

## Supporting Information

# Synthesis of Piperine Analogs Containing Isoxazoline/Pyrazoline Scaffold and Their Pesticidal Bioactivities

Ruige Yang<sup>†,‡</sup>, Min Lv<sup>†,‡</sup>, and Hui Xu<sup>\*,†</sup>

<sup>†</sup>Research Institute of Pesticidal Design & Synthesis, College of Chemistry and Pharmacy/ Plant Protection, Northwest A&F University, Yangling 712100, Shaanxi Province, China

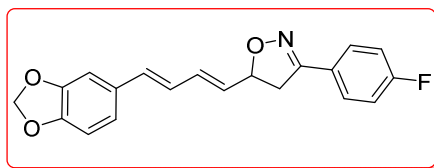
<sup>‡</sup> These authors contributed equally to this work.

\*H. Xu, Tel: 8629-8709-1952. Fax: 8629-8709-1952. E-mail: orgxuhui@nwsuaf.edu.cn.

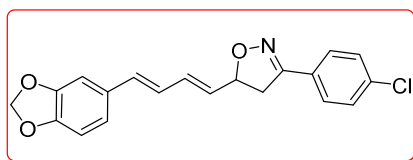
## Content

|                                                               |              |
|---------------------------------------------------------------|--------------|
| <b>1 Characterization.....</b>                                | <b>2-14</b>  |
| <b>2 Bioassay pictures.....</b>                               | <b>15-16</b> |
| <b>3 <sup>1</sup>HNMR and <sup>13</sup>C NMR Spectra.....</b> | <b>17-76</b> |

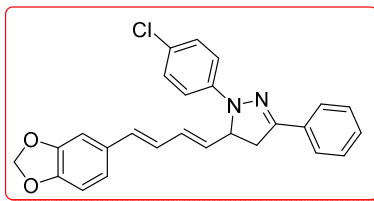
## 1 Characterization



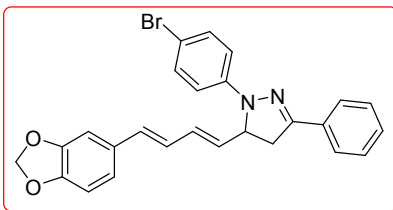
*Data for VIb:* Yield = 5%: Light yellow solid, m.p. 130–132 °C. IR  $\text{cm}^{-1}$  (KBr): 3010, 2900, 1605, 1504, 1490, 1443, 1383, 1252, 1040, 982, 841;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO-}d_6$ )  $\delta$ : 7.72–7.74 (m, 2H), 7.28–7.31 (m, 2H), 7.15 (s, 1H), 6.86–6.92 (m, 2H), 6.78–6.83 (m, 1H, H-3'), 6.61 (d,  $J = 15.5$  Hz, 1H, H-4'), 6.45–6.50 (m, 1H, H-2'), 6.01 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.91 (dd,  $J = 7.5$  Hz,  $J = 15.0$  Hz, 1H, H-1'), 5.20–5.25 (m, 1H, H-5), 3.62 (dd,  $J = 10.5$  Hz, 16.5 Hz, 1H, H-4), 3.25 (dd,  $J = 9.0$  Hz, 17.0 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO-}d_6$ )  $\delta$ : 164.4 ( $J = 246.2$  Hz), 156.4, 148.3, 147.6, 133.89, 133.86, 131.7, 131.1, 129.4 ( $J = 7.5$  Hz), 126.6, 126.5, 122.1, 116.4 ( $J = 21.2$  Hz), 108.8, 105.8, 101.6, 82.1, 40.3. HRMS (ESI): Calcd for  $\text{C}_{20}\text{H}_{17}\text{O}_3\text{NF}$  ( $[\text{M}+\text{H}]^+$ ), 338.1187; found, 338.1186.



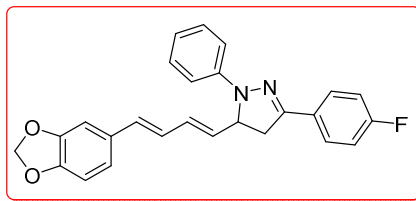
*Data for VIc:* Yield = 13%: White solid, m.p. 132–134 °C. IR  $\text{cm}^{-1}$  (KBr): 3010, 2920, 1504, 1492, 1448, 1254, 1096, 1045, 984, 822;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO-}d_6$ )  $\delta$ : 7.70 (d,  $J = 9.0$  Hz, 2H), 7.54 (d,  $J = 9.0$  Hz, 2H), 7.16 (s, 1H), 6.87–6.92 (m, 2H), 6.84 (dd,  $J = 10.5$  Hz, 15.5 Hz, 1H, H-3'), 6.62 (d,  $J = 15.5$  Hz, 1H, H-4'), 6.50 (dd,  $J = 10.5$  Hz, 15.0 Hz, 1H, H-2'), 6.02 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.91 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 5.22–5.27 (m, 1H, H-5), 3.62 (dd,  $J = 10.5$  Hz, 17.0 Hz, 1H, H-4), 3.25 (dd,  $J = 9.0$  Hz, 17.0 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO-}d_6$ )  $\delta$ : 156.5, 148.3, 147.6, 135.0, 133.9, 131.7, 131.0, 129.3, 128.5, 128.8, 126.6, 122.1, 108.8, 105.8, 101.6, 82.3, 40.3. HRMS (ESI): Calcd for  $\text{C}_{20}\text{H}_{17}\text{O}_3\text{NCl}$  ( $[\text{M}+\text{H}]^+$ ), 354.0891; found, 354.0891.



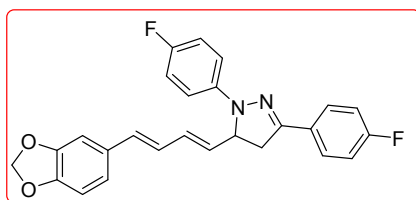
*Data for VIIc:* Yield = 55%: Yellow solid, m.p. 100–102 °C. IR  $\text{cm}^{-1}$  (KBr): 3016, 2880, 1594, 1501, 1488, 1253, 1040, 981, 815, 684;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.75 (d,  $J = 7.5$  Hz, 2H), 7.45 (t,  $J = 7.5$  Hz, 2H), 7.37-7.40 (m, 1H), 7.28 (d,  $J = 9.0$  Hz, 2H), 7.15 (d,  $J = 9.0$  Hz, 2H), 7.10 (s, 1H), 6.84-6.88 (m, 2H), 6.77 (dd,  $J = 10.5$  Hz, 15.5 Hz, 1H, H-3'), 6.53 (d,  $J = 15.5$  Hz, 1H, H-4'), 6.44 (dd,  $J = 10.5$  Hz, 15.0 Hz, 1H, H-2'), 6.00 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.81 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 5.02-5.07 (m, 1H, H-5), 3.68 (dd,  $J = 11.5$  Hz, 17.0 Hz, 1H, H-4), 3.17 (dd,  $J = 5.5$  Hz, 17.0 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 149.3, 148.3, 147.5, 143.9, 133.1, 132.66, 132.61, 132.0, 131.7, 129.1, 126.8, 126.3, 126.2, 122.7, 121.9, 115.2, 108.8, 105.7, 101.6, 101.5, 62.0, 40.4. HRMS (ESI): Calcd for  $\text{C}_{26}\text{H}_{22}\text{O}_2\text{N}_2\text{Cl}$  ( $[\text{M}+\text{H}]^+$ ), 429.1364; found, 429.1366.



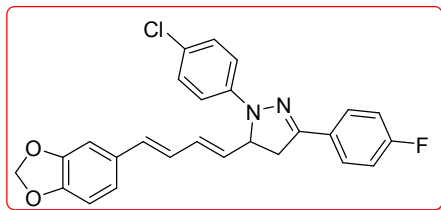
*Data for VIIId:* Yield = 77%: Yellow solid, m.p. 102–104 °C. IR  $\text{cm}^{-1}$  (KBr): 3029, 2887, 1588, 1501, 1488, 1250, 1038, 985, 816, 691;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.74-7.75 (m, 2H), 7.45 (t,  $J = 7.5$  Hz, 2H), 7.37-7.40 (m, 3H), 7.08-7.10 (m, 3H), 6.84-6.88 (m, 2H), 6.77 (dd,  $J = 10.5$  Hz, 16.0 Hz, 1H, H-3'), 6.53 (d,  $J = 16.0$  Hz, 1H, H-4'), 6.44 (dd,  $J = 10.5$  Hz, 15.5 Hz, 1H, H-2'), 5.99 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.81 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 5.02-5.07 (m, 1H, H-5), 3.68 (dd,  $J = 11.5$  Hz, 17.0 Hz, 1H, H-4), 3.17 (dd,  $J = 5.5$  Hz, 17.0 Hz, 1H, H-4). HRMS (ESI): Calcd for  $\text{C}_{26}\text{H}_{22}\text{O}_2\text{N}_2\text{Br}$  ( $[\text{M}+\text{H}]^+$ ), 473.0859; found, 473.0859.



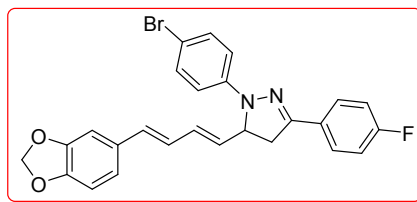
*Data for VIIe:* Yield = 30%: Yellow solid, m.p. 108–110 °C. IR  $\text{cm}^{-1}$  (KBr): 3015, 2890, 1596, 1497, 1446, 1251, 1038, 985, 833, 691;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.77–7.79 (m, 2H), 7.21–7.29 (m, 4H), 7.15 (d,  $J = 8.0$  Hz, 2H), 7.10 (s, 1H), 6.84–6.88 (m, 2H), 6.72–6.78 (m, 2H), 6.53 (d,  $J = 15.5$  Hz, 1H, H-4'), 6.46 (dd,  $J = 10.5$  Hz, 15.0 Hz, 1H, H-2'), 5.99 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.83 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 5.00–5.05 (m, 1H, H-5), 3.66 (dd,  $J = 11.5$  Hz, 17.5 Hz, 1H, H-4), 3.15 (dd,  $J = 6.0$  Hz, 17.0 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 163.7 ( $J = 245.0$  Hz), 148.2, 147.7, 147.4, 145.2, 132.9, 132.6, 132.4, 131.8, 129.5, 129.3, 128.2 ( $J = 8.7$  Hz), 126.9, 121.9, 119.2, 116.2 ( $J = 21.2$  Hz), 113.9, 108.8, 105.6, 101.5, 62.3, 40.3. HRMS (ESI): Calcd for  $\text{C}_{26}\text{H}_{22}\text{O}_2\text{N}_2\text{F}$  ( $[\text{M}+\text{H}]^+$ ), 413.1660; found, 413.1659.



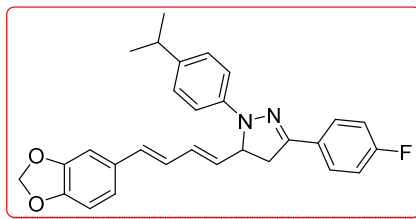
*Data for VIIIf:* Yield = 61%: Light yellow solid, m.p. 143–145 °C. IR  $\text{cm}^{-1}$  (KBr): 3009, 2920, 1504, 1446, 1255, 1043, 985, 821;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.76–7.79 (m, 2H), 7.29 (t,  $J = 8.5$  Hz, 2H), 7.13–7.15 (m, 2H), 7.06–7.10 (m, 3H), 6.84–6.88 (m, 2H), 6.78 (dd,  $J = 10.5$  Hz, 15.5 Hz, 1H, H-3'), 6.53 (d,  $J = 15.5$  Hz, 1H, H-4'), 6.47 (dd,  $J = 10.5$  Hz, 15.0 Hz, 1H, H-2'), 6.00 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.82 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 4.96–5.01 (m, 1H, H-5), 3.66 (dd,  $J = 11.5$  Hz, 17.0 Hz, 1H, H-4), 3.15 (dd,  $J = 6.5$  Hz, 17.0 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 163.8 ( $J = 246.2$  Hz), 157.4 ( $J = 232.5$  Hz), 148.3, 148.0, 147.4, 142.1, 133.0, 132.7, 132.4, 131.7, 129.4, 128.3 ( $J = 7.5$  Hz), 126.8, 121.9, 116.2 ( $J = 21.2$  Hz), 115.9 ( $J = 22.5$  Hz), 115.2 ( $J = 7.5$  Hz), 108.8, 105.7, 101.5, 63.0, 40.6. HRMS (ESI): Calcd for  $\text{C}_{26}\text{H}_{21}\text{O}_2\text{N}_2\text{F}_2$  ( $[\text{M}+\text{H}]^+$ ), 431.1566; found, 431.1564.



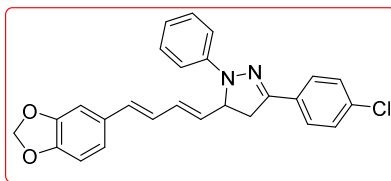
*Data for VIIg:* Yield = 65%: Light yellow solid, m.p. 152–154 °C. IR  $\text{cm}^{-1}$  (KBr): 3015 2962, 1601, 1514, 1492, 1447, 1255, 1124, 983, 829;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.77-7.80 (m, 2H), 7.25-7.29 (m, 4H), 7.14 (d,  $J = 8.5$  Hz, 2H), 7.10 (s, 1H), 6.84-6.88 (m, 2H), 6.77 (dd,  $J = 10.5$  Hz, 15.5 Hz, 1H, H-3'), 6.53 (d,  $J = 15.5$  Hz, 1H, H-4'), 6.45 (dd,  $J = 11.0$  Hz, 15.0 Hz, 1H, H-2'), 6.00 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.80 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 5.02-5.07 (m, 1H, H-5), 3.68 (dd,  $J = 11.5$  Hz, 17.0 Hz, 1H, H-4), 3.17 (dd,  $J = 5.5$  Hz, 17.5 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 163.9 ( $J = 245.0$  Hz), 148.5, 148.3, 147.5, 144.0, 133.1, 132.6, 132.1, 131.8, 129.3 ( $J = 2.5$  Hz), 129.1, 128.4, 126.8, 122.8, 122.0, 116.2 ( $J = 21.2$  Hz), 115.3, 108.8, 105.7, 101.6, 62.3, 40.3. HRMS (ESI): Calcd for  $\text{C}_{26}\text{H}_{21}\text{O}_2\text{N}_2\text{ClF}$  ( $[\text{M}+\text{H}]^+$ ), 447.1270; found, 447.1269.



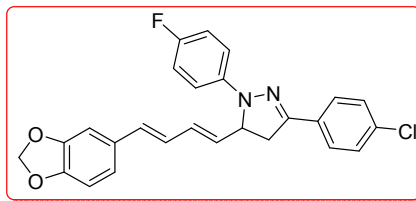
*Data for VIIh:* Yield = 50%: Light yellow solid, m.p. 125–127 °C. IR  $\text{cm}^{-1}$  (KBr): 3002, 2920, 1715, 1490, 1445, 1363, 1222, 1039, 987, 834;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.77-7.80 (m, 2H), 7.39 (d,  $J = 8.5$  Hz, 2H), 7.26-7.29 (m, 2H), 7.07-7.10 (m, 3H), 6.84-6.88 (m, 2H), 6.77 (dd,  $J = 10.5$  Hz, 15.5 Hz, 1H, H-3'), 6.53 (d,  $J = 15.5$  Hz, 1H, H-4'), 6.44 (dd,  $J = 10.5$  Hz, 15.0 Hz, 1H, H-2'), 6.00 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.80 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 5.02-5.07 (m, 1H, H-5), 3.68 (dd,  $J = 11.5$  Hz, 17.0 Hz, 1H, H-4), 3.17 (dd,  $J = 5.5$  Hz, 17.5 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 163.9 ( $J = 245.0$  Hz), 148.6, 148.2, 147.5, 144.2, 133.1, 132.8, 132.6, 131.9, 131.7, 129.2, 128.4 ( $J = 7.5$  Hz), 126.8, 121.9, 116.2 ( $J = 21.2$  Hz), 115.7, 110.3, 108.8, 105.7, 101.5, 62.0, 40.3. HRMS (ESI): Calcd for  $\text{C}_{26}\text{H}_{21}\text{O}_2\text{N}_2\text{BrF}$  ( $[\text{M}+\text{H}]^+$ ), 491.0765; found, 491.0765.



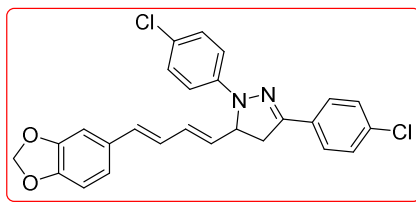
*Data for VIIi:* Yield = 34%; Yellow solid, m.p. 160–162 °C. IR  $\text{cm}^{-1}$  (KBr): 3018, 2957, 2922 1610, 1508, 1488, 1446, 1251, 1038, 985, 833;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.74-7.77 (m, 2H), 7.28 (t,  $J = 9.0$  Hz, 2H), 7.06-7.11 (m, 5H), 6.84-6.88 (m, 2H), 6.78 (dd,  $J = 10.5$  Hz, 15.5 Hz, 1H, H-3'), 6.54 (d,  $J = 16.0$  Hz, 1H, H-4'), 6.47 (dd,  $J = 10.5$  Hz, 15.0 Hz, 1H, H-2'), 6.00 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.84 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 4.94-4.99 (m, 1H, H-5), 3.64 (dd,  $J = 11.5$  Hz, 17.0 Hz, 1H, H-4), 3.12 (dd,  $J = 6.5$  Hz, 17.0 Hz, 1H, H-4), 2.76-2.81 (m, 1H,  $\text{CH}_3\text{CHCH}_3$ ), 1.16 (d,  $J = 7.0$  Hz, 6H,  $\text{CH}_3\text{CHCH}_3$ ). HRMS (ESI): Calcd for  $\text{C}_{29}\text{H}_{26}\text{O}_2\text{N}_2\text{F}$  ( $[\text{M}-\text{H}]^+$ ), 453.1973; found, 453.1973.



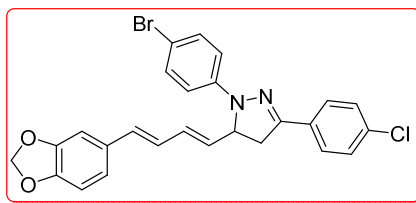
*Data for VIIj:* Yield = 42%; Light yellow solid, m.p. 135–137 °C. IR  $\text{cm}^{-1}$  (KBr): 3023, 2917, 1597, 1500, 1490, 1445, 1251, 1039, 985, 745, 691;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.75 (d,  $J = 8.5$  Hz, 2H), 7.50 (d,  $J = 9.0$  Hz, 2H), 7.22-7.25 (m, 2H), 7.16 (d,  $J = 8.0$  Hz, 2H), 7.10 (d,  $J = 0.5$  Hz, 1H), 6.84-6.88 (m, 2H), 6.72-6.79 (m, 2H), 6.53 (d,  $J = 16.0$  Hz, 1H, H-4'), 6.46 (dd,  $J = 10.5$  Hz, 15.5 Hz, 1H, H-2'), 5.99 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.83 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 5.03-5.08 (m, 1H, H-5), 3.66 (dd,  $J = 11.5$  Hz, 17.0 Hz, 1H, H-4), 3.14 (dd,  $J = 6.0$  Hz, 17.0 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 148.3, 147.5, 147.4, 144.9, 133.5, 133.0, 132.5, 131.85, 131.81, 129.4, 129.2, 127.8, 127.7, 126.9, 121.9, 119.4, 113.9, 108.8, 105.7, 101.5, 62.3, 40.4. HRMS (ESI): Calcd for  $\text{C}_{26}\text{H}_{22}\text{O}_2\text{N}_2\text{Cl}$  ( $[\text{M}+\text{H}]^+$ ), 429.1364; found, 429.1363.



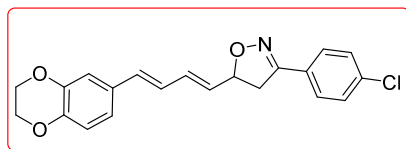
*Data for VIIIk:* Yield = 47%: Light yellow solid, m.p. 130–132 °C. IR  $\text{cm}^{-1}$  (KBr): 3015, 2919, 2850, 1505, 1499, 1446, 1255, 1040, 985, 822;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.74 (d,  $J$  = 8.5 Hz, 2H), 7.49 (d,  $J$  = 8.0 Hz, 2H), 7.07-7.16 (m, 5H), 6.84-6.88 (m, 2H), 6.77 (dd,  $J$  = 10.5 Hz, 15.5 Hz, 1H, H-3'), 6.53 (d,  $J$  = 15.5 Hz, 1H, H-4'), 6.47 (dd,  $J$  = 10.5 Hz, 15.0 Hz, 1H, H-2'), 6.00 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.82 (dd,  $J$  = 7.5 Hz, 15.0 Hz, 1H, H-1'), 4.99-5.04 (m, 1H, H-5), 3.65 (dd,  $J$  = 11.5 Hz, 17.0 Hz, 1H, H-4), 3.14 (dd,  $J$  = 6.5 Hz, 17.0 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 157.5 ( $J$  = 233.7 Hz), 148.3, 147.7, 147.5, 141.9, 133.6, 133.1, 132.8, 132.3, 131.79, 131.78, 129.2, 127.8, 126.8, 122.0, 116.0 ( $J$  = 22.5 Hz), 115.3 ( $J$  = 6.2 Hz), 108.8, 105.6, 101.6, 62.9, 40.3. HRMS (ESI): Calcd for  $\text{C}_{26}\text{H}_{21}\text{O}_2\text{N}_2\text{ClF}$  ( $[\text{M}+\text{H}]^+$ ), 447.1270; found, 447.1270.



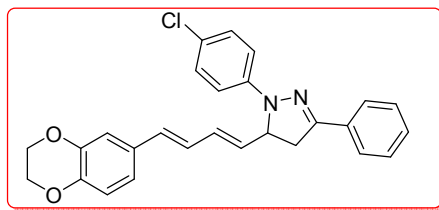
*Data for VIIIl:* Yield = 68%: Light yellow solid, m.p. 117–119 °C. IR  $\text{cm}^{-1}$  (KBr): 3019, 2892, 1598, 1489, 1447, 1254, 1040, 984, 821;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.76 (d,  $J$  = 8.0 Hz, 2H), 7.50 (d,  $J$  = 8.5 Hz, 2H), 7.28 (d,  $J$  = 8.5 Hz, 2H), 7.15 (d,  $J$  = 8.5 Hz, 2H), 7.10 (s, 1H), 6.84-6.88 (m, 2H), 6.77 (dd,  $J$  = 10.5 Hz, 15.5 Hz, 1H, H-3'), 6.53 (d,  $J$  = 15.5 Hz, 1H, H-4'), 6.45 (dd,  $J$  = 11.0 Hz, 14.5 Hz, 1H, H-2'), 6.00 (s, 2H,  $\text{OCH}_2\text{O}$ ), 5.80 (dd,  $J$  = 7.5 Hz, 15.0 Hz, 1H, H-1'), 5.05-5.10 (m, 1H, H-5), 3.67 (dd,  $J$  = 11.5 Hz, 17.0 Hz, 1H, H-4), 3.16 (dd,  $J$  = 5.0 Hz, 17.5 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 148.3, 148.2, 147.5, 143.7, 133.7, 133.1, 132.7, 131.9, 131.7, 131.5, 129.18, 129.16, 127.8, 126.7, 122.9, 121.9, 115.3, 108.8, 105.7, 101.5, 62.6, 40.3. HRMS (ESI): Calcd for  $\text{C}_{26}\text{H}_{21}\text{O}_2\text{N}_2\text{Cl}_2$  ( $[\text{M}+\text{H}]^+$ ), 463.0975; found, 463.0975.



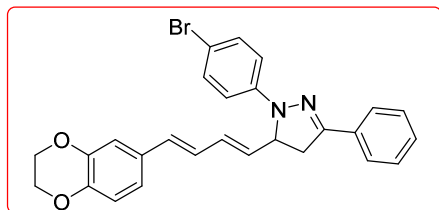
*Data for VIIIm:* Yield = 76%: Yellow solid, m.p. 114–116 °C. IR  $\text{cm}^{-1}$  (KBr): 3024, 2897, 1587, 1500, 1488, 1446, 1251, 1040, 987, 817;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.76 (d,  $J = 8.5$  Hz, 2H), 7.50 (d,  $J = 8.5$  Hz, 2H), 7.39 (d,  $J = 9.0$  Hz, 2H), 7.08–7.10 (m, 3H), 6.84–6.88 (m, 2H), 6.76 (dd,  $J = 10.5$  Hz, 15.5 Hz, 1H, H-3'), 6.53 (d,  $J = 15.5$  Hz, 1H, H-4'), 6.44 (dd,  $J = 10.5$  Hz, 15.5 Hz, 1H, H-2'), 6.00 (s, 2H, OCH<sub>2</sub>O), 5.80 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 5.05–5.10 (m, 1H, H-5), 3.67 (dd,  $J = 11.5$  Hz, 17.0 Hz, 1H, H-4), 3.17 (dd,  $J = 5.5$  Hz, 17.5 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 148.4, 148.3, 147.5, 144.0, 133.8, 133.2, 132.7, 132.0, 131.8, 131.7, 131.6, 129.2, 127.9, 126.8, 122.0, 115.8, 110.6, 108.9, 105.7, 101.6, 62.1, 40.4. HRMS (ESI): Calcd for  $\text{C}_{26}\text{H}_{21}\text{O}_2\text{N}_2\text{BrCl}$  ( $[\text{M}+\text{H}]^+$ ), 507.0469; found, 507.0469.



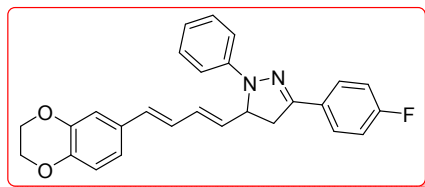
*Data for VIIIc:* Yield = 36%: Light yellow solid, m.p. 207–209 °C. IR  $\text{cm}^{-1}$  (KBr): 3008, 2976, 2910, 2870, 1583, 1500, 1299, 1126, 1070, 984, 861, 668;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.70 (d,  $J = 8.5$  Hz, 2H), 7.54 (d,  $J = 8.5$  Hz, 2H), 6.99 (d,  $J = 2.0$  Hz, 1H), 6.96 (dd,  $J = 2.0$  Hz, 8.5 Hz, 1H), 6.75–6.82 (m, 2H), 6.57 (d,  $J = 10.5$  Hz, 1H, H-4'), 6.50 (dd,  $J = 10.5$  Hz, 15.0 Hz, 1H, H-2'), 5.91 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 5.26 (dd,  $J = 8.5$  Hz, 18.5 Hz, 1H, H-5), 4.23 (s, 4H, OCH<sub>2</sub>CH<sub>2</sub>O), 3.62 (dd,  $J = 10.5$  Hz, 17.0 Hz, 1H, H-4), 3.25 (dd,  $J = 8.5$  Hz, 16.5 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 155.9, 143.39, 143.34, 134.4, 133.3, 133.1, 130.3, 130.1, 128.7, 128.28, 128.21, 126.0, 119.7, 117.1, 114.5, 81.7, 64.0, 63.9, 39.7. HRMS (ESI): Calcd for  $\text{C}_{21}\text{H}_{19}\text{ClNO}_3$  ( $[\text{M}+\text{H}]^+$ ), 368.1048; found, 368.1046.



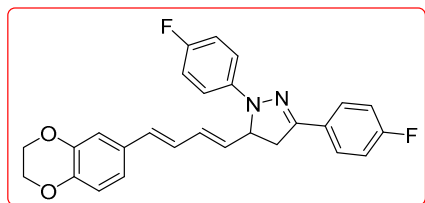
*Data for IXc:* Yield = 42%: Yellow solid, m.p. 94–96 °C. IR  $\text{cm}^{-1}$  (KBr): 3020, 2922, 2872, 1594, 1504, 1489, 1391, 1288, 1068, 987, 819, 758, 691;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.75 (d,  $J = 7.0$  Hz, 2H), 7.45 (t,  $J = 7.0$  Hz, 2H), 7.37-7.39 (m, 1H), 7.27 (d,  $J = 8.5$  Hz, 2H), 7.15 (d,  $J = 8.0$  Hz, 2H), 6.94 (s, 1H), 6.92 (d,  $J = 8.5$  Hz, 1H), 6.79 (d,  $J = 8.0$  Hz, 1H), 6.74 (dd,  $J = 10.5$  Hz, 15.5 Hz, 1H), 6.39-6.48 (m, 2H), 5.82 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 5.02-5.07 (m, 1H, H-5), 4.21 (s, 4H,  $\text{OCH}_2\text{CH}_2\text{O}$ ), 3.68 (dd,  $J = 11.5$  Hz, 17.0 Hz, 1H, H-4), 3.17 (dd,  $J = 5.0$  Hz, 17.0 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 149.3, 143.9, 143.7, 132.8, 132.6, 132.0, 130.8, 129.3, 129.1, 126.8, 126.2, 122.7, 120.1, 117.6, 115.2, 115.0, 64.6, 64.4, 62.0, 40.3. HRMS (ESI): Calcd for  $\text{C}_{27}\text{H}_{24}\text{O}_2\text{N}_2\text{Cl}$  ( $[\text{M}+\text{H}]^+$ ), 443.1521; found, 443.1520.



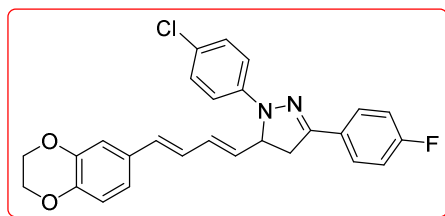
*Data for IXd:* Yield = 34%: Yellow solid, m.p. 106–108 °C. IR  $\text{cm}^{-1}$  (KBr): 3004, 2922, 2871, 1587, 1505, 1487, 1391, 1288, 1068, 987, 816, 758, 691;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.75 (d,  $J = 7.0$  Hz, 2H), 7.37-7.43 (m, 5H), 7.10 (d,  $J = 8.5$  Hz, 2H), 6.94 (s, 1H), 6.91 (d,  $J = 8.0$  Hz, 1H), 6.79 (d,  $J = 8.0$  Hz, 1H), 6.74 (dd,  $J = 11.0$  Hz, 15.0 Hz, 1H), 6.38-6.48 (m, 2H), 5.81 (dd,  $J = 7.5$  Hz, 15.0 Hz, 1H, H-1'), 5.02-5.07 (m, 1H, H-5), 4.21 (s, 4H,  $\text{OCH}_2\text{CH}_2\text{O}$ ), 3.68 (dd,  $J = 12.0$  Hz, 17.0 Hz, 1H, H-4), 3.17 (dd,  $J = 4.5$  Hz, 17.0 Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 149.4, 144.2, 143.9, 143.7, 132.8, 132.6, 132.5, 131.9, 130.8, 129.4, 129.1, 126.8, 126.2, 120.1, 117.6, 115.7, 115.0, 110.3, 64.6, 64.4, 61.9, 40.3. HRMS (ESI): Calcd for  $\text{C}_{27}\text{H}_{24}\text{O}_2\text{N}_2\text{Br}$  ( $[\text{M}+\text{H}]^+$ ), 487.1016; found, 487.1015.



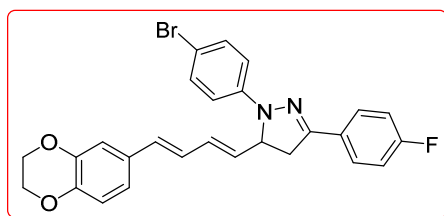
*Data for IXe:* Yield = 38%; Yellow solid, m.p. 88–90 °C. IR  $\text{cm}^{-1}$  (KBr): 3008, 2923, 2878, 1596, 1497, 1288, 1067, 987, 748;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.78 (brs, 2H), 7.22–7.27 (m, 4H), 7.14–7.15 (m, 2H), 6.90–6.94 (m, 2H), 6.69–6.77 (m, 3H), 6.41–6.48 (m, 2H), 5.80–5.82 (m, 1H, H-1'), 5.02 (brs, 1H, H-5), 4.21 (s, 4H,  $\text{OCH}_2\text{CH}_2\text{O}$ ), 3.60–3.66 (m, 1H, H-4), 3.14 (d,  $J = 16.0$  Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 163.8 ( $J = 245.0$  Hz), 147.7, 145.2, 143.9, 143.7, 132.6, 132.5, 132.4, 130.8, 129.5, 129.3, 128.2 ( $J = 7.5$  Hz), 126.9, 120.1, 119.2, 117.6, 116.2 ( $J = 21.2$  Hz), 115.0, 113.9, 64.6, 64.5, 62.3, 40.3. HRMS (ESI): Calcd for  $\text{C}_{27}\text{H}_{24}\text{FN}_2\text{O}_2$  ( $[\text{M}+\text{H}]^+$ ), 427.1816; found, 427.1811.



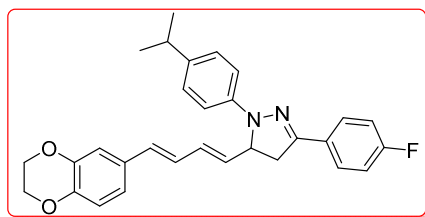
*Data for IXf:* Yield = 75%; Yellow solid, m.p. 93–95 °C. IR  $\text{cm}^{-1}$  (KBr): 3002, 2918, 2873, 1504, 1288, 1220, 1068, 988, 833, 668;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.78 (brs, 2H), 7.27 (brs, 2H), 7.08–7.13 (m, 4H), 6.92–6.95 (m, 2H), 6.70–6.79 (m, 2H), 6.41–6.49 (m, 2H), 5.81 (brs, 1H, H-1'), 4.98 (brs, 1H, H-5), 4.22 (s, 4H,  $\text{OCH}_2\text{CH}_2\text{O}$ ), 3.61–3.66 (m, 1H, H-4), 3.14 (d,  $J = 15.0$  Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 163.8 ( $J = 245.0$  Hz), 157.5 ( $J = 233.7$  Hz), 147.9, 143.9, 143.7, 142.2, 132.78, 132.70, 132.3, 130.8, 129.4, 128.3 ( $J = 21.2$  Hz), 126.8, 120.1, 117.6, 116.1 ( $J = 21.2$  Hz), 115.9 ( $J = 21.2$  Hz), 115.2 ( $J = 21.2$  Hz), 115.0, 64.6, 64.5, 63.0, 40.3. HRMS (ESI): Calcd for  $\text{C}_{27}\text{H}_{23}\text{F}_2\text{N}_2\text{O}_2$  ( $[\text{M}+\text{H}]^+$ ), 445.1722; found, 445.1731.



*Data for IXg*: Yield = 41%: Yellow solid, m.p. 90–92 °C. IR  $\text{cm}^{-1}$  (KBr): 3001, 2924, 2878, 1597, 1491, 1288, 1068, 987, 833, 668;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO-}d_6$ )  $\delta$ : 7.79 (brs, 2H), 7.26–7.27 (m, 4H), 7.14 (d,  $J = 7.0$  Hz, 2H), 6.90–6.94 (m, 2H), 6.69–6.79 (m, 2H), 6.39–6.48 (m, 2H), 5.77–5.81 (m, 1H, H-1'), 5.04 (brs, 1H, H-5), 4.21 (s, 4H,  $\text{OCH}_2\text{CH}_2\text{O}$ ), 3.62–3.67 (m, 1H, H-4), 3.17 (d,  $J = 18.0$  Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO-}d_6$ )  $\delta$ : 163.9 ( $J = 245.0$  Hz), 148.5, 143.96, 143.91, 143.7, 132.8, 132.6, 131.9, 130.8, 129.2, 129.1, 128.4 ( $J = 8.7$  Hz), 126.8, 122.7, 120.1, 117.6, 116.2 ( $J = 22.5$  Hz), 115.2, 115.0, 64.6, 64.4, 62.1, 40.3. HRMS (ESI): Calcd for  $\text{C}_{27}\text{H}_{23}\text{ClFN}_2\text{O}_2$  ( $[\text{M}+\text{H}]^+$ ), 461.1426; found, 461.1417.

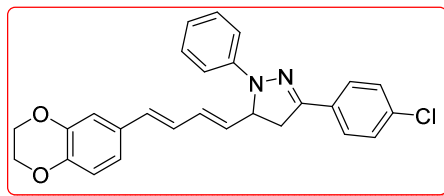


*Data for IXh*: Yield = 59%: Pale white solid, m.p. 99–101 °C. IR  $\text{cm}^{-1}$  (KBr): 3005, 2923, 2882, 1590, 1508, 1489, 1382, 1289, 1219, 1069, 986, 835;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO-}d_6$ )  $\delta$ : 7.79 (brs, 2H), 7.38 (d,  $J = 7.5$  Hz, 2H), 7.26–7.29 (m, 2H), 7.09 (d,  $J = 7.5$  Hz, 2H), 6.90–6.94 (m, 2H), 6.68–6.79 (m, 2H), 6.38–6.48 (m, 2H), 5.76–5.80 (m, 1H, H-1'), 5.04 (brs, 1H, H-5), 4.21 (s, 4H,  $\text{OCH}_2\text{CH}_2\text{O}$ ), 3.62–3.67 (m, 1H, H-4), 3.16 (d,  $J = 13.5$  Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO-}d_6$ )  $\delta$ : 163.9 ( $J = 241.2$  Hz), 148.6, 144.2, 143.9, 143.7, 132.8, 132.6, 131.9, 130.8, 129.3, 129.2, 128.4 ( $J = 5.0$  Hz), 126.8, 120.1, 117.6, 116.2 ( $J = 21.2$  Hz), 115.7, 115.0, 110.3, 64.6, 64.4, 62.0, 40.3. HRMS (ESI): Calcd for  $\text{C}_{27}\text{H}_{23}\text{BrFN}_2\text{O}_2$  ( $[\text{M}+\text{H}]^+$ ), 505.0921; found, 505.0903.

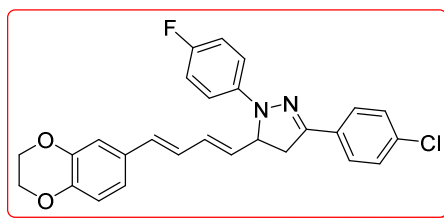


*Data for IXi*: Yield = 27%: Yellow solid, m.p. 84–86 °C. IR  $\text{cm}^{-1}$  (KBr): 3002, 2955, 2923, 2869, 1609, 1507, 1288, 1067, 987, 833, 668;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO-}d_6$ )  $\delta$ : 7.76 (brs, 2H), 7.26 (brs, 2H), 7.08 (brs, 4H), 6.91–6.94 (m, 2H), 6.69–6.78 (m, 2H), 6.46–6.49 (m, 2H), 5.83 (brs, 1H, H-1'), 4.96 (brs, 1H, H-5), 4.21 (s, 4H,  $\text{OCH}_2\text{CH}_2\text{O}$ ),

3.58-3.63 (m, 1H, H-4), 3.10 (d,  $J = 12.0$  Hz, 1H, H-4), 2.77 (brs, 1H,  $\text{CH}_3\text{CHCH}_3$ ), 1.15 (s, 6H,  $\text{CH}_3\text{CHCH}_3$ ).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 163.7 ( $J = 245.0$  Hz), 147.1, 143.9, 143.7, 143.4, 139.3, 132.8, 132.6, 132.4, 130.8, 129.6, 128.1 ( $J = 8.7$  Hz), 127.0, 126.9, 120.1, 117.6, 116.2 ( $J = 21.2$  Hz), 115.0, 114.0, 64.6, 64.5, 62.7, 40.3, 33.0, 24.6, 24.5. HRMS (ESI): Calcd for  $\text{C}_{30}\text{H}_{30}\text{FN}_2\text{O}_2$  ( $[\text{M}+\text{H}]^+$ ), 469.2285; found, 469.2280.

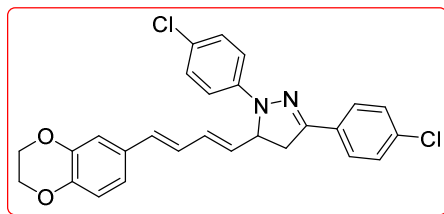


*Data for IXj*: Yield = 85%: Yellow solid, m.p. 145–147 °C. IR  $\text{cm}^{-1}$  (KBr): 3014, 2972, 2932, 2885, 1599, 1502, 1288, 1070, 986, 777, 668;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.74 (brs, 2H), 7.49 (brs, 2H), 7.15-7.22 (m, 4H), 6.91-6.94 (m, 2H), 6.68-6.78 (m, 3H), 6.45-6.48 (m, 2H), 5.81 (brs, 1H, H-1'), 5.05 (brs, 1H, H-5), 4.21 (s, 4H,  $\text{OCH}_2\text{CH}_2\text{O}$ ), 3.62 (brs, 1H, H-4), 3.12 (d,  $J = 10.5$  Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 147.3, 144.8, 143.8, 143.6, 133.4, 132.6, 132.3, 131.7, 130.7, 129.3, 129.1, 127.7, 126.8, 122.9, 120.1, 119.3, 117.6, 114.9, 113.8, 64.5, 64.4, 62.2, 40.2. HRMS (ESI): Calcd for  $\text{C}_{27}\text{H}_{24}\text{ClN}_2\text{O}_2$  ( $[\text{M}+\text{H}]^+$ ), 443.1520; found, 443.1520.

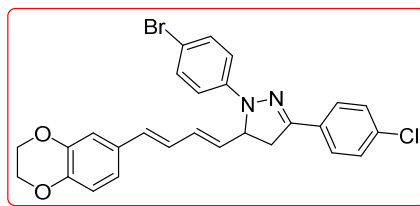


*Data for IXk*: Yield = 80%: Yellow solid, m.p. 91–93 °C. IR  $\text{cm}^{-1}$  (KBr): 3017, 2980, 2923, 1579, 1507, 1288, 1216, 1067, 987, 824;  $^1\text{H}$  NMR (500 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 7.74 (brs, 2H), 7.49 (brs, 2H), 7.09-7.14 (m, 4H), 6.91-6.95 (m, 2H), 6.69-6.79 (m, 2H), 6.46-6.48 (m, 2H), 5.80 (brs, 1H, H-1'), 5.01 (brs, 1H, H-5), 4.22 (s, 4H,  $\text{OCH}_2\text{CH}_2\text{O}$ ), 3.62 (brs, 1H, H-4), 3.13 (d,  $J = 12.5$  Hz, 1H, H-4).  $^{13}\text{C}$  NMR (125 MHz,  $\text{DMSO}-d_6$ )  $\delta$ : 157.5 ( $J = 232.5$  Hz), 147.7, 143.9, 143.7, 141.9, 133.5, 132.8, 132.7, 132.2, 131.7, 130.8, 129.1, 127.7, 126.8, 120.1, 117.6, 115.9 ( $J = 22.5$  Hz),

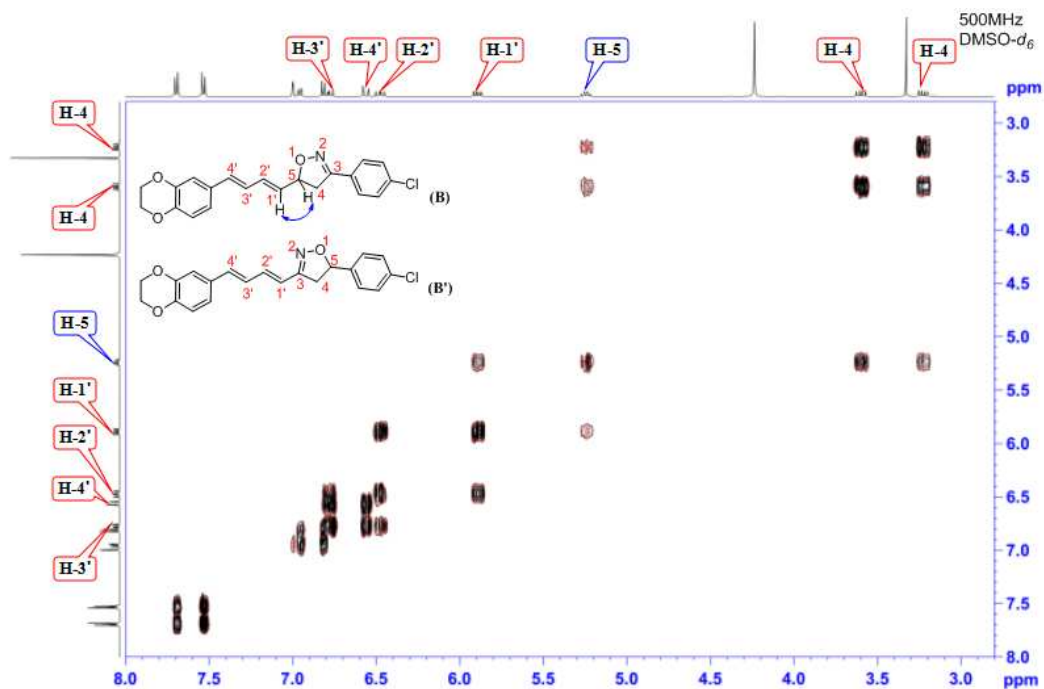
115.3 ( $J = 7.5$  Hz), 115.0, 64.6, 64.5, 63.0, 40.3. HRMS (ESI): Calcd for  $C_{27}H_{23}ClFN_2O_2$  ( $[M+H]^+$ ), 461.1426; found, 461.1428.



*Data for IXl:* Yield = 69%: Yellow solid, m.p. 145–147 °C. IR  $cm^{-1}$  (KBr): 3008, 2927, 2875, 1597, 1507. 1488, 1384, 1290, 1124, 1068, 985, 820;  $^1H$  NMR (500 MHz, DMSO- $d_6$ )  $\delta$ : 7.78 (d,  $J = 5.5$  Hz, 2H), 7.52 (d,  $J = 6.0$  Hz, 2H), 7.30 (d,  $J = 6.5$  Hz, 2H), 7.17 (d,  $J = 6.5$  Hz, 2H), 6.92–6.97 (m, 2H), 6.71–6.81 (m, 2H), 6.41–6.51 (m, 2H), 5.79–5.83 (m, 1H, H-1'), 5.09 (brs, 1H, H-5), 4.24 (s, 4H,  $OCH_2CH_2O$ ), 3.64–3.68 (m, 1H, H-4), 3.18 (d,  $J = 15.0$  Hz, 1H, H-4).  $^{13}C$  NMR (125 MHz, DMSO- $d_6$ )  $\delta$ : 148.3, 143.9, 143.79, 143.75, 133.7, 132.9, 132.7, 131.86, 131.85, 131.5, 130.8, 129.1, 127.9, 126.7, 122.9, 120.2, 117.7, 115.3, 115.0, 64.6, 64.4, 62.2, 40.3. HRMS (ESI): Calcd for  $C_{27}H_{23}Cl_2N_2O_2$  ( $[M+H]^+$ ), 477.1131; found, 477.1095.



*Data for IXm:* Yield = 65%: Light yellow solid, m.p. 125–127 °C. IR  $cm^{-1}$  (KBr): 3010, 2922, 2882, 1582, 1507, 1487, 1290, 1124, 1069, 986, 818;  $^1H$  NMR (500 MHz, DMSO- $d_6$ )  $\delta$ : 7.75 (d,  $J = 5.5$  Hz, 2H), 7.50 (d,  $J = 5.0$  Hz, 2H), 7.39 (d,  $J = 6.0$  Hz, 2H), 7.10 (d,  $J = 6.5$  Hz, 2H), 6.90–6.94 (m, 2H), 6.68–6.79 (m, 2H), 6.38–6.48 (m, 2H), 5.80 (dd,  $J = 6.5$  Hz, 13.0 Hz, 1H, H-1'), 5.07 (brs, 1H, H-5), 4.21 (s, 4H,  $OCH_2CH_2O$ ), 3.61–3.67 (m, 1H, H-4), 3.15 (d,  $J = 14.0$  Hz, 1H, H-4).  $^{13}C$  NMR (125 MHz, DMSO- $d_6$ )  $\delta$ : 148.3, 144.0, 143.9, 143.7, 133.7, 132.9, 132.6, 132.0, 131.7, 131.5, 130.8, 129.2, 127.9, 126.7, 120.2, 117.6, 115.8, 115.0, 110.5, 64.6, 64.4, 62.0, 40.3. HRMS (ESI): Calcd for  $C_{27}H_{23}BrClN_2O_2$  ( $[M+H]^+$ ), 521.0625; found, 521.0600.



**Figure S1.**  $^1\text{H}$ - $^1\text{H}$  COSY spectrum of compound **VIIIc** (structure **B** is the right isomer).

## 2 Bioassay pictures



**Figure S2.** The representative abnormal larvae pictures of compounds **VIIb** (YRG-129), **VIa** (YRG-130), **VIII** (YRG-133), and **VIIg** (YRG-139) against *M. separata* during the larval period (CK: blank control group).



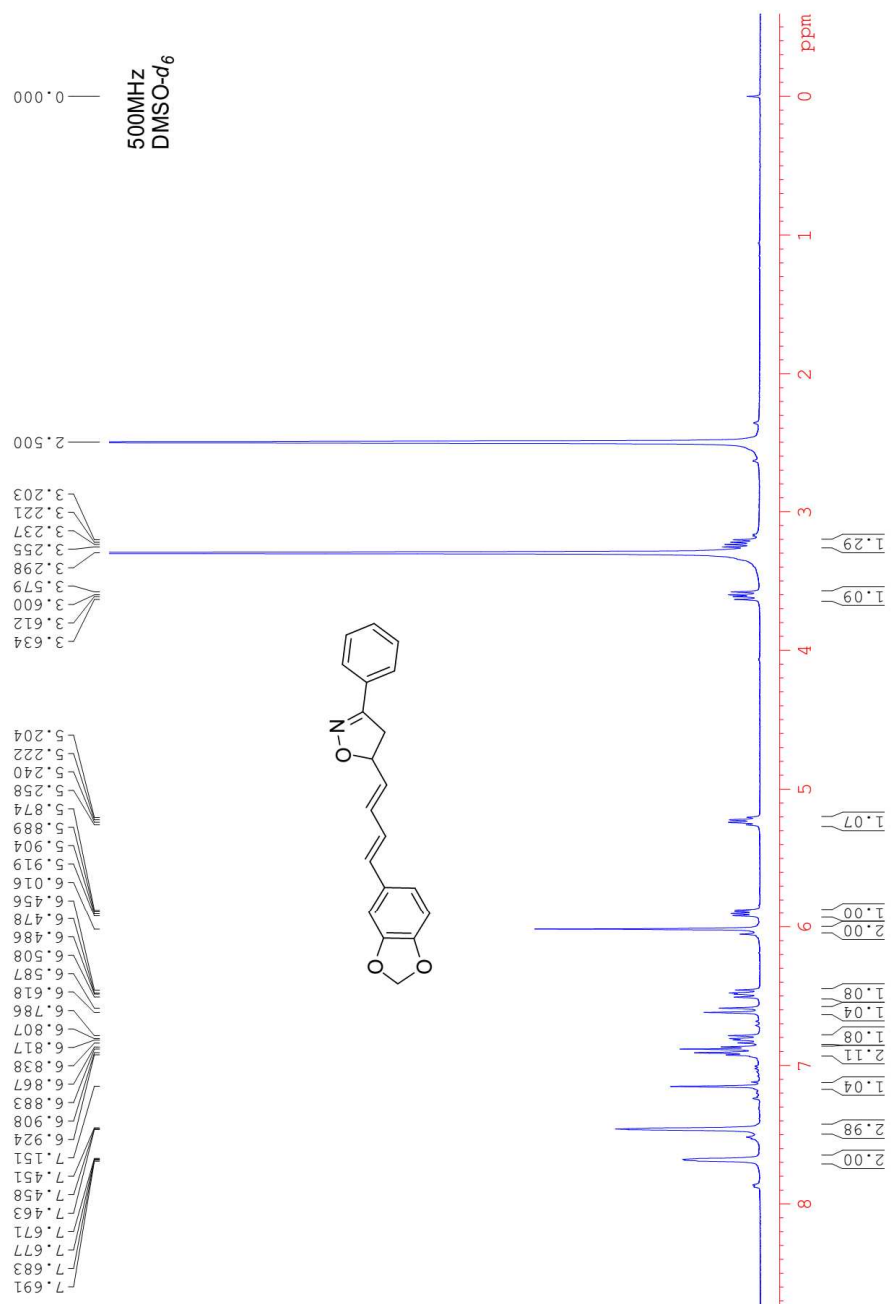
**Figure S3.** The representative malformed pupae pictures of compounds **VIIb** (YRG-129), **VIa** (YRG-130), **VIc** (YRG-135), **VIIIh** (YRG-140), **VIIIa** (YRG-143), **VIIIb** (YRG-144), and **VIIIc** (YRG-146) against *M. separata* during the pupation period (CK: blank control group).



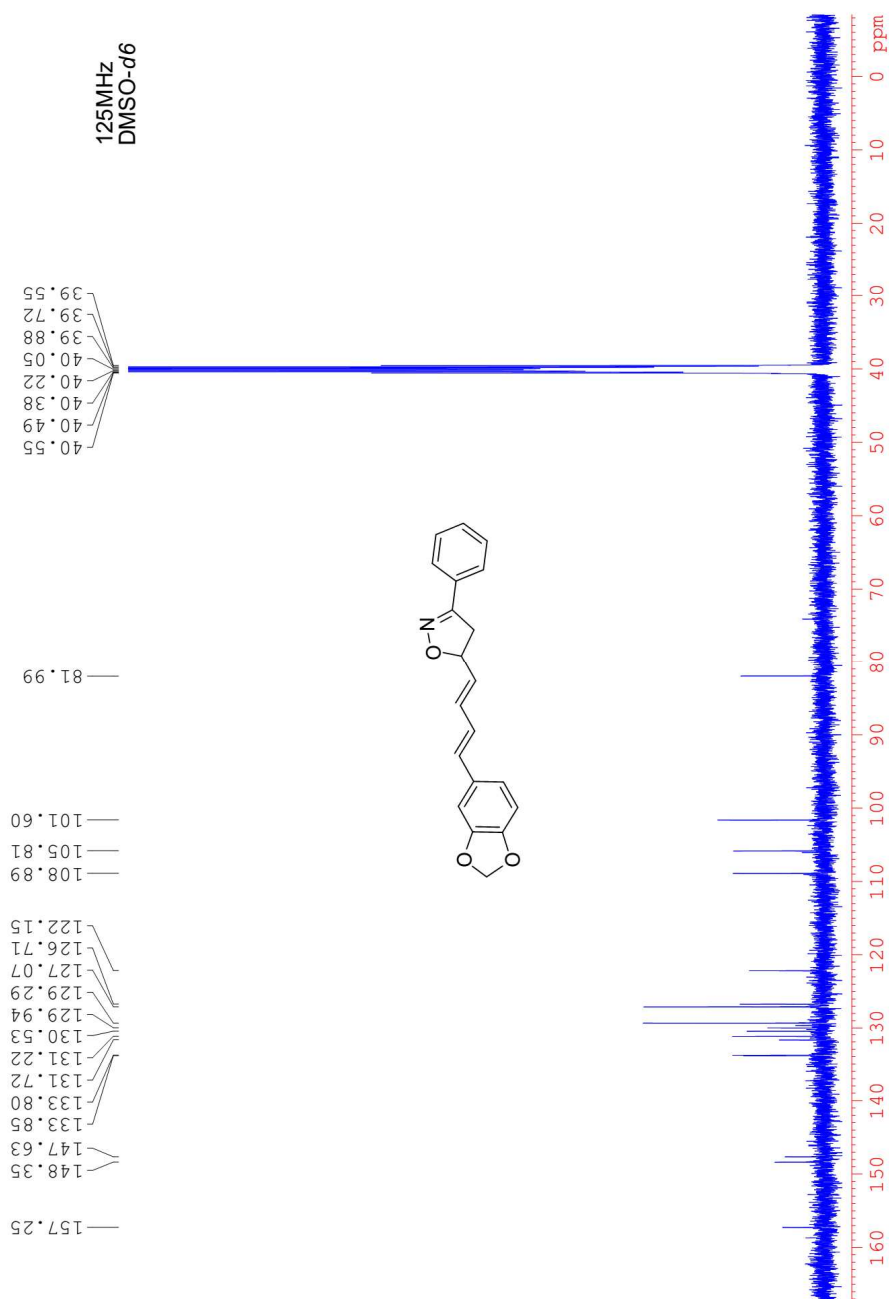
**Figure S4.** The representative malformed moth pictures of compounds **VIIb** (YRG-129), **VIc** (YRG-135), and **VIIh** (YRG-140) against *M. separata* during the adult period (CK: blank control group).

### 3 $^1\text{H}$ NMR and $^{13}\text{C}$ NMR Spectra

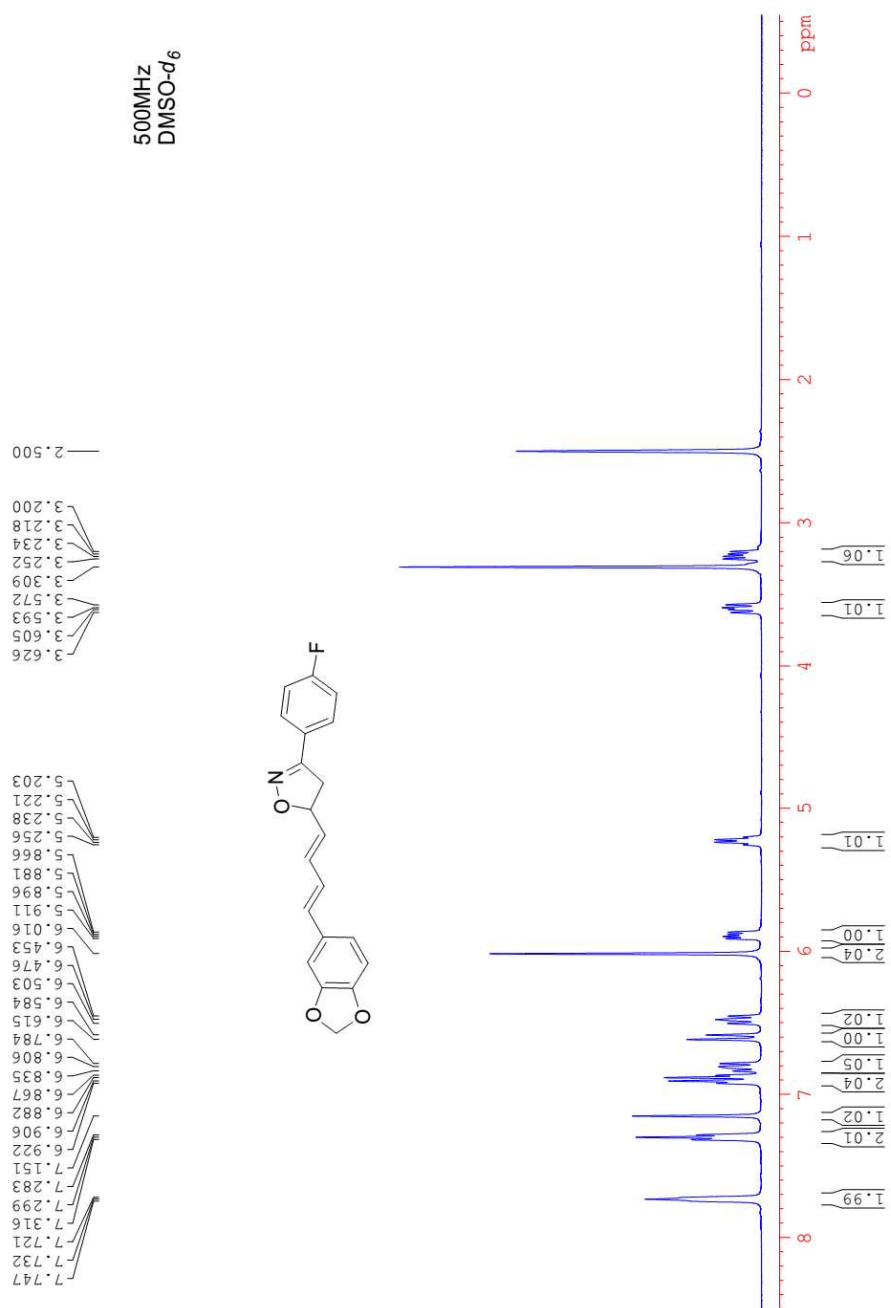
compound VIa



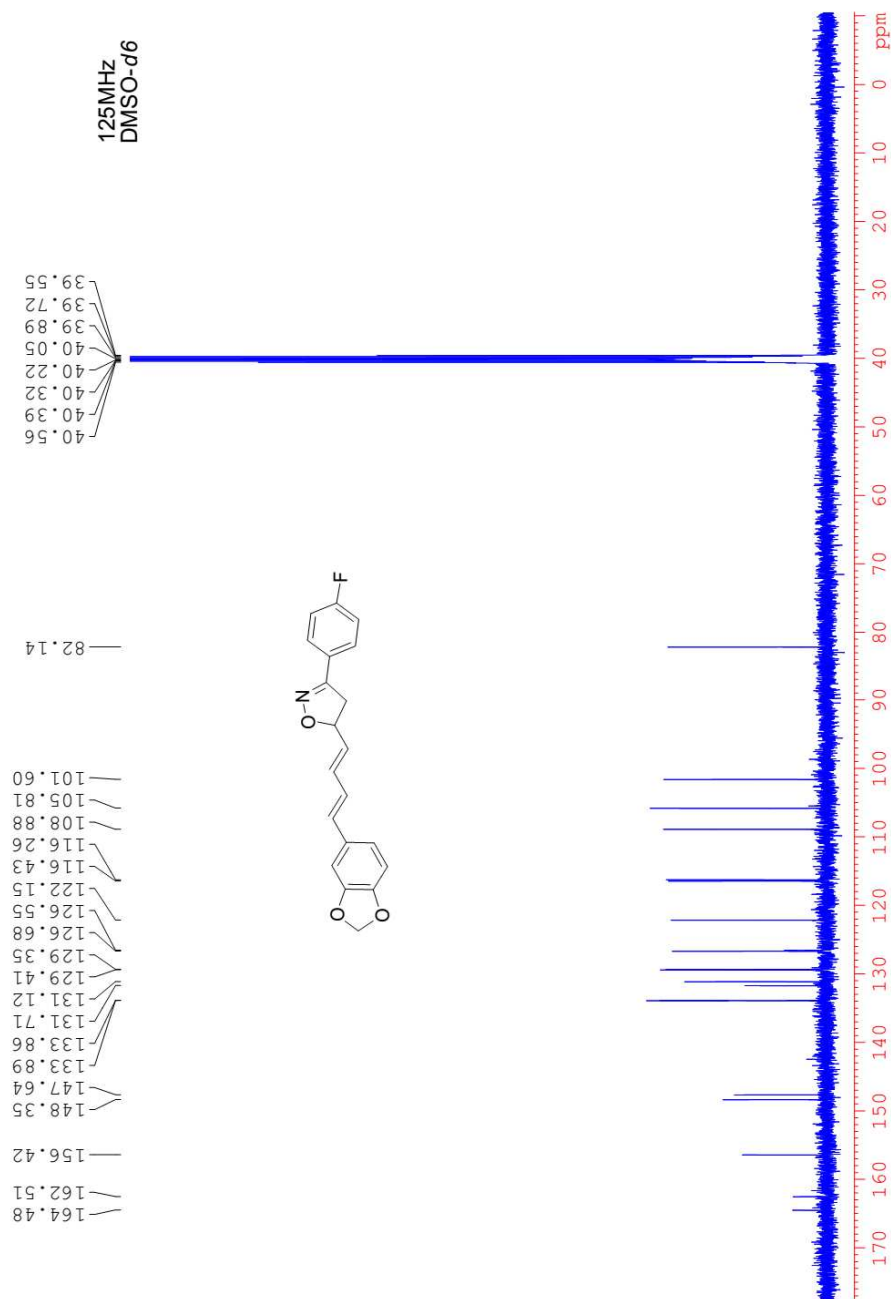
**compound VIa**



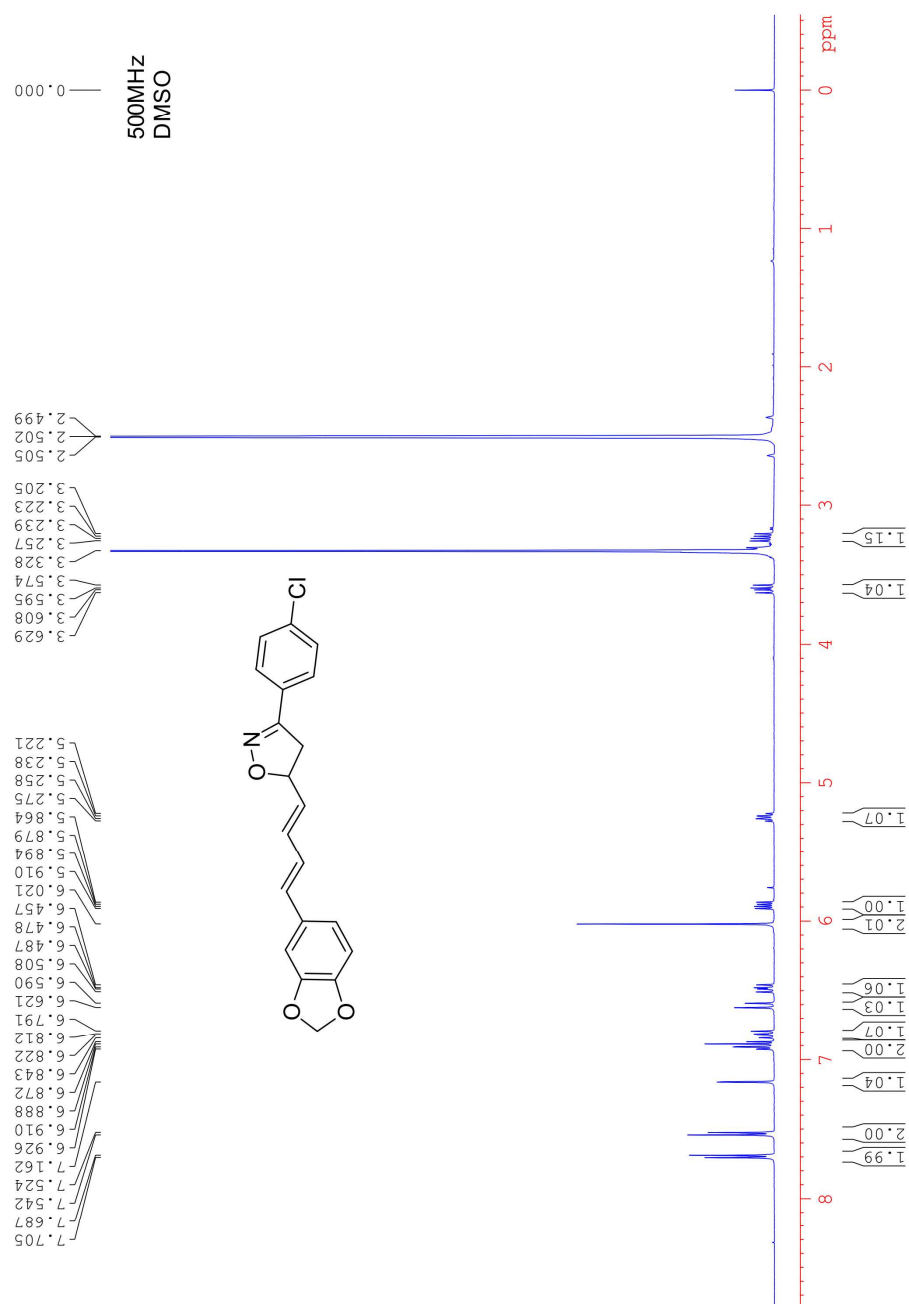
# compound VIb



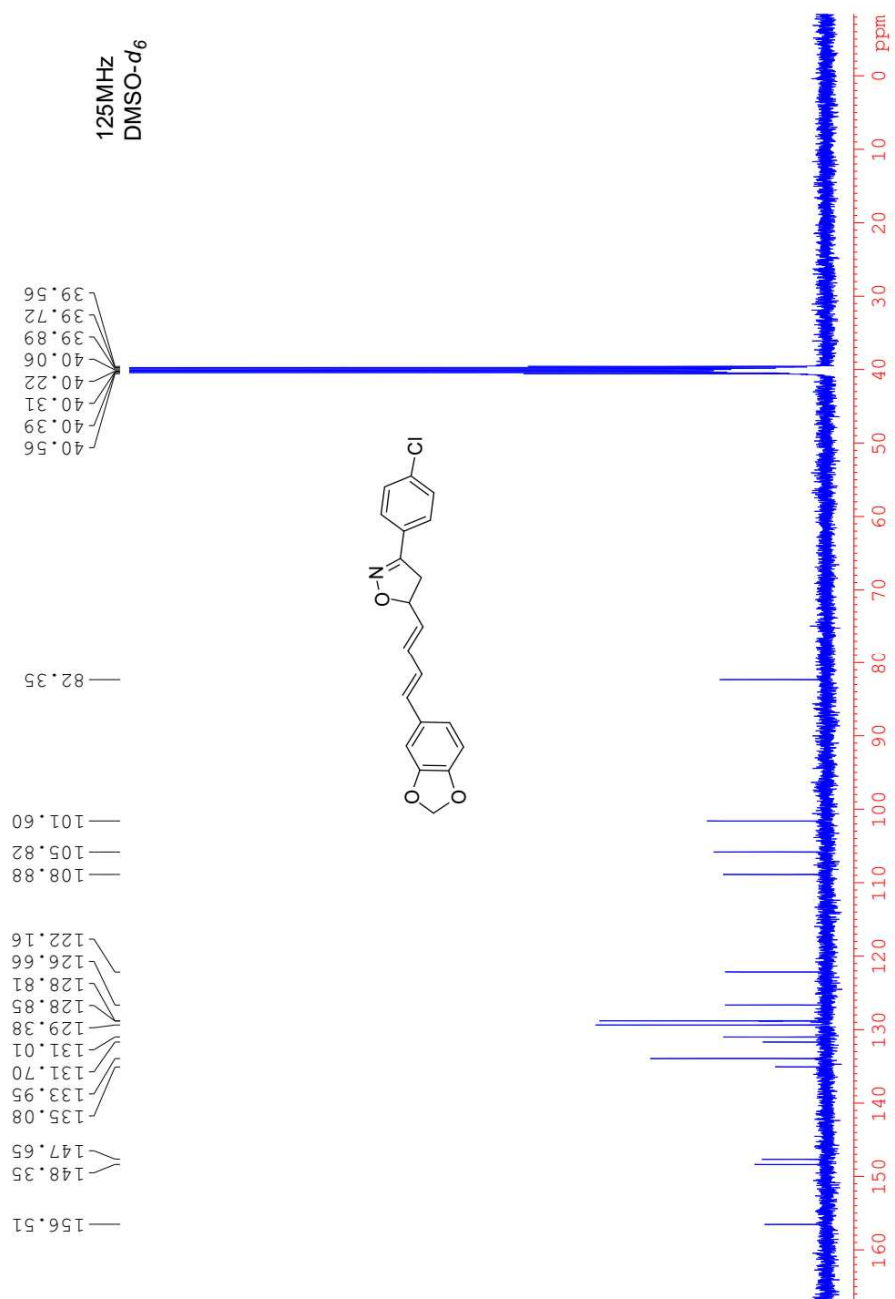
**compound VIb**



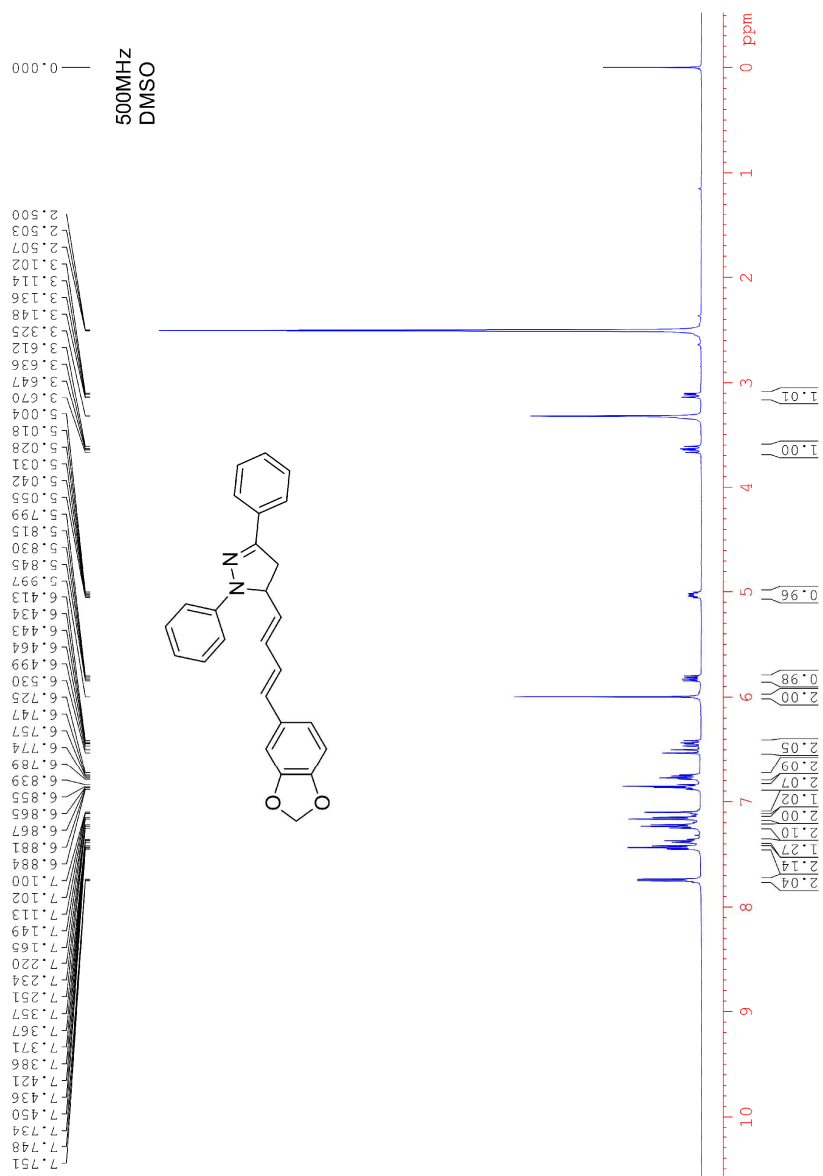
# compound VIc



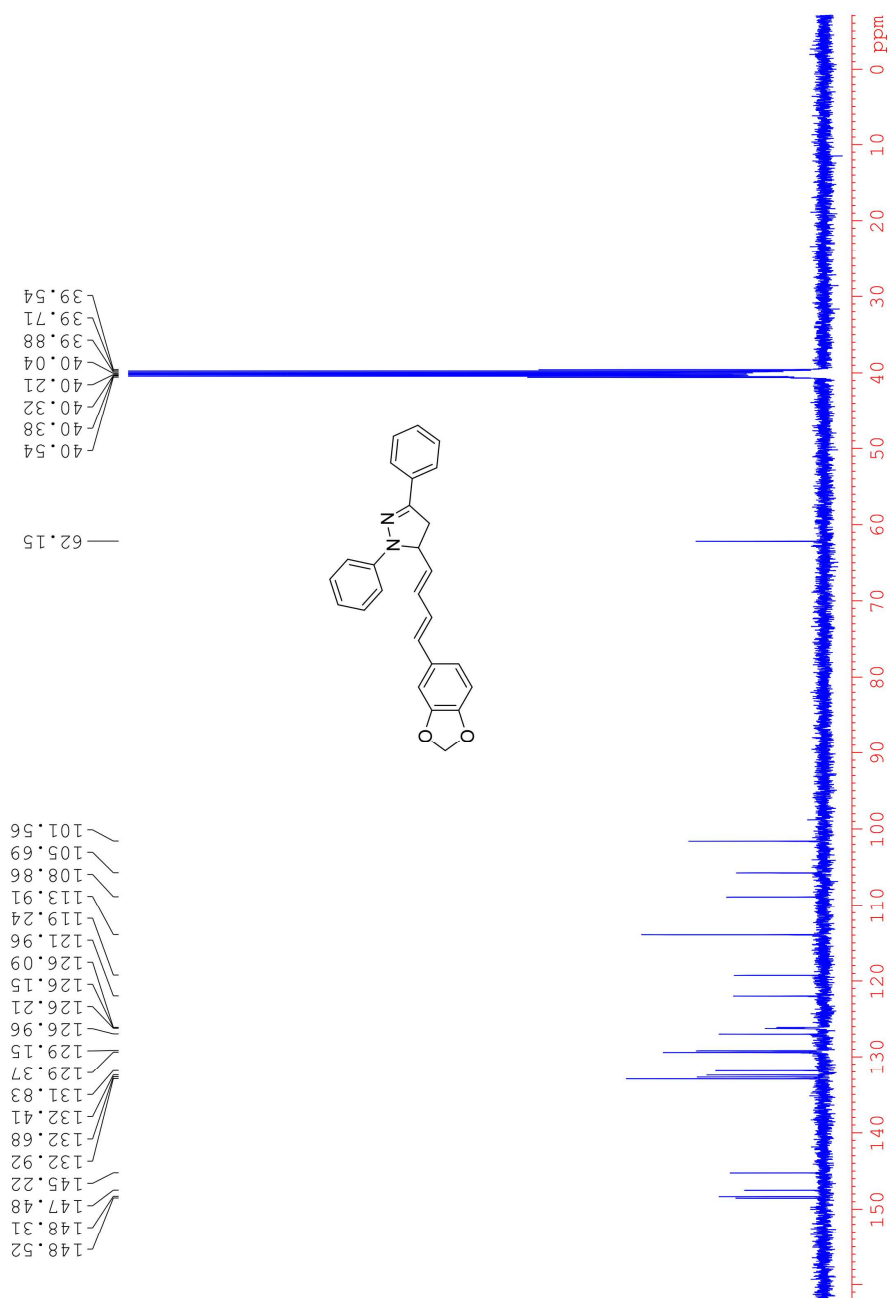
compound VIc



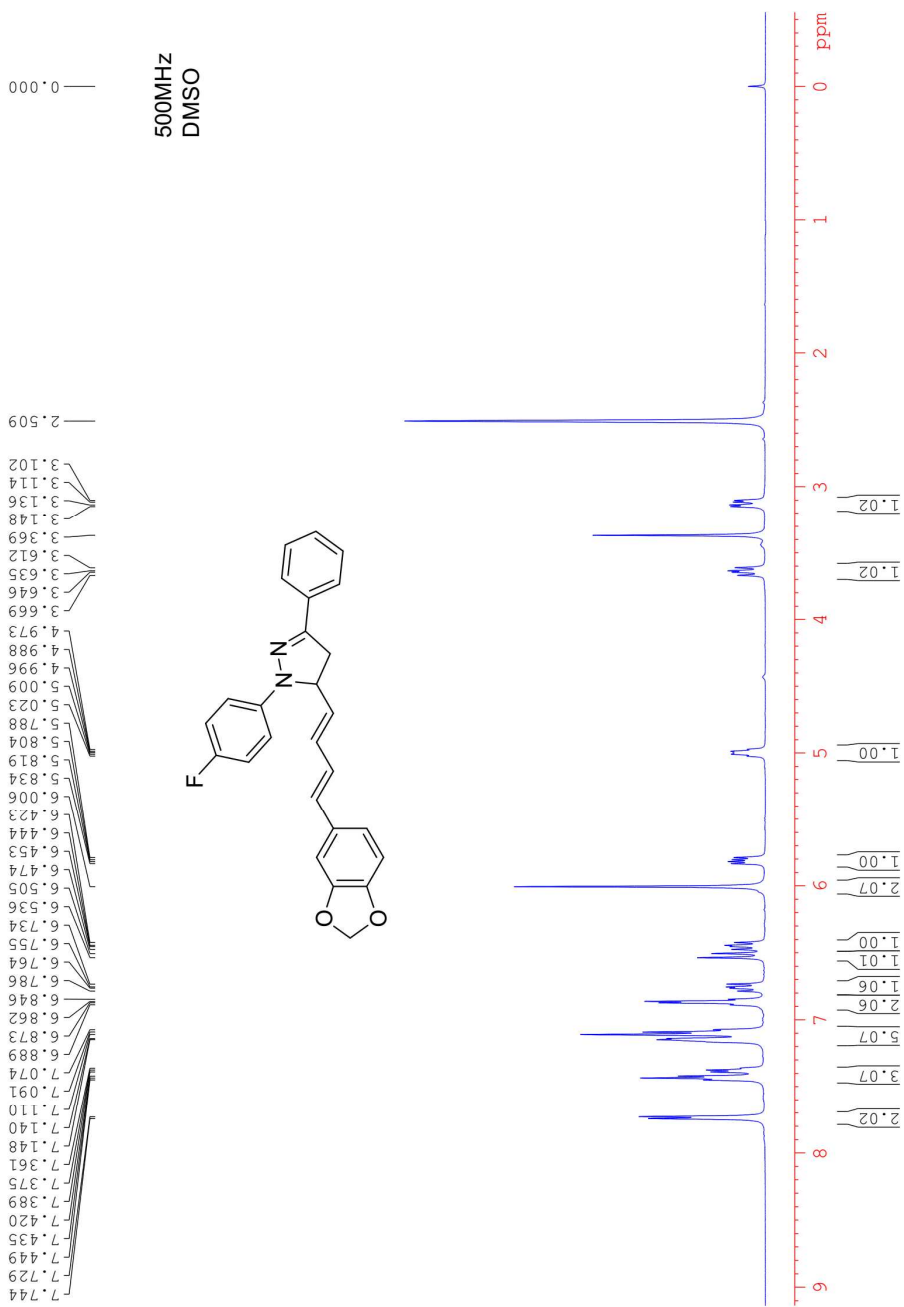
# compound VIIa



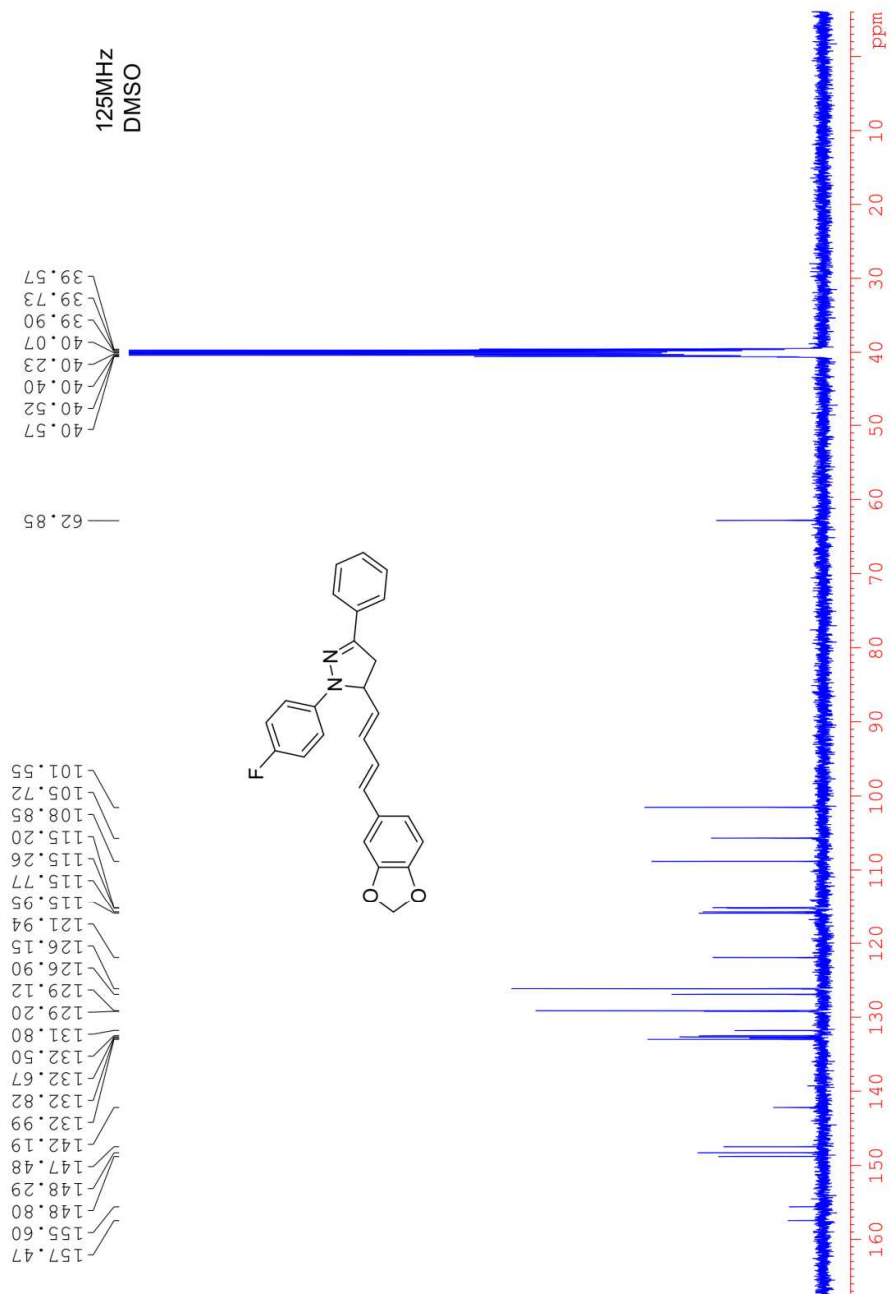
compound VIIa



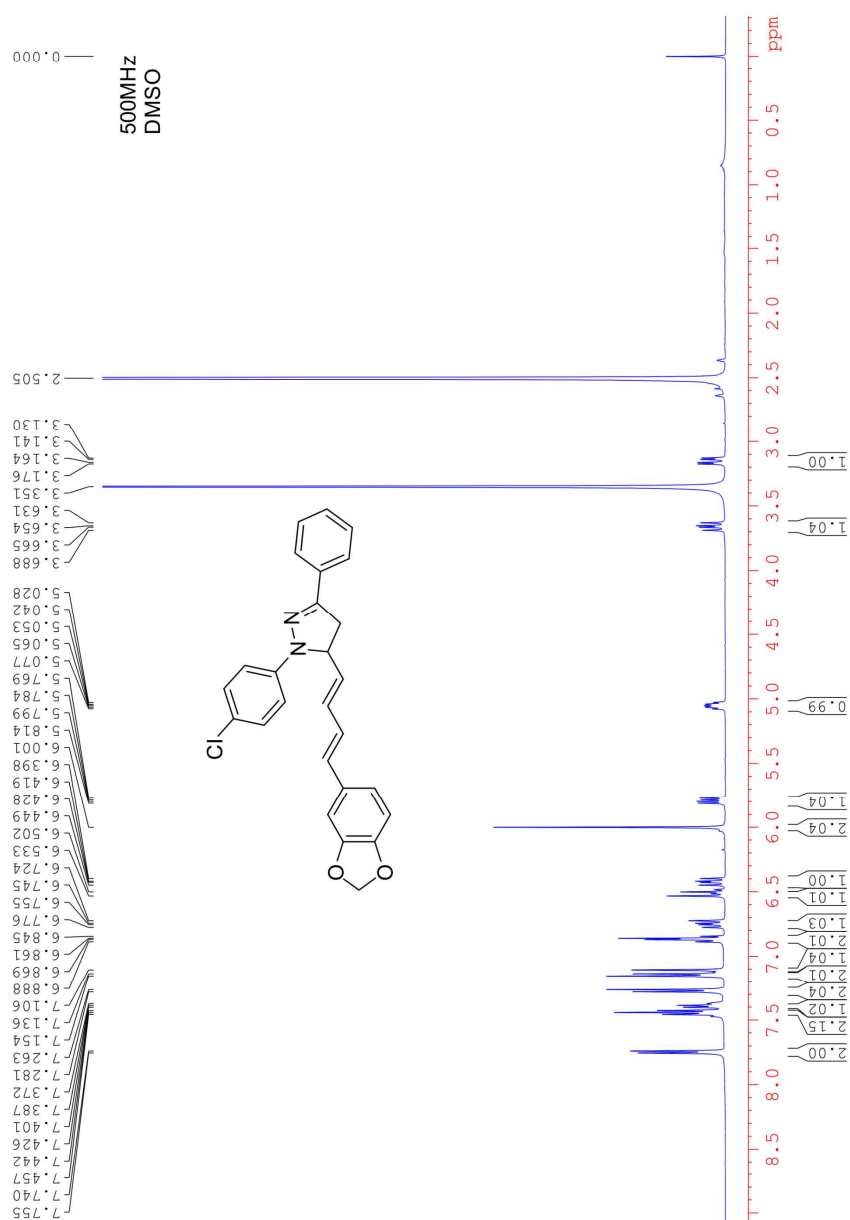
**compound VIIb**



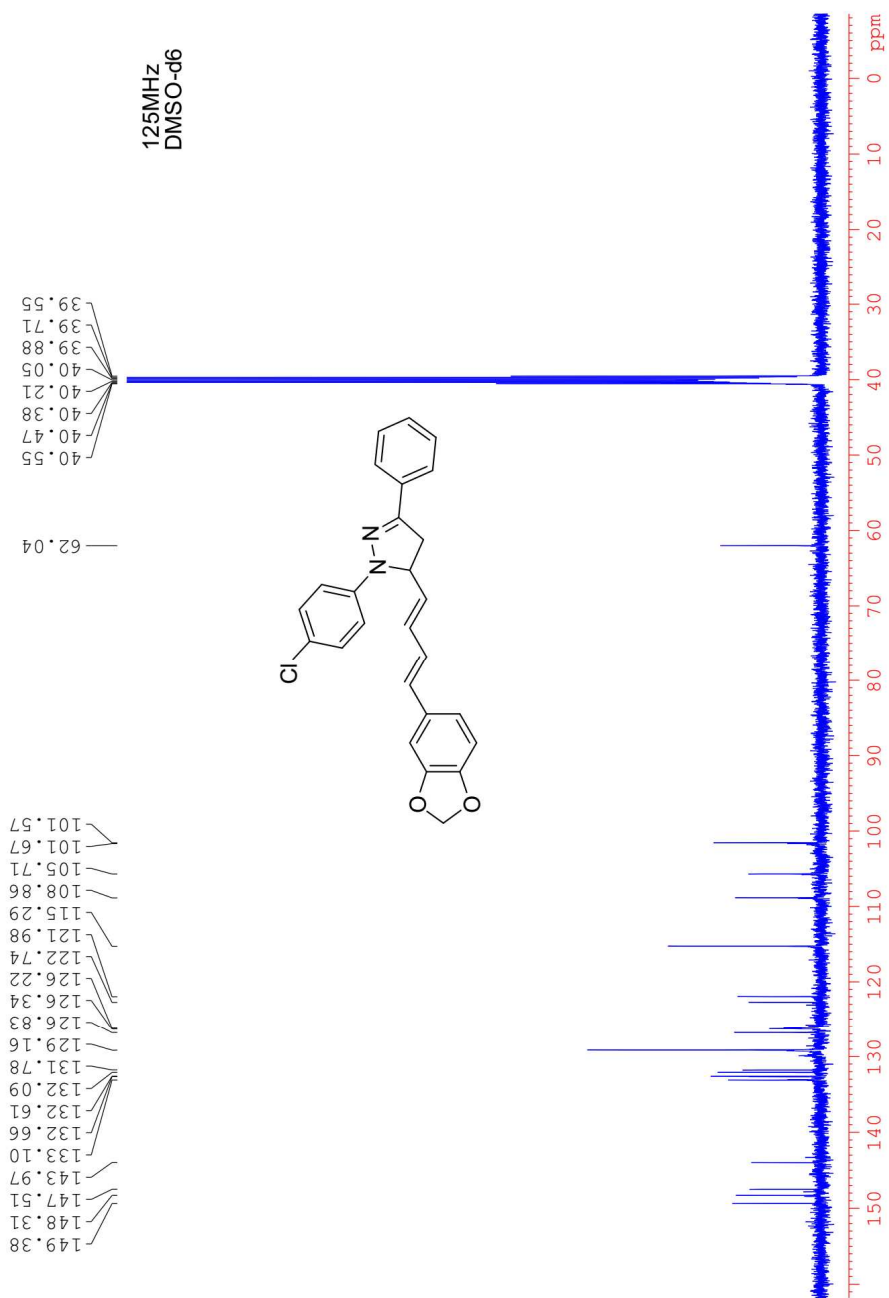
**compound VIIb**



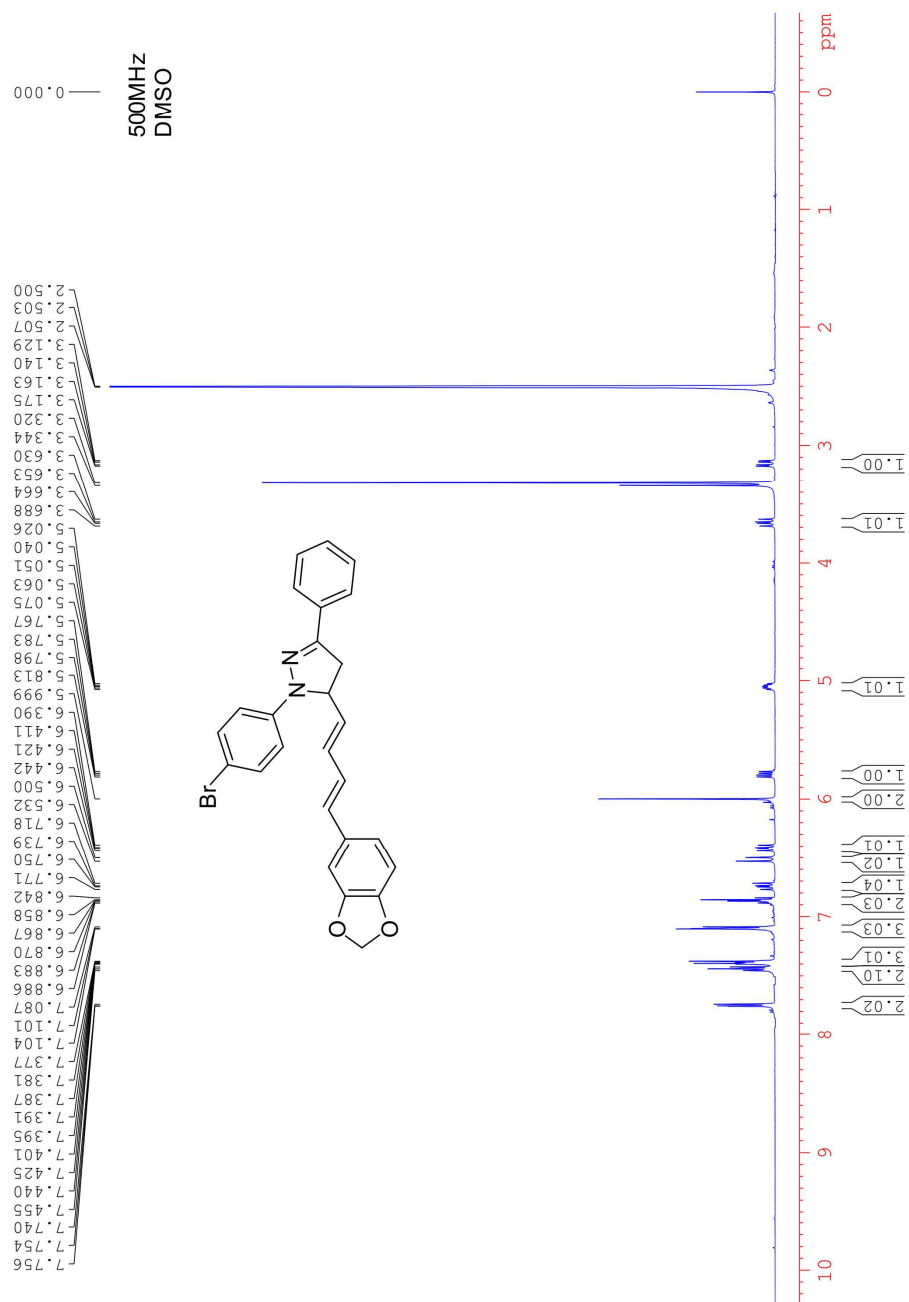
# compound VIIc



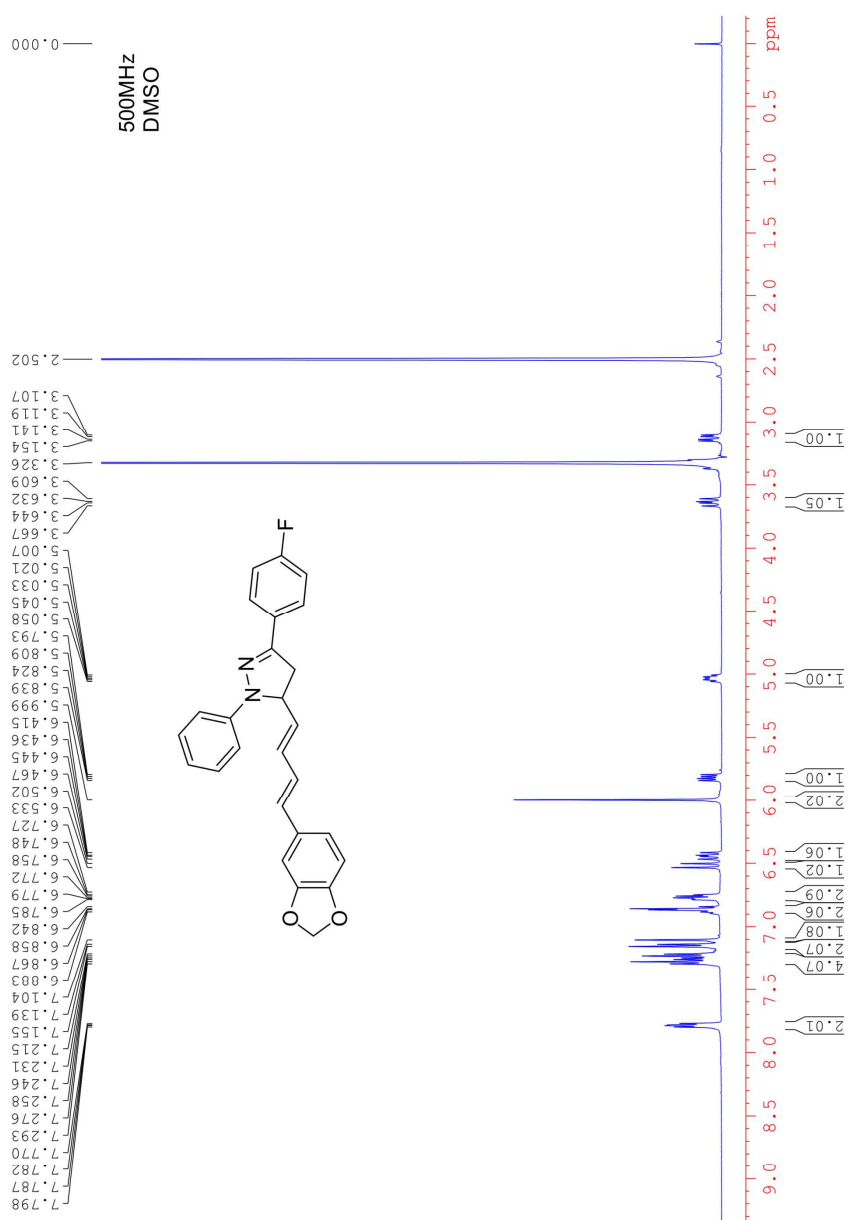
**compound VIIc**



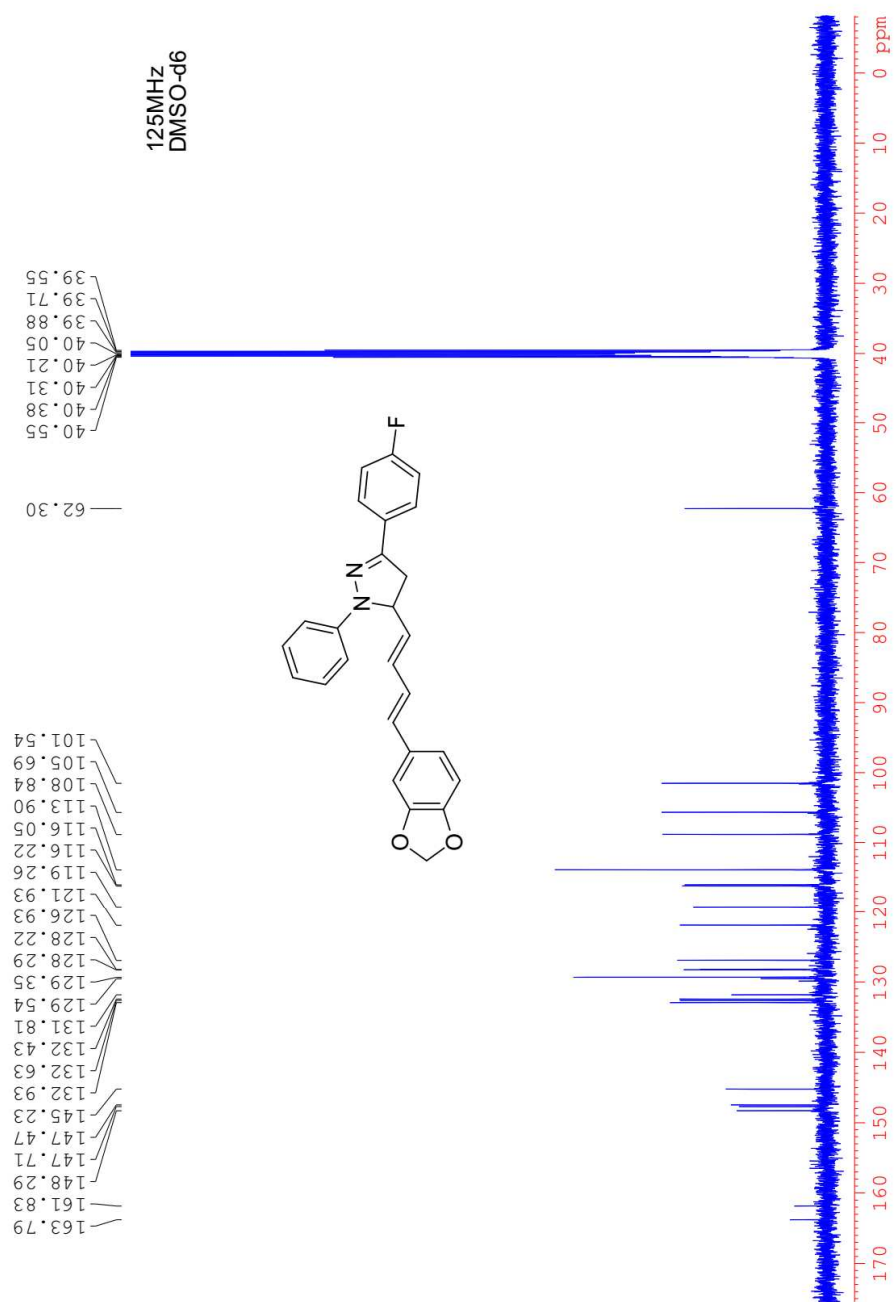
# compound VIId



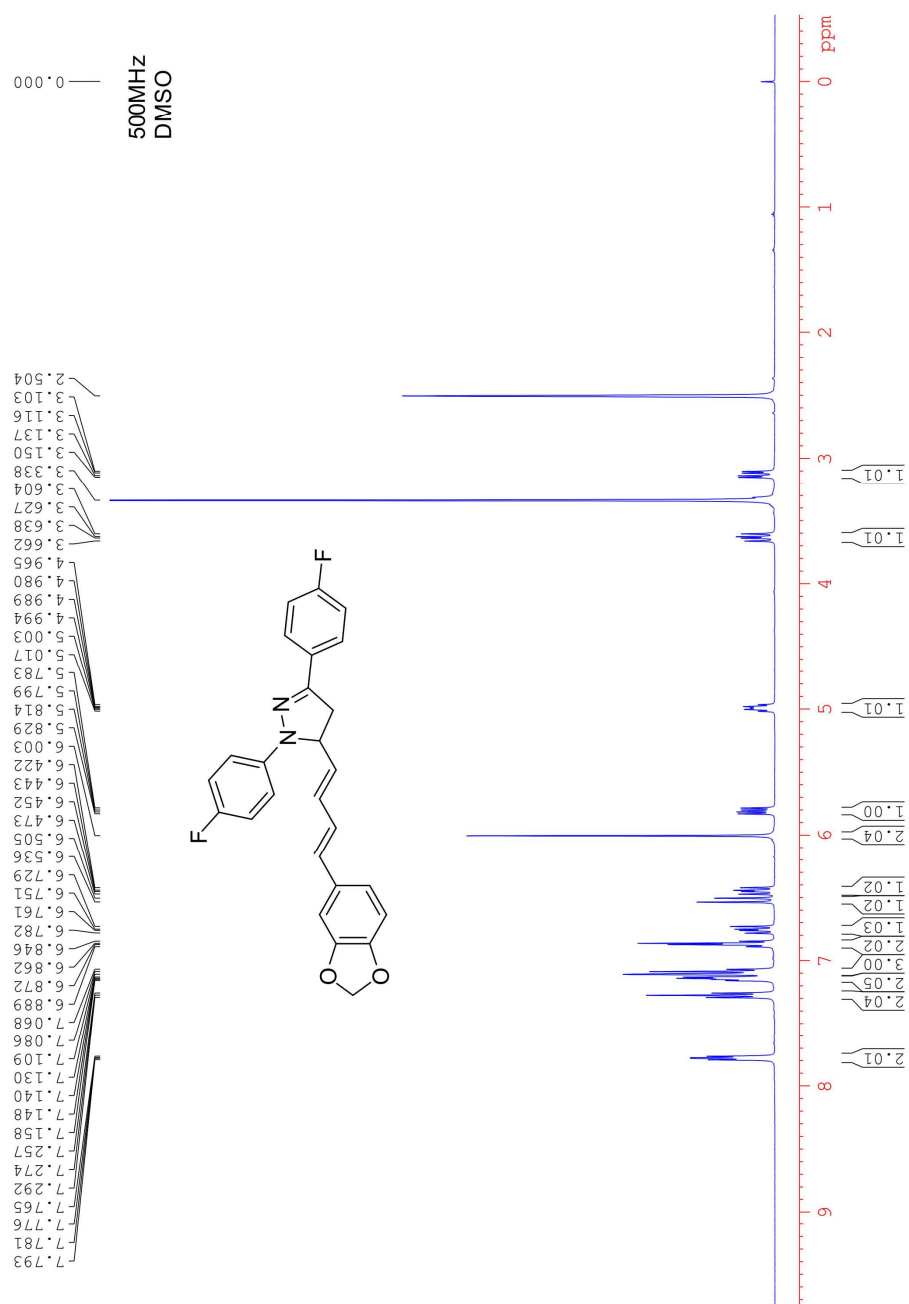
**compound VIIe**



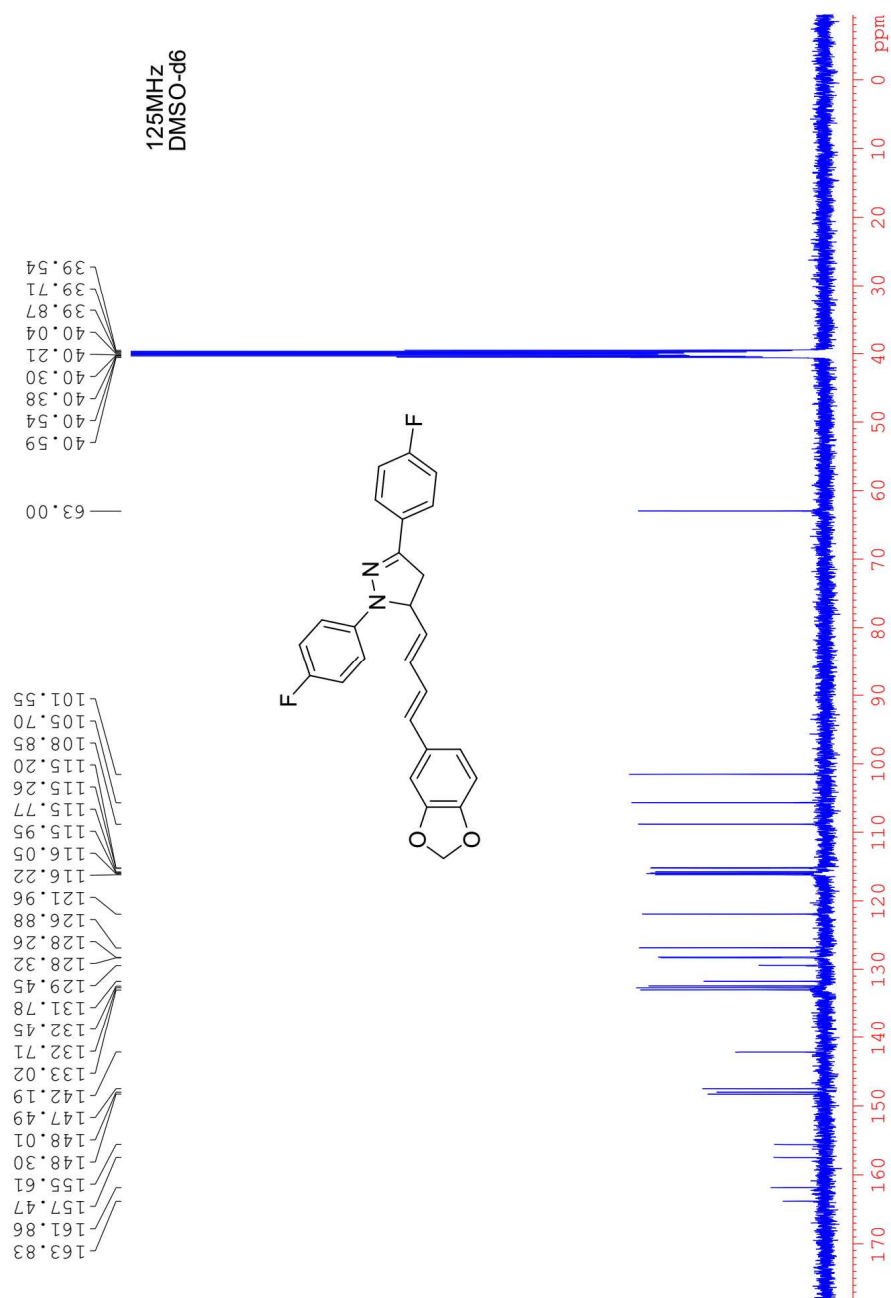
# compound VIIe



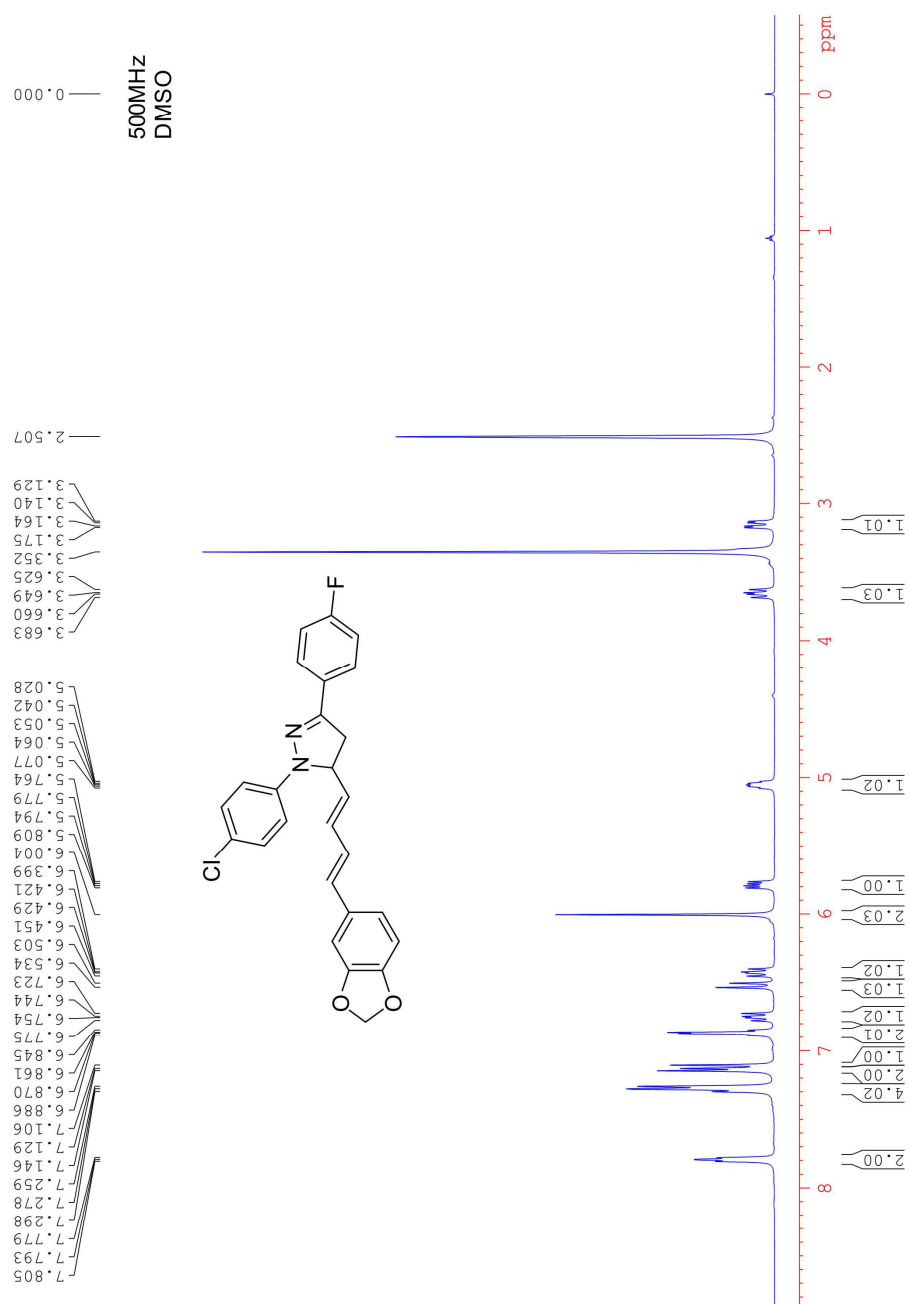
compound VIIf



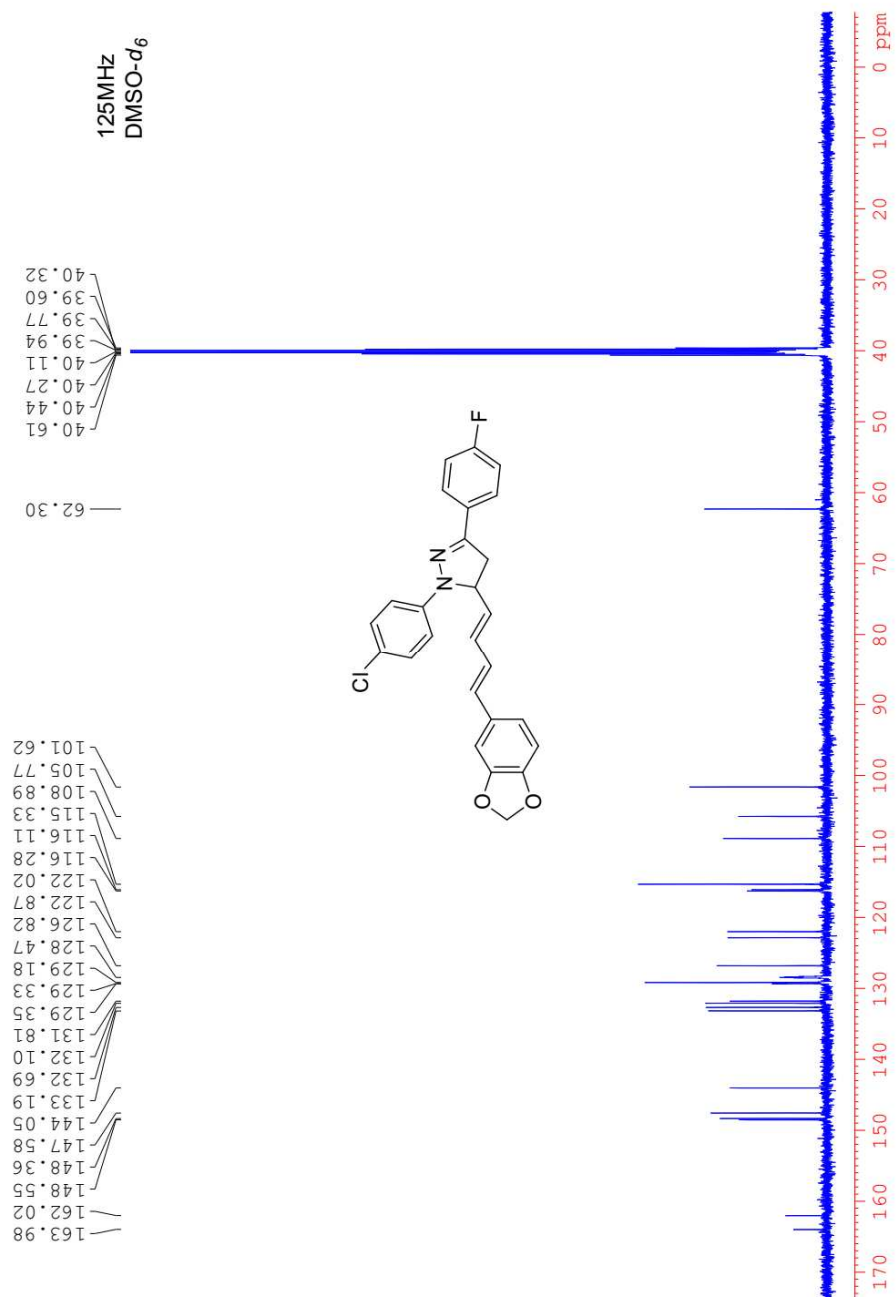
compound VIIf



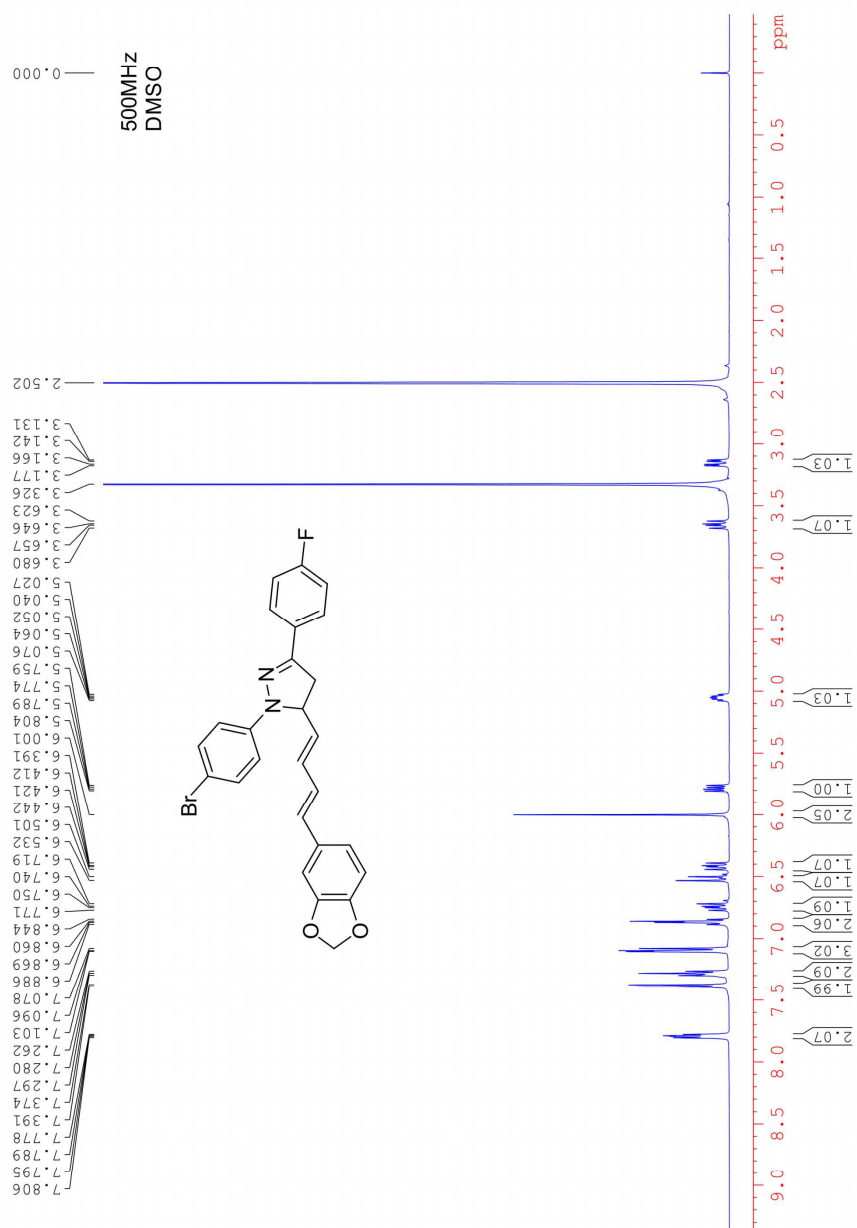
# compound VIIg



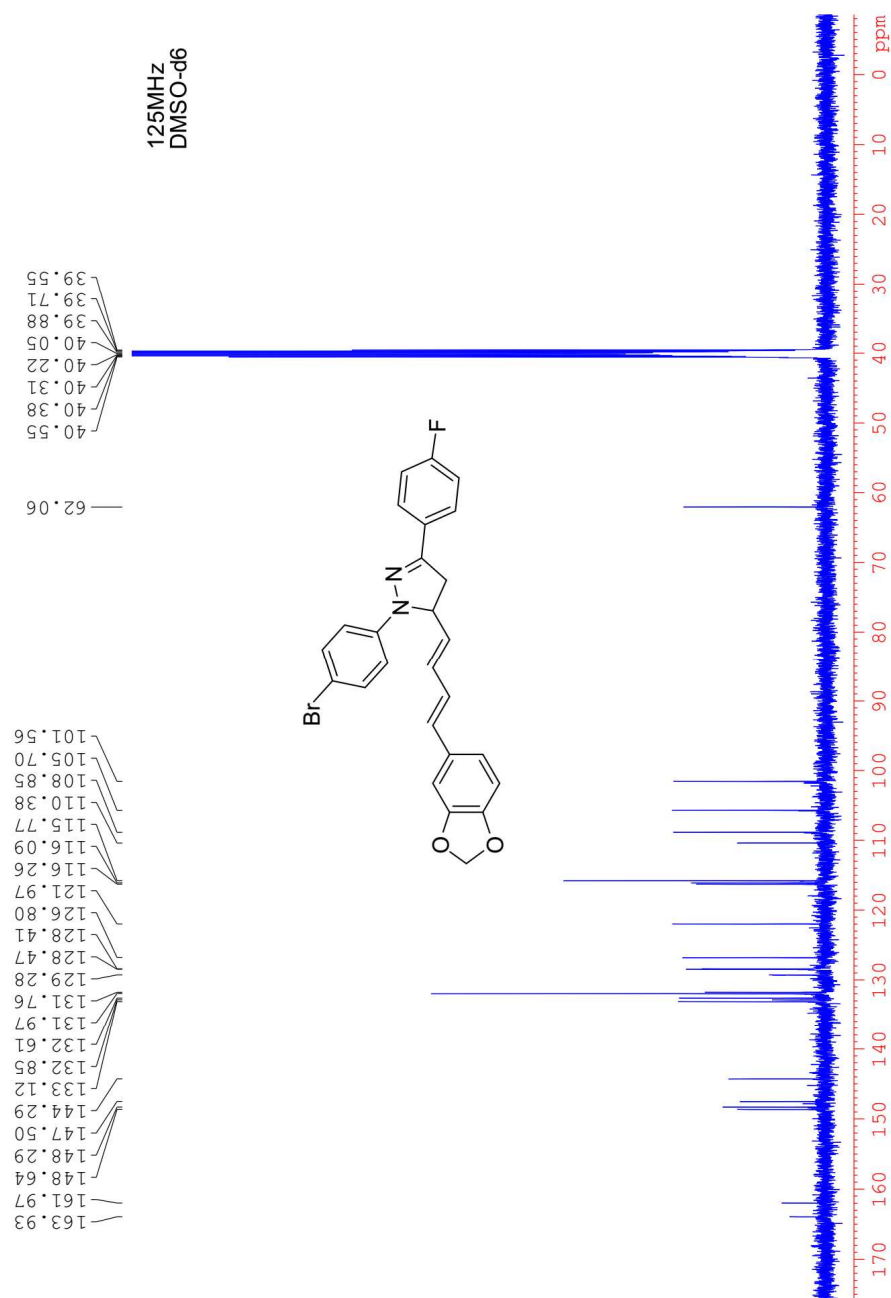
compound VIIg



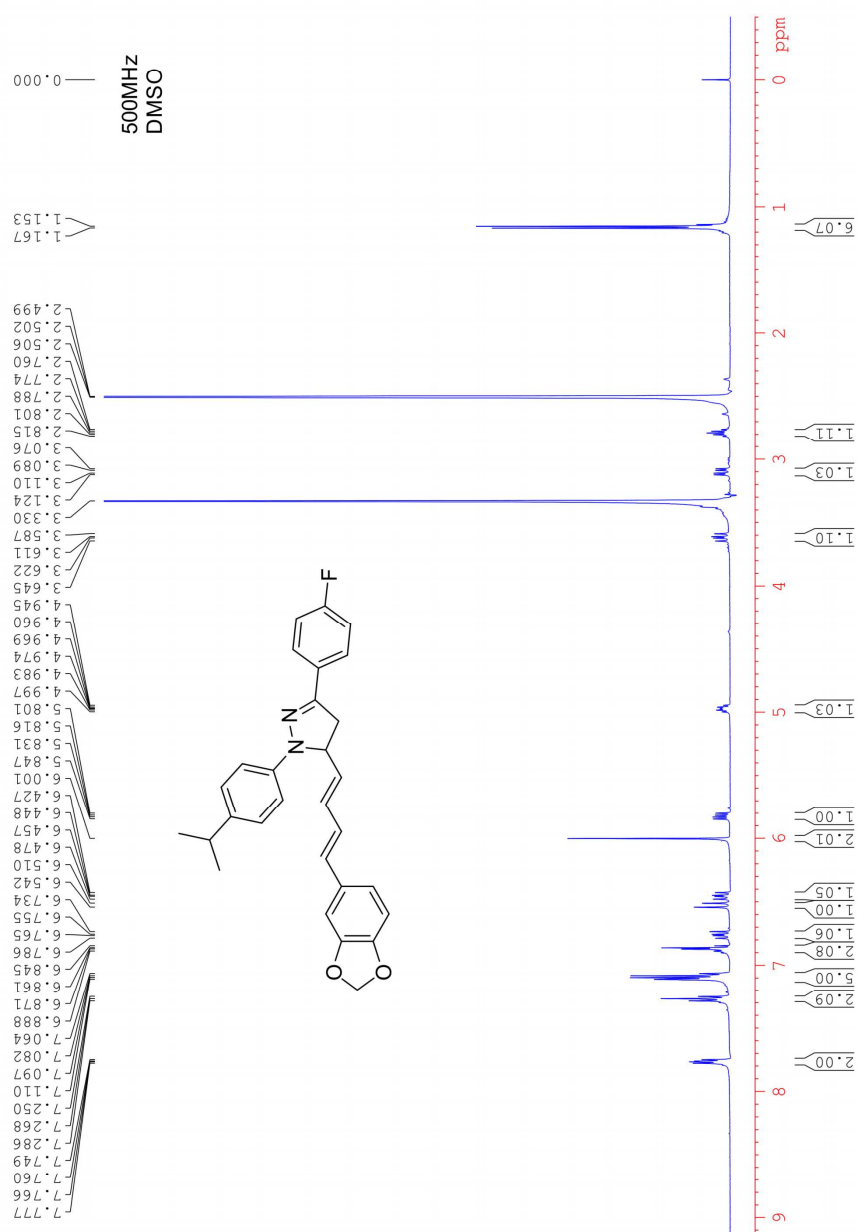
# compound VIIh



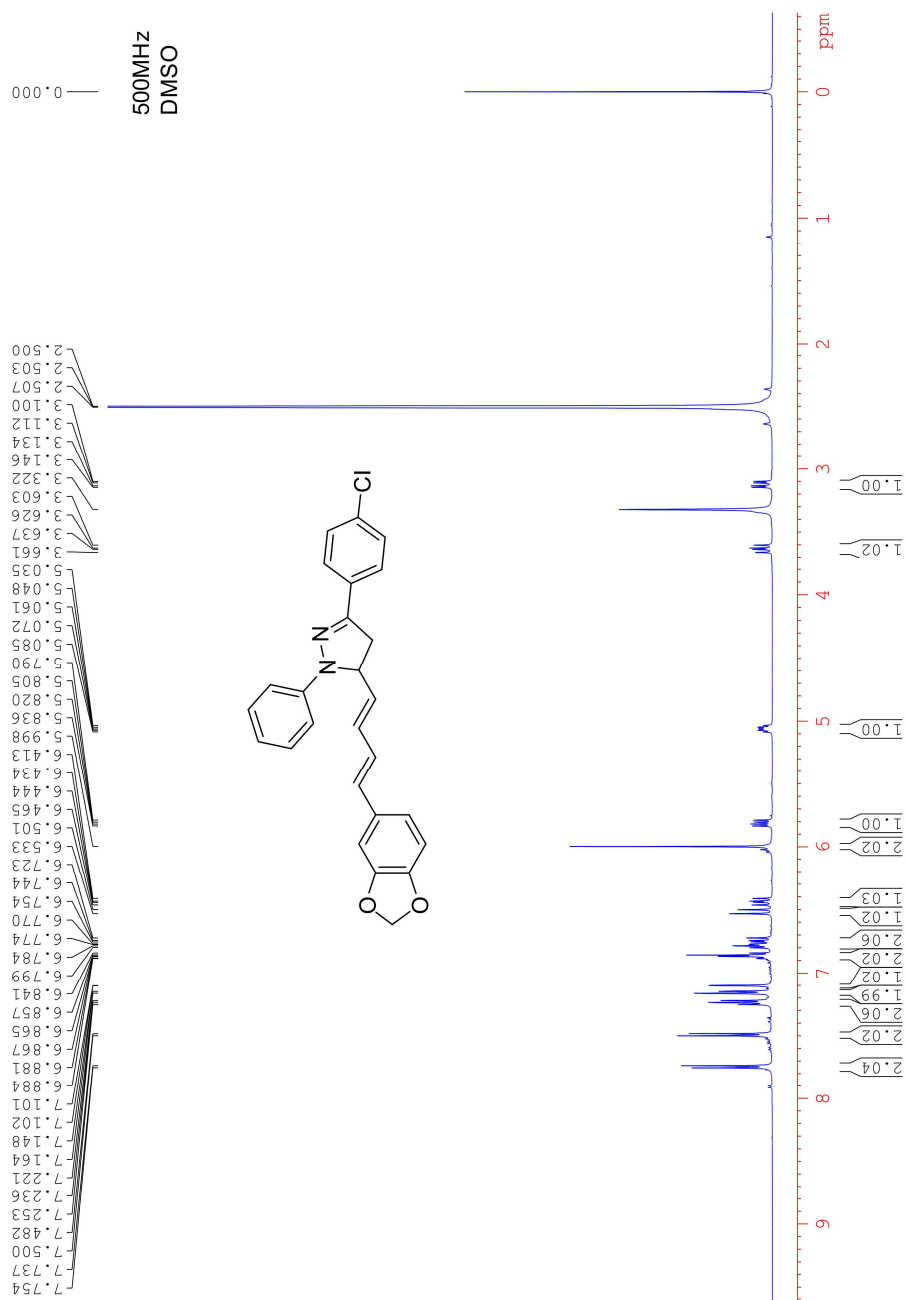
# compound VIIh



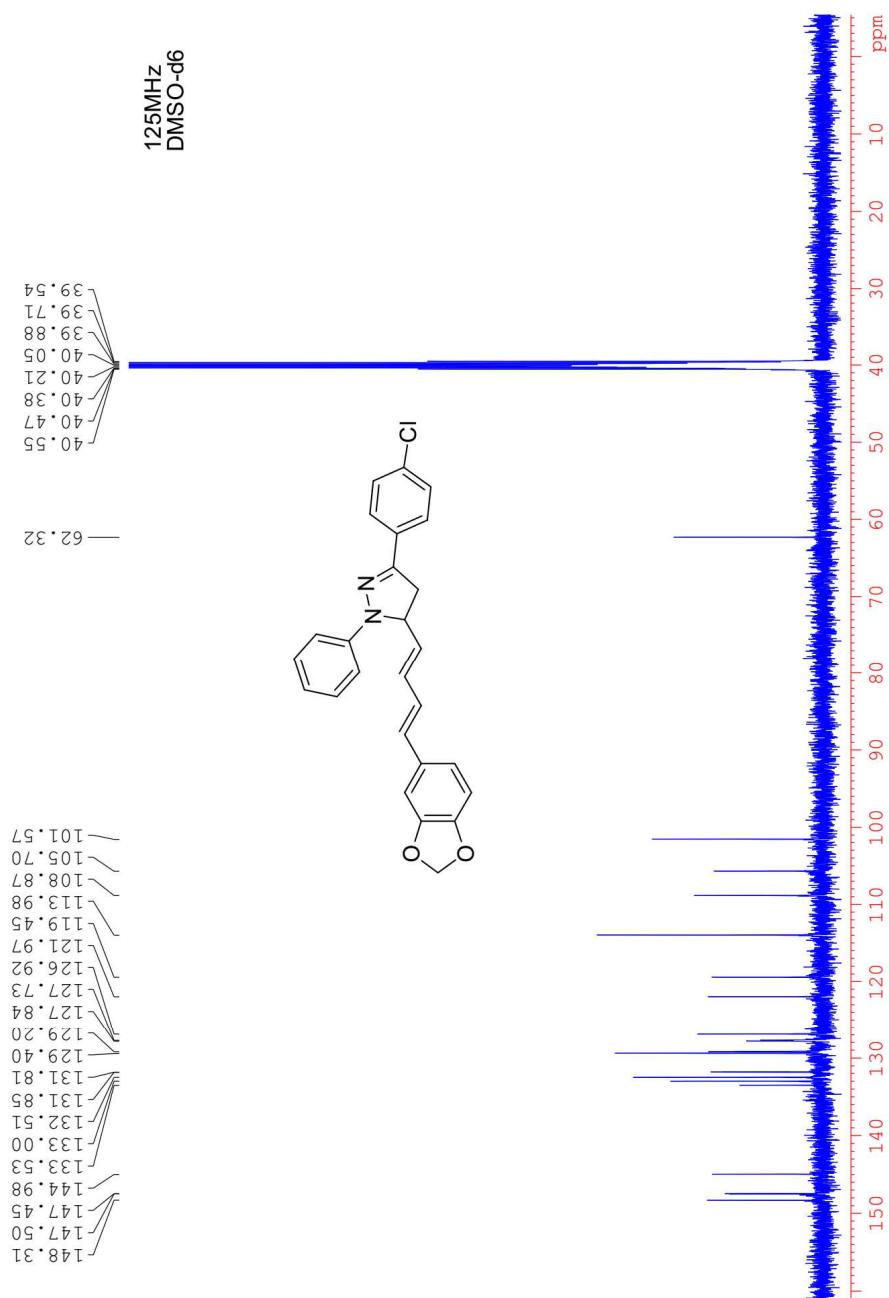
compound VIIi



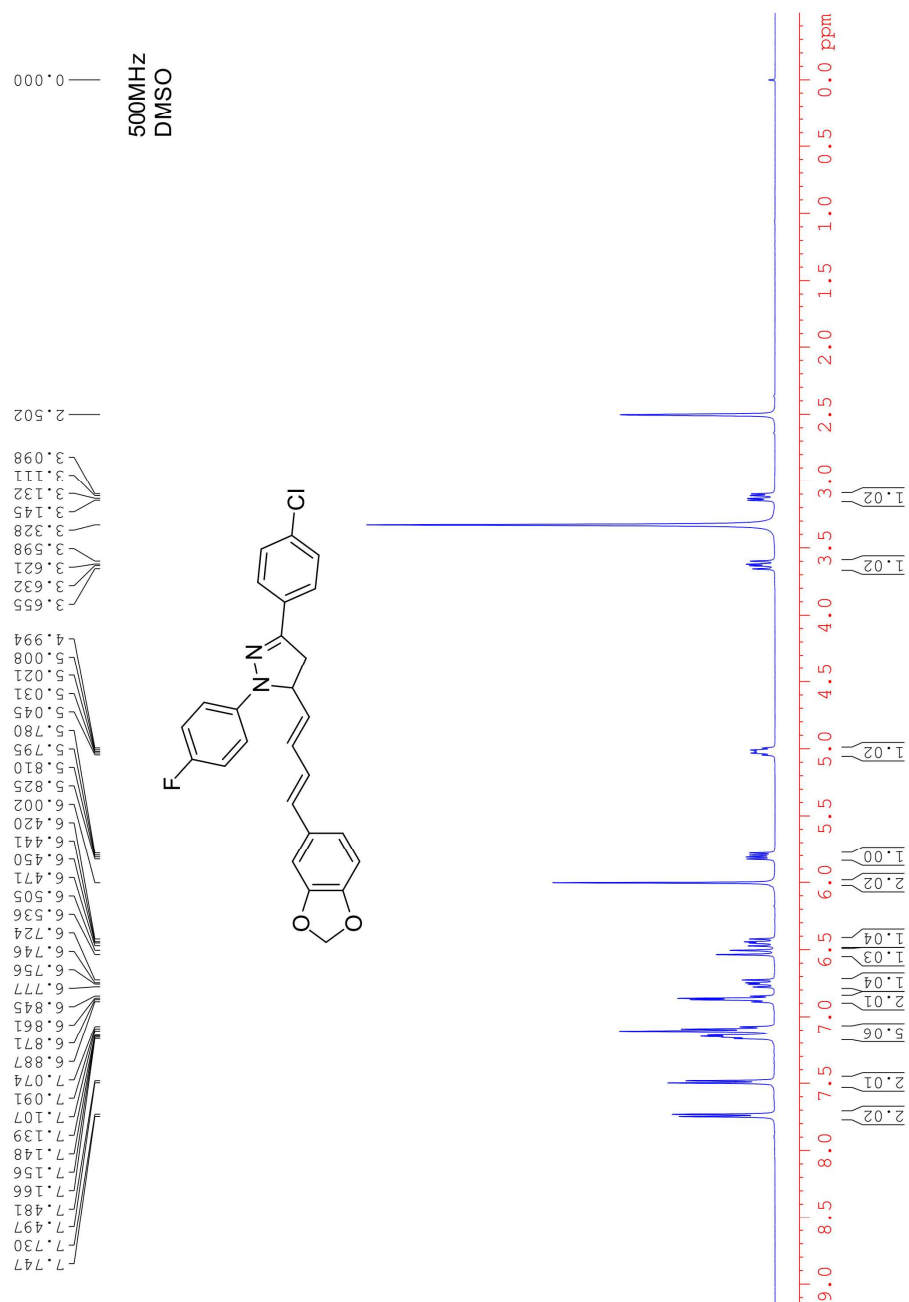
compound VIIj



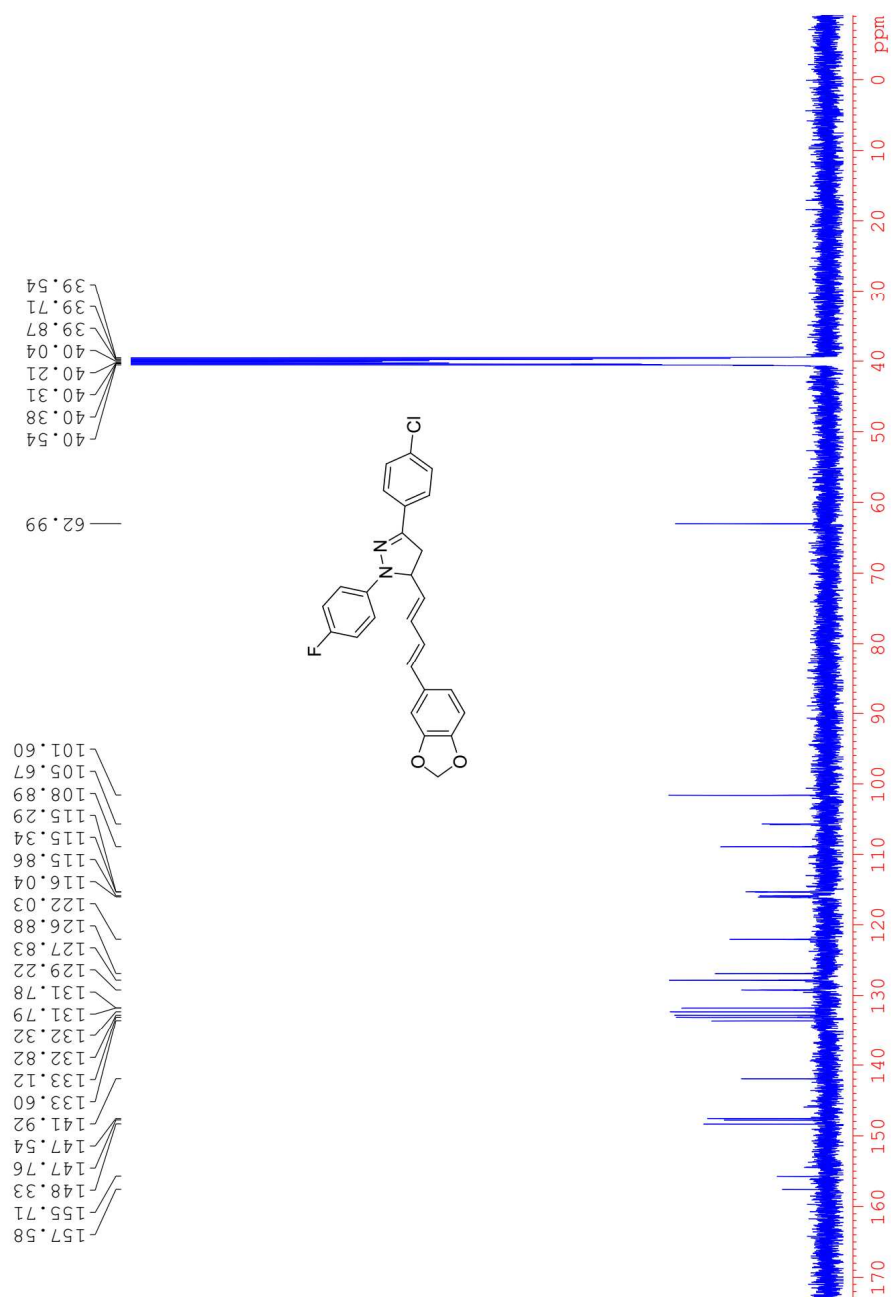
compound VIIj



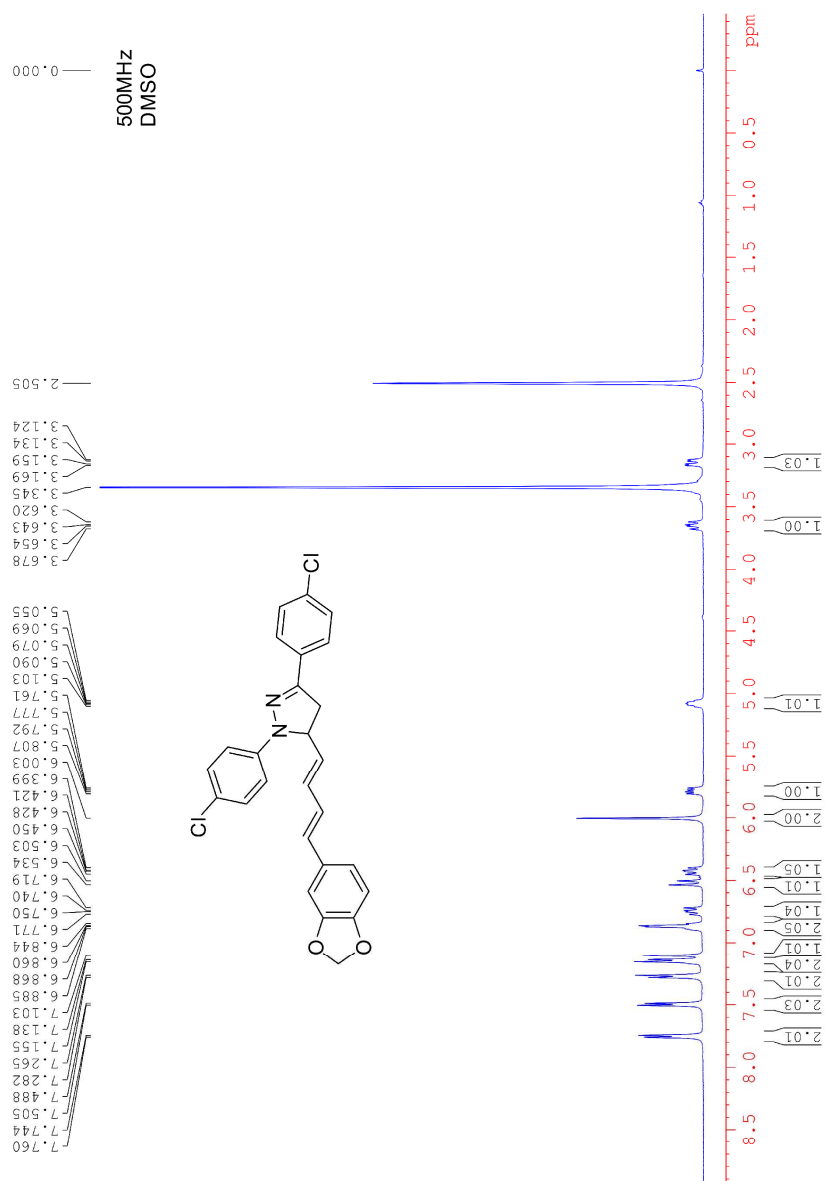
# compound VIIk



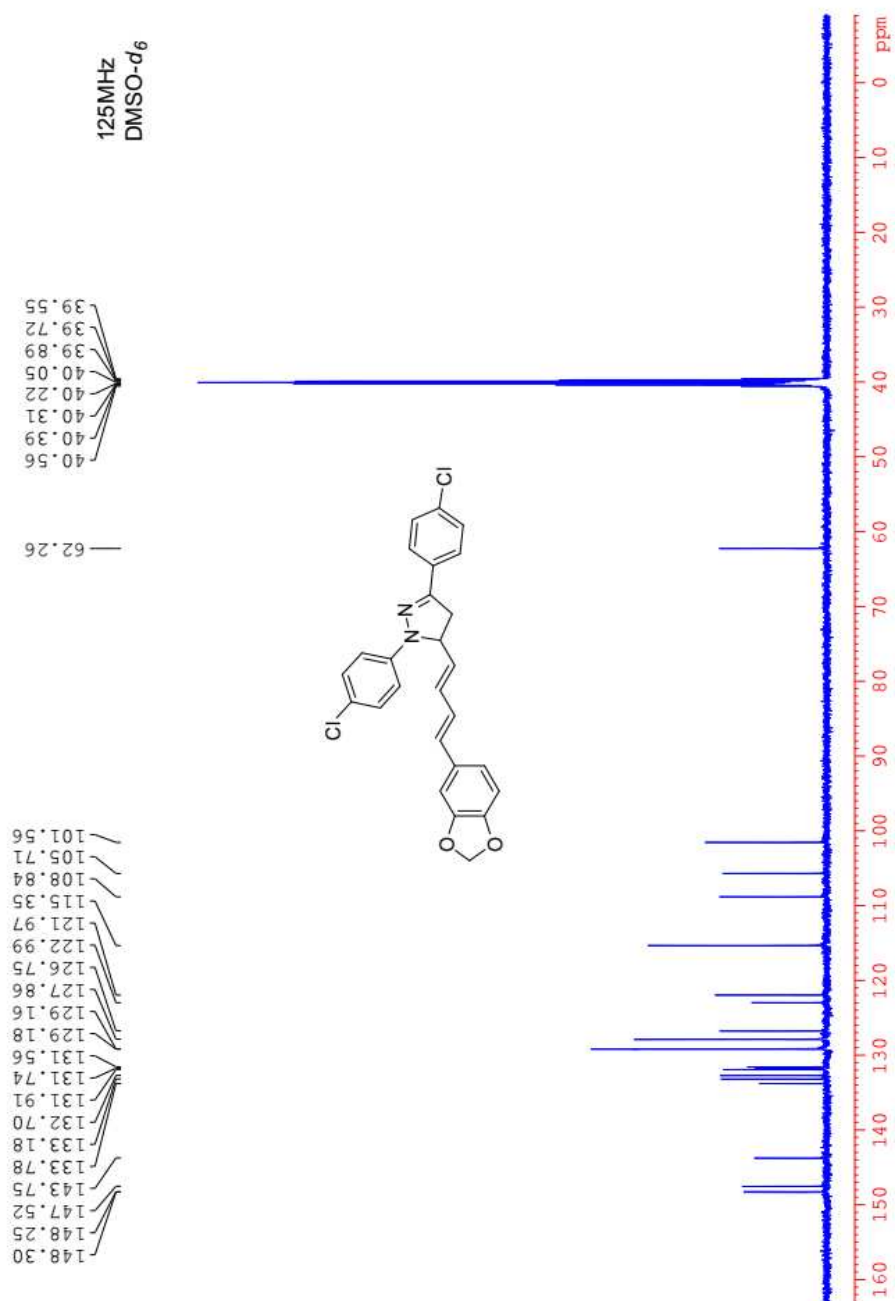
compound VIIk



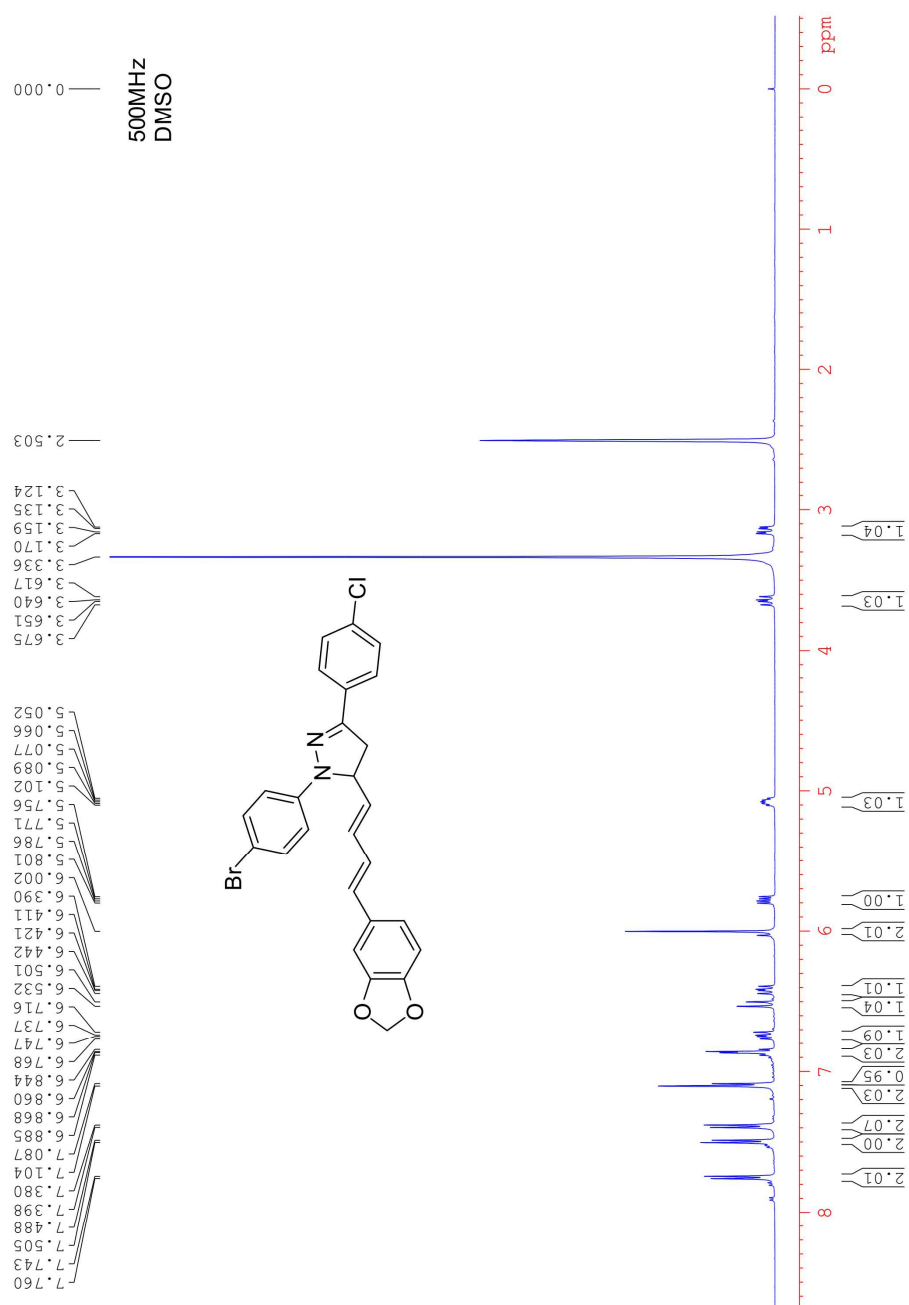
# compound VIII



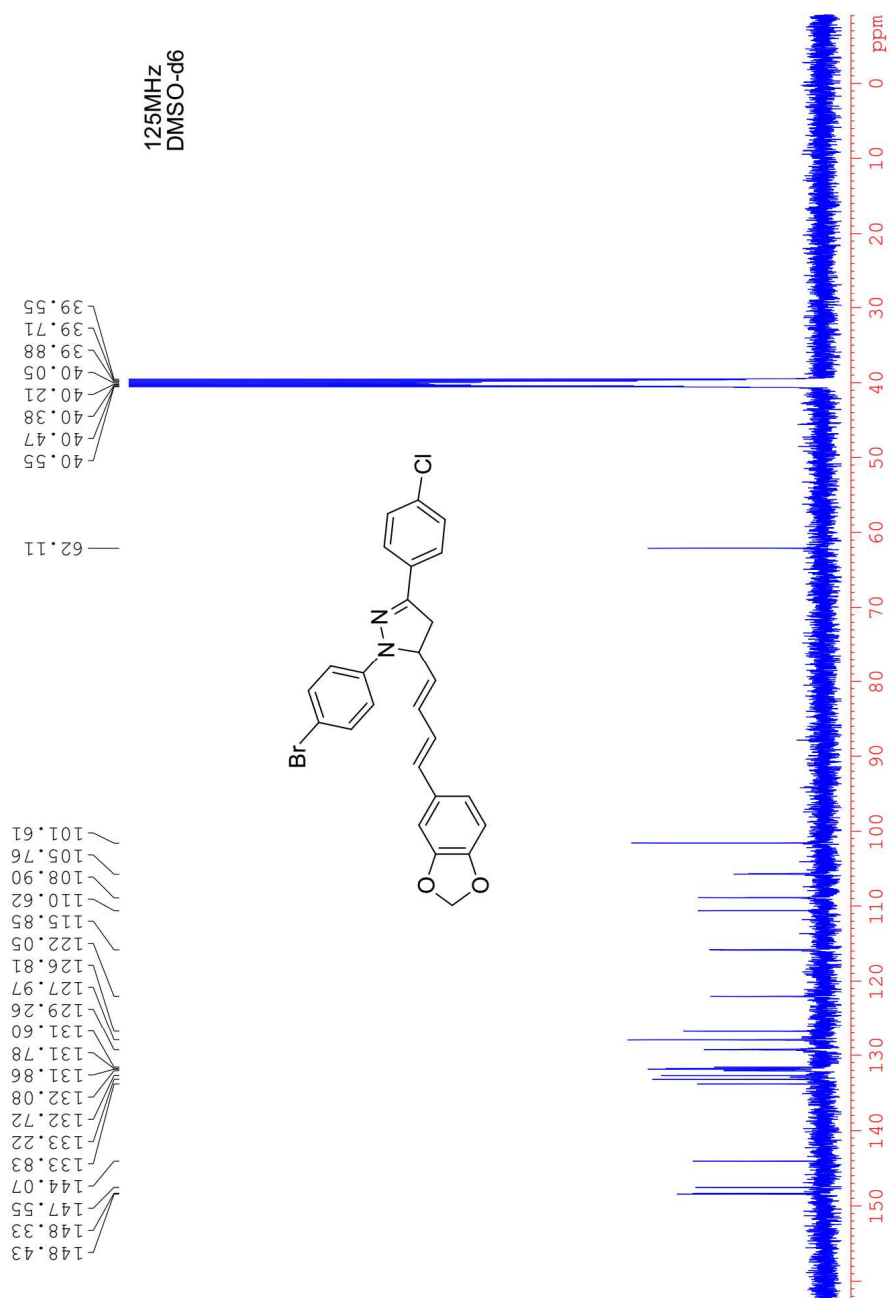
compound VIII



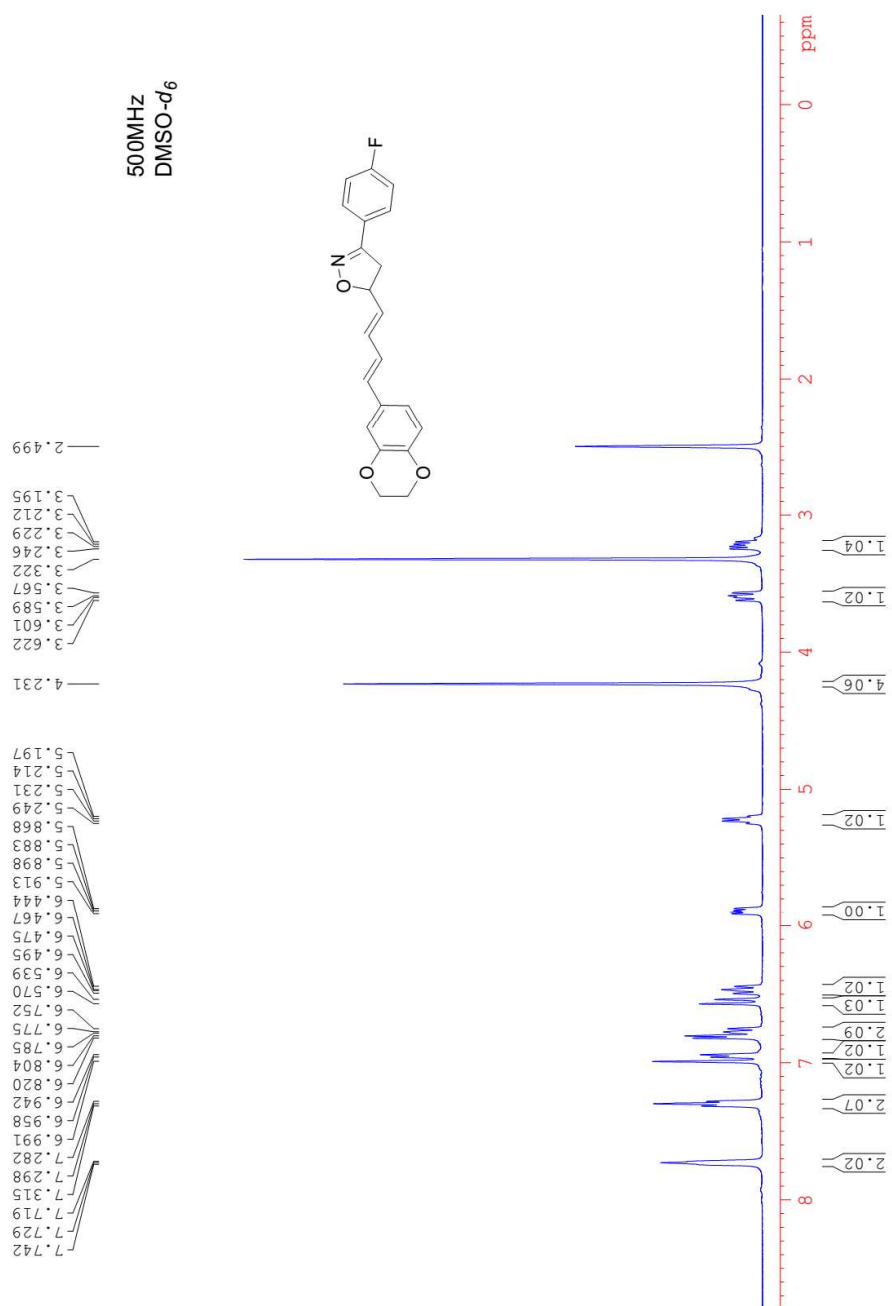
# compound VIIIm



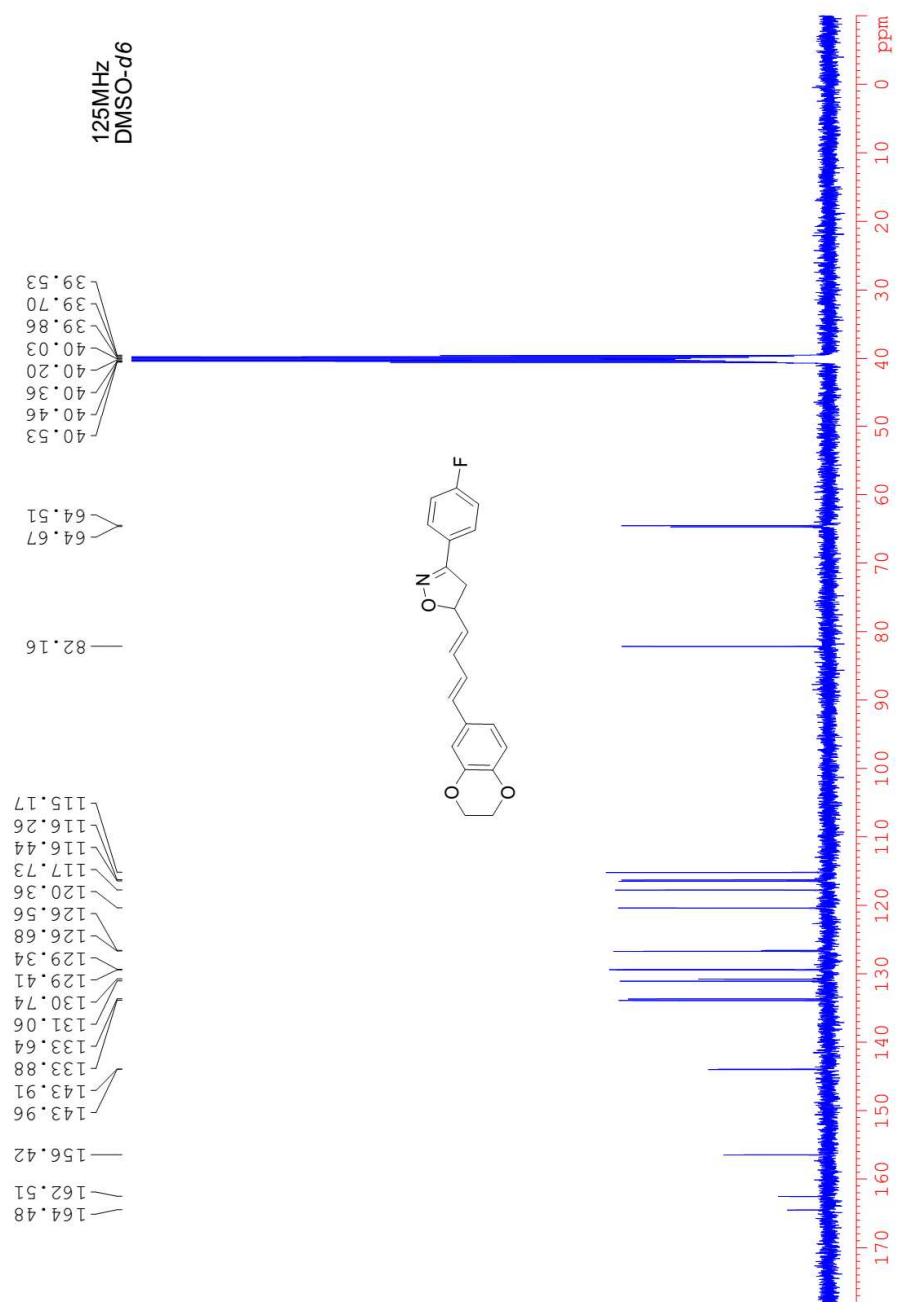
# compound VIIIm



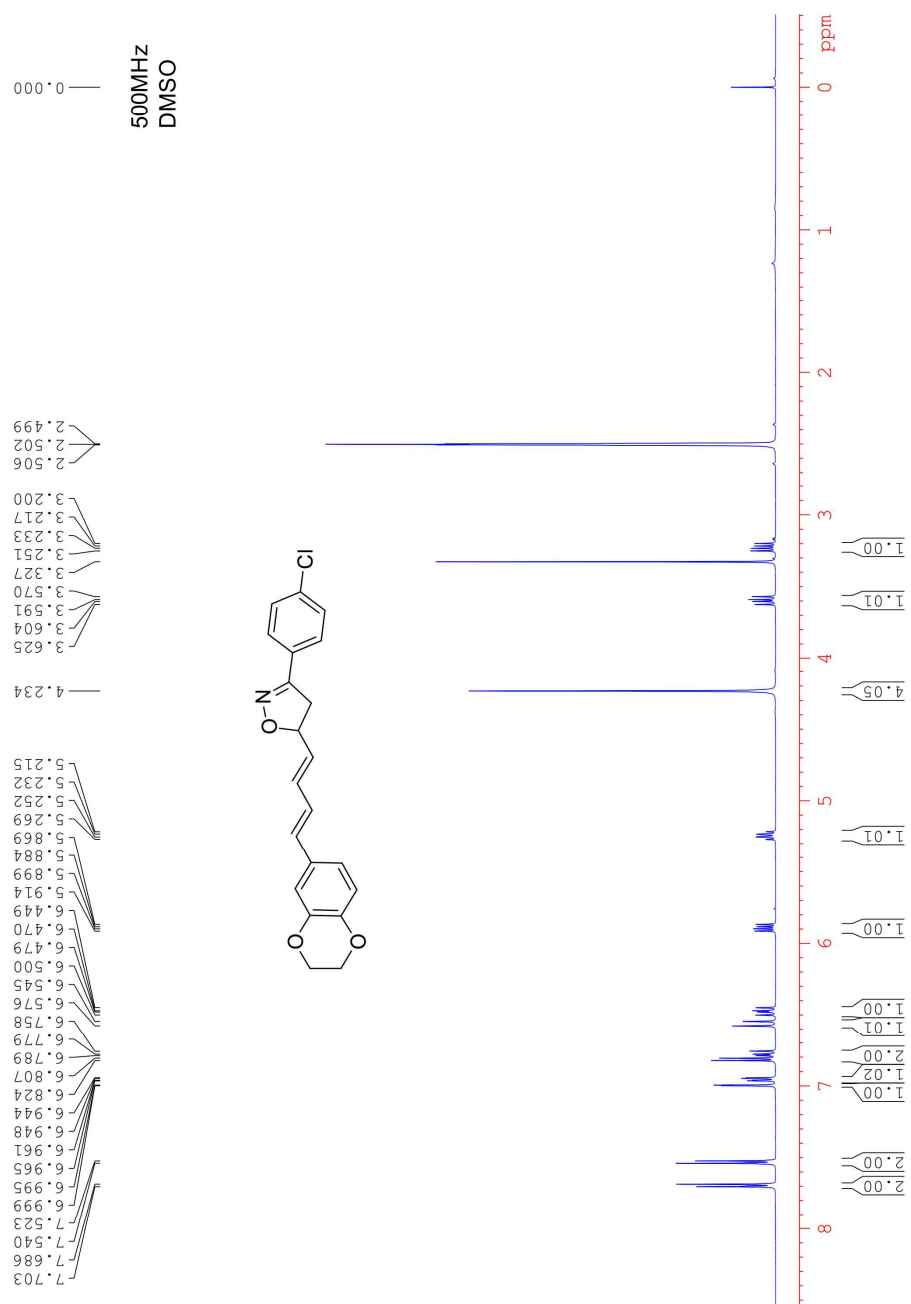
compound VIIIb



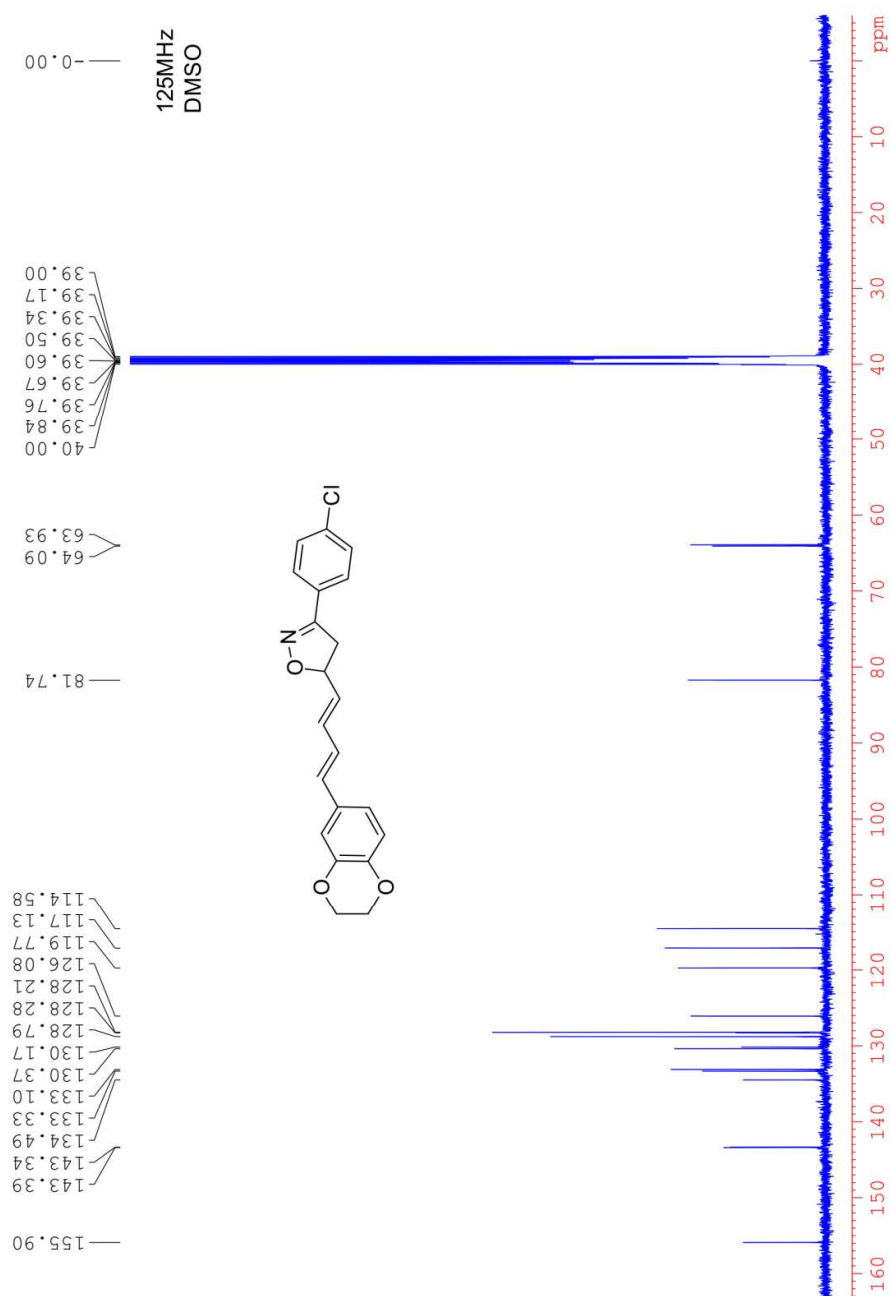
compound VIIIb



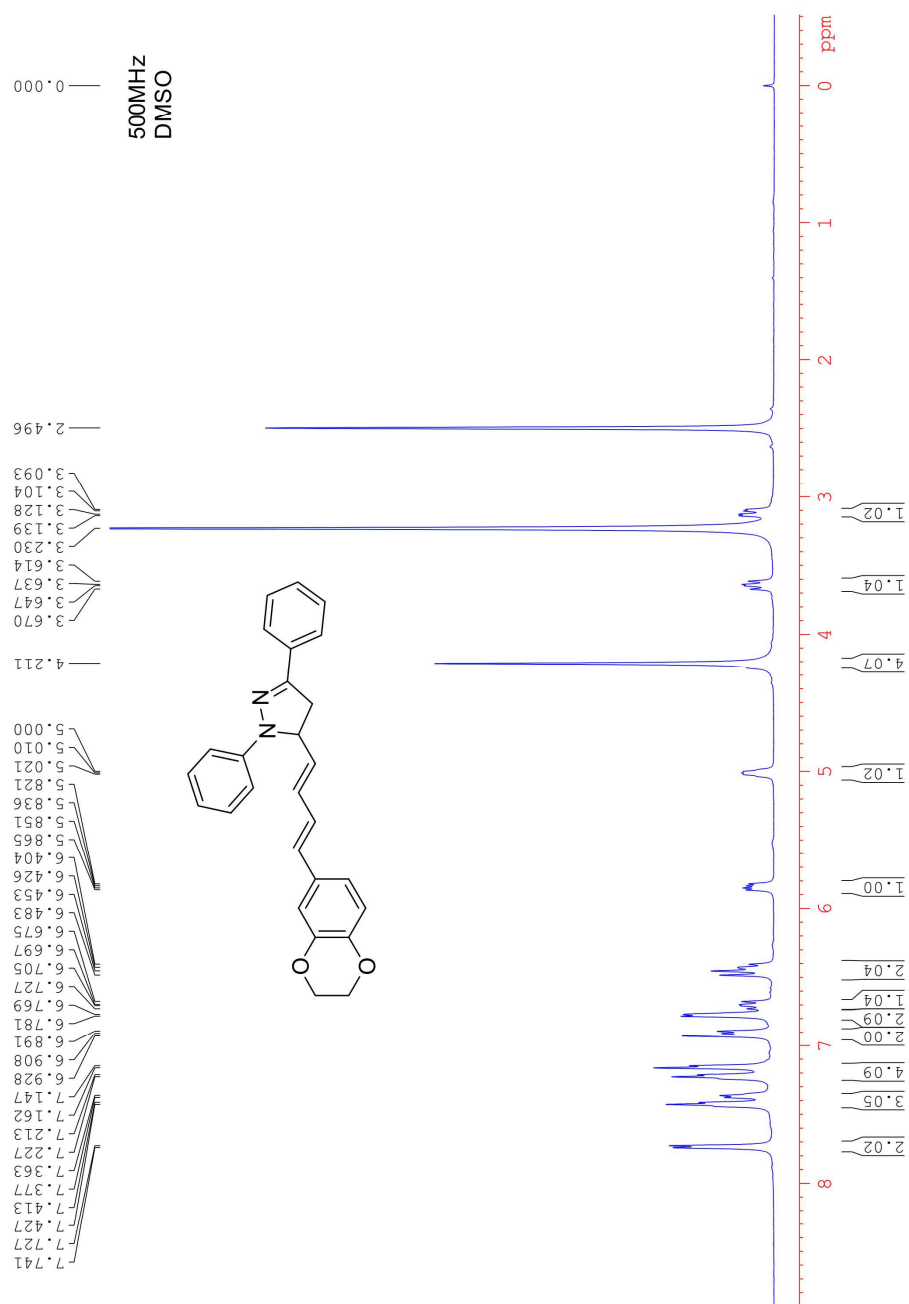
compound VIIIc



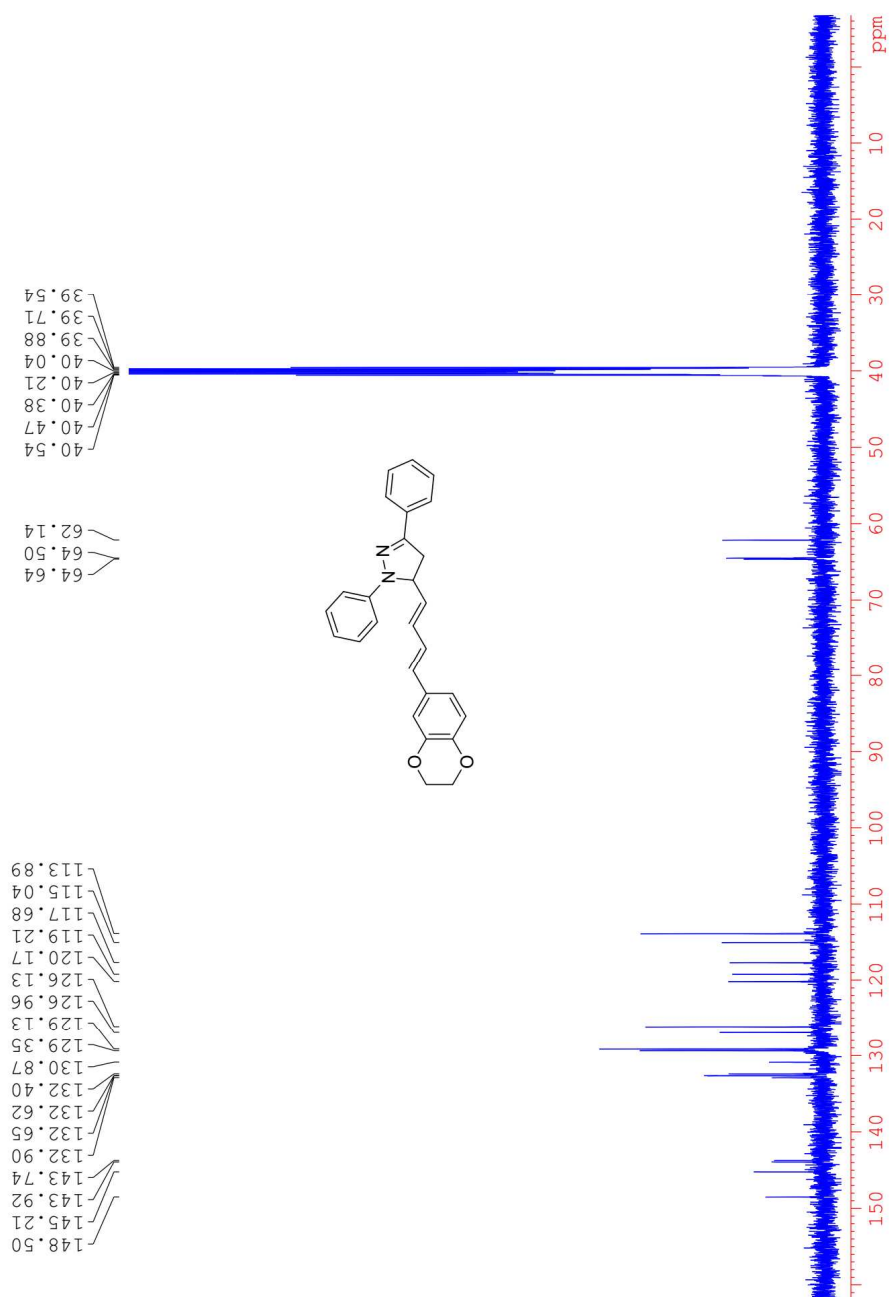
compound VIIIc



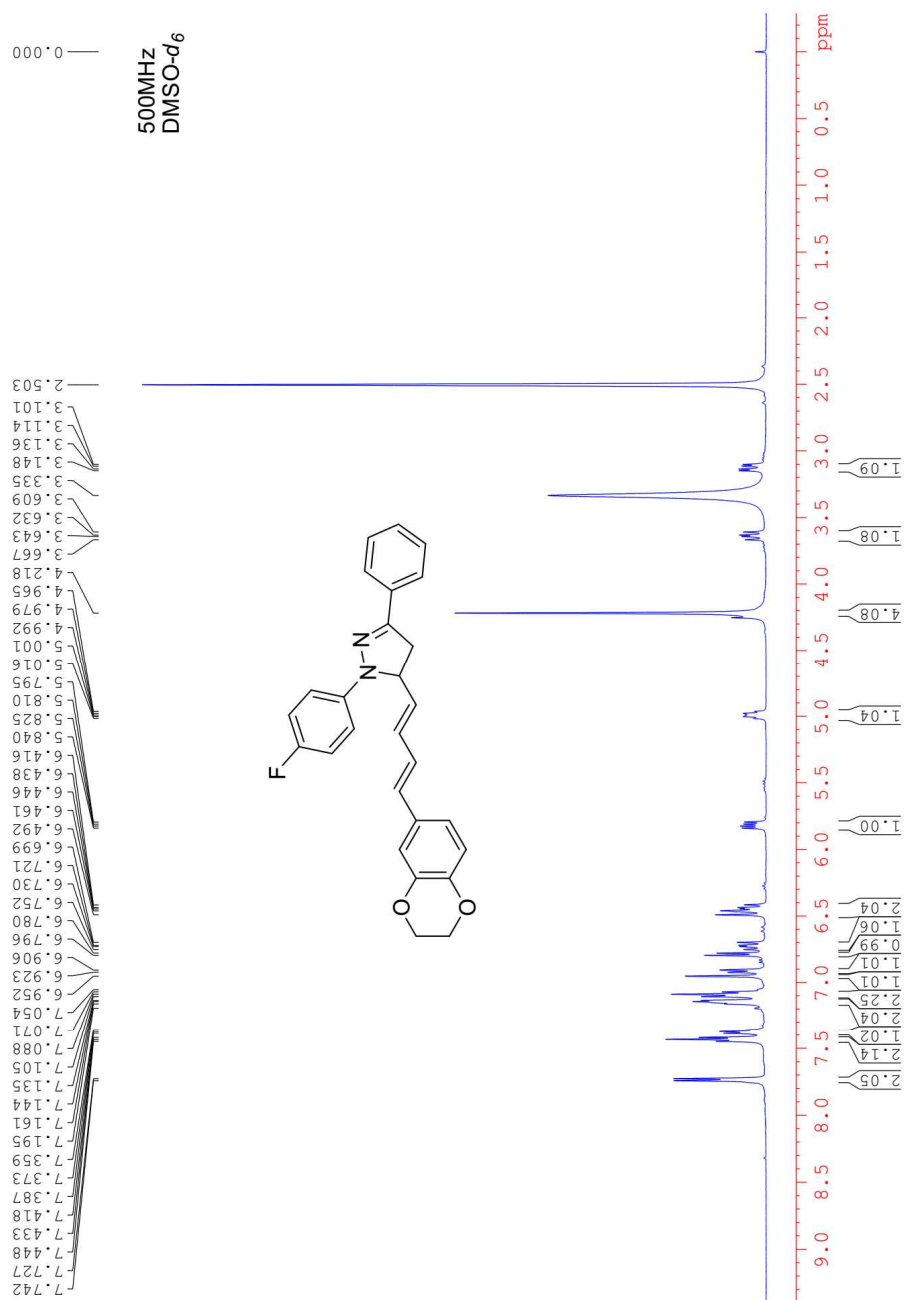
compound IXa



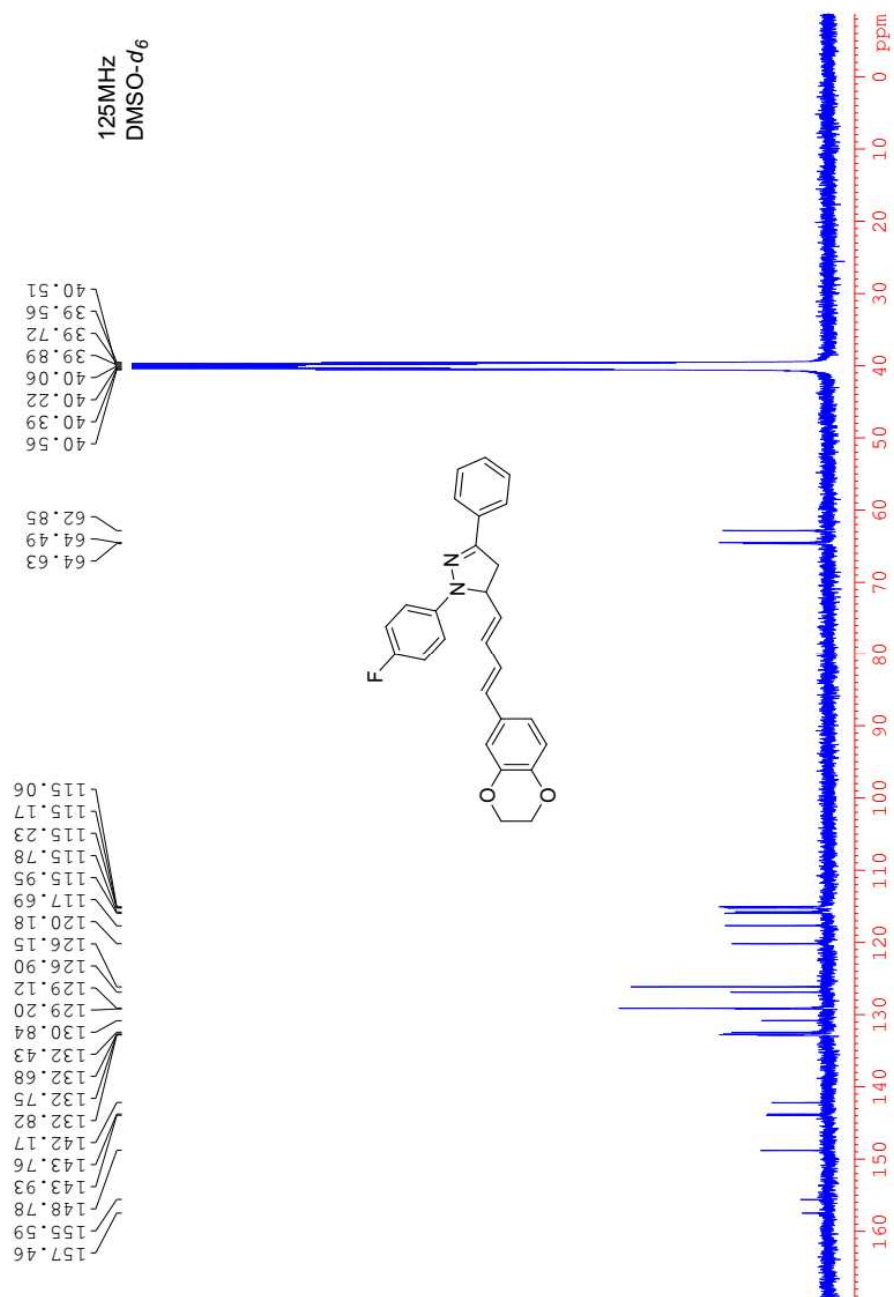
compound IXa



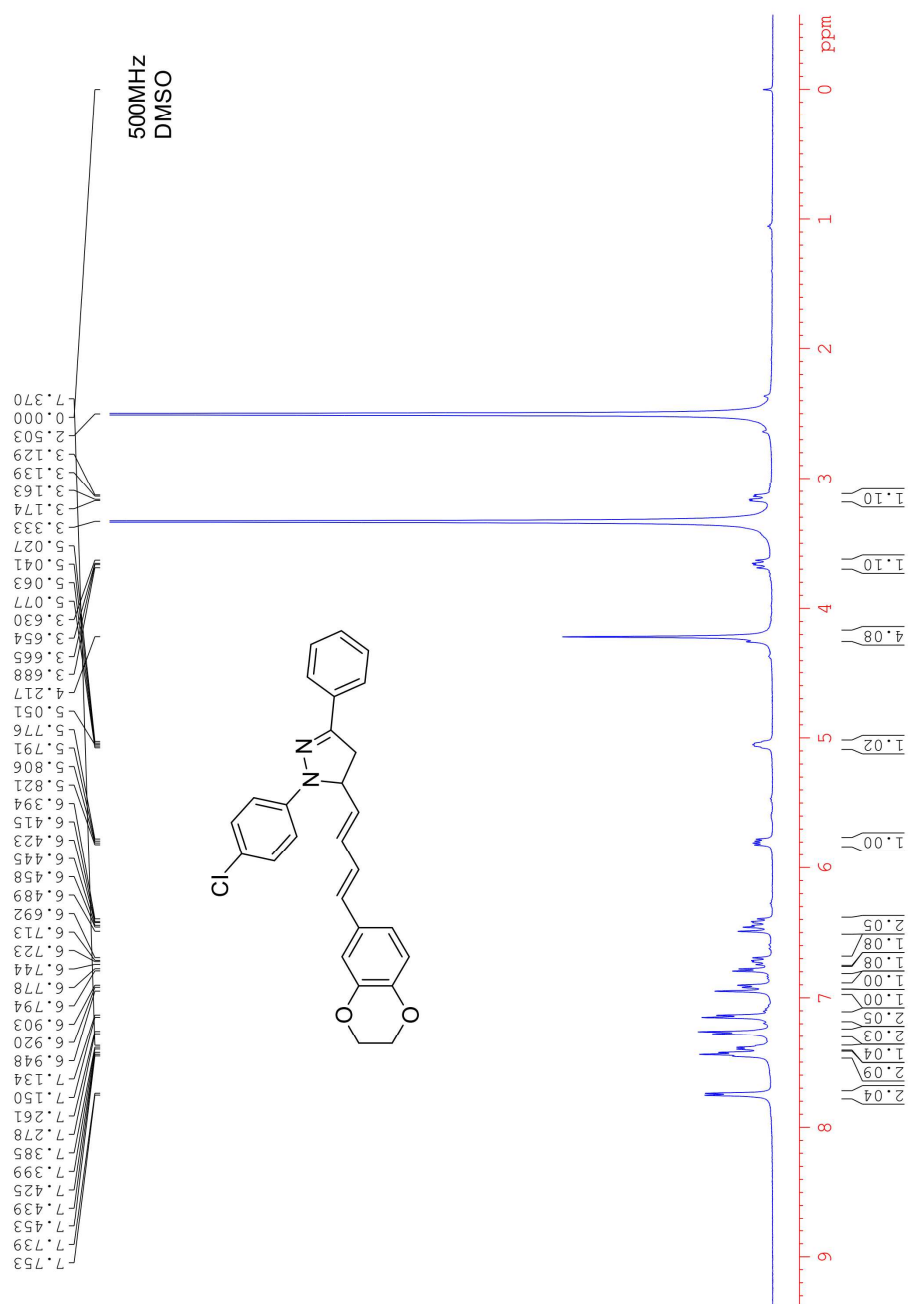
# compound IXb



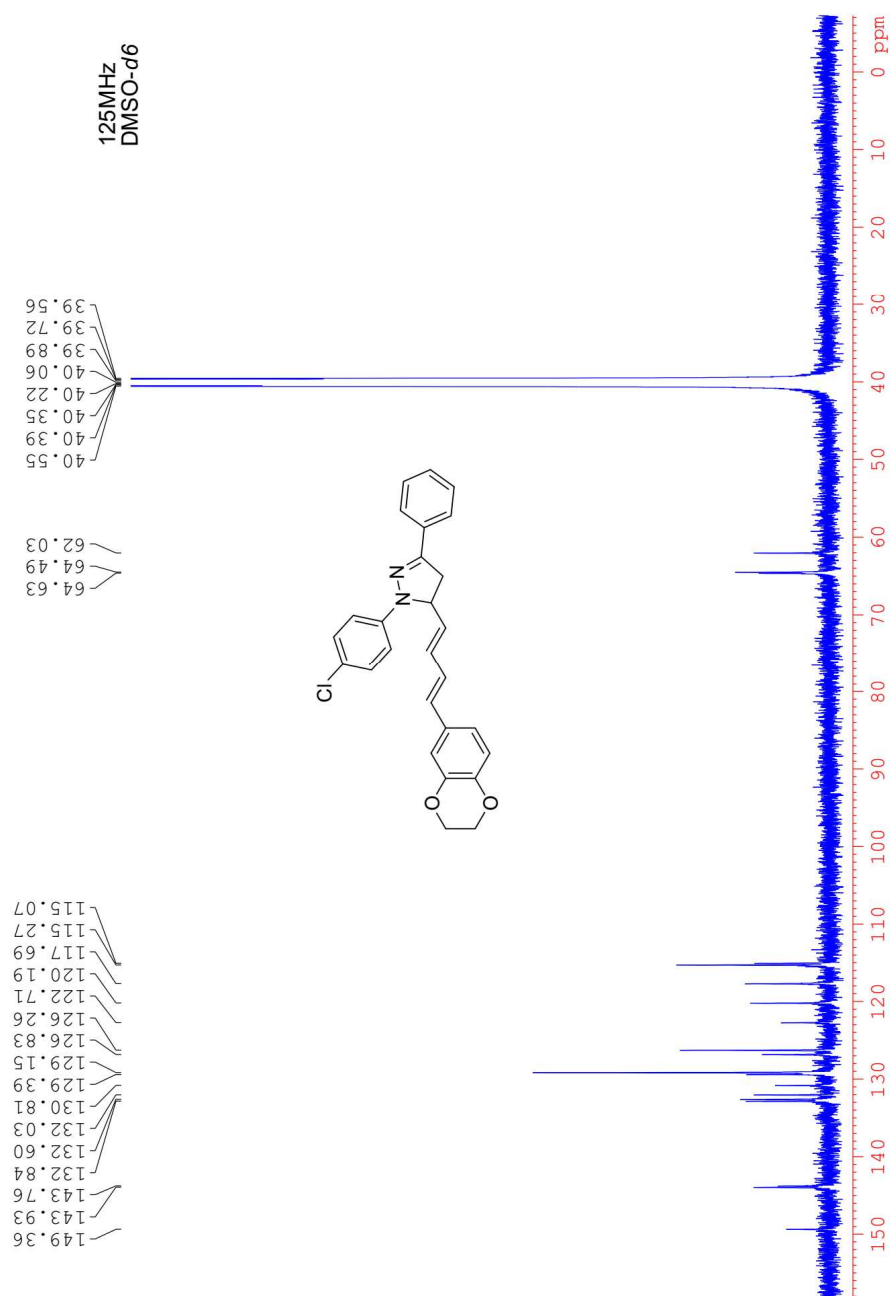
compound IXb



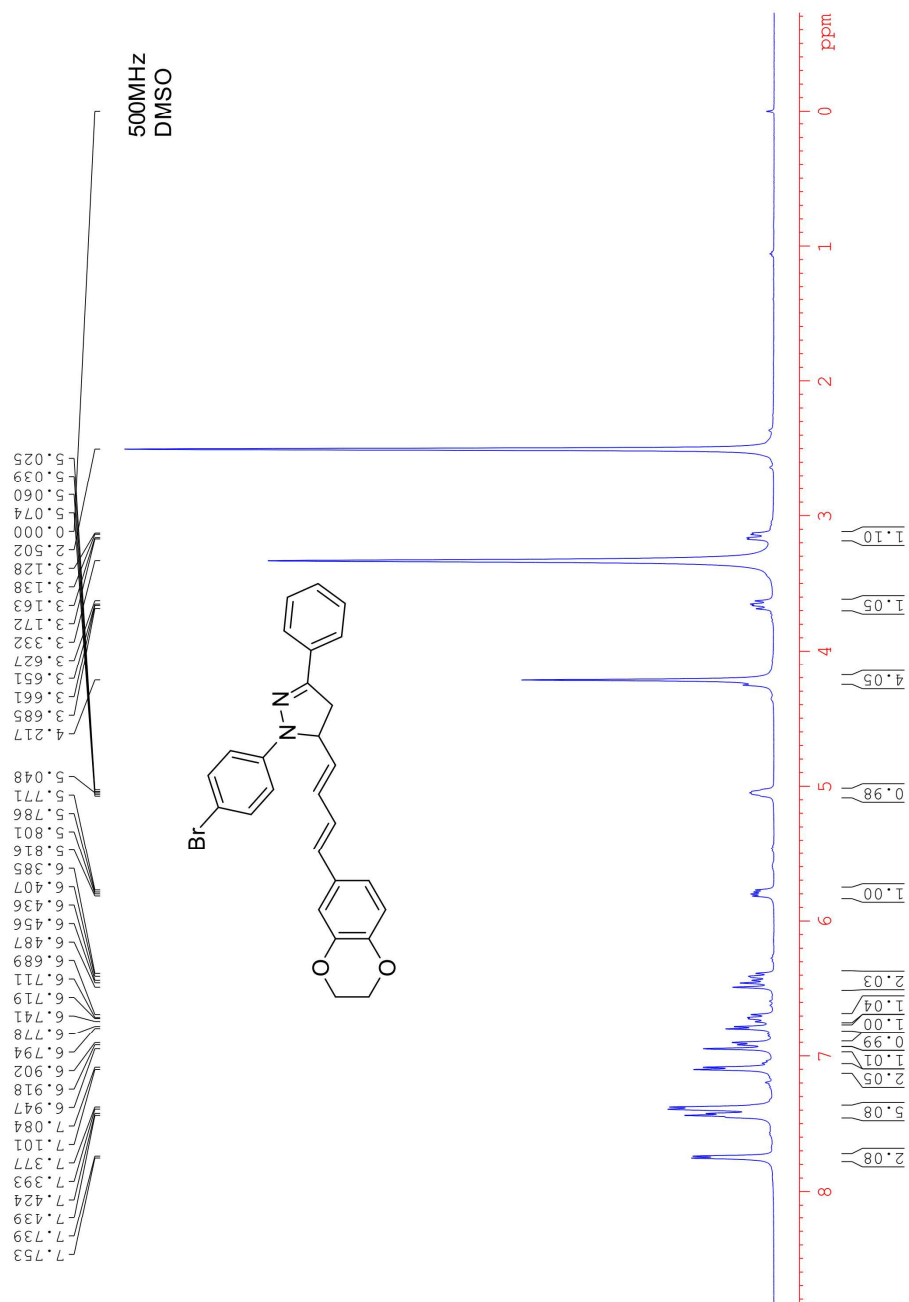
# compound IXc



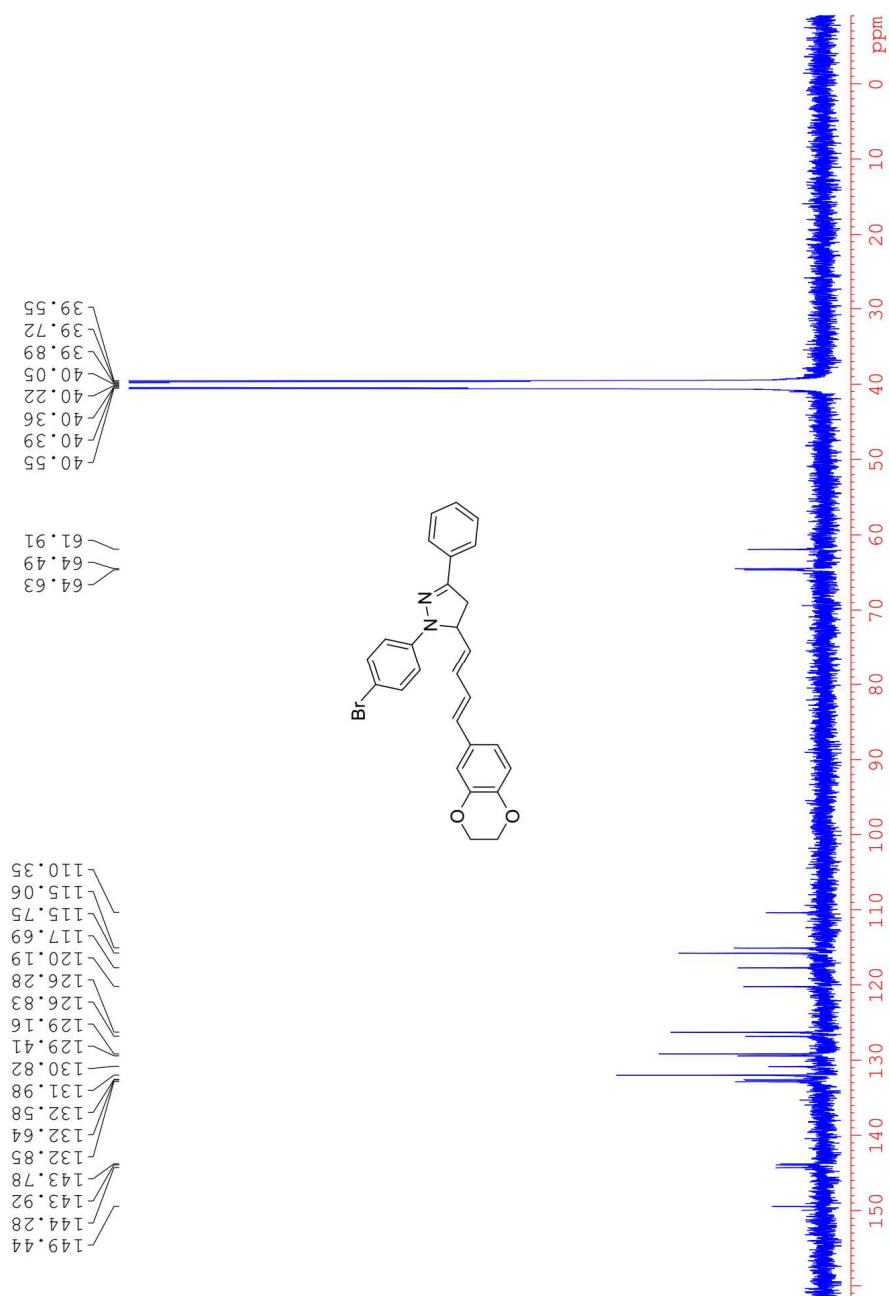
compound IXc



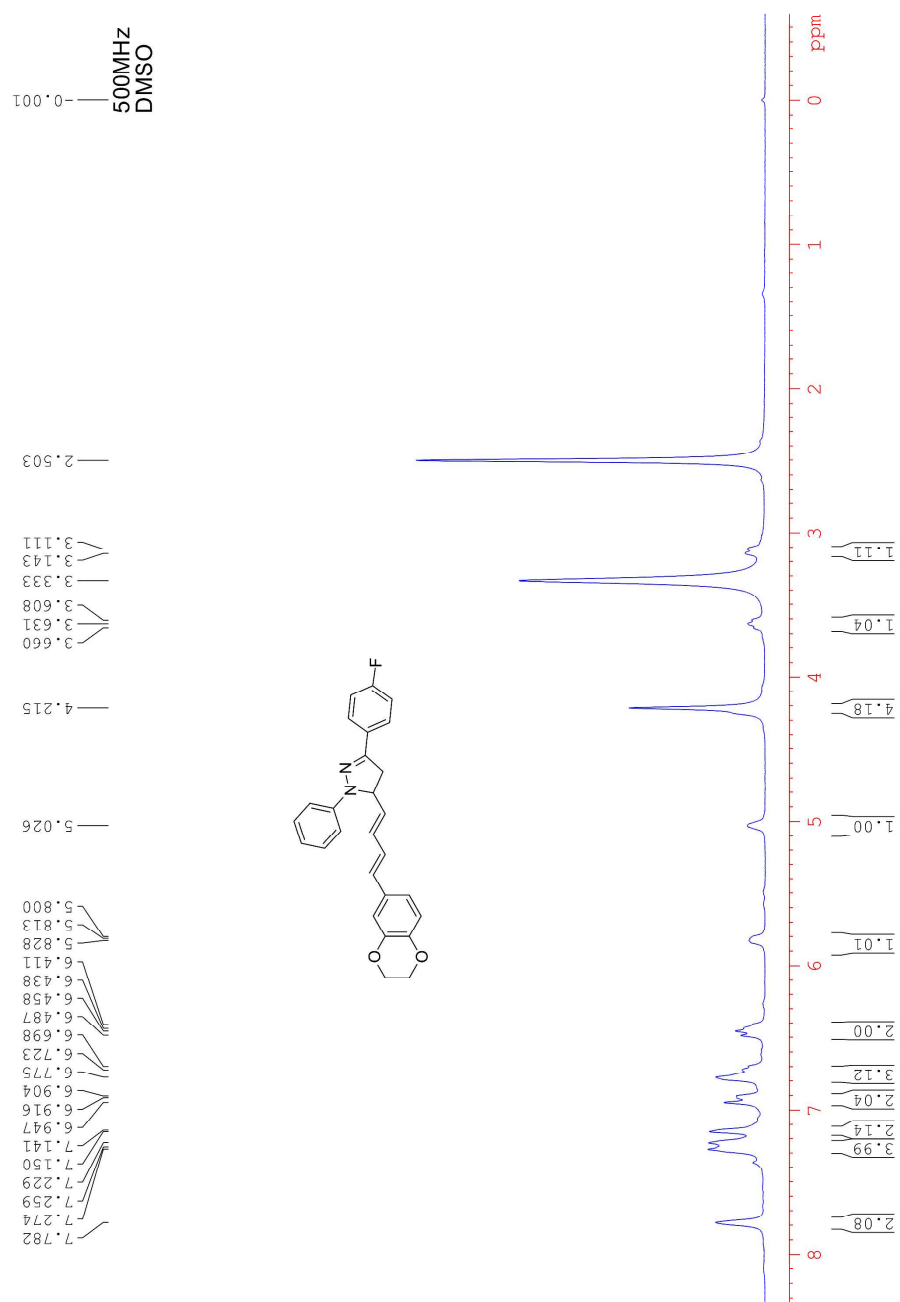
**compound IXd**



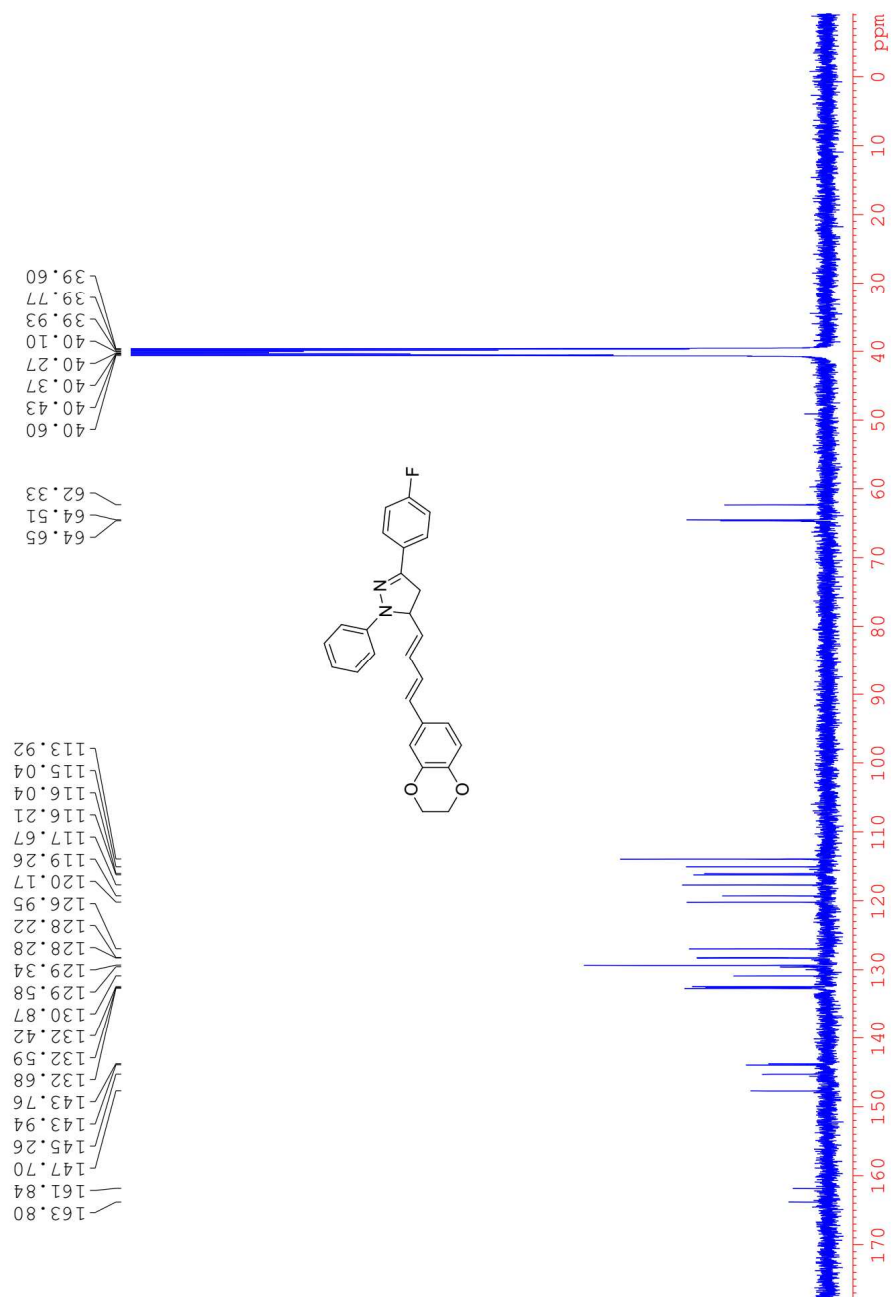
compound IXd



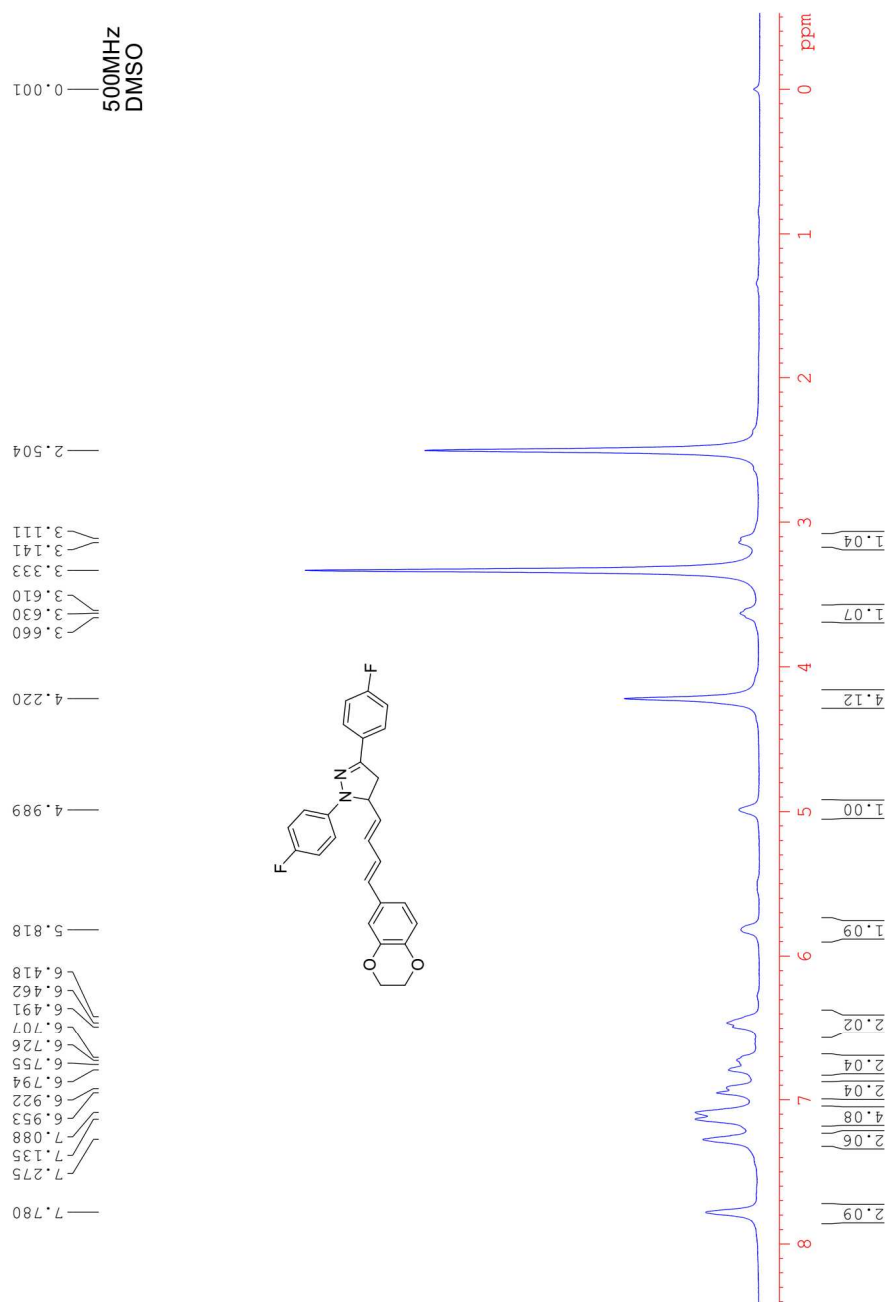
# compound IXe



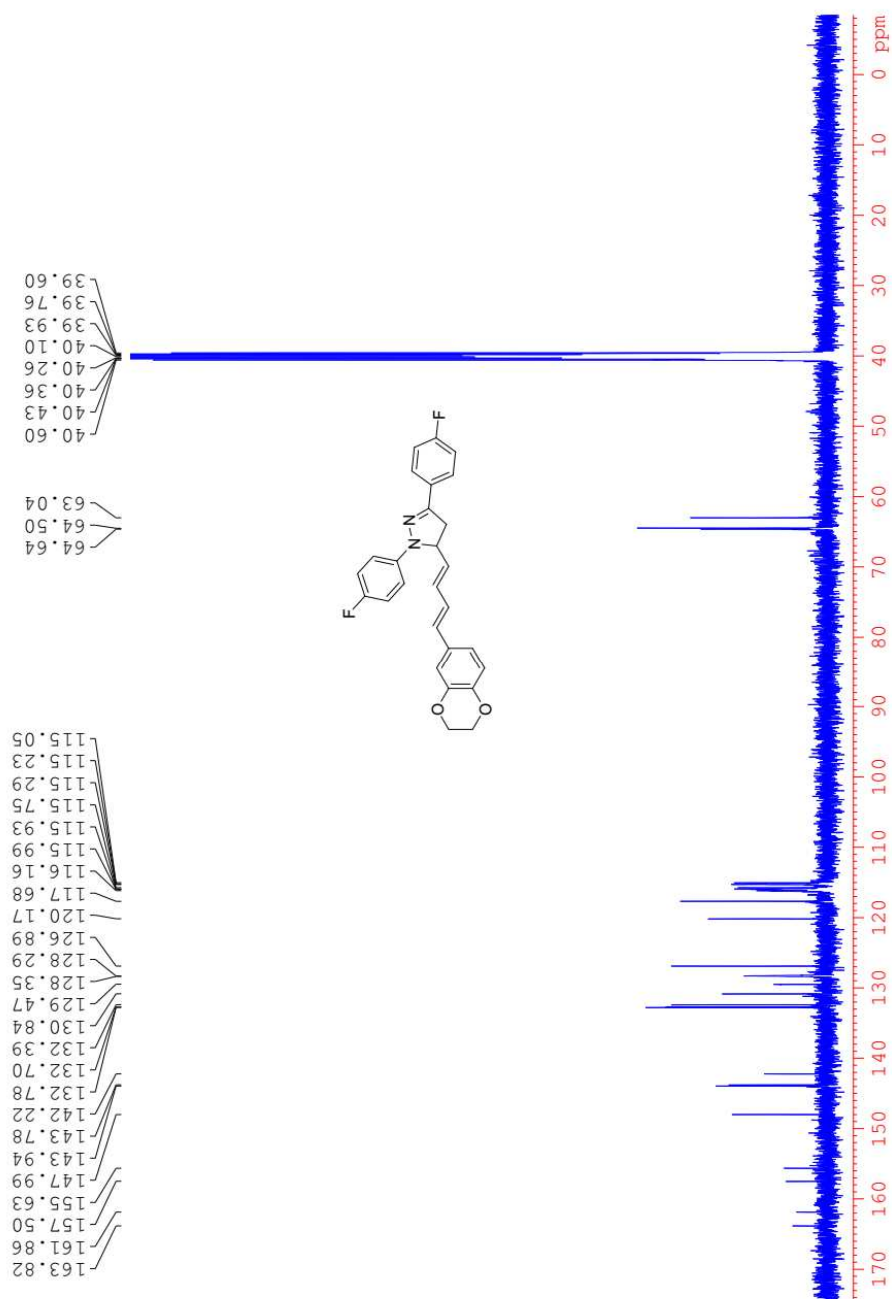
compound IXe



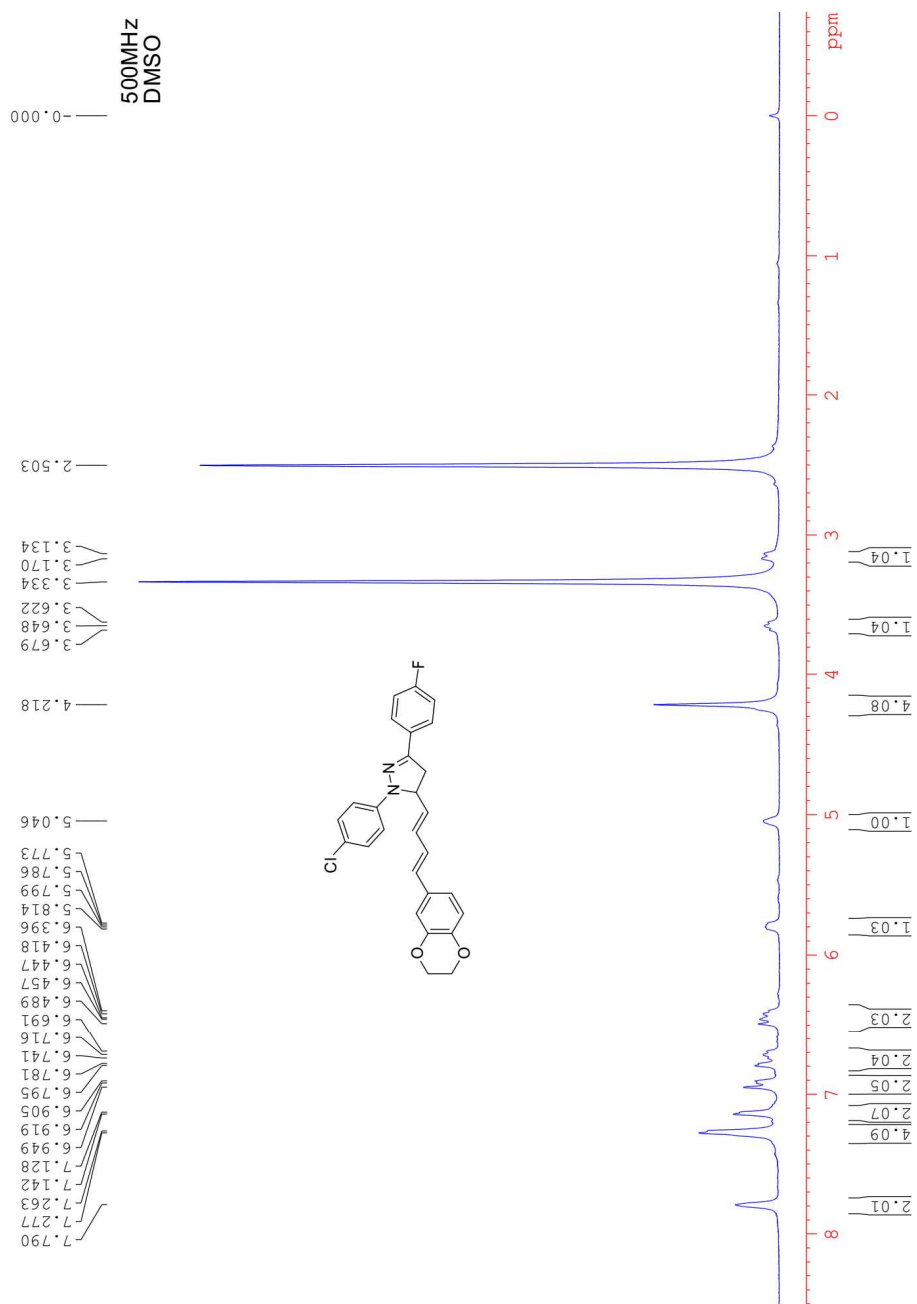
compound IXf



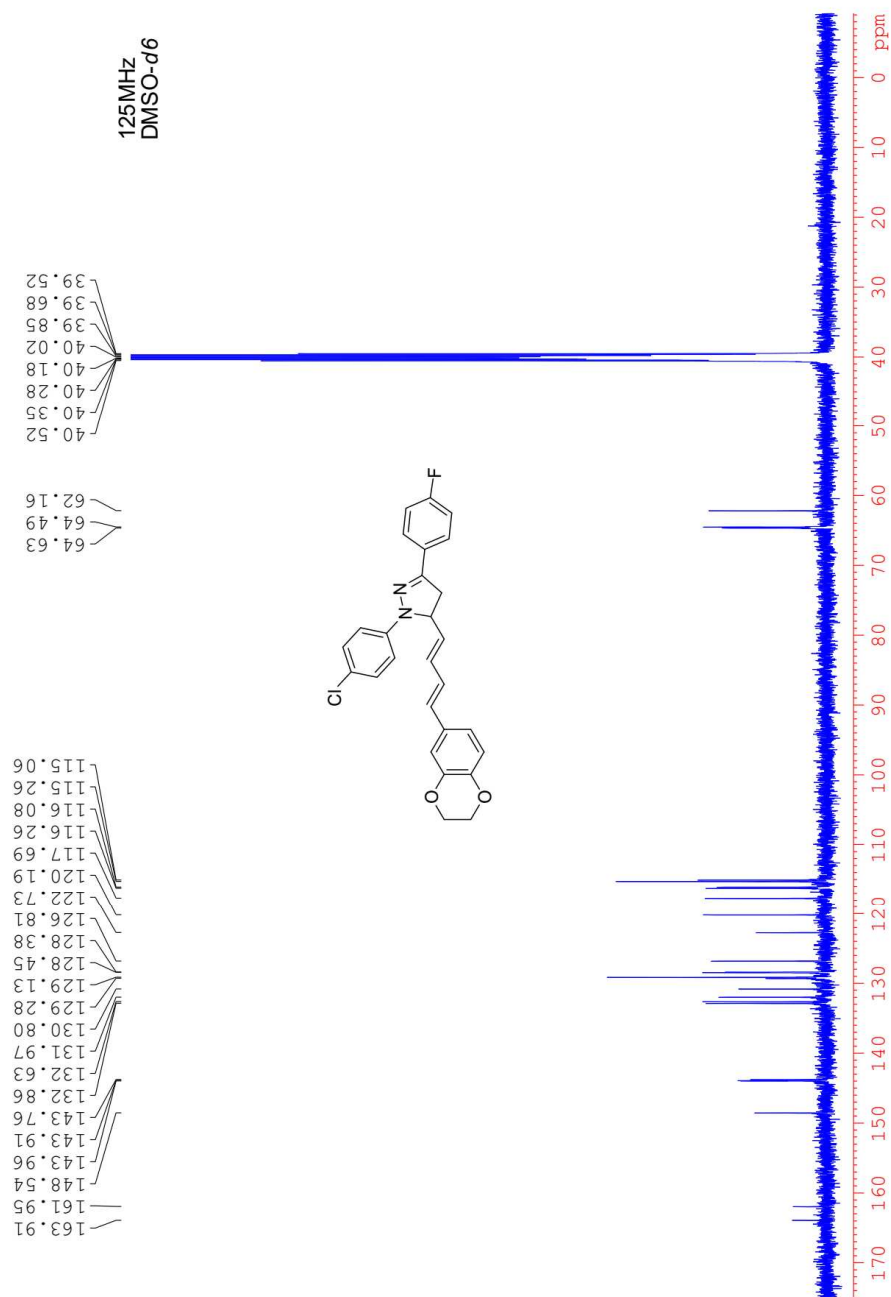
compound IXf



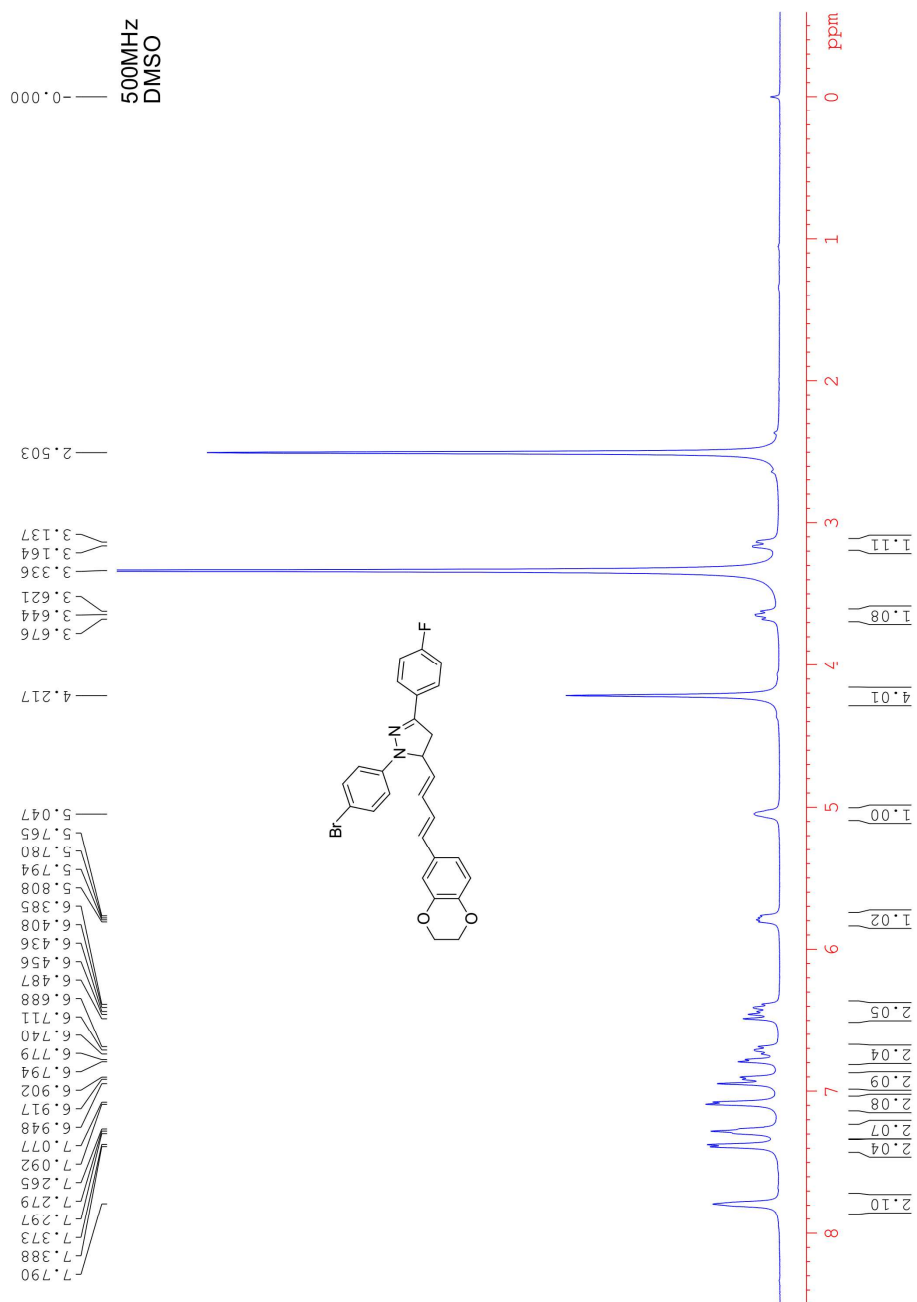
compound IXg



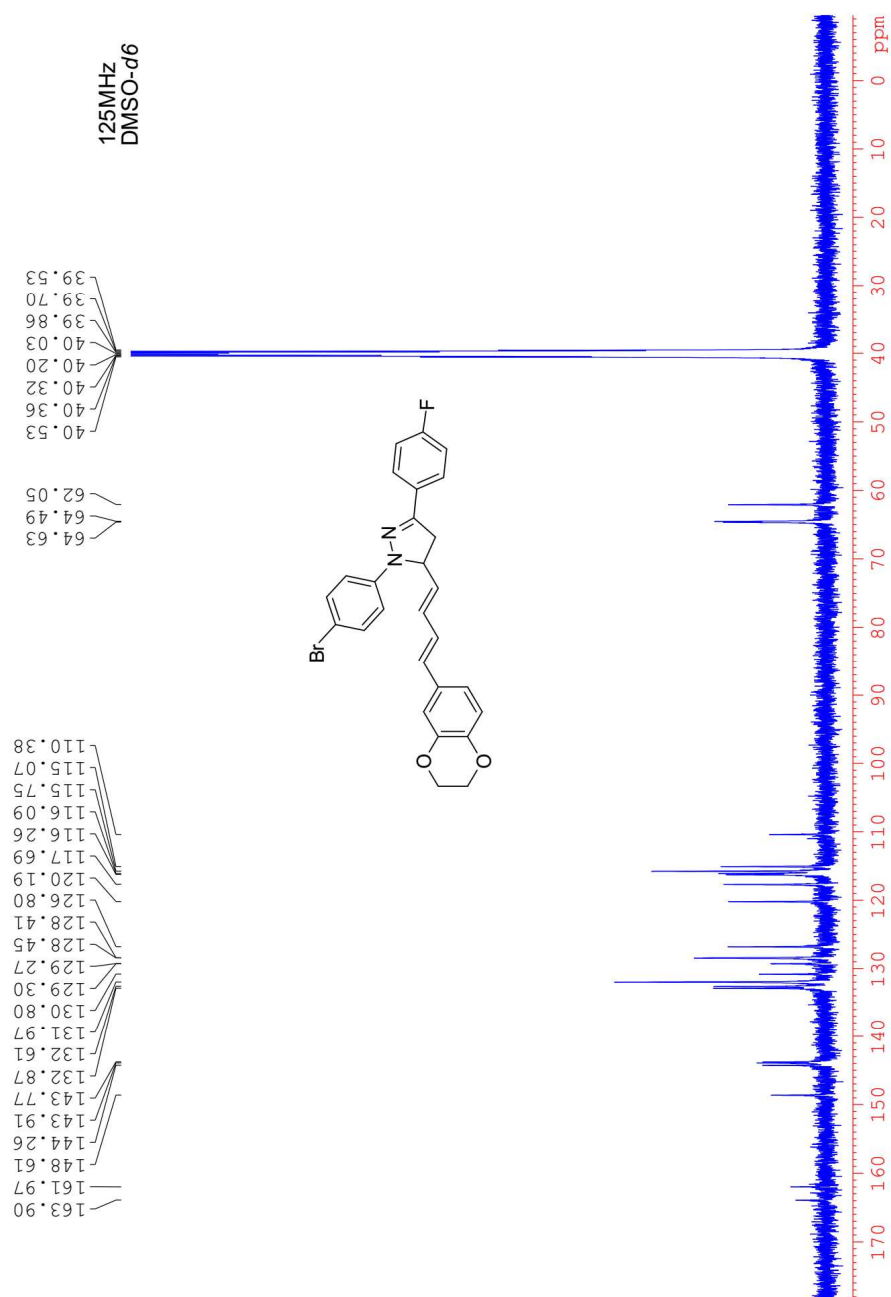
compound IXg



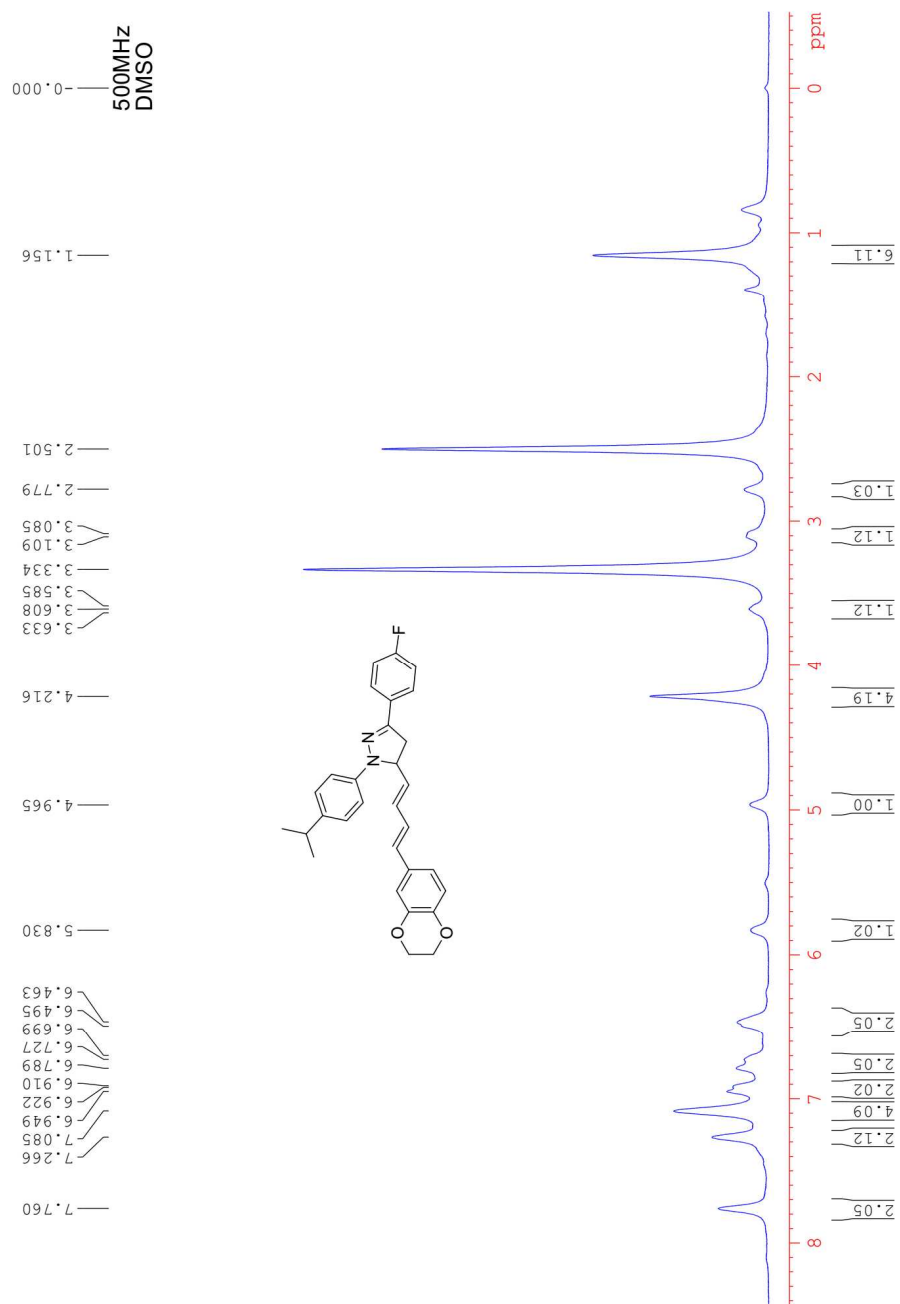
# compound IXh



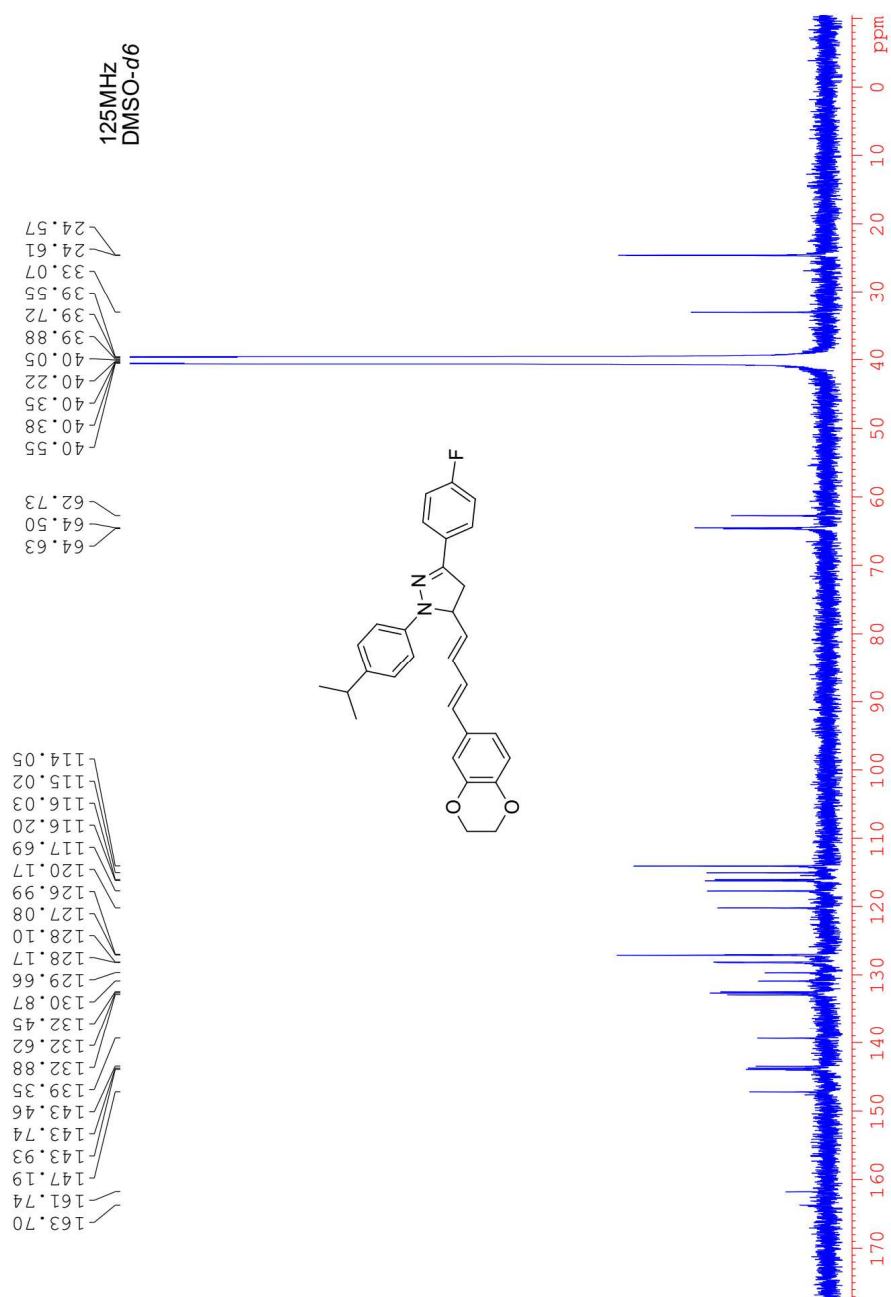
compound IXh



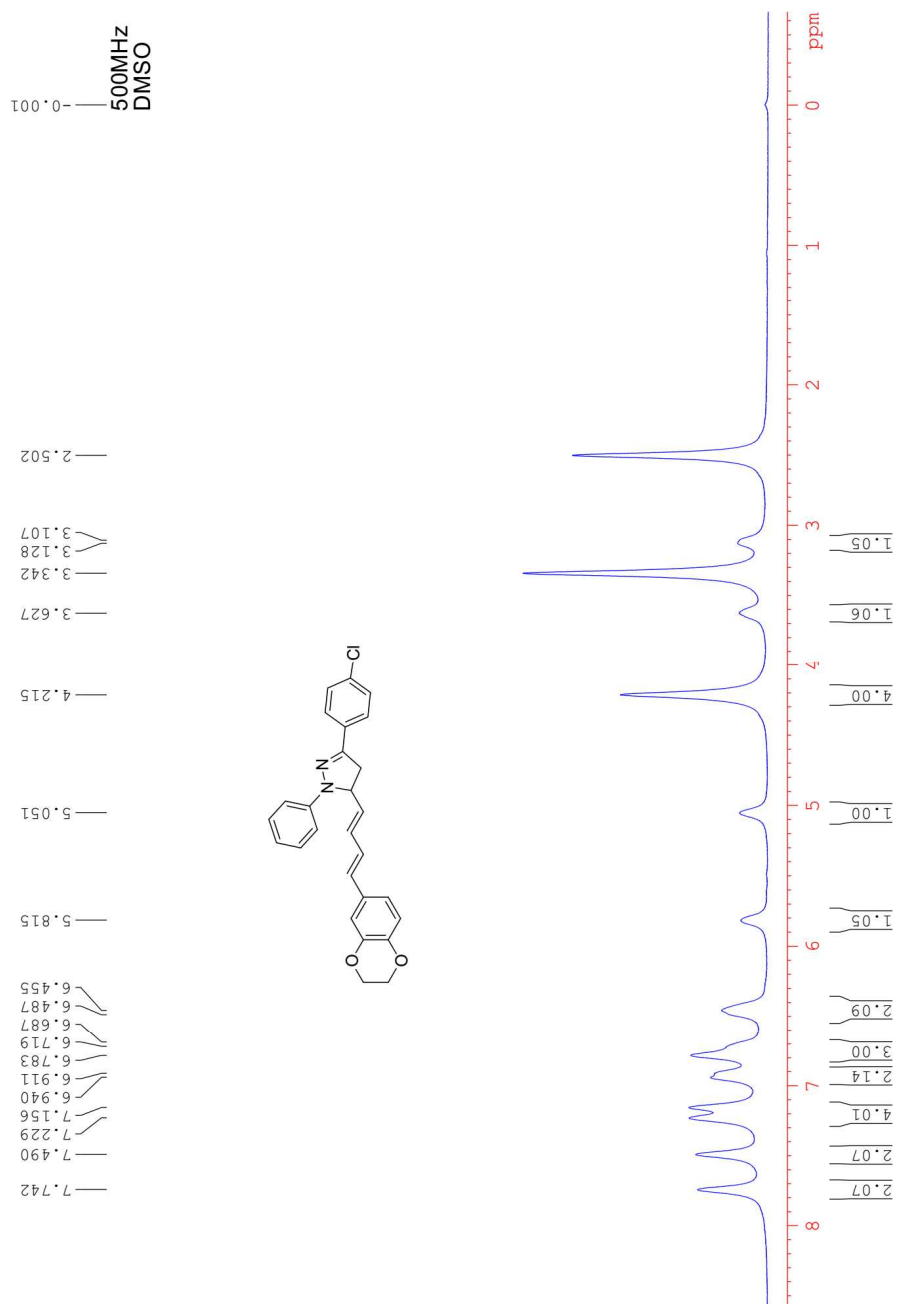
# compound IXi



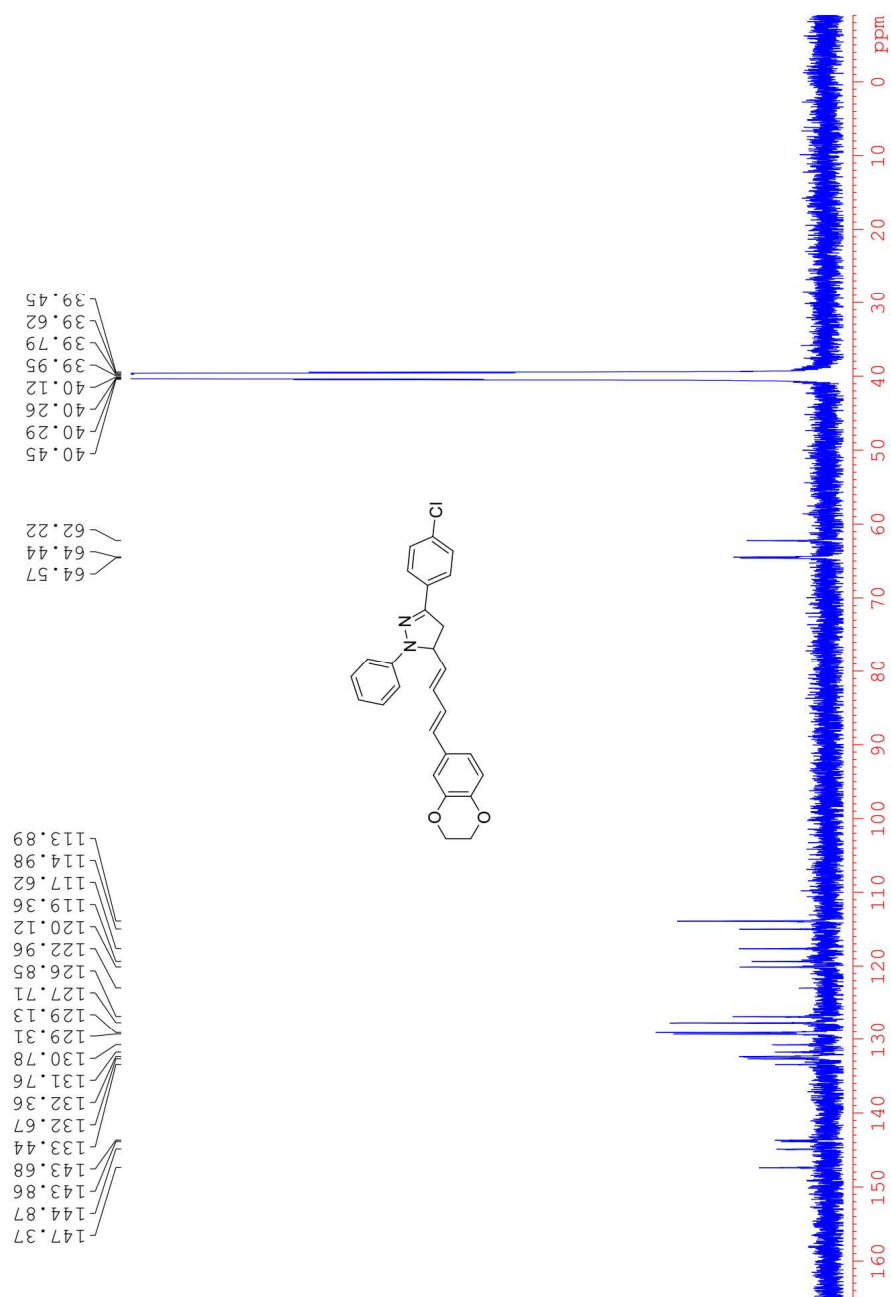
compound IXi



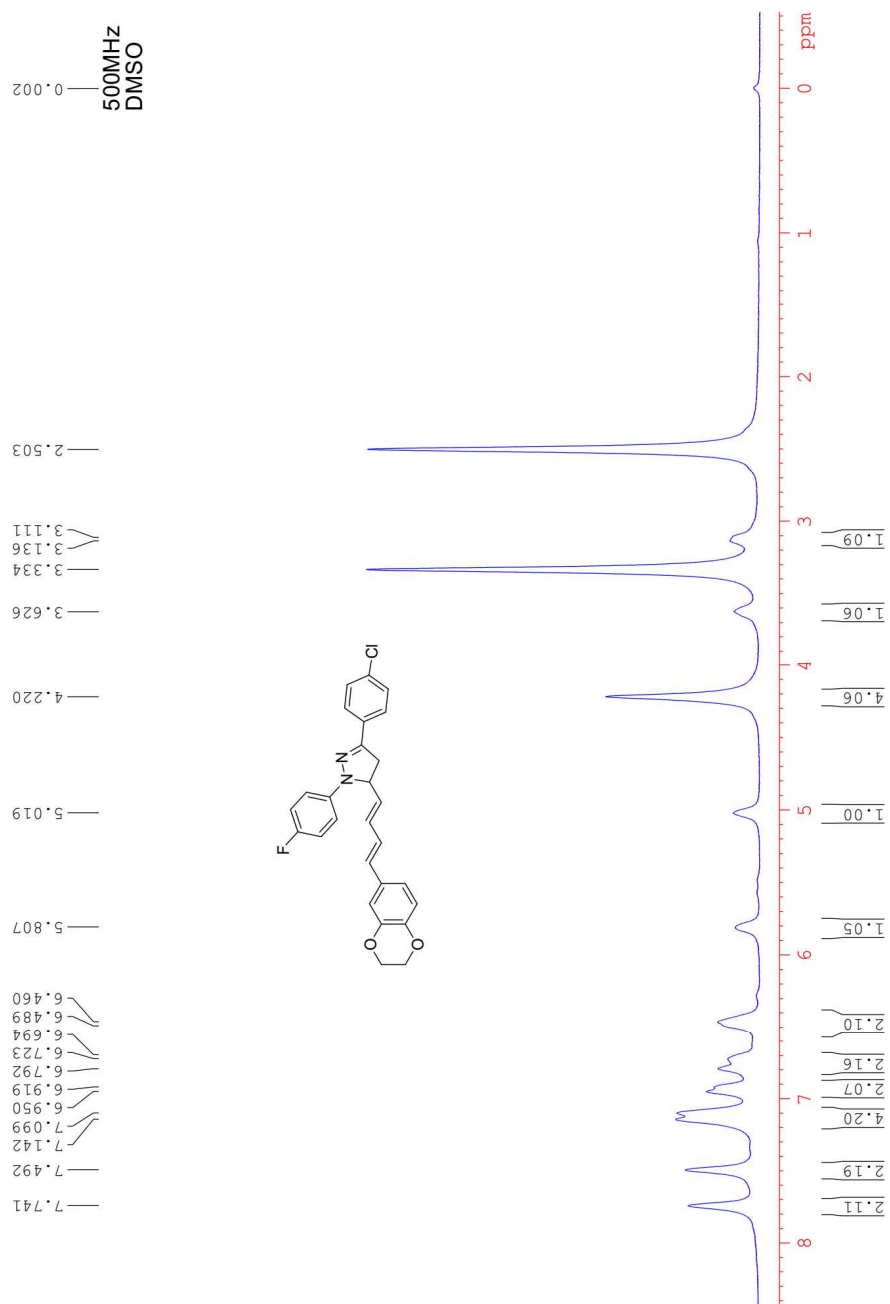
compound IXj



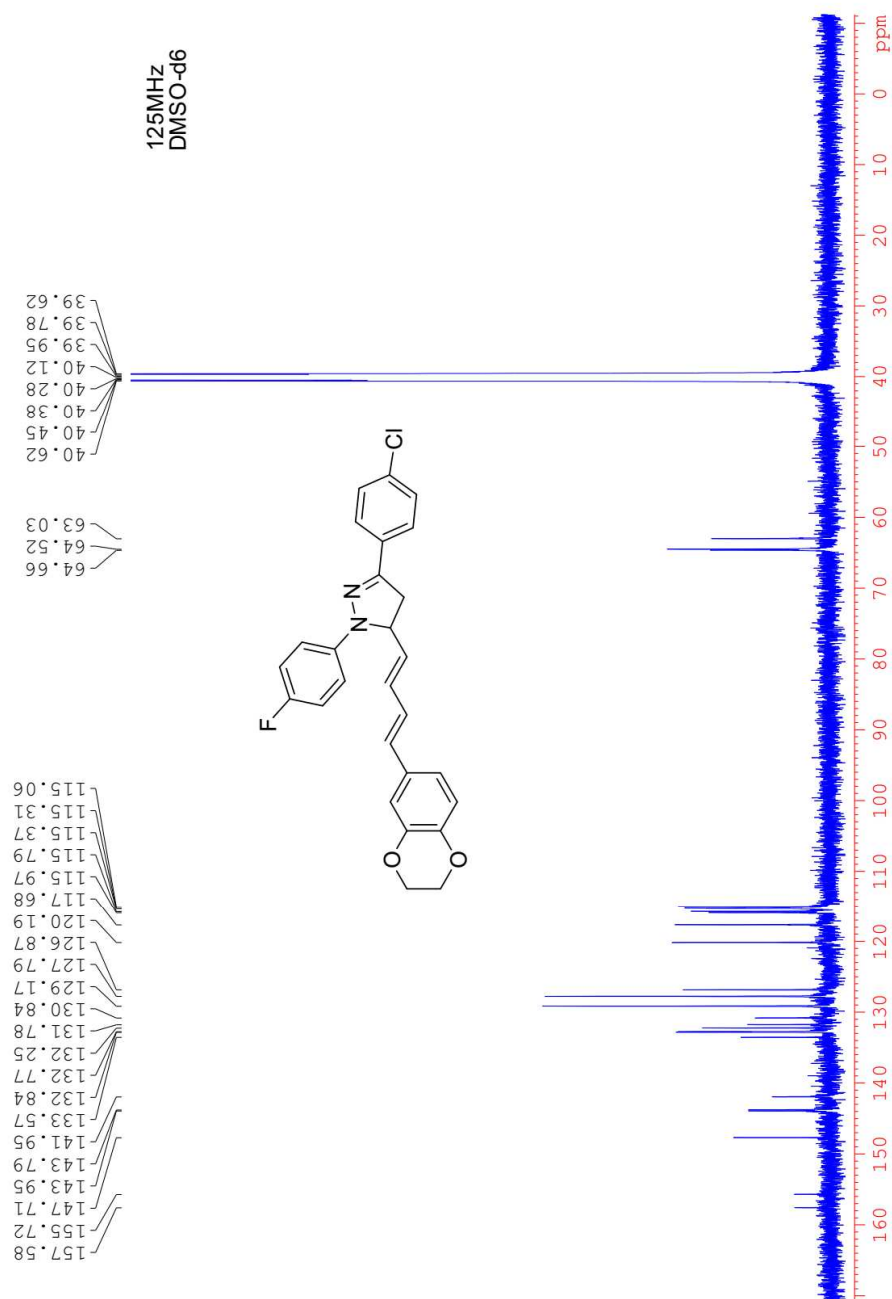
compound IXj



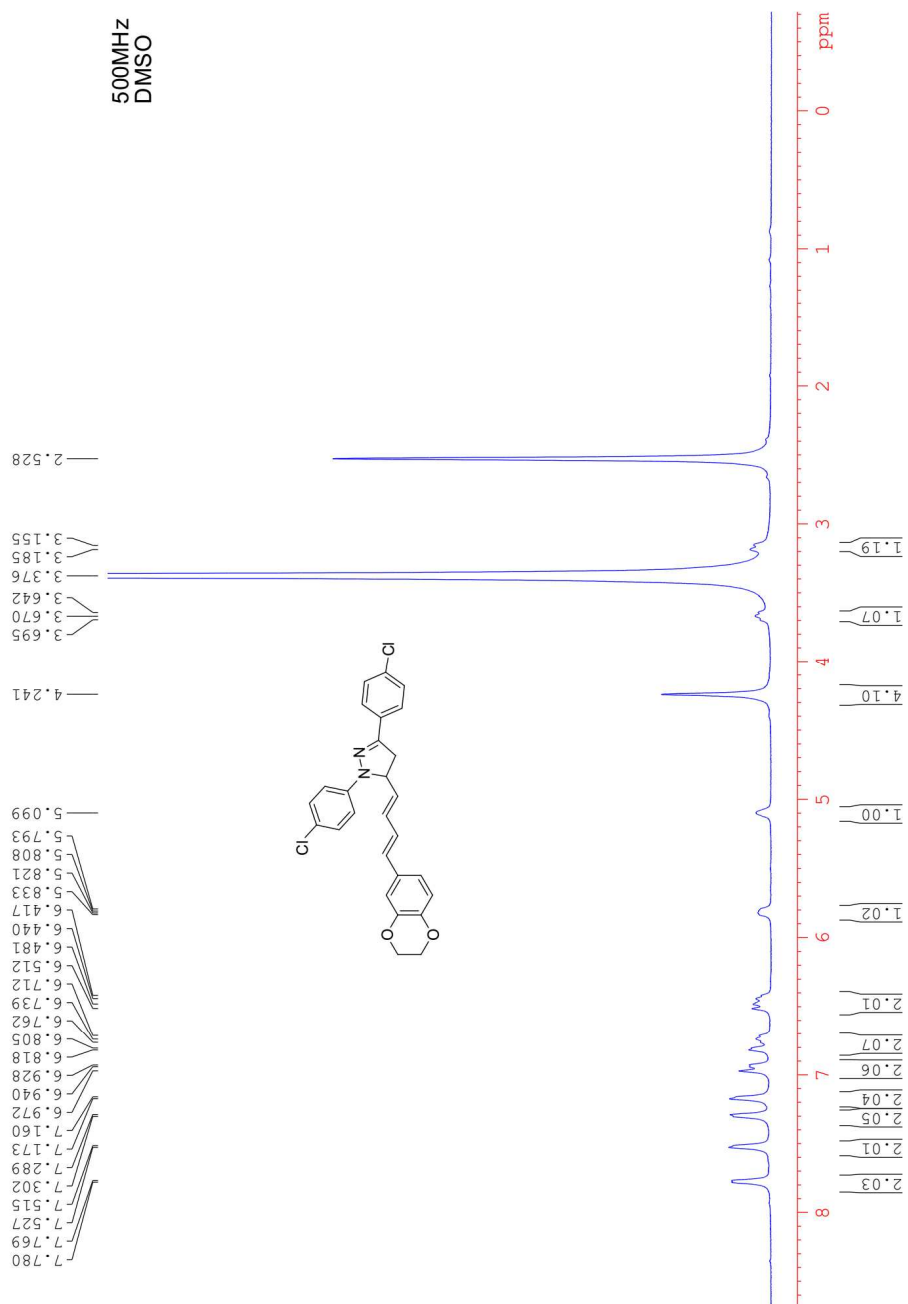
compound IXk



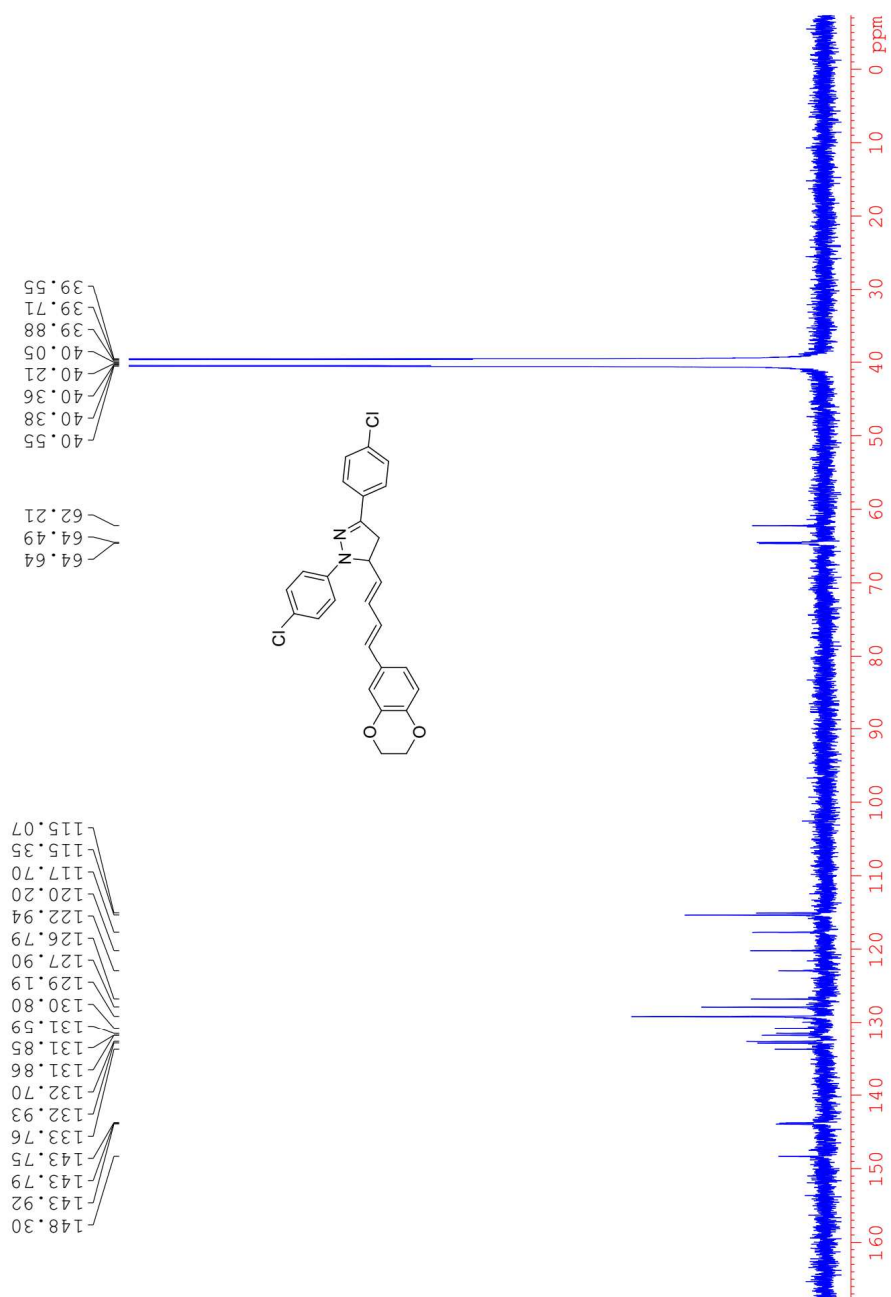
# compound IXk



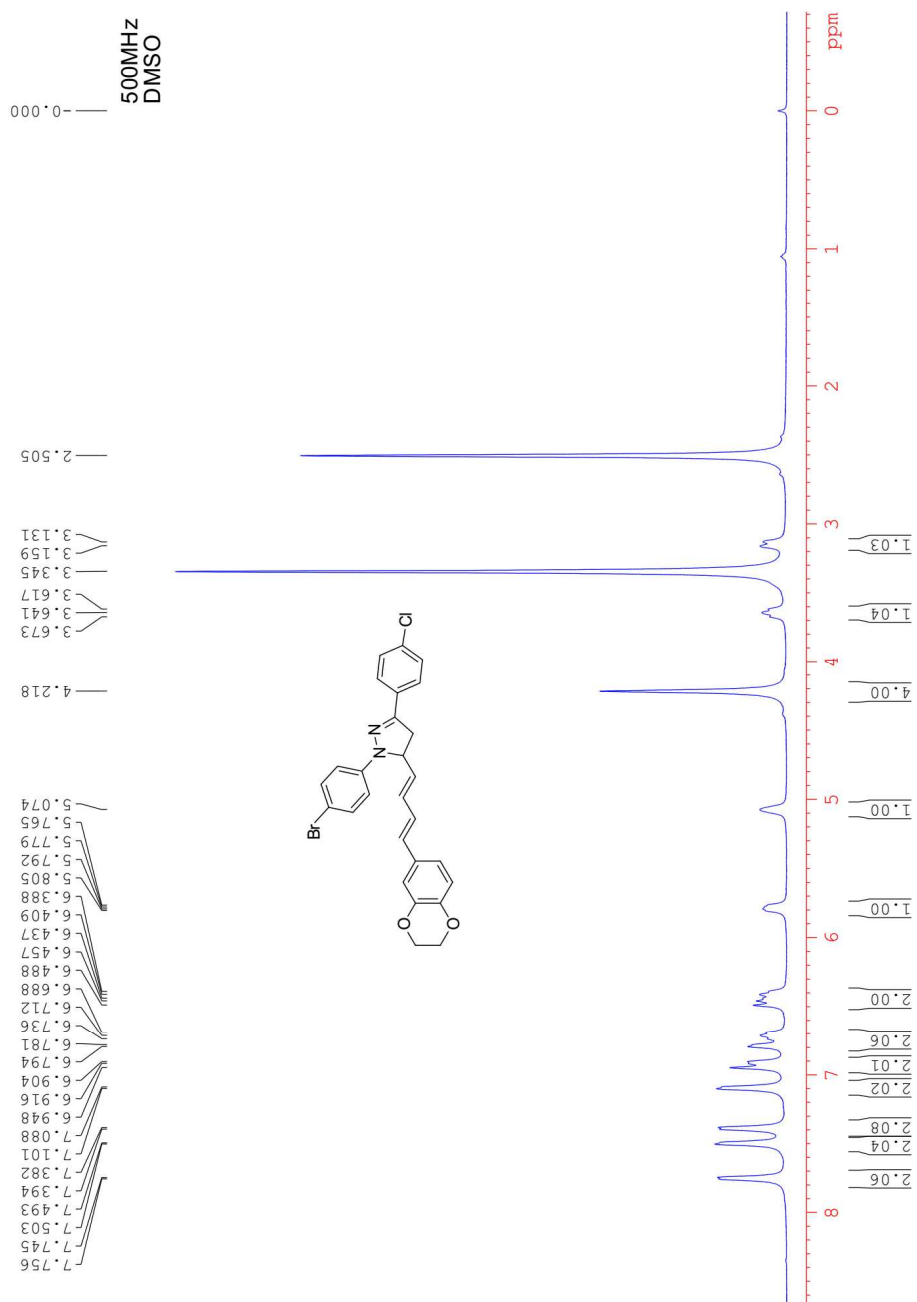
# compound IXI



compound IXI



**compound IXm**



compound IXm

