Supporting Information

Rhenium-Catalyzed Insertion of Nonpolar and Polar Unsaturated Molecules into an Olefinic C-H Bond

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General. All reactions were carried out under an argon atmosphere. Toluene was purchased from Kanto Kagaku Co. and dried and degassed before use. A rhenium complex, $[ReBr(CO)_3(thf)]_2$, was prepared by heating a THF solution of $ReBr(CO)_5$ at reflux temperature for 16 h. A manganese complex, $MnBr(CO)_5$, was prepared by stirring a cyclohexane solution of $Mn_2(CO)_{10}$ (Aldrich Co.) and Br_2 at 25 °C for 7 h, and resulting precipitates were collected and washed with hexane.

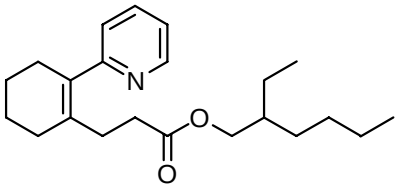
2-Vinylpiridine (**1b**), α,β-unsaturated carbonyl compounds (**2a**-**2c**), alkynes (**4a**-**4d**), aldehydes (**6a**-**6f**), and molecular sieves 4A in powder form were purchased from Wako Pure Chemical Industries, Tokyo Kasei Kogyo Co. and Aldrich Co., and used as received. 2-(1-Cyclohexenyl)pyridine (**1a**),[1] 2-isopropenylpyridine (**1c**),[2] (*E*)-2-(1-propenyl)pyridine (**1d**),[3] and 2-(1-cyclohexenyl)imidazole (**1e**)[4] were prepared according to the literature method.

^1H (400 MHz) and ^{13}C (100 MHz) NMR spectra were recorded using a JEOL JNM-LA400 spectrometer. Proton chemical shifts are reported relative to Me_4Si ($CDCl_3$) at δ 0.00 ppm or residual solvent peak ($CDCl_3$ at δ 7.26 ppm). Carbon chemical shifts are reported relative to $CDCl_3$ at δ 77.00 ppm. IR spectra were recorded on a Nicolet Protégé 460.

Typical Procedure for Rhenium-Catalyzed Insertion of α,β-Unsaturated Carbonyl Compounds into an Olefinic C-H Bond. A mixture of 2-(1-cyclohexenyl)pyridine (**1a**, 39.8 mg, 0.250 mmol), 2-ethylhexyl acrylate (**2a**, 46.1 mg, 0.250 mmol), $[ReBr(CO)_3(thf)]_2$ (5.3 mg, 0.0063 mmol), and toluene (0.50 mL) was stirred at 135 °C for 24 h under argon atmosphere. After purification by silica gel column

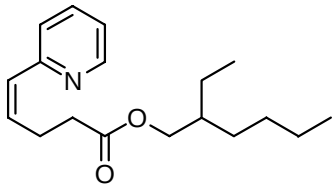
chromatography, the product **3a** was obtained in 91% yield as a clear pale yellow liquid.

2-Ethylhexyl 3-[2-(2-pyridyl)-1-cyclohexenyl]propionate (3a).



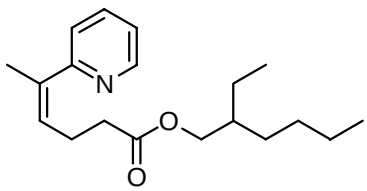
^{1}H NMR (400 MHz, $CDCl_3$) δ 0.77-0.94 (m, 6H), 1.15-1.40 (m, 8H), 1.42-1.56 (m, 1H), 1.65-1.78 (m, 4H), 2.03-2.13 (m, 2H), 2.18-2.28 (m, 2H), 2.28-2.43 (m, 4H), 3.84-3.95 (m, 2H), 7.06-7.15 (m, 2H), 7.60 (t, *J* = 7.5 Hz, 1H), 8.54 (d, *J* = 3.9 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 10.9, 13.9, 14.0, 22.7, 22.9, 23.6, 28.6, 28.8, 29.5, 30.2, 30.4, 33.2, 38.6, 66.6, 121.1, 123.0, 133.6, 134.0, 136.0, 149.2, 161.6, 173,6; IR (Nujol / cm^{-1}) 2927.7, 1737.7, 1585.4, 1463.9, 1172.6, 783.0; Anal. Calcd. for $C_{22}H_{33}NO_2$: C, 76.92; H, 9.68; N, 4.08. Found: C, 77.08; H, 9.89; N, 4.05.

2-Ethylhexyl (*Z*)-5-(2-pyridyl)-4-pentenate (3b).



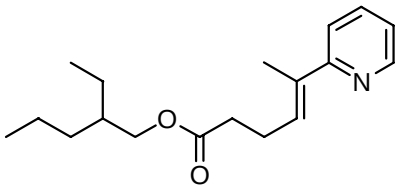
^{1}H NMR (400 MHz, $CDCl_3$) δ 0.82-0.97 (m, 6H), 1.20-1.48 (m, 8H), 1.49-1.63 (m, 1H), 2.50 (t, *J* = 7.5 Hz, 2H), 2.92-3.05 (m, 2H), 3.98 (dd, *J* = 5.7 and 2.1 Hz, 2H), 5.86 (dt, *J* = 11.7 and 7.2 Hz, 1H), 6.47 (d, *J* = 12.0 Hz, 1H), 7.07-7.17 (m, 1H), 7.21 (d, *J* = 7.8 Hz, 1H), 7.62 (dt, *J* = 7.5 and 1.8 Hz, 1H), 8.59 (d, *J* = 4.8 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 11.0, 14.0, 22.9, 23.7, 24.4, 28.9, 30.3, 34.3, 38.7, 66.8, 121.3, 123.9, 129.4, 134.8, 136.0, 149.2, 156.3, 173.4; IR (Nujol / cm^{-1}) 2923.9, 1737.7, 1463.9, 1377.1, 1159.1; HRMS (EI^+) Calcd. for $C_{18}H_{27}NO_2$ (M^+) 289.2042, Found 289.2046.

2-Ethylhexyl (*Z*)-5-(2-pyridyl)-4-hexenate (3c).



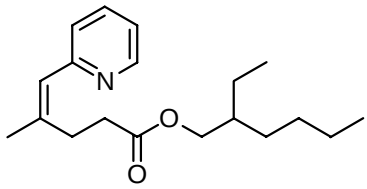
^{1}H NMR (400 MHz, $CDCl_3$) δ 0.73-0.98 (m, 6H), 1.13-1.44 (m, 8H), 1.47-1.63 (m, 1H), 2.07 (s, 3H), 2.28-2.44 (m, 4H), 3.93 (dd, *J* = 6.0 and 2.1 Hz, 2H), 5.58 (t, *J* = 7.2 Hz, 1H), 7.08-7.14 (m, 1H), 7.17 (d, *J* = 7.8 Hz, 1H), 7.61 (dt, *J* = 7.8 and 1.8 Hz, 1H), 8.55-8.62 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 11.1, 14.1, 23.01, 23.02, 23.9, 24.8, 29.0, 30.4, 34.6, 38.8, 66.8, 121.5, 122.9, 128.0, 135.8, 136.8, 149.1, 159.5, 173,2; IR (Nujol / cm^{-1}) 2923.9, 1737.7, 1585.4, 1463.9, 1377.1, 1164.9; HRMS (EI^+) Calcd. for $C_{19}H_{29}NO_2$ (M^+) 303.2198, Found 303.2201.

2-Ethylhexyl (*E*)-5-(2-pyridyl)-4-hexenate (3c).



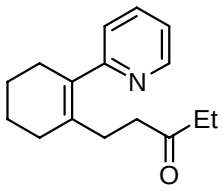
^{1}H NMR (400 MHz, $CDCl_3$) δ 0.73-0.98 (m, 6H), 1.13-1.44 (m, 8H), 1.82 (m, 1H), 2.09 (s, 3H), 2.47 (t, *J* = 7.2 Hz, 2H), 2.56 (q, *J* = 7.5 Hz, 2H), 3.94-4.04 (m, 2H), 6.31 (t, *J* = 7.2 Hz, 1H), 7.03-7.11 (m, 1H), 7.34 (d, *J* = 8.1 Hz, 1H), 7.53-7.62 (m, 1H), 8.48-8.53 (m, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 11.1, 14.3, 23.0, 23.8, 24.5, 29.0, 30.4, 34.0, 38.8, 66.9, 119.6, 122.0, 129.2, 135.8, 136.1, 148.7, 159.5, 173,2.

2-Ethylhexyl (*Z*)-4-methyl-5-(2-pyridyl)-4-pentenate (3d).



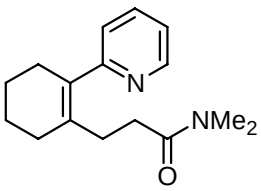
^{1}H NMR (400 MHz, $CDCl_3$) δ 0.83-0.93 (m, 6H), 1.21-1.39 (m, 8H), 1.48-1.60 (m, 1H), 1.93 (s, 3H), 2.53 (t, *J* = 8.4 Hz, 2H), 2.88 (t, *J* = 8.4 Hz, 2H), 3.96 (dd, *J* = 5.7 and 2.7 Hz, 2H), 6.32 (s, 1H), 7.03 (dt, *J* = 6.6 and 1.8 Hz, 1H), 7.12 (d, *J* = 7.8 Hz, 1H), 7.57 (dt, *J* = 7.5 and 1.8 Hz, 1H), 8.54 (d, *J* = 4.8 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 10.9, 14.0, 22.9, 23.7, 24.7, 28.3, 28.8, 30.3, 32.8, 38.6, 66.7, 120.6, 123.5, 125.9, 135.9, 142.4, 149.1, 156.6, 173.6; IR (Nujol / cm^{-1}) 2923.9, 1737.3, 1585.4, 1463.9, 1377.1, 1168.8, 740.6; HRMS (EI^+) Calcd. for $C_{19}H_{29}NO_2$ (M^+) 303.2198, Found 303.2199.

1-[2-(2-Pyridyl)-1-cyclohexenyl]pentan-3-one (3e).



^{1}H NMR (400 MHz, $CDCl_3$) δ 0.89 (t, *J* = 7.2 Hz, 3H), 1.57-1.69 (m, 4H), 1.95-2.05 (m, 2H), 2.09 (t, *J* = 8.4 Hz, 2H), 2.18-2.30 (m, 4H), 2.39 (t, *J* = 8.4 Hz, 2H), 6.98-7.09 (m, 2H), 7.53 (t, *J* = 7.8 Hz, 1H), 8.47 (d, *J* = 4.2 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 7.7, 22.7, 22.9, 28.4, 28.8, 30.4, 35.6, 41.1, 121.1, 123.0, 133.6, 134.1, 136.1, 149.0, 161.7; IR (Nujol / cm^{-1}) 2927.7, 1714.6, 1585.4, 1463.9, 783.0; HRMS (EI^+) Calcd. for $C_{16}H_{21}NO$ (M^+) 243.1623, Found 243.1618.

***N*,*N*-Dimethyl-3-[2-(2-pyridyl)-1-cyclohexenyl]propionamide (3f).**

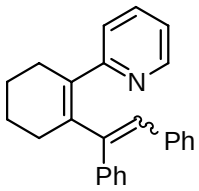


^{1}H NMR (400 MHz, $CDCl_3$) δ 1.71 (s, 4H), 2.12 (s, 2H), 2.16-2.25 (m, 2H), 2.25-2.44 (m, 4H), 2.82 (s, 3H), 2.83 (s, 3H), 7.09 (t, *J* = 7.0 Hz, 1H), 7.14 (d, *J* = 7.8 Hz, 1H), 7.60 (t, *J* = 7.2 Hz, 1H), 8.52 (d, *J* = 4.8 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 22.7, 22.9, 28.9, 29.9, 30.5, 32.5, 35.2, 37.0, 121.2, 123.1, 133.7, 134.4, 136.2, 149.1, 161.9, 172.8; IR (Nujol / cm^{-1}) 2925.8, 1645.2, 1463.9, 783.0; HRMS (EI^+) Calcd. for

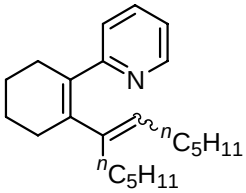
$C_{16}H_{22}N_2O$ (M^+) 258.1732, Found 258.1722.

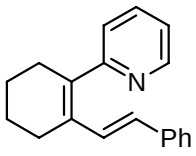
Typical Procedure for Rhenium-Catalyzed Insertion of Alkynes into an Olefinic C-H Bond. A mixture of 2-(1-cyclohexenyl)pyridine (**1a**, 39.8 mg, 0.250 mmol), diphenylacetylene (**4a**, 44.6 mg, 0.250 mmol), $[ReBr(CO)_3(thf)]_2$ (5.3 mg, 0.0063 mmol), and toluene (0.50 mL) was stirred at 135 °C for 24 h under argon atmosphere. After purification by silica gel column chromatography, the product **5a** was obtained in 96% yield as a clear pale yellow solid.

2-[2-(1,2-Diphenylvinyl)-1-cyclohexenyl]pyridine (5a). The isomers could not be isolated**.** ^1H NMR (400 MHz, $CDCl_3$) δ 1.52-1.92 (m, 4H, major and minor), 2.03-2.11 (m, 2H, minor), 2.15-2.27 (m, 2H, major), 2.36-2.57 (m, 2H, major and minor), 2.57-2.80 (m, 2H, major and minor), 6.19 (s, 1H, minor), 6.56 (s, 1H, major), 6.73 (t, *J* = 4.2 Hz, 1H, minor), 6.75-6.82 (m, 1H, major), 6.86 (t, *J* = 6.3 Hz, 1H, minor), 6.90-6.98 (m, 2H, minor), 6.98-7.45 (m, 12H, major and minor), 8.19 (d, *J* = 4.2 Hz, 1H, major), 8.40 (d, *J* = 4.5 Hz, 1H, minor); ^{13}C NMR (100 MHz, $CDCl_3$) δ 22.88, 22.94, 23.1, 29.2, 30.3, 30.4, 120.9, 122.7, 123.5, 126.2, 126.55, 126.59, 126.9, 127.0, 127.1, 127.6, 127.7, 128.1, 128.15, 128.21, 128.25, 128.35, 128.45, 129.0, 129.7, 130.1, 135.1, 135.3, 135.6, 137.2, 137.6, 139.4, 139.8, 141.6, 143.2, 148.4, 148.8, 160.3; IR (Nujol / cm^{-1}) 2927.7, 1585.4, 1463.9, 761.8, 694.3; HRMS (EI^+) Calcd. for $C_{25}H_{23}N$ (M^+) 337.1830, Found 337.1829.

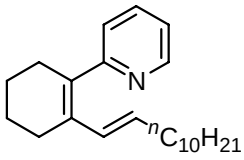


2-[2-(1-pentyl-1-heptenyl)-1-cyclohexenyl]pyridine (5b). ^1H NMR (400 MHz, $CDCl_3$) δ 0.72-0.96 (m, 6H), 1.00-1.39 (m, 12H), 1.60-1.80 (m, 4H), 1.83 (t, *J* = 7.2 Hz, 4H), 2.01-2.26 (m, 2H), 2.38-2.63 (m, 2H), 4.97 (t, *J* = 7.2 Hz, 1H, major), 5.06 (t, *J* = 7.2 Hz, 1H, major), 7.04 (t, *J* = 6.0 Hz, 1H), 7.19 (d, *J* = 7.8 Hz, 1H), 7.48 (t, *J* = 7.8 Hz, 1H), 8.52 (d, *J* = 4.2 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 14.0, 14.1, 22.4, 22.56, 22.65, 22.9, 23.0, 23.1, 27.7, 28.5, 29.10, 29.14, 29.26, 29.32, 29.9, 30.3, 30.8, 31.1, 31.3, 31.7, 31.8, 32.1, 32.2, 37.0, 120.5, 120.8, 120.9, 123.4, 124.2, 125.9, 129.1, 130.2, 132.8, 133.1, 135.1, 137.3, 137.6, 141.1, 141.5, 148.6, 161.7; IR (Nujol / cm^{-1}) 2922.0, 1461.9, 1377.1; HRMS (EI^+) Calcd. for $C_{23}H_{35}N$ (M^+) 325.2770, Found 325.2781.



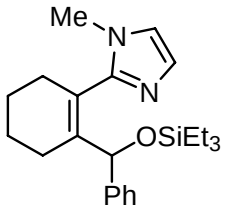
2-((*E*)-2-Styryl-1-cyclohexenyl)pyridine (5c). 

^{1}H NMR (400 MHz, $CDCl_3$) δ 1.78-1.94 (m, 4H), 2.46-2.58 (m, 2H), 2.58-2.70 (m, 2H), 6.63 (d, *J* = 16.2 Hz, 1H), 6.93 (d, *J* = 16.2 Hz, 1H), 7.15-7.32 (m, 7H), 7.69 (t, *J* = 7.8 Hz, 1H), 8.70 (d, *J* = 4.8 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 22.5, 22.8, 25.6, 31.1, 121.5, 124.6, 126.2, 126.8, 126.9, 128.4, 128.6, 132.5, 135.7, 138.0, 139.0, 149.3, 161.0; IR (Nujol / cm^{-1}) 2852.5, 1583.4, 1461.9, 1377.1, 964.3, 781.1, 746.4; HRMS (EI^+) Calcd. for $C_{19}H_{19}N$ (M^+) 261.1517, Found 261.1519.

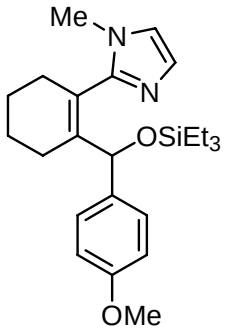
2-[(*E*)-2-(1-Dodecenyl)-l-cyclohexenyl]pyridine (5d). 

^{1}H NMR (400 MHz, $CDCl_3$) δ 0.86 (t, *J* = 6.9 Hz, 3H), 1.13-1.36 (m, 14H), 1.64-1.81 (m, 4H), 1.96 (q, *J* = 6.9 Hz, 2H), 2.24-2.36 (m, 2H), 2.41-2.55 (m, 2H), 5.67 (dt, *J* = 8.1, 7.5 and 6.9 Hz, 1H), 6.07 (d, *J* = 15.6 Hz, 1H), 7.11 (dt, *J* = 5.7 and 1.2 Hz, 1H), 7.17 (d, *J* = 7.8 Hz, 1H), 7.61 (dt, *J* = 7.5 and 1.8 Hz, 1H), 8.60 (d, *J* = 4.8 Hz, 1H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 14.1, 22.57, 22.63, 22.9, 25.7, 29.1, 29.3, 29.46, 29.54, 29.6, 30.8, 31.5, 31.9, 33.1, 121.1, 124.4, 129.3, 132.4, 135.5, 135.6, 149.19, 149.20, 161.5; IR (Nujol / cm^{-1}) 2925.8, 1581.5, 1461.9, 1282.6, 960.5, 781.1, 748.3, 692.4; HRMS (EI^+) Calcd. for $C_{19}H_{19}N$ (M^+) 261.1517, Found 261.1519.

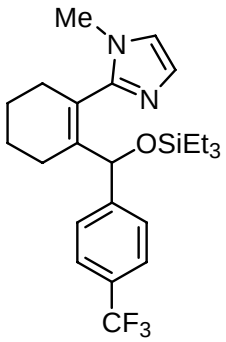
Typical Procedure for Rhenium-Catalyzed Insertion of Aldehyde into an Olefinic C-H Bond. A mixture of 2-(1-cyclohexenyl)imidazole (**1e**, 40.6 mg, 0.250 mmol), benzaldehyde (**6a**, 46.1 mg, 0.750 mmol), triethylsilane (102 mg, 0.750 mmol) $[ReBr(CO)_3(thf)]_2$ (5.3 mg, 0.0063 mmol), and toluene (0.50 mL) was stirred at 115 °C for 24 h under argon atmosphere. In this case, benzaldehyde (**6a**) and triethylsilane were added three times (3 x 0.250 mmol). After purification by silica gel column chromatography, the product **7a** was obtained in 80% yield as a clear pale yellow liquid.

1-Methyl-2-[2-(phenyltriethylsiloxymethyl) -1-cyclohexenyl]-1*H*-imidazole (7a). 

^{1}H NMR (400 MHz, $CDCl_3$) δ 0.46 (q, *J* = 8.1 Hz, 6H), 0.83 (t, *J* = 8.1 Hz, 9H), 1.60-1.70 (m, 4H), 1.80-1.88 (m, 1H), 2.17-2.21 (m, 2H), 2.42-2.47 (m, 1H), 3.43 (s, 3H), 5.35 (s, 1H), 6.85 (s, 1H), 7.06 (s, 1H), 7.17 (t, *J* = 7.2 Hz, 1H), 7.26 (d, *J* = 7.2 Hz, 2H), 7.40 (d, *J* = 7.2 Hz, 2H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 6.0, 6.8, 22.3, 22.5, 24.7, 29.8, 33.1, 73.0, 120.4, 124.5, 125.3, 126.3, 126.8, 127.7, 142.4, 146.2, 148.5; IR (Nujol / cm^{-1}) 2856.4, 1454.2, 1377.1, 721.3; HRMS (EI^+) calcd. For $C_{23}H_{34}N_2OSi$ (M^+) 382.2440, found 382.2455.

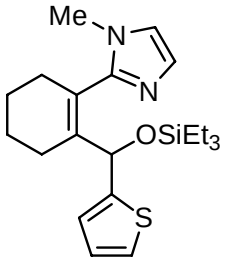
1-Methyl-2-{2-[triethylsiloxy(4-methoxyphenyl)methyl]-1-cycloh exenyl}-1*H*-imidazole (7b). 

^{1}H NMR (400 MHz, $CDCl_3$) δ 0.45 (q, *J* = 8.1 Hz, 6H), 0.83 (t, *J* = 8.1 Hz, 9H), 1.60-1.70 (m, 4H), 1.86-1.90 (m, 1H), 2.11-2.45 (m, 3H), 3.43 (s, 1H), 3.77 (s, 1H), 5.28 (s, 1H), 6.81 (d, *J* = 8.7 Hz, 2H), 6.85 (s, 1H), 7.05 (s, 1H), 7.33 (d, *J* = 8.4 Hz, 2H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 4.7, 6.8, 22.2, 22.3, 22.5, 29.9, 33.0, 55.1, 72.9, 113.0, 120.0, 122.6, 127.2, 128.0, 136.0, 145.2, 148.2, 158.2; IR (Nujol / cm^{-1}) 2873.7, 1739.7, 1610.5, 1510.2, 1442.7, 1244.0, 1170.7, 1051.1, 850.5, 725.2; HRMS (EI^+) calcd. For $C_{24}H_{36}N_2O_2Si$ (M^+) 412.2546, found 412.2558.

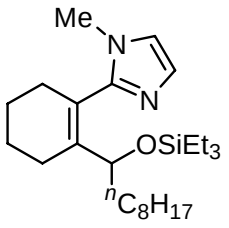
1-Methyl-2-{2-[triethylsiloxy(4-trifluoromethylphenyl)methyl]-1-cyclohexenyl}-1*H*-imidazole (7c). 

^{1}H NMR (400 MHz, $CDCl_3$) δ 0.45 (q, *J* = 8.1 Hz, 6H), 0.83 (t, *J* = 8.1 Hz, 9H), 1.58-1.60 (m, 3H), 1.68-1.73 (m,2H), 2.14-2.29 (m, 2H), 2.39-2.43 (m, 1H), 3.51 (s, 1H), 5.48 (s, 1H), 6.87 (s, 1H), 7.04 (s, 1H), 7.53 (d, *J* = 8.1 Hz, 2H), 7.70 (d, *J* = 8.1 Hz, 2H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 4.6, 6.6, 22.06, 22.14, 22.4, 29.8, 33.1, 72.7, 120.3, 124.48, 124.52, 124.6, 126.4, 128.0, 144.3, 147.8, 148.0; IR (Nujol / cm^{-1}) 2927.7, 1325.0, 1126.4, 852.5, 725.2; HRMS (EI^+) calcd. For $C_{24}H_{33}F_3N_2OSi$ (M^+) 450.2314, found 450.2304.

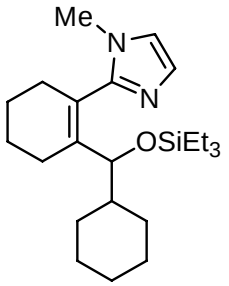
1-Methyl-2-{2-[triethylsiloxy(thiophen-2-yl)methyl]-1-cyclohexenyl}-1*H*-imidazole (7d). ^{1}H NMR (400 MHz, $CDCl_3$) δ 0.52 (q, *J* = 7.8 Hz, 6H), 0.87 (t, *J* = 7.8 Hz, 9H), 1.66-1.70 (m, 4H), 1.68-1.70 (m, 4H), 2.14-2.29 (m, 2H), 2.10-2.29 (m, 3H), 2.44-2.48 (m, 1H), 3.41 (s, 1H), 5.50 (s, 1H), 6.83-6.90 (m, 3H), 7.03 (s, 1H), 7.12 (d, *J* = 5.1 Hz, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 4.6, 6.7, 22.2, 22.5, 22.6, 29.9, 32.9, 70.6, 120.0, 123.3, 123.6, 123.8, 126.3, 128.1, 144.4, 147.7, 148.6; IR (Nujol / cm^{-1}) 2854.5, 1456.2, 1072.3, 848.6, 723.3; HRMS (EI^+) calcd. For $C_{21}H_{32}N_2OSSi$ (M^+) 388.2005, found 388.2022.



1-Methyl-2-[2-(1-triethylsiloxynonyl)-1-cyclohexenyl]-1*H*-imidazole (7e). ^{1}H NMR (400 MHz, $CDCl_3$) δ 0.44 (q, *J* = 8.1 Hz, 6H), 0.81 (t, *J* = 8.1 Hz, 9H), 1.16-1.65 (m, 20H), 2.00-2.36 (m,5H), 3.43 (m, 3H), 3.89-3.92 (m, 1H), 6.75 (s, 1H), 6.91 (s, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 4.6, 6.7, 13.9, 22.2, 22.5, 22.6, 25.9, 29.1, 29.1, 29.3, 29.4, 29.8, 31.7, 32.7, 36.2, 72.3, 119.4, 122.0, 127.8, 145.0, 148.0; IR (Nujol / cm^{-1}) 2925.8, 1456.2, 1076.2, 721.3; HRMS (EI^+) calcd. For $C_{25}H_{46}N_2OSi$ (M^+) 418.3379, found 418.3387.

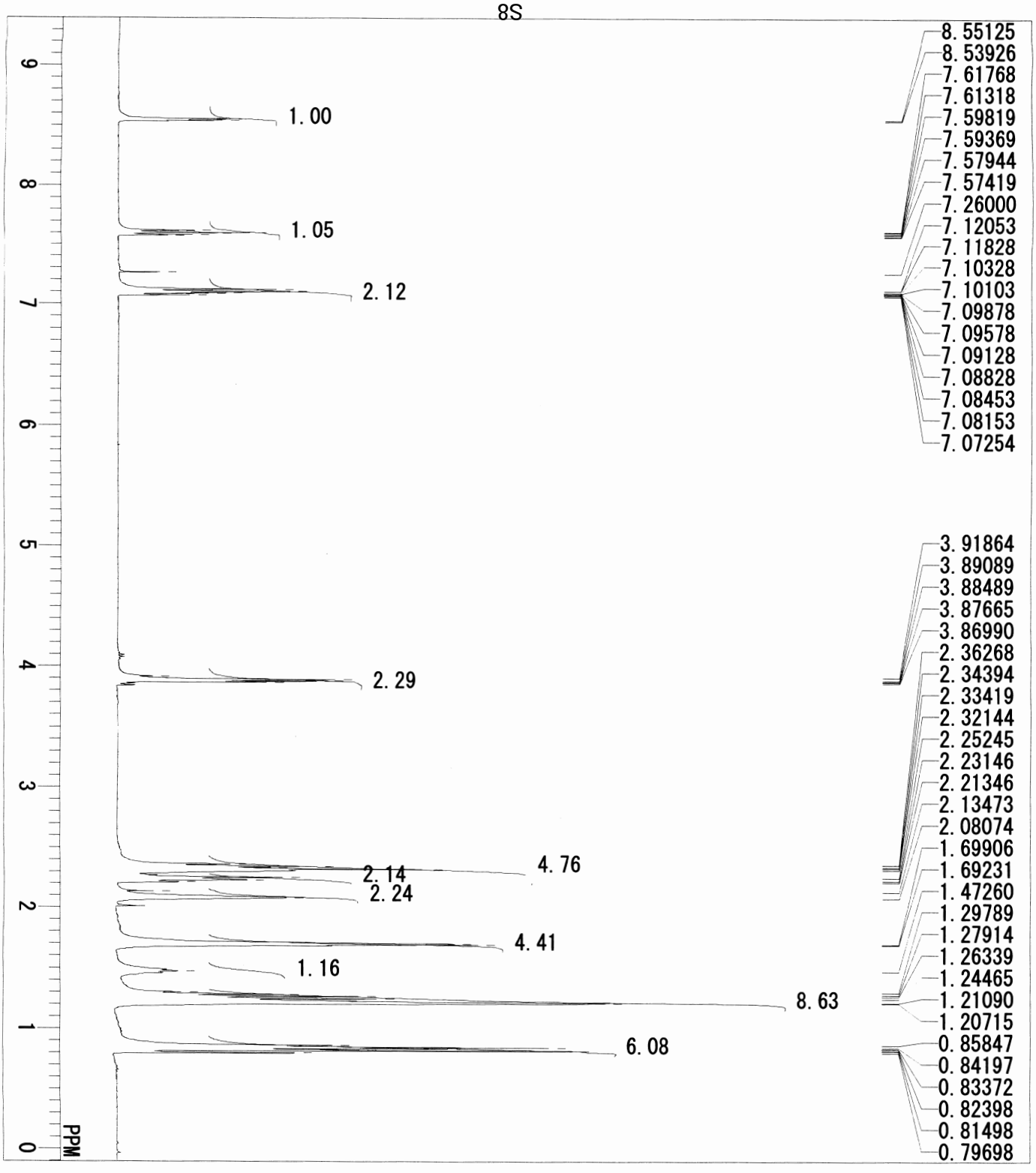


1-Methyl-2-[2-(triethylsiloxycyclohexylmethyl)-1-cyclohexenyl]-1*H*-imidazole (7f). ^{1}H NMR (400 MHz, $CDCl_3$) δ 0.48-0.57 (m, 6H), 0.87 (t, *J* = 7.8 Hz, 9H), 1.10-1.14 (m, 3H), 1.37-1.40 (m,2H), 1.59-1.73 (m, 9H), 1.91-2.02 (m, 2H), 2.14-2.17 (m, 2H), 2.40-2.45 (m, 1H), 3.50 (s, 3H), 3.79 (d, *J* = 8.4 Hz, 1H), 6.80 (s, 1H) , 6.96 (s, 1H); ^{13}C NMR (400 MHz, $CDCl_3$) δ 4.8, 6.9, 22.3, 22.7, 23.1, 26.2, 26.39, 26.43, 29.3, 30.0, 30.1, 33.2, 42.5, 76.6, 119.7, 123.7, 127.8, 144.2, 148.0; IR (Nujol / cm^{-1}) 2837.1, 1461.9, 1377.1, 721.3; HRMS (EI^+) calcd. For $C_{23}H_{40}N_2OSi$ (M^+) 388.2910, found 388.2923.



Reference

1. Ishihara, M.; Togo, H. *Tetrahedron* **2007**, *63*, 1474.
2. Waser, J.; Gaspar, B.; Nambu, H.; Carreira, E. M. *J. Am. Chem. Soc*. **2006**, *128*, 11693.
3. Vorbrüggen, H.; Krolikiewicz, K. *Tetrahedron Lett.* **1983**, *24*, 889.
4. Lochte, H. L.; Kruse, P. F.; Wheerler, E. N. *J. Am. Chem. Soc*. **1953**, *75*, 4477.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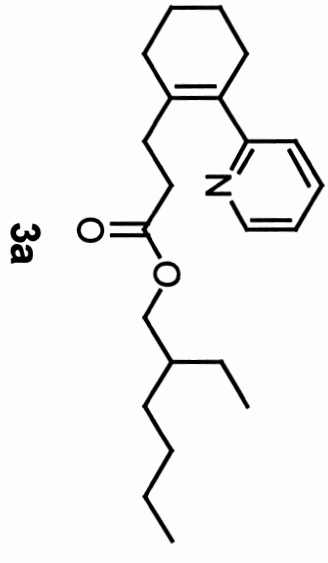
PPM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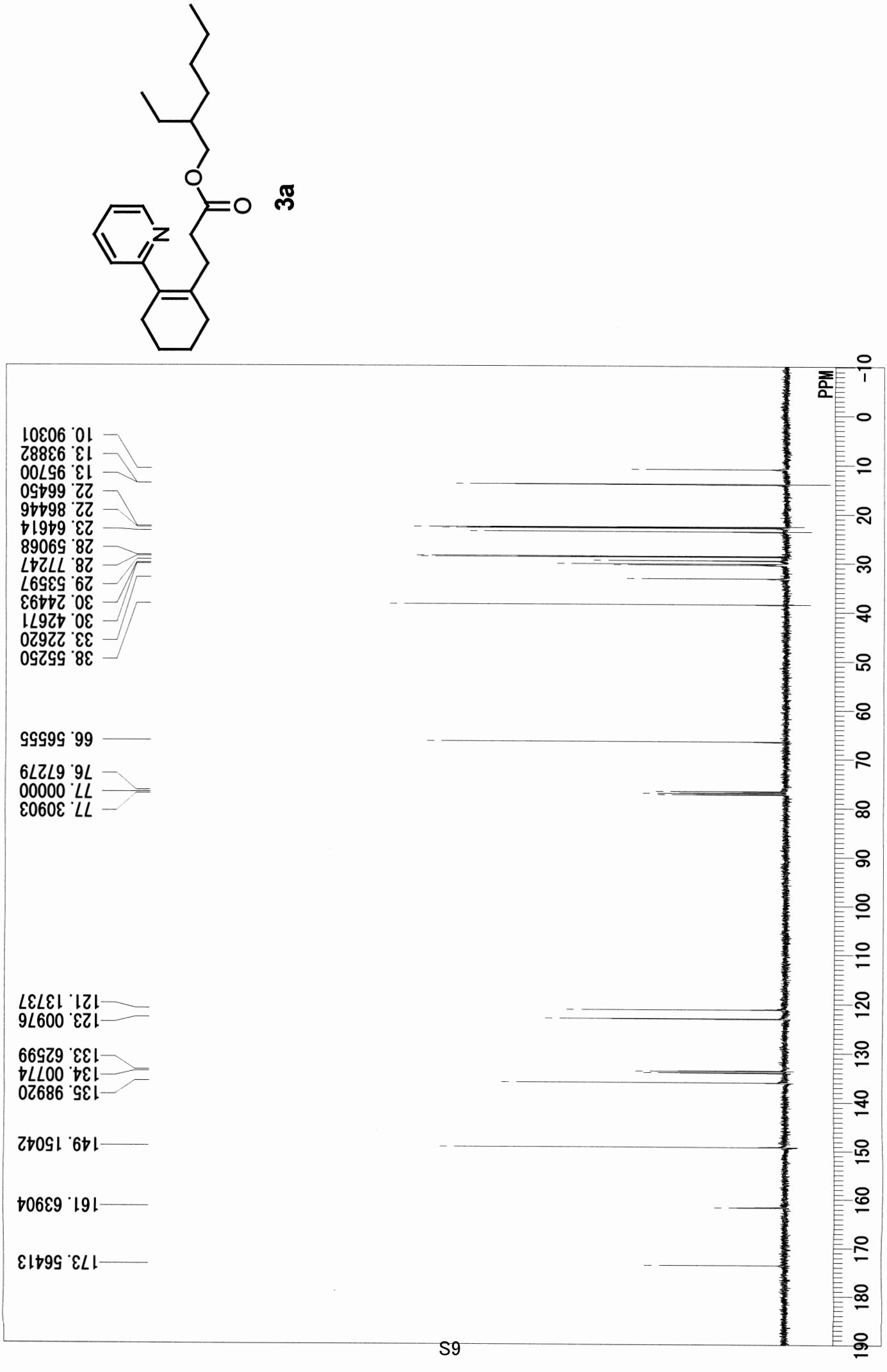
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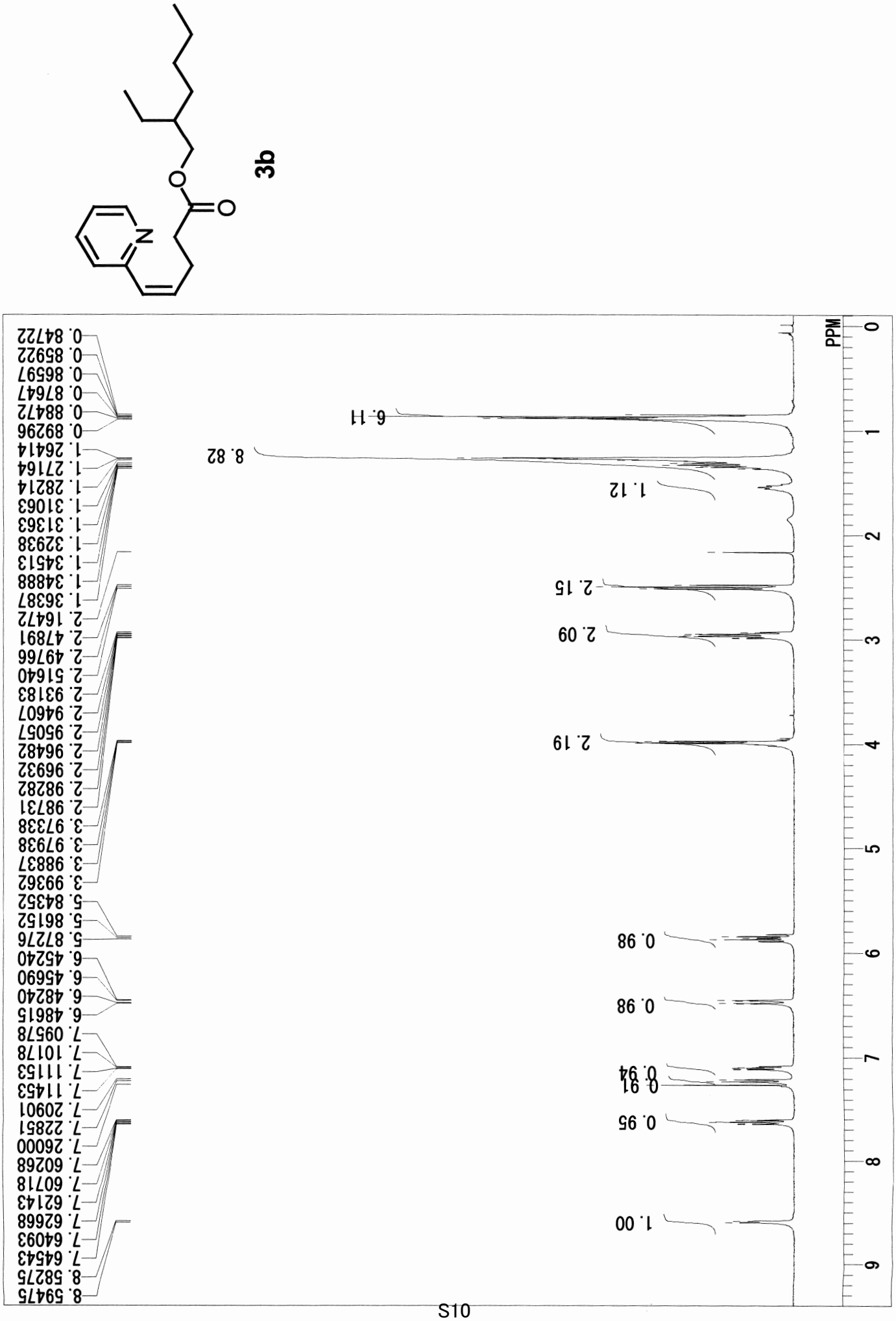
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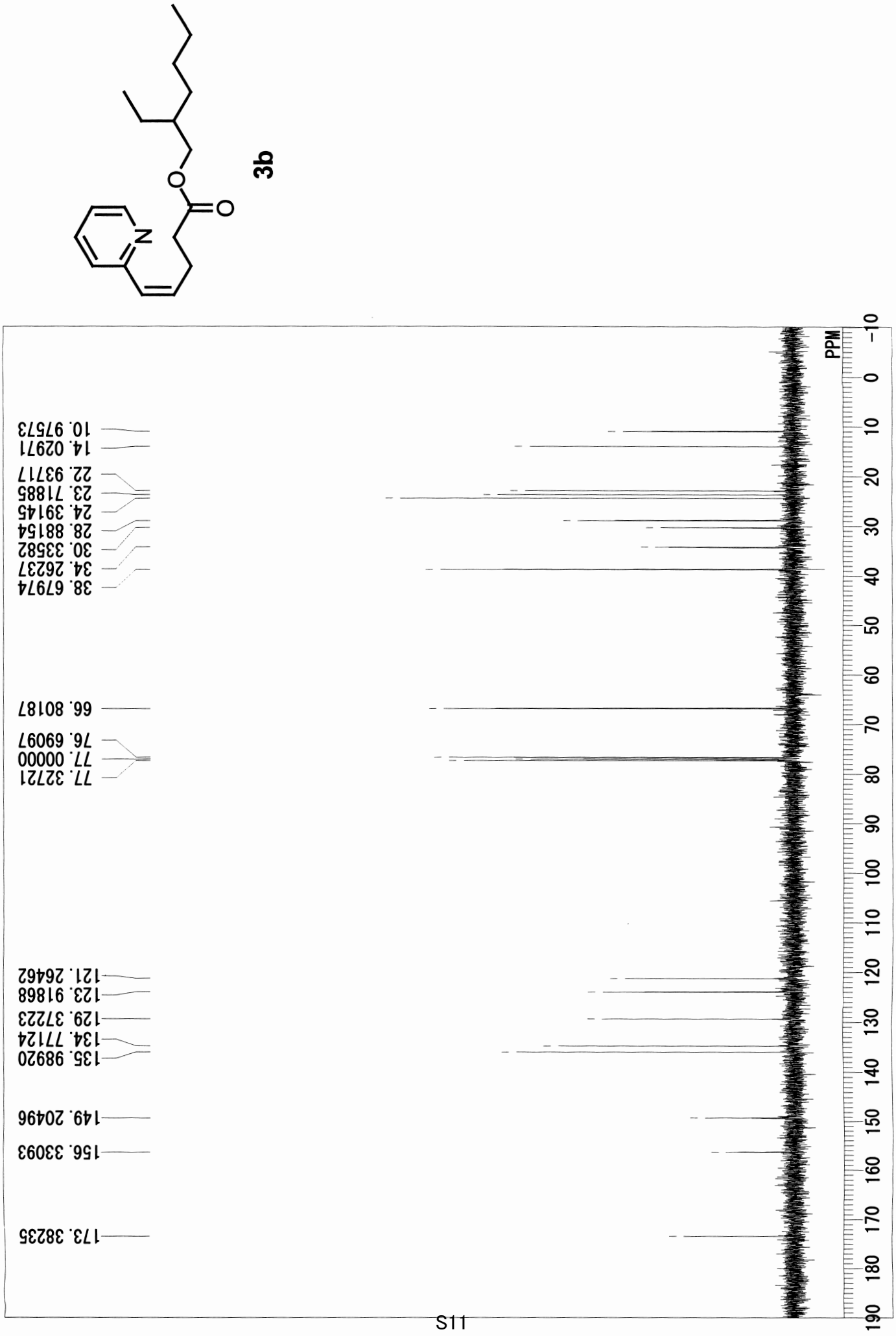
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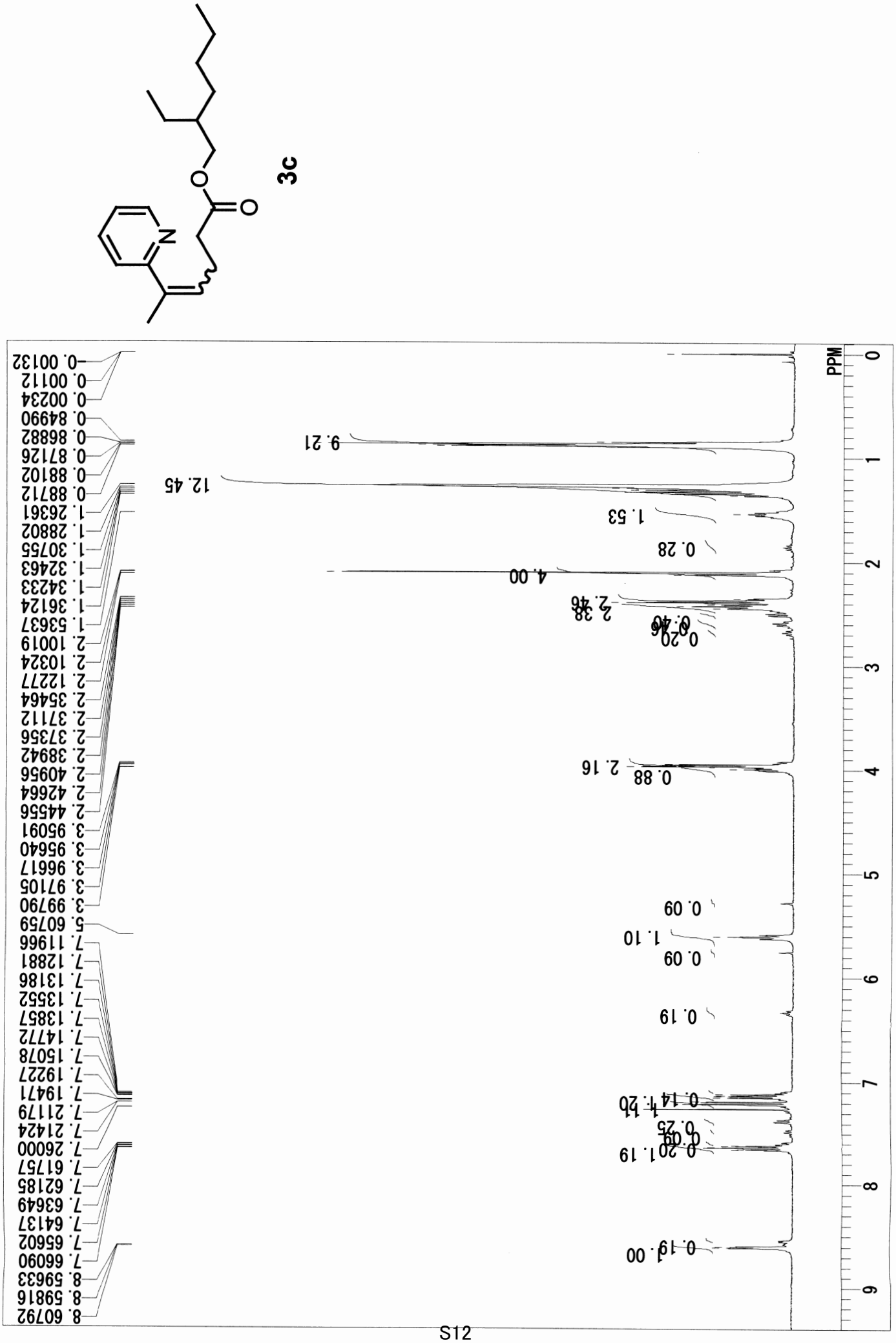
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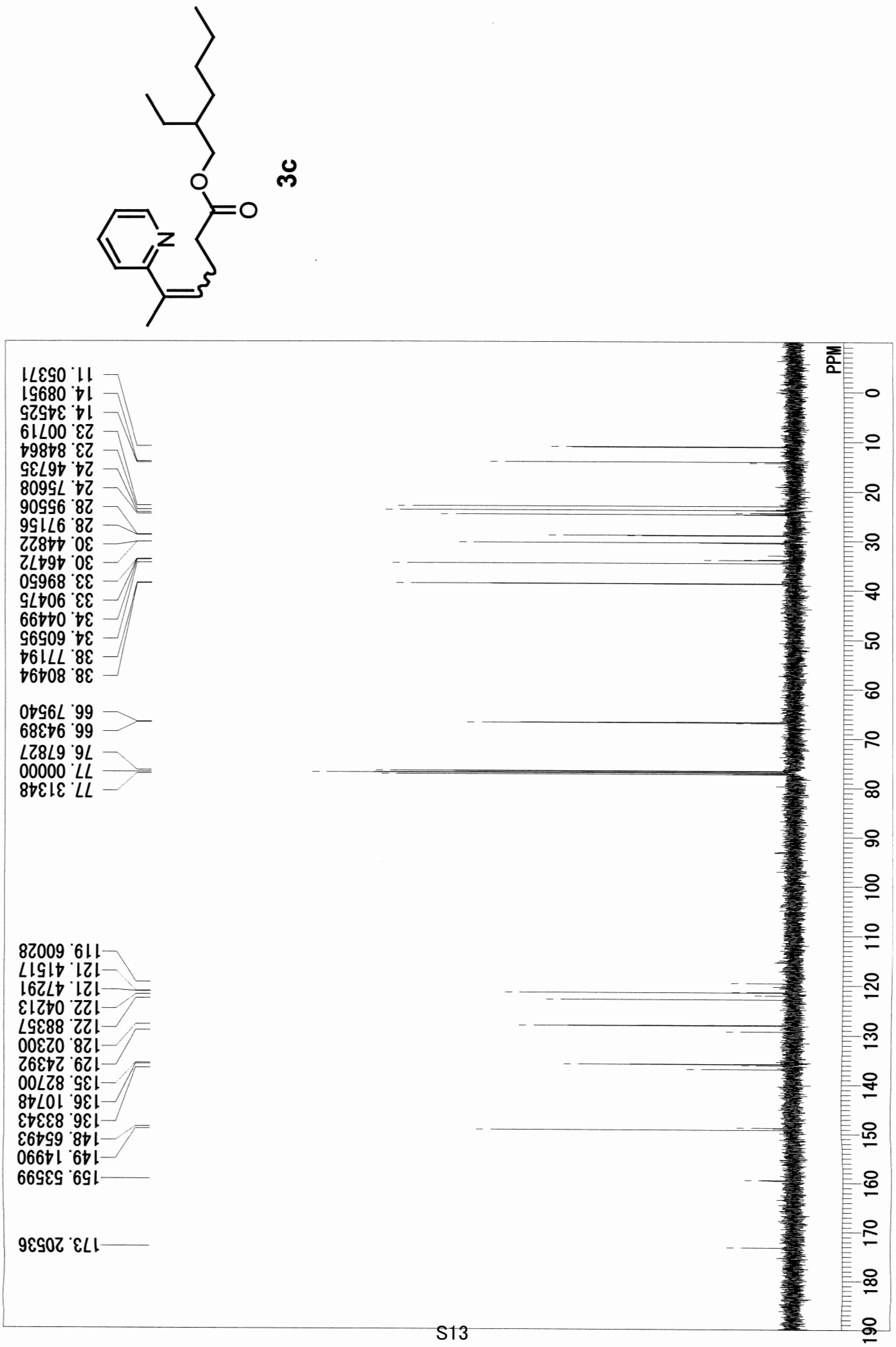
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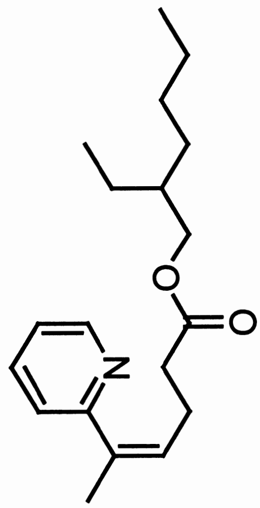

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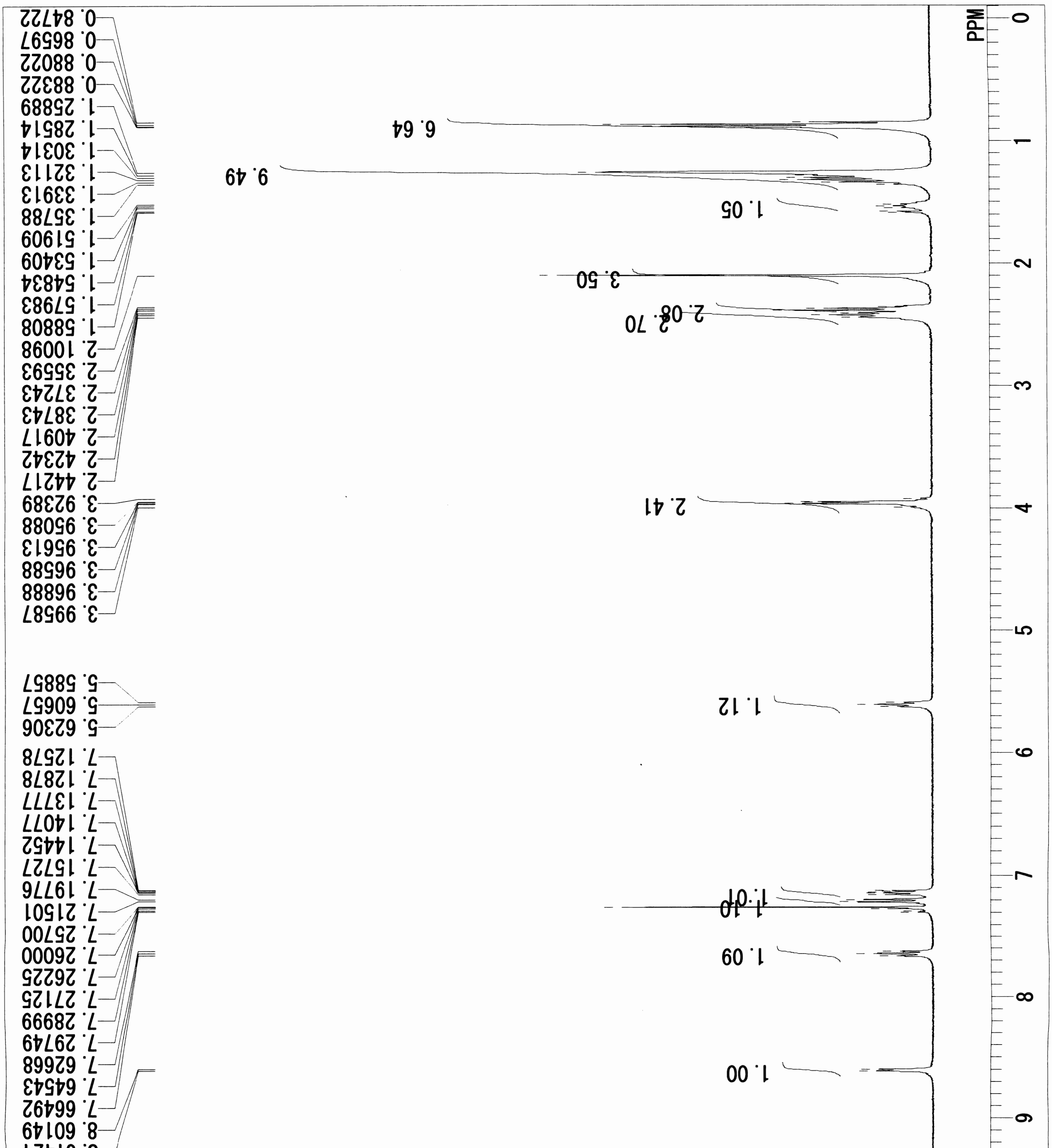
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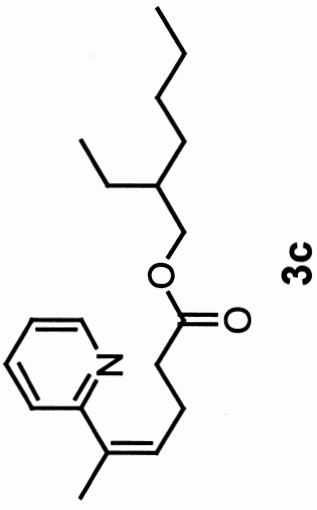

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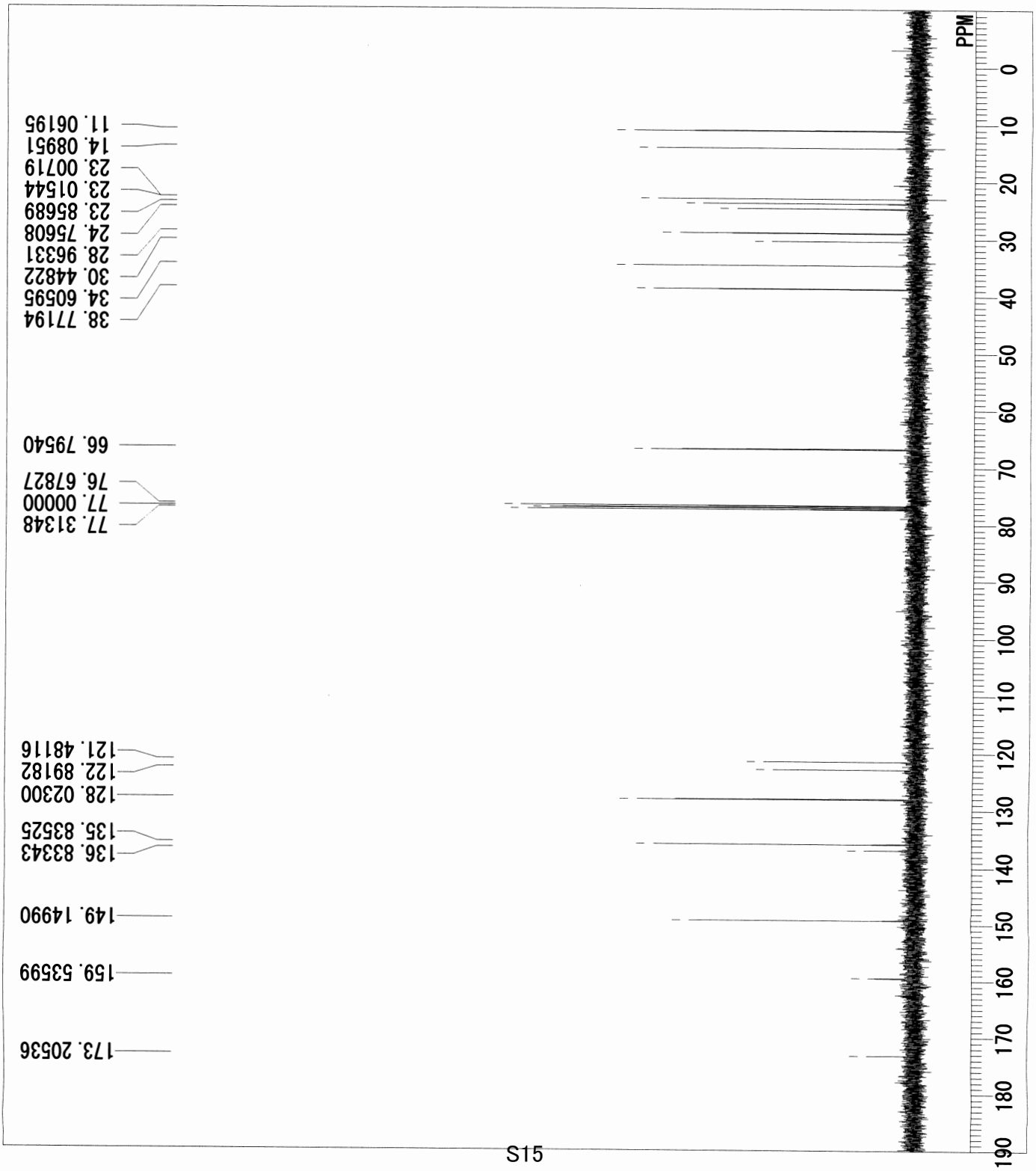
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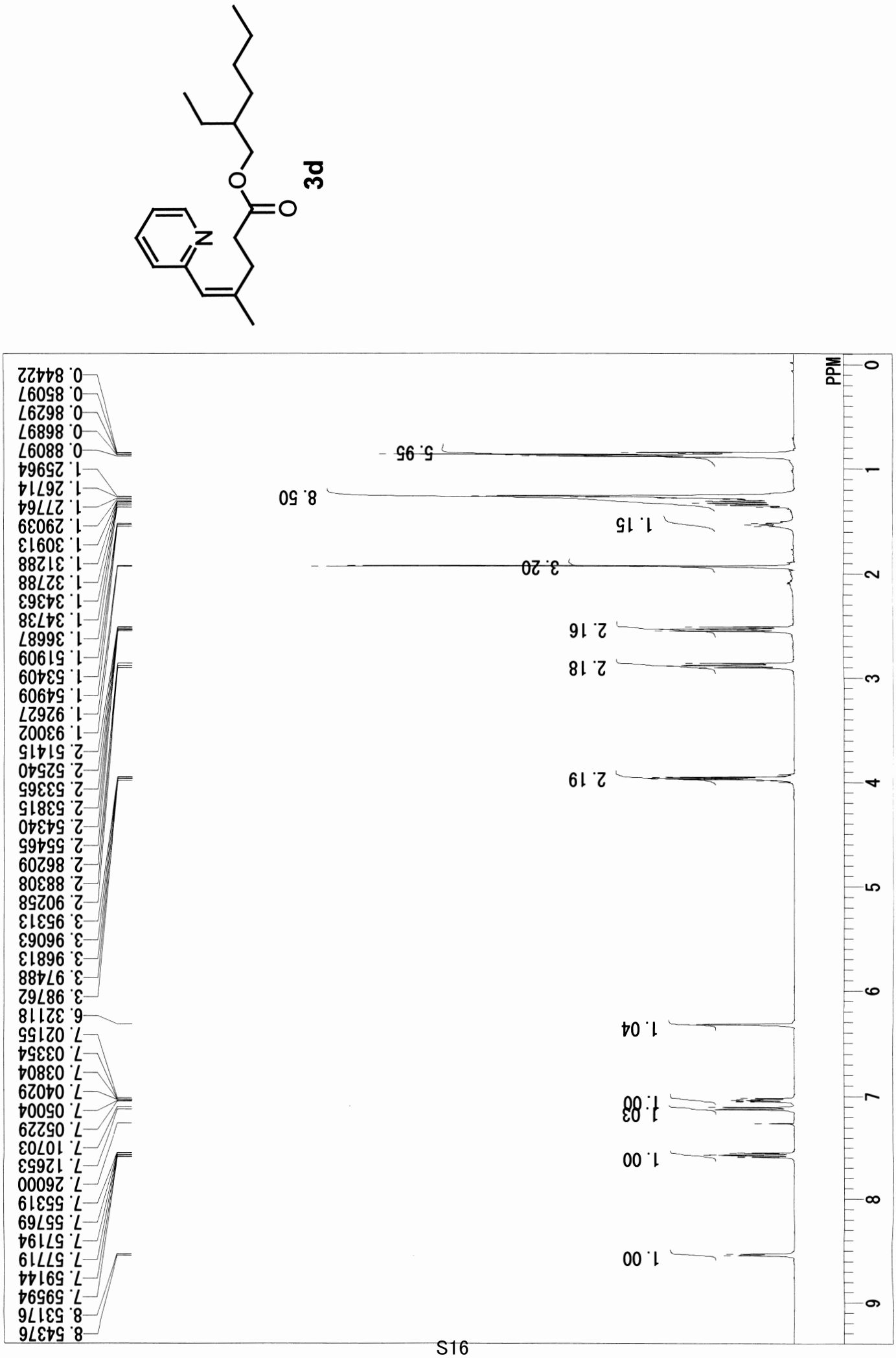
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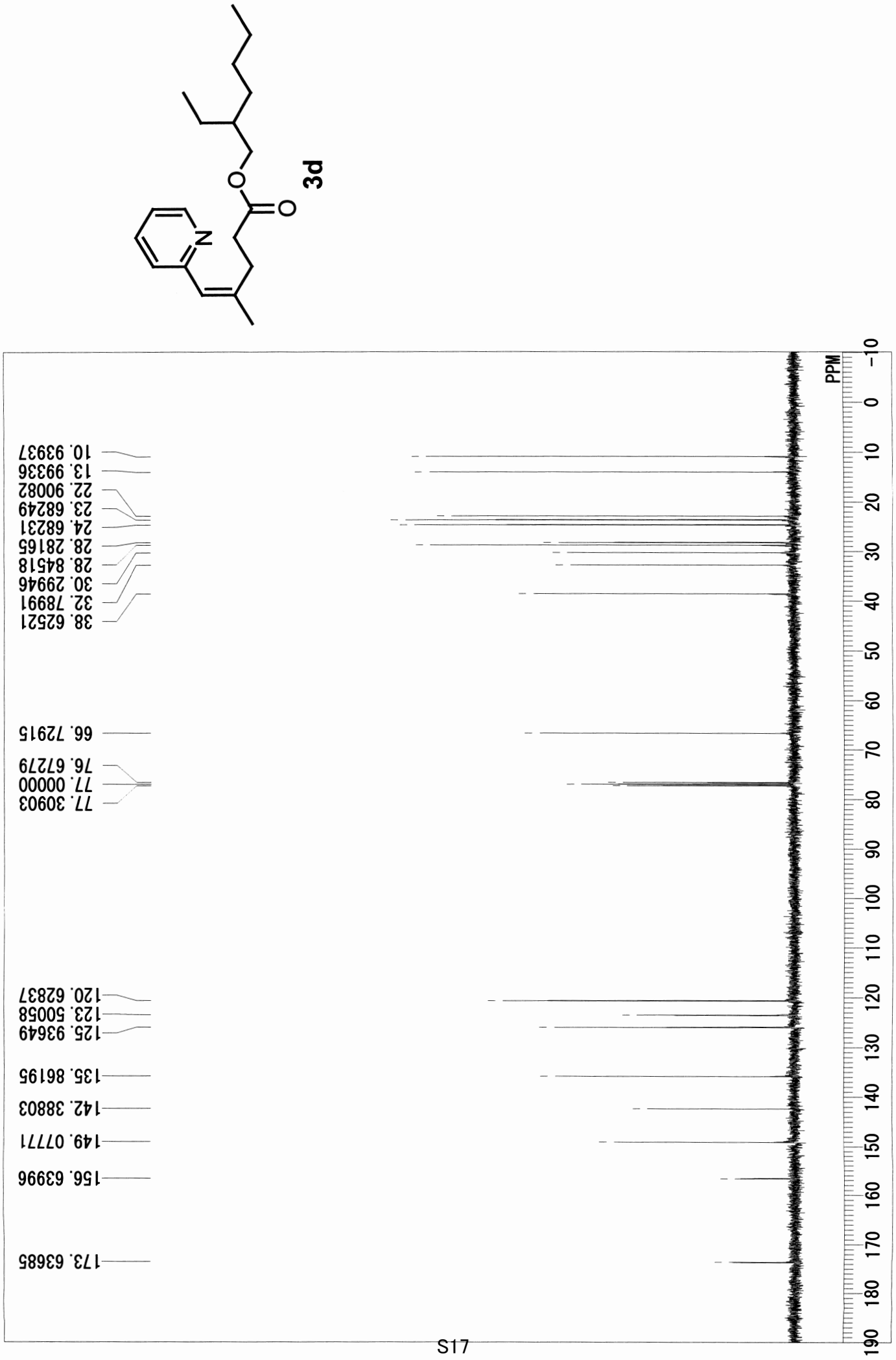
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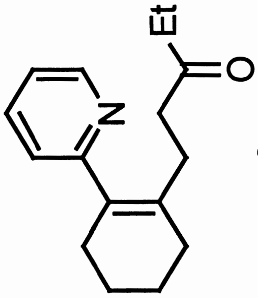

N
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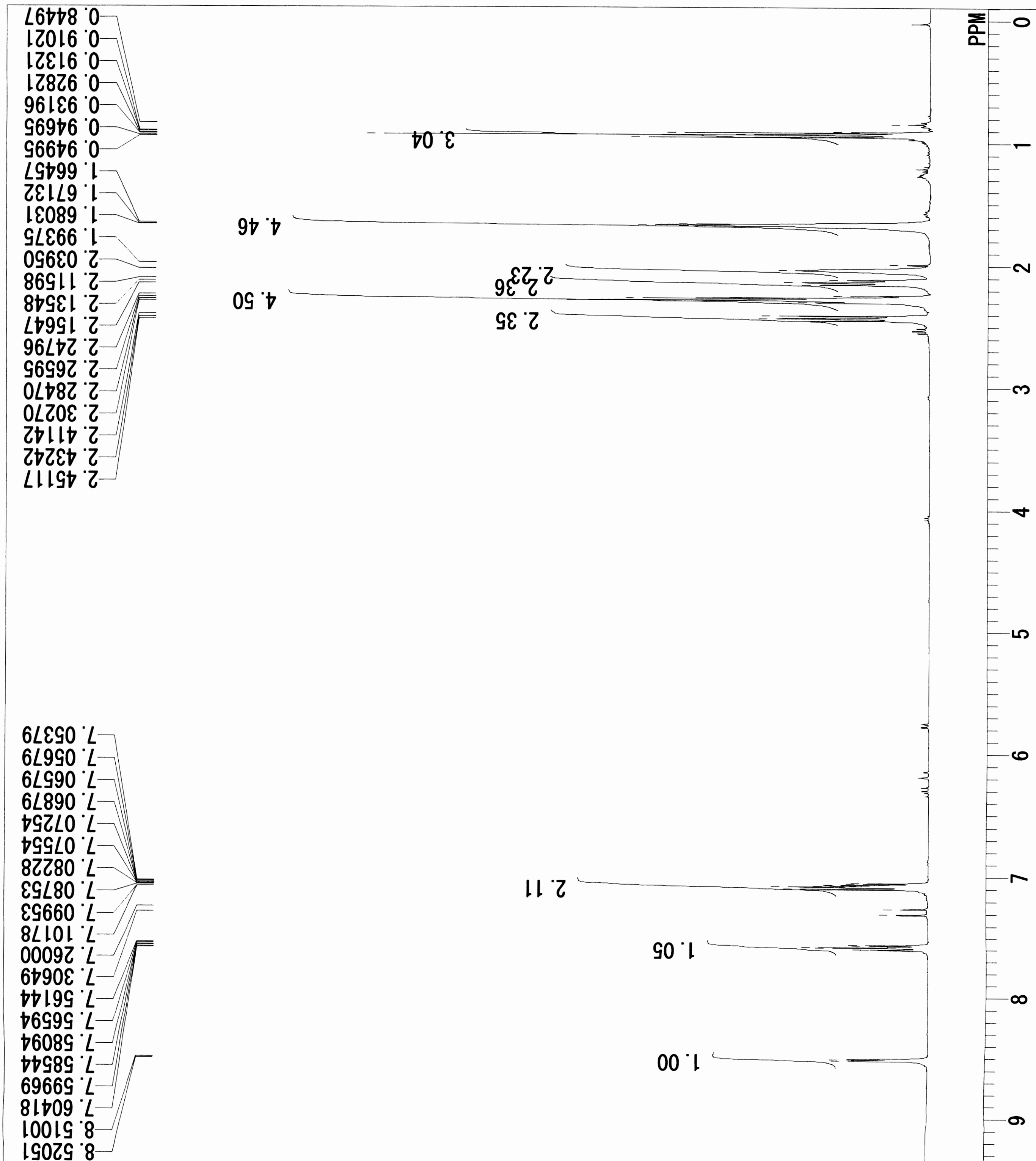
3e



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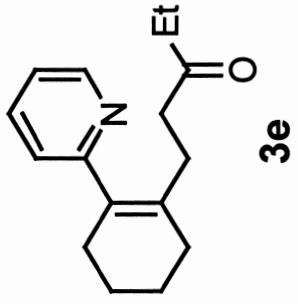
Et
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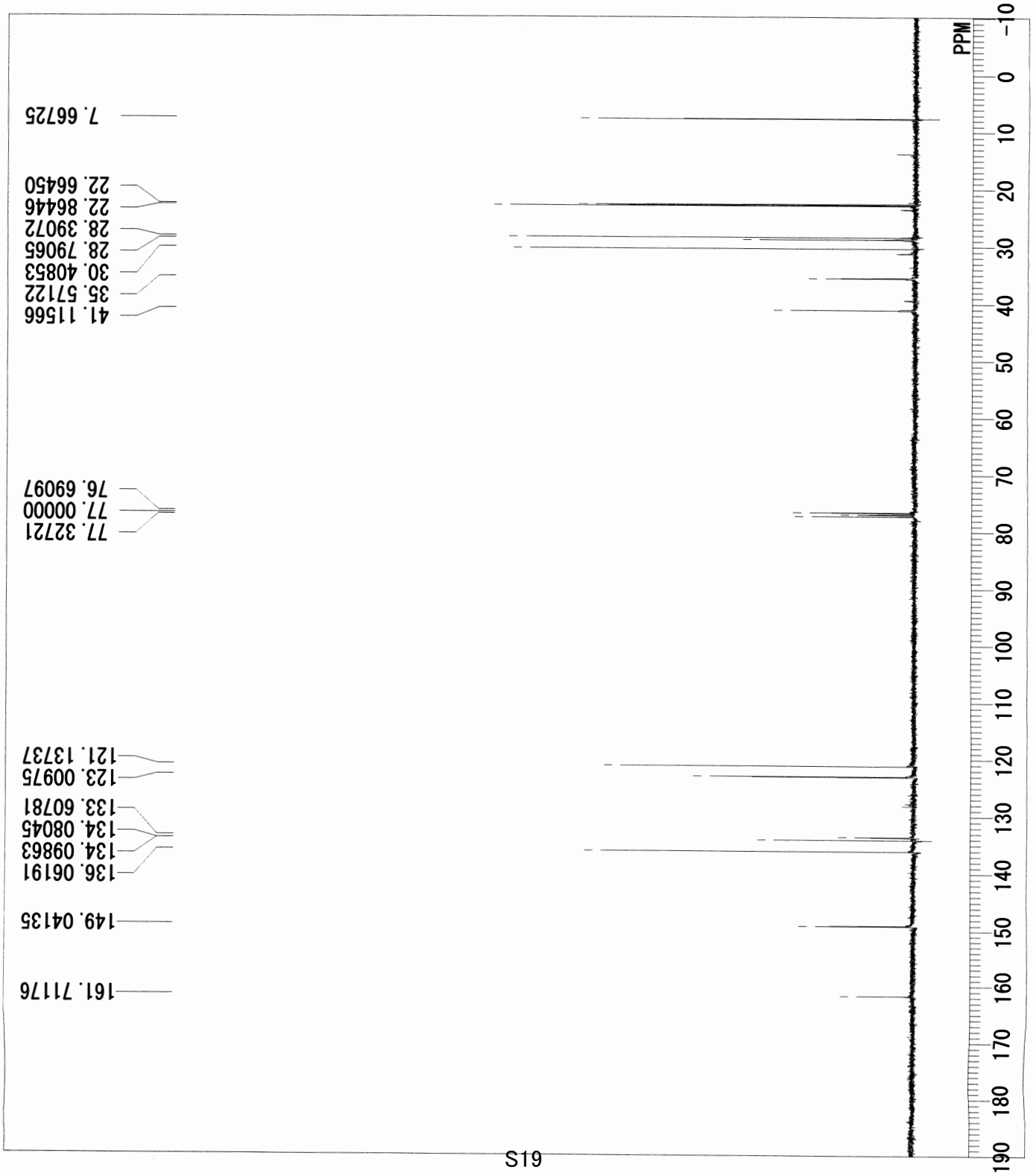
N

3e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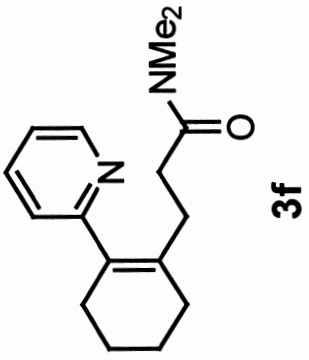
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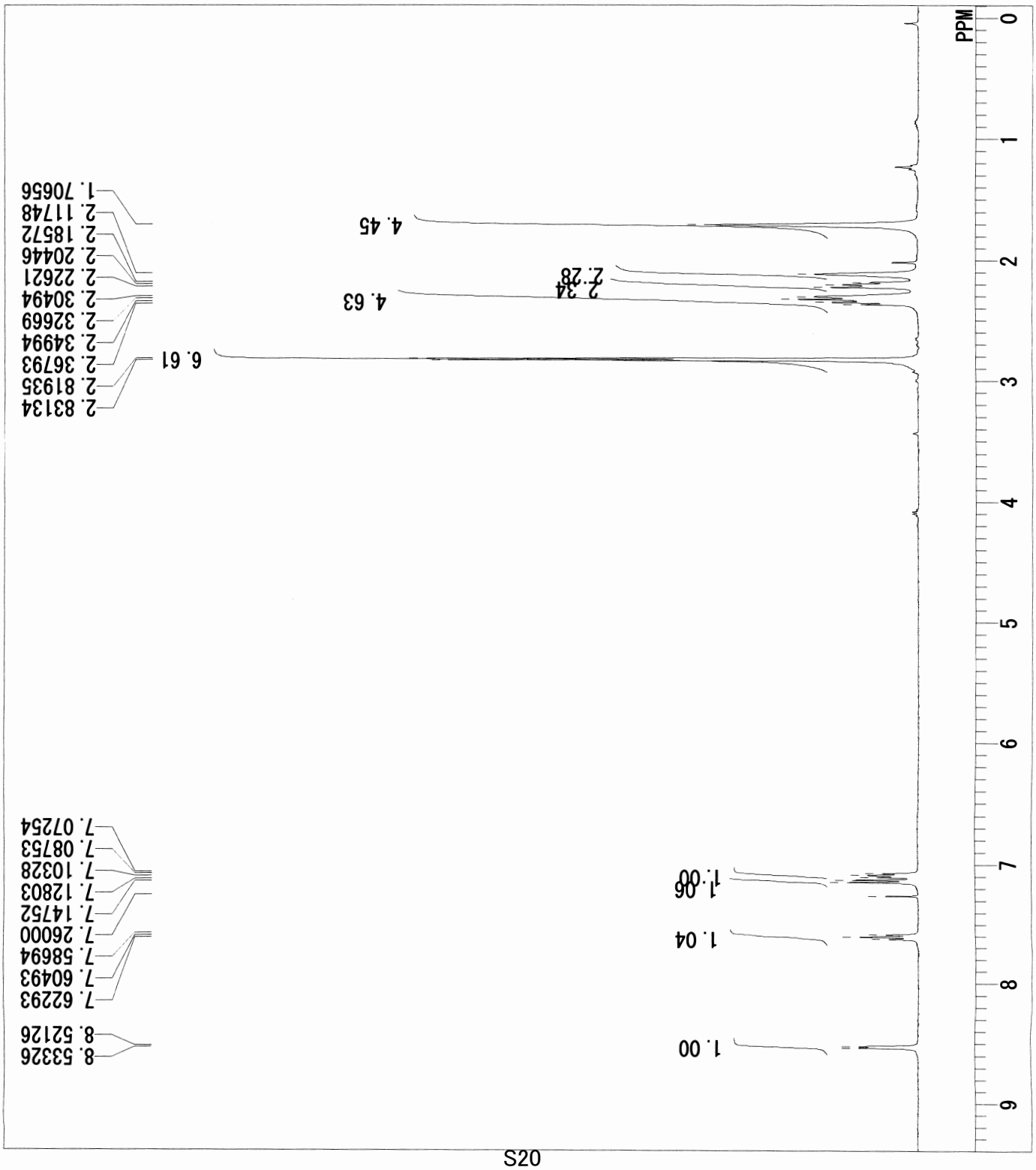
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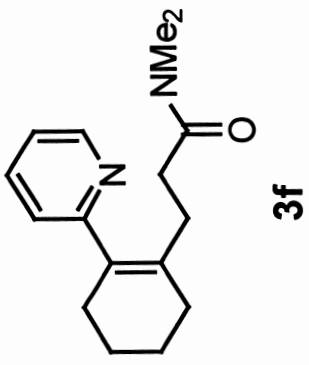
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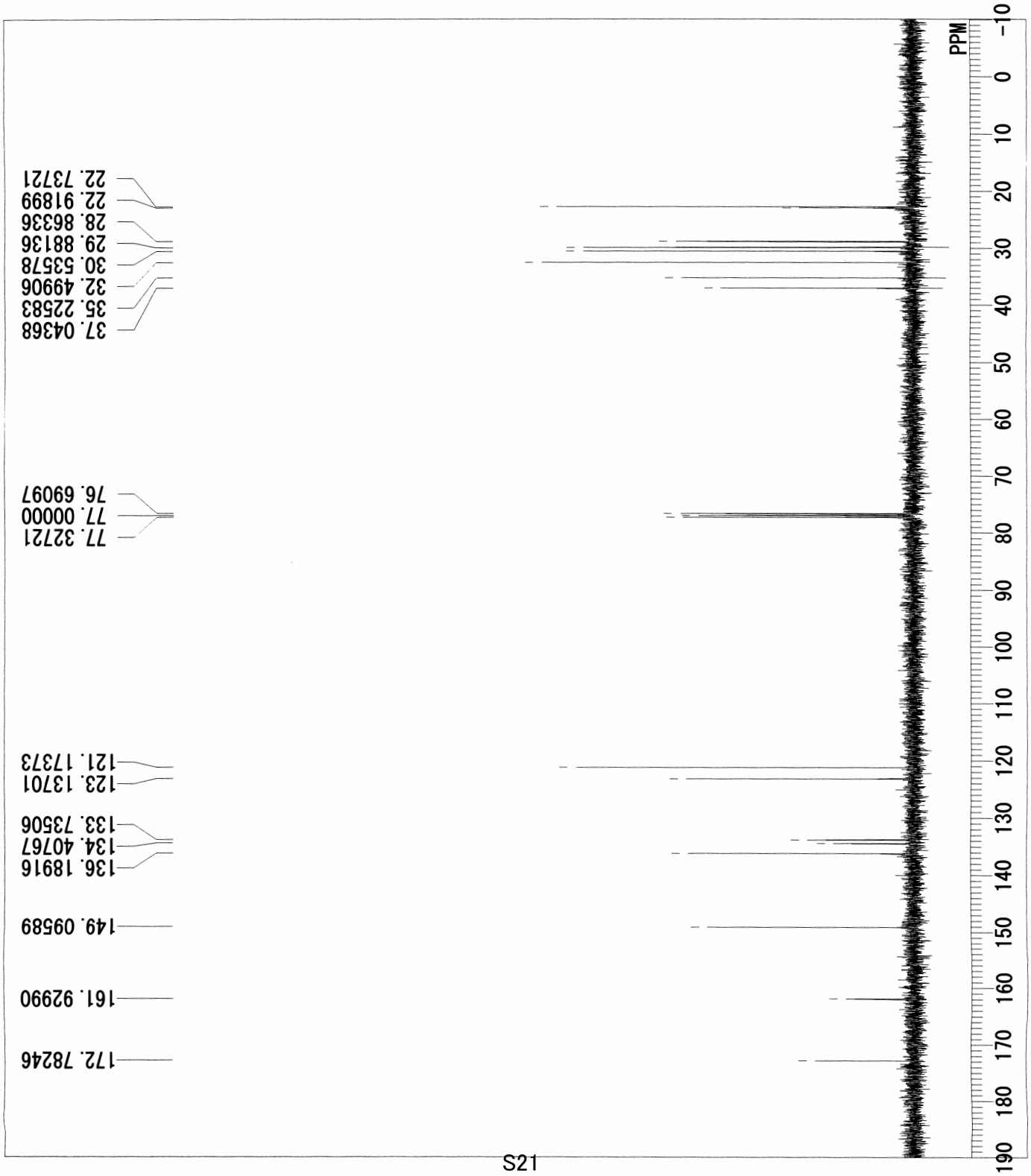
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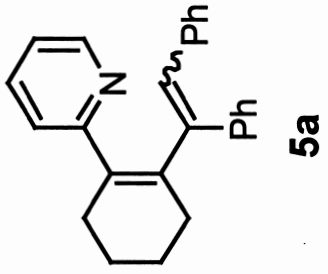
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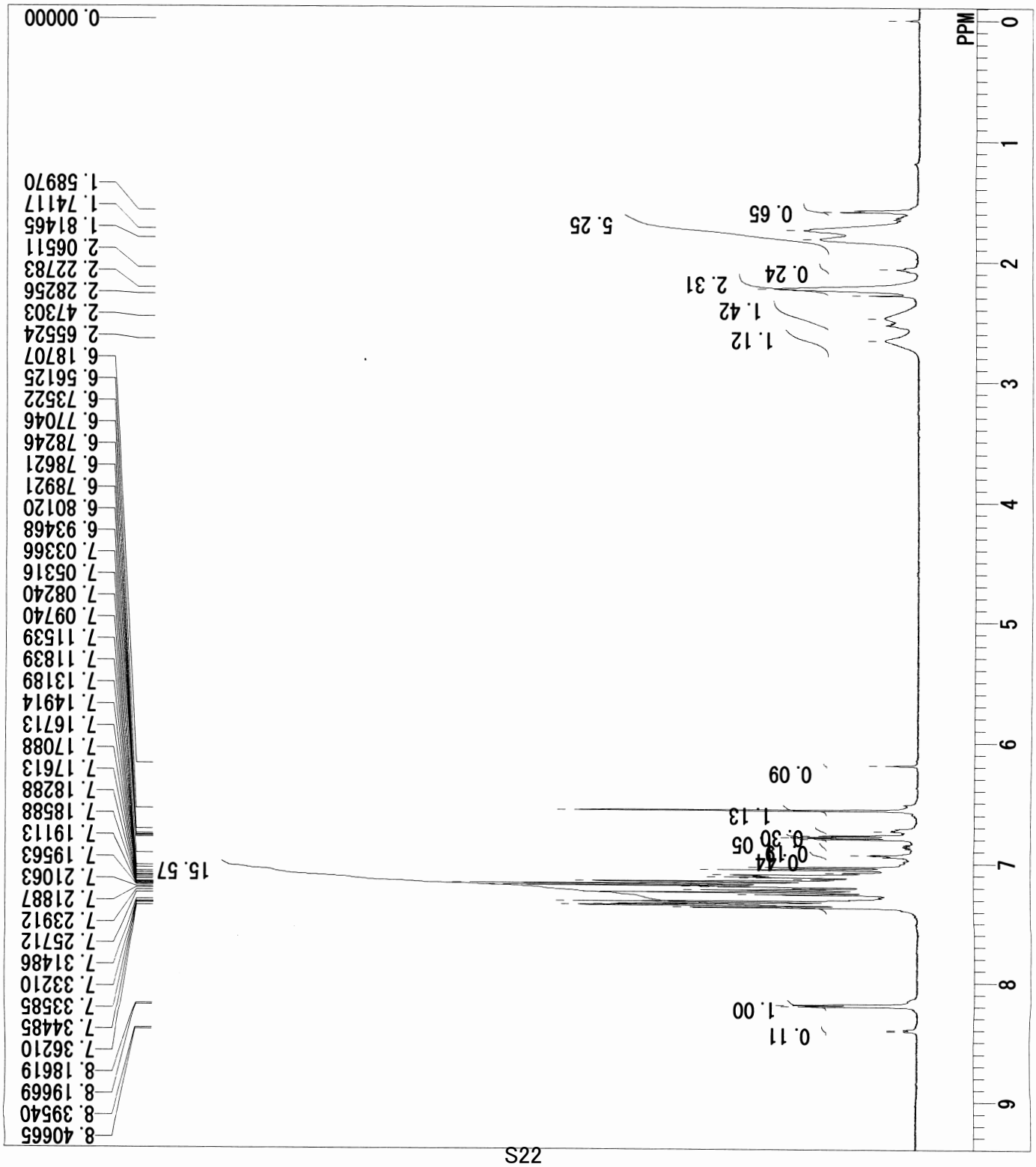
Ph
Ph

5a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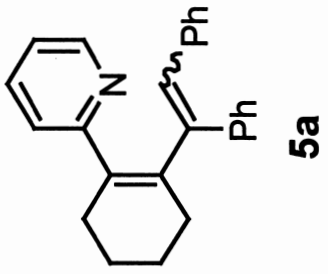
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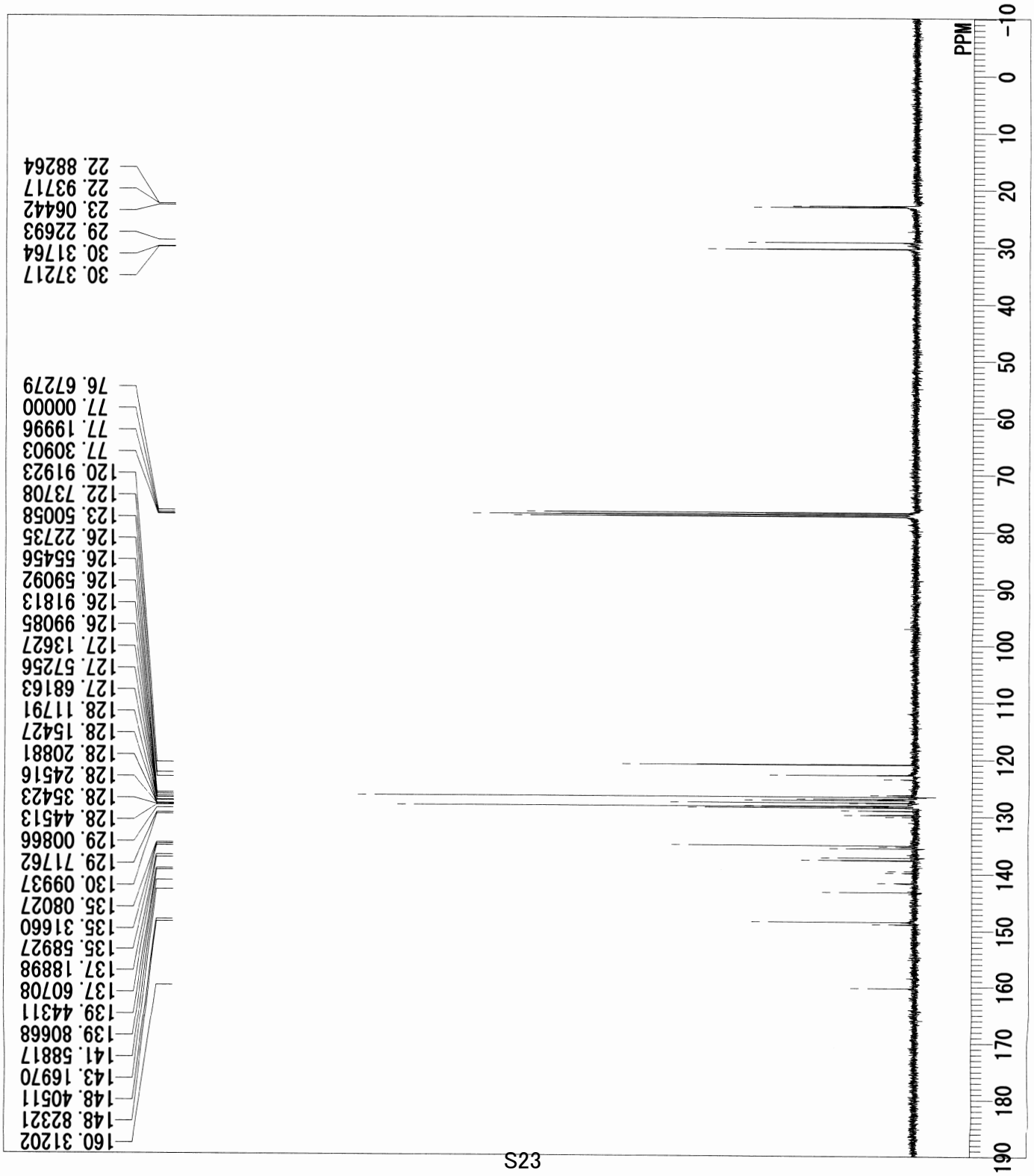
Ph
Ph

5a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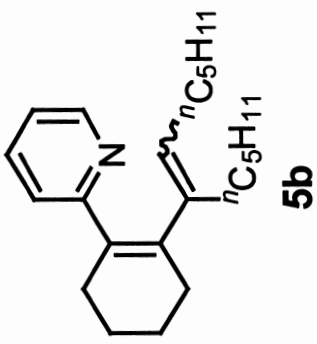
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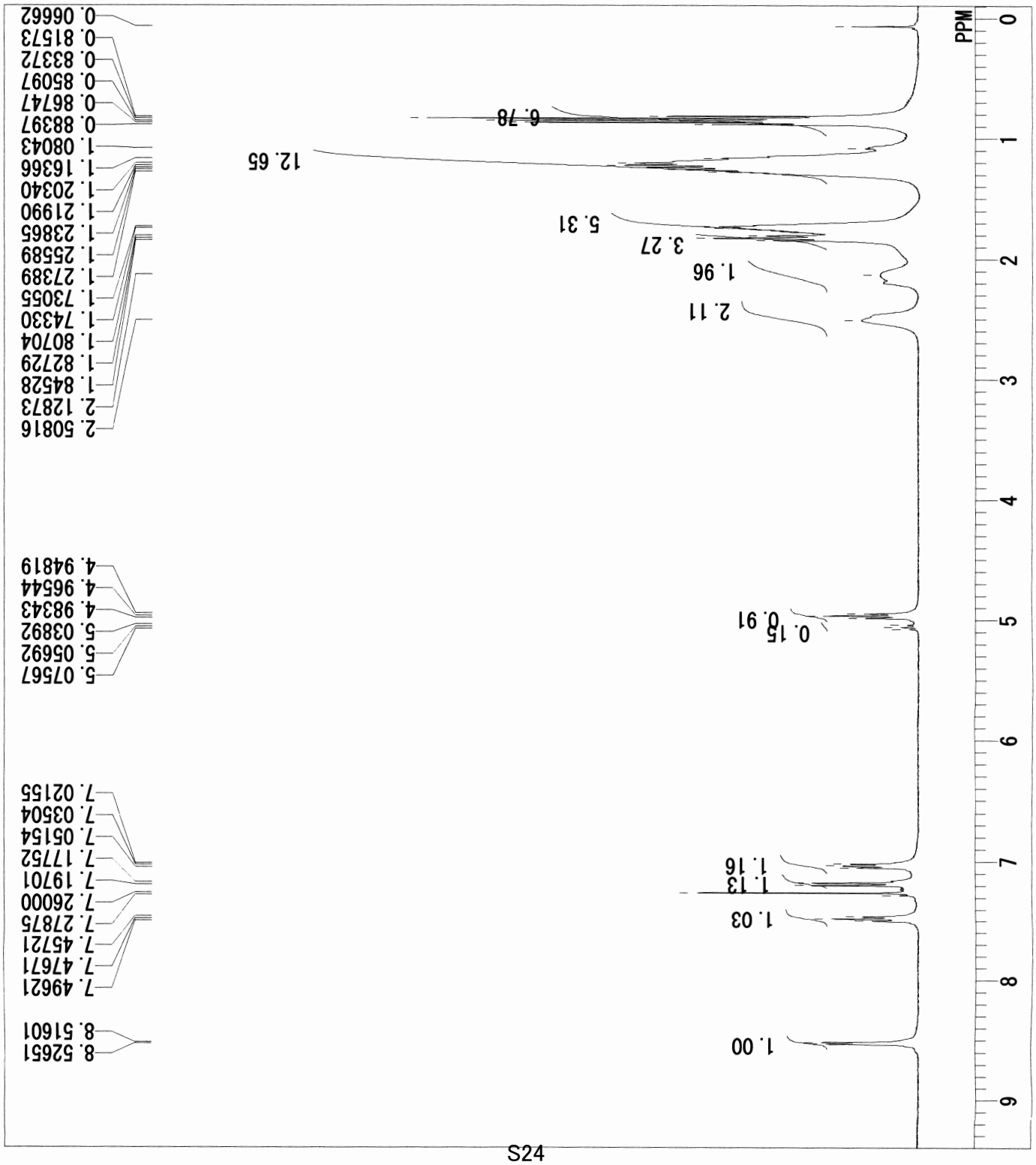
^{n}C$_5$H$_{11}$
N

5b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7.17752
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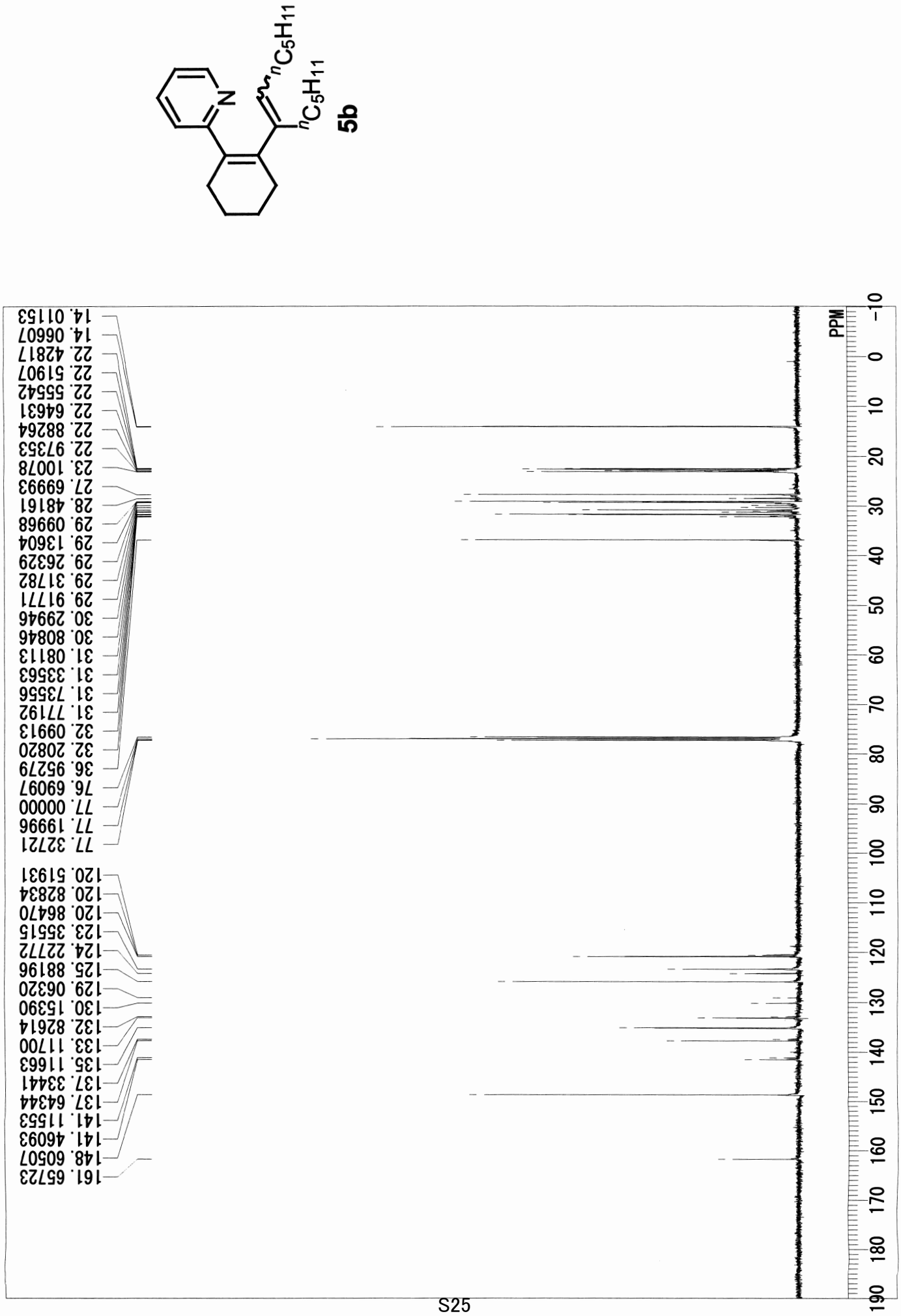
N
$^{n}C_5H_{11}$
$^{n}C_5H_{11}$
5b
PPM
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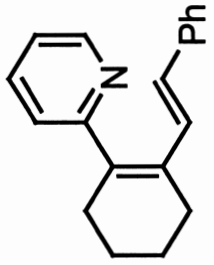
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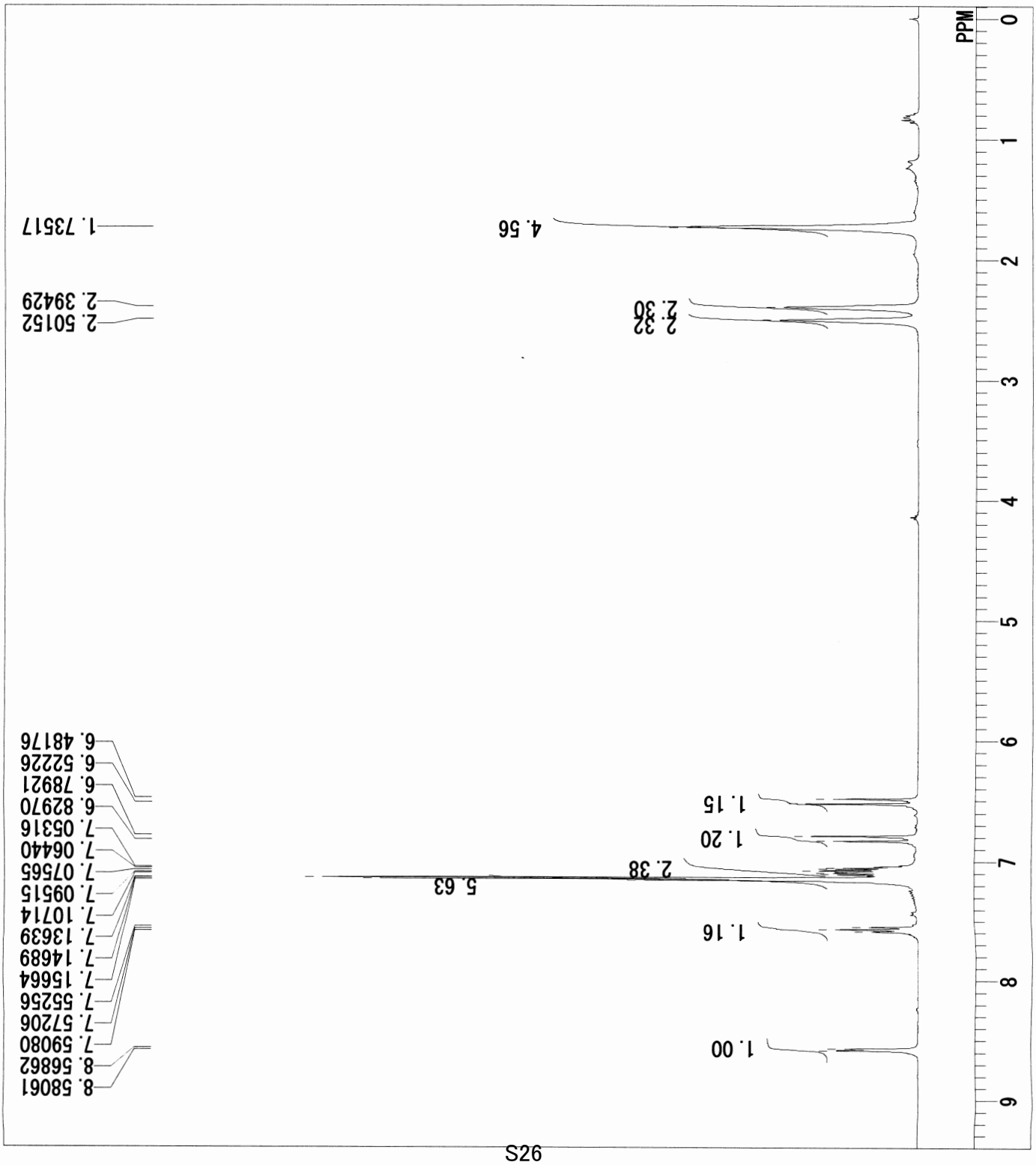
Ph

5c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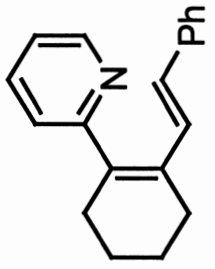
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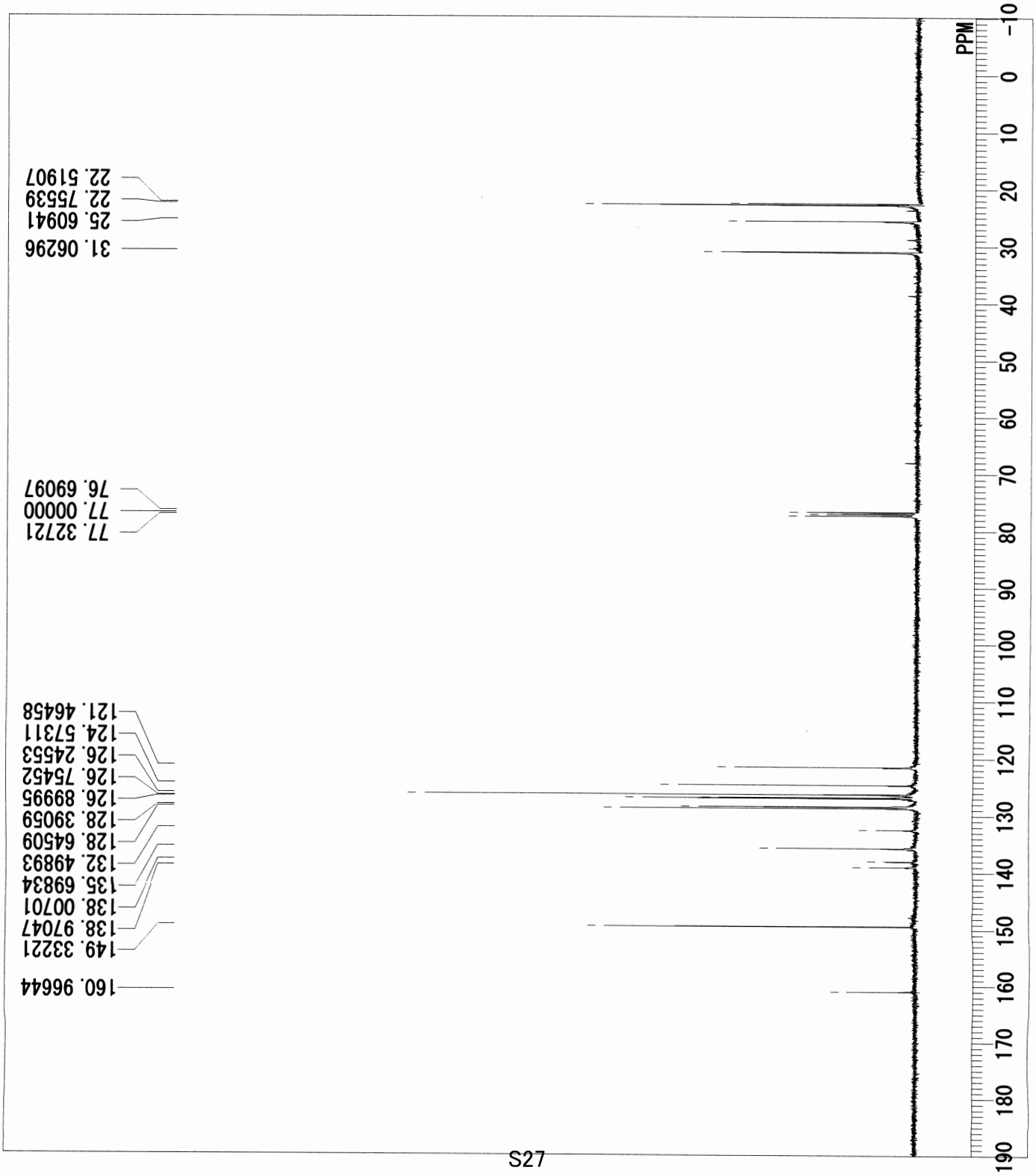
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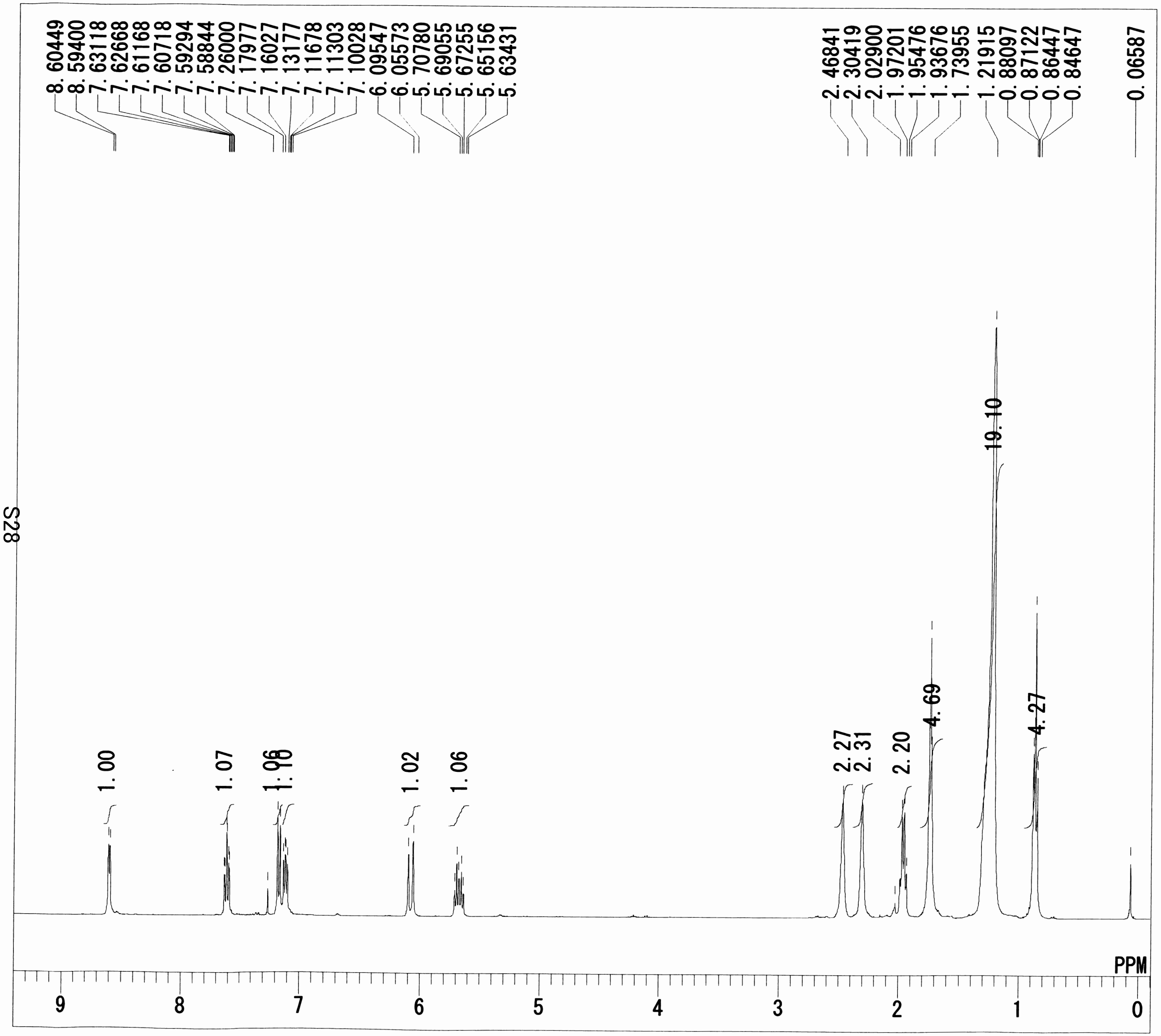
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0. 06587
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1. 07
1. 06
1. 10
1. 02
1. 06
2. 27
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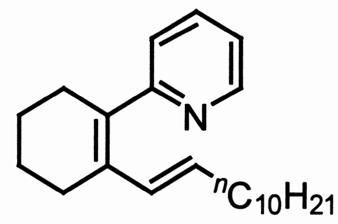
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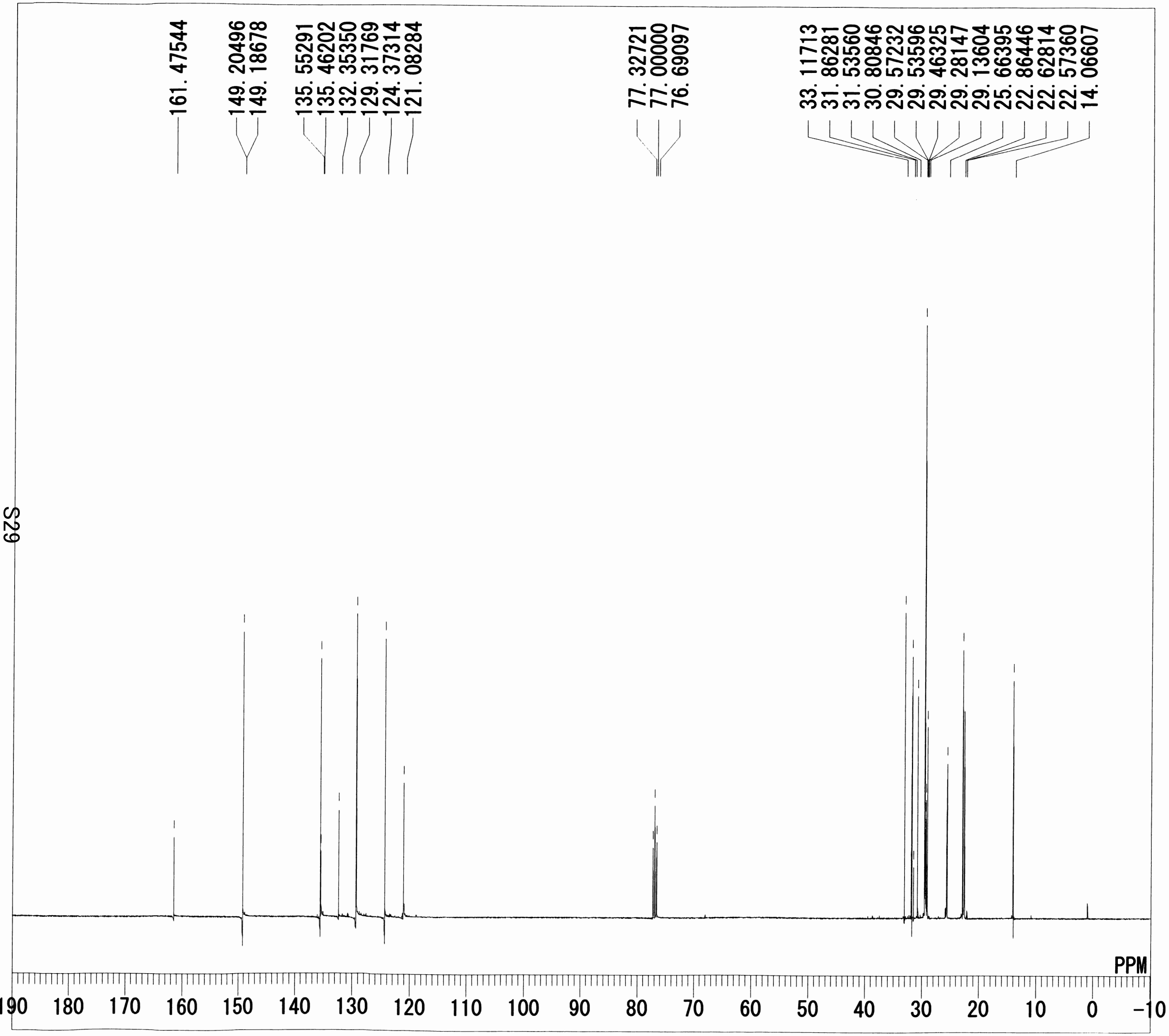
$^nC_{10}H_{21}$

5d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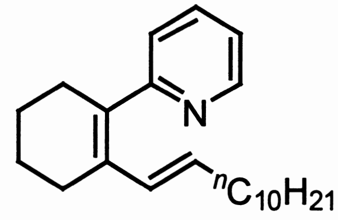
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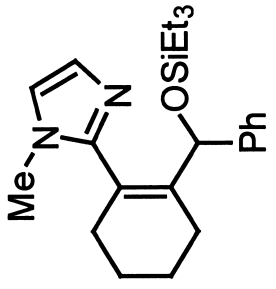
$^{n}C_{10}H_{21}$

5d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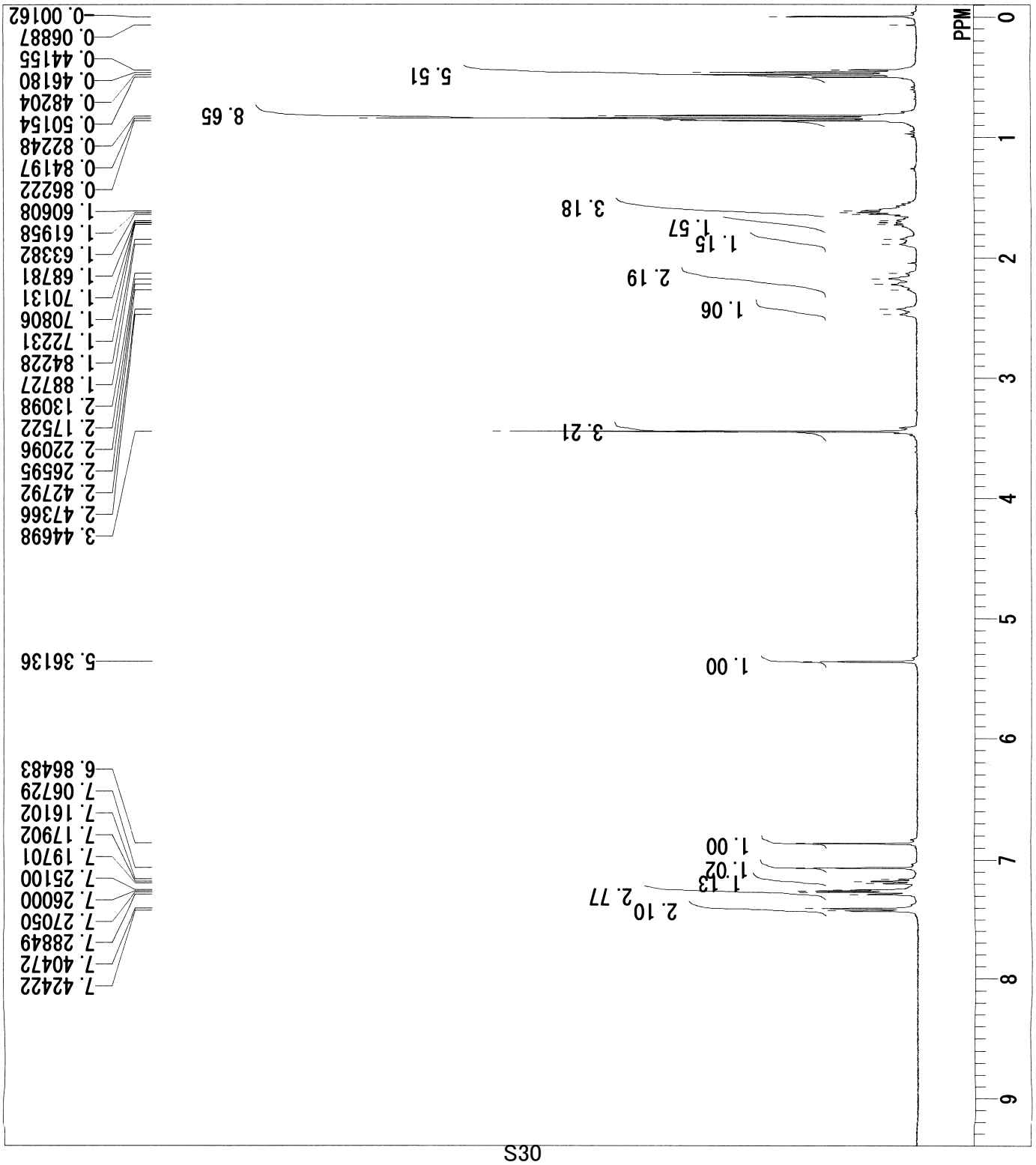
OSiEt3
Ph

7a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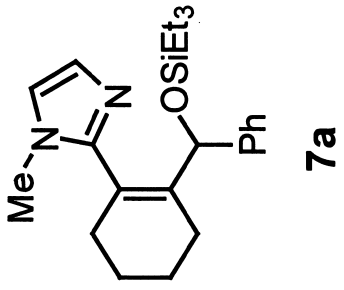
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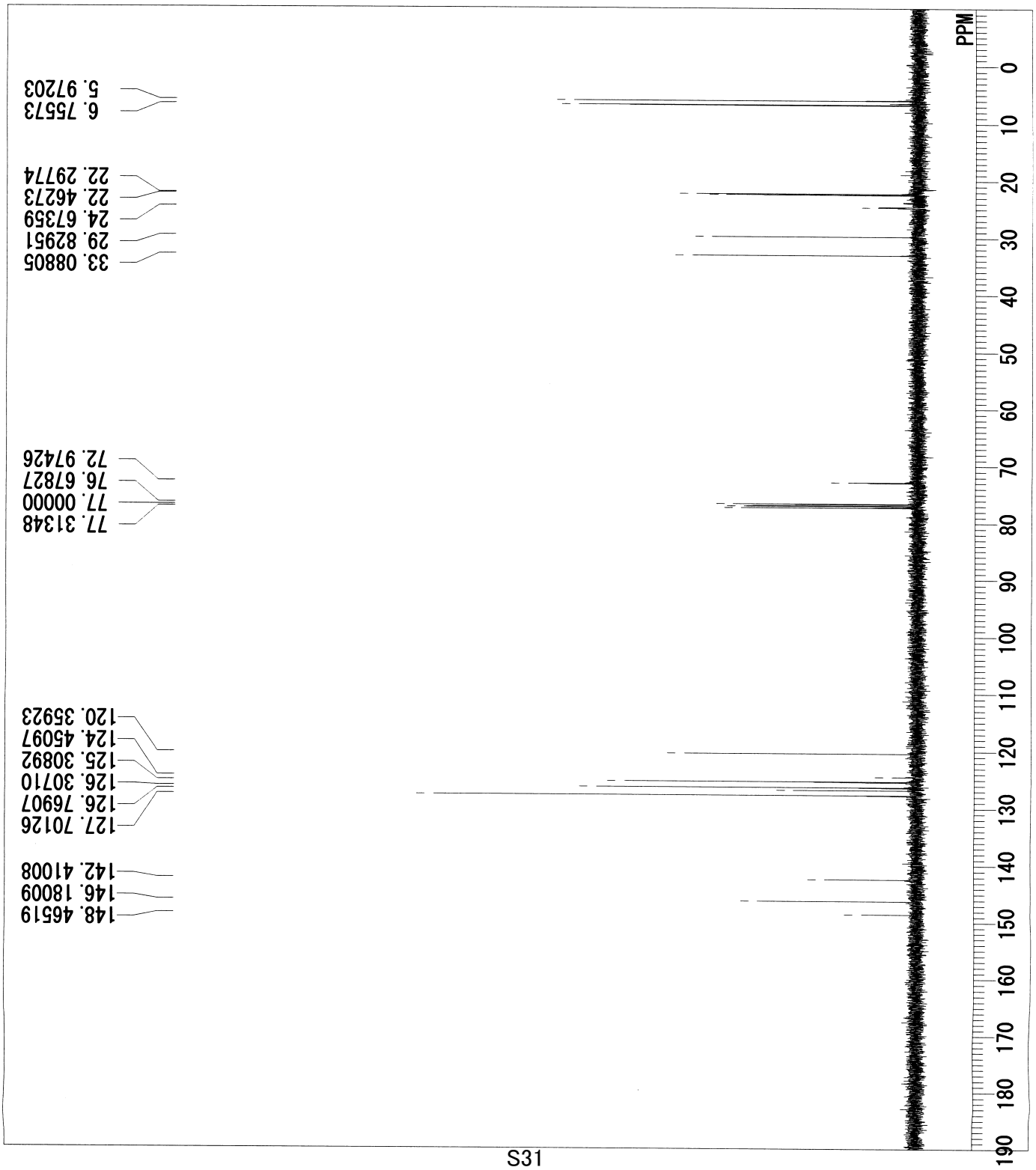
OSiEt3
Ph

7a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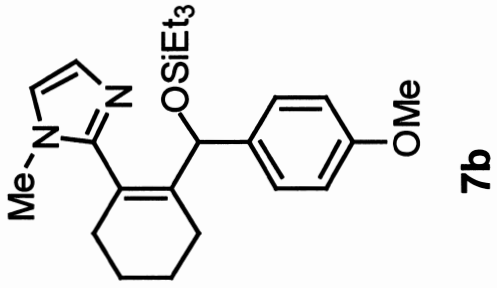
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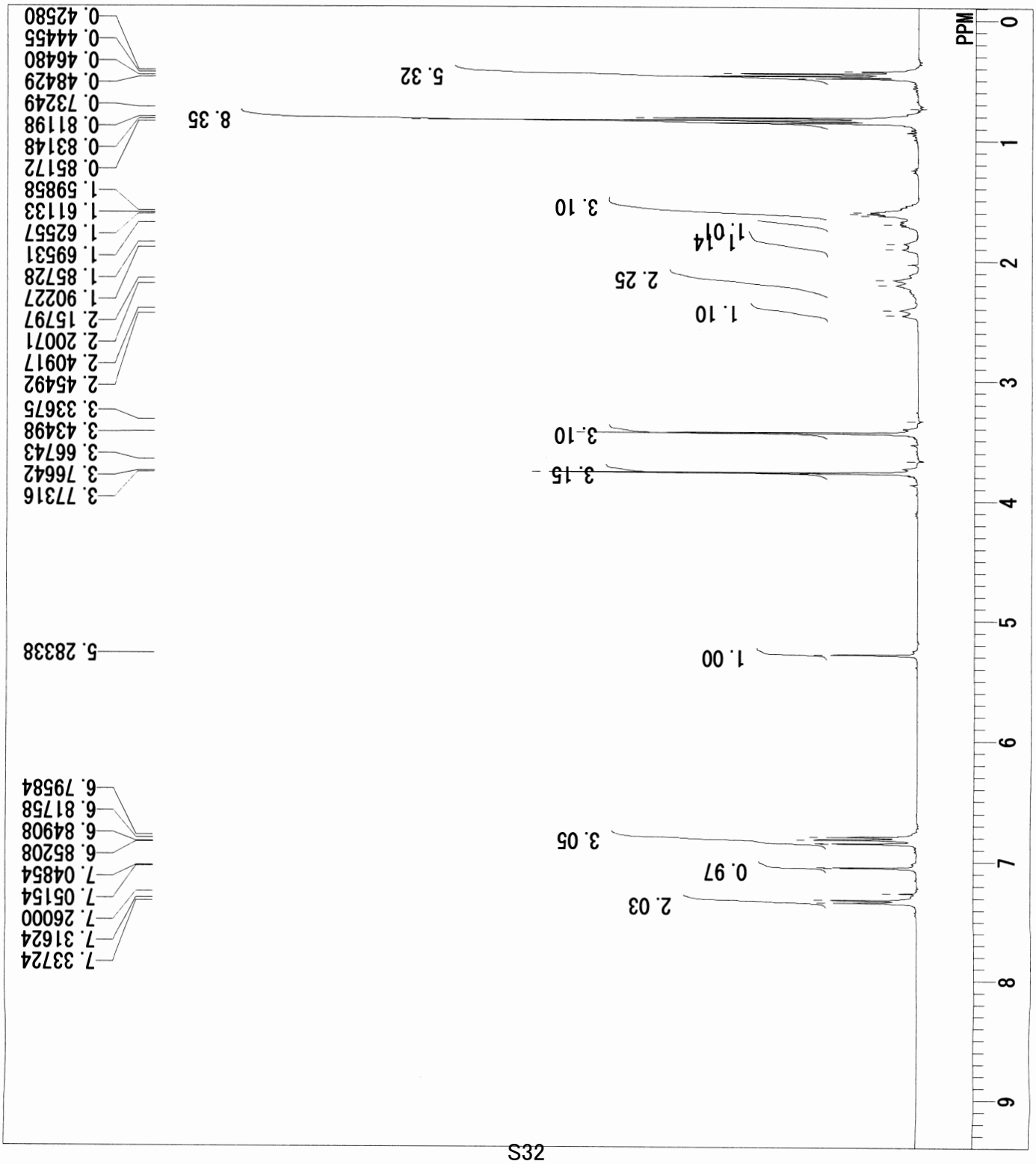
OSiEt3
OMe

7b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3.05
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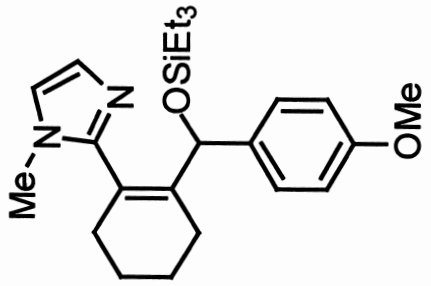
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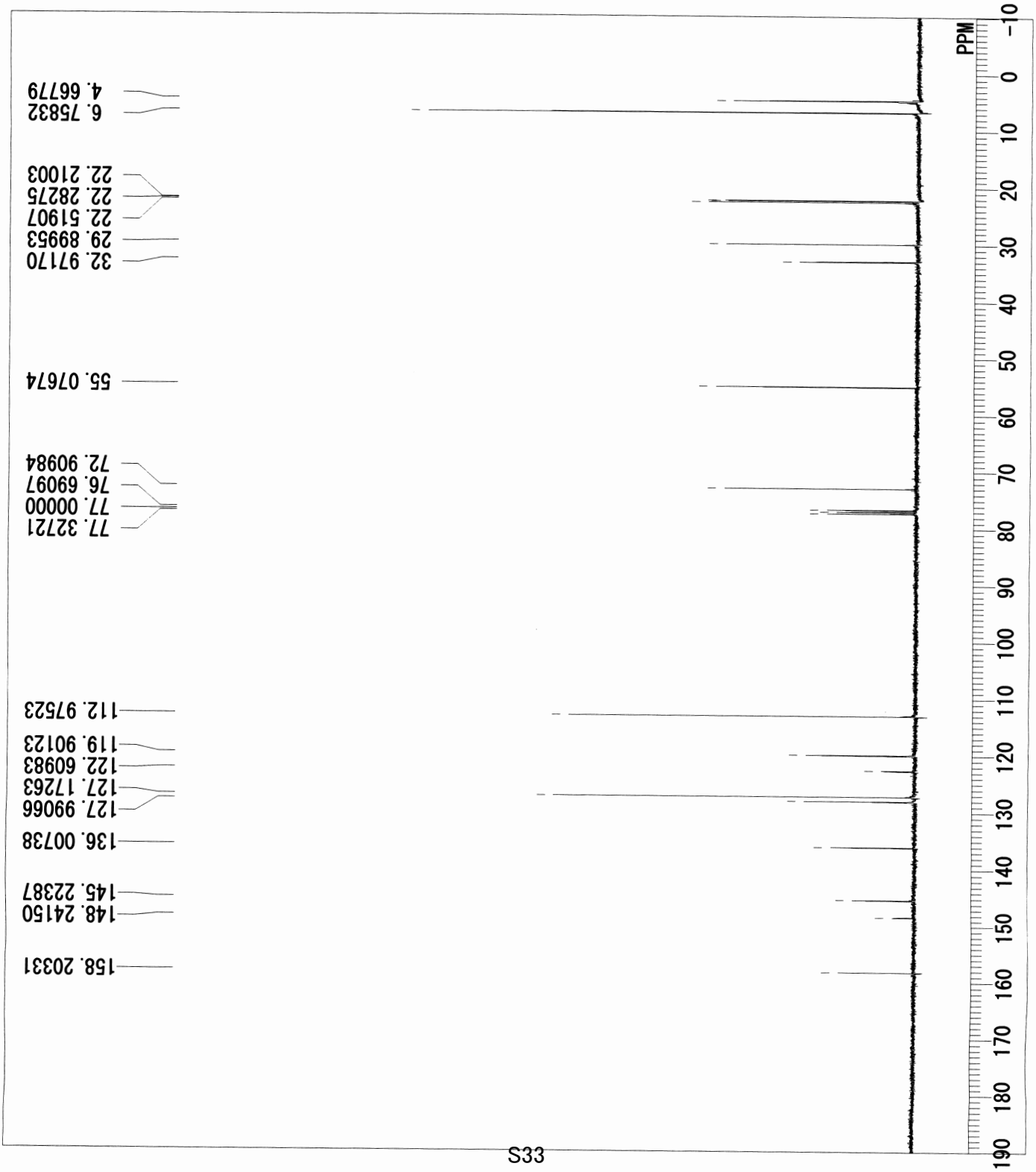
OMe

7b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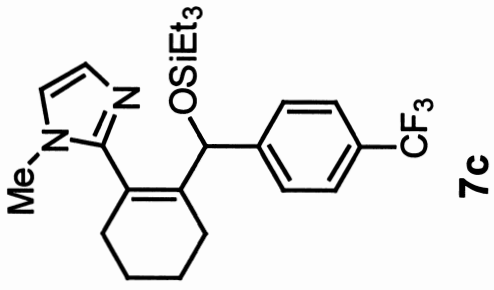
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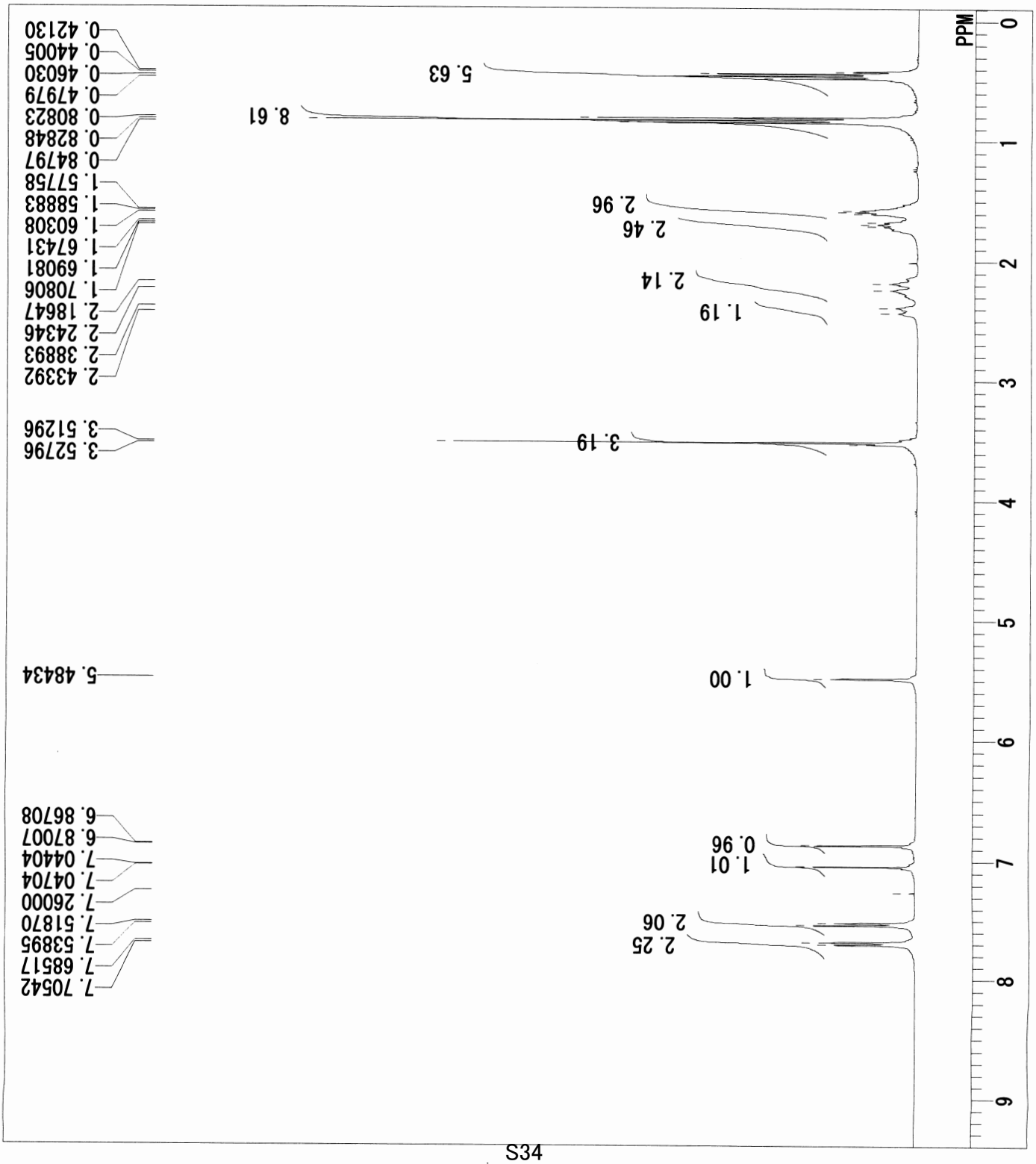
CF3

7c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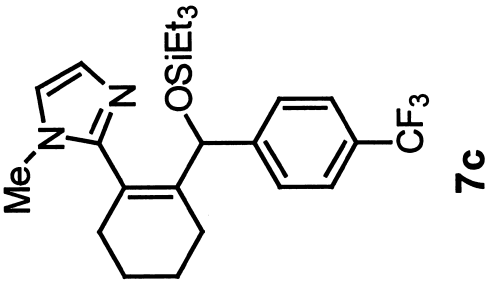
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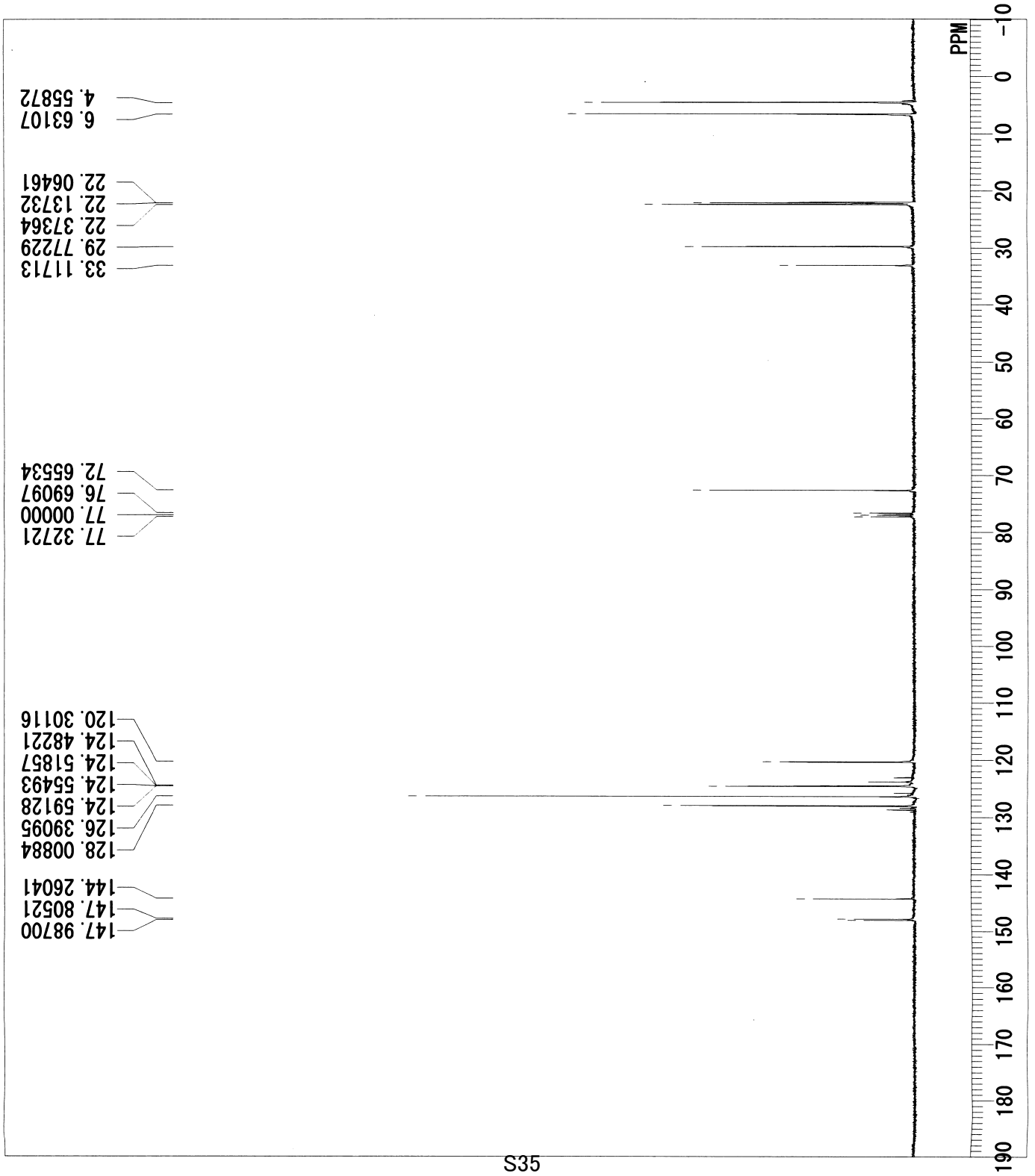
7c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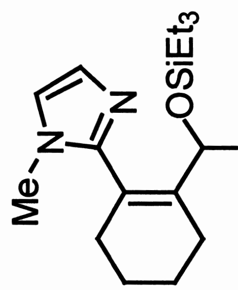
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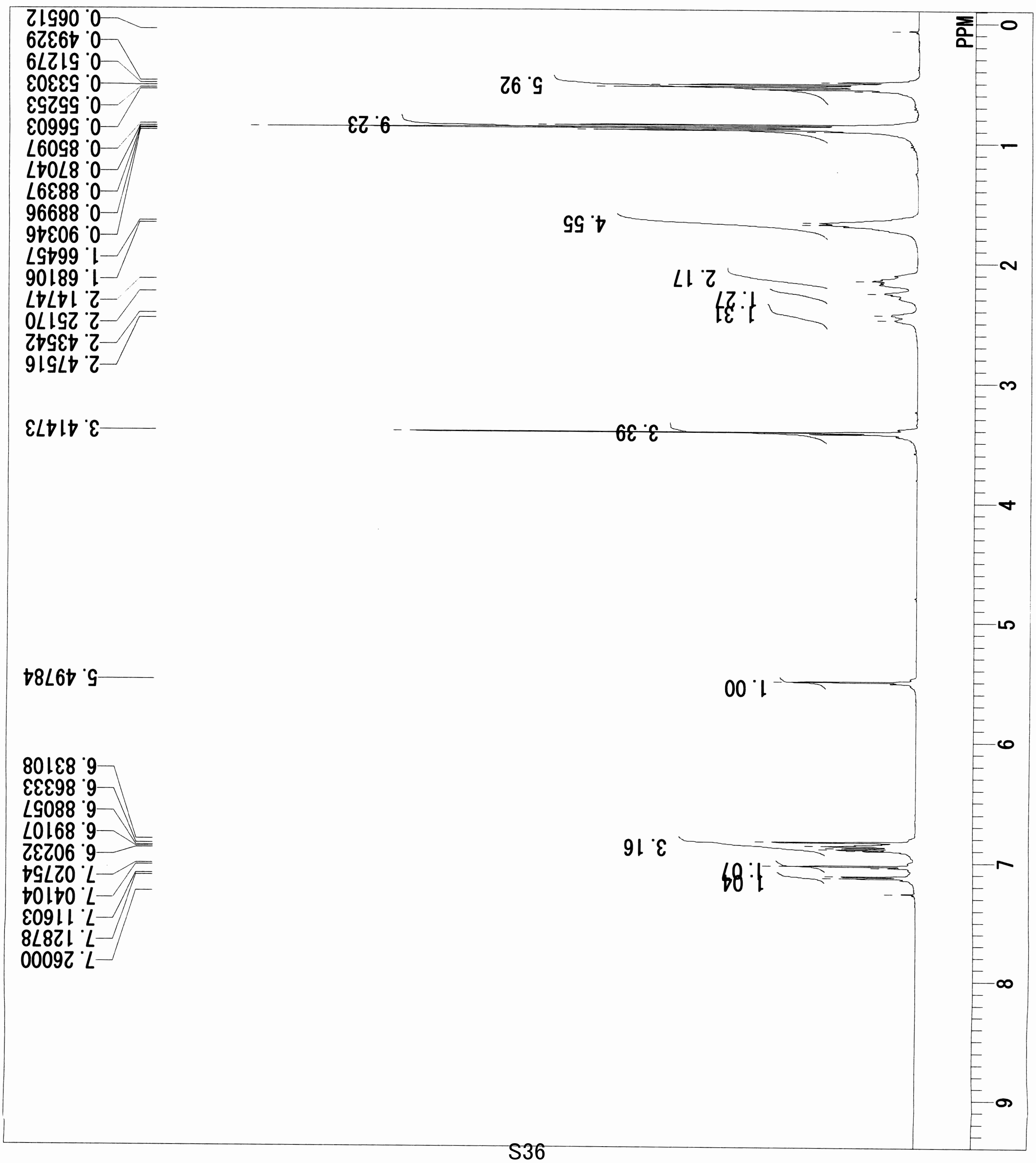
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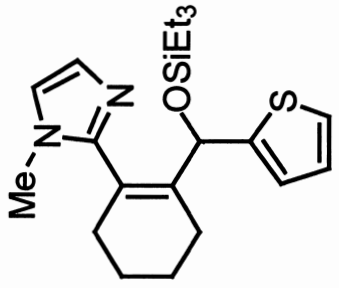
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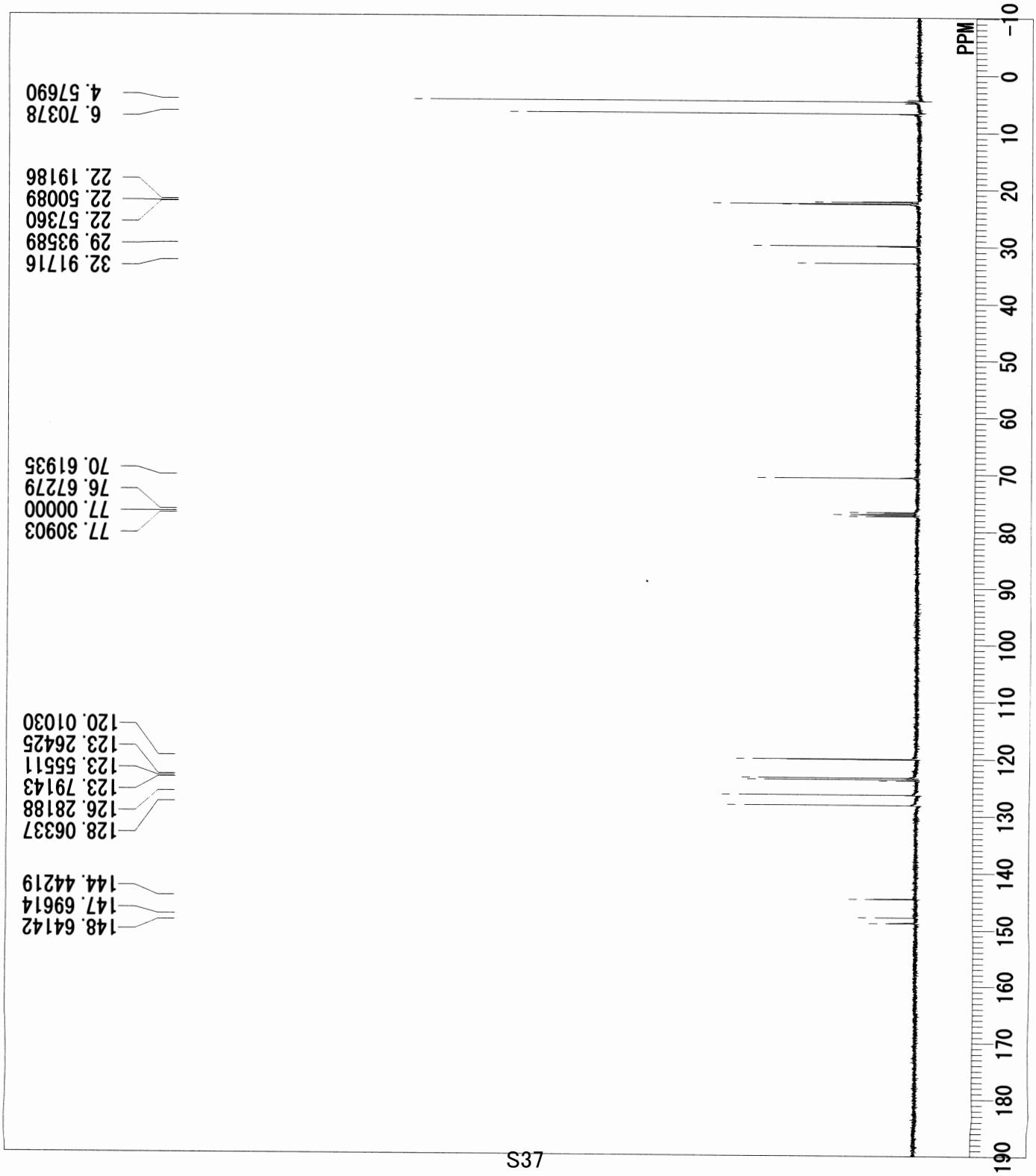
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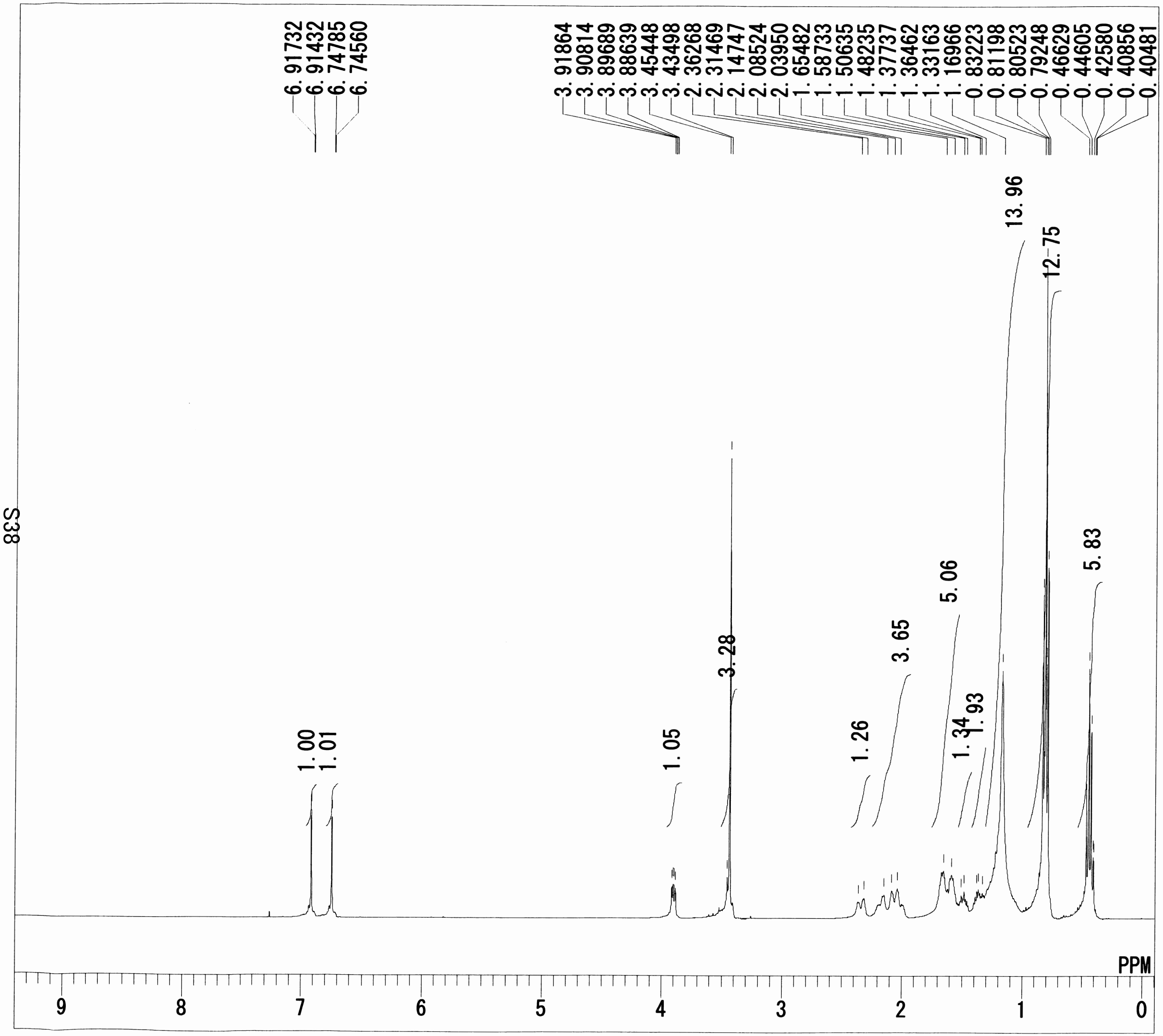
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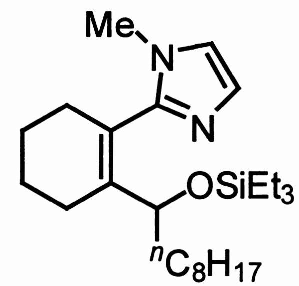
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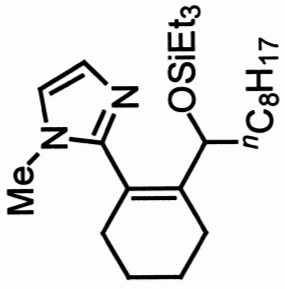
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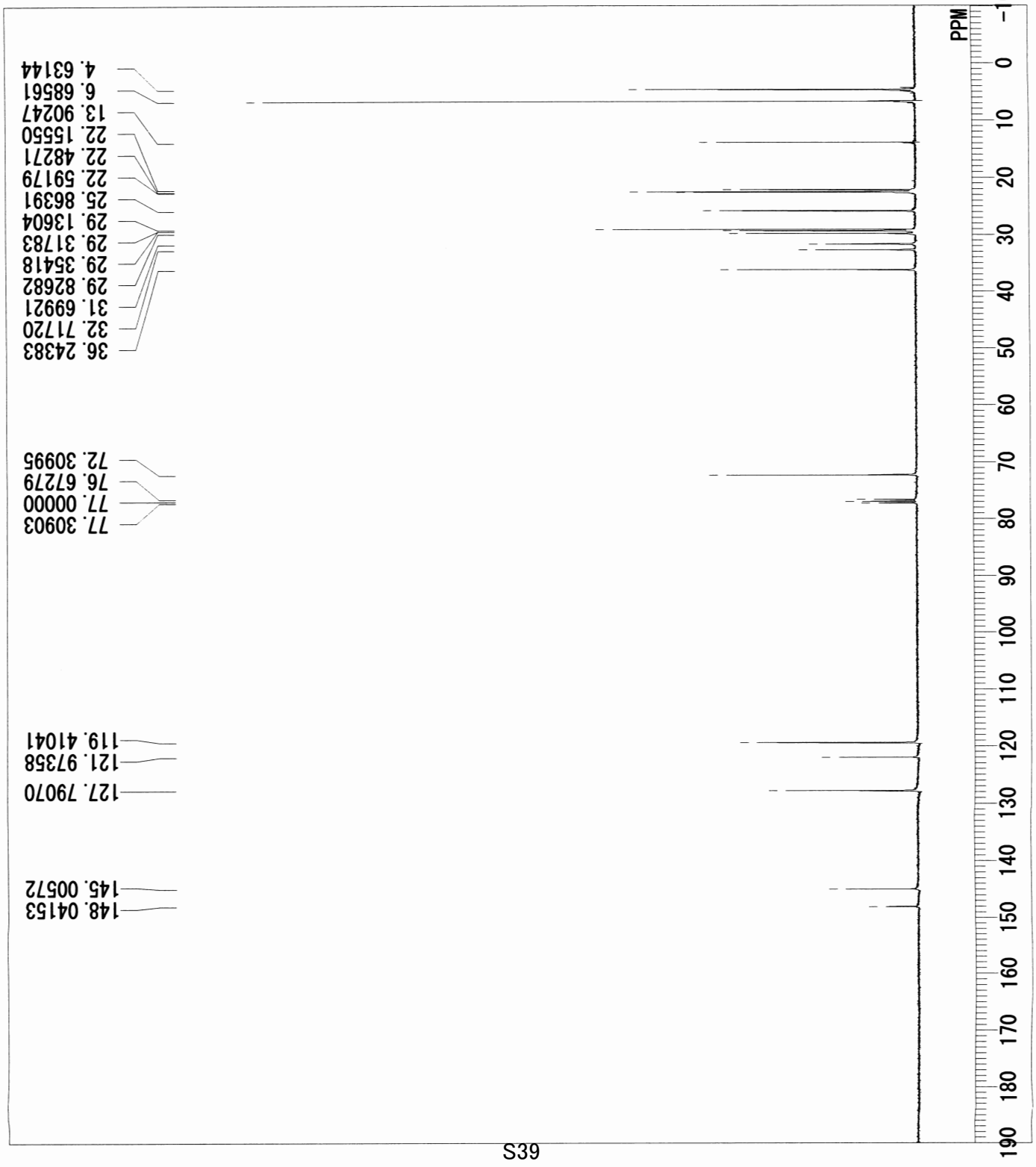
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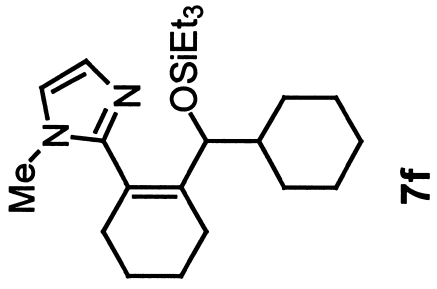
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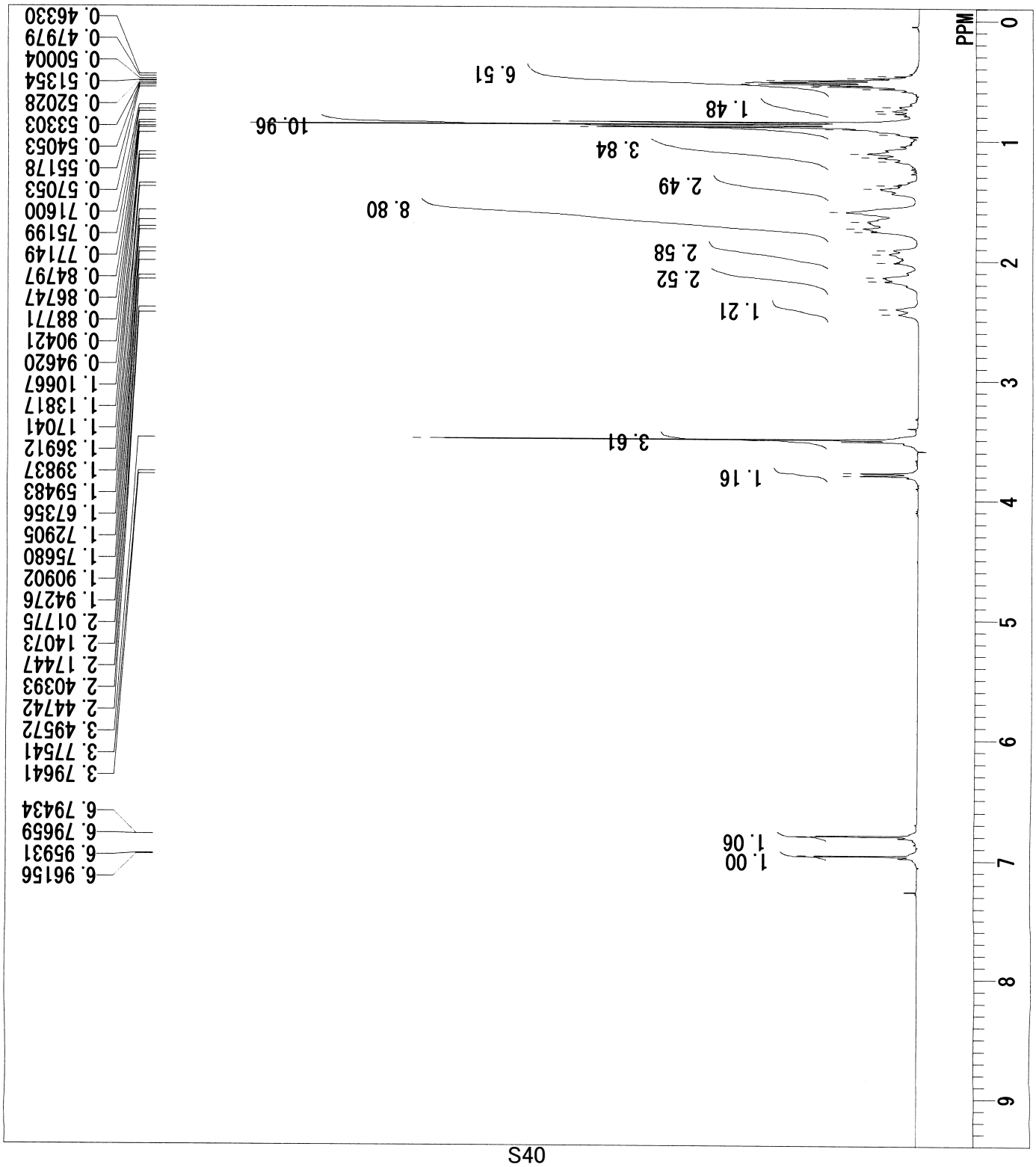
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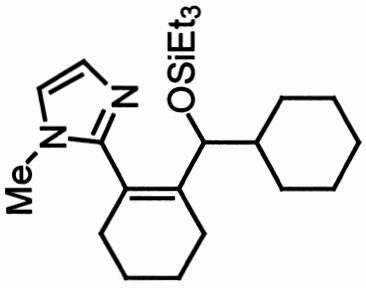
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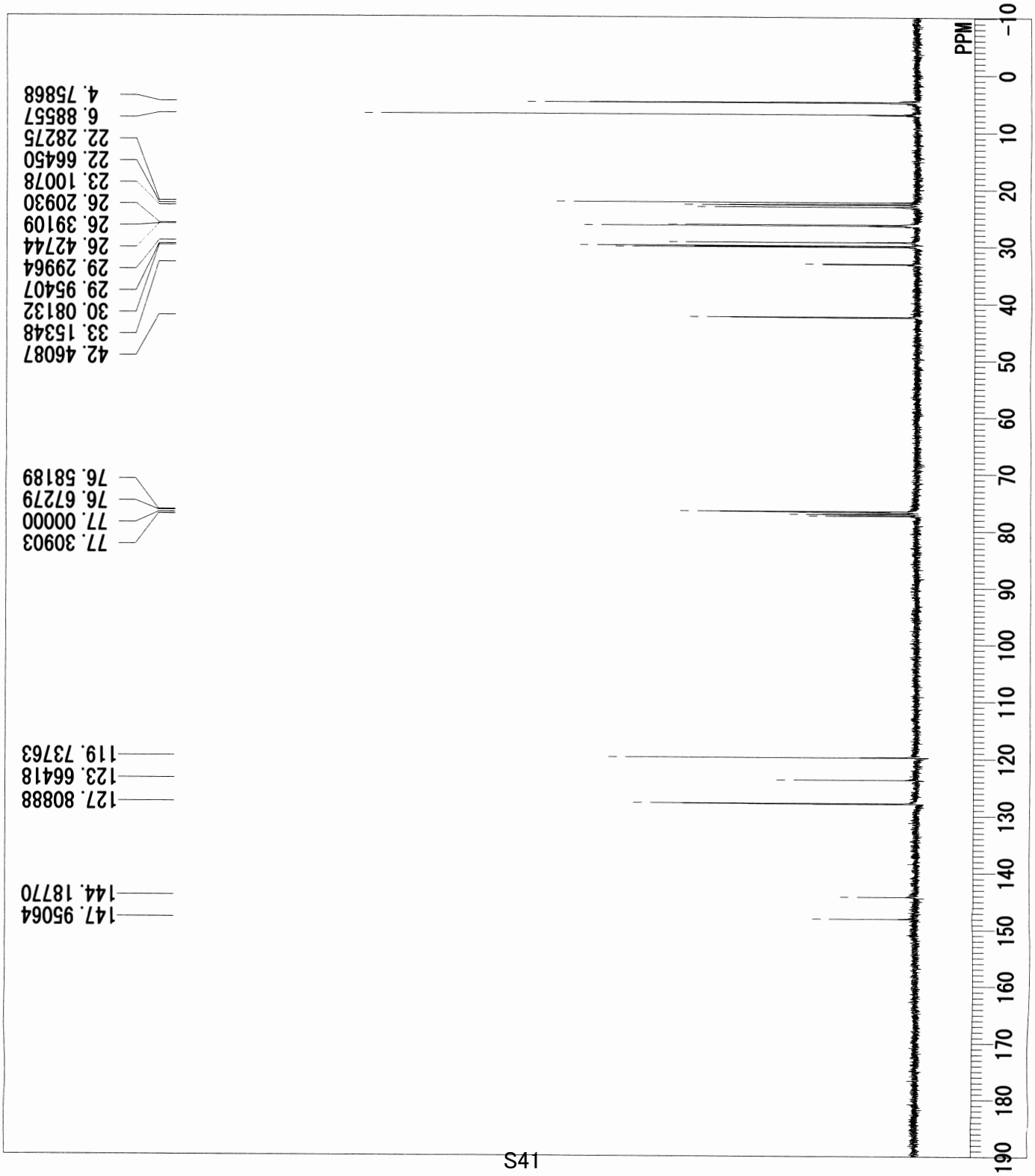
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