

Supporting Information  
for DOI: 10.1055/s-0043-1775443  
© 2025. Thieme. All rights reserved.  
Georg Thieme Verlag KG, Oswald-Hesse-Straße 50,  
70469 Stuttgart, Germany

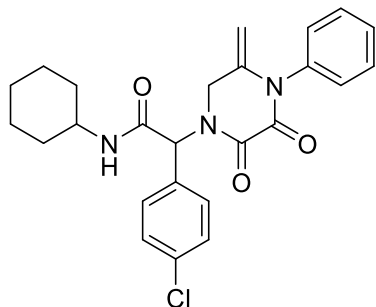
## Supporting Information

### Experimental section:

**General procedures.** All reagents were provided by commercial sources (Merck and Sigma Aldrich) and used as received. All solvents were dried and distilled before use.  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectra were recorded on a Bruker DRX-300 (at 300.1 and 75.5 MHz) spectrometer in dimethyl sulfoxide ( $\text{DMSO-}d_6$ ). Chemical shifts are expressed in parts per million (ppm), and coupling constants are reported in hertz (Hz). Melting points were measured using an Electrothermal 9100 apparatus.

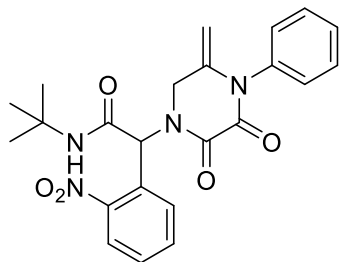
The structures of the compounds **6** were confirmed by  $^1\text{H}$  and  $^{13}\text{C}$  NMR spectroscopic data. In the  $^1\text{H}$  NMR spectrum of *N*-(*tert*-butyl)-2-(4-chlorophenyl)-2-(4-(4-methoxyphenyl)-5-methylene-2,3-dioxopiperazin-1-yl)acetamide **6j**, a singlet signal was observed at  $\delta = 1.30$  ppm for the three methyl groups of the *tert*-butyl group. Another singlet signal at  $\delta = 3.78$  ppm with an integral of three was apparent for the methoxy group. Two doublets at  $\delta = 3.87$  and 4.55 ppm with coupling constants of 14.3 Hz revealed the presence of diastereotopic hydrogens in the methylene group. Two singlet signals at  $\delta = 3.88$  and 4.42 ppm with an integral of one for each was apparent for the two H atoms of the ethylene group. Characteristic signals for the 8 aromatic H-atoms were observed as four doublet peaks in the range of  $\delta = 7.03$ -7.52 ppm. The hydrogen of the NH group appeared as a singlet at  $\delta = 8.18$  ppm. Furthermore, the  $^{13}\text{C}$  NMR spectrum indicated 18 distinct resonances.

### Physical data of compounds 6a-o:



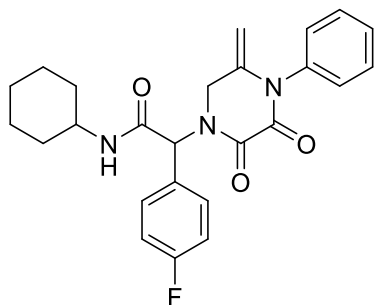
### 2-(4-Chlorophenyl)-*N*-cyclohexyl-2-(5-methylene-2,3-dioxo-4-phenylpiperazin-1-yl)acetamide (**6a**)

White solid (416.0 mg, 92%); m.p. 148-150 °C;  $^1\text{H}$  NMR ( $\text{DMSO-}d_6$ , 300 MHz):  $\delta$  8.41 (d, 1H,  $J = 7.7$  Hz), 7.47-7.51 (m, 4H), 7.42 (d, 1H,  $J = 7.0$  Hz), 7.36 (d, 2H,  $J = 8.5$  Hz), 7.27 (d, 2H,  $J = 7.6$  Hz), 6.21 (s, 1H), 4.56 (d, 1H,  $J = 14.1$  Hz), 4.44 (s, 1H), 3.95 (d, 1H,  $J = 14.2$  Hz), 3.82 (s, 1H), 3.59-3.69 (m, 1H), 1.52-1.83 (m, 5H), 1.05-1.34 (m, 5H).  $^{13}\text{C}\{^1\text{H}\}$  NMR ( $\text{DMSO-}d_6$ , 75 MHz):  $\delta$  167.1, 156.6, 155.2, 140.3, 138.2, 134.1, 133.6, 131.1, 130.1, 129.3, 128.9, 128.6, 98.1, 59.0, 48.4, 46.4, 32.7, 32.6, 25.6, 25.0, 24.9. Anal. Calcd for  $\text{C}_{25}\text{H}_{26}\text{ClN}_3\text{O}_3$ : C, 66.44; H, 5.80; N, 9.30. Found: C, 66.57; H, 5.73; N, 9.21.



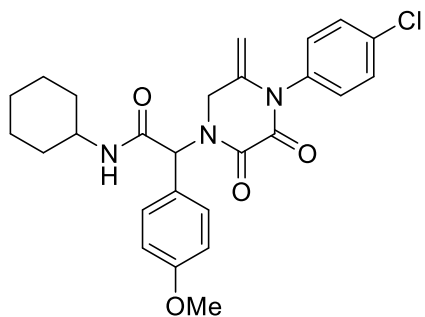
***N*-(*tert*-butyl)-2-(5-methylene-2,3-dioxo-4-phenylpiperazin-1-yl)-2-(2-nitrophenyl)acetamide (6b)**

Yellow solid (410.0 mg, 94%); m.p. 156-158 °C;  $^1\text{H}$  NMR (DMSO- $d_6$ , 300 MHz):  $\delta$  8.31 (s, 1H), 8.12 (dd, 1H,  $J = 8.1, 1.4$  Hz), 7.81 (td, 1H,  $J = 7.6, 1.2$  Hz), 7.63-7.70 (m, 1H), 7.58 (d, 2H,  $J = 8.1$  Hz), 7.53 (d, 2H,  $J = 7.7$  Hz), 7.34 (d, 2H,  $J = 7.1$  Hz), 6.49 (s, 1H), 4.60 (s, 1H), 4.40 (d, 1H,  $J = 14.2$  Hz), 4.17 (d, 1H,  $J = 14.2$  Hz), 3.94 (s, 1H), 1.28 (s, 9H).  $^{13}\text{C}\{^1\text{H}\}$  NMR (DMSO- $d_6$ , 75 MHz):  $\delta$  170.8, 166.0, 156.3, 155.4, 149.8, 140.0, 138.2, 134.2, 130.1, 130.0, 129.9, 129.0, 128.6, 125.6, 98.9, 59.6, 51.6, 46.7, 28.7. Anal. Calcd for  $\text{C}_{23}\text{H}_{24}\text{N}_4\text{O}_5$ : C, 63.29; H, 5.54; N, 12.84. Found: C, 63.40; H, 5.46; N, 12.78.



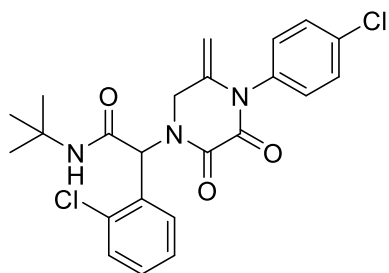
***N*-cyclohexyl-2-(4-fluorophenyl)-2-(5-methylene-2,3-dioxo-4-phenylpiperazin-1-yl)acetamide (6c)**

Yellow solid (392.0 mg, 90%); m.p. 117-119 °C;  $^1\text{H}$  NMR (DMSO- $d_6$ , 300 MHz):  $\delta$  8.41 (d, 1H,  $J = 7.6$  Hz), 7.48-7.53 (m, 2H), 7.36-7.45 (m, 3H), 7.25-7.31 (m, 4H), 6.21 (s, 1H), 4.56 (d, 1H,  $J = 14.2$  Hz), 4.44 (s, 1H), 3.93 (d, 1H,  $J = 14.1$  Hz), 3.82 (s, 1H), 3.60-3.70 (m, 1H), 1.52-1.83 (m, 5H), 1.08-1.34 (m, 5H).  $^{13}\text{C}\{^1\text{H}\}$  NMR (DMSO- $d_6$ , 75 MHz):  $\delta$  167.3, 162.4 (d,  $^1J_{\text{CF}} = 244.8$  Hz), 156.5, 155.3, 140.3, 138.2, 131.4 (d,  $^3J_{\text{CF}} = 8.7$  Hz), 131.3, 130.1, 128.9, 128.6, 116.2 (d,  $^2J_{\text{CF}} = 21.5$  Hz), 98.1, 59.0, 48.4, 46.3, 32.7, 32.6, 25.6, 25.0, 24.9. Anal. Calcd for  $\text{C}_{25}\text{H}_{26}\text{FN}_3\text{O}_3$ : C, 68.95; H, 6.02; N, 9.65. Found: C, 68.87; H, 6.14; N, 9.59.



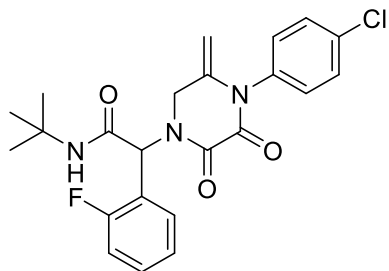
**2-(4-(4-Chlorophenyl)-5-methylene-2,3-dioxopiperazin-1-yl)-N-cyclohexyl-2-(4-methoxyphenyl)acetamide (6d)**

White solid (424.0 mg, 88%); m.p. 191-193 °C;  $^1\text{H}$  NMR (DMSO- $d_6$ , 300 MHz):  $\delta$  8.35 (d, 1H,  $J$  = 7.7 Hz), 7.56 (d, 2H,  $J$  = 8.6 Hz), 7.34 (d, 2H,  $J$  = 8.6 Hz), 7.26 (d, 2H,  $J$  = 8.6 Hz), 6.99 (d, 2H,  $J$  = 8.6 Hz), 6.17 (s, 1H), 4.57 (d, 1H,  $J$  = 14.3 Hz), 4.20 (s, 1H), 3.88 (d, 1H,  $J$  = 14.5 Hz), 3.86 (s, 1H), 3.77 (s, 3H), 3.59-3.66 (m, 1H), 1.52-1.83 (m, 5H), 1.09-1.33 (m, 5H).  $^{13}\text{C}\{^1\text{H}\}$  NMR (DMSO- $d_6$ , 75 MHz):  $\delta$  167.8, 159.7, 156.2, 155.4, 140.2, 137.0, 133.4, 130.6, 130.6, 130.2, 126.7, 114.7, 98.2, 59.2, 55.6, 48.3, 46.3, 32.7, 32.6, 25.6, 25.0, 24.9. Anal. Calcd for  $\text{C}_{26}\text{H}_{28}\text{ClN}_3\text{O}_4$ : C, 64.79; H, 5.86; N, 8.72. Found: C, 64.91; H, 5.77; N, 8.75.



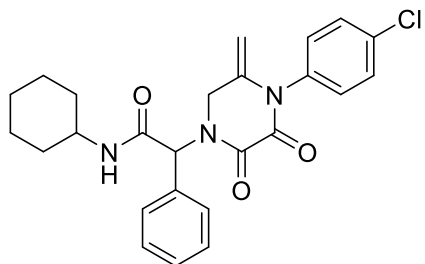
**N-(tert-butyl)-2-(2-chlorophenyl)-2-(4-(4-chlorophenyl)-5-methylene-2,3-dioxopiperazin-1-yl)acetamide (6e)**

White solid (428.0 mg, 93%); m.p. 163-165 °C;  $^1\text{H}$  NMR (DMSO- $d_6$ , 300 MHz):  $\delta$  8.28 (s, 1H), 7.57 (d, 2H,  $J$  = 8.8 Hz), 7.42-7.49 (m, 4H), 7.37 (d, 2H,  $J$  = 8.7 Hz), 6.23 (s, 1H), 4.48 (s, 1H), 4.42 (d, 1H,  $J$  = 14.2 Hz), 3.91 (s, 1H), 3.72 (d, 1H,  $J$  = 14.2 Hz), 1.30 (s, 9H).  $^{13}\text{C}\{^1\text{H}\}$  NMR (DMSO- $d_6$ , 75 MHz):  $\delta$  167.5, 155.7, 155.3, 139.9, 137.0, 134.9, 133.4, 132.9, 130.9, 130.7, 130.6, 130.5, 130.2, 128.1, 99.1, 59.0, 51.2, 46.6, 28.8. Anal. Calcd for  $\text{C}_{23}\text{H}_{23}\text{Cl}_2\text{N}_3\text{O}_3$ : C, 60.01; H, 5.04; N, 9.13. Found: C, 60.09; H, 4.91; N, 9.18.



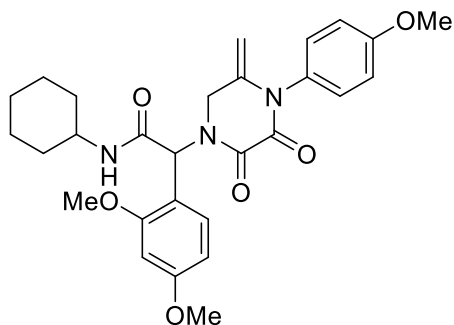
***N*-(*tert*-butyl)-2-(4-(4-chlorophenyl)-5-methylene-2,3-dioxopiperazin-1-yl)-2-(2-fluorophenyl)acetamide (6f)**

Yellow pale solid (386.0 mg, 87%); m.p. 130-132 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 300 MHz): δ 8.19 (s, 1H), 7.56 (d, 2H, *J* = 8.6 Hz), 7.45-7.49 (m, 1H), 7.35-7.41 (m, 3H), 7.31 (d, 2H, *J* = 7.8 Hz), 6.37 (s, 1H), 4.53 (d, 1H, *J* = 14.3 Hz), 4.49 (s, 1H), 3.91 (s, 1H), 3.87 (d, 1H, *J* = 14.1 Hz), 1.30 (s, 9H). <sup>13</sup>C{<sup>1</sup>H} NMR (DMSO-*d*<sub>6</sub>, 75 MHz): δ 167.3, 161.2 (d, <sup>1</sup>*J*<sub>CF</sub> = 247.9 Hz), 155.8, 155.3, 140.0, 137.1, 133.5, 131.4 (d, <sup>3</sup>*J*<sub>CF</sub> = 8.4 Hz), 130.6, 130.2, 125.2, 122.7, 122.5, 116.3 (d, <sup>2</sup>*J*<sub>CF</sub> = 21.3 Hz), 98.8, 54.9, 51.3, 46.6, 28.8. Anal. Calcd for C<sub>23</sub>H<sub>23</sub>ClFN<sub>3</sub>O<sub>3</sub>: C, 62.23; H, 5.22; N, 9.47. Found: C, 62.31; H, 5.16; N, 9.41.



**2-(4-(4-Chlorophenyl)-5-methylene-2,3-dioxopiperazin-1-yl)-*N*-cyclohexyl-2-phenylacetamide (6g)**

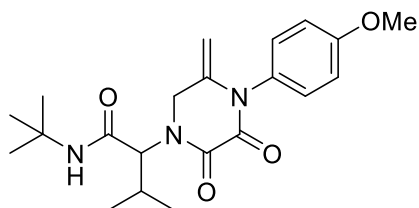
White solid (375.0 mg, 83%); m.p. 144-146 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 300 MHz): δ 8.42 (d, 1H, *J* = 7.7 Hz), 7.57 (dd, 2H, *J* = 8.7, 2.1 Hz), 7.33-7.47 (m, 7H), 6.25 (s, 1H), 4.59 (d, 1H, *J* = 14.2 Hz), 4.42 (s, 1H), 3.91 (d, 1H, *J* = 13.7 Hz), 3.87 (s, 1H), 3.59-3.68 (m, 1H), 1.43-1.83 (m, 5H), 1.05-1.34 (s, 5H). <sup>13</sup>C{<sup>1</sup>H} NMR (DMSO-*d*<sub>6</sub>, 75 MHz): δ 167.4, 156.4, 155.3, 140.2, 137.1, 135.1, 133.4, 130.6, 130.2, 129.3, 129.1, 129.0, 128.8, 98.2, 59.6, 48.4, 46.4, 32.7, 32.6, 25.6, 25.0, 24.9. Anal. Calcd for C<sub>25</sub>H<sub>26</sub>ClN<sub>3</sub>O<sub>3</sub>: C, 66.44; H, 5.80; N, 9.30. Found: C, 66.56; H, 5.74; N, 9.21.



***N*-cyclohexyl-2-(2,4-dimethoxyphenyl)-2-(4-(4-methoxyphenyl)-5-methylene-2,3-dioxopiperazin-1-yl)acetamide (6h)**

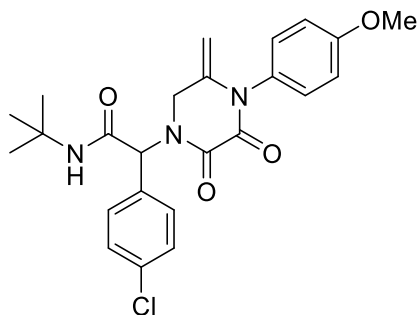
White solid (401.0 mg, 79%); m.p. 236-238 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 300 MHz): δ 8.34 (d, 1H, *J* = 7.7 Hz), 7.20 (d, 2H, *J* = 8.9 Hz), 6.99-7.06 (m, 3H), 6.85-6.88 (m, 2H), 6.13 (s, 1H), 4.51 (d, 1H, *J* = 14.4 Hz), 4.40 (s, 1H), 3.90 (d, 1H, *J* = 14.3 Hz), 3.86 (s, 1H), 3.78 (s, 3H), 3.77 (s, 3H), 3.75 (s, 3H), 3.60-3.69 (m, 1H), 1.51-1.83 (m, 5H), 1.06-1.34 (m, 5H). <sup>13</sup>C{<sup>1</sup>H} NMR (DMSO-*d*<sub>6</sub>, 75 MHz): δ 167.8, 159.3, 156.4, 155.6, 149.3, 149.3, 140.8, 130.7, 129.7, 127.0, 121.6, 115.2,

112.7, 112.2, 97.7, 59.6, 56.0, 56.0, 55.8, 48.3, 46.3, 32.7, 32.6, 25.6, 25.0, 24.9. Anal. Calcd for  $C_{28}H_{33}N_3O_6$ : C, 66.26; H, 6.55; N, 8.28. Found: C, 66.33; H, 6.43; N, 8.22.



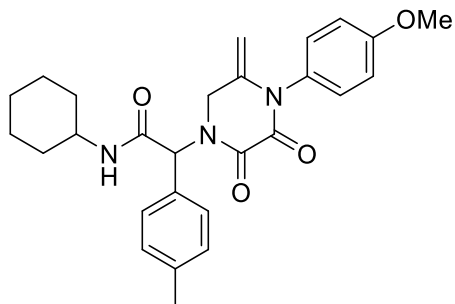
***N*-(*tert*-butyl)-2-(4-(4-methoxyphenyl)-5-methylene-2,3-dioxopiperazin-1-yl)-3-methylbutanamide (6i)**

White solid (345.0 mg, 89%); m.p. 111-113 °C;  $^1H$  NMR (DMSO- $d_6$ , 300 MHz):  $\delta$  7.94 (s, 1H), 7.22 (d, 2H,  $J = 8.9$  Hz), 7.04 (d, 2H,  $J = 9.0$  Hz), 4.69 (d, 1H,  $J = 14.5$  Hz), 4.63 (s, 1H), 4.61 (d, 1H,  $J = 10.7$  Hz), 4.40 (d, 1H,  $J = 14.5$  Hz), 3.94 (s, 1H), 3.79 (s, 3H), 2.13-2.25 (m, 1H), 1.26 (s, 9H), 0.94 (d, 3H,  $J = 6.6$  Hz), 0.86 (d, 3H,  $J = 6.6$  Hz).  $^{13}C\{^1H\}$  NMR (DMSO- $d_6$ , 75 MHz):  $\delta$  168.9, 159.3, 156.6, 155.8, 141.0, 130.7, 129.7, 115.2, 98.0, 62.1, 55.8, 51.0, 44.9, 28.7, 27.3, 19.6, 19.3. Anal. Calcd for  $C_{21}H_{29}N_3O_4$ : C, 65.10; H, 7.54; N, 10.84. Found: C, 65.04; H, 7.62; N, 10.76.



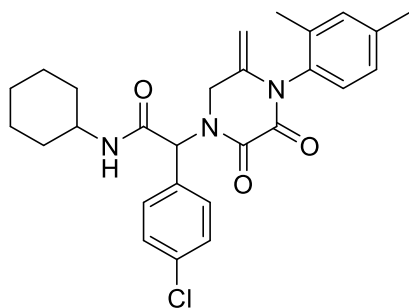
***N*-(*tert*-butyl)-2-(4-chlorophenyl)-2-(4-(4-methoxyphenyl)-5-methylene-2,3-dioxopiperazin-1-yl)acetamide (6j)**

White solid (410.0 mg, 90%); m.p. 154-156 °C;  $^1H$  NMR (DMSO- $d_6$ , 300 MHz):  $\delta$  8.18 (s, 1H), 7.52 (d, 2H,  $J = 8.5$  Hz), 7.35 (d, 2H,  $J = 8.5$  Hz), 7.20 (d, 2H,  $J = 8.9$  Hz), 7.03 (d, 2H,  $J = 9.0$  Hz), 6.20 (s, 1H), 4.55 (d, 1H,  $J = 14.3$  Hz), 4.42 (s, 1H), 3.88 (s, 1H), 3.87 (d, 1H,  $J = 14.3$  Hz), 3.78 (s, 3H), 1.30 (s, 9H).  $^{13}C\{^1H\}$  NMR (DMSO- $d_6$ , 75 MHz):  $\delta$  167.8, 159.3, 156.6, 155.4, 140.6, 134.4, 133.5, 131.1, 130.7, 129.7, 129.3, 115.2, 97.9, 59.3, 55.8, 51.2, 46.4, 28.8. Anal. Calcd for  $C_{24}H_{26}ClN_3O_4$ : C, 63.22; H, 5.75; N, 9.22. Found: C, 63.30; H, 5.69; N, 9.17.



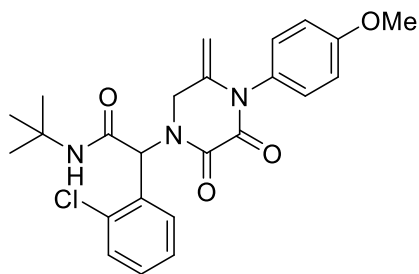
***N*-cyclohexyl-2-(4-(4-methoxyphenyl)-5-methylene-2,3-dioxopiperazin-1-yl)-2-(*p*-tolyl)acetamide (6k)**

White solid (392.0 mg, 85%); m.p. 175-177 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 300 MHz): δ 8.35 (d, 1H, *J* = 7.7 Hz), 7.22-7.26 (m, 4H), 7.18-7.21 (m, 2H), 7.03 (d, 2H, *J* = 8.9 Hz), 6.18 (s, 1H), 4.54 (d, 1H, *J* = 14.4 Hz), 4.37 (s, 1H), 3.87 (d, 1H, *J* = 14.3 Hz), 3.85 (s, 1H), 3.78 (s, 3H), 3.61-3.67 (m, 1H), 2.32 (s, 3H), 1.53-1.82 (m, 5H), 1.06-1.34 (m, 5H). <sup>13</sup>C{<sup>1</sup>H} NMR (DMSO-*d*<sub>6</sub>, 75 MHz): δ 167.6, 159.3, 156.8, 155.5, 140.7, 138.2, 132.0, 130.7, 129.9, 129.7, 129.1, 115.2, 97.8, 59.4, 55.8, 48.3, 46.3, 32.7, 32.6, 25.6, 25.0, 24.9, 21.2. Anal. Calcd for C<sub>27</sub>H<sub>31</sub>N<sub>3</sub>O<sub>4</sub>: C, 70.26; H, 6.77; N, 9.10. Found: C, 70.15; H, 6.84; N, 9.19.



**2-(4-Chlorophenyl)-*N*-cyclohexyl-2-(4-(2,4-dimethylphenyl)-5-methylene-2,3-dioxopiperazin-1-yl)acetamide (6l)**

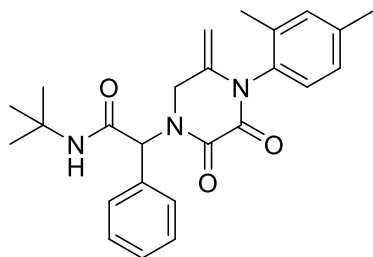
White solid (408.0 mg, 85%); m.p. 194-196 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 300 MHz): δ 8.42 (d, 1H, *J* = 7.0 Hz), 7.51 (d, 2H, *J* = 8.5 Hz), 7.38 (d, 2H, *J* = 8.5 Hz), 7.16-7.18 (m, 1H), 7.04-7.13 (m, 2H), 6.22 (s, 1H), 4.55 (d, 1H, *J* = 14.2 Hz), 4.40 (d, 1H, *J* = 1.2 Hz), 3.98 (d, 1H, *J* = 14.2 Hz), 3.75 (s, 1H), 3.61-3.69 (m, 1H), 2.30 (s, 3H), 2.03 (s, 3H), 1.50-1.83 (m, 5H), 1.08-1.34 (m, 5H). <sup>13</sup>C{<sup>1</sup>H} NMR (DMSO-*d*<sub>6</sub>, 75 MHz): δ 167.1, 156.6, 155.1, 139.3, 138.7, 135.2, 134.2, 133.6, 132.1, 131.2, 129.3, 128.5, 128.3, 97.2, 59.1, 48.4, 46.1, 32.7, 32.6, 25.6, 25.0, 24.9, 21.1, 17.3. Anal. Calcd for C<sub>27</sub>H<sub>30</sub>ClN<sub>3</sub>O<sub>3</sub>: C, 67.56; H, 6.30; N, 8.75. Found: C, 67.63; H, 6.25; N, 8.68.



***N*-(*tert*-butyl)-2-(2-chlorophenyl)-2-(4-(4-methoxyphenyl)-5-methylene-2,3-dioxopiperazin-1-yl)acetamide (6m)**

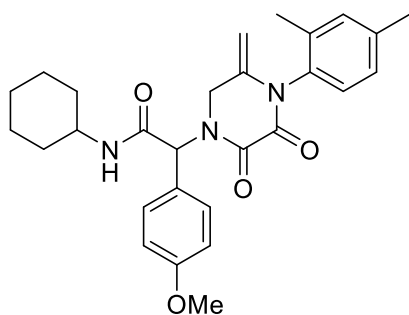
White solid (396.0 mg, 87%); m.p. 160-162 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 300 MHz): δ 8.29 (s, 1H), 7.54-7.58 (m, 1H), 7.41-7.47 (m, 3H), 7.21 (d, 2H, *J* = 8.9 Hz), 7.03 (d, 2H, *J* = 9.0 Hz), 6.26 (s, 1H), 4.43 (d, 1H, *J* = 14.0 Hz), 4.42 (s, 1H), 3.91 (s, 1H), 3.78 (s, 3H), 3.71 (d, 1H, *J* = 14.5 Hz), 1.31 (s, 9H). <sup>13</sup>C{<sup>1</sup>H} NMR (DMSO-*d*<sub>6</sub>, 75 MHz): δ 167.6, 159.4, 155.9, 155.6, 140.3, 134.9,

133.00, 130.9, 130.7, 130.6, 130.5, 129.6, 128.1, 115.2, 98.5, 59.0, 55.8, 51.3, 46.6, 28.8. Anal. Calcd for C<sub>24</sub>H<sub>26</sub>ClN<sub>3</sub>O<sub>4</sub>: C, 63.22; H, 5.75; N, 9.22. Found: C, 63.30; H, 5.70; N, 9.15.



***N*-(*tert*-butyl)-2-(4-(2,4-dimethylphenyl)-5-methylene-2,3-dioxopiperazin-1-yl)-2-phenylacetamide (6n)**

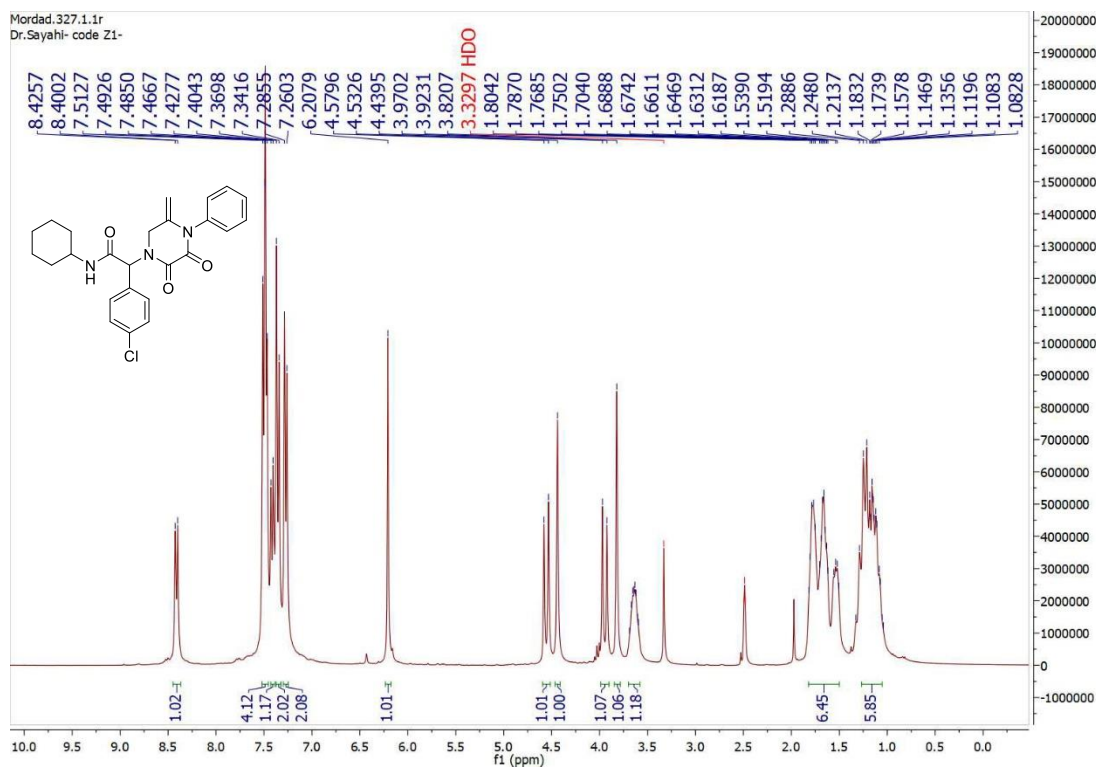
White solid (360.0 mg, 86%); m.p. 123-125 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 300 MHz): δ 8.15 (s, 1H), 7.33-7.48 (m, 5H), 7.05-7.19 (m, 3H), 6.22 (s, 1H), 4.55 (d, 1H, *J* = 14.5 Hz), 4.35 (s, 1H), 3.85 (s, 1H), 3.73 (s, 1H), 2.31 (s, 3H), 2.03 (s, 3H), 1.31 (s, 9H). <sup>13</sup>C{<sup>1</sup>H} NMR (DMSO-*d*<sub>6</sub>, 75 MHz): δ 168.1, 156.5, 155.1, 139.4, 138.7, 135.5, 135.2, 134.3, 132.0, 129.3, 129.2, 128.8, 128.6, 128.3, 97.1, 60.0, 51.2, 46.2, 28.9, 21.1, 17.3. Anal. Calcd for C<sub>25</sub>H<sub>29</sub>N<sub>3</sub>O<sub>3</sub>: C, 71.57; H, 6.97; N, 10.02. Found: C, 71.60; H, 7.06; N, 9.93.



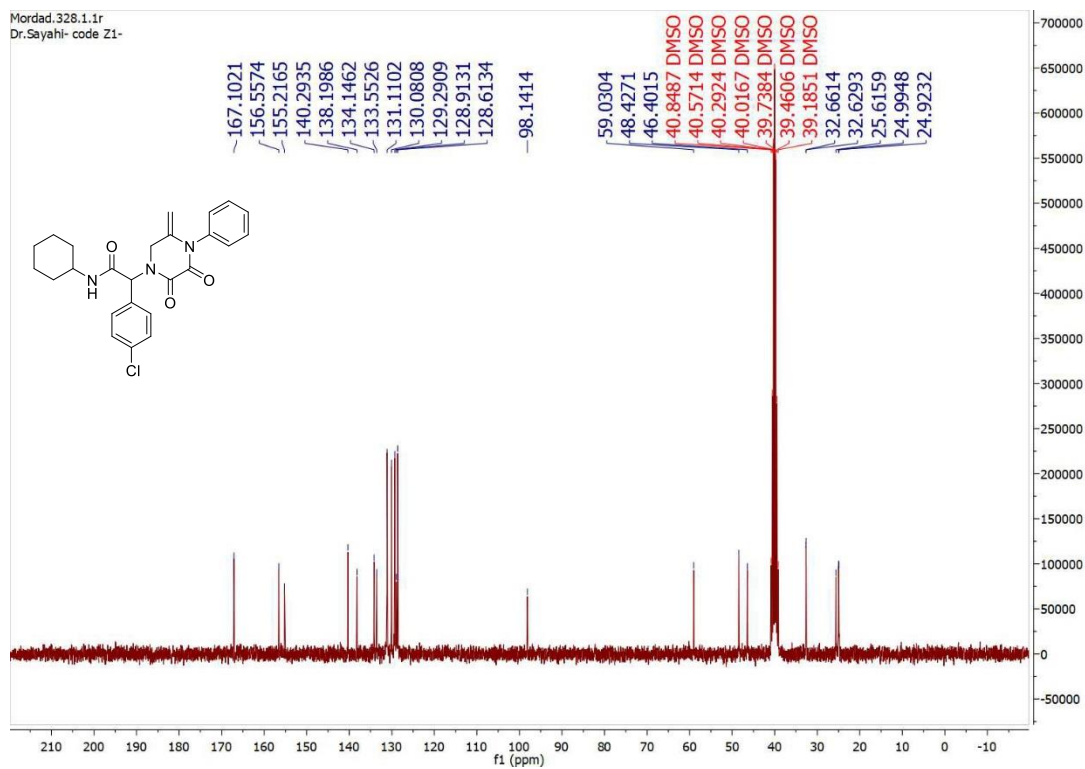
***N*-cyclohexyl-2-(4-(2,4-dimethylphenyl)-5-methylene-2,3-dioxopiperazin-1-yl)-2-(4-methoxyphenyl)acetamide (6o)**

White solid (371.0 mg, 78%); m.p. 184-186 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 300 MHz): δ 8.34 (d, 1H, *J* = 7.8 Hz), 7.27 (d, 2H, *J* = 8.1 Hz), 7.16-7.19 (m, 1H), 7.06-7.13 (m, 2H), 7.00 (dd, 2H, *J* = 8.8, 1.7 Hz), 6.15 (s, 1H), 4.53 (d, 1H, *J* = 14.4 Hz), 4.35 (s, 1H), 3.90 (d, 1H, *J* = 14.4 Hz), 3.77 (s, 3H), 3.73 (s, 1H), 3.59-3.69 (m, 1H), 2.30 (s, 3H), 2.02 (s, 3H), 1.48-1.81 (m, 5H), 1.05-1.33 (m, 5H). <sup>13</sup>C{<sup>1</sup>H} NMR (DMSO-*d*<sub>6</sub>, 75 MHz): δ 167.8, 156.4, 155.2, 139.4, 138.7, 135.2, 134.3, 132.0, 130.6, 128.6, 128.5, 128.3, 126.7, 114.7, 97.1, 59.2, 55.6, 48.3, 46.0, 32.7, 32.6, 25.6, 25.0, 24.9, 21.1, 17.3. Anal. Calcd for C<sub>28</sub>H<sub>33</sub>N<sub>3</sub>O<sub>4</sub>: C, 70.71; H, 6.99; N, 8.84. Found: C, 70.62; H, 6.89; N, 8.80.

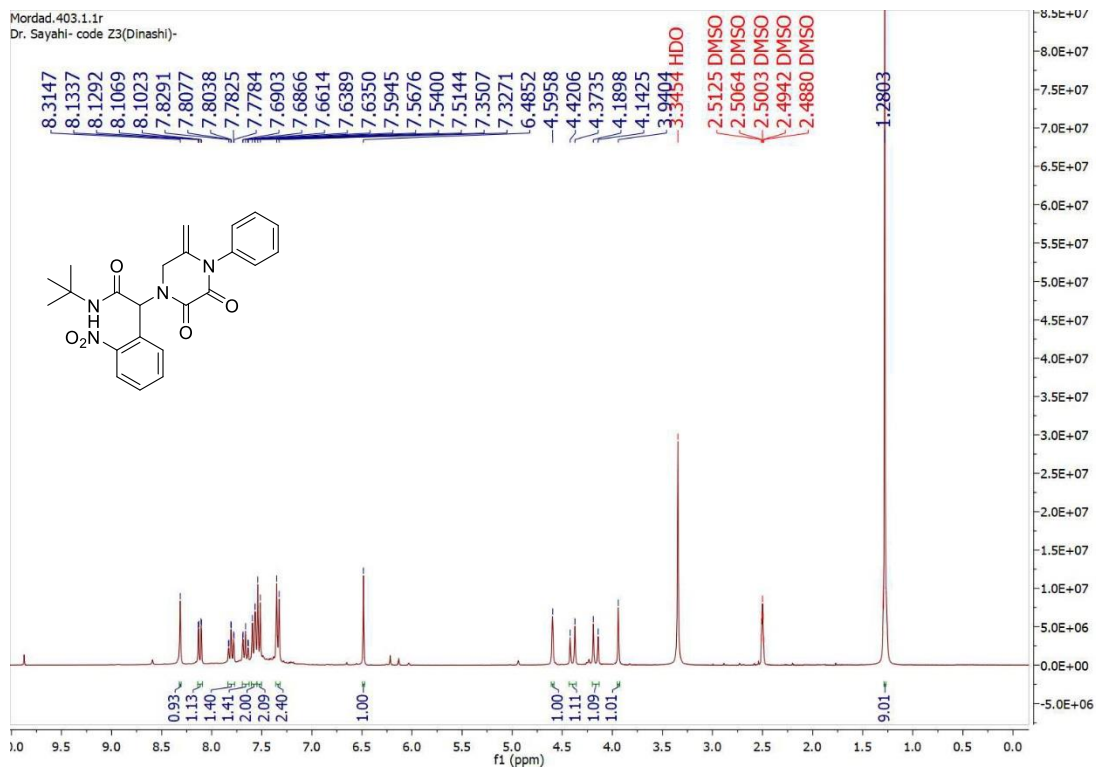
# $^1\text{H}$ and $^{13}\text{C}$ NMR spectra:



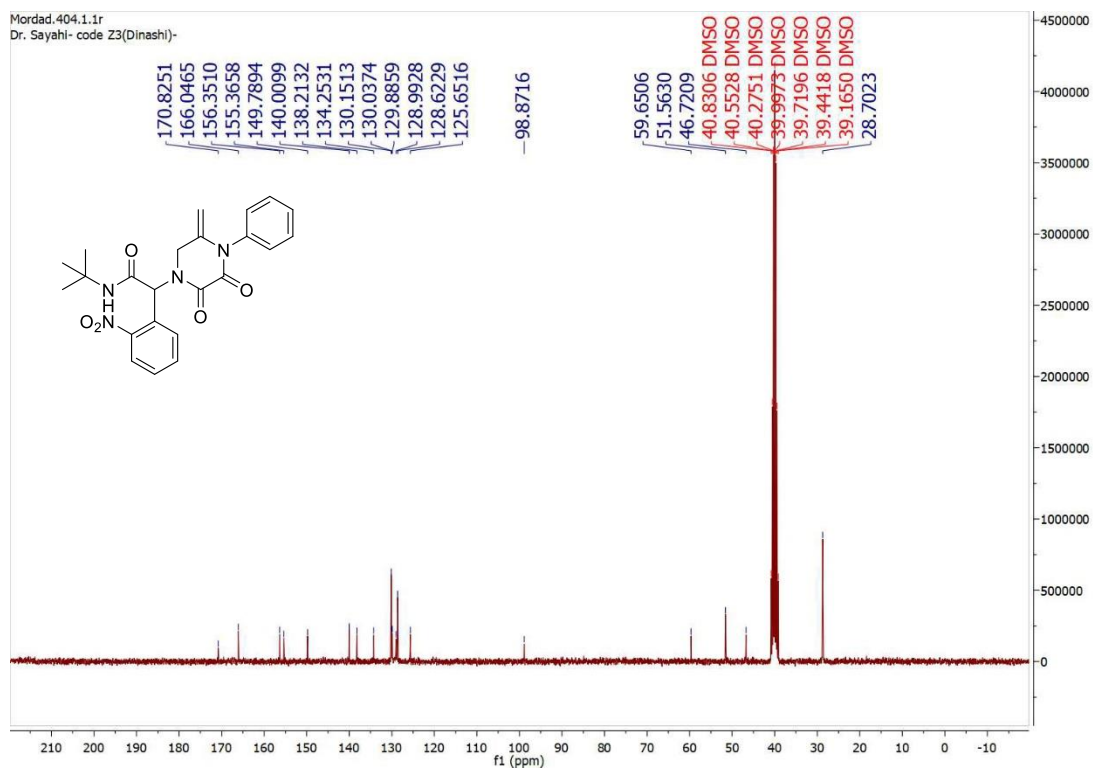
$^1\text{H}$  NMR spectrum of 6a



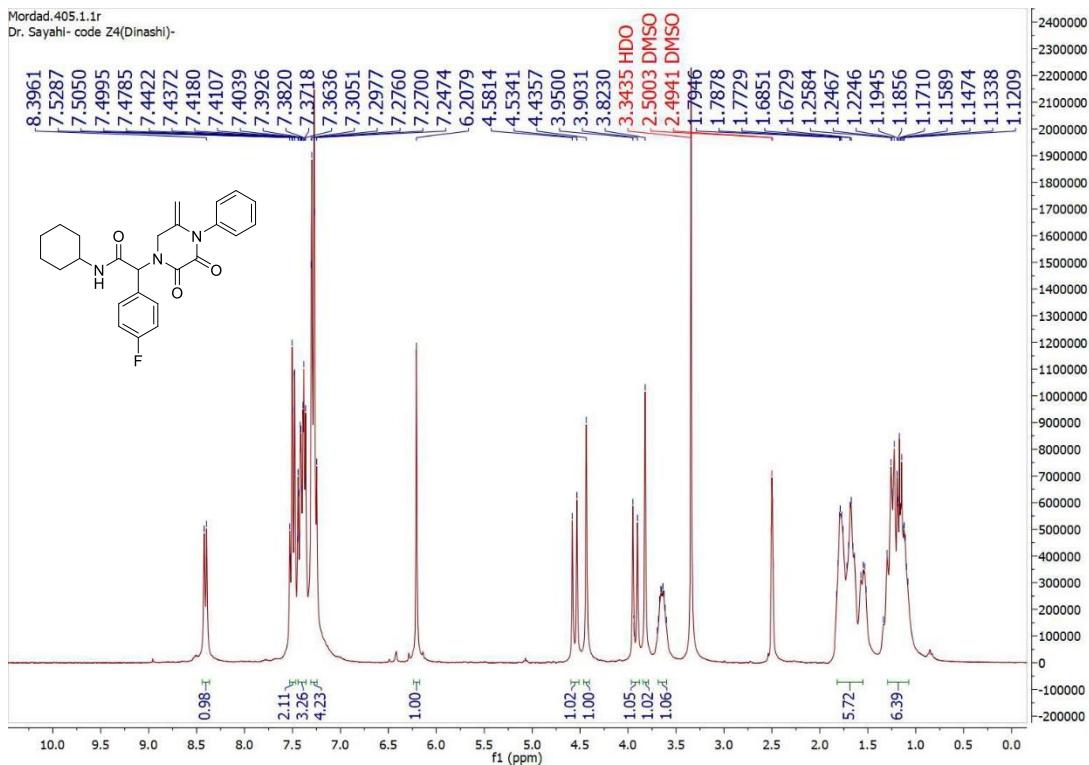
$^{13}\text{C}$  NMR spectrum of 6a



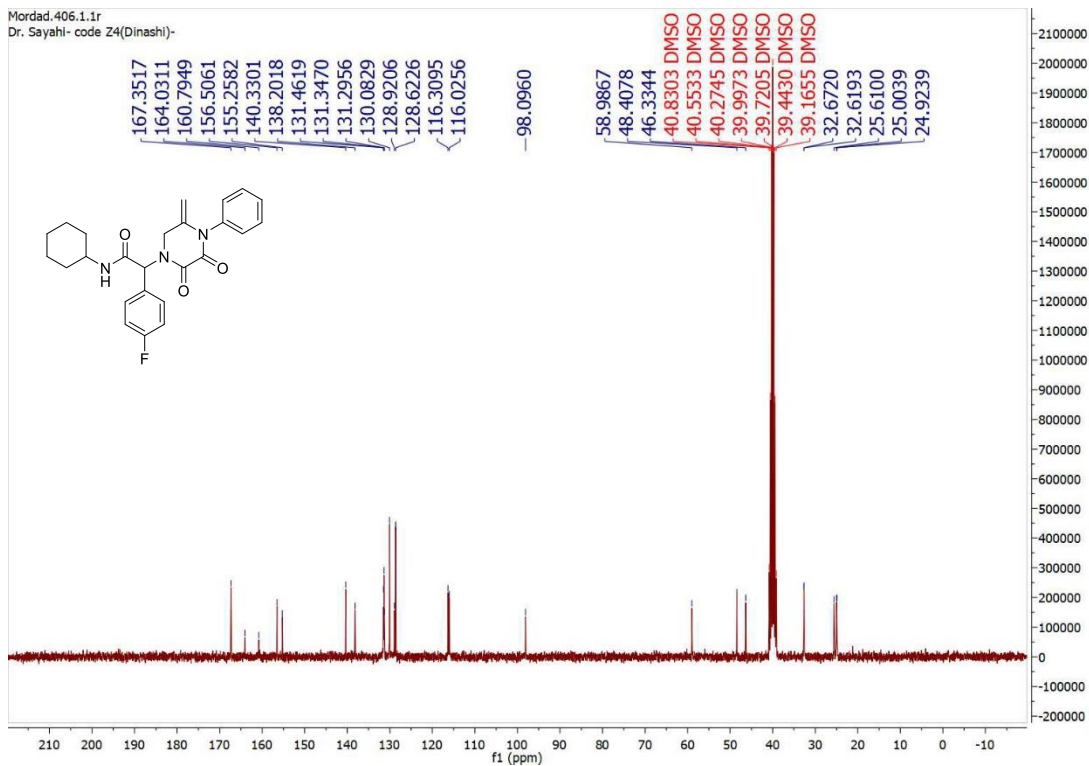
<sup>1</sup>H NMR spectrum of 6b



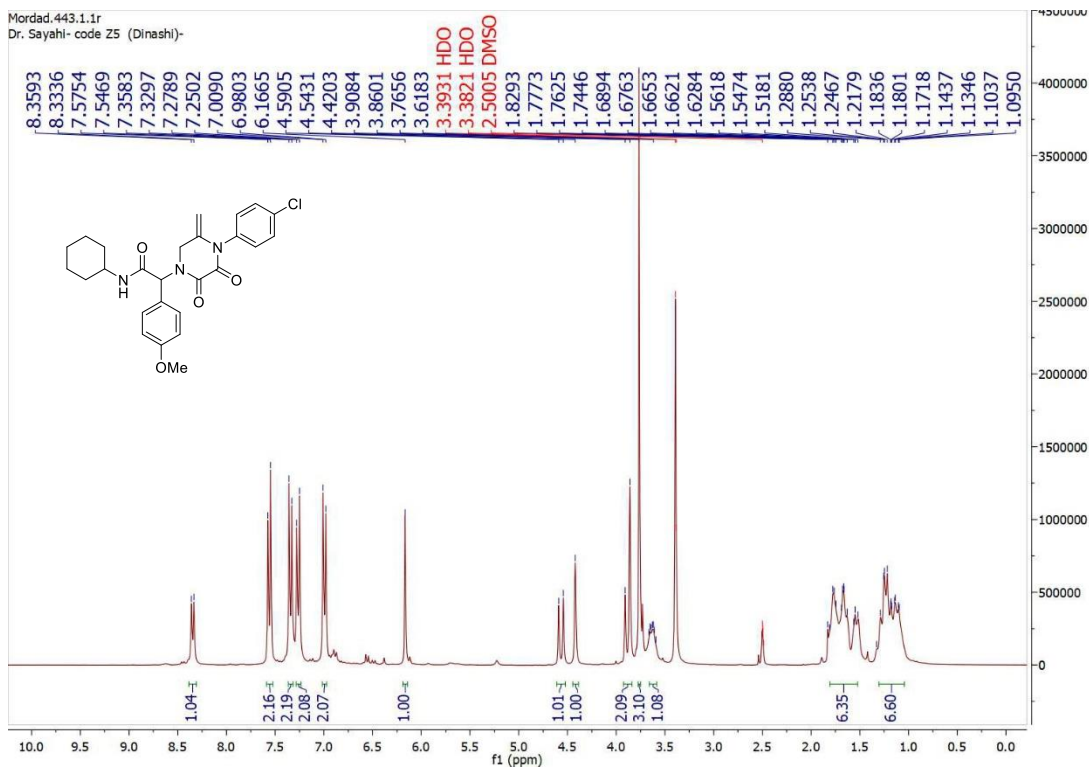
<sup>13</sup>C NMR spectrum of 6b



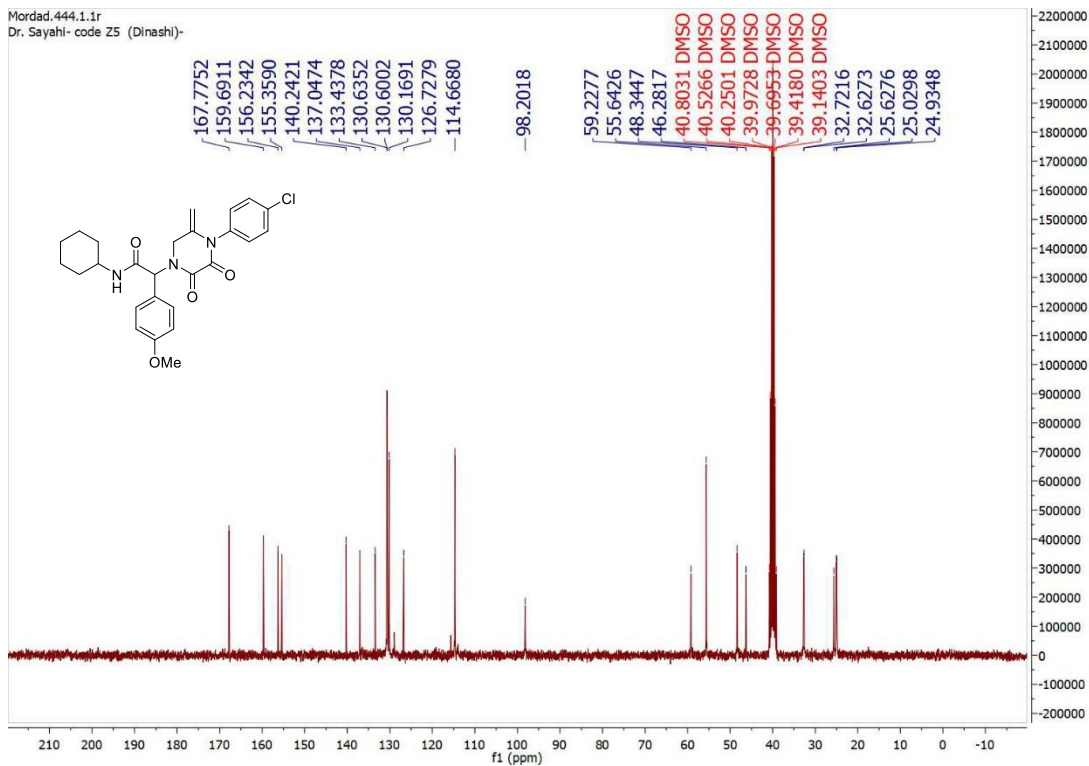
$^1\text{H}$  NMR spectrum of 6c



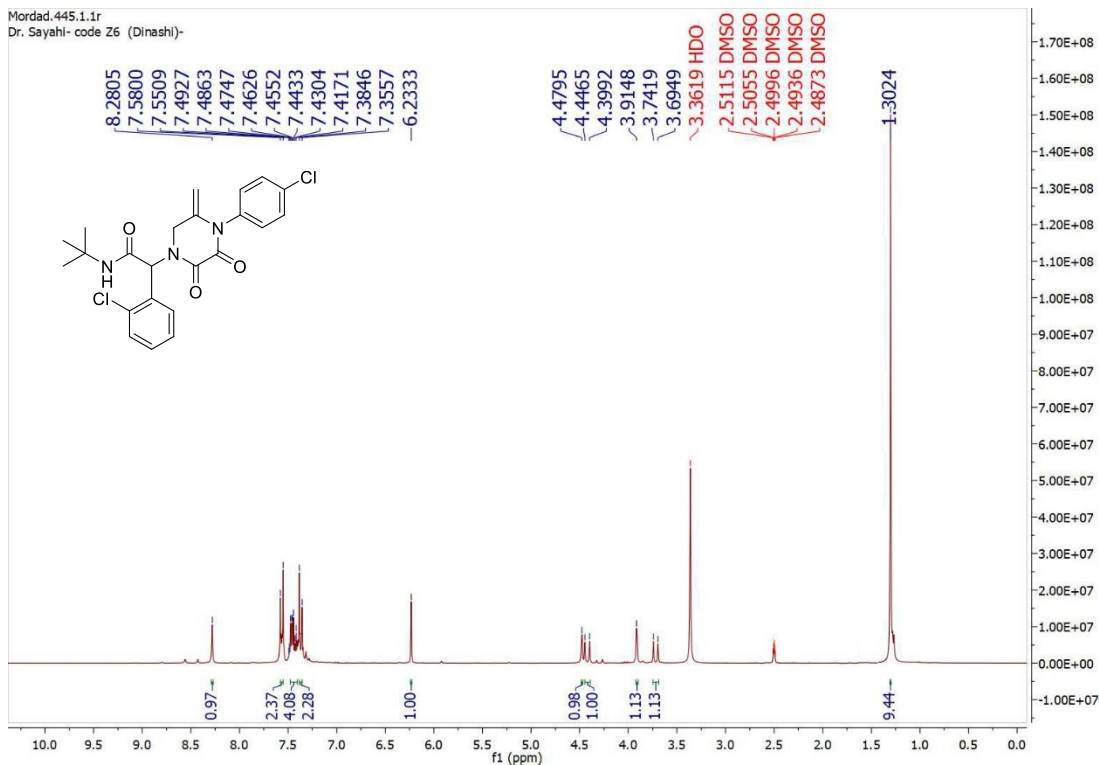
$^{13}\text{C}$  NMR spectrum of 6c



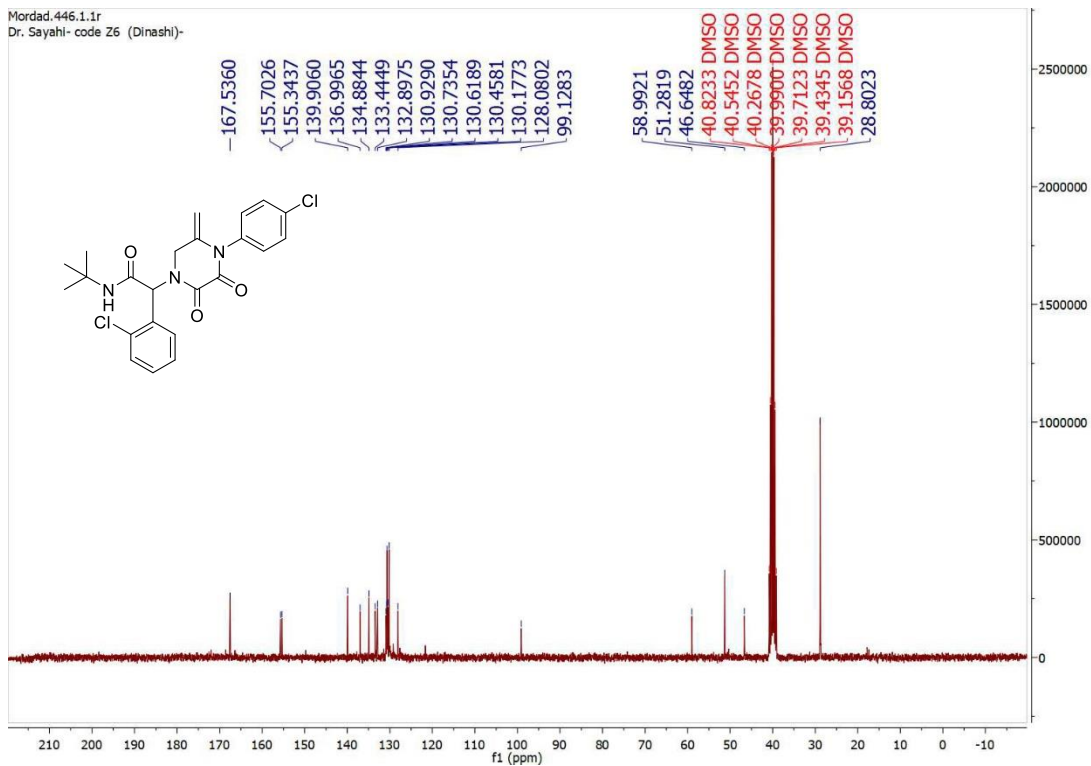
<sup>1</sup>H NMR spectrum of 6d



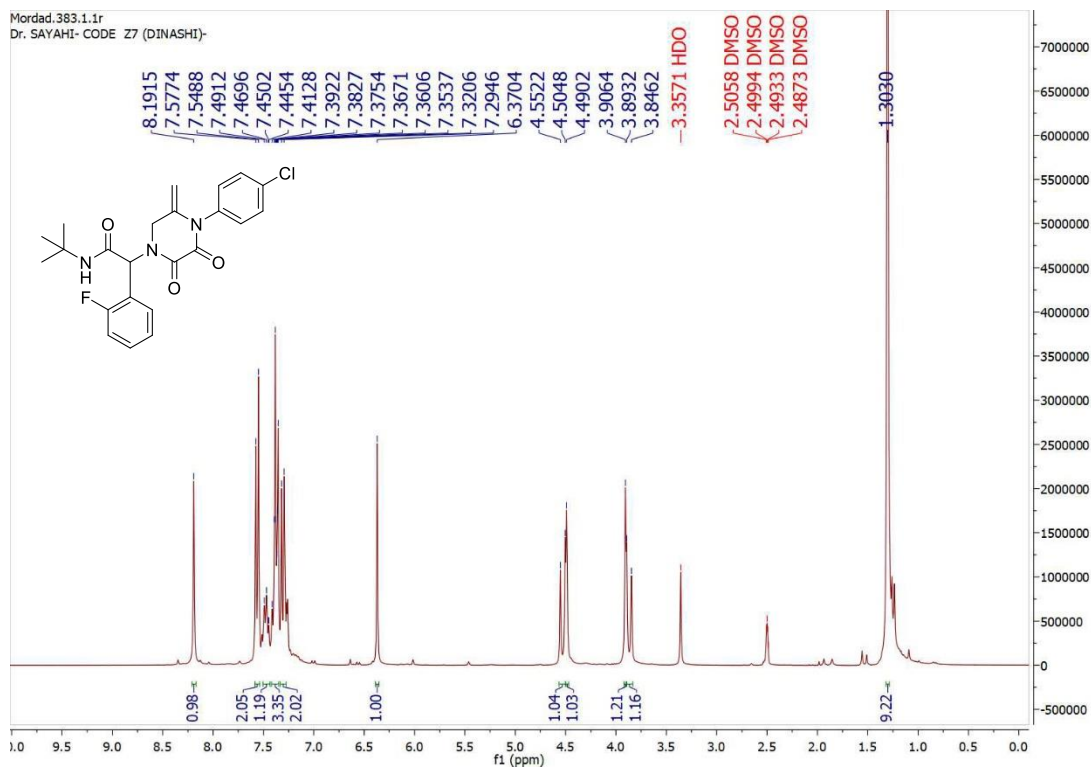
<sup>13</sup>C NMR spectrum of 6d



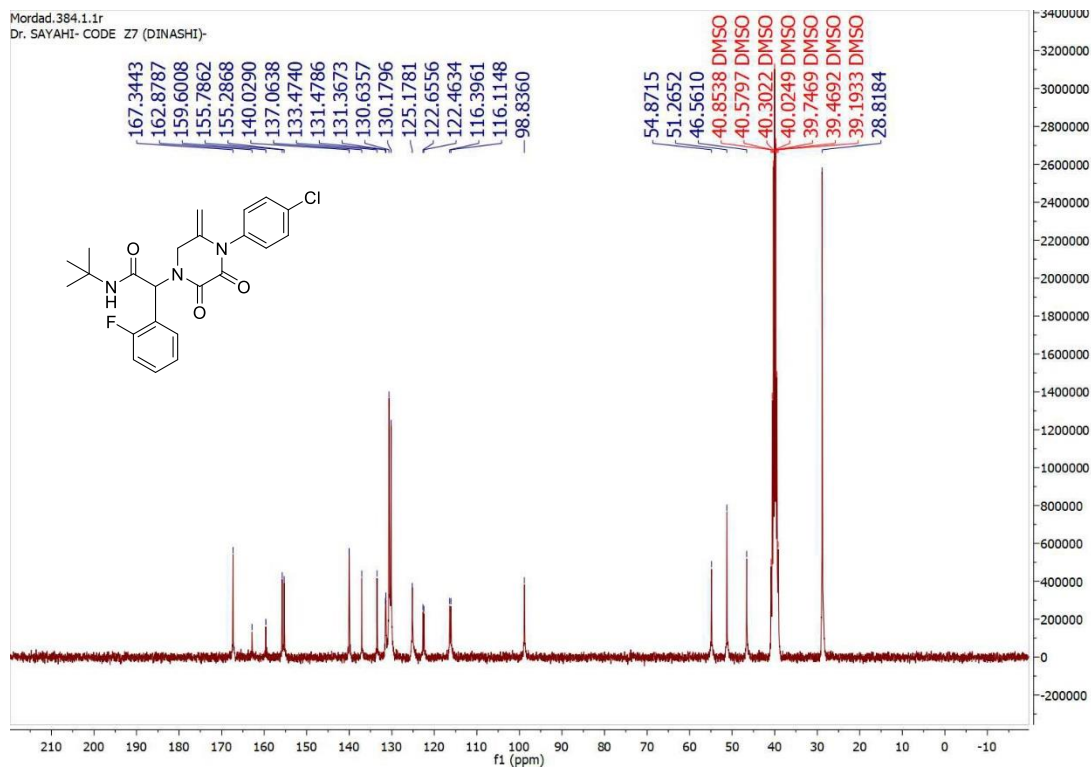
<sup>1</sup>H NMR spectrum of 6e



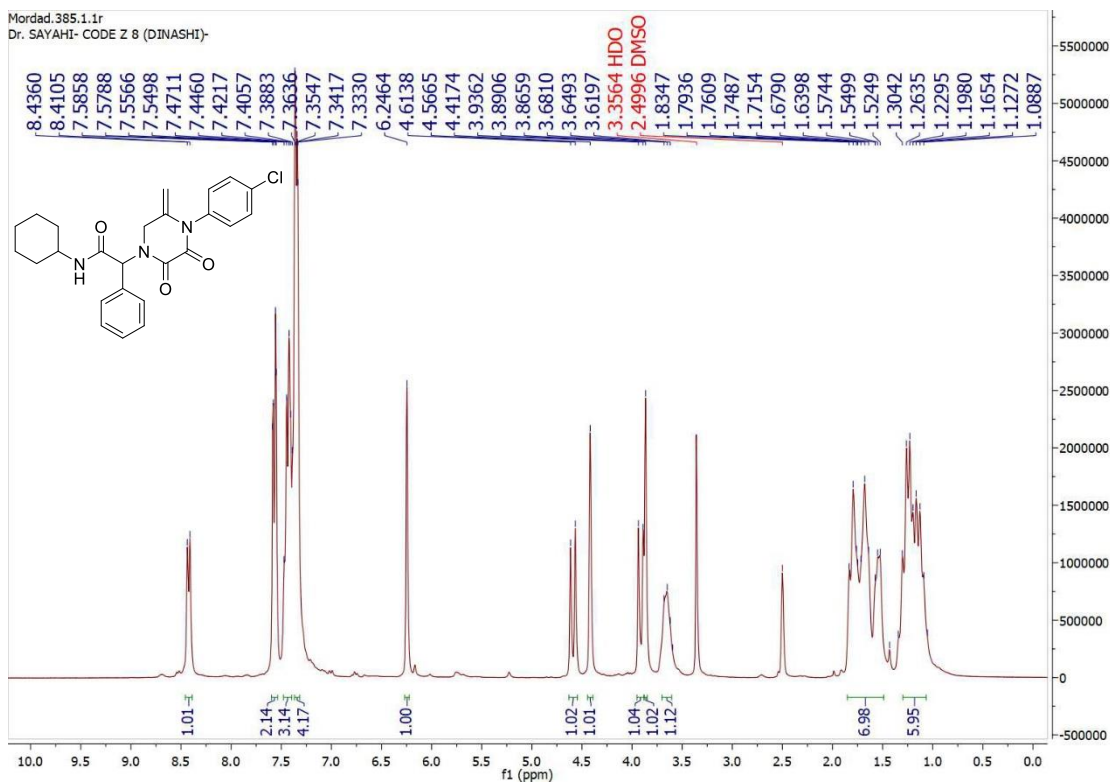
<sup>13</sup>C NMR spectrum of 6e



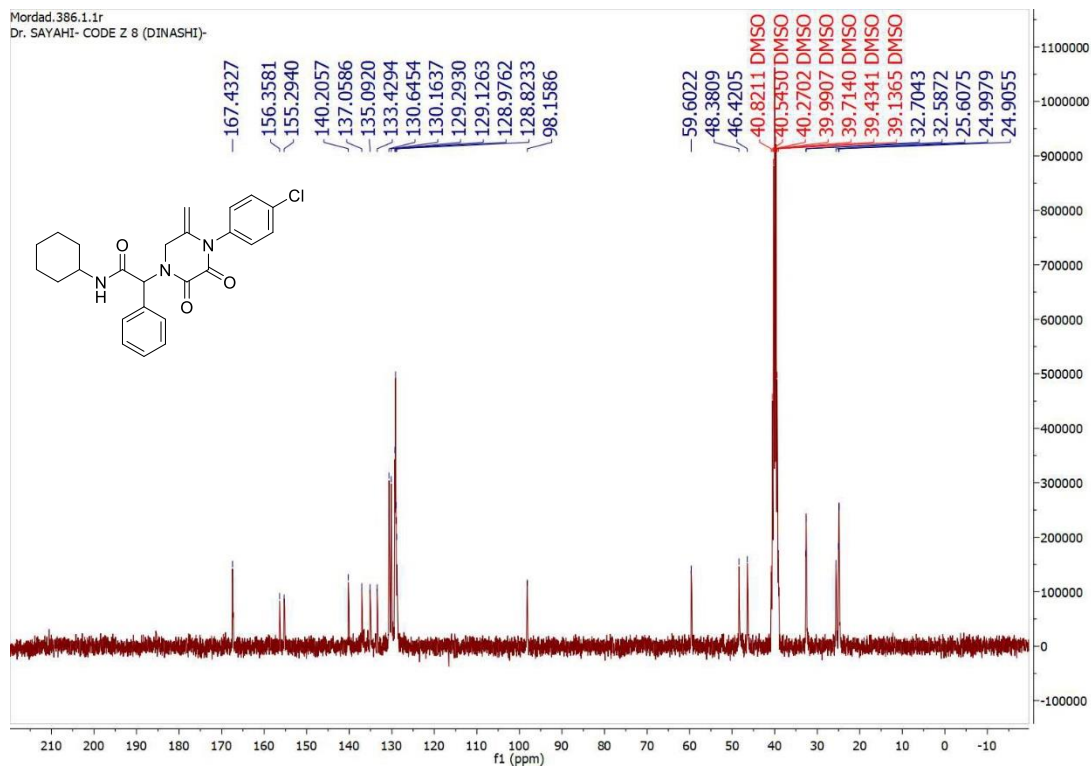
<sup>1</sup>H NMR spectrum of 6f



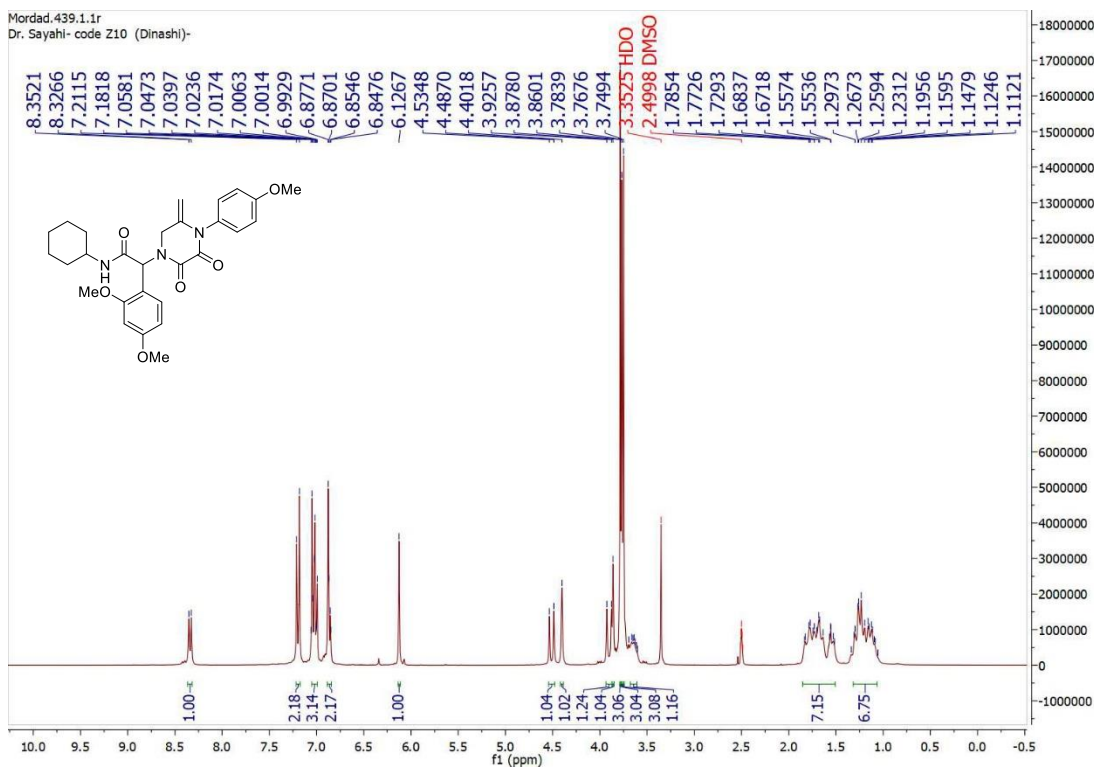
<sup>13</sup>C NMR spectrum of 6f



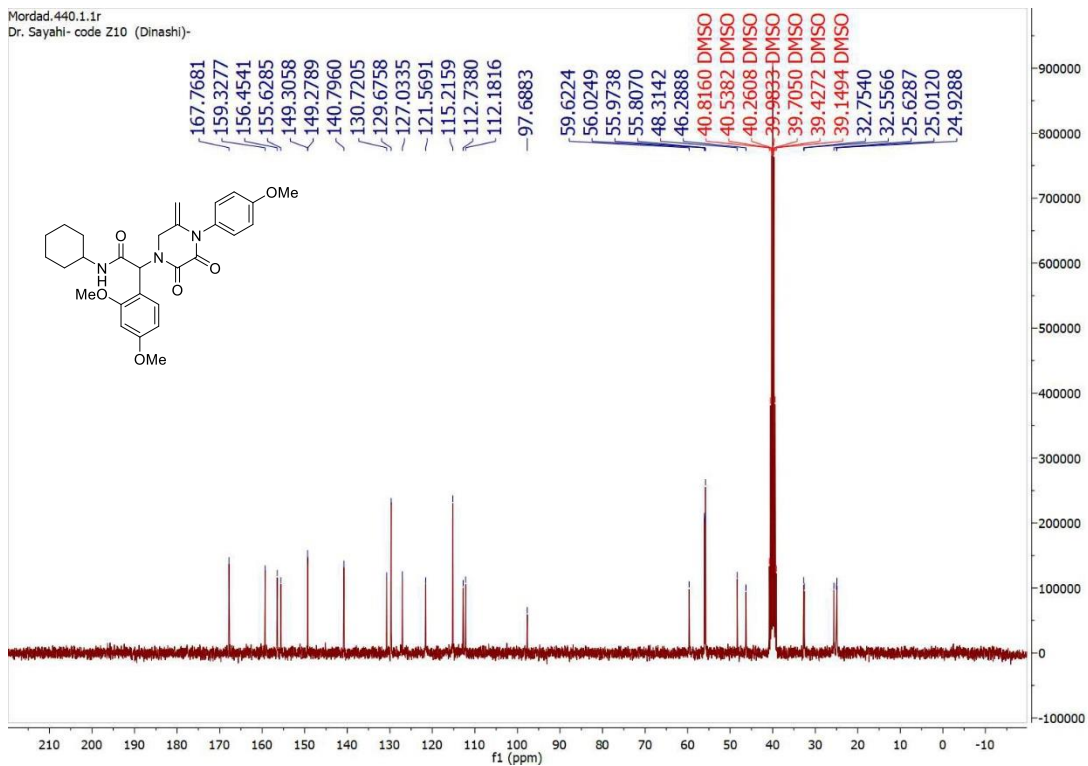
<sup>1</sup>H NMR spectrum of 6g



<sup>13</sup>C NMR spectrum of 6g

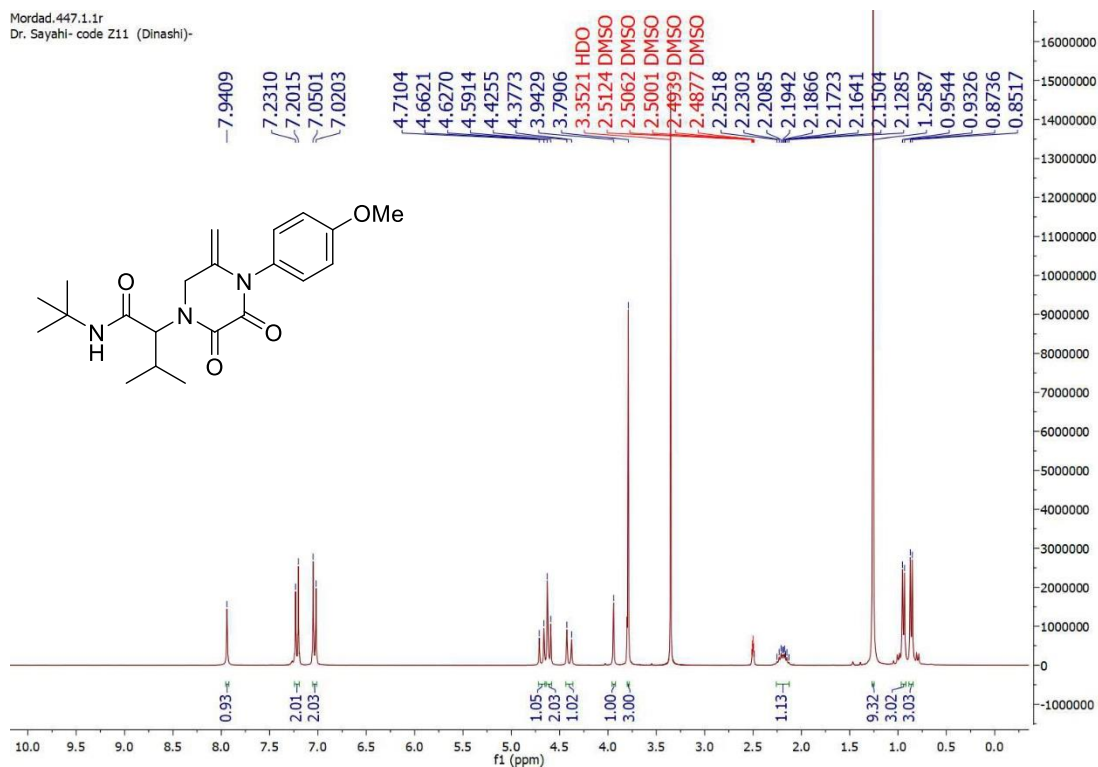


<sup>1</sup>H NMR spectrum of 6h



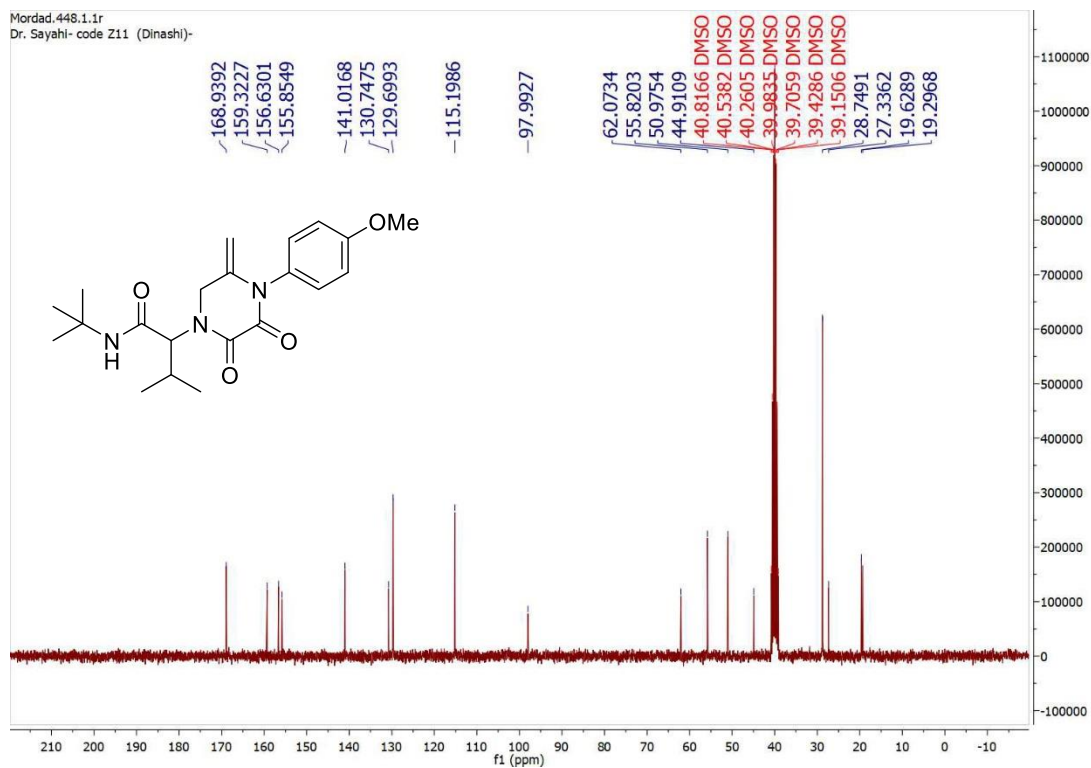
<sup>13</sup>C NMR spectrum of 6h

Mordad.447.1.1r  
Dr. Sayahi- code Z11 (Dinashi)-

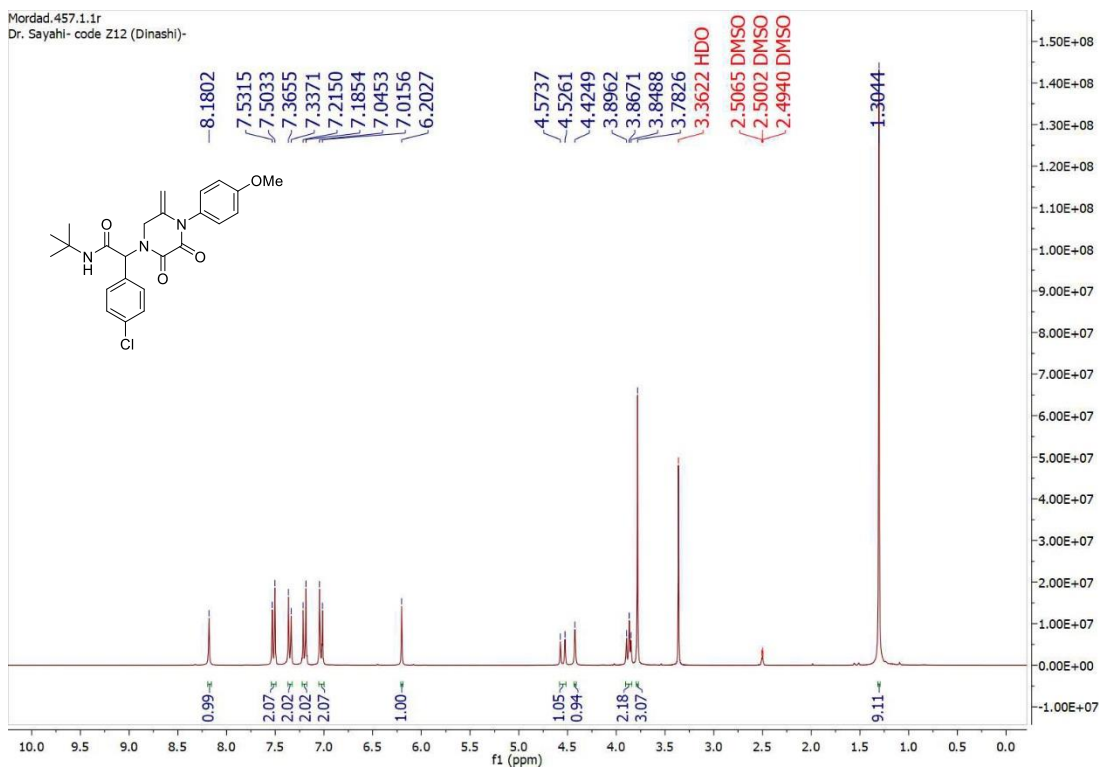


<sup>1</sup>H NMR spectrum of 6i

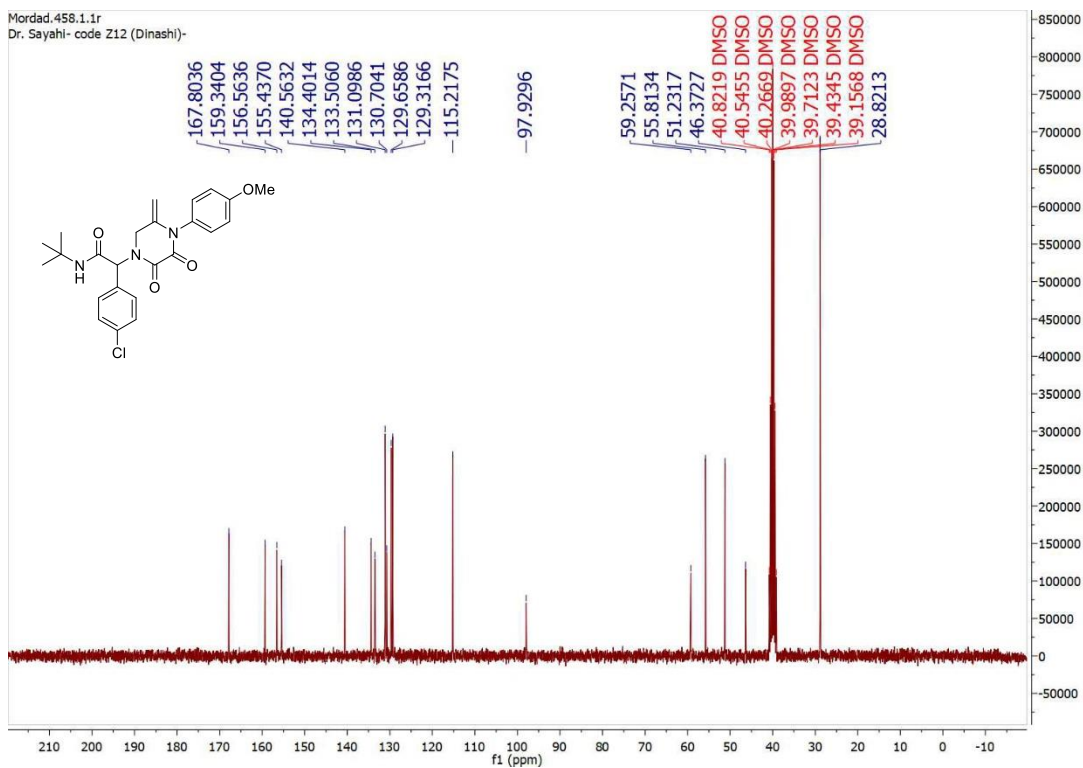
Mordad.448.1.1r  
Dr. Sayahi- code Z11 (Dinashi)-



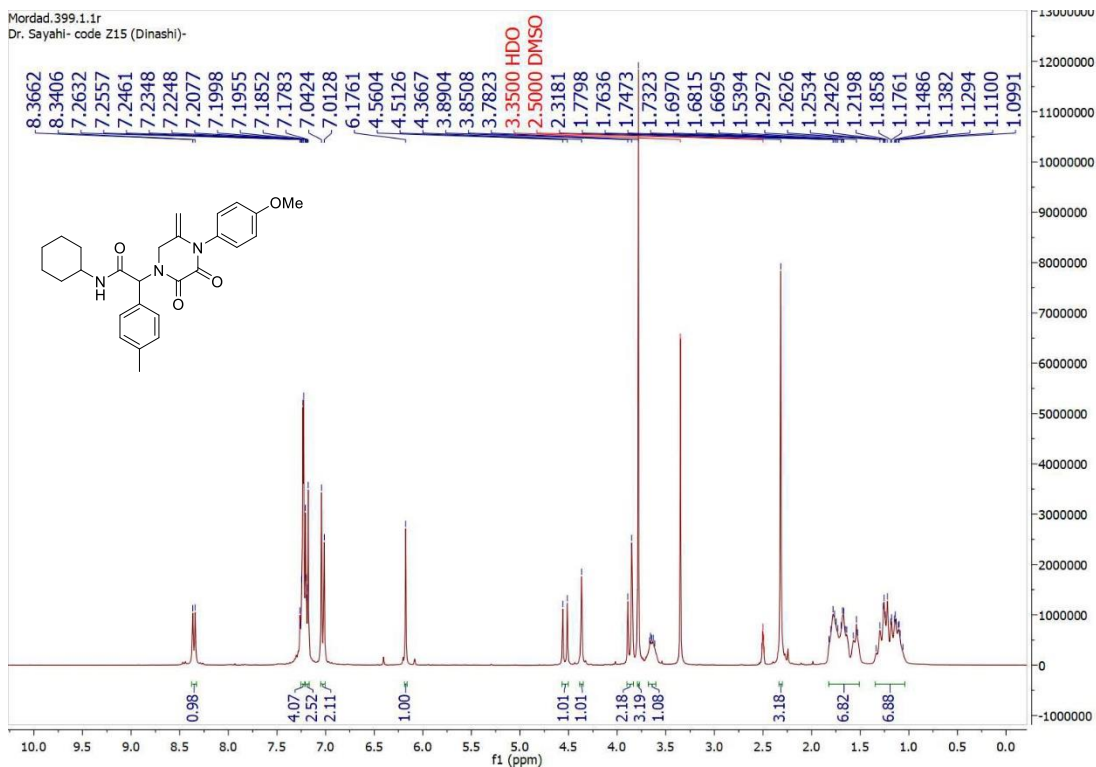
<sup>13</sup>C NMR spectrum of 6i



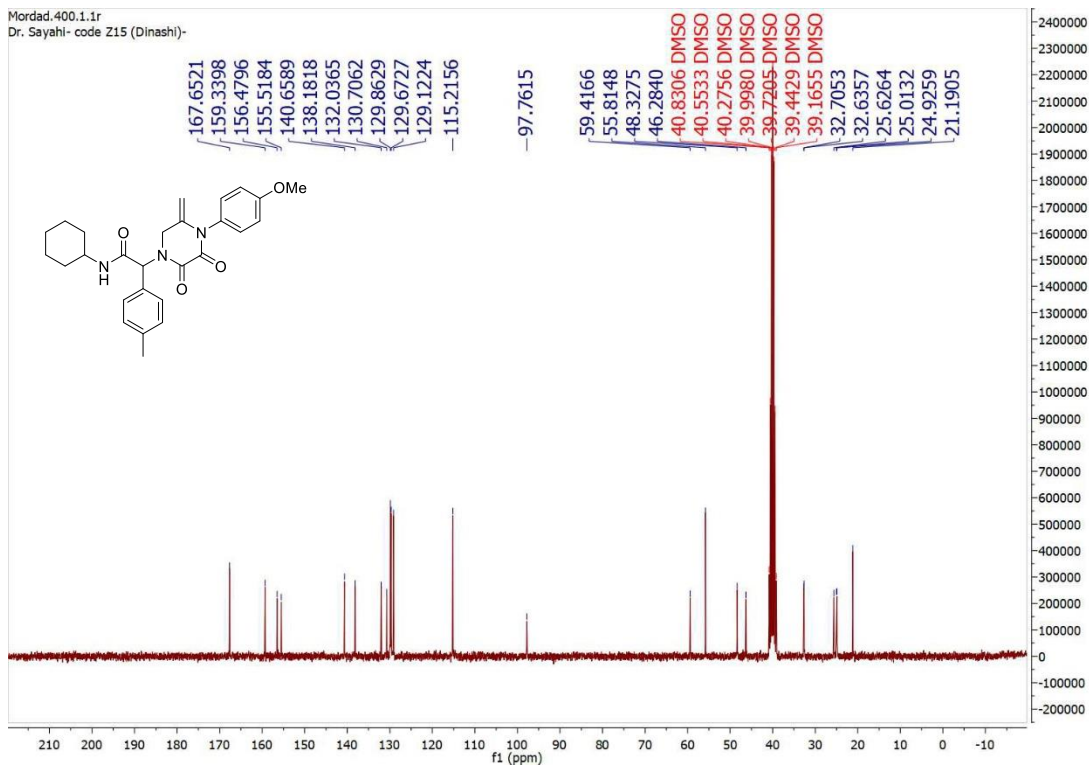
<sup>1</sup>H NMR spectrum of 6j



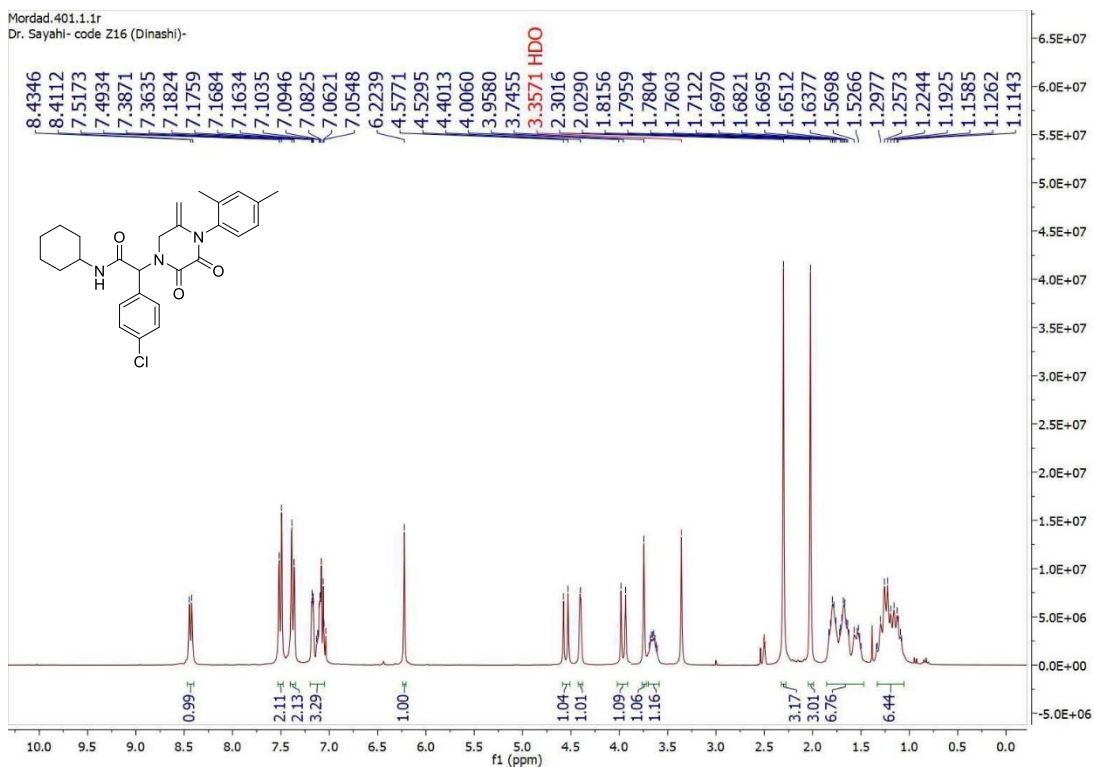
<sup>13</sup>C NMR spectrum of 6j



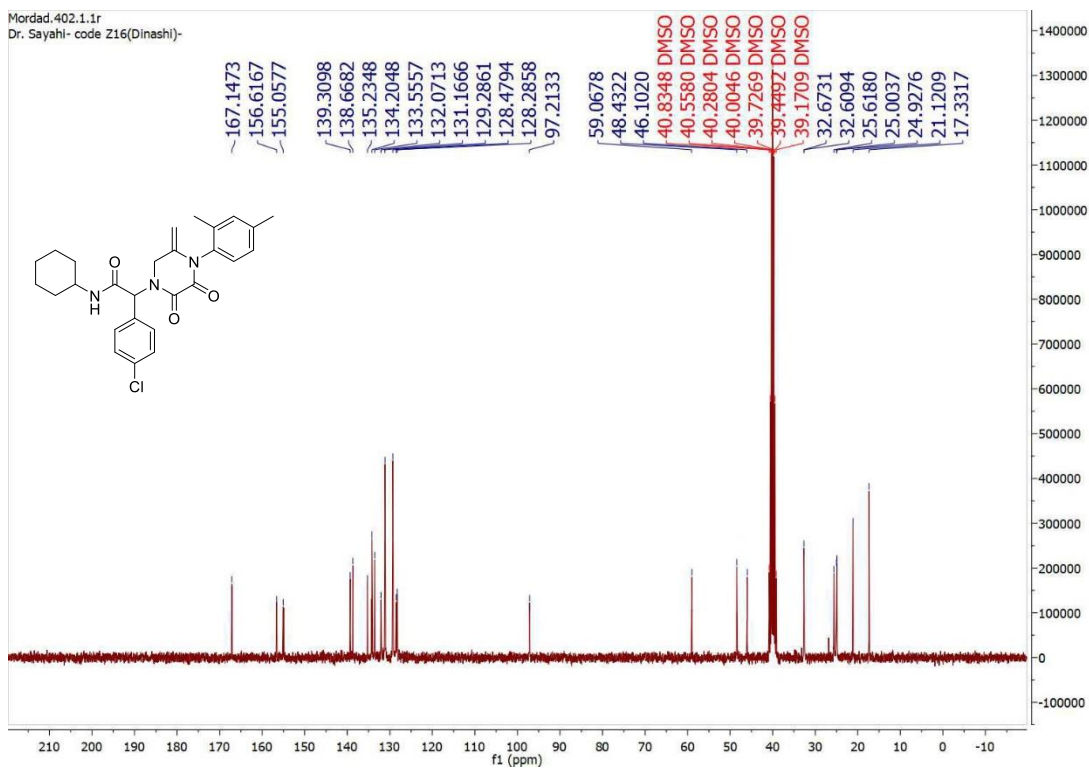
<sup>1</sup>H NMR spectrum of 6k



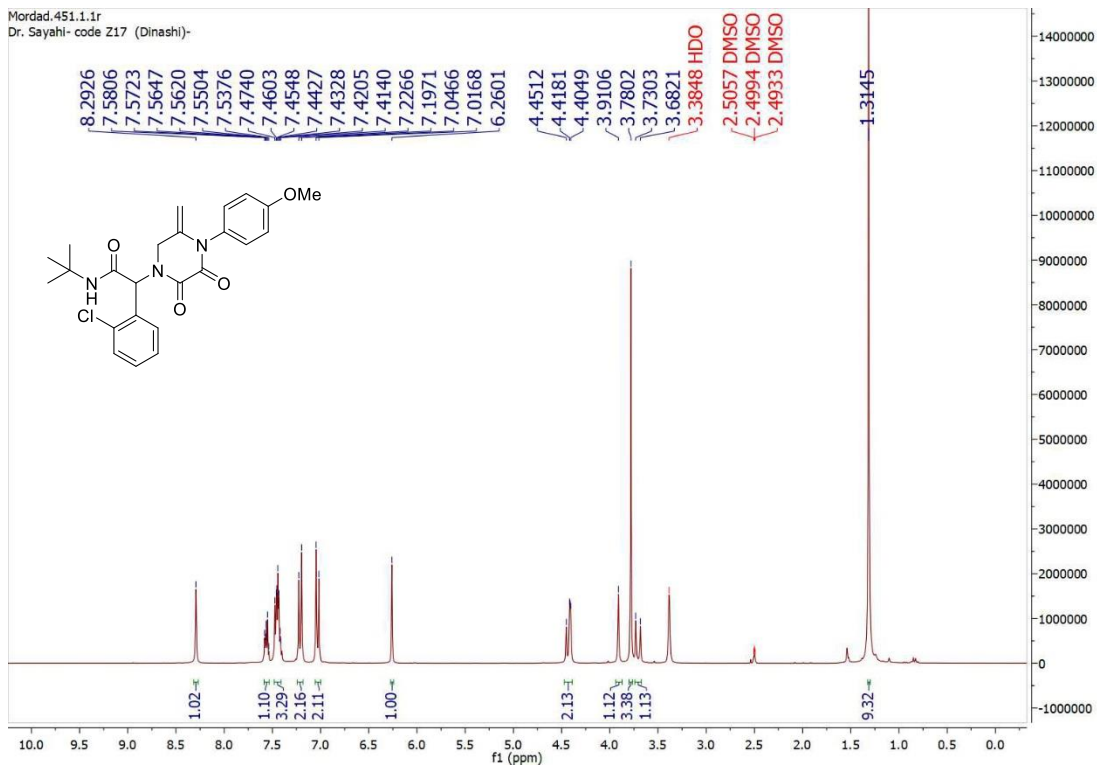
<sup>13</sup>C NMR spectrum of 6k



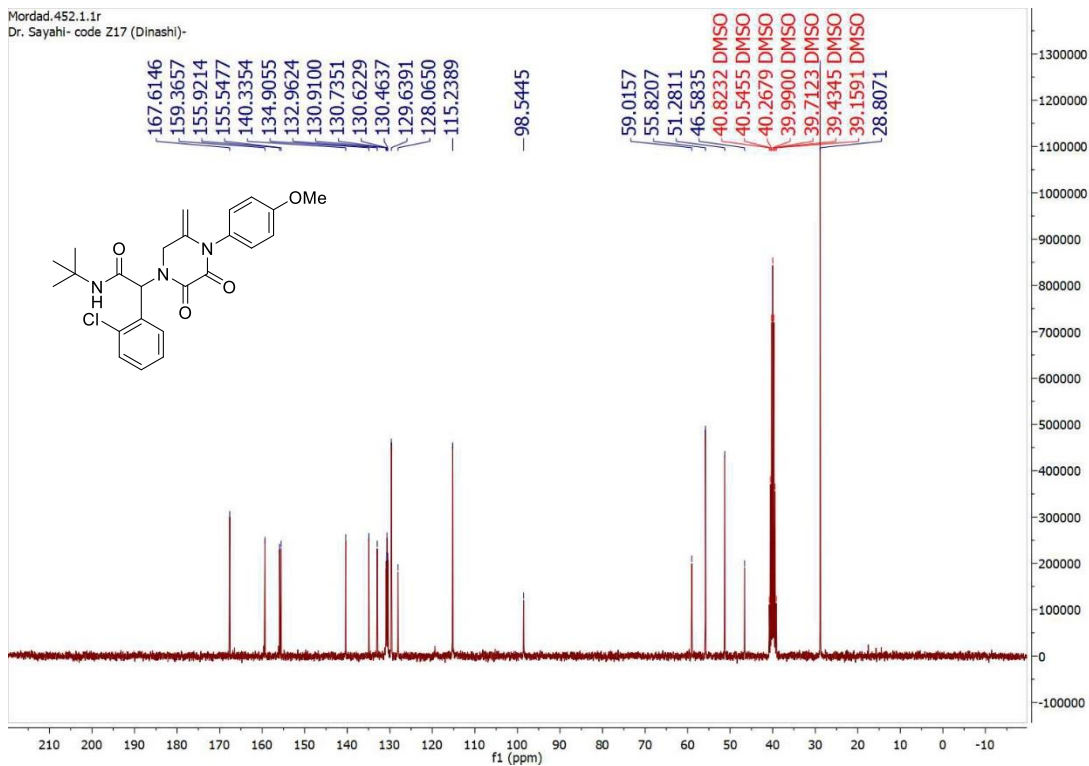
<sup>1</sup>H NMR spectrum of 6l



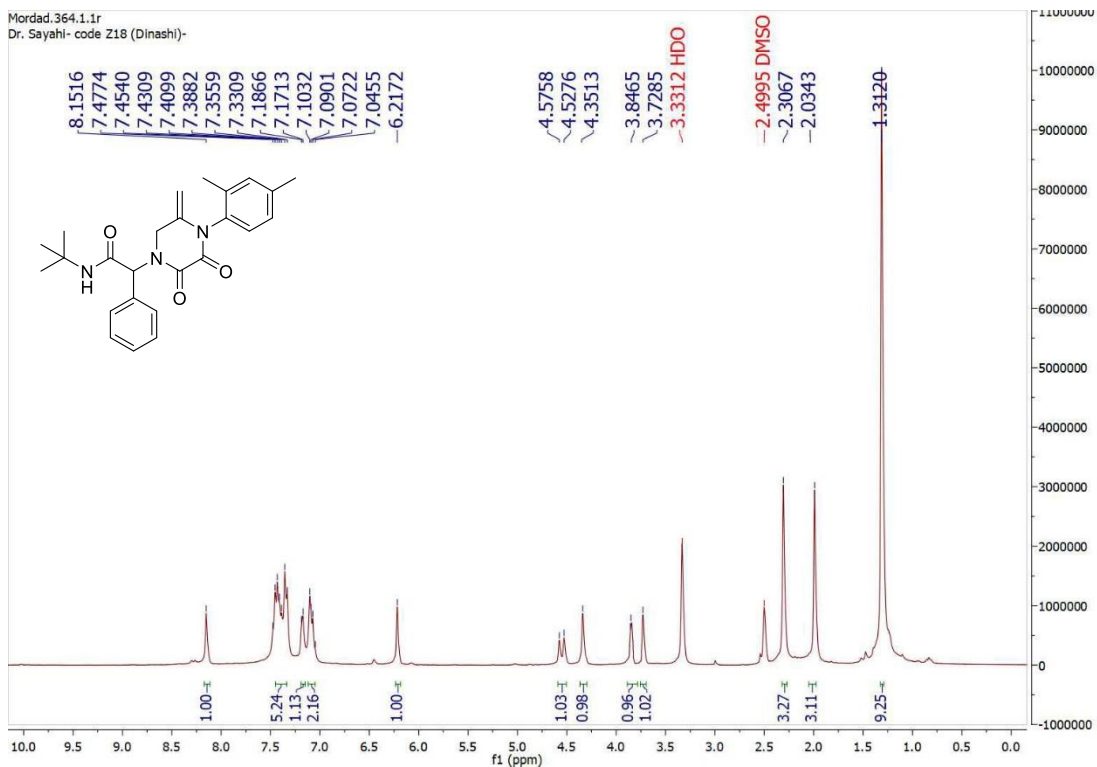
<sup>13</sup>C NMR spectrum of 6l



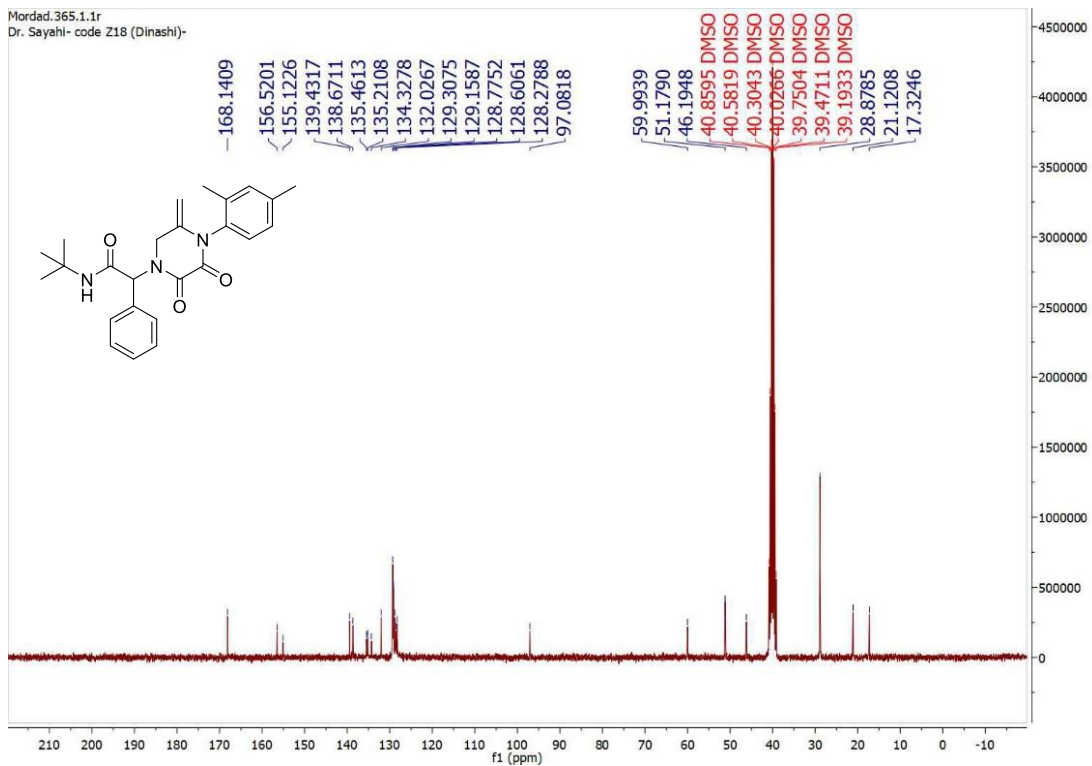
<sup>1</sup>H NMR spectrum of 6m



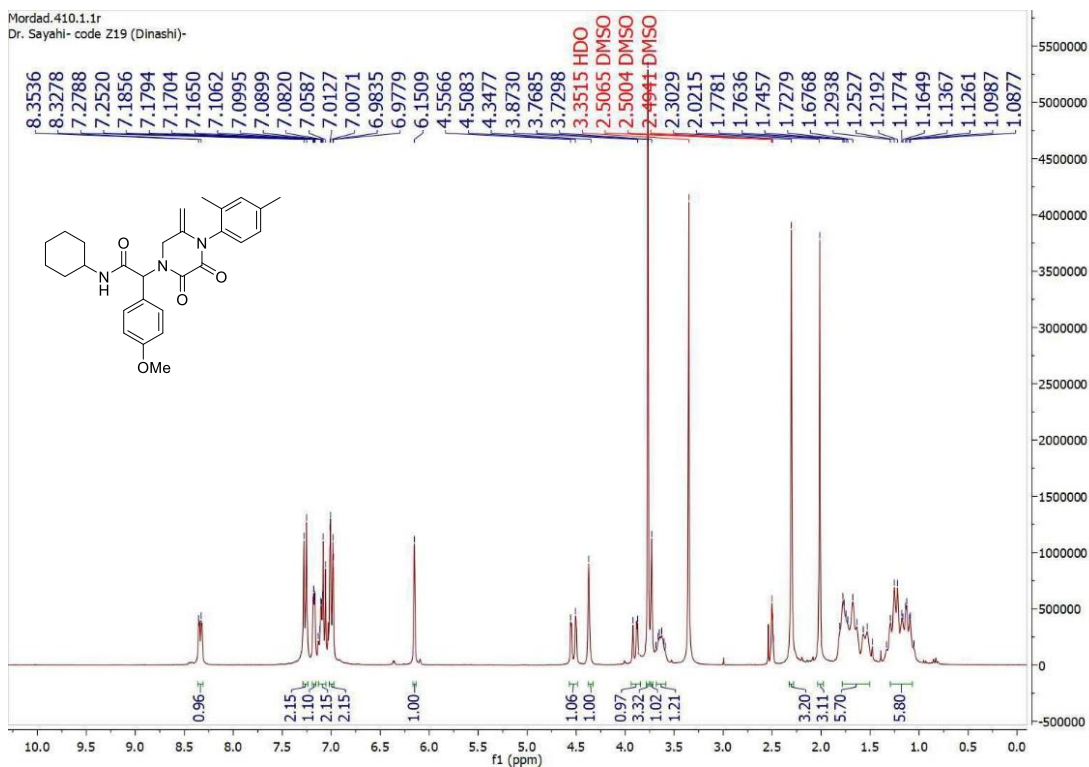
<sup>13</sup>C NMR spectrum of 6m



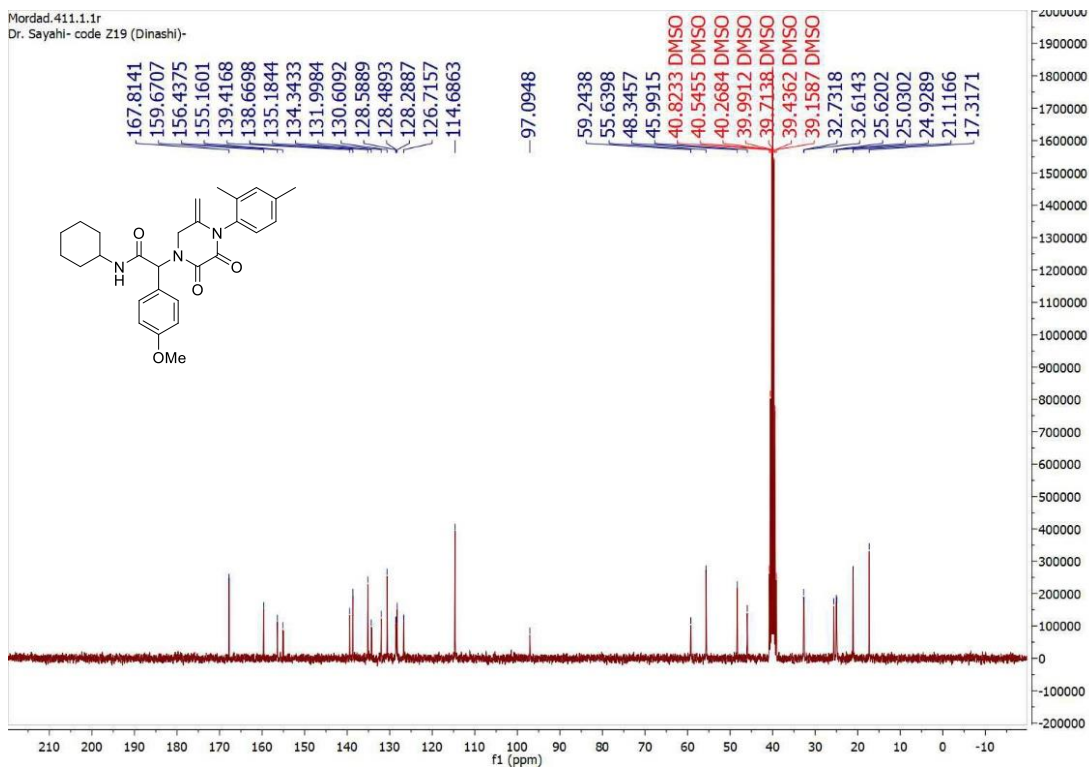
<sup>1</sup>H NMR spectrum of 6n



<sup>13</sup>C NMR spectrum of 6n



<sup>1</sup>H NMR spectrum of 6o



<sup>13</sup>C NMR spectrum of 6o