

One-pot, pseudo four-component synthesis of spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-trione library

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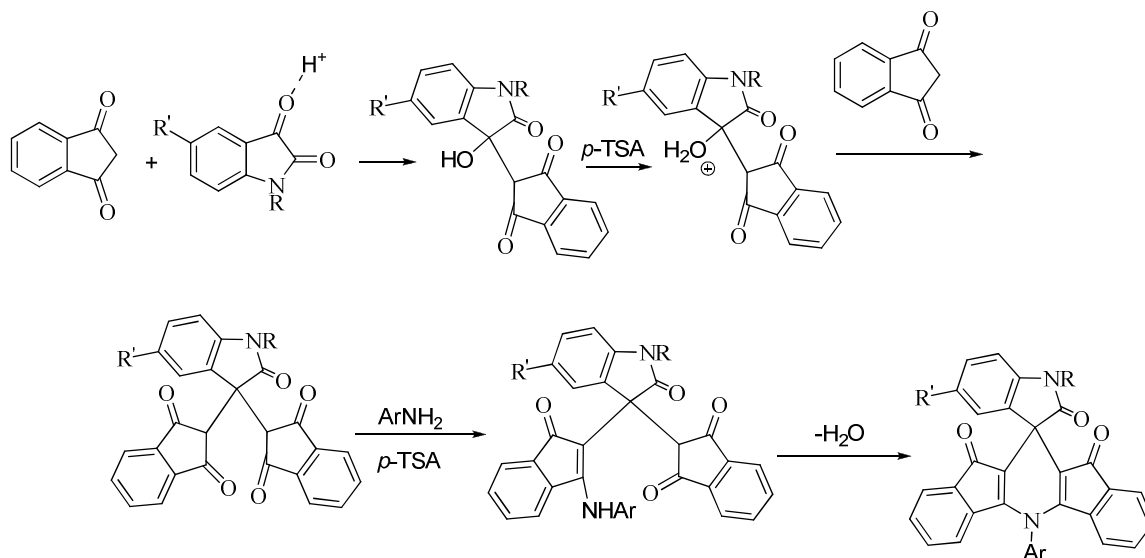
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SUPPORTING INFORMATION

<i>List of contents</i>	<i>Page</i>	<i>List of contents</i>	<i>Page</i>
Title, author's name, address	S1	¹ H NMR of 4n	S32
Mechanism, General methods and characterization data	S2-S14	¹³ C NMR of 4n	S33
¹ H NMR of 4a	S15	¹ H NMR of 4o	S34
¹³ C NMR of 4a	S16	¹³ C NMR of 4o	S35
¹ H NMR of 4b	S17	¹ H NMR of 4p	S36
¹ H NMR of 4c	S18	¹ H NMR of 4q	S37
¹ H NMR of 4d	S19	¹ H NMR of 4r	S38
¹ H NMR of 4e	S20	¹³ C NMR of 4r	S39
¹ H NMR of 4f	S21	¹ H NMR of 4s	S40
¹ H NMR of 4g	S22	¹ H NMR of 4t	S41
¹ H NMR of 4h	S23	¹³ C NMR of 4t	S42
¹ H NMR of 4i	S24	¹ H NMR of 7a	S43
¹³ C NMR of 4i	S25	¹ H NMR of 7b	S44
¹ H NMR of 4j	S26	¹ H NMR of 7c	S45
¹ H NMR of 4k	S27	¹ H NMR of 7d	S46
¹³ C NMR of 4k	S28	¹ H NMR of 7e	S47
¹ H NMR of 4l	S29	¹³ C NMR of 7e	S48
¹³ C NMR of 4l	S30	¹ H NMR of 7f	S49
¹ H NMR of 4m	S31		

Proposed mechanism of the reaction:

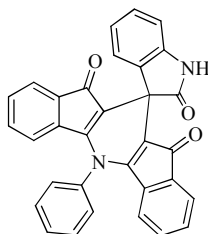


Experimental Section:

General Methods: Melting points were measured on an Electrothermal 9100 apparatus and are uncorrected. ¹H and ¹³C NMR spectra were recorded on a BRUKER DRX-300 AVANCE spectrometer at 300.13 and 75.47 MHz, respectively. ¹H and ¹³C NMR spectra were obtained on solutions in DMSO-*d*₆ using TMS as internal standard. IR spectra were recorded using an FTIR apparatus. Elemental analyses were performed using a Heracus CHN-O-Rapid analyzer.

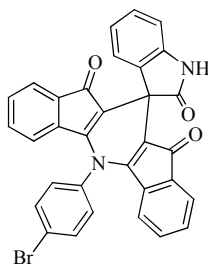
The chemical used in this work were obtained from Fluka and Merck and were used without purification.

Typical procedure for preparation of 5-phenyl-5*H*-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4a)



A mixture of 1,3-indandione (0.30 g, 2 mmol), aniline (0.09 g, 1 mmol), isatine (0.15 g, 1 mmol) and *p*-TSA (0.1 g) in refluxing acetonitrile (5 mL) was stirred for 30 min. After completion of the reaction confirmed by TLC (eluent: EtOAc/*n*-hexane, 1:3), the reaction mixture was cooled to room temperature. Then, the precipitated product was filtered and washed with water (10 mL) and ethanol (5 mL) to afford the pure product **4a** as a red powder (0.39 g, 82%); mp >300 °C. IR (KBr) (ν_{\max} /cm⁻¹): 3437, 3132, 1703, 1624. ¹H NMR (300 MHz, DMSO-*d*₆): δ_{H} (ppm) 5.46 (2H, d, ³*J*_{HH} = 6.0 Hz, H-Ar), 6.45-8.14 (15H, m, H-Ar), 10.65 (1H, s, NH). ¹³C NMR (75 MHz, DMSO-*d*₆): δ_{C} (ppm) 46.1, 109.5, 111.9, 121.8, 121.9, 122.7, 124.9, 125.9, 128.5, 129.0, 130.7, 132.1, 132.8, 134.8, 136.5, 138.2, 142.6, 156.2, 178.0, 190.0. Anal. Calcd for C₃₂H₁₈N₂O₃: C, 80.32; H, 3.79; N, 5.85. Found: C, 80.41; H, 3.71; N, 5.76.

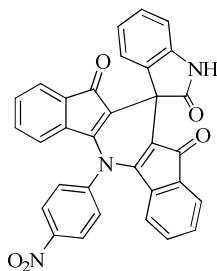
5-(4-Bromophenyl)-5*H*-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4b).



Red Powder (yield 85%); mp >300 °C. IR (KBr) (ν_{\max} /cm⁻¹): 3495, 1708, 1629. ¹H NMR (300 MHz, DMSO-*d*₆): δ_{H} (ppm) 5.56 (2H, d, ³*J*_{HH} = 6.0 Hz, H-Ar), 6.84-8.15 (14H, m, H-Ar), 10.65 (1H, s, NH). Anal. Calcd for C₃₂H₁₇BrN₂O₃: C, 68.95; H, 3.07; N, 5.03. Found: C, 68.92; H, 3.02; N, 4.96.

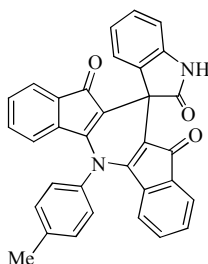
Due to very low solubility of the products **4b-4h**, we can not report the ¹³C NMR data for these products.

5-(4-Nitrophenyl)-5*H*-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4c).



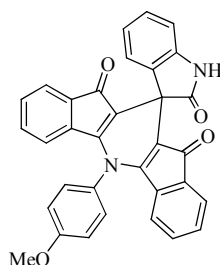
Red Powder (yield 80%); mp >300 °C. IR (KBr) (ν_{\max} /cm⁻¹): 3337, 1713, 1613. ¹H NMR (300 MHz, DMSO-*d*₆): δ_{H} (ppm) 5.55 (2H, d, ³*J*_{HH} = 6.0 Hz, H-Ar), 6.87-8.60 (14H, m, H-Ar), 10.66 (1H, s, NH). Anal. Calcd for C₃₂H₁₇N₃O₅: C, 73.42; H, 3.27; N, 8.03. Found: C, 73.49; H, 3.20; N, 8.11.

5-*p*-Tolyl-5H-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4d).



Red Powder (yield 90%); mp >300 °C. IR (KBr) (ν_{\max} /cm⁻¹): 3379, 1729, 1698. ¹H NMR (300 MHz, DMSO-*d*₆): δ_{H} (ppm) 2.56 (3H, s, CH₃), 5.53 (2H, d, ³*J*_{HH} = 6.0 Hz, H-Ar), 6.85-7.99 (14H, m, H-Ar), 10.64 (1H, s, NH). Anal. Calcd for C₃₃H₂₀N₂O₃: C, 80.47; H, 4.09; N, 5.69. Found: C, 80.39; H, 4.01; N, 5.60.

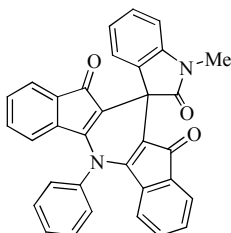
5-(4-Methoxyphenyl)-5H-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4e).



Red Powder (yield 92%); mp >300 °C. IR (KBr) (ν_{\max} /cm⁻¹): 3374, 1734, 1682. ¹H NMR (300 MHz, DMSO-*d*₆): δ_{H} (ppm) 3.06 (3H, s, OCH₃), 5.61 (2H, d, ³*J*_{HH} = 6.0 Hz, H-

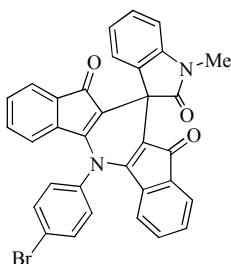
Ar), 6.84-8.05 (14H, m, H-Ar), 10.62 (1H, s, NH). Anal. Calcd for C₃₃H₂₀N₂O₄: C, 77.94; H, 3.96; N, 5.51. Found: C, 77.81; H, 3.89; N, 5.58.

1'-Methyl-5-phenyl-5H-spiro[diindeno[1,2-b:2',1'-e]pyridine-11,3'-indoline]-2',10,12-trione (4f).



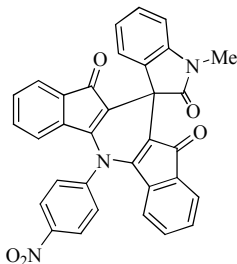
Red Powder (yield 78%); mp >300 °C. IR (KBr) (ν_{\max} /cm⁻¹): 3064, 1705, 1614. ¹H NMR (300 MHz, DMSO-*d*₆): δ_{H} (ppm) 3.26 (3H, s, CH₃), 5.47 (2H, d, ³*J*_{HH} = 7.5 Hz, H-Ar), 6.98-8.15 (15H, m, H-Ar). Anal. Calcd for C₃₃H₂₀N₂O₃: C, 80.47; H, 4.09; N, 5.69. Found: C, 80.53; H, 4.17; N, 5.63.

5-(4-Bromophenyl)-1'-methyl-5H-spiro[diindeno[1,2-b:2',1'-e]pyridine-11,3'-indoline]-2',10,12-trione (4g).



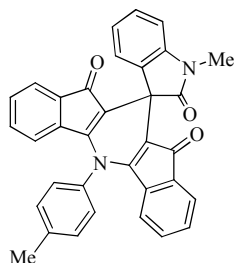
Red Powder (yield 78%); mp >300 °C. IR (KBr) (ν_{\max} /cm⁻¹): 3069, 1708, 1614. ¹H NMR (300 MHz, DMSO-*d*₆): δ_{H} (ppm) 3.25 (3H, s, CH₃), 5.58 (2H, d, ³*J*_{HH} = 7.2 Hz, H-Ar), 6.95-8.15 (14H, m, H-Ar). Anal. Calcd for C₃₃H₁₉BrN₂O₃: C, 69.36; H, 3.35; N, 4.90. Found: C, 69.29; H, 3.40; N, 4.81.

1'-Methyl-5-(4-nitrophenyl)-5H-spiro[diindeno[1,2-b:2',1'-e]pyridine-11,3'-indoline]-2',10,12-trione (4h).



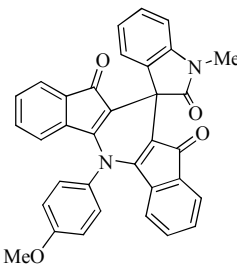
Red Powder (yield 75%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3059, 1703, 1614. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 3.26 (3H, s, CH_3), 5.57 (2H, d, $^3J_{\text{HH}} = 7.8$ Hz, H-Ar), 6.96-8.60 (14H, m, H-Ar). Anal. Calcd for $\text{C}_{33}\text{H}_{19}\text{N}_3\text{O}_5$: C, 73.74; H, 3.56; N, 7.82. Found: C, 73.85; H, 3.49; N, 7.89.

1'-Methyl-5-p-tolyl-5H-spiro[diindeno[1,2-b:2',1'-e]pyridine-11,3'-indoline]-2',10,12-trione (4i).



Red Powder (yield 84%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3059, 1702, 1614. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 2.57 (3H, s, CH_3), 3.25 (3H, s, NCH_3), 5.54 (2H, d, $^3J_{\text{HH}} = 7.4$ Hz, H-Ar), 6.97-8.03 (14H, m, H-Ar). ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$): δ_{C} (ppm) 21.5, 26.9, 45.6, 108.4, 111.6, 121.9, 122.0, 122.7, 124.6, 129.2, 130.1, 130.8, 131.2, 132.7, 132.9, 133.9, 135.6, 136.6, 142.0, 144.0, 156.5, 176.5, 190.0. Anal. Calcd for $\text{C}_{34}\text{H}_{22}\text{N}_2\text{O}_3$: C, 80.62; H, 4.38; N, 5.53. Found: C, 80.53; H, 4.31; N, 5.44.

5-(4-Methoxyphenyl)-1'-methyl-5H-spiro[diindeno[1,2-b:2',1'-e]pyridine-11,3'-indoline]-2',10,12-trione (4j).

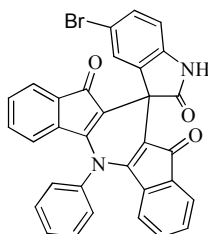


Red Powder (yield 87%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3069, 1701, 1614. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 3.25 (3H, s, CH_3), 3.96 (3H, s, OCH_3), 5.62 (2H,

d, $^3J_{\text{HH}} = 7.2$ Hz, H-Ar), 6.95-8.06 (14H, m, H-Ar). Anal. Calcd for $\text{C}_{34}\text{H}_{22}\text{N}_2\text{O}_4$: C, 78.15; H, 4.24; N, 5.36. Found: C, 78.27; H, 4.29; N, 5.42.

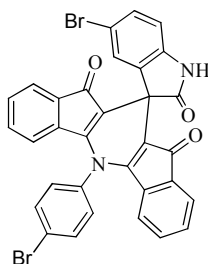
Due to very low solubility of the product **4j**, we can not report the ^{13}C NMR data for this product.

5'-Bromo-5-phenyl-5H-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4k**).**



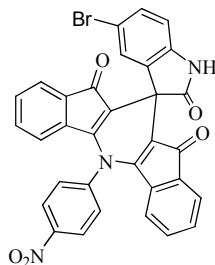
Red Powder (yield 80%); mp >300 °C. IR (KBr) (ν_{max} / cm^{-1}): 3342, 3064, 1729, 1694. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 5.45 (2H, d, $^3J_{\text{HH}} = 7.2$ Hz, H-Ar), 6.83-8.24 (14H, m, H-Ar), 10.80 (1H, s, NH). ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$): δ_{C} (ppm) 46.3, 111.2, 111.4, 113.9, 121.9, 122.0, 127.8, 130.2, 130.7, 130.9, 131.7, 132.1, 132.7, 132.9, 136.5, 136.9, 138.2, 142.0, 156.6, 177.7, 190.0. Anal. Calcd for $\text{C}_{32}\text{H}_{17}\text{BrN}_2\text{O}_3$: C, 68.95; H, 3.07; N, 5.03. Found: C, 68.83; H, 3.13; N, 5.10.

5'-Bromo-5-(4-bromophenyl)-5H-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4l**).**



Red Powder (yield 80%); mp >300 °C. IR (KBr) (ν_{max} / cm^{-1}): 3379, 3080, 1698, 1629. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 5.56 (2H, d, $^3J_{\text{HH}} = 7.2$ Hz, H-Ar), 6.83-8.23 (13H, m, H-Ar), 10.81 (1H, s, NH). ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$): δ_{C} (ppm) 46.2, 111.4, 113.9, 121.9, 122.1, 125.5, 127.9, 130.9, 131.7, 132.6, 133.1, 133.9, 136.4, 136.9, 137.6, 142.0, 156.4, 177.6, 190.0. Anal. Calcd for $\text{C}_{32}\text{H}_{16}\text{Br}_2\text{N}_2\text{O}_3$: C, 60.40; H, 2.53; N, 4.40. Found: C, 60.30; H, 2.46; N, 4.34.

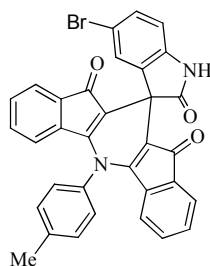
5'-Bromo-5-(4-nitrophenyl)-5H-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4m).



Red Powder (yield 76%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3385, 3080, 1740, 1698. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 5.55 (2H, d, $^3J_{\text{HH}} = 7.5$ Hz, H-Ar), 6.83-8.63 (13H, m, H-Ar), 10.81 (1H, s, NH). Anal. Calcd for $\text{C}_{32}\text{H}_{16}\text{BrN}_3\text{O}_5$: C, 63.80; H, 2.68; N, 6.98. Found: C, 63.88; H, 2.61; N, 6.93.

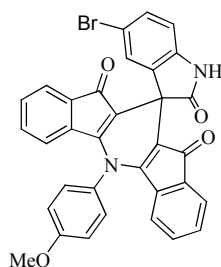
Due to very low solubility of the product **4m**, we can not report the ^{13}C NMR data for this product.

5'-Bromo-5-*p*-tolyl-5H-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4n).



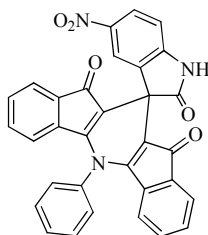
Red Powder (yield 85%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3232, 3064, 1703, 1619. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 2.57 (3H, s, CH_3), 5.52 (2H, d, $^3J_{\text{HH}} = 7.2$ Hz, H-Ar), 6.82-8.09 (13H, m, H-Ar), 10.79 (1H, s, NH). ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$): δ_{C} (ppm) 21.5, 46.3, 111.2, 111.4, 113.9, 122.0, 127.8, 129.8, 130.3, 130.9, 131.1, 131.7, 132.8, 132.9, 135.7, 136.5, 137.0, 142.0, 156.8, 177.8, 190.0. Anal. Calcd for $\text{C}_{33}\text{H}_{19}\text{BrN}_2\text{O}_3$: C, 69.36; H, 3.35; N, 4.90. Found: C, 69.47; H, 3.42; N, 4.81.

5'-Bromo-5-(4-methoxyphenyl)-5H-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4o).



Red Powder (yield 88%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3332, 3059, 1726, 1619. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 3.96 (3H, s, OCH_3), 5.60 (2H, d, $^3J_{\text{HH}} = 7.5$ Hz, H-Ar), 6.83-8.13 (13H, m, H-Ar), 10.80 (1H, s, NH). ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$): δ_{C} (ppm) 46.3, 56.3, 111.2, 111.4, 113.9, 115.5, 115.7, 121.9, 122.1, 127.8, 130.7, 130.8, 131.2, 131.7, 132.8, 133.0, 136.6, 137.0, 142.0, 157.1, 161.5, 177.8, 190.1. Anal. Calcd for $\text{C}_{33}\text{H}_{19}\text{BrN}_2\text{O}_4$: C, 67.47; H, 3.26; N, 4.77. Found: C, 67.54; H, 3.33; N, 4.85.

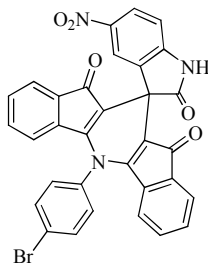
5'-Nitro-5-phenyl-5H-spiro[diindeno[1,2-b:2',1'-e]pyridine-11,3'-indoline]-2',10,12-trione (4p).



Red Powder (yield 84%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3311, 3064, 1745, 1698. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 5.48 (2H, d, $^3J_{\text{HH}} = 7.2$ Hz, H-Ar), 7.10-8.45 (14H, m, H-Ar), 11.41 (1H, s, NH). Anal. Calcd for $\text{C}_{32}\text{H}_{17}\text{N}_3\text{O}_5$: C, 73.42; H, 3.27; N, 8.03. Found: C, 73.31; H, 3.22; N, 8.92.

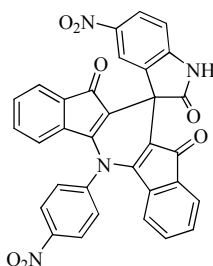
Due to very low solubility of the products **4p,q**, we can not report the ^{13}C NMR data for these products.

5-(4-Bromophenyl)-5'-nitro-5H-spiro[diindeno[1,2-b:2',1'-e]pyridine-11,3'-indoline]-2',10,12-trione (4q).



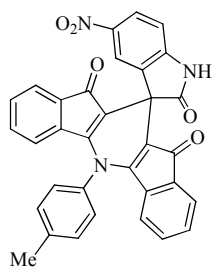
Red Powder (yield 82%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3364, 3064, 1740, 1703. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 5.57 (2H, d, $^3J_{\text{HH}} = 6.0$ Hz, H-Ar), 7.09-8.46 (13H, m, H-Ar), 11.42 (1H, s, NH). Anal. Calcd for $\text{C}_{32}\text{H}_{16}\text{BrN}_3\text{O}_5$: C, 63.80; H, 2.68; N, 6.98. Found: C, 63.89; H, 2.60; N, 6.91.

5'-Nitro-5-(4-nitrophenyl)-5H-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4r).



Red Powder (yield 77%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3490, 3206, 1729, 1698. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 5.57 (2H, d, $^3J_{\text{HH}} = 7.5$ Hz, H-Ar), 7.09-8.67 (13H, m, H-Ar), 11.43 (1H, s, NH). ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$): δ_{C} (ppm) 46.1, 109.7, 110.8, 121.1, 122.1, 122.4, 126.0, 126.7, 131.0, 132.4, 133.4, 135.3, 136.2, 143.0, 143.4, 149.2, 149.7, 156.6, 178.6, 190.0. Anal. Calcd for $\text{C}_{32}\text{H}_{16}\text{N}_4\text{O}_7$: C, 67.61; H, 2.84; N, 9.86. Found: C, 67.74; H, 2.93; N, 9.77.

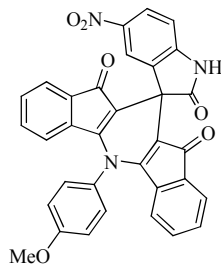
5'-Nitro-5-*p*-tolyl-5H-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4s).



Red Powder (yield 88%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3442, 3195, 1738, 1698. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 2.57 (3H, s, CH_3), 5.54 (2H, d, $^3J_{\text{HH}} = 6.9$ Hz, H-Ar), 7.08-8.43 (13H, m, H-Ar), 11.40 (1H, s, NH). Anal. Calcd for $\text{C}_{33}\text{H}_{19}\text{N}_3\text{O}_5$: C, 73.74; H, 3.56; N, 7.82. Found: C, 73.62; H, 3.51; N, 7.74.

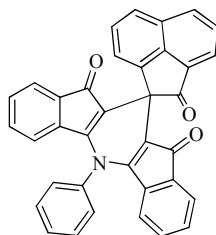
Due to very low solubility of the product **4s**, we can not report the ^{13}C NMR data for this product.

5-(4-Methoxyphenyl)-5'-nitro-5H-spiro[diindeno[1,2-*b*:2',1'-*e*]pyridine-11,3'-indoline]-2',10,12-trione (4t).



Red Powder (yield 91%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3301, 3064, 1740, 1698. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 3.96 (3H, s, OCH_3), 5.61 (2H, d, $^3J_{\text{HH}} = 6.6$ Hz, H-Ar), 7.08-8.43 (13H, m, H-Ar), 11.40 (1H, s, NH). ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$): δ_{C} (ppm) 46.2, 56.2, 109.6, 110.5, 115.5, 115.7, 120.9, 122.0, 122.3, 126.6, 130.6, 131.0, 131.2, 131.7, 132.7, 133.1, 135.4, 136.6, 143.0, 149.2, 157.6, 161.5, 190.1. Anal. Calcd for $\text{C}_{33}\text{H}_{19}\text{N}_3\text{O}_6$: C, 71.61; H, 3.46; N, 7.59. Found: C, 71.70; H, 3.52; N, 7.65.

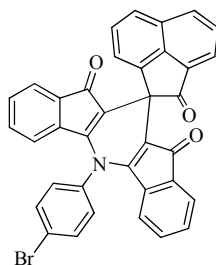
5'-Phenyl-5',5a'-dihydro-2H,4b'H-spiro[acenaphthylene-1,11'-diindeno[1,2-*b*:2',1'-*e*]pyridine]-2,10',12'(10a'H,11a'H)-trione (7a).



Red Powder (yield 80%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3442, 1725, 1687, 1621. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 5.48 (2H, d, $^3J_{\text{HH}} = 7.2$ Hz, H-Ar), 7.09-8.32 (19H, m, H-Ar). Anal. Calcd for $\text{C}_{36}\text{H}_{19}\text{NO}_3$: C, 84.20; H, 3.73; N, 2.73. Found: C, 84.33; H, 3.67; N, 2.65.

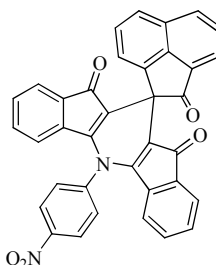
Due to very low solubility of the products **7a-d** we can not report the ^{13}C NMR data for these products.

5'-(4-Bromophenyl)-5',5a'-dihydro-2H,4b'H-spiro[acenaphthylene-1,11'-diindeno[1,2-*b*:2',1'-*e*]pyridine]-2,10',12'(10a'H,11a'H)-trione (7b).



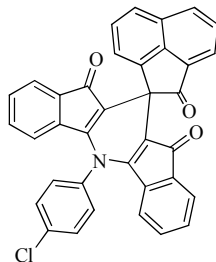
Red Powder (yield 85%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3435, 1732, 1690, 1619. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 5.60 (2H, d, $^3J_{\text{HH}} = 5.9$ Hz, H-Ar), 7.17-8.31 (18H, m, H-Ar). Anal. Calcd for $\text{C}_{36}\text{H}_{18}\text{BrNO}_3$: C, 72.98; H, 3.06; N, 2.36. Found: C, 72.91; H, 3.11; N, 2.43.

5'-(4-Nitrophenyl)-5',5a'-dihydro-2H,4b'H-spiro[acenaphthylene-1,11'-diindeno[1,2-b:2',1'-e]pyridine]-2,10',12'(10a'H,11a'H)-trione (7c).



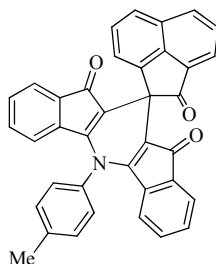
Red Powder (yield 78%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3038, 1729, 1693, 1619. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 5.59 (2H, d, $^3J_{\text{HH}} = 7.4$ Hz, H-Ar), 7.11-8.62 (18H, m, H-Ar). Anal. Calcd for $\text{C}_{36}\text{H}_{18}\text{N}_2\text{O}_5$: C, 77.41; H, 3.25; N, 5.02. Found: C, 77.30; H, 3.18; N, 5.11.

5'-(4-Chlorophenyl)-5',5a'-dihydro-2H,4b'H-spiro[acenaphthylene-1,11'-diindeno[1,2-b:2',1'-e]pyridine]-2,10',12'(10a'H,11a'H)-trione (7d).



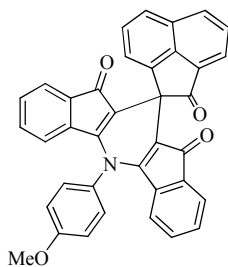
Red Powder (yield 83%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3737, 1734, 1687, 1614. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 5.60(2H, d, $^3J_{\text{HH}} = 7.0$ Hz, H-Ar), 7.15-8.34 (18H, m, H-Ar). Anal. Calcd for $\text{C}_{36}\text{H}_{18}\text{ClNO}_3$: C, 78.90; H, 3.31; N, 2.56. Found: C, 78.88; H, 3.39; N, 2.64.

5'-*p*-Tolyl-5',5a'-dihydro-2H,4b'H-spiro[acenaphthylene-1,11'-diindeno[1,2-*b*:2',1'-*e*]pyridine]-2,10',12'(10a'H,11a'H)-trione (7e).



Red Powder (yield 88%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3500, 1697, 1619, 1610. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 2.57 (3H, s, CH_3), 5.56(2H, d, $^3J_{\text{HH}} = 7.4$ Hz, H-Ar), 7.14-8.33 (18H, m, H-Ar). ^{13}C NMR (75 MHz, $\text{DMSO-}d_6$): δ_{C} (ppm) 21.3, 50.9, 109.7, 113.1, 113.5, 117.3, 121.1, 121.8, 122.0, 125.2, 128.9, 129.2, 129.9, 130.6, 131.0, 131.8, 132.6, 132.8, 135.7, 136.7, 141.2, 142.0, 156.6, 158.0, 158.6, 159.1, 159.6, 190.3, 204.5, 206.7. Anal. Calcd for $\text{C}_{37}\text{H}_{21}\text{NO}_3$: C, 84.23; H, 4.01; N, 2.65. Found: C, 84.10; H, 3.94; N, 2.71.

5'-(4-Methoxyphenyl)-5',5a'-dihydro-2H,4b'H-spiro[acenaphthylene-1,11'-diindeno[1,2-*b*:2',1'-*e*]pyridine]-2,10',12'(10a'H,11a'H)-trione (7f).



Red Powder (yield 90%); mp >300 °C. IR (KBr) (ν_{\max} / cm^{-1}): 3432, 1728, 1694, 1622. ^1H NMR (300 MHz, $\text{DMSO-}d_6$): δ_{H} (ppm) 3.97 (3H, s, OCH_3), 5.64 (2H, d, $^3J_{\text{HH}} = 7.1$ Hz, H-Ar), 7.13-8.31 (18H, m, H-Ar). Anal. Calcd for $\text{C}_{37}\text{H}_{21}\text{NO}_4$: C, 81.76; H, 3.89; N, 2.58%. Found: C, 81.87; H, 3.83; N, 2.50.

Due to very low solubility of the product **7f**, we can not report the ^{13}C NMR data for this product.

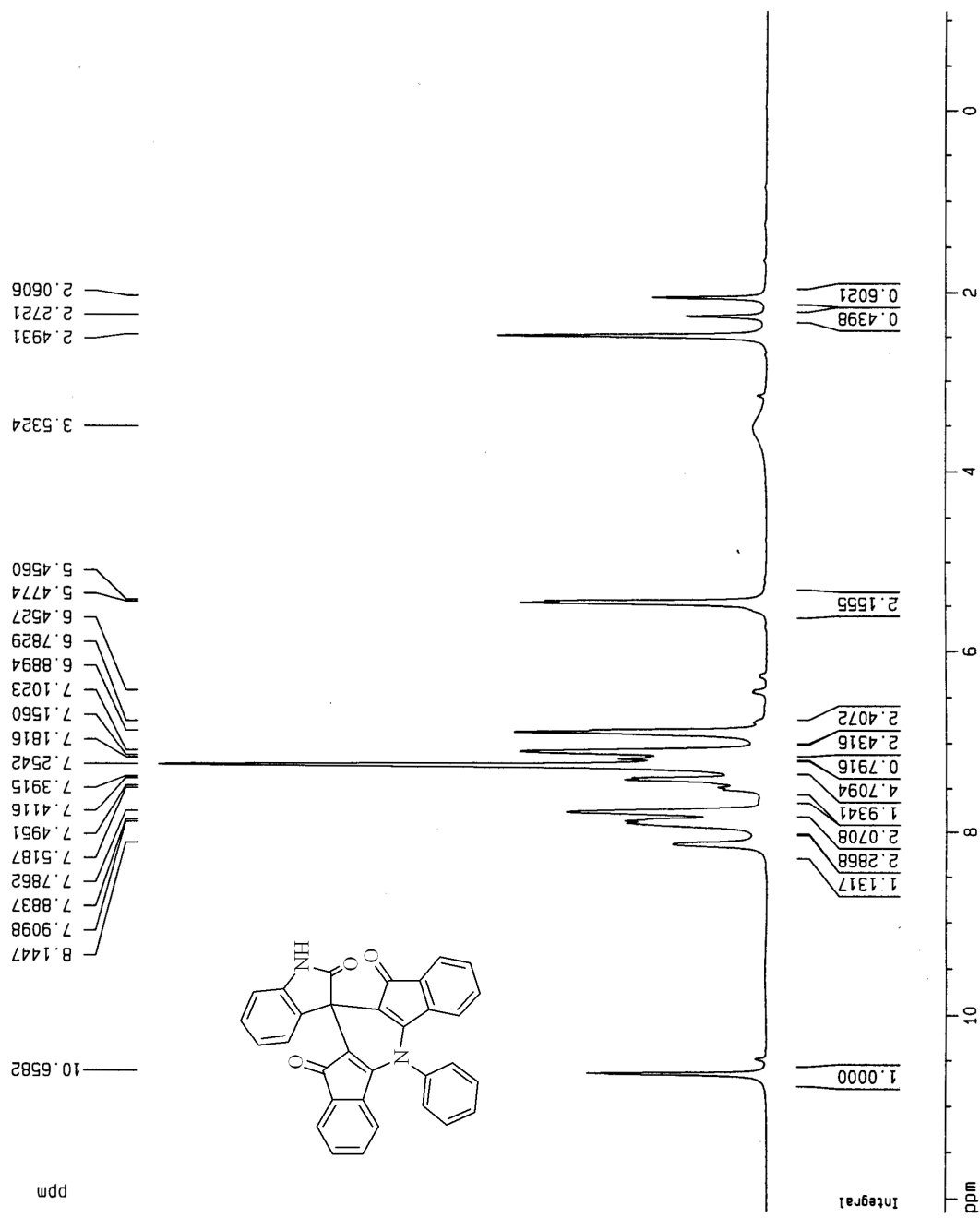
Current Data Parameters
 NAME Ahadi
 EXPNO 319
 PROCNO 1

F2 - Acquisition Parameters
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 Time 15.45
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SMH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.0000000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 MDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 10.16 cm
 F1P 12.151 ppm
 F1 3647.00 Hz
 F2P -1.099 ppm
 F2 -329.72 Hz
 PPMCM 0.66250 ppm/cm
 HZCM 198.83617 Hz/cm



Current Data Parameters
 NAME: Ahad1
 EXPNO: 320
 PROCNO: 1

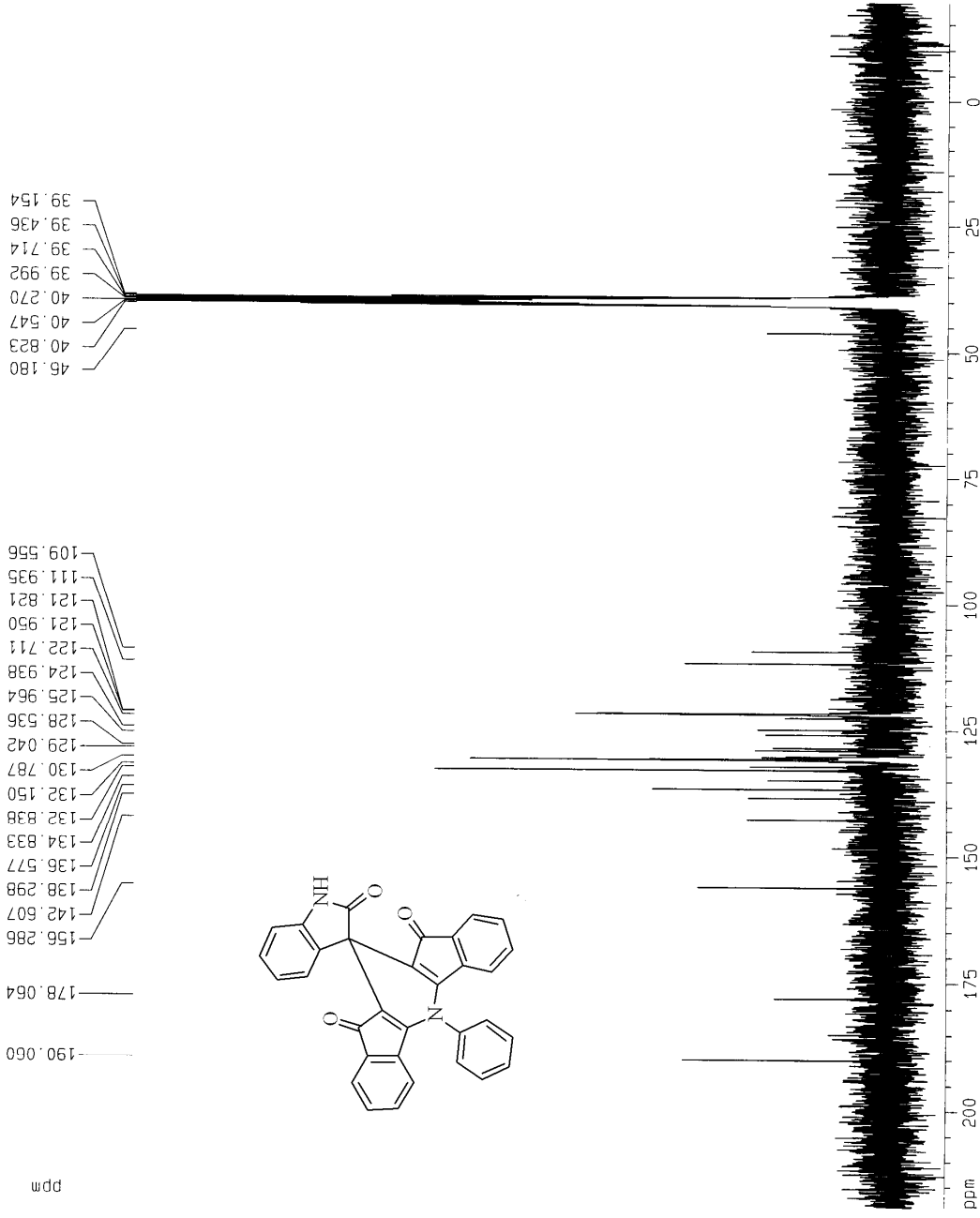
F2 - Acquisition Parameters
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 Time: 15.48
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 PULPROG: zgpg30
 TD: 65536
 SOLVENT: DMSO
 NS: 483
 DS: 2
 SWH: 17985.611 Hz
 FIDRES: 0.274439 Hz
 AQ: 1.8219508 sec
 RG: 2048
 DM: 27.800 usec
 DE: 6.00 usec
 TE: 300.0 K
 D1: 2.0000000 sec
 d11: 0.0300000 sec
 d12: 0.0000200 sec

===== CHANNEL f1 =====
 NUC1: 13C
 P1: 8.75 usec
 PL1: -2.00 dB
 SF01: 75.4752953 MHz

===== CHANNEL f2 =====
 CPDPRG2: waltz16
 NUC2: 1H
 PCPD2: 87.00 usec
 PL2: -2.00 dB
 PL12: 12.00 dB
 PL13: 18.00 dB
 SF02: 300.1312005 MHz

F2 - Processing parameters
 SI: 65536
 SF: 75.4677490 MHz
 WDM: EM
 SSB: 0
 LB: 1.00 Hz
 GB: 0
 PC: 1.40

1D NMR plot parameters
 CX: 20.00 cm
 CY: 59.74 cm
 F1P: 219.155 ppm
 F1: 16539.10 Hz
 F2P: -19.167 ppm
 F2: -1446.51 Hz
 PPMCM: 11.91609 ppm/cm
 HZCM: 899.28058 Hz/cm



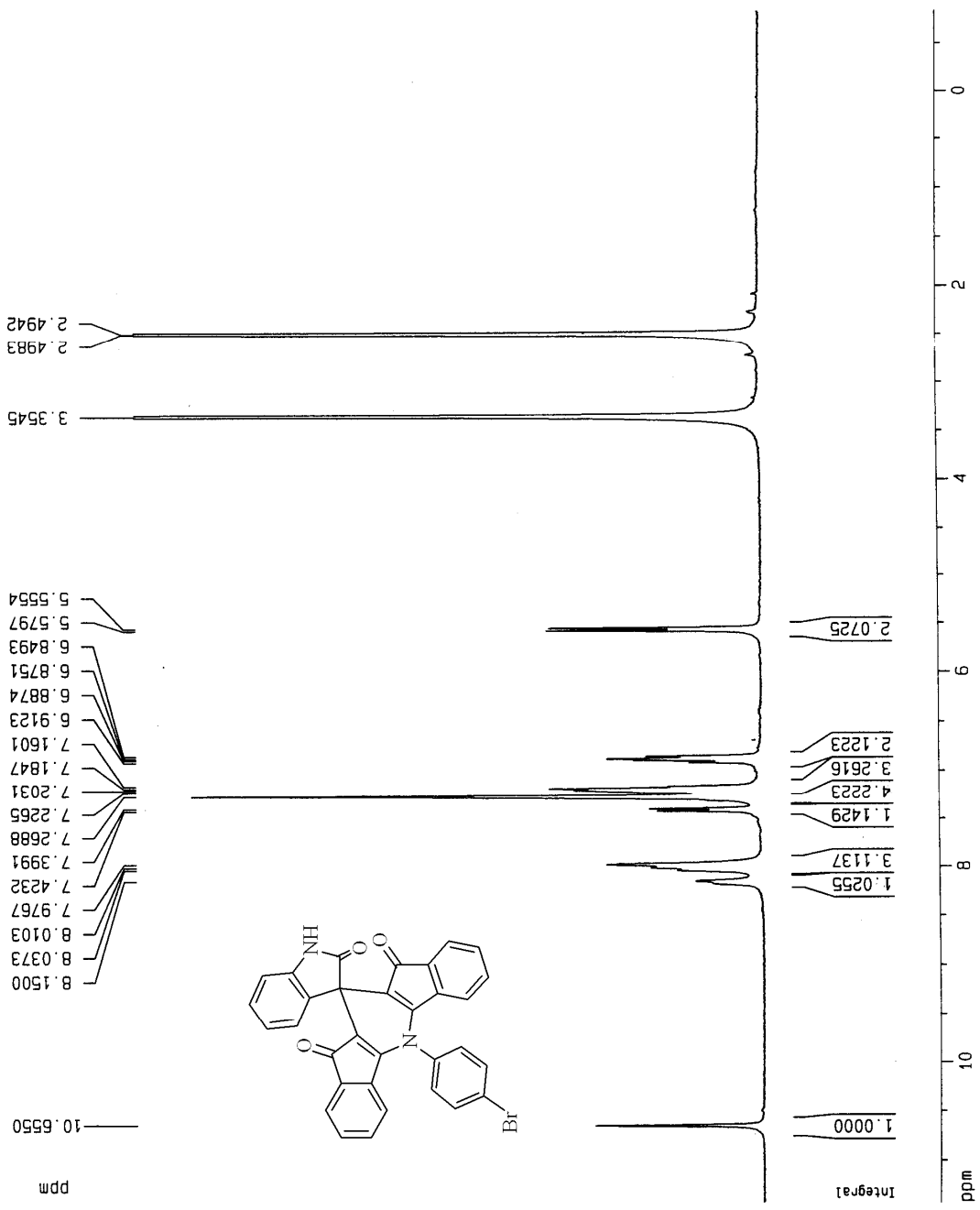
Current Data Parameters
 NAME Imani
 EXPNO 30
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090421
 Time 19.29
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 20
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 50.8
 OW 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.00000000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1329986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 41.59 cm
 F1P 11.419 ppm
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 F2P -0.895 ppm
 F2 -250.57 Hz
 PPM0H 0.61268 ppm/cm
 HZ0H 183.88464 Hz/cm



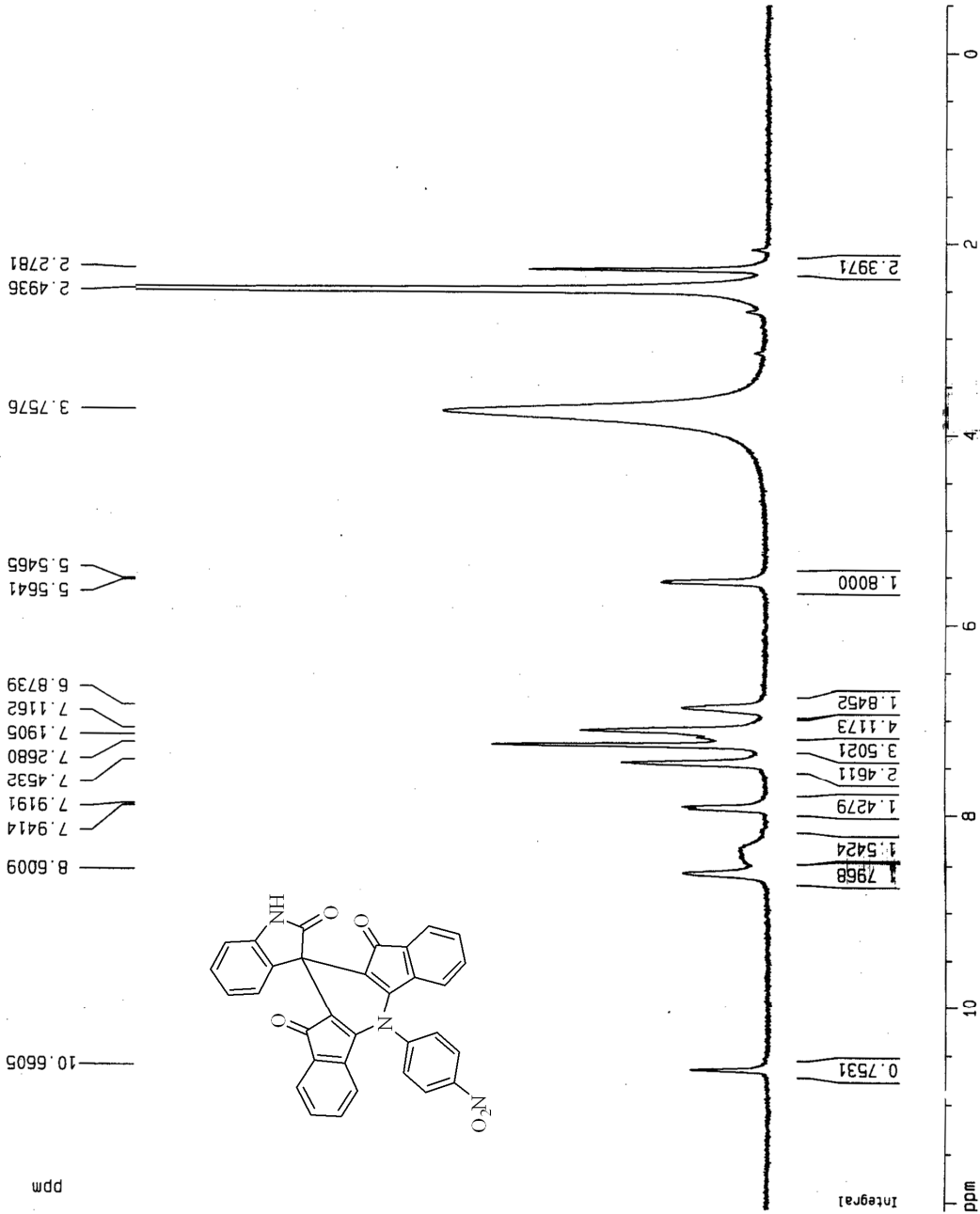
Current Data Parameters
 NAME Imani
 EXPNO 13
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090407
 Time 19.28
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 50.8
 DM 64.000 usec
 DE 6.00 usec
 TE 300.0 K
 D1 2.0000000 sec

===== CHANNEL f1 =====
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SFO1 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 32.21 cm
 F1P 12.086 ppm
 F1 3627.42 Hz
 F2P -0.504 ppm
 F2 -151.36 Hz
 PPMCH 0.62952 ppm/cm
 HZCH 188.93869 Hz/cm



Current Data Parameters
 NAME Imani
 EXPNO 20
 PROCNO 1

F2 - Acquisition Parameters

Date_ 20090413
 Time_ 19.32
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 50.8
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.0000000 sec

===== CHANNEL f1 =====

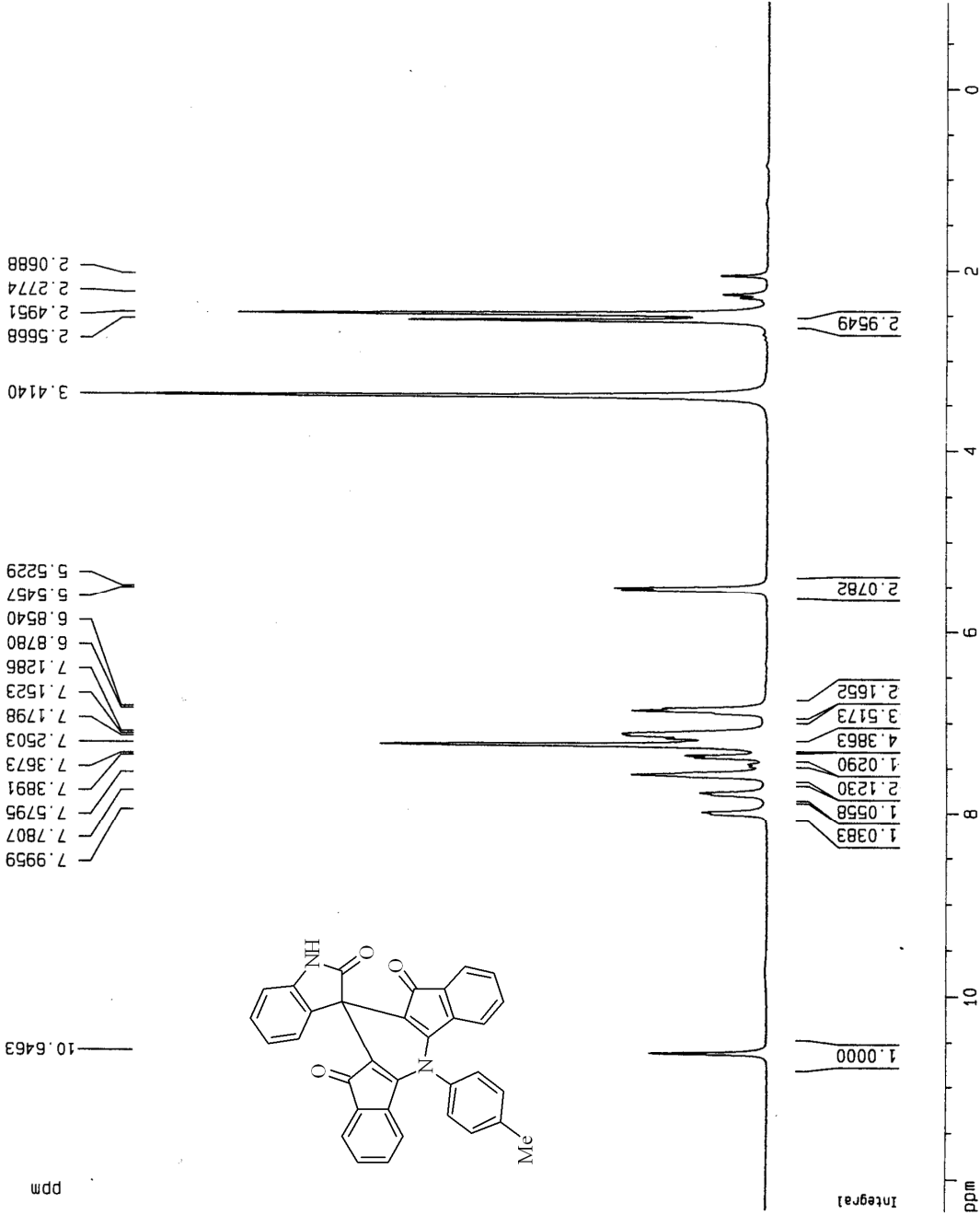
NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SFO1 300.1323986 MHz

F2 - Processing parameters

SI 65536
 SF 300.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters

CX 20.00 cm
 CY 10.94 cm
 F1P 12.342 ppm
 F1 3704.12 Hz
 F2P -0.947 ppm
 F2 -284.36 Hz
 PPMCM 0.66445 ppm/cm
 HZCM 199.42435 Hz/cm



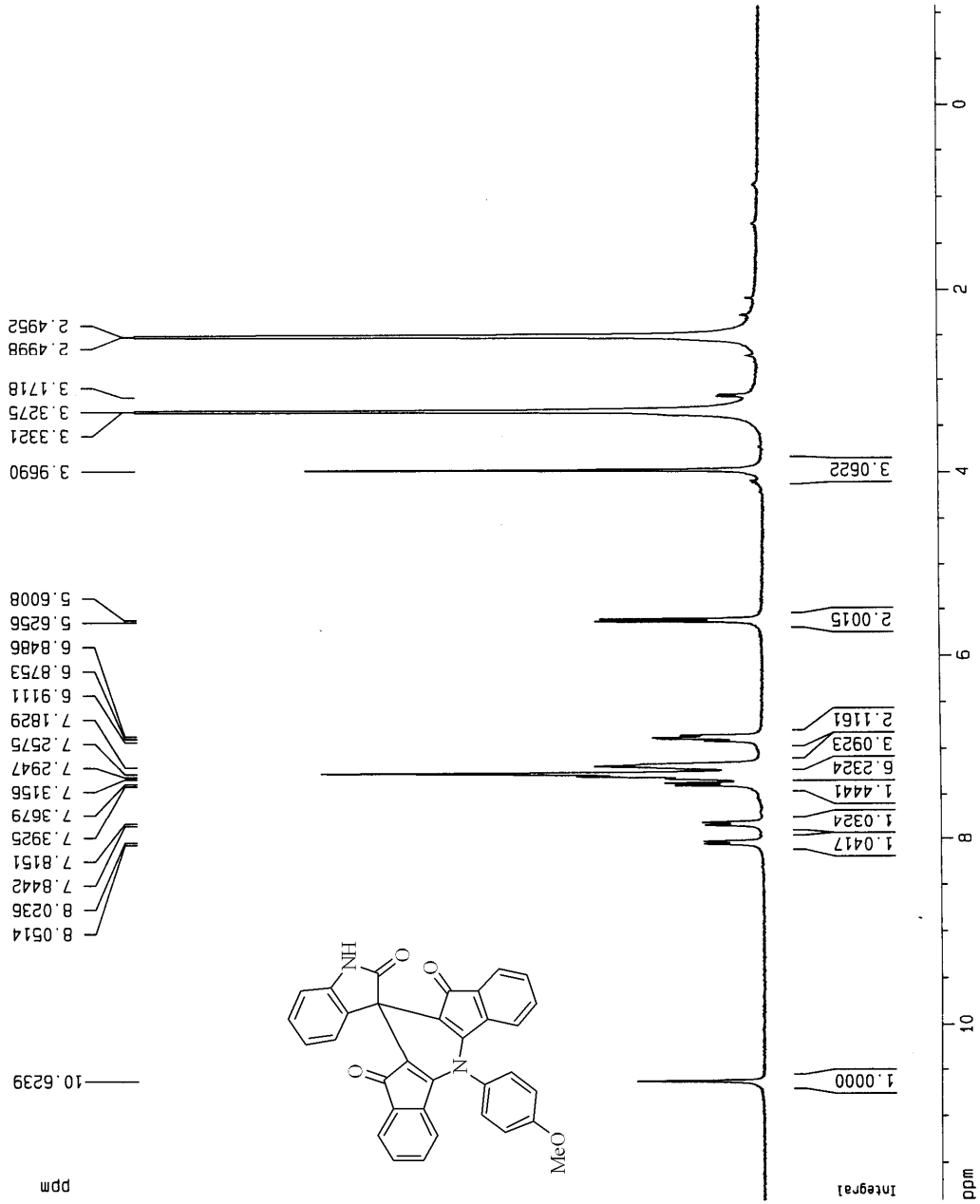
Current Data Parameters
 NAME Iman1
 EXPNO 36
 PROCNO 1

F2 - Acquisition Parameters
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 Time 20.07
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TO 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.0000000 sec

***** CHANNEL f1 *****
 NUC1 ¹H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 MDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

ID NMR plot parameters
 CX 20.00 cm
 CY 51.53 cm
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 F1 3570.49 Hz
 F2 -1.084 ppm
 F2 -325.48 Hz
 PPMCM 0.64905 ppm/cm
 HZCM 194.79852 Hz/cm



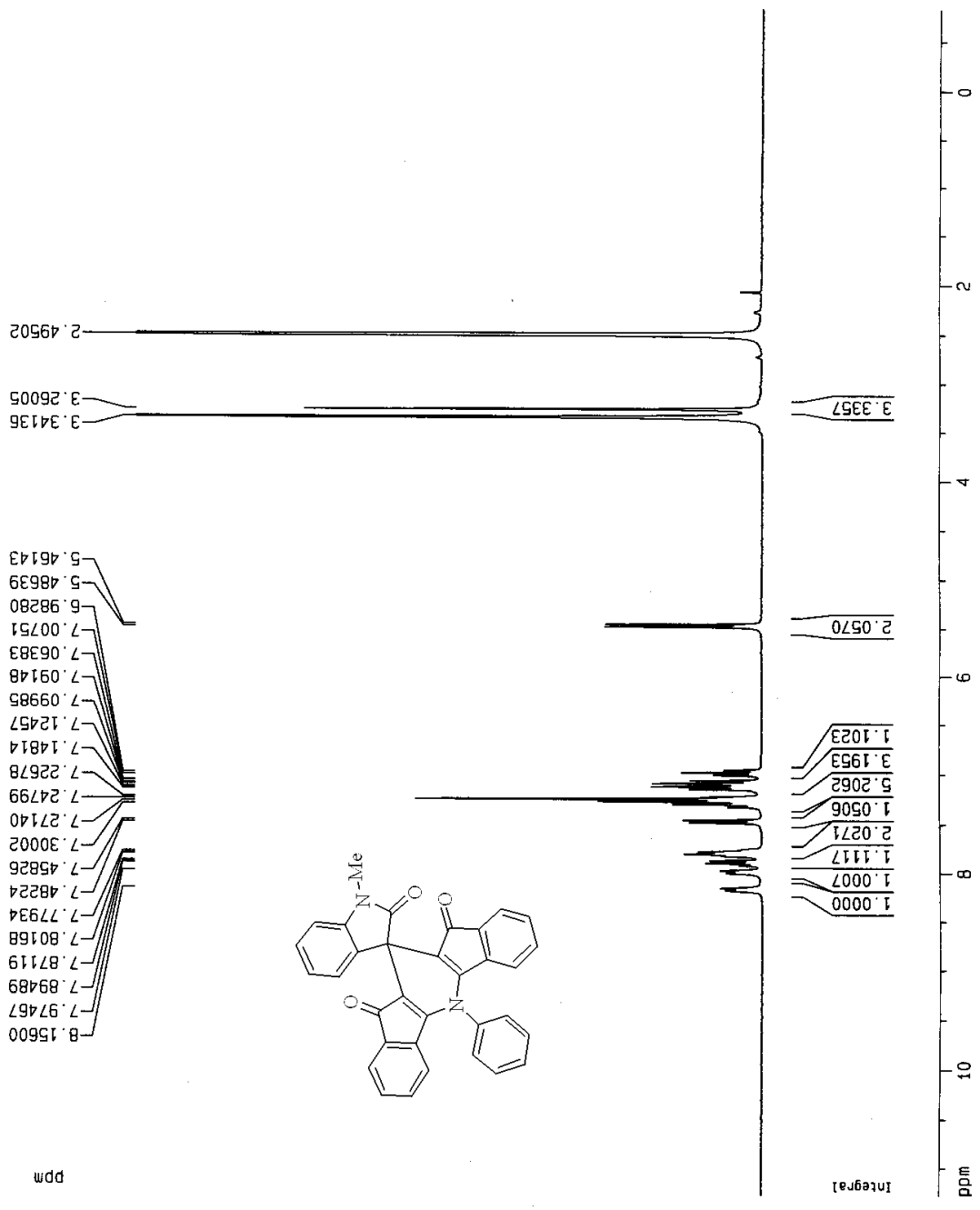
Current Data Parameters
 NAME Ahadi
 EXPNO 389
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090519
 Time 19.35
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 PROBHD 5 mm BBO BB-IH
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.00000000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 42.66 cm
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 F2P -0.830 ppm
 F2 -249.18 Hz
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 HZCM 181.72116 Hz/cm



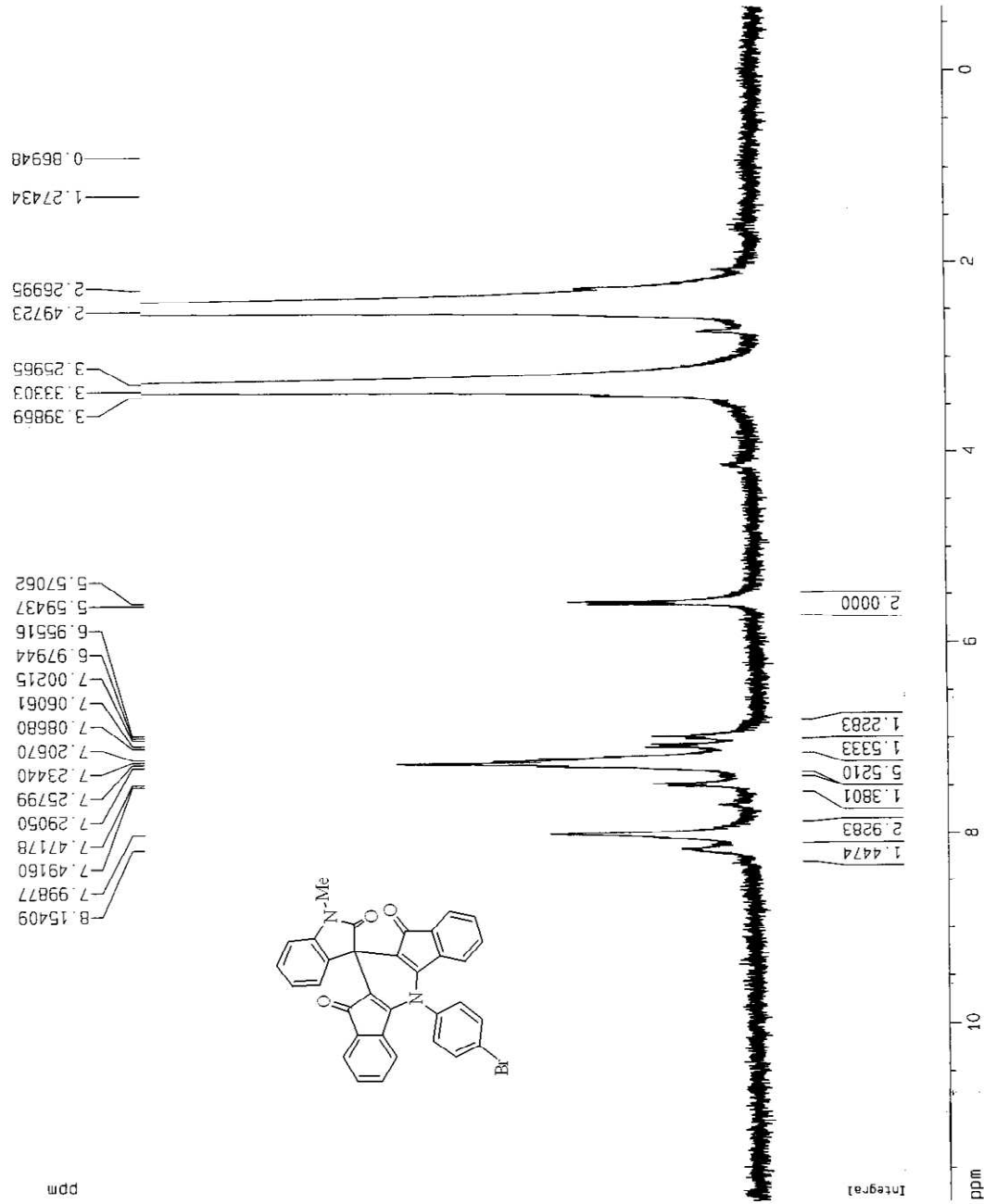
Current Data Parameters
 NAME Alhad1
 EXPNO 350
 PROCNO 1

F2 - Acquisition Parameters
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 Time 21.26
 INSTRUM spect
 PROBHD 5 mm BB3 BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DW 64.000 usec
 DE 6.00 usec
 TE 300.0 K
 D1 2.0000000 sec

===== CHANNEL f1 =====
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323985 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 MDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 FC 1.00

ID NMR plot parameters
 CX 20.00 cm
 CY 192.80 cm
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 F1 3555.63 Hz
 F2P -0.673 ppm
 F2 -202.01 Hz
 PPMCM 0.62500 ppm/cm
 HZCM 187.88216 kHz/cm



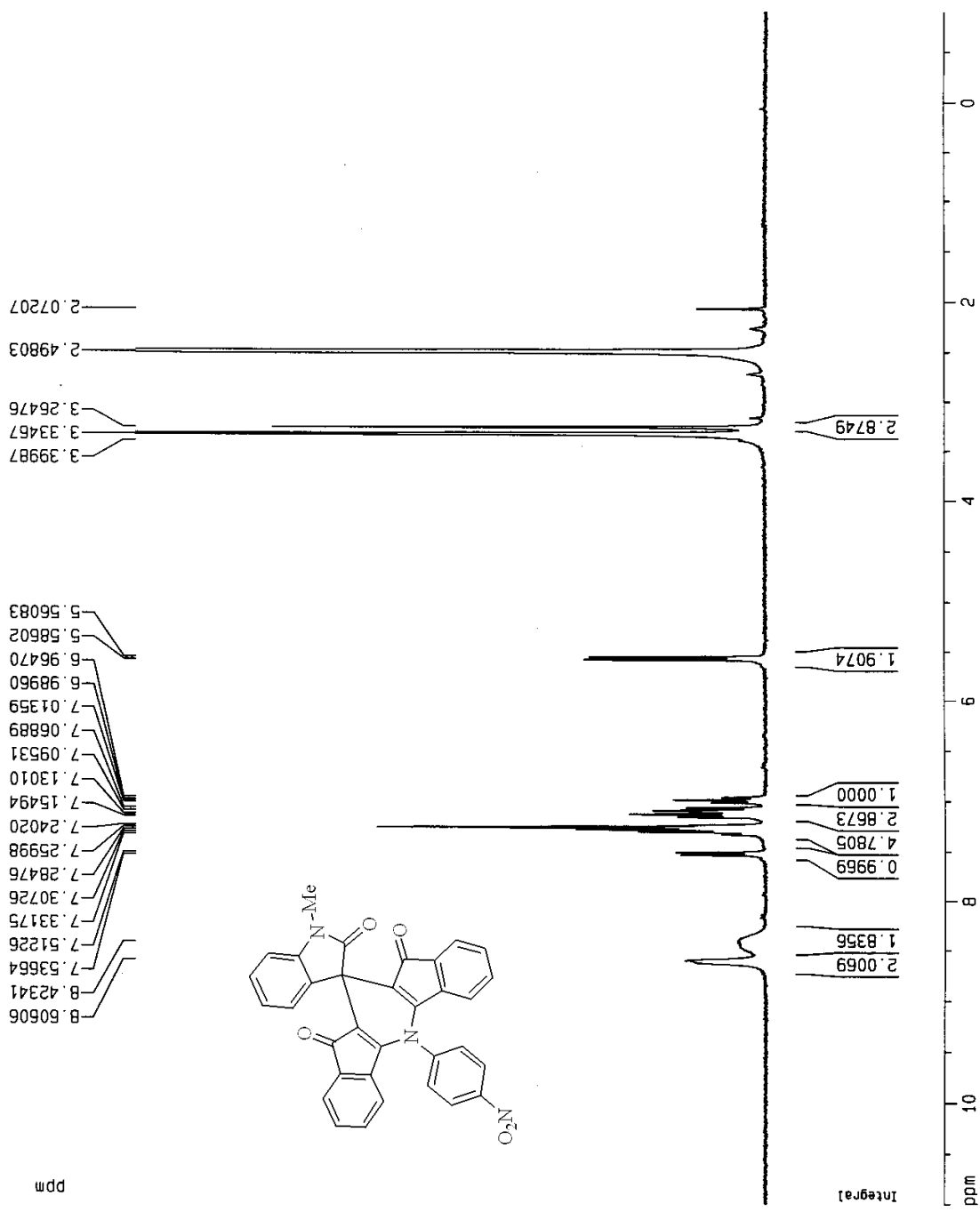
Current Data Parameters
 NAME Ahadi
 EXPNO 388
 PROCNO 1

F2 - Acquisition Parameters
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 Time 19.16
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.00 usec
 TE 300.0 K
 D1 2.0000000 sec

===== CHANNEL f1 =====
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 MDM EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 57.51 cm
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 F1 3304.70 Hz
 F2P -0.897 ppm
 F2 -269.31 Hz
 PPMCM 0.59541 ppm/cm
 HZCM 178.70087 Hz/cm



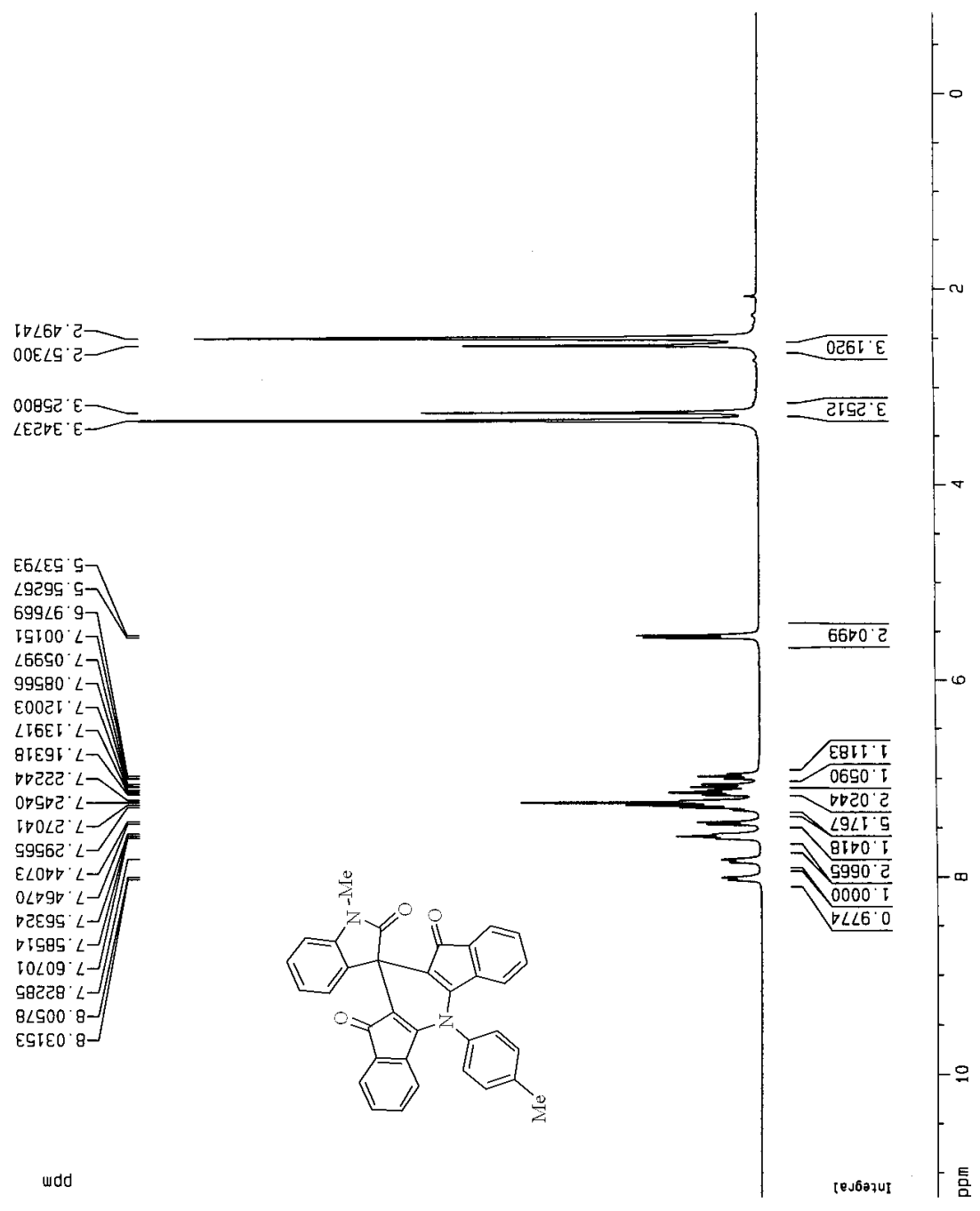
Current Data Parameters
 NAME Ahadi
 EXPNO 392
 PROCNO 1

F2 - Acquisition Parameters
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 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.00000000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 MDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 21.64 cm
 FIP 11.246 ppm
 F1 3375.18 Hz
 F2P -0.830 ppm
 F2 -249.18 Hz
 PPMCN 0.60380 ppm/cm
 HZCN 181.21779 Hz/cm



Current data parameters
 NAME Ahad1
 EXPNO 394
 PROCNO 1

F2 - Acquisition Parameters

Date_ 20090523
 Time 23.18
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 1018
 DS 2
 SWH 17985.611 Hz
 FIDRES 0.274439 Hz
 AQ 1.8219508 sec
 RG 2048
 DM 27.800 usec
 DE 6.00 usec
 TE 300.0 K
 D1 2.0000000 sec
 d11 0.0300000 sec
 d12 0.0000200 sec

***** CHANNEL f1 *****

NUC1 13C
 P1 8.75 usec
 PL1 -2.00 dB
 SF01 75.4752953 MHz

***** CHANNEL f2 *****

CPDPRG2 waltz16
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 P2 87.00 usec
 PL2 -2.00 dB
 PL12 12.00 dB
 PL13 18.00 dB
 SF02 300.1312005 MHz

F2 - Processing parameters

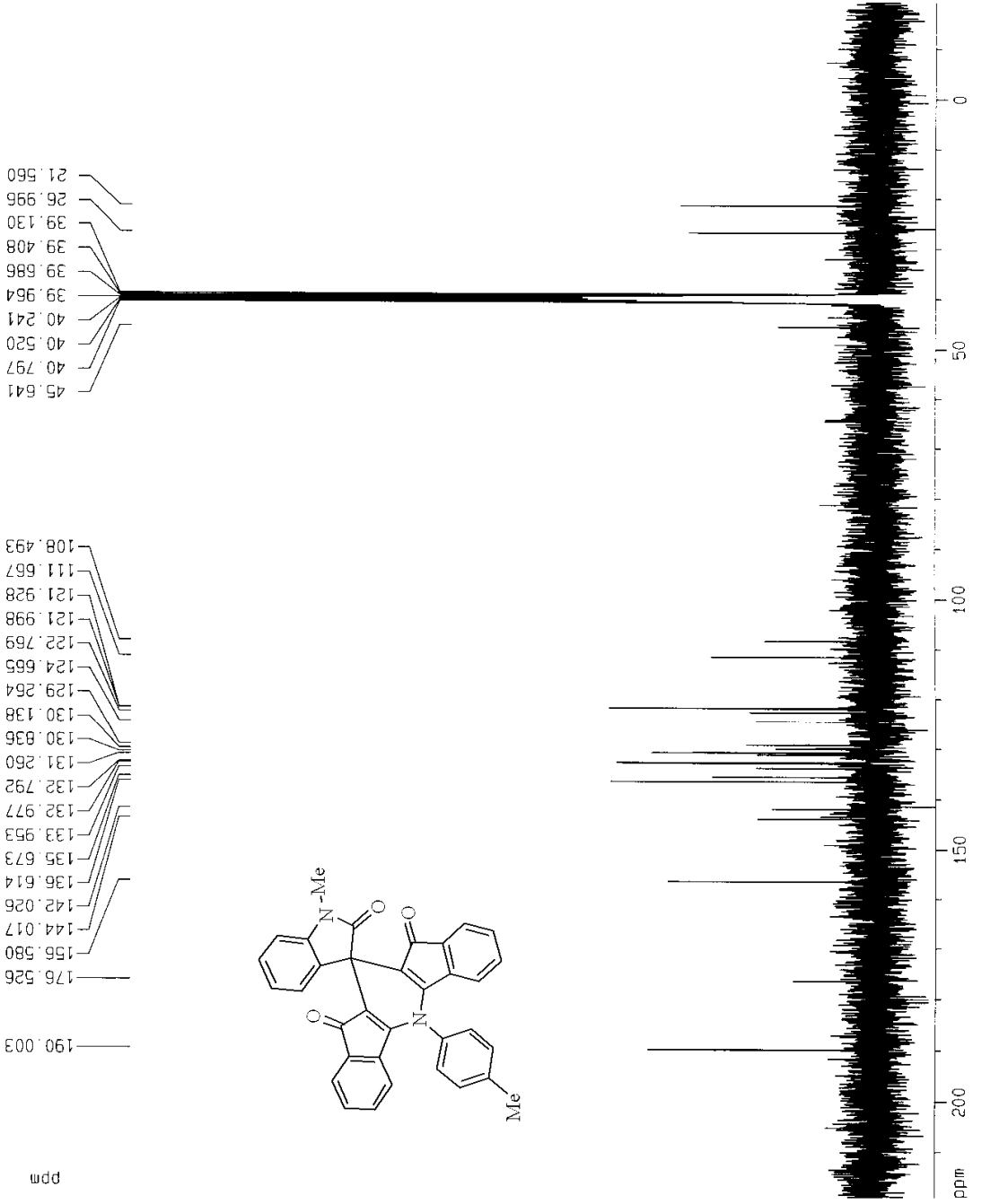
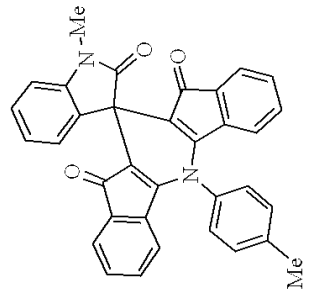
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 GB 0
 PC 1.40

1D NMR plot parameters

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 F1 16539.10 Hz
 F2P -19.167 ppm
 F2 -1446.51 Hz
 PRMCH 11.91609 ppm/cm
 HZCH 899.26056 Hz/cm

21.560
 26.996
 39.130
 39.408
 39.686
 39.964
 40.241
 40.520
 40.797
 45.641

108.493
 111.667
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 122.769
 124.665
 129.264
 130.138
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 142.026
 144.017
 156.580
 176.526
 190.003



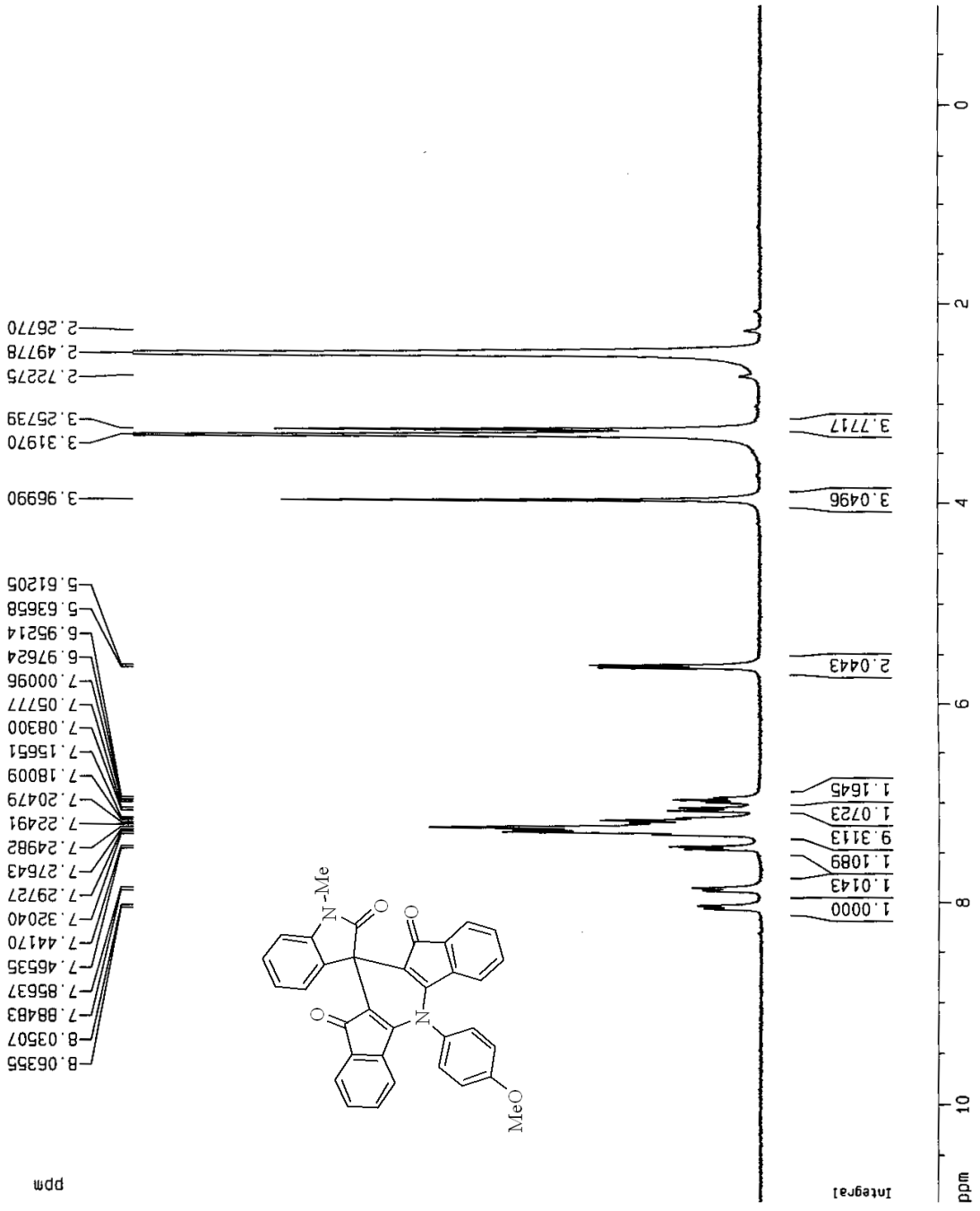
Current Data Parameters
 NAME Anad1
 EXPNO 358
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090426
 Time 19.21
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 20
 DS 1
 SFO1 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.000 usec
 TE 380.0 K
 D1 2.00000000 sec

===== CHANNEL f1 =====
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 45.97 cm
 F1P 10.972 ppm
 F1 3292.94 Hz
 F2P -0.982 ppm
 F2 -294.64 Hz
 PPMCH 0.59767 ppm/cm
 HZCM 179.37912 Hz/cm



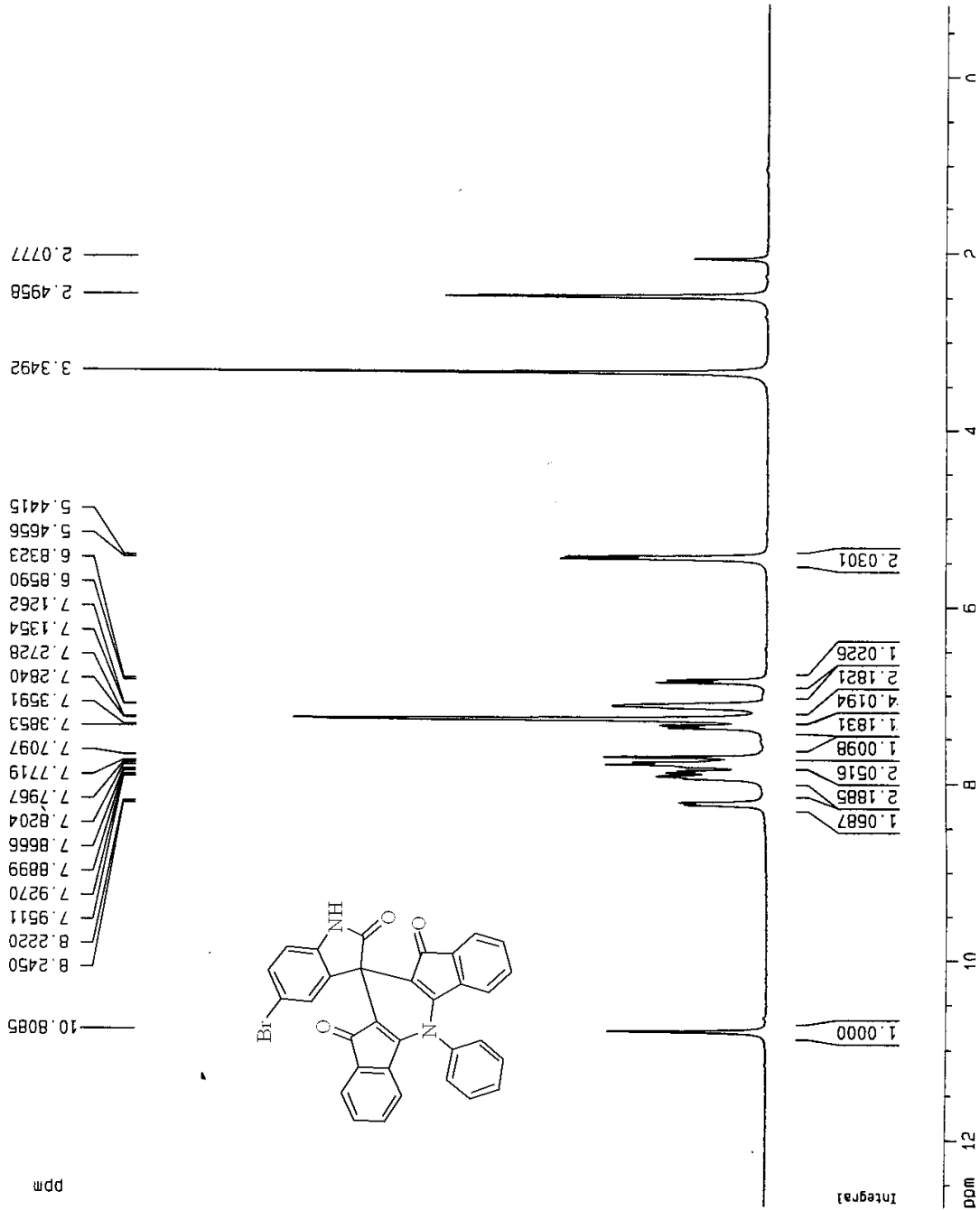
Current Data Parameters
 NAME Imani
 EXPNO 3
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090305
 Time 1.46
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TO 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0572021 sec
 RG 50.8
 DW 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.0000000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 WDM EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

ID NMR plot parameters
 CX 20.00 cm
 CY 11.02 cm
 F1P 12.753 ppm
 F1 3827.48 Hz
 F2P -0.810 ppm
 F2 -243.24 Hz
 PPMCH 0.67816 ppm/cm
 HZCH 203.53618 Hz/cm



Current Data Parameters
 NAME: PRCHO
 F1: 4
 F2: 1

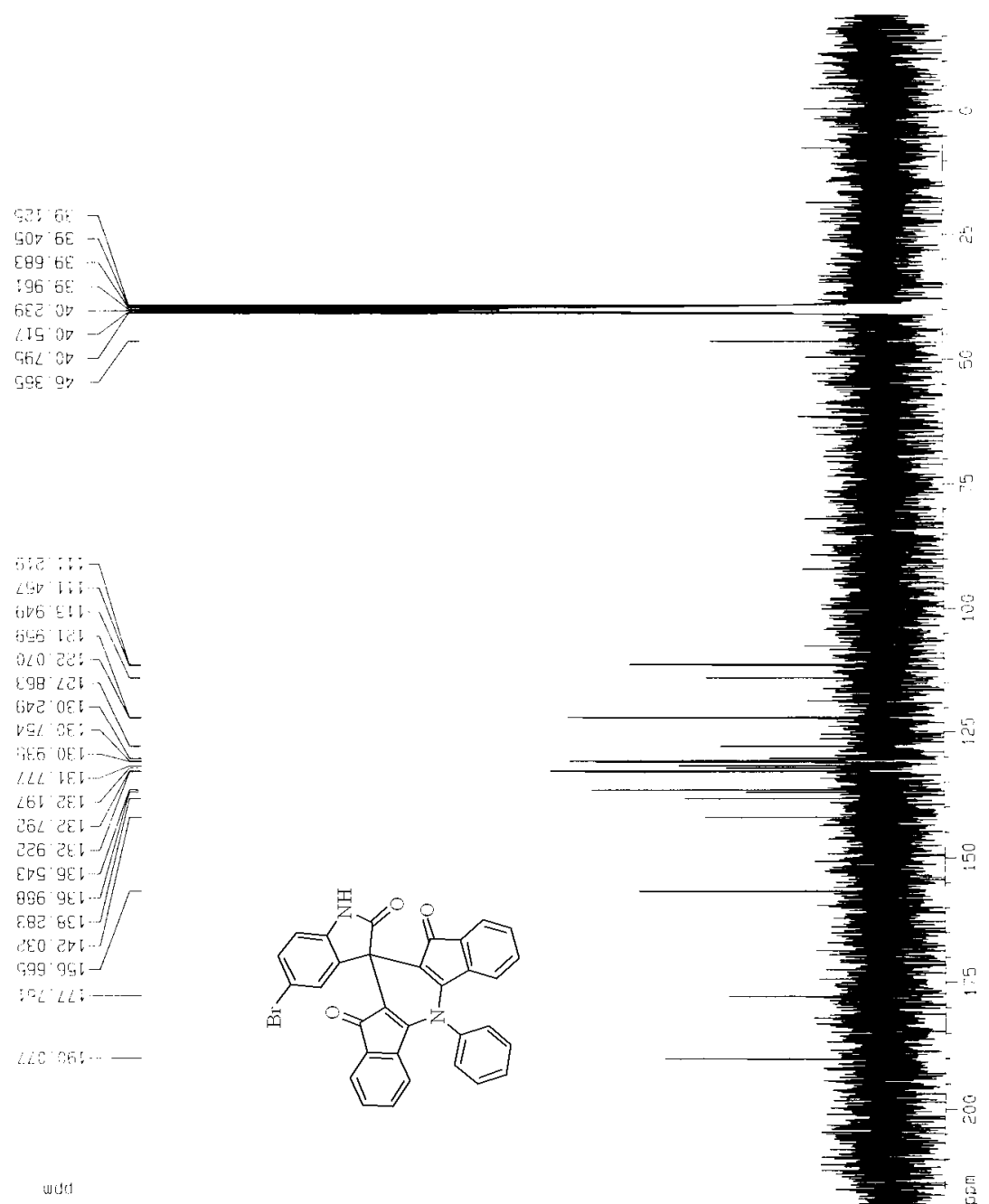
Acquisition Parameters
 Date_: 20090305
 Time: 1:30
 INSTRUM: spect
 PROBHD: 5 mm BBO BB-1H
 PULPROG: zgpg30
 TD: 65536
 SOLVENT: DMSO
 NS: 316
 DS: 2
 SWH: 17985.611 Hz
 FIDRES: 0.274439 Hz
 AQ: 1.8219508 sec
 RG: 2048
 DIH: 27.800 usec
 DE: 6.00 usec
 TE: 300.0 K
 D1: 2.0000000 sec
 d11: 0.0300000 sec
 d12: 0.0000200 sec

Channel f1
 NUC1: 13C
 P1: 8.75 usec
 PL1: -2.00 dB
 SF01: 75.4752953 MHz

Channel f2
 CPROG2: waltz16
 NUC2: 1H
 PCPD2: 87.00 usec
 PL2: -2.00 dB
 PL12: 12.00 dB
 PL13: 18.00 dB
 SF02: 300.1312005 MHz

Processing parameters
 SI: 65536
 SF: 75.4677490 MHz
 WDW: EM
 SSB: 0
 GB: 1.00 Hz
 CB: 0
 PC: 1.40

ID NMR plot parameters
 CX: 20.00 cm
 CY: 105.46 cm
 F1P: 219.155000 MHz
 F1: 16539.11 Hz
 F2P: -19.167 ppm
 F2: -1446.51 Hz
 SFOCM: 11.91609 ppm/cm
 AFDM: 899.28652 Hz/cm



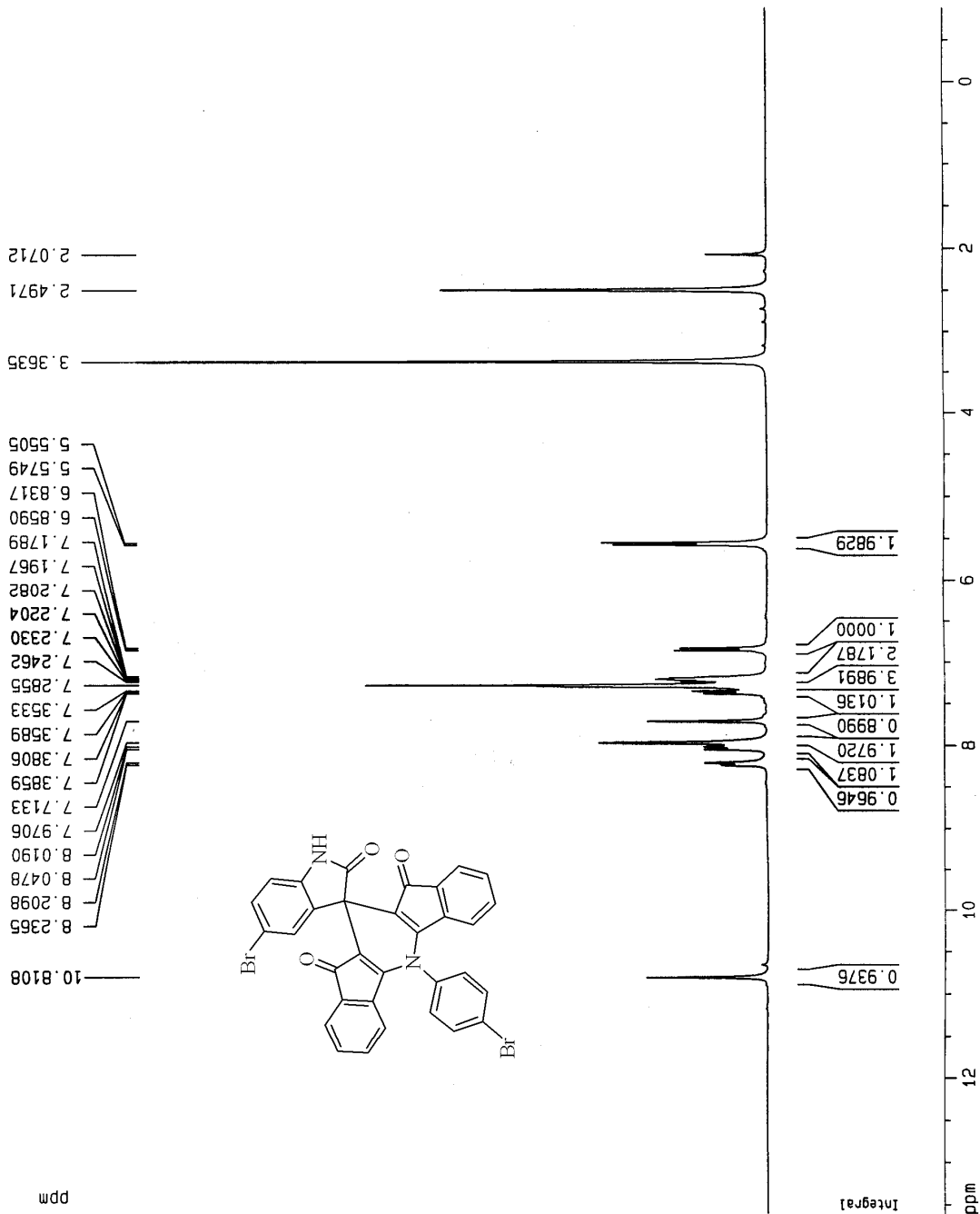
Current Data Parameters
 NAME Ahadi
 EXPNO 375
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090510
 Time 18.19
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 9
 DS 1
 SMH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DW 64.000 usec
 DE 6.000 usec
 TE 380.0 K
 D1 2.00000000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

ID NMR plot parameters
 CX 20.00 cm
 CY 14.98 cm
 F1 13.615 ppm
 F2 4086.27 Hz
 F2P -0.885 ppm
 PPMCH 0.72500 ppm/cm
 HZCM 217.58331 Hz/cm



Current Data Parameters
 NAME Anad1
 EXPNO 380
 PROCNO 1

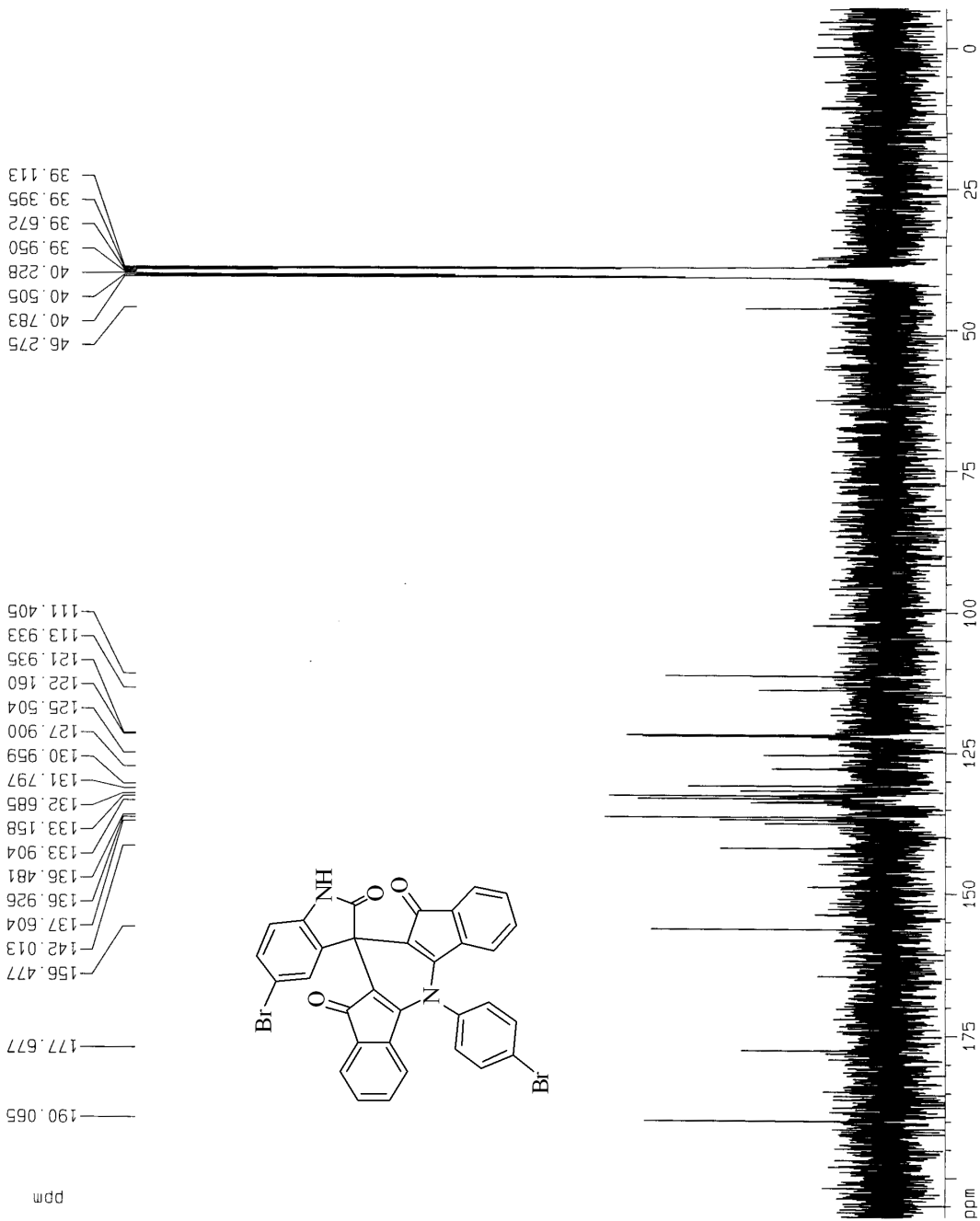
F2 - Acquisition Parameters
 Date_ 20090511
 Time 20.09
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 551
 DS 2
 SMH 17985.611 Hz
 FIDRES 0.274439 Hz
 AQ 1.8219508 sec
 RG 2048
 DW 27.800 usec
 DE 6.00 usec
 TE 300.0 K
 D1 2.0000000 sec
 d11 0.0300000 sec
 d12 0.0000200 sec

===== CHANNEL f1 =====
 NUC1 13C
 P1 8.75 usec
 PL1 -2.00 dB
 SFO1 75.4752953 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 87.00 usec
 PL2 -2.00 dB
 PL12 12.00 dB
 PL13 18.00 dB
 SFO2 300.1312005 MHz

F2 - Processing parameters
 SI 65536
 SF 75.4677490 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 20.00 cm
 CY 92.76 cm
 F1P 207.107 ppm
 F1 15629.87 Hz
 F2P -6.976 ppm
 F2 -526.47 Hz
 PPMCM 10.70413 ppm/cm
 HZCM 807.81683 Hz/cm



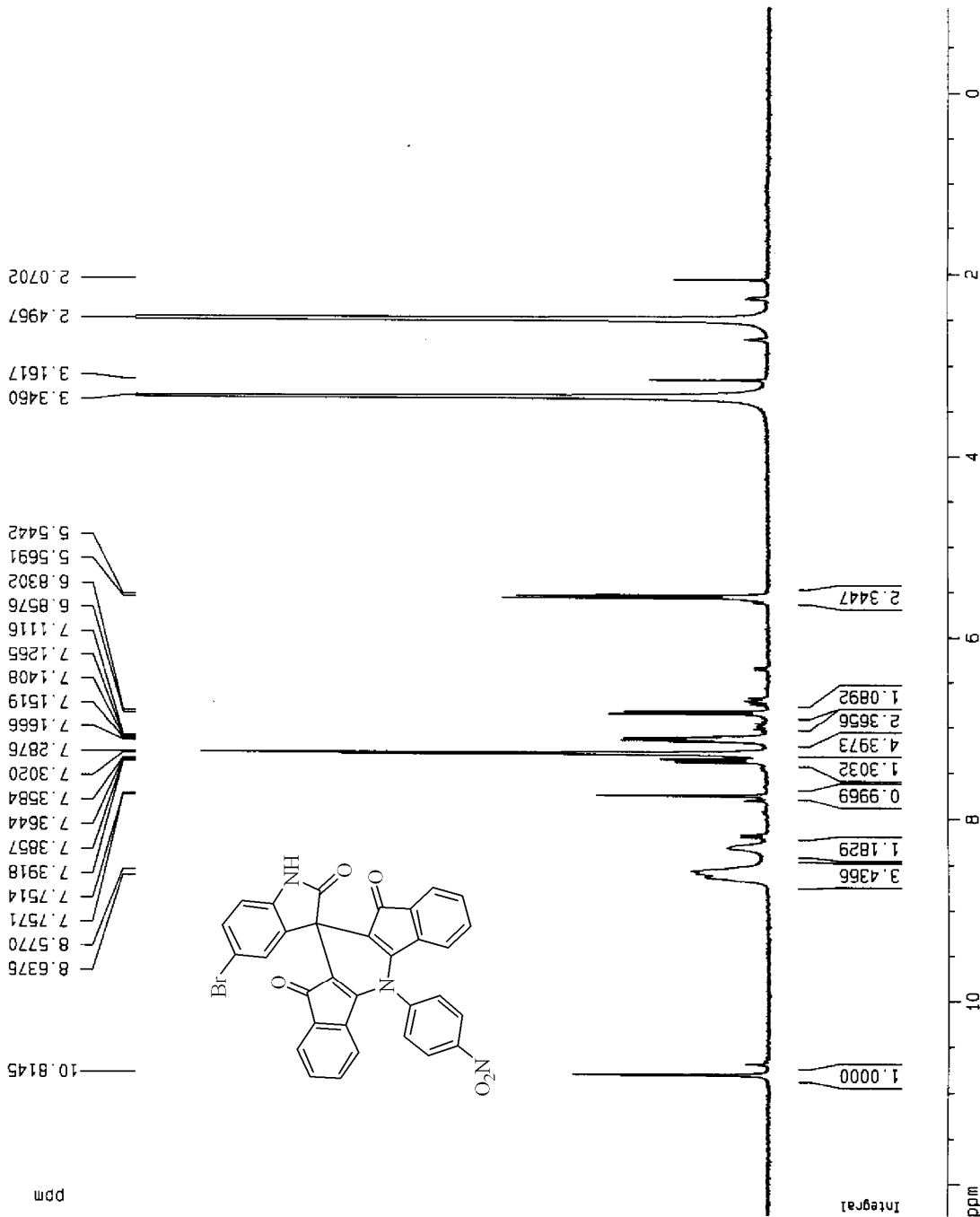
Current Data Parameters
 NAME Ahad1
 EXPNO 387
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090519
 Time 19.04
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TO 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SMH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.0000000 sec

***** CHANNEL f1 *****
 NUC1 ¹H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 MDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 57.04 cm
 F1P 12.353 ppm
 F1 3707.41 Hz
 F2P -0.931 ppm
 F2 -279.38 Hz
 PPMCM 0.66418 ppm/cm
 HZCM 199.33957 Hz/cm



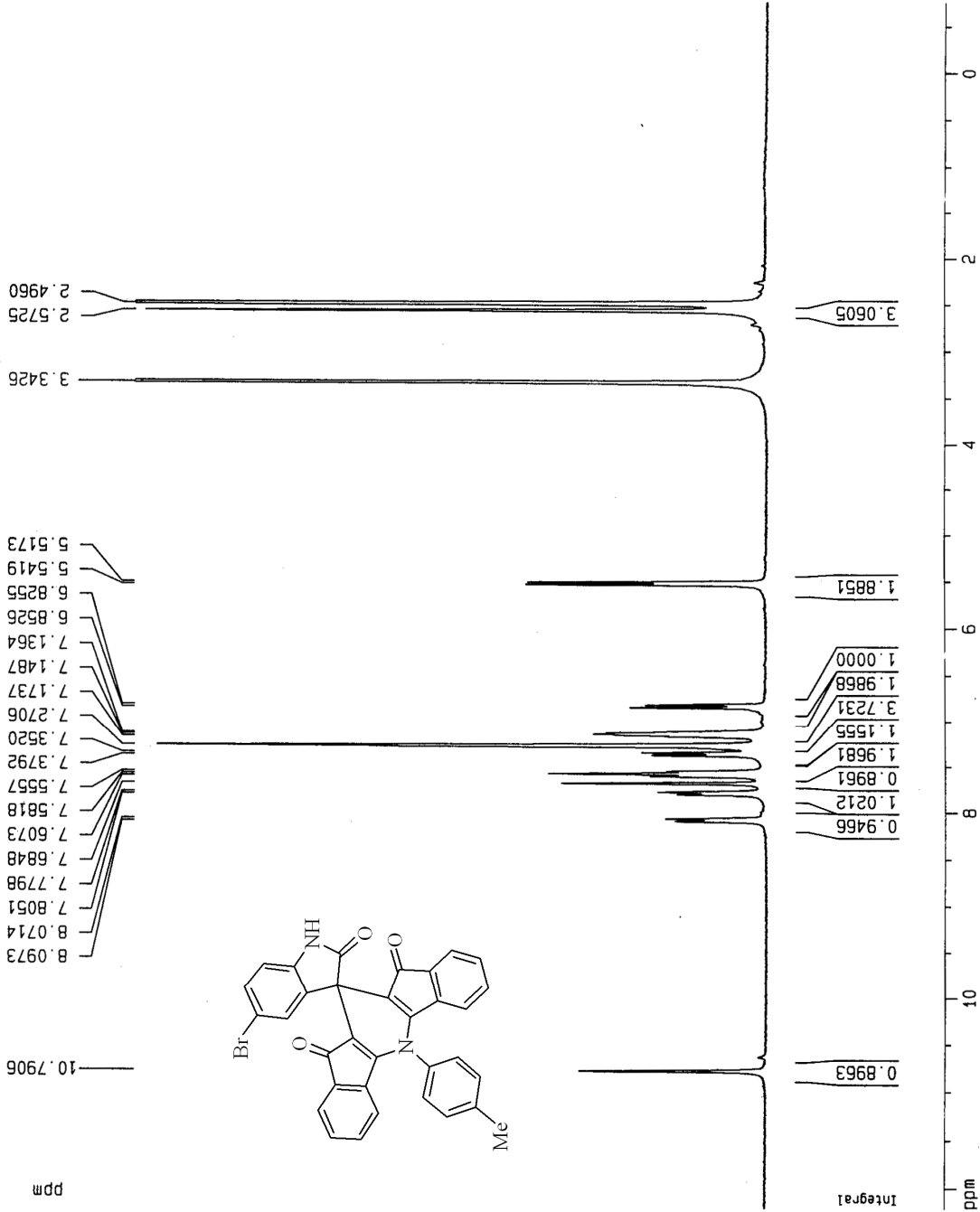
Current Data Parameters
NAME Ahad1
EXPNO 374
PROCNO 1

F2 - Acquisition Parameters
Date_ 20090509
Time 19.43
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 32768
SOLVENT DMSO
NS 13
DS 1
SMH 7812.500 Hz
FIDRES 0.238419 Hz
AQ 2.0972021 sec
RG 228.1
DM 64.000 usec
DE 6.00 usec
TE 380.0 K
D1 2.00000000 sec

===== CHANNEL f1 =====
NUC1 ¹H
P1 15.50 usec
PL1 -2.00 dB
SF01 300.1323986 MHz

F2 - Processing parameters
SI 65536
SF 300.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

1D NMR plot parameters
CX 20.00 cm
CY 36.42 cm
F1P 12.219 ppm
F1 3667.14 Hz
F2P -0.763 ppm
F2 -229.04 Hz
PPMCM 0.64908 ppm/cm
HZCM 194.80913 Hz/cm



Current Data Parameters
 NAME Ahadi
 EXPNO 381
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090511
 Time 20.47
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 401
 DS 2
 SWH 17985.611 Hz
 FIDRES 0.274439 Hz
 AQ 1.8219508 sec
 RG 2048
 DM 27.800 usec
 DE 6.00 usec
 TE 300.0 K
 D1 2.0000000 sec
 d11 0.0300000 sec
 d12 0.0002000 sec

***** CHANNEL f1 *****
 NUC1 13C
 P1 8.75 usec
 PL1 -2.00 dB
 SF01 75.4752953 MHz

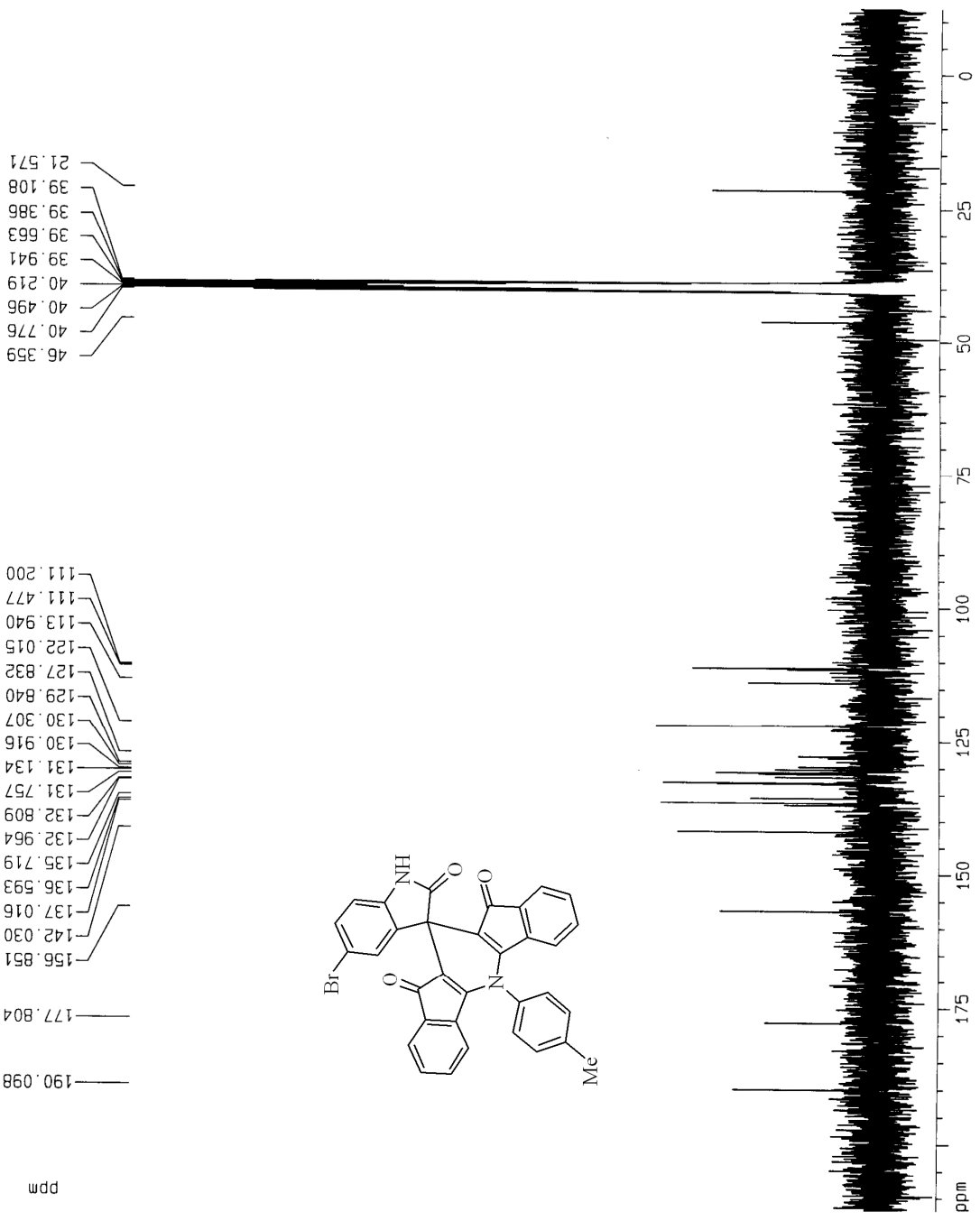
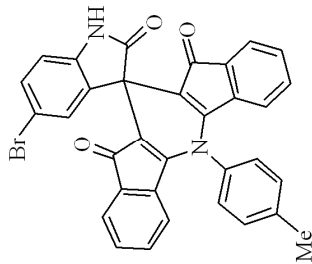
***** CHANNEL f2 *****
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 87.00 usec
 PL2 -2.00 dB
 PL12 12.00 dB
 PL13 18.00 dB
 SF02 300.1312005 MHz

F2 - Processing parameters
 SI 65536
 SF 75.4677490 MHz
 WDM EN
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 20.00 cm
 CY 69.73 cm
 F1P 212.398 ppm
 F1 16029.20 Hz
 F2p -12.411 ppm
 F2 -936.61 Hz
 PPMCM 11.24044 ppm/cm
 HZCM 848.29041 Hz/cm

46.359
 40.776
 40.496
 40.219
 39.941
 39.663
 39.386
 39.108
 21.571

190.098
 177.804
 156.851
 142.030
 137.016
 136.593
 135.719
 132.964
 132.809
 131.757
 131.134
 130.916
 130.307
 129.840
 127.832
 122.015
 113.940
 111.477
 111.200



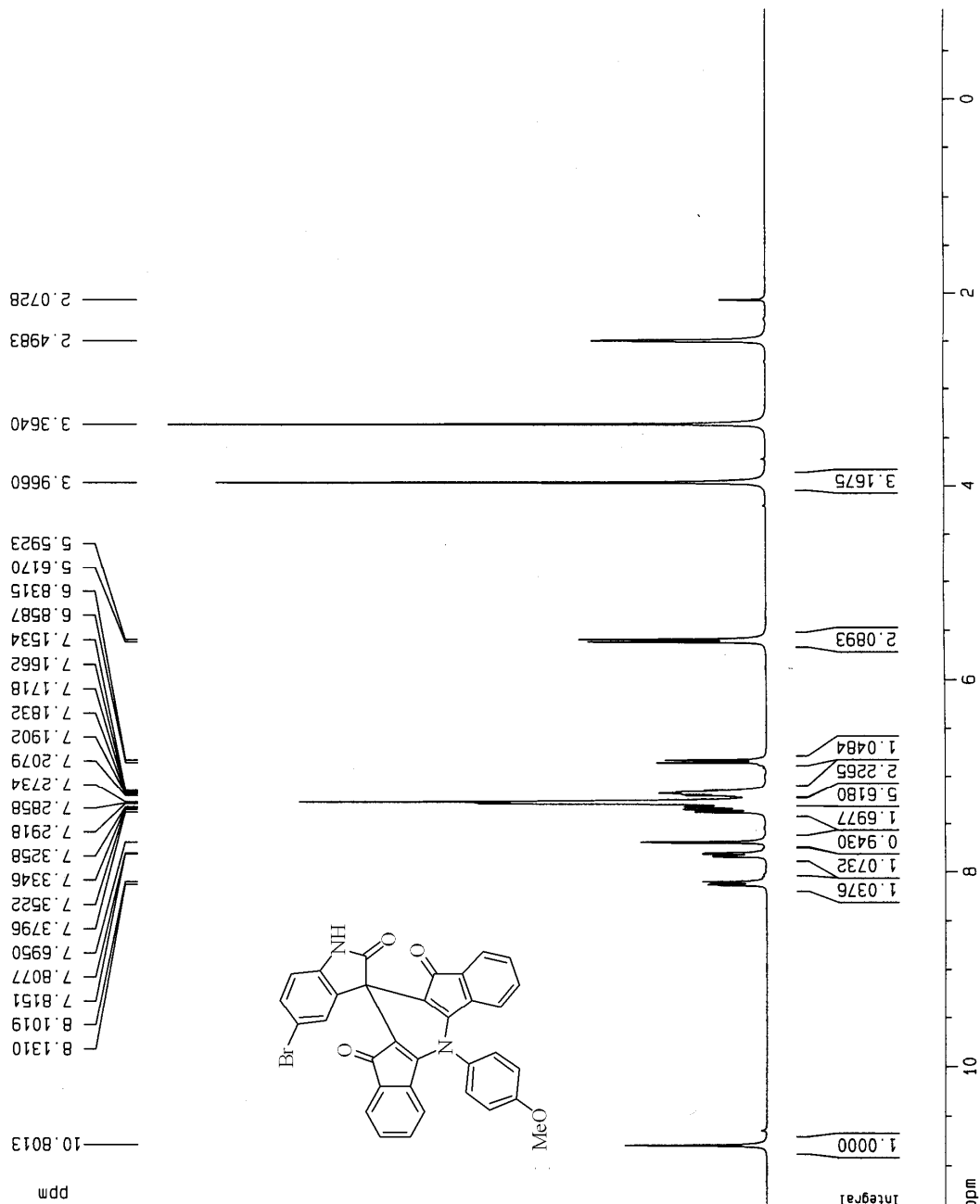
Current Data Parameters
 NAME Ahadi
 EXPNO 372
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090509
 Time 19.26
 INSTRUM spect
 PROBHD 5 mm BBO BB-IH
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 14
 DS 1
 SMH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.00000000 sec

==== CHANNEL f1 =====
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 WDM EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 9.99 cm
 F1P 11.447 ppm
 F1 3435.98 Hz
 F2P -0.931 ppm
 F2 -279.38 Hz
 PPMCM 0.61889 ppm/cm
 HZCM 185.74823 Hz/cm



Current Data Parameters
 NAME Ahad1
 EXPNO 373
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090506
 Time 22.08
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TO 65536
 SOLVENT DMSO
 NS 762
 DS 2
 SMH 17985.611 Hz
 FIDRES 0.274439 Hz
 AQ 1.8219508 sec
 RG 2048
 DK 27.800 usec
 DE 6.00 usec
 TE 300.0 K
 D1 2.0000000 sec
 d11 0.0300000 sec
 d12 0.0002000 sec

==== CHANNEL f1 =====
 NUC1 13C
 P1 8.75 usec
 PL1 -2.00 dB
 SF01 75.4752953 MHz

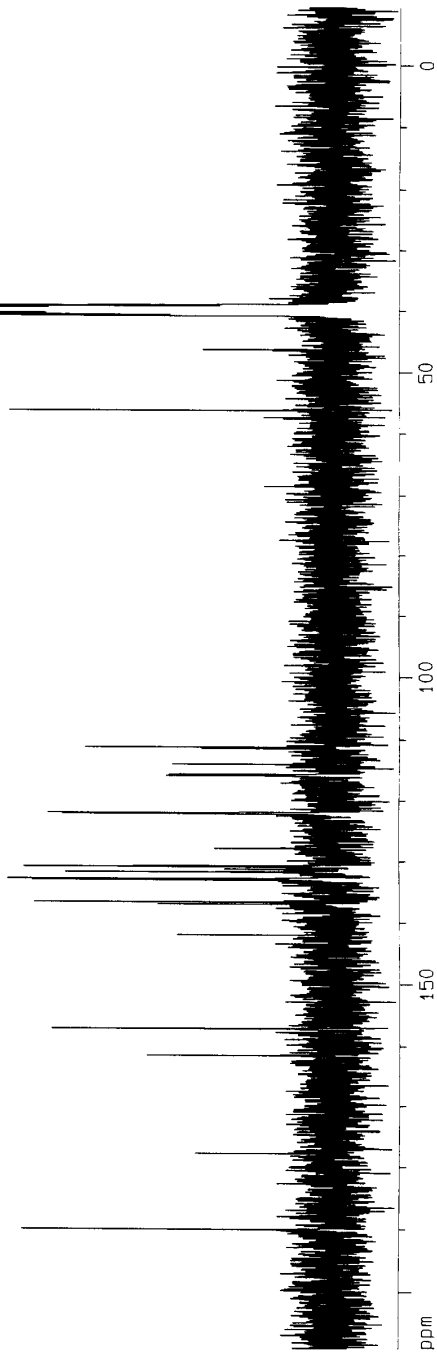
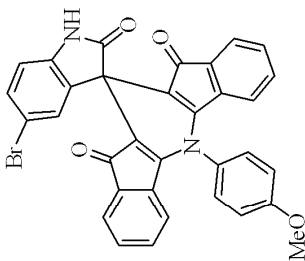
==== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD02 87.00 usec
 PL2 -2.00 dB
 PL12 12.00 dB
 PL13 18.00 dB
 SF02 300.1312005 MHz

F2 - Processing parameters
 SI 65536
 SF 75.4677490 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 20.00 cm
 CY 87.74 cm
 F1P 209.234 ppm
 F1 15790.38 Hz
 F2 -9.541 ppm
 PPMCM 10.93874 ppm/cm
 HZCM 825.52228 Hz/cm

56.300
 46.350
 40.789
 40.512
 40.235
 39.957
 39.679
 39.401
 39.122

190.138
 177.815
 161.519
 157.153
 142.031
 137.043
 136.651
 133.045
 132.840
 131.750
 131.271
 130.885
 130.728
 130.728
 127.834
 122.160
 121.998
 115.754
 115.548
 113.928
 111.446
 111.203



Current Data Parameters
 NAME Imani
 EXPNO 38
 PROCNO 1

F2 - Acquisition Parameters

Date_ 20090427
 Time 22.11
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.00000000 sec

***** CHANNEL f1 *****

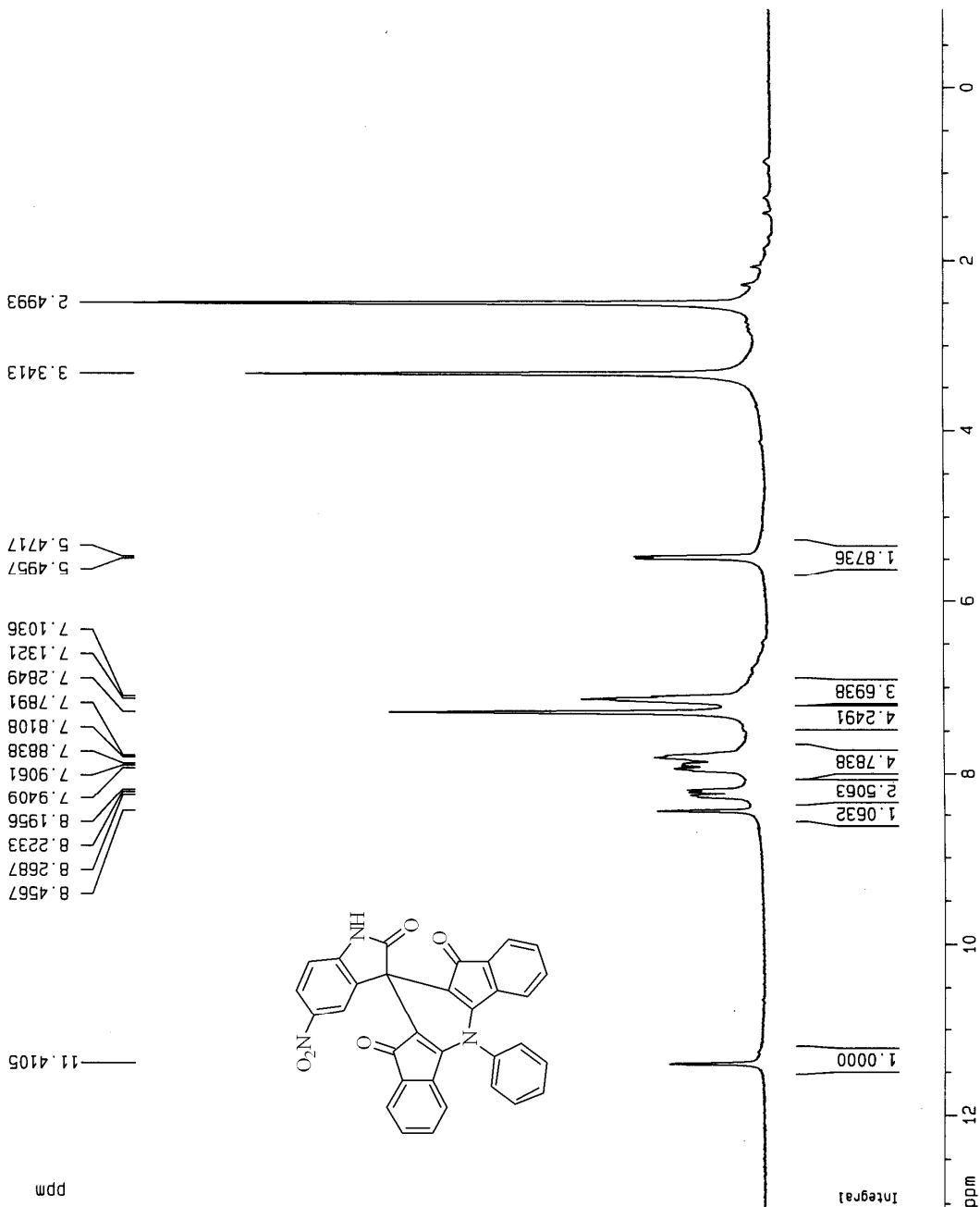
NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SFO1 300.1323986 MHz

F2 - Processing parameters

SI 65536
 SF 300.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

10 NMR plot parameters

CX 20.00 cm
 CY 11.68 cm
 F1P 13.042 ppm
 F1 3914.32 Hz
 F2P -0.922 ppm
 F2 -276.76 Hz
 PPMCM 0.69821 ppm/cm
 HZCM 209.55403 Hz/cm



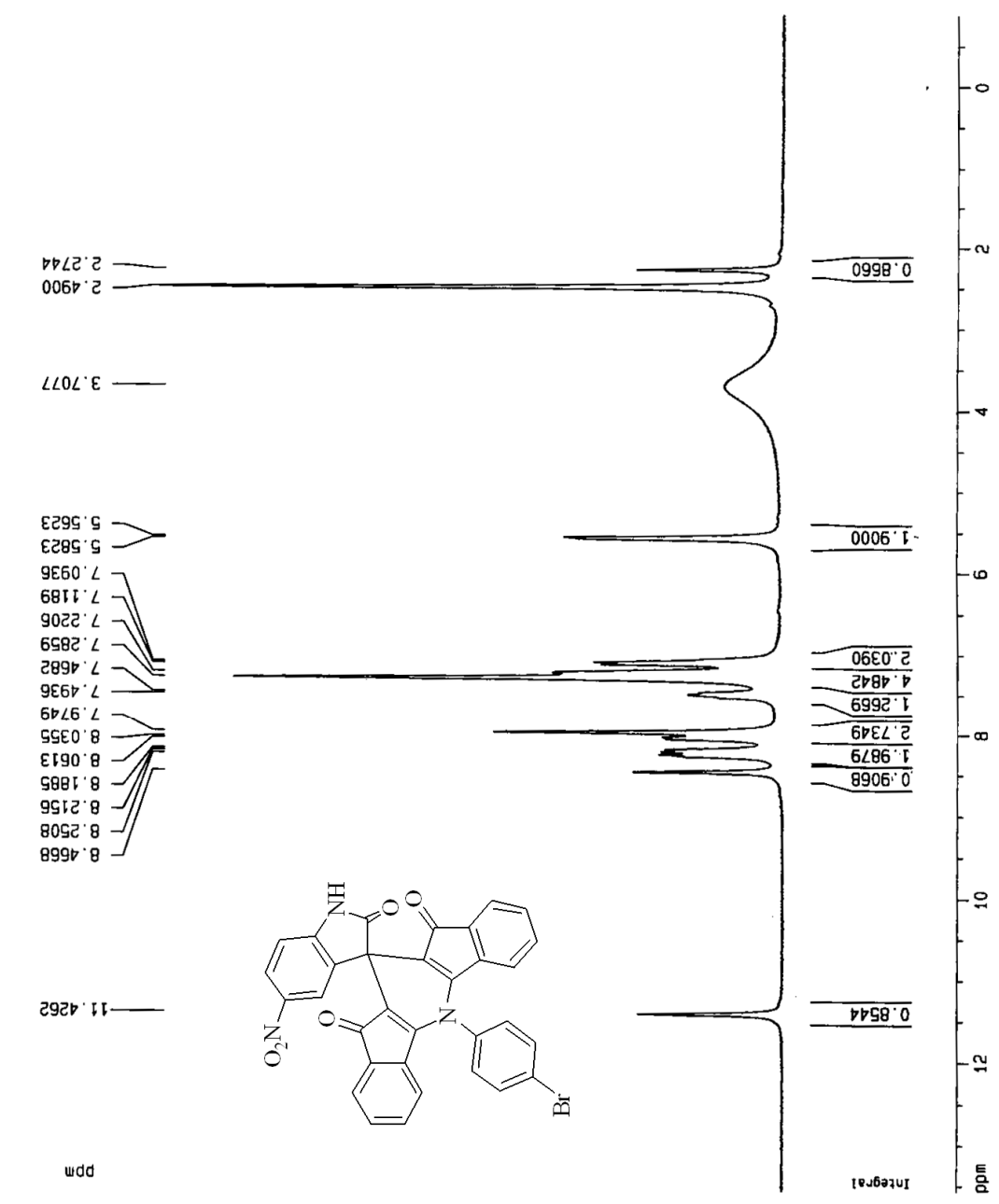
Current Data Parameters
NAME Inan1
EXPNO 9
PROCNO 1

F2 - Acquisition Parameters
Date_ 20090405
Time 18.06
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 32768
SOLVENT DMSO
NS 10
DS 1
SFR 7812.500 Hz
FIDRES 0.238419 Hz
AQ 2.0972021 sec
RG 50.8
DM 64.000 usec
DE 6.00 usec
TE 380.0 K
D1 2.00000000 sec

===== CHANNEL f1 =====
NUC1 1H
P1 15.50 usec
PL1 -2.00 dB
SF01 300.1323986 MHz

F2 - Processing parameters
SI 65536
SF 300.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

1D NMR plot parameters
CX 20.00 cm
CY 11.26 cm
F1P 13.575 ppm
F1 4074.19 Hz
F2P -0.879 ppm
F2 -263.80 Hz
PPMCM 0.72269 ppm/cm
HZCM 216.89867 Hz/cm



Current Data Parameters
 NAME Imani
 EXPNO 26
 PROCNO 1

F2 - Acquisition Parameters

Date_ 20090419
 Time 18.42
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 50.8
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.00000000 sec

***** CHANNEL f1 *****

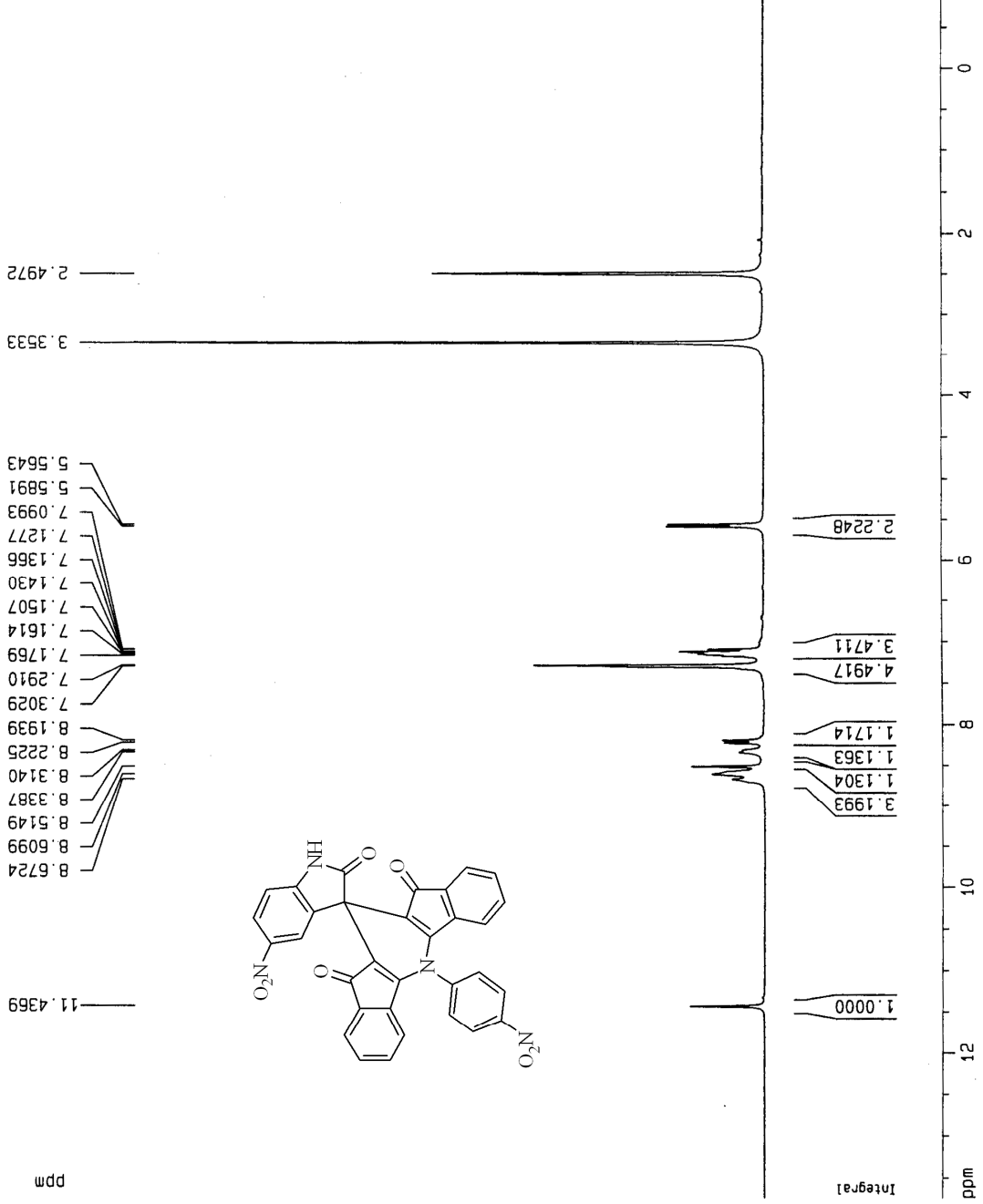
NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.132986 MHz

F2 - Processing parameters

SI 65536
 SF 300.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters

CX 20.00 cm
 CY 11.75 cm
 F1P 13.746 ppm
 F1 4125.59 Hz
 F2P -0.845 ppm
 F2 -253.52 Hz
 PPMCM 0.72954 ppm/cm
 HZCM 218.95560 Hz/cm



```

Current Data Parameters
NAME          Inani
EXPNO        27
PROCNO       1

F2 - Acquisition Parameters
Date_        20090419
Time         18.45
INSTRUM      spect
PROBHD       5 mm BBO BB-1H
PULPROG      zgpg30
TD           65536
SOLVENT      DMSO
NS           496
DS           2
SWH          17965.611 Hz
FIDRES       0.274439 Hz
AQ           1.8219508 sec
RG           2048
DM           27.800 usec
DE           6.00 usec
TE           300.0 K
D1           2.0000000 sec
d11          0.0300000 sec
d12          0.0000200 sec

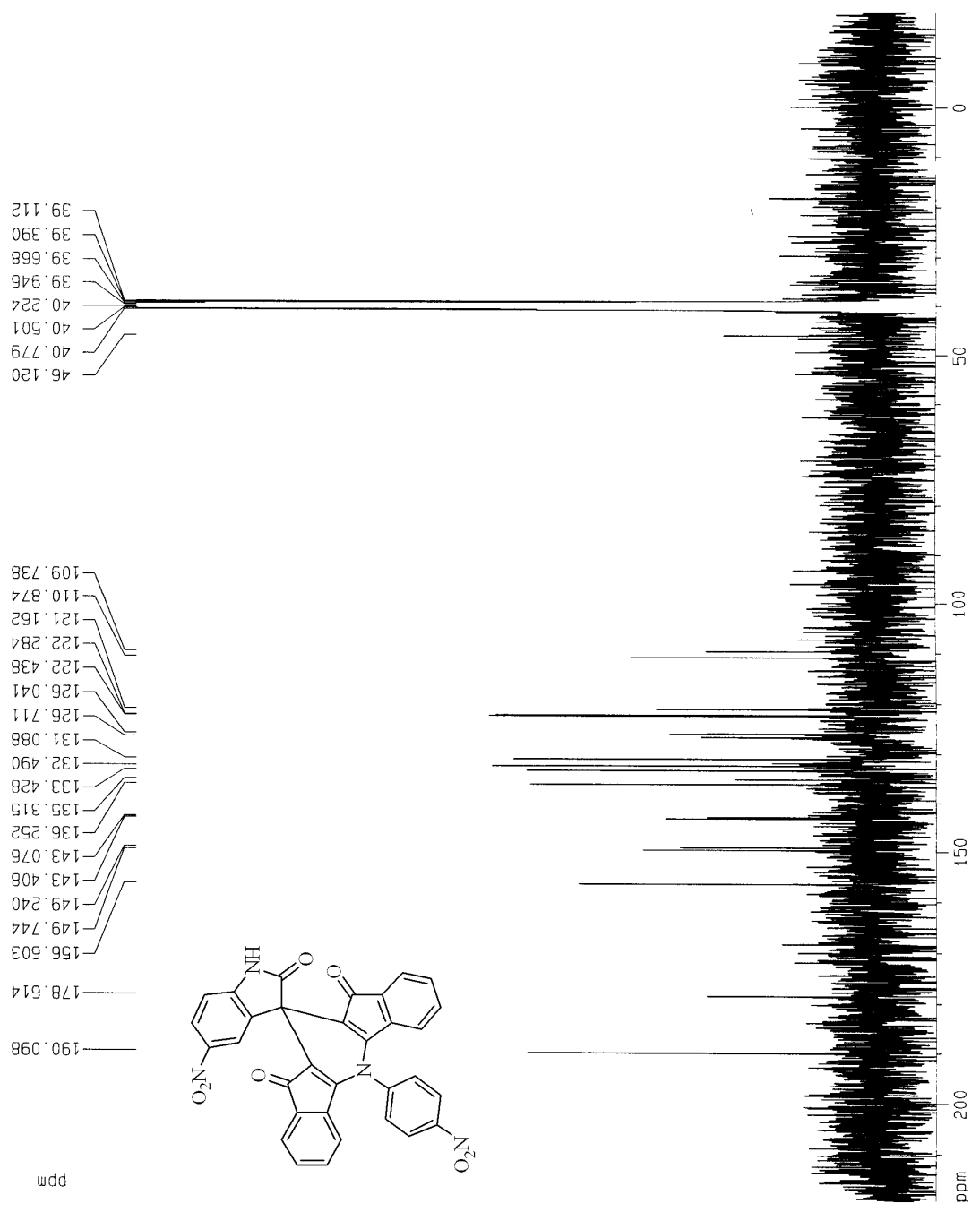
===== CHANNEL f1 =====
NUC1         13C
P1           8.75 usec
PL1          -2.00 dB
SFO1         75.4752953 MHz

===== CHANNEL f2 =====
CPDPRG2      waltz16
NUC2         1H
PCPD2        87.00 usec
PL2          -2.00 dB
PL12         12.00 dB
PL13         18.00 dB
SFO2         300.1312005 MHz

F2 - Processing parameters
SI           65536
SF           75.4677490 MHz
WDW          EM
SSB          0
LB           2.00 Hz
GB           0
PC           1.40

1D NMR plot parameters
CX           20.00 cm
CY           181.52 cm
F1p         219.155 ppm
F1          16539.11 Hz
F2p         -19.167 ppm
F2          -1446.51 Hz
pp4MCM      11.91609 ppm/cm
HZCM        899.28052 Hz/cm

```



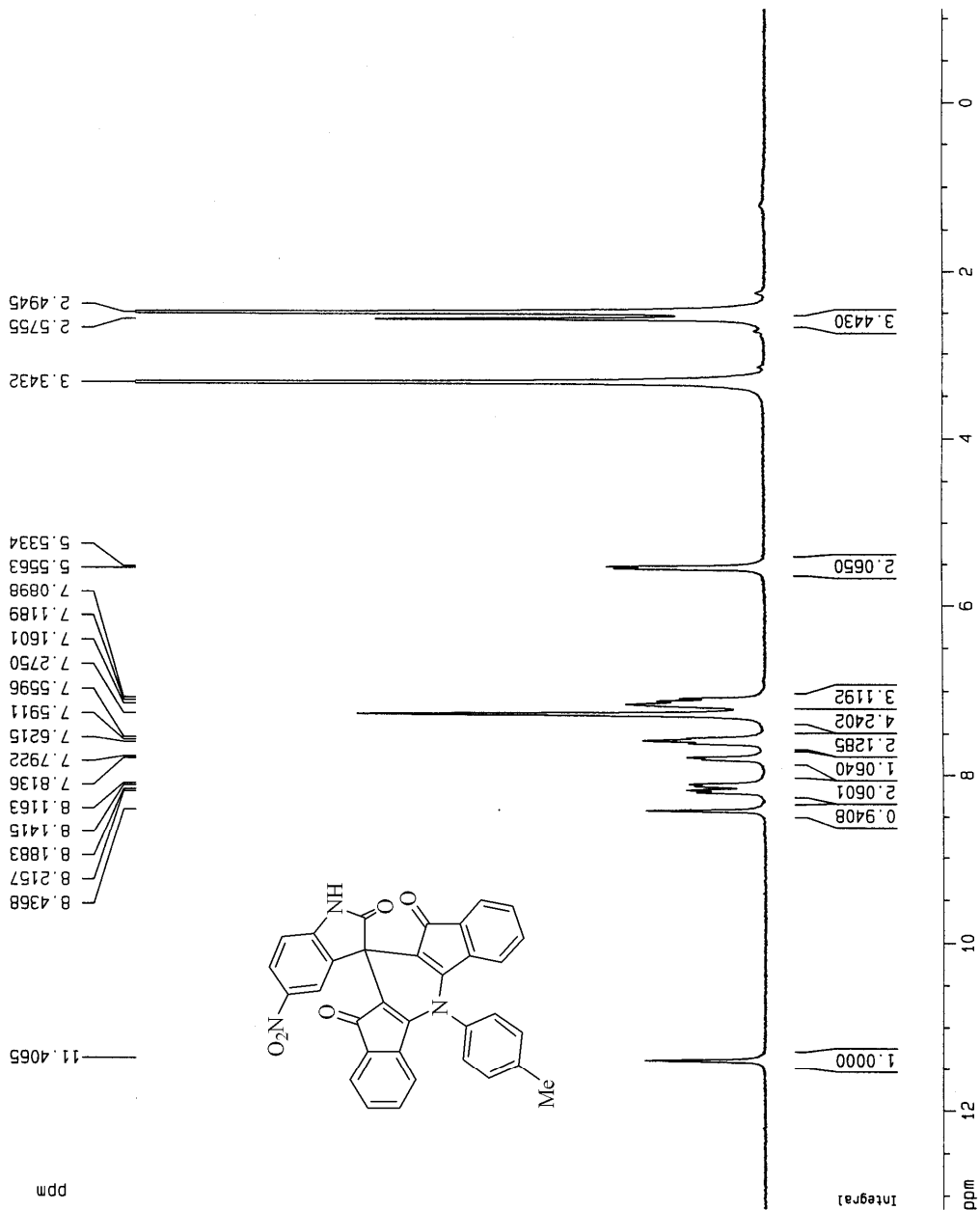
Current Data Parameters
 Name Inani
 EXPNO 22
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090414
 Time 16.58
 INSTRUM spect
 PROBHD 5 mm BBO BB-IH
 PULPROG zg30
 TO 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 50.8
 DW 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.0000000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 28.73 cm
 F1P 13.164 ppm
 F1 3950.83 Hz
 F2P -1.119 ppm
 F2 -335.76 Hz
 PPMCH 0.71412 ppm/cm
 HZCH 214.32977 Hz/cm



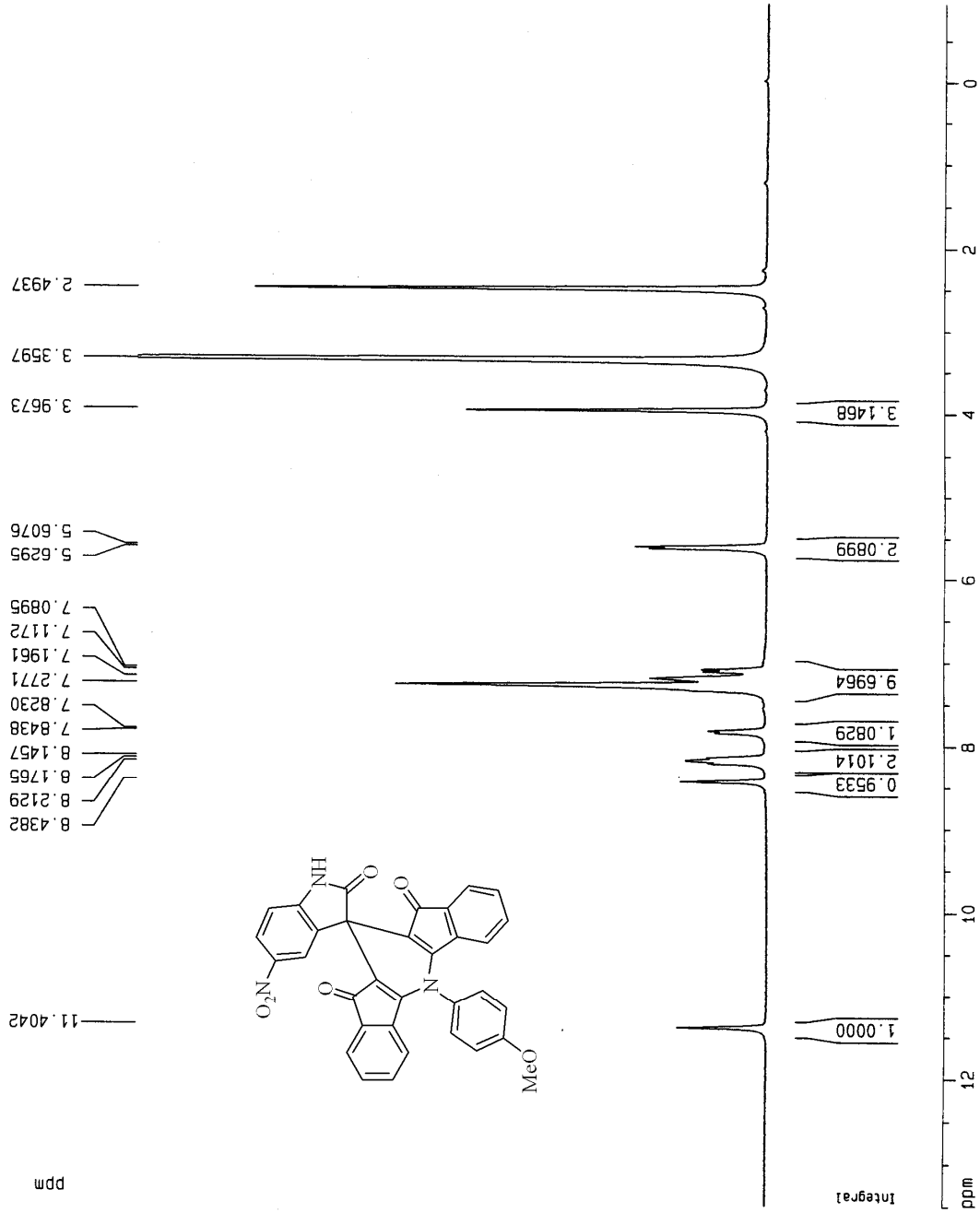
Current Data Parameters
 NAME Iman1
 EXPNO 24
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090418
 Time 13.44
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SMH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 50.8
 DW 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.00000000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 MDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 28.73 cm
 F1P 13.506 ppm
 F1 4053.63 Hz
 F2P -0.947 ppm
 F2 -284.36 Hz
 PPMCM 0.72269 ppm/cm
 HZCM 216.89967 Hz/cm



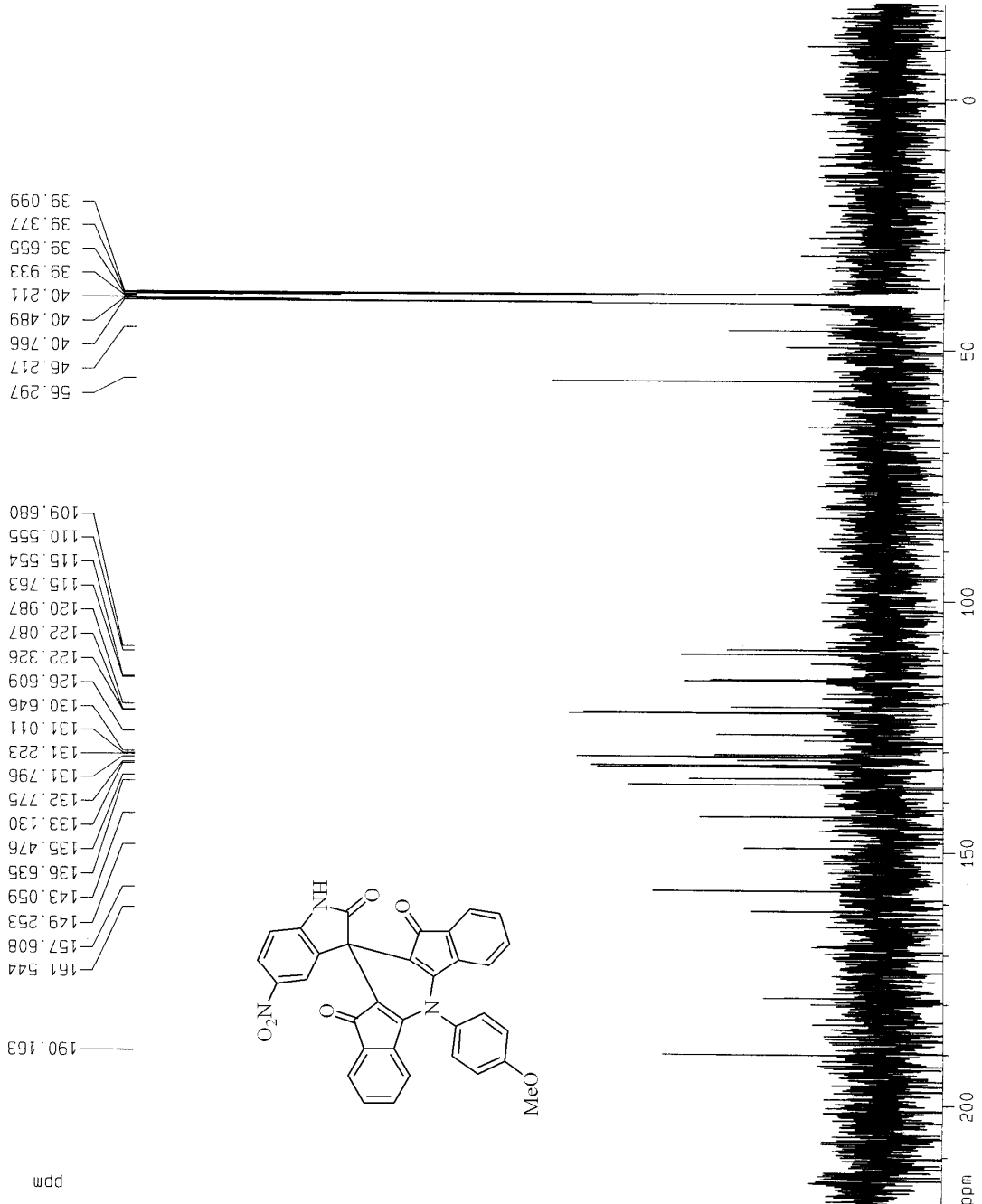
Current Data Parameters
 NAME Imani
 EXPNO 25
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090418
 Time 13.56
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 65536
 SOLVENT DMSO
 NS 590
 DS 2
 SWH 17985.611 Hz
 FIDRES 0.274439 Hz
 AQ 1.8219508 sec
 RG 2048
 DM 27.800 usec
 DE 6.00 usec
 TE 300.0 K
 D1 2.0000000 sec
 d11 0.0300000 sec
 d12 0.0002000 sec

***** CHANNEL f1 *****
 NUC1 13C
 P1 8.75 usec
 PL1 -2.00 dB
 SF01 75.4677490 MHz
 ***** CHANNEL f2 *****
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 67.00 usec
 PL2 -2.00 dB
 PL12 12.00 dB
 PL13 18.00 dB
 SF02 300.1312005 MHz

F2 - Processing parameters
 SI 65536
 SF 75.4677490 MHz
 MDW EM
 SSB 0
 LB 2.00 Hz
 GB 0
 PC 1.40

1D NMR plot parameters
 CX 20.00 cm
 CY 171.07 cm
 F1P 219.155 ppm
 F1 16539.11 Hz
 F2P -19.167 ppm
 F2 -1446.51 Hz
 PPKMC 11.91609 ppm/cm
 HZCM 899.28052 Hz/cm



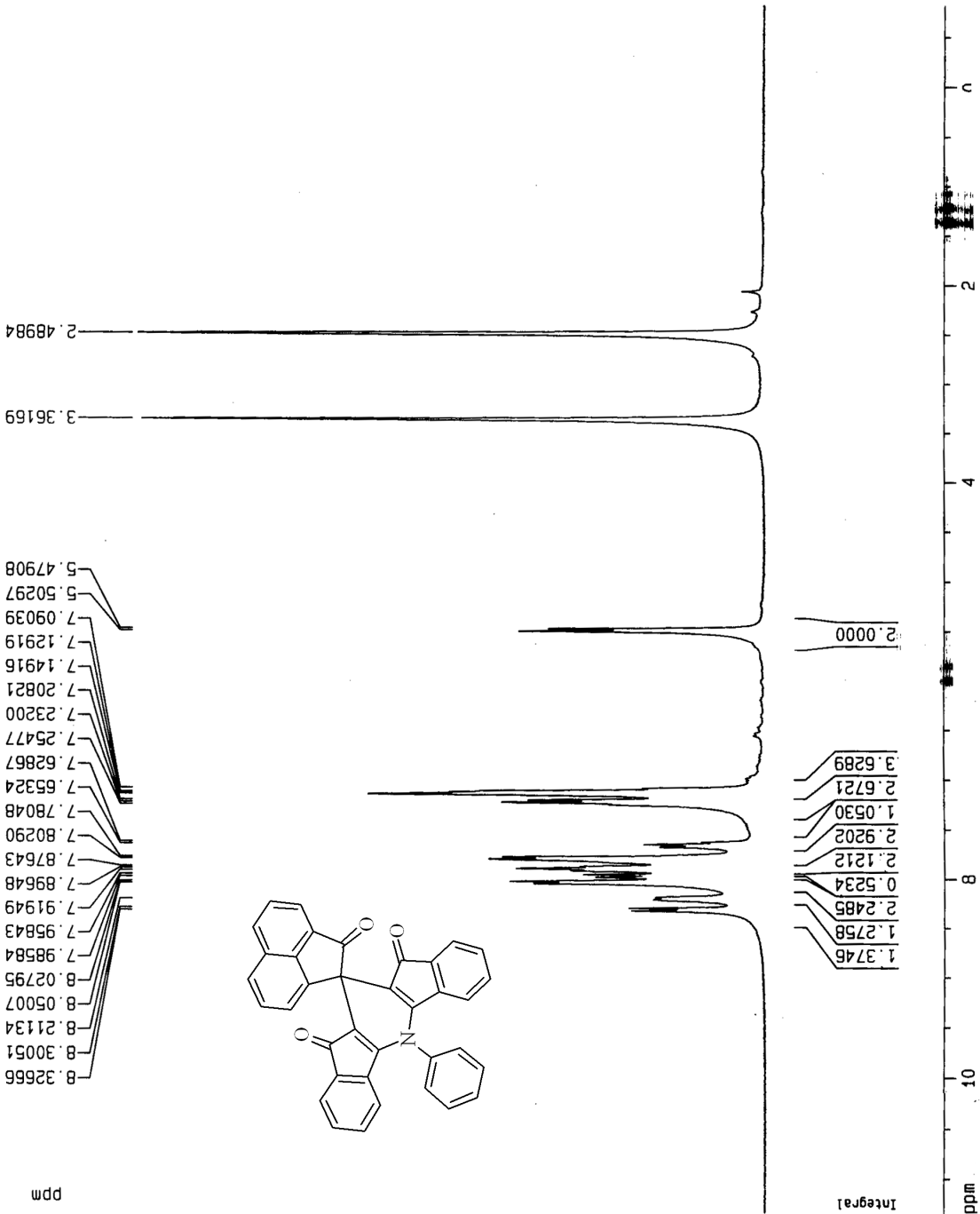
Current Data Parameters
 NAME Imani
 EXPNO 94
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090813
 Time 1.23
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SMH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DH 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.00000000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 MOW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 10.41 cm
 F1P 11.351 ppm
 F1 3406.68 Hz
 F2P -0.825 ppm
 F2 -247.56-Hz
 PPMCH 0.60878 ppm/cm
 HZCM 182.71169-Hz/cm



Current Data Parameters

NAME Imani
EXPNO 89
PROCNO 1

F2 - Acquisition Parameters

Date_ 20090812
Time 1.25
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zg30
TD 32768
SOLVENT DMSO
NS 10
DS 1
SWH 7812.500 Hz
FIDRES 0.238419 Hz
AQ 2.0972021 sec
RG 228.1
DM 64.000 usec
DE 6.00 usec
TE 300.0 K
D1 2.00000000 sec

===== CHANNEL f1 =====

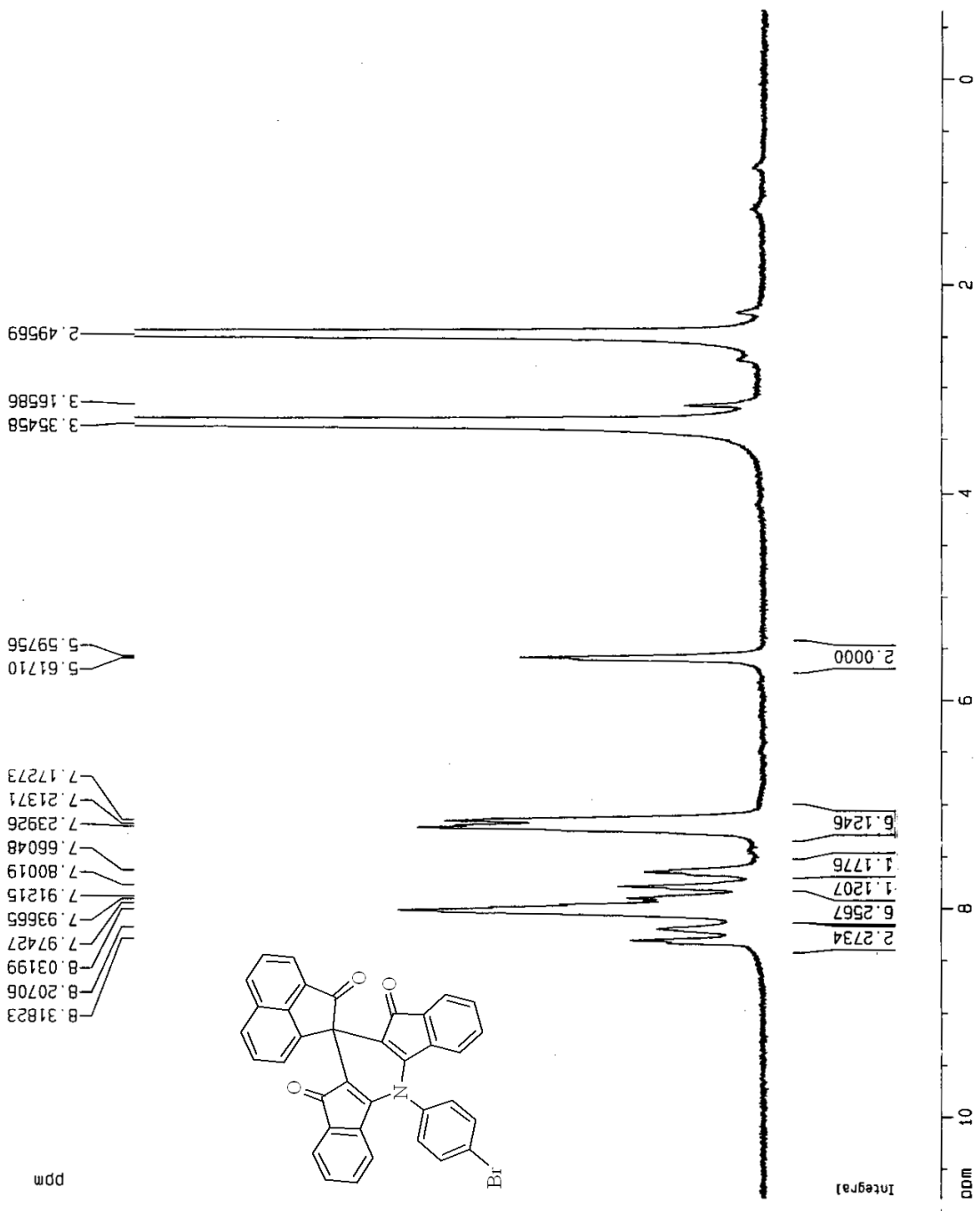
NUC1 1H
P1 15.50 usec
PL1 -2.00 dB
SF01 300.1323996 MHz

F2 - Processing parameters

SI 65536
SF 300.1300000 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00

1D NMR plot parameters

CX 20.00 cm
CY 68.31 cm
FIP 10.783 ppm
F1 3236.38 Hz
F2 -0.657 ppm
PPMCM -197.14 Hz
HZCM 0.57200 ppm/cm
171.67581 Hz/cm



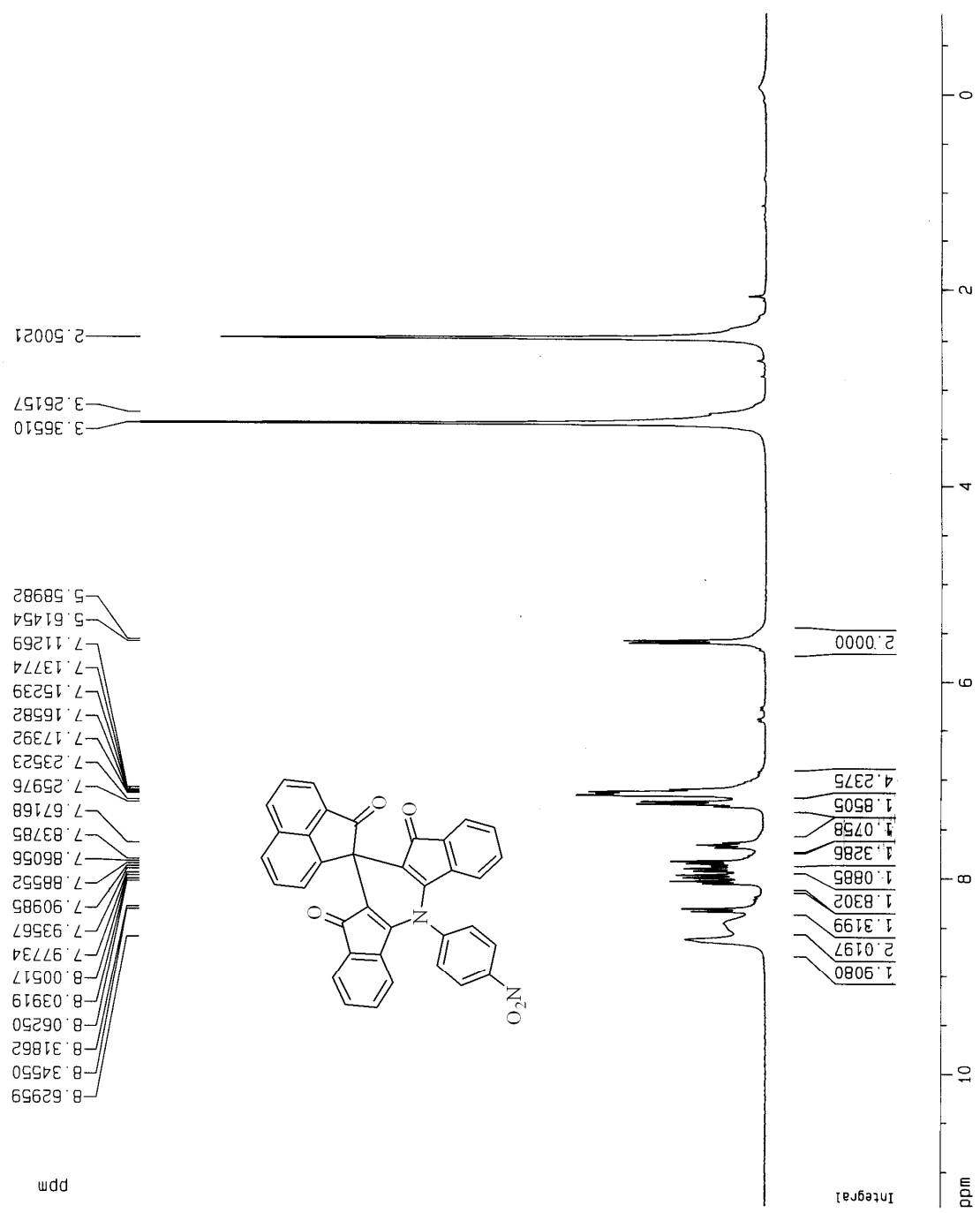
Current Data Parameters
 NAME Imani
 EXPNO 95
 PROCNO 1

F2 - Acquisition Parameters
 Date_ 20090813
 Time 1.52
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.0000000 sec

===== CHANNEL f1 =====
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SFO1 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 25.26 cm
 F1P 11.351 ppm
 F1 3406.68 Hz
 F2P -0.825 ppm
 F2 -247.56 Hz
 PPMCM 0.60878 ppm/c
 HZCM 182.71169 Hz/cm



Current Data Parameters
 NAME [man]
 EXPNO 91
 PROCNO 1

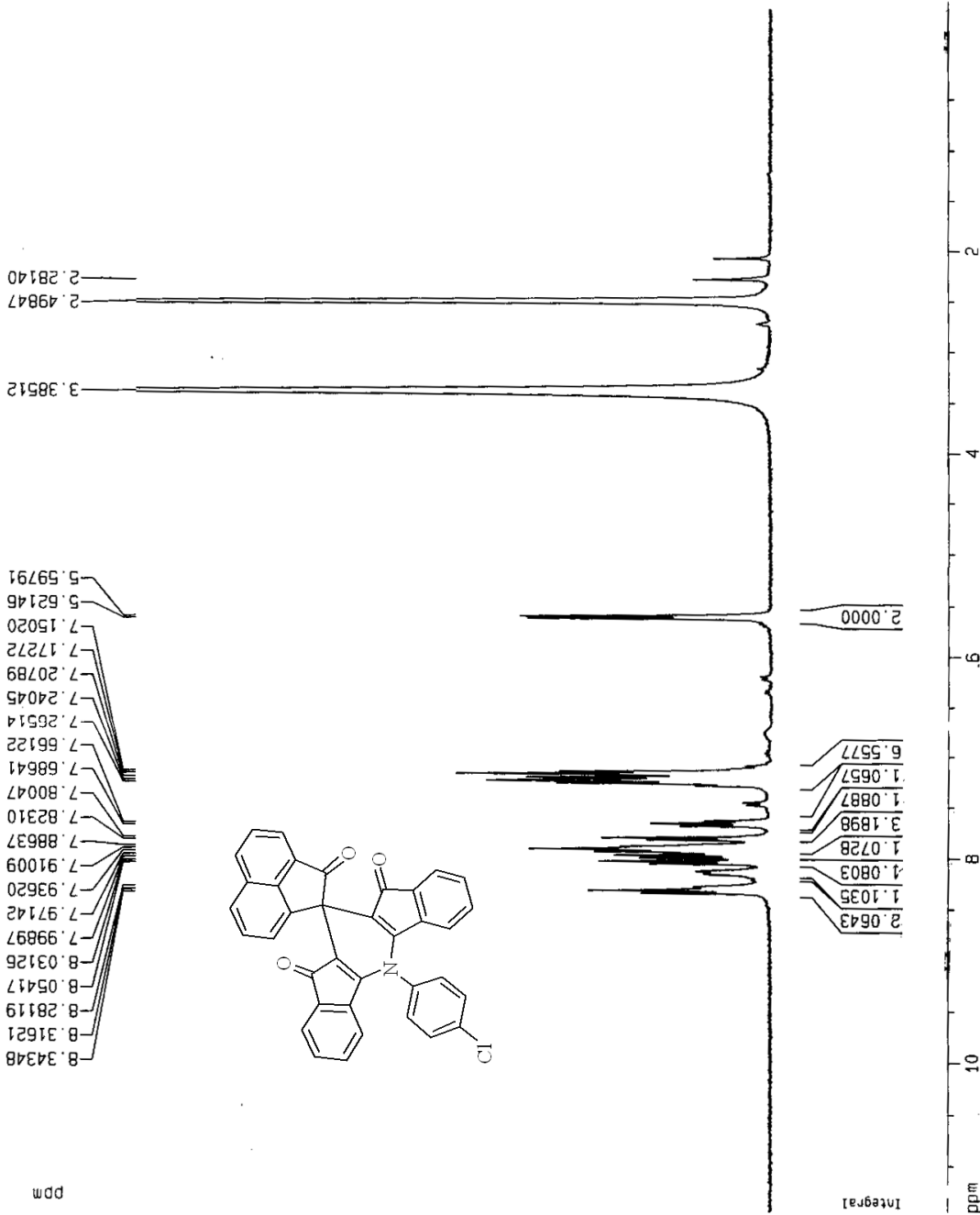
F2 - Acquisition Parameters
 Date_ 20090812
 Time 1.57

INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SMH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 O1 2.00000000 sec

***** CHANNEL f1 *****
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters
 SI 65536
 SF 300.1300000 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters
 CX 20.00 cm
 CY 35.73 cm
 F1P 11.458 ppm
 F1 3438.87 Hz
 F2P -0.390 ppm
 F2 -117.10 Hz
 PPMCH 0.59240 ppm/cm
 HZCM 177.79807 Hz/cm



Current Data Parameters
 NAME Imani
 EXPNO 72
 PROCNO 1

F2 - Acquisition Parameters

Date_ 20090603
 Time 21.37
 INSTRUM spect
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 32768
 SOLVENT DMSO
 NS 10
 DS 1
 SWH 7812.500 Hz
 FIDRES 0.238419 Hz
 AQ 2.0972021 sec
 RG 228.1
 DM 64.000 usec
 DE 6.00 usec
 TE 380.0 K
 D1 2.0000000 sec

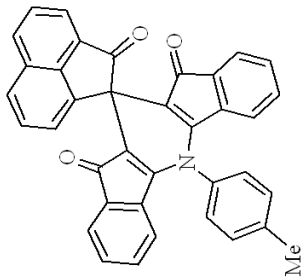
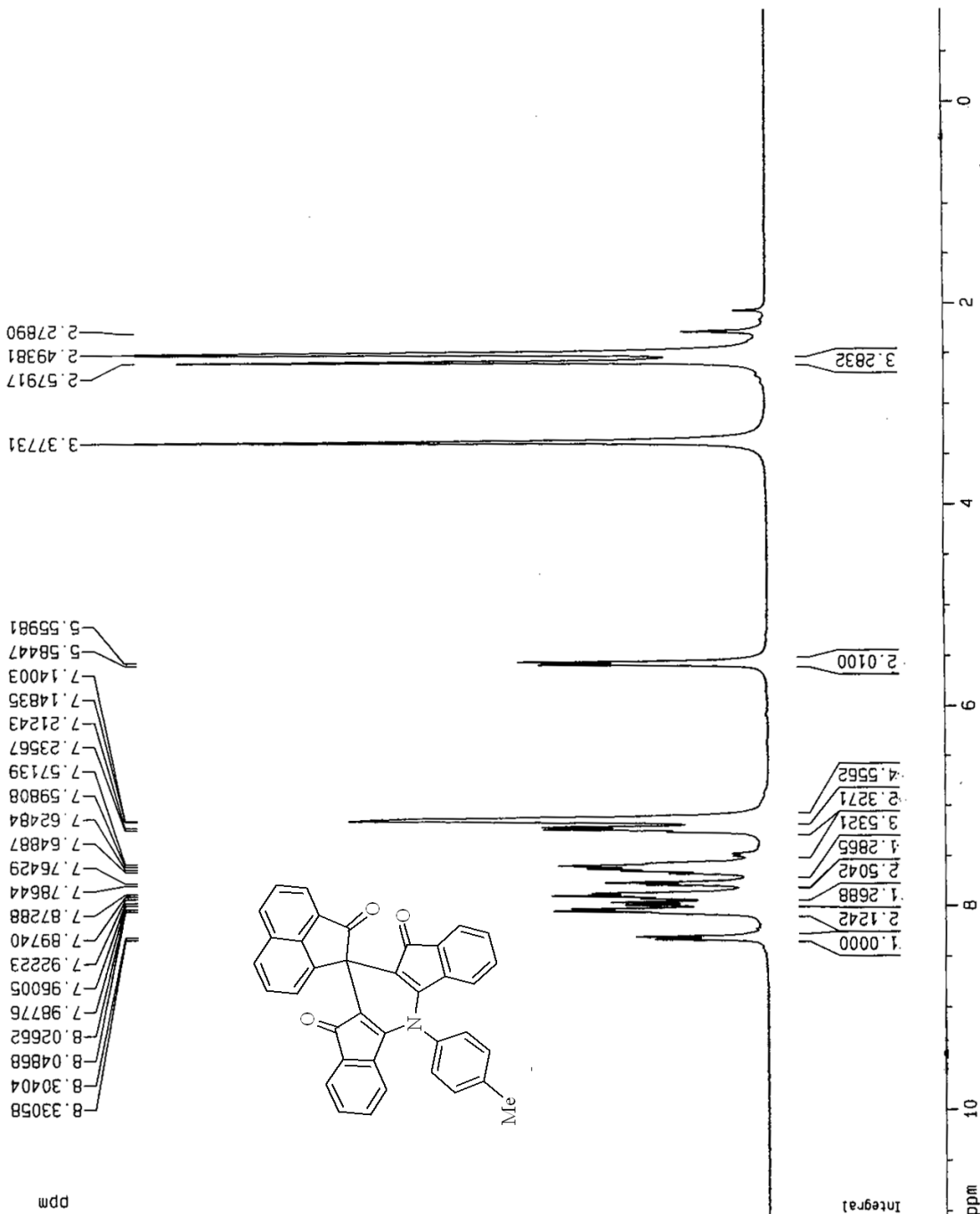
===== CHANNEL f1 =====
 NUC1 1H
 P1 15.50 usec
 PL1 -2.00 dB
 SF01 300.1323986 MHz

F2 - Processing parameters

SI 65536
 SF 300.1300000 MHz
 MDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.00

1D NMR plot parameters

CX 20.00 cm
 CY 13.79 cm
 F1P 11.050 ppm
 F1 3316.58 Hz
 F2P -0.923 ppm
 F2 -277.17 Hz
 PPMCM 0.59870 ppm/cm
 HZCM 179.68750 Hz/cm



Current Data Parameters
Name

EXPNO 79
PROCNO 1

F2 - Acquisition Parameters

Date_ 20090609
Time 20.34
INSTRUM spect
PROBHD 5 mm BBO BB-1H
PULPROG zgpg30
TD 65536
SOLVENT DMSO
NS 817
DS 2
SWH 17985.611 Hz
FIDRES 0.274439 Hz
AQ 1.8219508 sec
RG 2048
DM 27.800 usec
DE 6.00 usec
TE 300.0 K
D1 2.0000000 sec
d11 0.0300000 sec
d12 0.0002000 sec

CHANNEL f1

NUC1 13C
P1 9.00 usec
PL1 -2.00 dB
SFO1 75.4752953 MHz

CHANNEL f2

CPDPRG2 waltz16
NUC2 1H
PCPD2 85.00 usec
PL2 -4.00 dB
PL12 11.00 dB
PL13 11.00 dB
SFO2 300.132005 MHz

F2 - Processing parameters

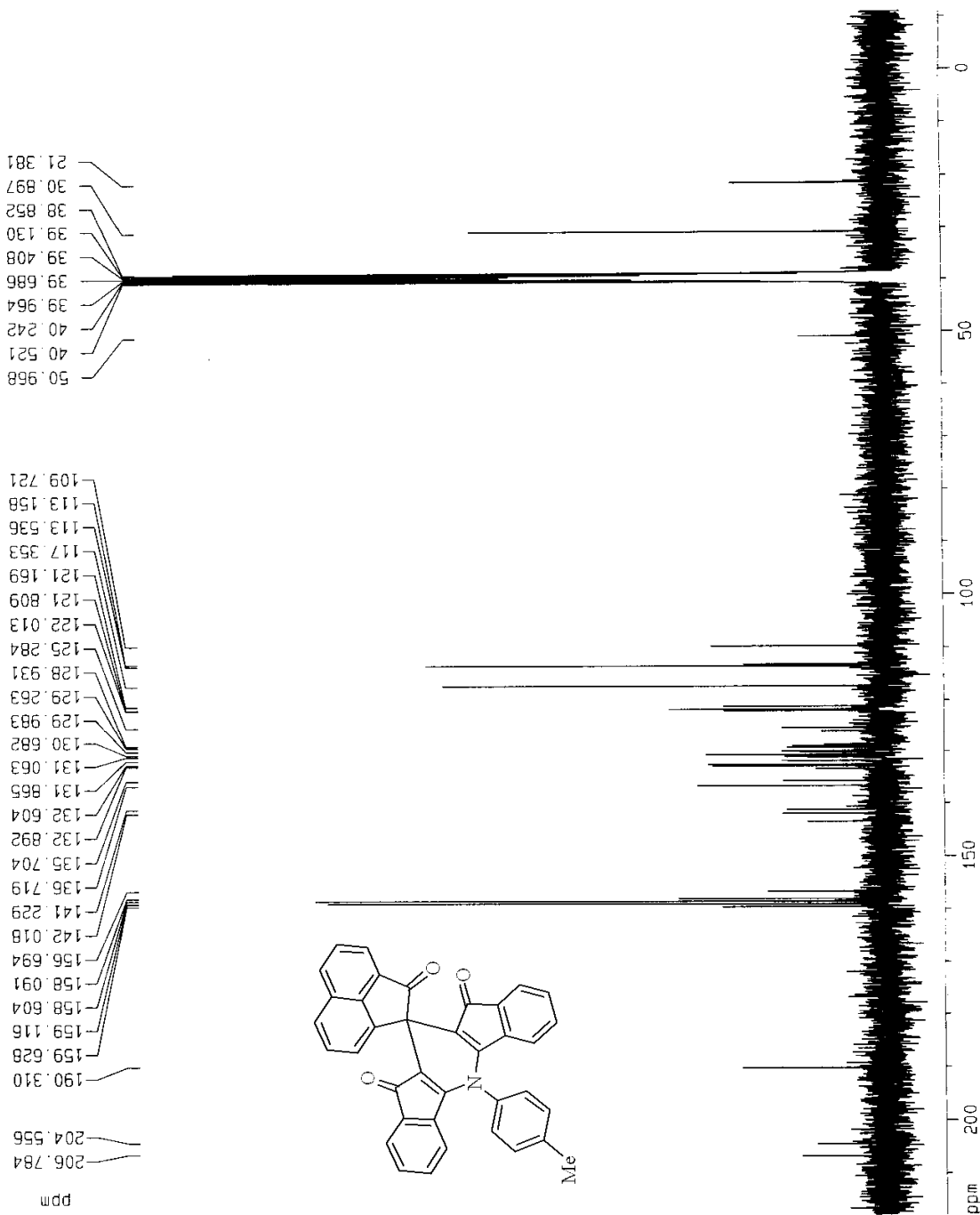
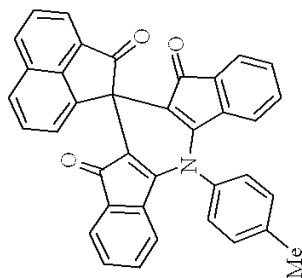
SI 65536
SF 75.4677490 MHz
WDW EN
SSB 0
LB 1.00 Hz
GB 0
PC 1.40

1D NMR plot parameters

CX 20.00 cm
CY 83.95 cm
F1P 247.939 ppm
F1 16447.34 Hz
F2 -10.960 ppm
F2 -827.10 Hz
PPMCM 11.44492 ppm/cm
HZCM 863.72229 Hz/cm

50.968
40.521
40.242
39.964
39.686
39.408
39.130
38.852
30.897
21.381

109.721
113.158
113.536
117.353
121.169
121.809
122.013
125.284
128.931
129.263
129.983
130.682
131.063
131.865
132.604
132.892
135.704
136.719
141.229
142.018
156.694
158.091
158.604
159.116
159.628
190.310
204.556
206.784



Current Data Parameters

NAME	Imani
EXPNO	86
PROCNO	1

F2 - Acquisition Parameters

Date_	20090704
Time	18.13
INSTRUM	spect
PROBHD	5 mm BBO BB-1H
PULPROG	zg30
TD	32768
SOLVENT	DMSO
NS	10
DS	1
SWH	7812.500 Hz
FIDRES	0.238419 Hz
AQ	2.0972021 sec
RG	228.1
DW	64.000 usec
DE	6.00 usec
TE	380.0 K
D1	2.00000000 sec

***** CHANNEL f1 *****

NUC1	1H
P1	15.50 usec
PL1	-2.00 dB
SFO1	300.1323986 MHz

F2 - Processing parameters

SF	300.1300000 MHz
WDW	EM
SSB	0
LB	0.30 Hz
GB	0
PC	1.00

1D NMR plot parameters

CX	20.00 cm
CY	61.29 cm
F1P	11.008 ppm
F1	3303.97 Hz
F2P	-1.125 ppm
F2	-337.79 Hz
PPHCH	0.60670 ppm/cm
HZCH	182.08621 Hz/cm

