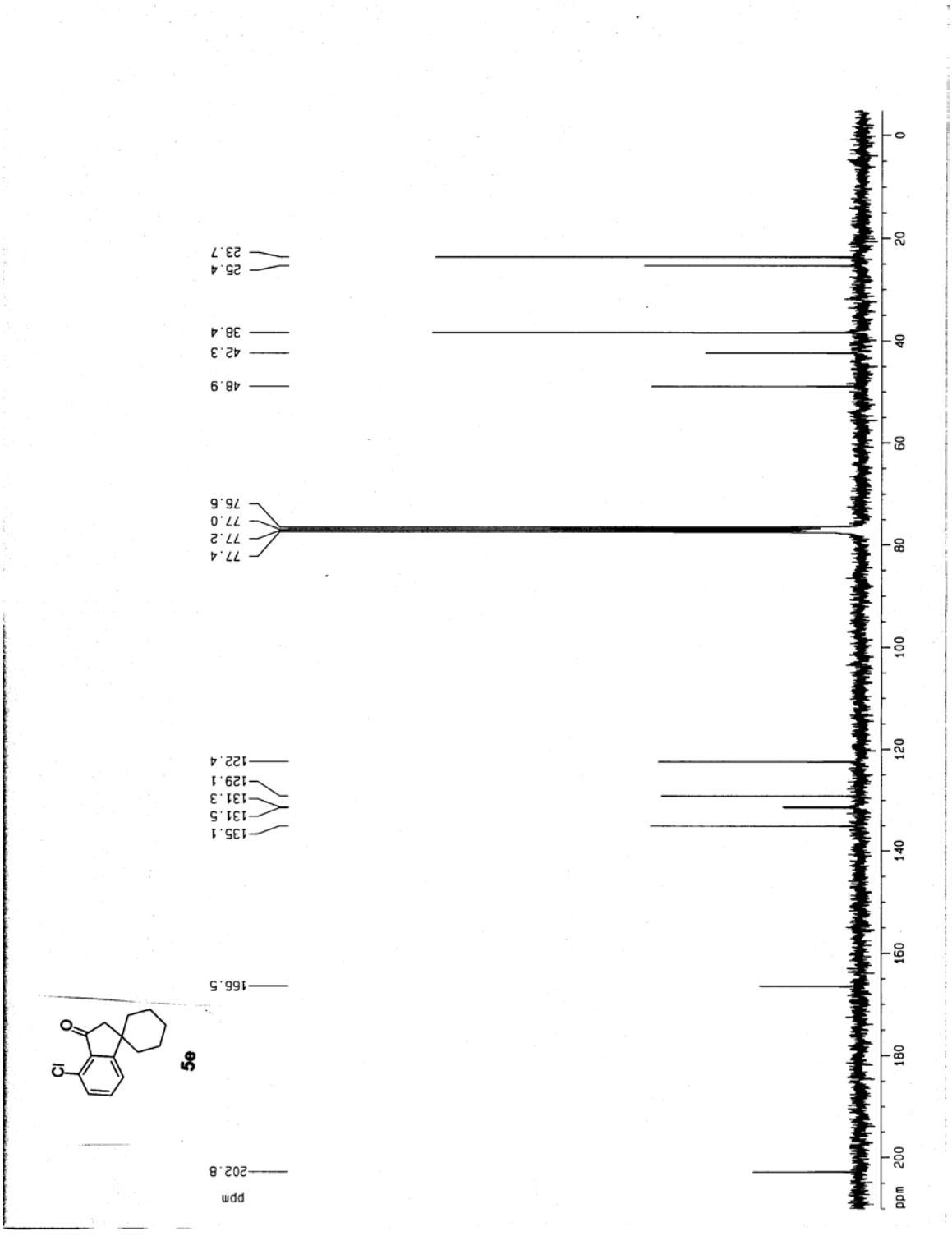
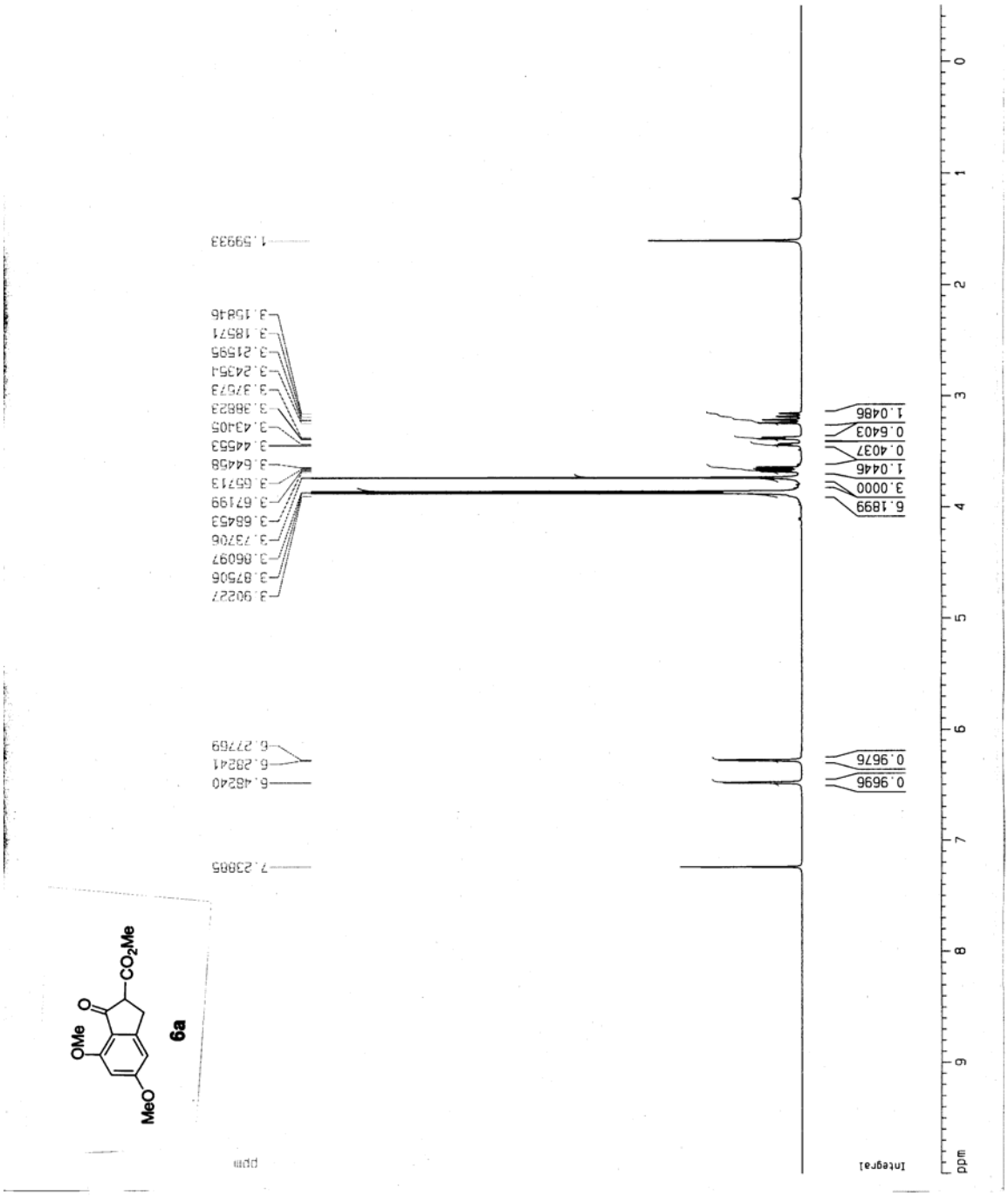
Integral
ppm
5e


23.7
25.4
38.4
42.3
48.9
76.6
77.0
77.2
77.4
122.4
129.1
131.3
131.5
135.1
166.5
202.8
ppm
0
20
40
60
80
100
120
140
160
180
200
ppm
O
Cl
5e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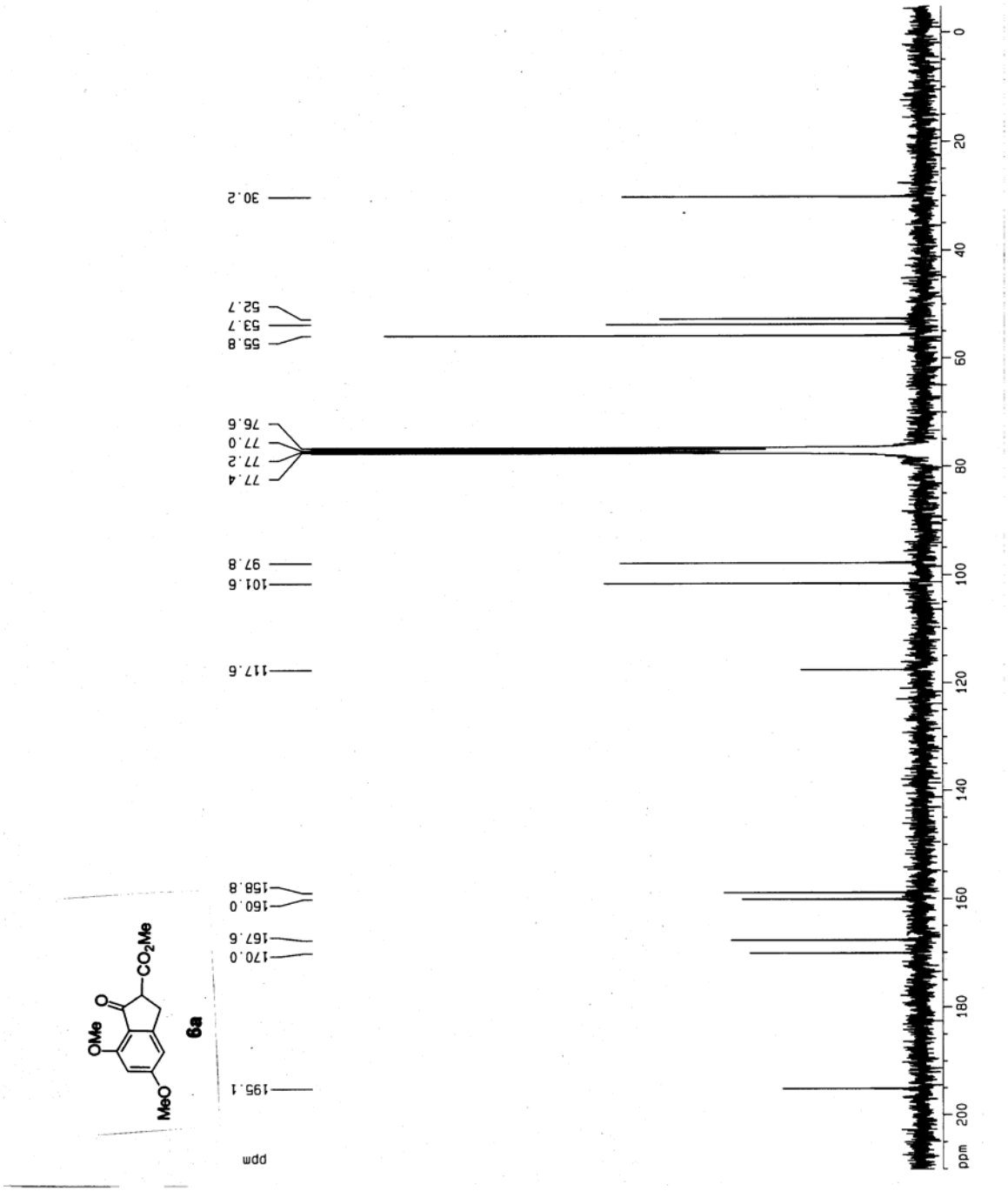
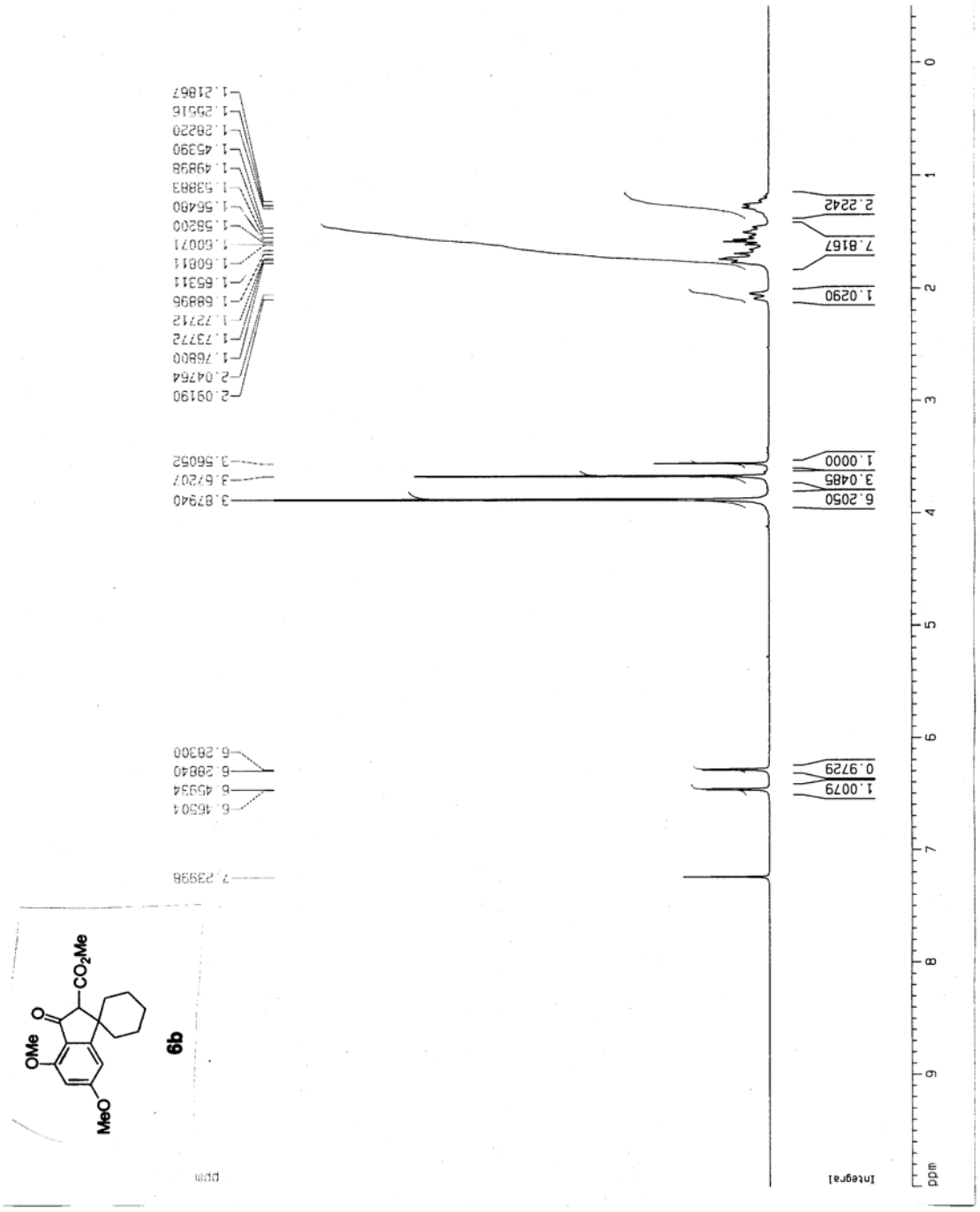
3.67199
3.68453
3.73706
3.86097
3.87506
3.90227
6.27769
6.28241
6.48240
7.23885
1.0486
0.6403
0.4037
1.0446
3.0000
6.1899
0.9676
0.9696
OMe
MeO
CO2Me
6a
ppm
Integral


6a
MeO
OMe
CO2Me
195.1
170.0
167.6
160.0
158.8
117.6
101.6
97.8
77.4
77.2
77.0
76.6
55.8
53.7
52.7
30.2
ppm
0
20
40
60
80
100
120
140
160
180
200
ppm


6b
OMe
MeO
CO2Me
ppm
Integral
7.23998
6.46504
6.45934
6.28040
6.28300
3.87940
3.67207
3.56052
2.09190
2.04764
1.76800
1.73772
1.72712
1.68896
1.65311
1.60811
1.60071
1.58200
1.56480
1.53883
1.49898
1.45390
1.28220
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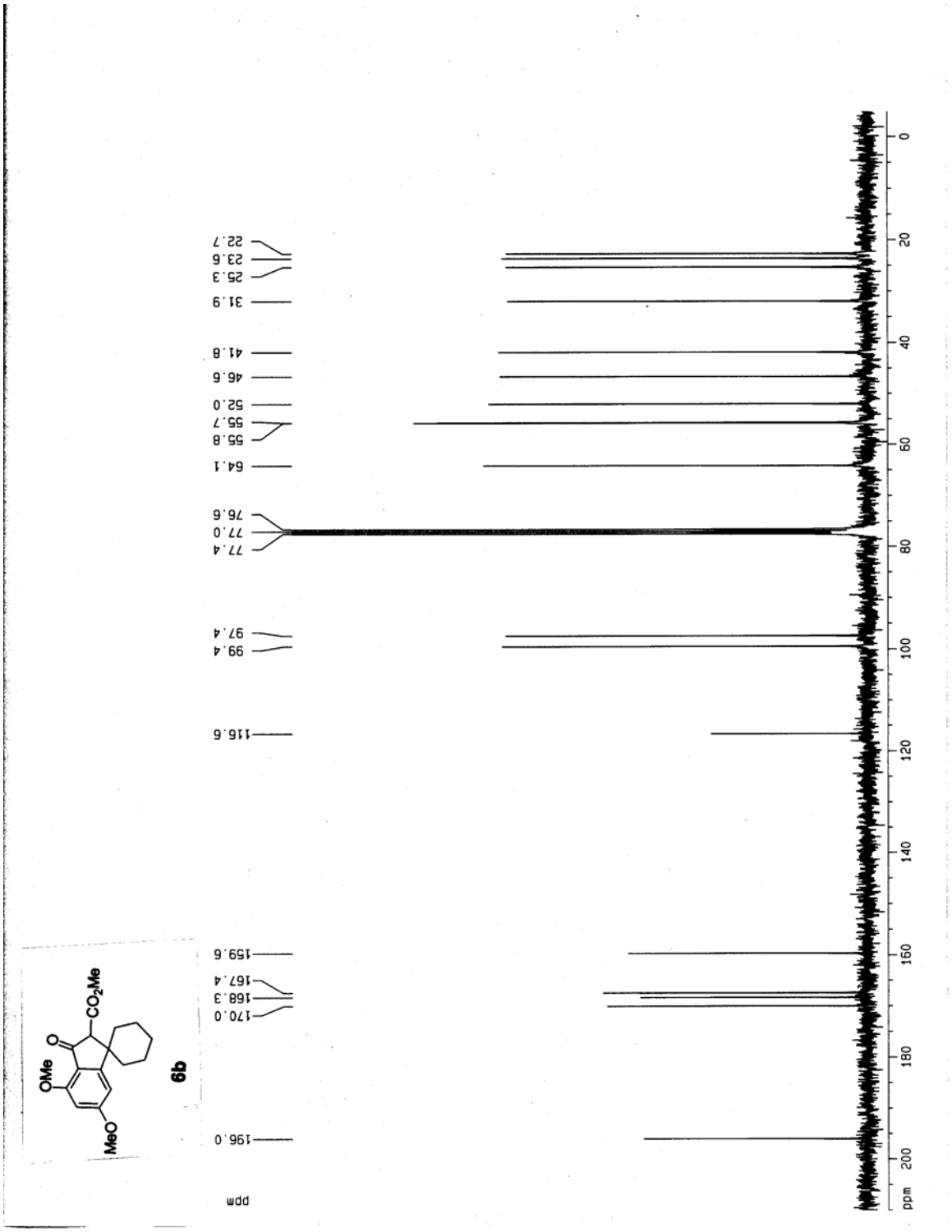
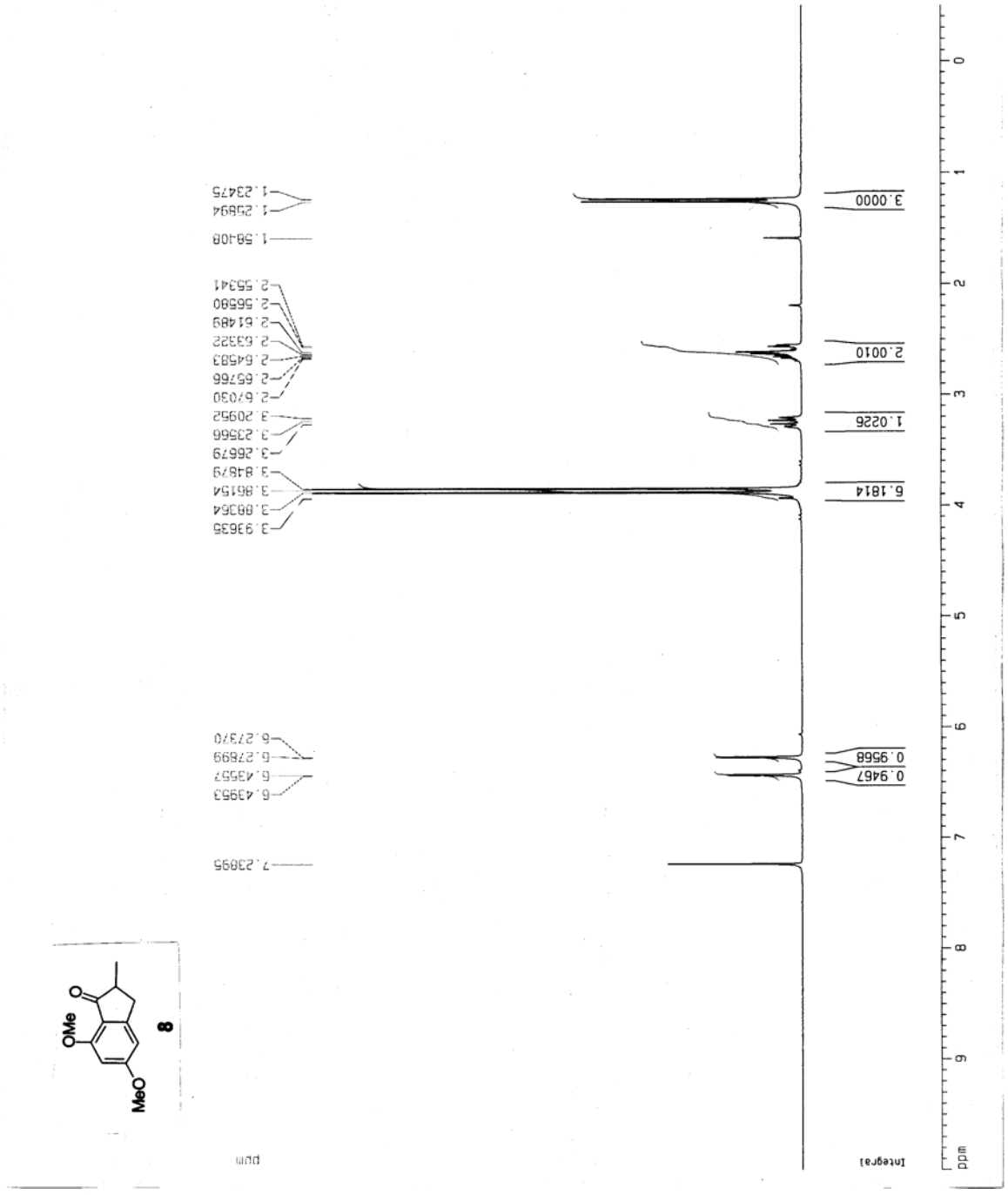
6.2050
3.0485
1.0000
1.0290
7.8167
2.2242
1.0079
0.9729


22.7
23.6
25.3
31.9
41.8
46.6
52.0
55.7
55.8
64.1
76.6
77.0
77.4
97.4
99.4
116.6
159.6
167.4
168.3
170.0
196.0
ppm
0
20
40
60
80
100
120
140
160
180
200
ppm
CO2Me
OMe
MeO
6b


OMe
MeO
8
ppm
Integral
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6.43953
6.43557
6.27899
6.27370
3.93635
3.88064
3.86154
3.84879
3.26679
3.23566
3.20952
2.67030
2.65766
2.64583
2.63322
2.61489
2.55680
2.55341
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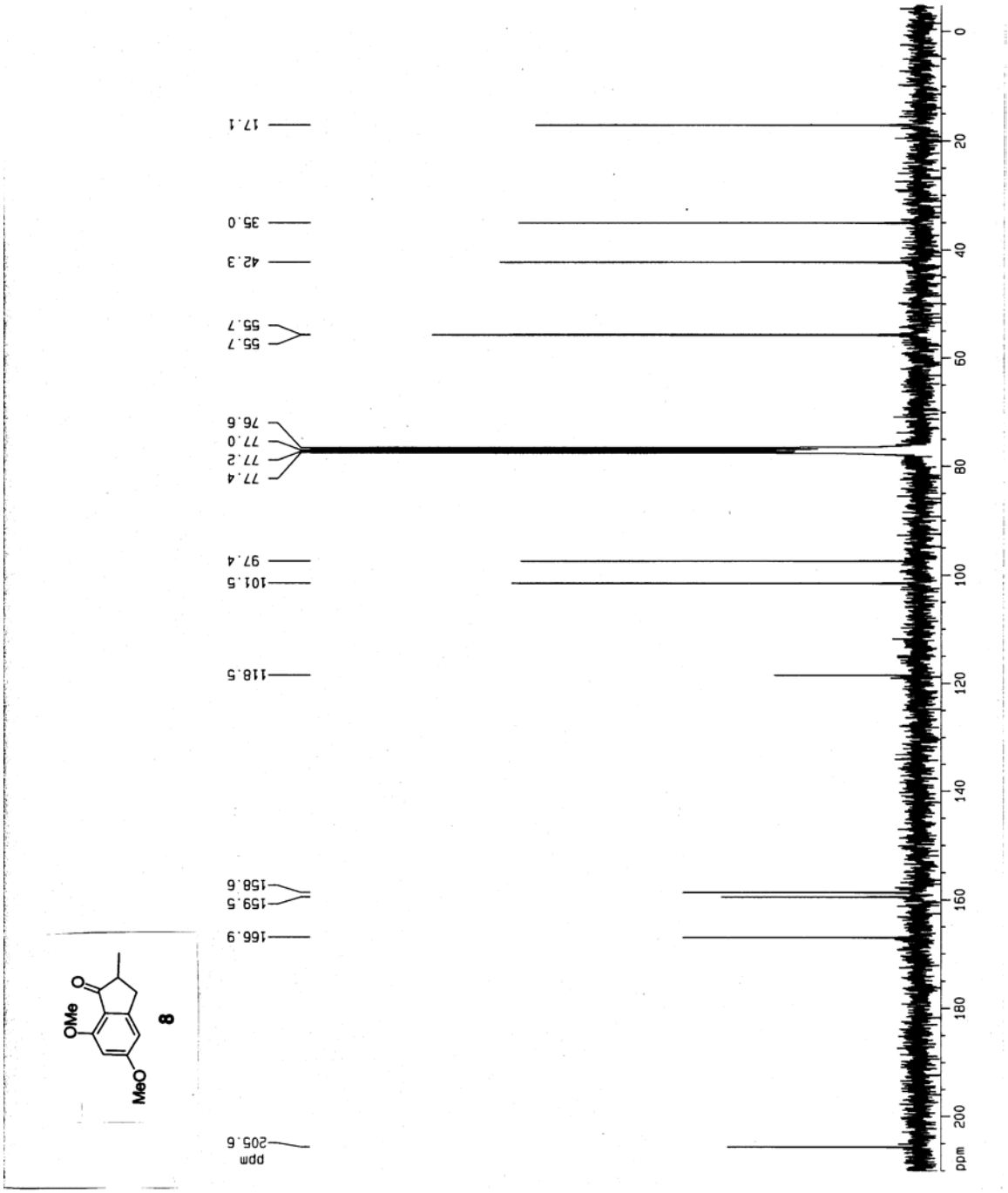
1.25894
1.23475
0.9467
0.9568
6.1814
1.0226
2.0010
3.0000


17.1
35.0
42.3
55.7
55.7
76.6
77.0
77.2
77.4
97.4
101.5
118.5
158.6
159.5
166.9
205.6
ppm
0
20
40
60
80
100
120
140
160
180
200
ppm
OMe
MeO
O
8