

## Preparation of some chromeno[4,3-d]pyrido[1,2-a]pyrimidine derivatives by ultrasonic irradiation using NiFe<sub>2</sub>O<sub>4</sub>@SiO<sub>2</sub> grafted di(3-propylsulfonic acid) nanoparticles

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### Experimental

Chemicals including, NiCl<sub>2</sub>.6H<sub>2</sub>O, FeCl<sub>3</sub>.6H<sub>2</sub>O, Si(OEt)<sub>4</sub>, and organic materials were purchased from Merck and Aldrich companies.

The following instruments were used for the catalyst characterizations and organic materials analysis:

X-ray diffraction pattern (XRD): X-Ray diffractometer (Philips, D5000, Cu-K $\alpha$  irradiation)

NMR spectra: Bruker Avance DPX 400 MHz instrument. The spectra were measured in DMSO-d<sub>6</sub> relative to TMS (0.00 ppm).

Elemental analysis: Heraeus CHN-O-Rapid analyzer

### Selected spectral data:

**7-Phenyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one (Table 2, Product d<sub>1</sub>):**

~~White powder, m.p.: 212–214 °C; <sup>1</sup>H-NMR (400 MHz, DMSO-d<sub>6</sub>):  $\delta$  = 6.29 (s, 1H, CH), 6.86-~~

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7.32 (m, 9H), 7.52 (t,  $J = 8.4$  Hz, 1H), 7.81 (t,  $J = 8.4$  Hz, 1H), 7.88-7.92 (m, 2H) ppm;  $^{13}\text{C}$ -NMR (100 MHz, DMSO- $d_6$ ):  $\delta = 168.3, 165.3, 153.7, 152.3, 145.1, 142.5, 136.1, 130.9, 127.4, 126.4, 124.8, 124.4, 123.0, 120.0, 116.0, 113.7, 112.8, 104.0, 36.6$  ppm; MS:  $m/z$  (%)= 326 ( $\text{M}^+$ ), 325 (100%); Found: C, 77.18; H, 4.23; N, 8.47%  $\text{C}_{21}\text{H}_{14}\text{N}_2\text{O}_2$ ; requires: C, 77.29; H, 4.32; N, 8.58%.

**7-(*p*-tolyl)-6H,7H-chromeno[4,3-*d*]pyrido[1,2-*a*]pyrimidin-6-one (Table 2, Product **d**<sub>2</sub>):**

White powder, m.p.: 231-233 °C;  $^1\text{H}$ -NMR (400 MHz, DMSO- $d_6$ ):  $\delta = 2.20$  (s, 3H,  $\text{CH}_3$ ), 6.23 (s, 1H, CH), 6.86-7.22 (m, 8H), 7.52 (t,  $J = 8.4$  Hz, 1H), 7.79-7.93 (m, 3H) ppm;  $^{13}\text{C}$ -NMR (100 MHz, DMSO- $d_6$ ):  $\delta = 167.9, 165.1, 153.7, 152.2, 144.9, 139.6, 136.0, 133.3, 130.4, 128.1, 126.6, 124.5, 123.3, 119.2, 115.9, 113.0, 112.5, 103.6, 35.9, 21.2$  ppm; MS:  $m/z$  (%)= 340 ( $\text{M}^+$ ), 339 (100%); Found: C, 77.55; H, 4.68; N, 8.14%  $\text{C}_{22}\text{H}_{16}\text{N}_2\text{O}_2$ ; requires: C, 77.63; H, 4.74; N, 8.23%.

**7-(4-methoxyphenyl)-6H,7H-chromeno[4,3-*d*]pyrido[1,2-*a*]pyrimidin-6-one (Table 2,**

**Product **d**<sub>3</sub>):** White powder, m.p.: 239-241 °C;  $^1\text{H}$ -NMR (400 MHz, DMSO- $d_6$ ):  $\delta = 3.68$  (s, 3H,  $\text{OCH}_3$ ), 6.19 (s, 1H, CH), 6.85-7.93 (m, 12H) ppm;  $^{13}\text{C}$ -NMR (100 MHz, DMSO- $d_6$ ):  $\delta = 167.6, 164.8, 156.2, 153.6, 152.2, 144.7, 136.1, 133.6, 130.7, 127.4, 124.5, 123.1, 119.0, 115.7, 114.2, 113.2, 112.3, 103.4, 55.3, 35.4$  ppm; MS:  $m/z$  (%)= 356 ( $\text{M}^+$ ), 355 (100%); Found: C, 74.06; H, 4.44; N, 7.83%  $\text{C}_{22}\text{H}_{16}\text{N}_2\text{O}_3$ ; requires: C, 74.15; H, 4.53; N, 7.86%.

**7-(3,4,5-trimethoxyphenyl)-6H,7H-chromeno[4,3-*d*]pyrido[1,2-*a*]pyrimidin-6-one (Table 2,**

**Product **d**<sub>4</sub>):** White powder, m.p.: 278-279 °C;  $^1\text{H}$ -NMR (400 MHz, DMSO- $d_6$ ):  $\delta = 3.58$  (s, 6H,  $\text{OCH}_3$ ), 3.66 (s, 3H,  $\text{OCH}_3$ ), 6.14 (s, 1H, CH), 6.34 (s, 2H), 6.85-7.15 (m, 4H), 7.52 (t,  $J = 8.3$  Hz, 1H), 7.80-7.93 (m, 3H) ppm;  $^{13}\text{C}$ -NMR (100 MHz, DMSO- $d_6$ ):  $\delta = 167.3, 164.6, 158.3, 155.4, 153.7, 152.3, 144.6, 136.2, 133.7, 130.2, 127.3, 123.2, 119.1, 114.2, 113.3, 112.2, 109.4,$

105.7, 56.7, 55.1, 35.9 ppm; MS:  $m/z$  (%)= 416 ( $M^+$ ), 415 (100%); Found: C, 69.15; H, 4.78; N, 6.69%  $C_{24}H_{20}N_2O_5$ ; requires: C, 69.22; H, 4.84; N, 6.73%.

**7-(2-fluorophenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one (Table 2, Product d<sub>5</sub>):** White powder, m.p.: 222-224 °C; <sup>1</sup>H-NMR (400 MHz, DMSO-d<sub>6</sub>):  $\delta$  = 6.35 (s, 1H), 6.85-7.95 (m, 12H) ppm; <sup>13</sup>C-NMR (100 MHz, DMSO-d<sub>6</sub>):  $\delta$  = 168.0, 163., 160.2, 154.1, 152.5, 144.4, 136.2, 130.7, 130.3, 130.2, 128.8, 128.6, 127.4, 127.3, 124.3, 123.4, 123.2, 120.1, 115.8, 114.4, 114.2, 113.5, 112.6, 103.2, 35.6 ppm; MS:  $m/z$  (%)= 344 ( $M^+$ ), 343 (100%); Found: C, 73.18; H, 3.76; N, 8.08%  $C_{21}H_{13}FN_2O_2$ ; requires: C, 73.25; H, 3.81; N, 8.14%.

**7-(2-methoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one (Table 2, Product d<sub>6</sub>):** White powder, m.p.: 231-233 °C; <sup>1</sup>H-NMR (400 MHz, DMSO-d<sub>6</sub>):  $\delta$  = 3.71 (s, 3H, OCH<sub>3</sub>), 5.93 (s, 1H, CH), 6.86-7.94 (m, 12H) ppm; <sup>13</sup>C-NMR (100 MHz, DMSO-d<sub>6</sub>):  $\delta$  = 167.3, 164.4, 156.6, 153.4, 152.0, 144.5, 136.0, 133.6, 129.9, 128.2, 125.4, 124.5, 123.1, 119.0, 115.7, 114.2, 113.2, 112.3, 108.2, 103.3, 55.6, 34.0 ppm; MS:  $m/z$  (%)= 356 ( $M^+$ ), 355 (100%); Found: C, 74.08; H, 4.42; N, 7.79%  $C_{22}H_{16}N_2O_3$ ; requires: C, 74.15; H, 4.53; N, 7.86%.

**2,3-dimethoxy-11-methyl-7-(3,4,5-trimethoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one (Table 2, Product d<sub>12</sub>):** White powder, m.p.: >300 °C; <sup>1</sup>H-NMR (400 MHz, DMSO-d<sub>6</sub>):  $\delta$  = 2.32 (s, 3H, CH<sub>3</sub>), 3.55 (s, 6H, OCH<sub>3</sub>), 3.63 (s, 3H, OCH<sub>3</sub>), 3.65 (s, 3H, OCH<sub>3</sub>), 3.76 (s, 3H, OCH<sub>3</sub>), 6.03 (s, 1H, CH), 6.39 (s, 2H), 6.64 (s, 1H), 6.74 (s, 1H), 7.07 (d,  $J$  = 8.4 Hz, 1H), 7.32 (s, 1H), 7.85 (d,  $J$  = 8.4 Hz, 1H) ppm; <sup>13</sup>C-NMR (100 MHz, DMSO-d<sub>6</sub>):  $\delta$  = 167.0, 161.3, 158.0, 155.7, 153.6, 152.3, 150.1, 148.9, 144.2, 132.8, 130.3, 123.2, 114.3, 112.2, 109.0, 103.7, 98.7, 92.5, 56.7, 55.8, 55.4, 54.5, 34.8, 21.1 ppm; MS:  $m/z$  (%)= 490 ( $M^+$ ), 489 (100%); Found: C, 66.03; H, 5.25; N, 5.66%  $C_{27}H_{26}N_2O_7$ ; requires: C, 66.11; H, 5.34; N, 5.71%.

**2,3-dimethoxy-11-methyl-7-phenyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one**

(Table 2, Product d<sub>13</sub>): White powder, m.p.: >300 °C; <sup>1</sup>H-NMR (400 MHz, DMSO-d<sub>6</sub>): δ = 2.32 (s, 3H, CH<sub>3</sub>), 3.62 (s, 3H, OCH<sub>3</sub>), 3.73 (s, 3H, OCH<sub>3</sub>), 6.14 (s, 1H, CH), 6.59 (s, 1H), 6.73 (s, 1H), 7.04 (d, *J* = 8.2 Hz, 1H), 7.14 (t, *J* = 7.8 Hz, 2H), 7.21 (t, *J* = 7.8 Hz, 1H), 7.27 (s, 1H), 7.35 (d, *J* = 8.2 Hz, 2H), 7.82 (d, *J* = 8.2 Hz, 1H) ppm; <sup>13</sup>C-NMR (100 MHz, DMSO-d<sub>6</sub>): δ = 166.3, 160.3, 153.4, 152.7, 150.7, 148.3, 144.3, 132.6, 130.7, 128.4, 127.2, 126.6, 123.7, 114.0, 109.0, 103.6, 97.8, 91.8, 55.9, 54.8, 34.6, 21.1 ppm; MS: *m/z* (%) = 400 (100%); Found: C, 72.07; H, 5.09; N, 6.94% C<sub>24</sub>H<sub>20</sub>N<sub>2</sub>O<sub>4</sub>; requires: C, 71.99; H, 5.03; N, 7.00%.

**2,3-dimethoxy-11-methyl-7-(*p*-tolyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one**

(Table 2, Product d<sub>14</sub>): White powder, m.p.: >300 °C; <sup>1</sup>H-NMR (400 MHz, DMSO-d<sub>6</sub>): δ = 2.21 (s, 3H, CH<sub>3</sub>), 2.33 (s, 3H, CH<sub>3</sub>), 3.63 (s, 3H, OCH<sub>3</sub>), 3.75 (s, 3H, OCH<sub>3</sub>), 5.98 (s, 1H, CH), 6.61 (s, 1H), 6.74 (s, 1H), 7.02-7.06 (m, 3H), 7.23 (d, *J* = 7.8 Hz, 2H), 7.29 (s, 1H), 7.83 (d, *J* = 8.4 Hz, 1H) ppm; <sup>13</sup>C-NMR (100 MHz, DMSO-d<sub>6</sub>): δ = 166.2, 159.9, 153.2, 152.8, 150.3, 148.6, 144.1, 139.1, 132.4, 130.5, 125.6, 123.6, 123.2, 114.2, 108.6, 103.8, 98.3, 91.9, 55.8, 54.8, 34.4, 21.4, 21.2 ppm; MS: *m/z* (%) = 414 (M<sup>+</sup>), (100%); Found: C, 72.53; H, 5.44; N, 6.68% C<sub>25</sub>H<sub>22</sub>N<sub>2</sub>O<sub>4</sub>; requires: C, 72.45; H, 5.35; N, 6.76%.

**2,3-dimethoxy-7-(4-methoxyphenyl)-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-**

**a]pyrimidin-6-one (Table 2, Product d<sub>15</sub>):** White powder, m.p.: >300 °C; <sup>1</sup>H-NMR (400 MHz, DMSO-d<sub>6</sub>): δ = 2.31 (s, 3H, CH<sub>3</sub>), 3.64 (s, 3H, OCH<sub>3</sub>), 3.70 (s, 3H, OCH<sub>3</sub>), 3.74 (s, 3H, OCH<sub>3</sub>), 5.89 (s, 1H, CH), 6.60 (s, 1H), 6.74 (s, 1H), 6.91 (d, *J* = 7.8 Hz, 2H), 7.04 (d, *J* = 8.4 Hz, 1H),

7.25 (d,  $J = 7.8$  Hz, 2H), 7.28 (s, 1H), 7.81 (d,  $J = 8.4$  Hz, 1H) ppm;  $^{13}\text{C}$ -NMR (100 MHz, DMSO- $d_6$ ):  $\delta = 166.6, 160.3, 156.2, 153.4, 152.6, 150.1, 148.8, 144.3, 132.5, 129.3, 124.6, 123.2, 115.6, 114.3, 109.0, 103.9, 98.8, 92.1, 55.8, 55.3, 54.6, 34.1, 21.1$  ppm; MS:  $m/z$  (%)= 430 ( $\text{M}^+$ ), 429 (100%); Found: C, 69.68; H, 5.07; N, 6.44%  $\text{C}_{25}\text{H}_{22}\text{N}_2\text{O}_5$ ; requires: C, 69.76; H, 5.15; N, 6.51%.

**7-(4-chlorophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-**

**a]pyrimidin-6-one (Table 2, Product  $\text{d}_{16}$ ):** White powder, m.p.:  $>300$  °C;  $^1\text{H}$ -NMR (400 MHz, DMSO- $d_6$ ):  $\delta = 2.31$  (s, 3H), 3.65 (s, 3H, OCH<sub>3</sub>), 3.76 (s, 3H, OCH<sub>3</sub>), 6.03 (s, 1H, CH), 6.61 (s, 1H), 6.76 (s, 1H), 7.89 (d,  $J = 8.0$  Hz, 2H), 7.07 (d,  $J = 8.5$  Hz, 1H), 7.48 (d,  $J = 8.0$  Hz, 2H), 7.32 (s, 1H), 7.86 (d,  $J = 8.5$  Hz, 1H) ppm;  $^{13}\text{C}$ -NMR (100 MHz, DMSO- $d_6$ ):  $\delta = 166.9, 162.3, 153.7, 152.6, 150.3, 148.9, 147.0, 144.4, 135.7, 132.6, 128.6, 127.3, 123.3, 114.4, 109.3, 103.7, 100.1, 93.2, 55.7, 54.6, 36.0, 21.2$  ppm; MS:  $m/z$  (%)= 434 ( $\text{M}^+$ ), 433 (100%); Found: C, 66.22; H, 4.37; N, 6.33%  $\text{C}_{24}\text{H}_{19}\text{ClN}_2\text{O}_4$ ; requires: C, 66.29; H, 4.40; N, 6.44%.

**7-(4-bromophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-**

**a]pyrimidin-6-one (Table 2, Product  $\text{d}_{17}$ ):** White powder, m.p.:  $>300$  °C;  $^1\text{H}$ -NMR (400 MHz, DMSO- $d_6$ ):  $\delta = 2.32$  (s, 3H), 3.65 (s, 3H, OCH<sub>3</sub>), 3.77 (s, 3H, OCH<sub>3</sub>), 6.07 (s, 1H, CH), 6.62 (s, 1H), 6.75 (s, 1H), 7.93 (d,  $J = 8.0$  Hz, 2H), 7.08 (d,  $J = 8.5$  Hz, 1H), 7.54 (d,  $J = 8.0$  Hz, 2H), 7.31 (s, 1H), 7.85 (d,  $J = 8.5$  Hz, 1H) ppm;  $^{13}\text{C}$ -NMR (100 MHz, DMSO- $d_6$ ):  $\delta = 166.5, 162.4, 153.6, 152.5, 151.8, 151.3, 149.5, 144.6, 134.3, 133.8, 128.7, 127.1, 123.2, 114.7, 109.5, 104.1, 100.3, 93.1, 55.6, 54.4, 36.1, 21.2$  ppm; MS:  $m/z$  (%)= 479 ( $\text{M}^+$ ), 478 (100%); Found: C, 60.06; H, 3.91; N, 5.77%  $\text{C}_{24}\text{H}_{19}\text{BrN}_2\text{O}_4$ ; requires: C, 60.14; H, 4.00; N, 5.84%.

**2,3-dimethoxy-11-methyl-7-(4-nitrophenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-**

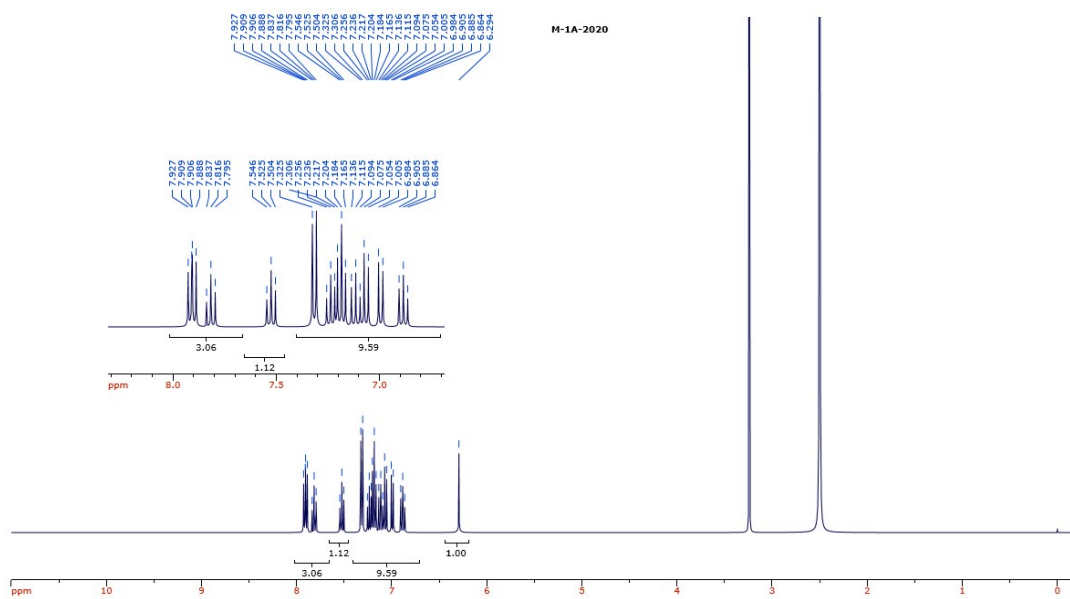
**a]pyrimidin-6-one (Table 2, Product  $\text{d}_{18}$ ):** Pale yellow powder, m.p.:  $>300$  °C;  $^1\text{H}$ -NMR (400

MHz, DMSO- $d_6$ ):  $\delta$  = 2.33 (s, 3H), 3.67 (s, 3H, OCH<sub>3</sub>), 3.78 (s, 3H, OCH<sub>3</sub>), 6.27 (s, 1H, CH), 6.64 (s, 1H), 6.76 (s, 1H), 8.14 (d,  $J$  = 7.8 Hz, 2H), 7.08 (d,  $J$  = 8.4 Hz, 1H), 7.94 (d,  $J$  = 7.8 Hz, 2H), 7.32 (s, 1H), 7.86 (d,  $J$  = 8.4 Hz, 1H) ppm; <sup>13</sup>C-NMR (100 MHz, DMSO- $d_6$ ):  $\delta$  = 168.5, 164.4, 154.1, 153.0, 151.5, 150.1, 146.3, 144.5, 134.7, 131.8, 130.7, 128.1, 123.3, 115.1, 110.5, 104.0, 99.9, 94.1, 55.7, 54.6, 37.3, 21.1 ppm; MS:  $m/z$  (%) = 445 (M<sup>+</sup>, 100%); Found: C, 64.83; H, 4.38; N, 9.36% C<sub>24</sub>H<sub>19</sub>N<sub>3</sub>O<sub>6</sub>; requires: C, 64.72; H, 4.30; N, 9.43%.

**7-(3,4-dichlorophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one (Table 2, Product d<sub>19</sub>):** White powder, m.p.: >300 °C; <sup>1</sup>H-NMR (400 MHz, DMSO- $d_6$ ):  $\delta$  = 2.33 (s, 3H), 3.66 (s, 3H, OCH<sub>3</sub>), 3.77 (s, 3H, OCH<sub>3</sub>), 6.19 (s, 1H, CH), 6.63 (s, 1H), 6.76 (s, 1H), 7.07 (d,  $J$  = 8.4 Hz, 1H), 7.31 (s, 1H), 7.63 (d,  $J$  = 7.8 Hz, 1H), 7.84 (d,  $J$  = 8.4 Hz, 1H), 8.01-8.05 (m, 2H) ppm; <sup>13</sup>C-NMR (100 MHz, DMSO- $d_6$ ):  $\delta$  = 166.5, 161.3, 153.0, 152.2, 151.4, 150.3, 149.3, 148.6, 144.2, 134.8, 131.3, 128.7, 128.1, 127.7, 123.2, 114.2, 109.0, 102.7, 100.2, 93.4, 55.6, 54.4, 35.6, 21.2 ppm; MS:  $m/z$  (%) = 469 (M<sup>+</sup>, 100%); Found: C, 61.33; H, 3.81; N, 5.88% C<sub>24</sub>H<sub>18</sub>Cl<sub>2</sub>N<sub>2</sub>O<sub>4</sub>; requires: C, 61.42; H, 3.87; N, 5.97%.

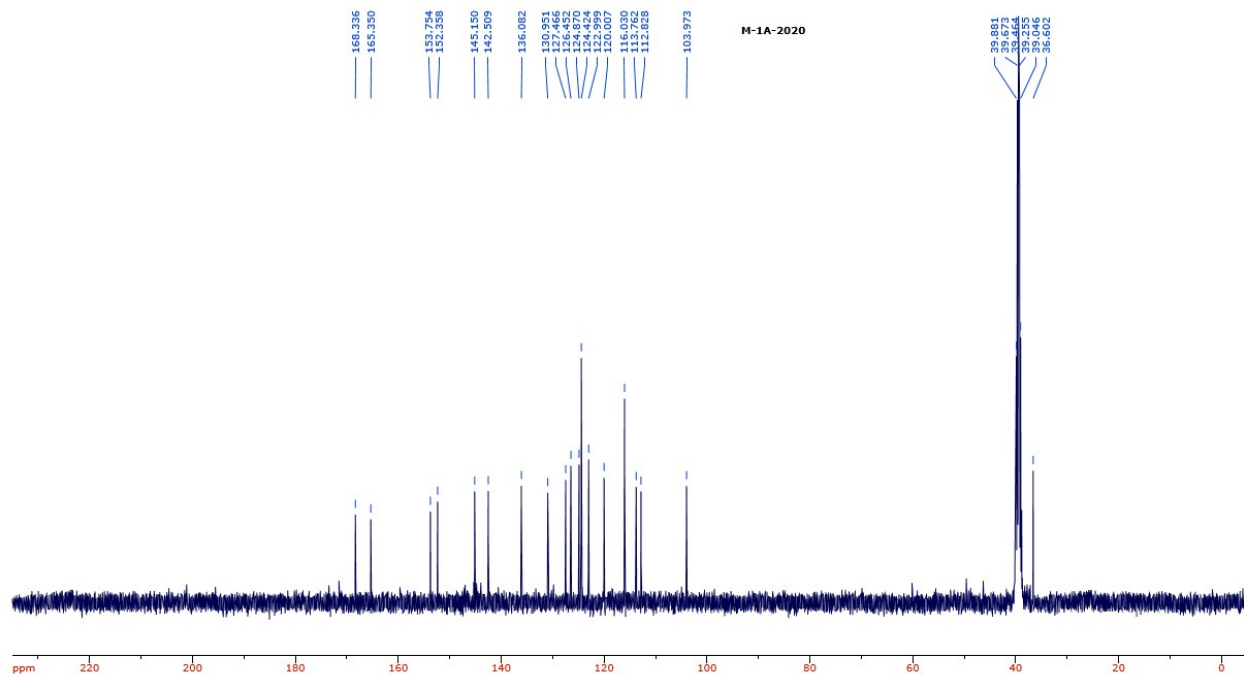
**7-(3,4-dimethoxyphenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one (Table 2, Product d<sub>20</sub>):** White powder, m.p.: >300 °C; <sup>1</sup>H-NMR (400 MHz, DMSO- $d_6$ ):  $\delta$  = 2.32 (s, 3H, CH<sub>3</sub>), 3.66 (s, 3H, OCH<sub>3</sub>), 3.76 (s, 3H, OCH<sub>3</sub>), 3.73 (s, 3H, OCH<sub>3</sub>), 3.81 (s, 3H, OCH<sub>3</sub>), 6.07 (s, 1H, CH), 6.63 (s, 1H), 6.75 (s, 1H), 6.84 (d,  $J$  = 7.8 Hz, 1H), 6.97 (d,  $J$  = 7.8 Hz, 1H), 7.04 (s, 1H), 7.07 (d,  $J$  = 8.4 Hz, 1H), 7.31 (s, 1H), 7.83 (d,  $J$  = 8.4 Hz, 1H) ppm; <sup>13</sup>C-NMR (100 MHz, DMSO- $d_6$ ):  $\delta$  = 166.9, 161.1, 157.2, 156.5, 153.2, 152.4, 150.0, 148.7, 144.1, 132.7, 127.3, 124.4, 115.4, 114.1, 112.3, 111.4, 109.2, 103.7, 98.7, 92.2, 56.1, 55.8, 55.4, 54.7, 34.3, 21.1 ppm; MS:  $m/z$  (%) = 460 (M<sup>+</sup>), 459 (100%); Found: C, 67.74; H, 5.16; N, 6.03% C<sub>26</sub>H<sub>24</sub>N<sub>2</sub>O<sub>6</sub>; requires: C, 67.82; H, 5.25; N, 6.08%.

**7-(3,5-dimethoxyphenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one (Table 2, Product d<sub>21</sub>):** White powder, m.p.: >300 °C; <sup>1</sup>H-NMR (400 MHz, DMSO-d<sub>6</sub>): δ = 2.32 (s, 3H, CH<sub>3</sub>), 3.68 (s, 3H, OCH<sub>3</sub>), 3.75 (s, 3H, OCH<sub>3</sub>), 3.88 (s, 6H, OCH<sub>3</sub>), 6.14 (s, 1H, CH), 6.53 (s, 1H), 6.64 (s, 1H), 6.67 (s, 2H), 6.76 (s, 1H), 6.84 (d, *J* = 7.8 Hz, 1H), 6.97 (d, *J* = 7.8 Hz, 1H), 7.04 (s, 1H), 7.07 (d, *J* = 8.4 Hz, 1H), 7.32 (s, 1H), 7.84 (d, *J* = 8.4 Hz, 1H) ppm; <sup>13</sup>C-NMR (100 MHz, DMSO-d<sub>6</sub>): δ = 166.1, 161.0, 158.1, 153.3, 152.2, 150.1, 148.9, 144.0, 133.7, 124.4, 115.5, 114.7, 114.3, 109.2, 103.9, 102.2, 98.8, 92.1, 56.8, 55.7, 54.5, 35.7, 21.1 ppm; MS: *m/z* (%) = 460 (M<sup>+</sup>), 459 (100%); Found: C, 67.72; H, 5.17; N, 5.98% C<sub>26</sub>H<sub>24</sub>N<sub>2</sub>O<sub>6</sub>; requires: C, 67.82; H, 5.25; N, 6.08%.

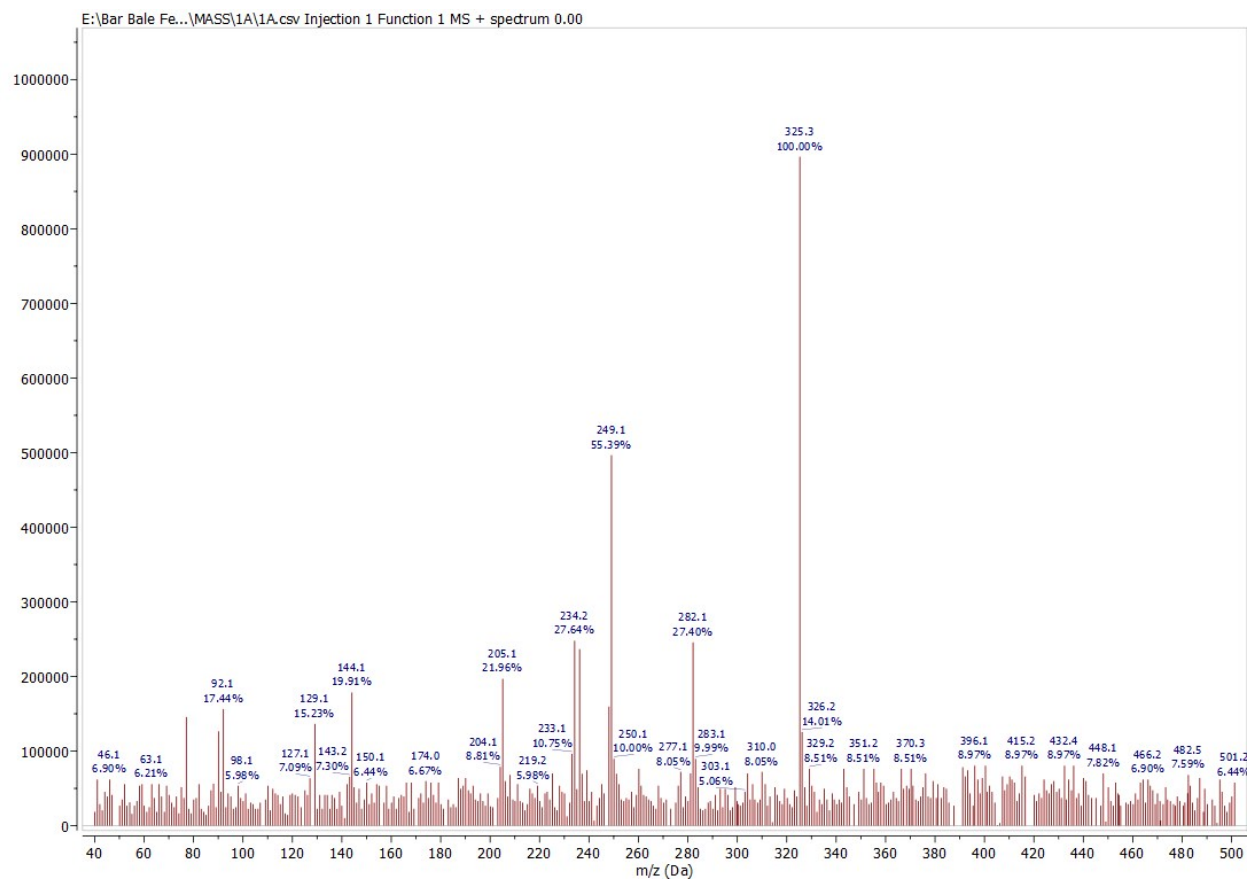


**Figure S<sub>1</sub>:** <sup>1</sup>H-NMR spectra of 7-Phenyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

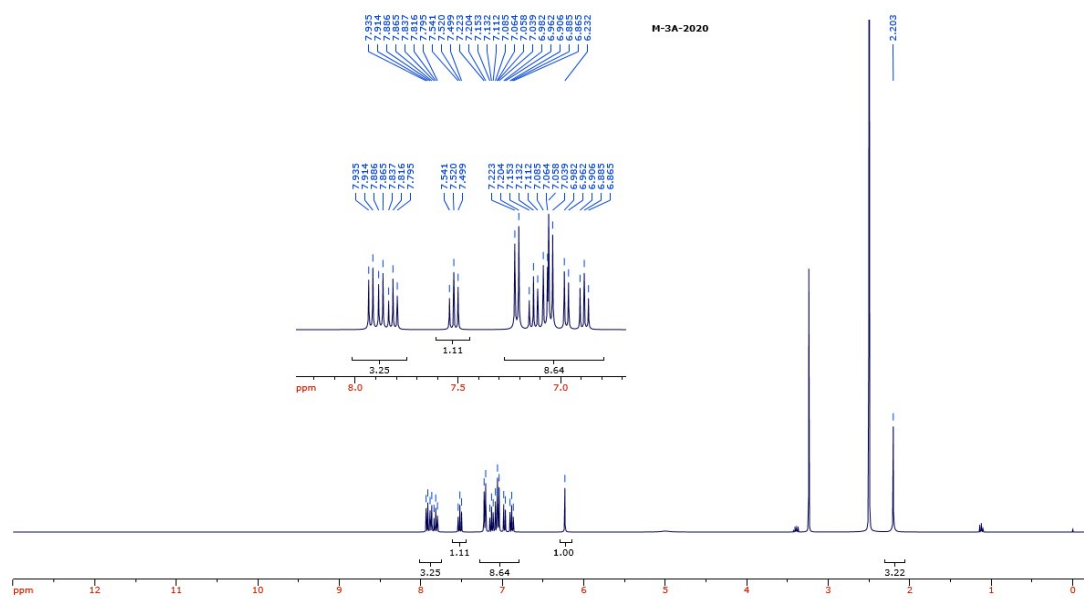




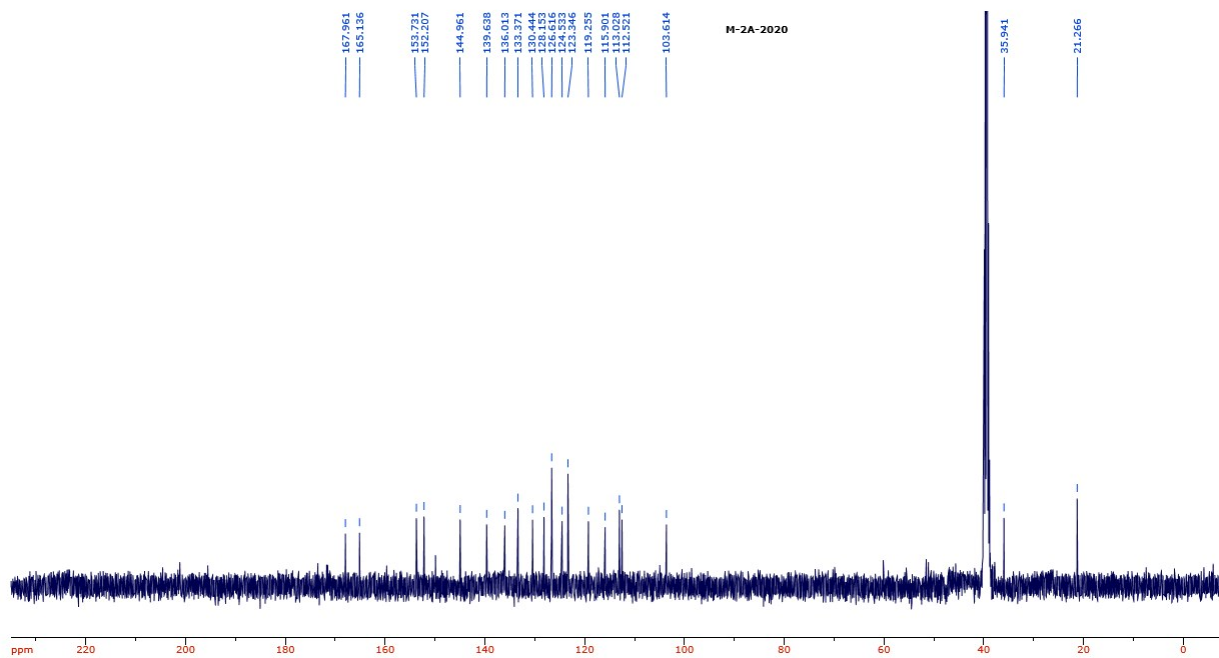
**Figure S<sub>2</sub>:** <sup>13</sup>C-NMR spectra of 7-Phenyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



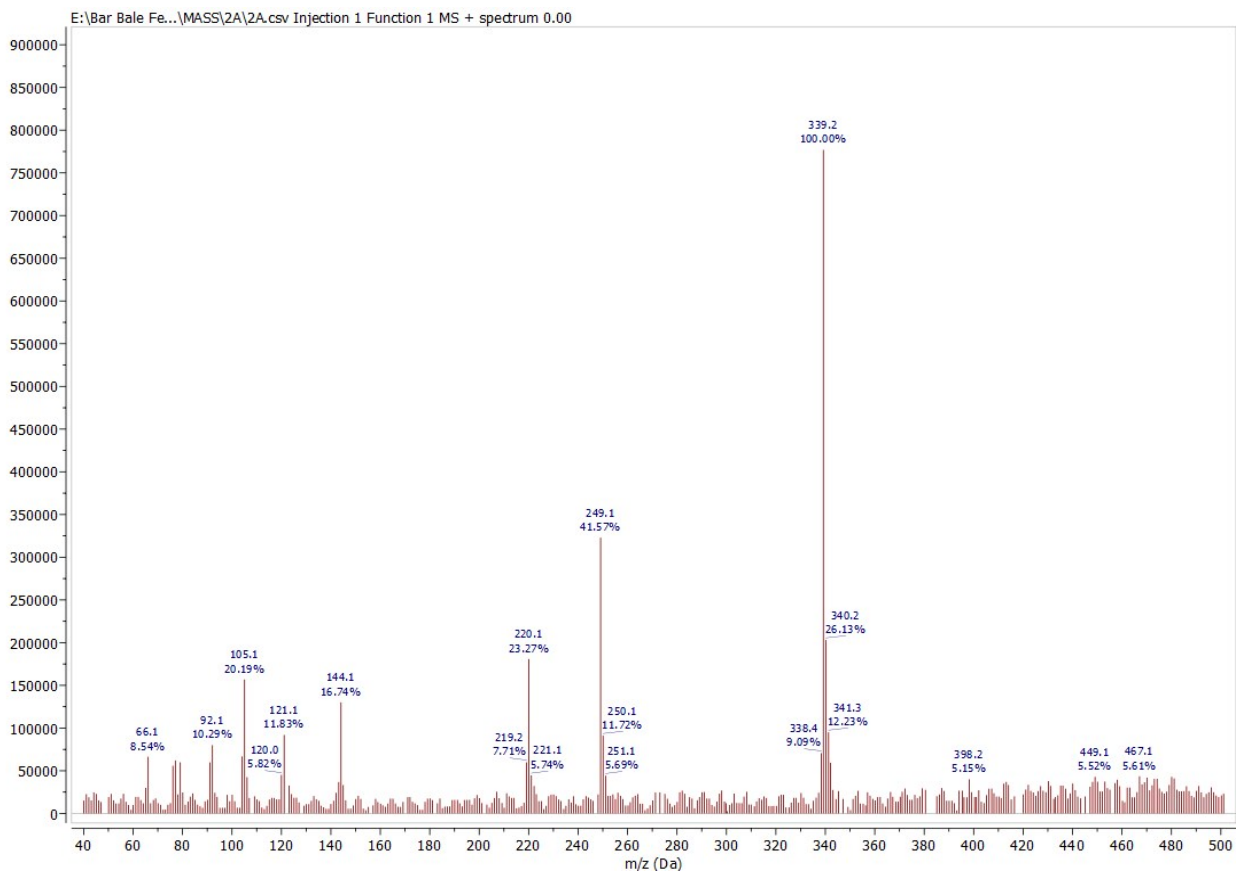
**Figure S<sub>3</sub>:** MASS spectra of 7-Phenyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



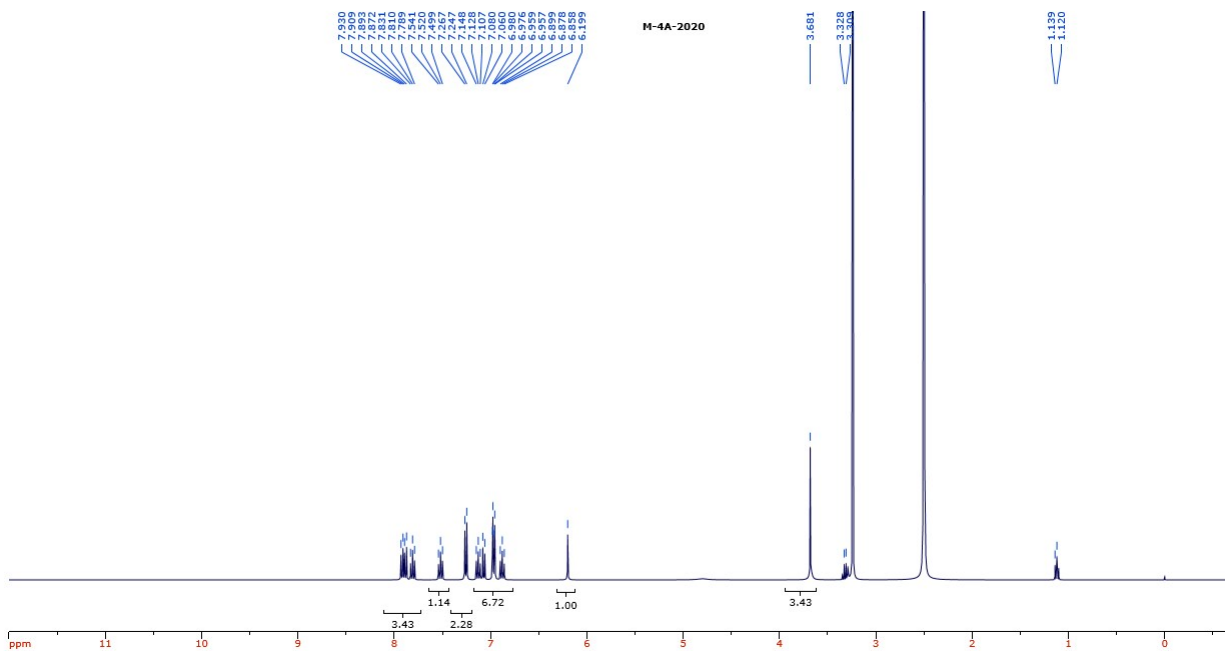
**Figure S4:**  $^1\text{H}$ -NMR spectra of 7-(*p*-tolyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



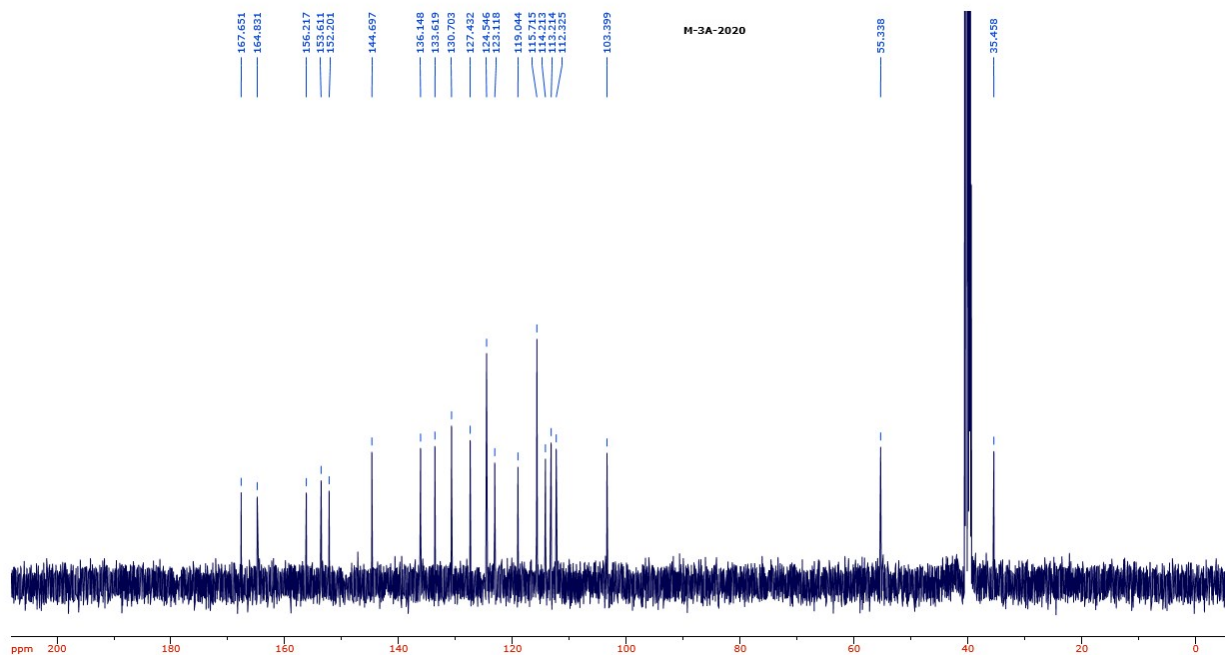
**Figure S5:**  $^{13}\text{C}$ -NMR spectra of 7-(*p*-tolyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



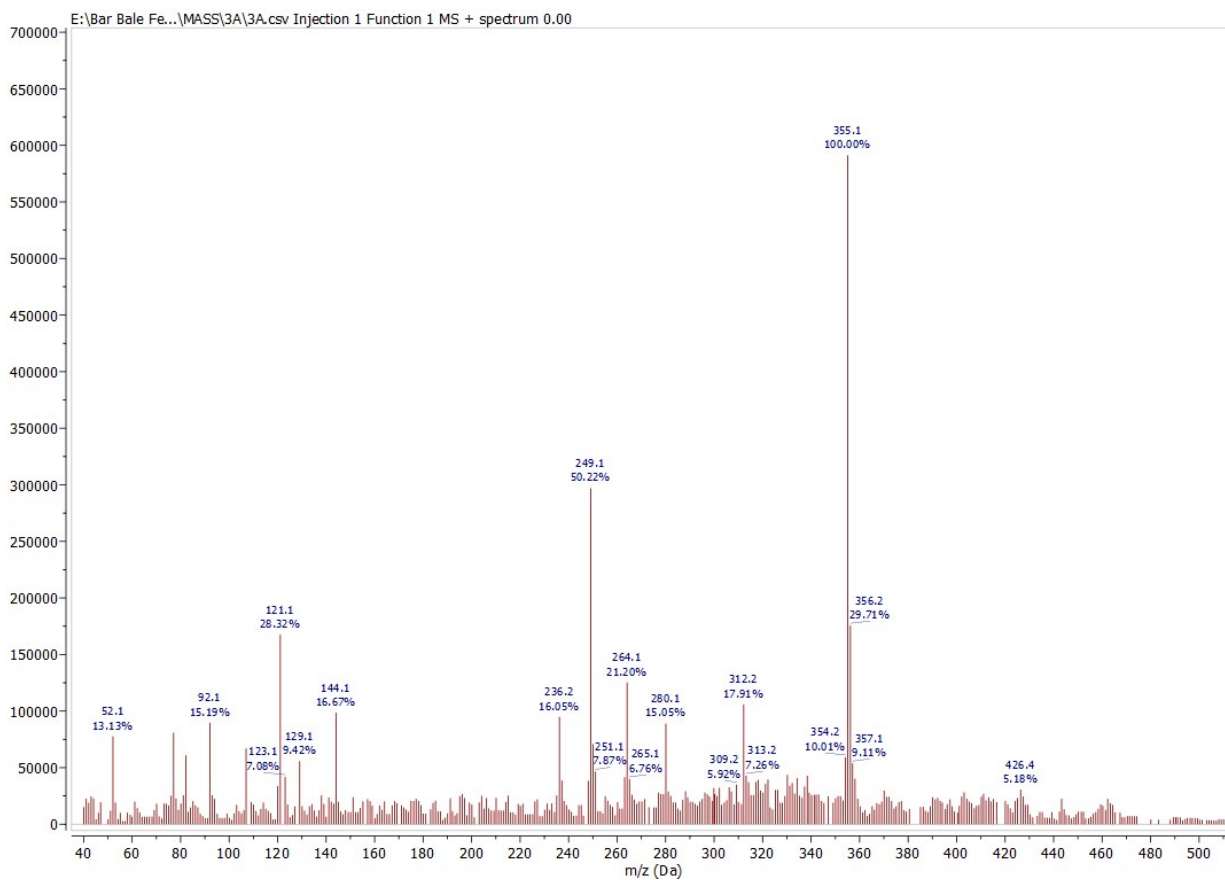
**Figure S<sub>6</sub>:** MASS spectra of 7-(*p*-tolyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



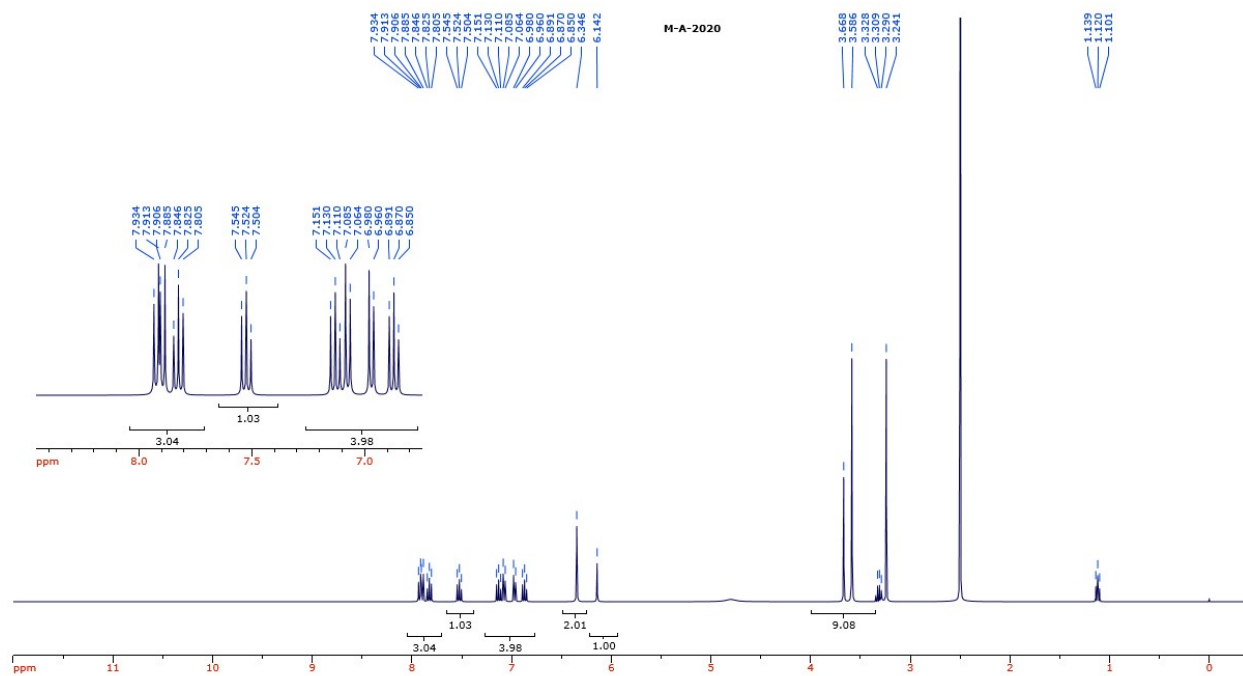
**Figure S7:** <sup>1</sup>H-NMR spectra of 7-(4-methoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



**Figure S8:**  $^{13}\text{C}$ -NMR spectra of 7-(4-methoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

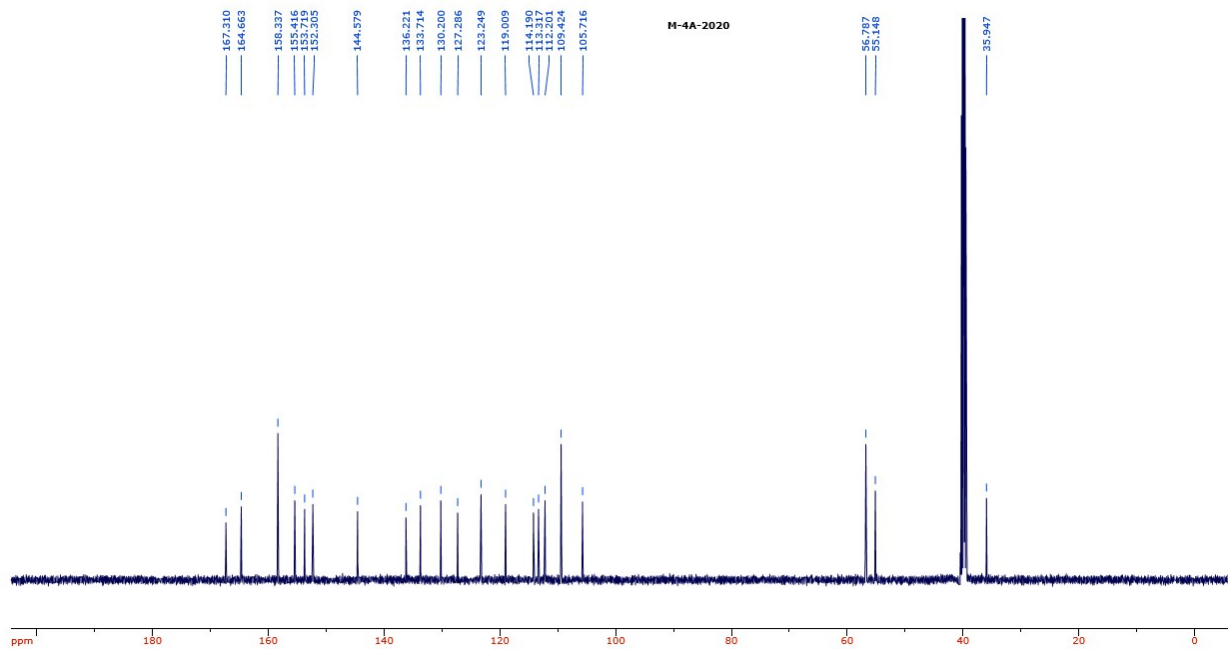


**Figure S<sub>9</sub>**: MASS spectra of 7-(4-methoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

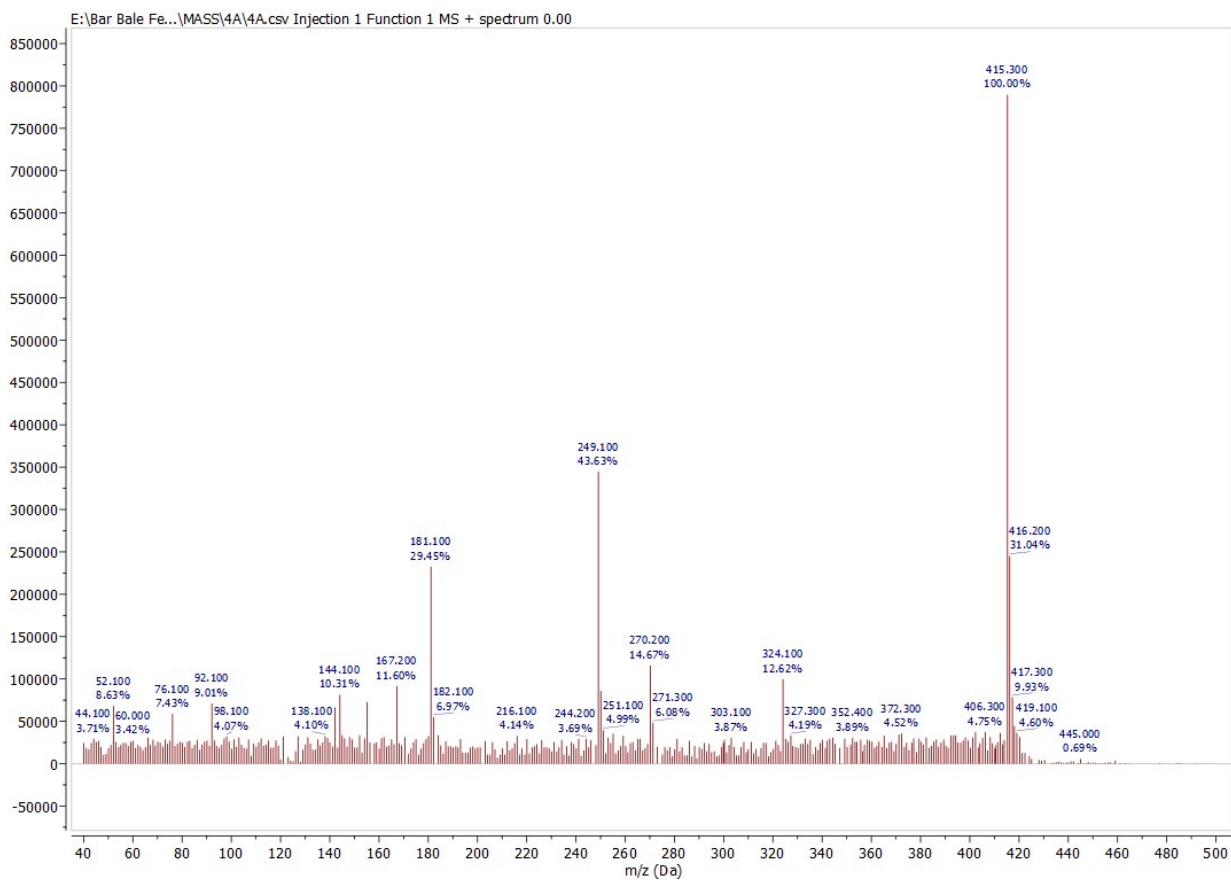


**Figure S<sub>10</sub>:** <sup>1</sup>H-NMR spectra of 7-(3,4,5-trimethoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

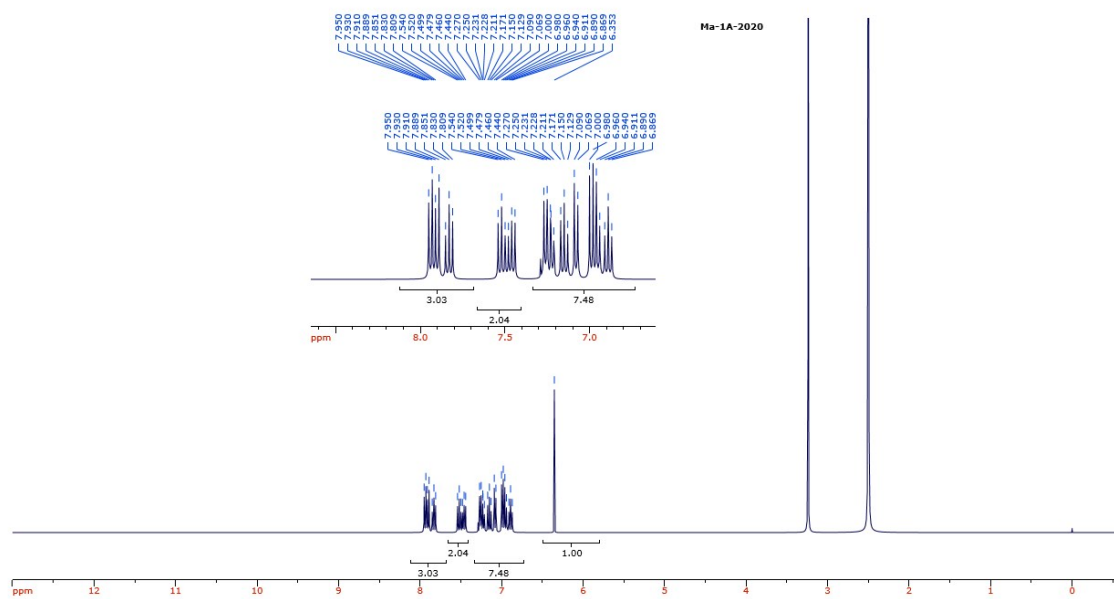




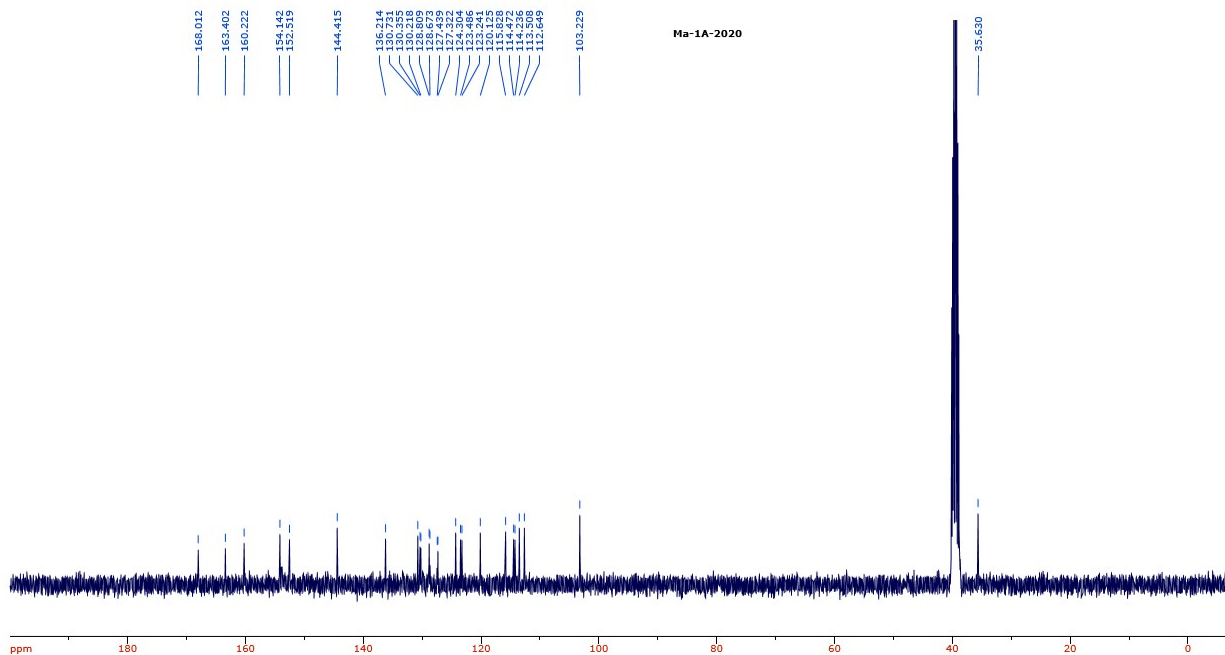
**Figure S<sub>11</sub>:** <sup>13</sup>C-NMR spectra of 7-(3,4,5-trimethoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



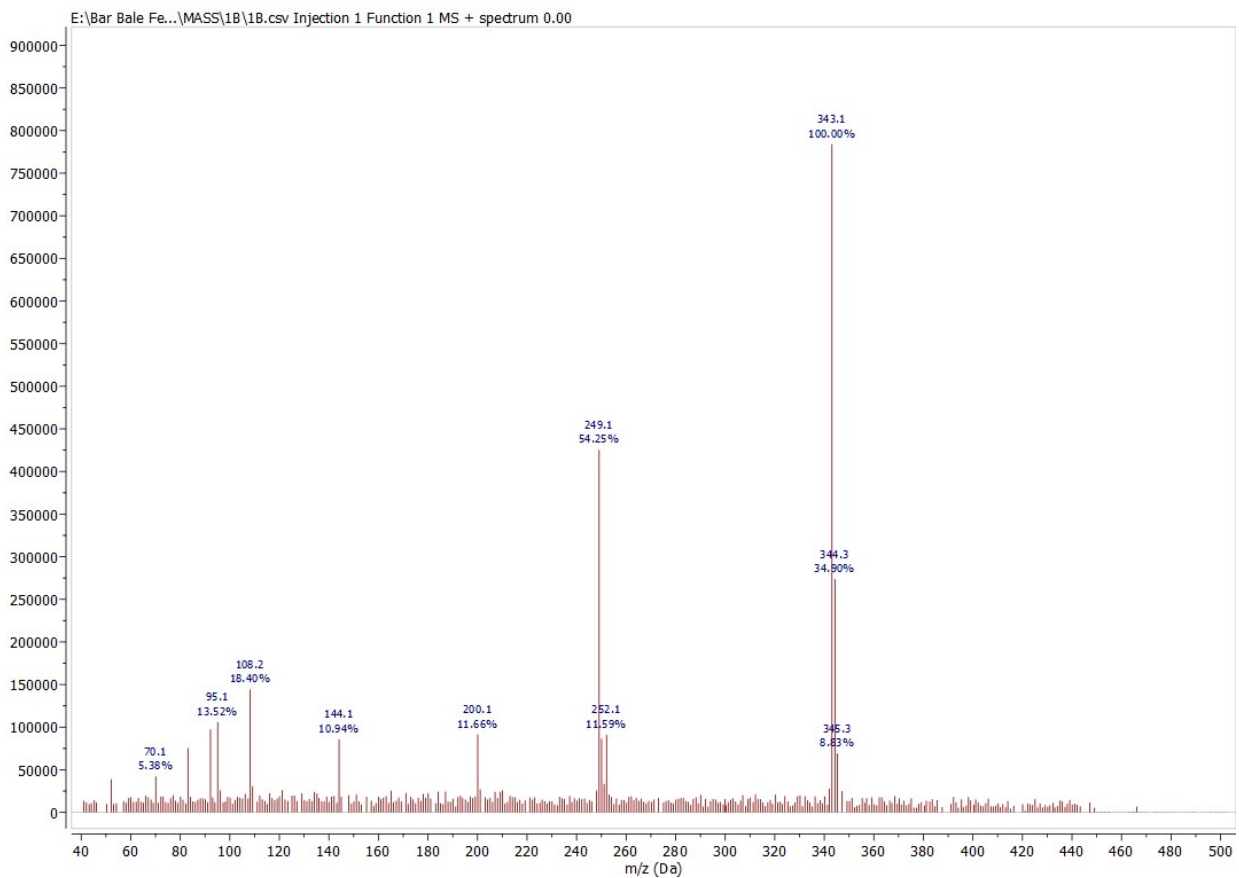
**Figure S12:** MASS spectra of 7-(3,4,5-trimethoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



**Figure S<sub>13</sub>:** <sup>1</sup>H-NMR spectra of 7-(2-fluorophenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

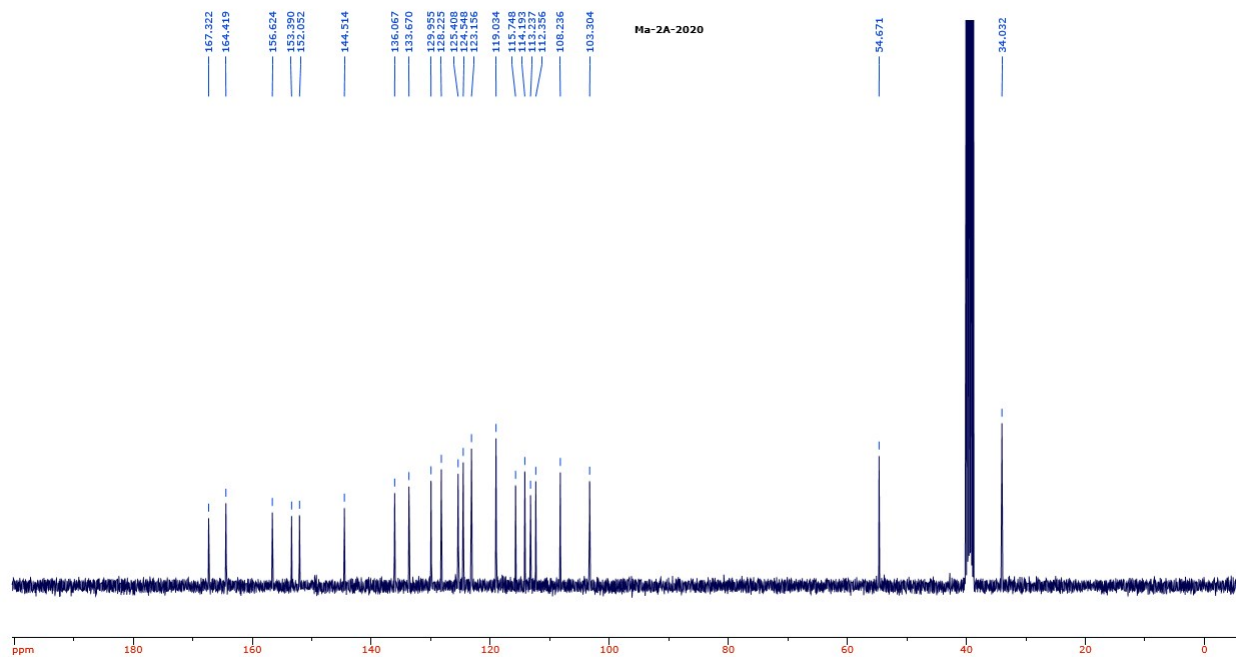


**Figure S<sub>14</sub>:** <sup>13</sup>C-NMR spectra of 7-(2-fluorophenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

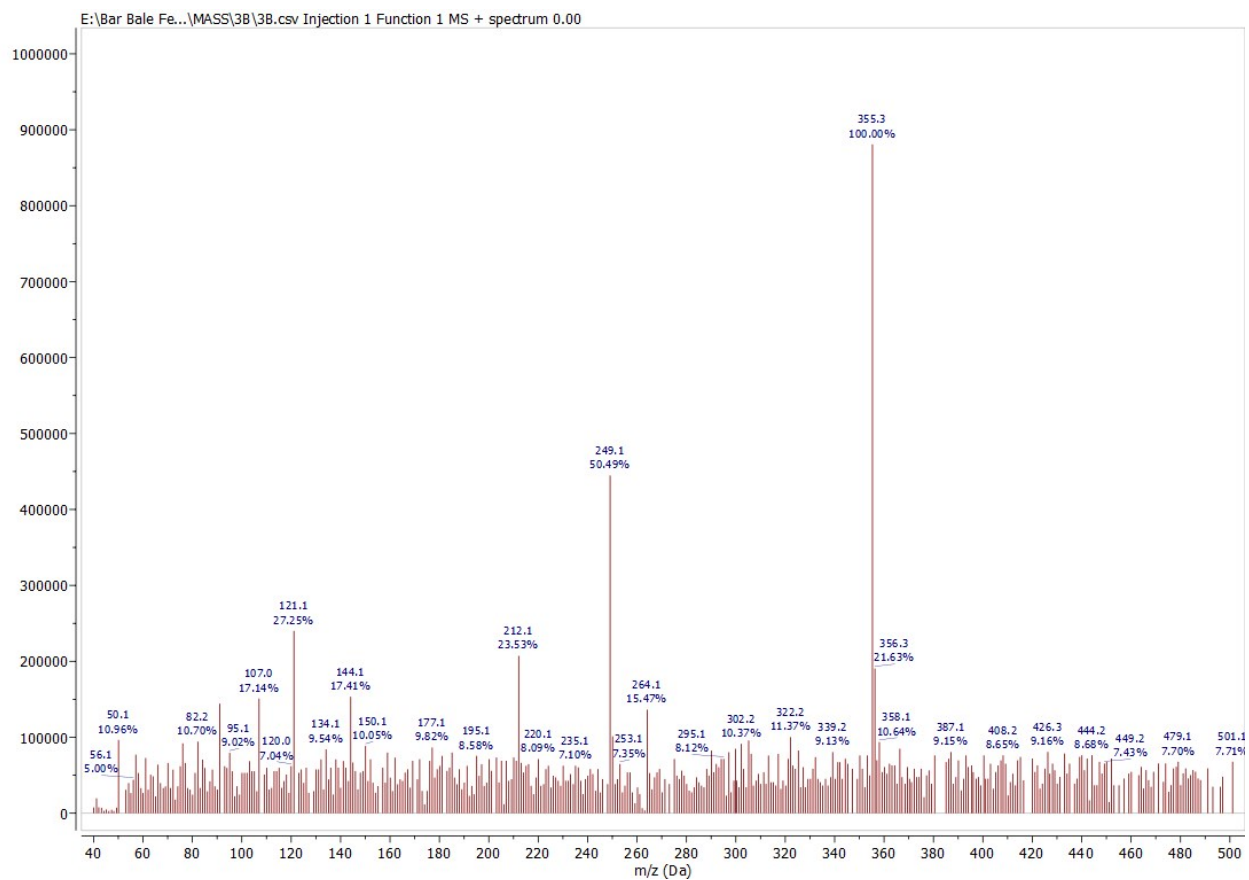


**Figure S15:** MASS spectra of 7-(2-fluorophenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



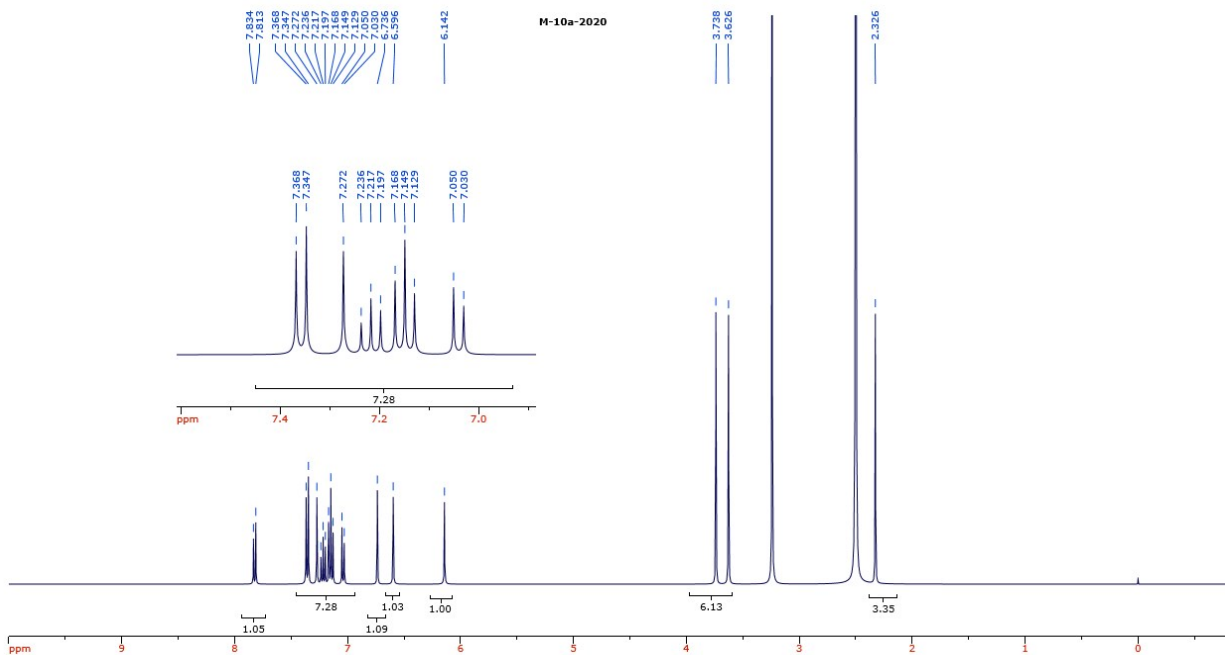


**Figure S17:**  $^{13}\text{C}$ -NMR spectra of 7-(2-methoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

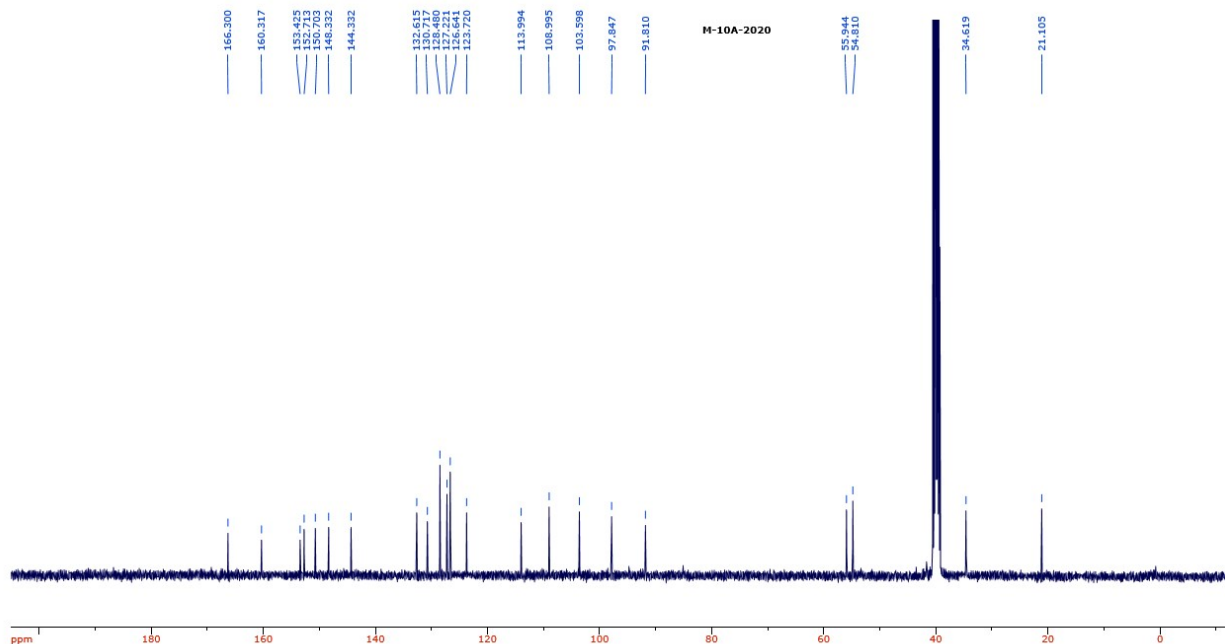


**Figure S<sub>18</sub>:** MASS spectra of 7-(2-methoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

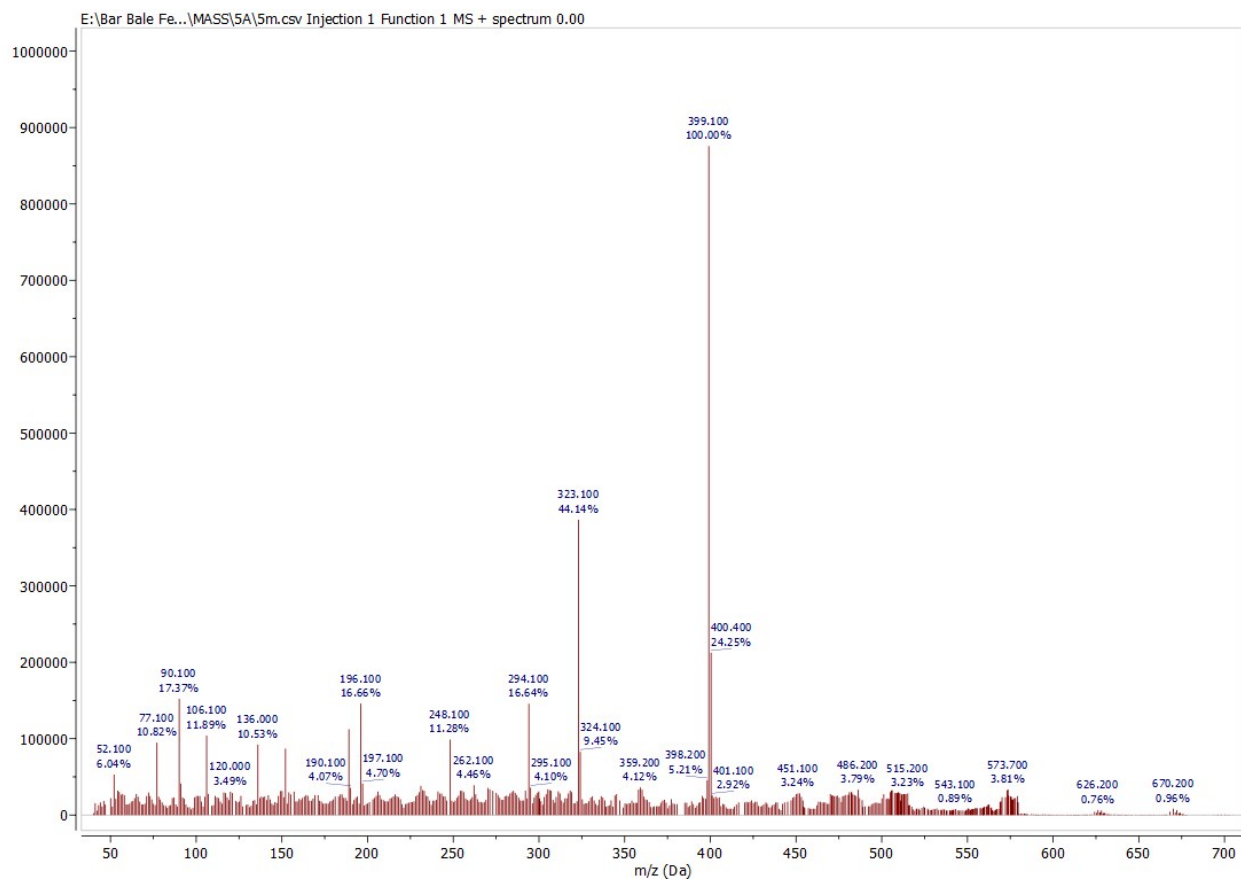




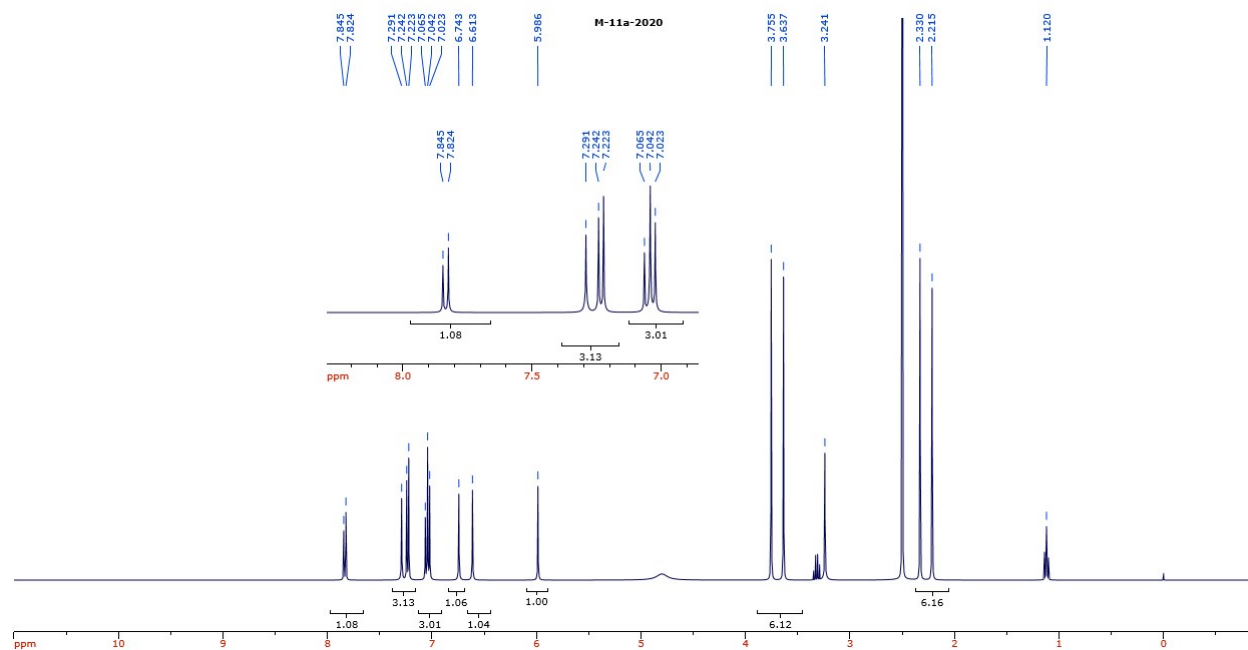
**Figure S<sub>37</sub>:** <sup>1</sup>H-NMR spectra of 2,3-dimethoxy-11-methyl-7-phenyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



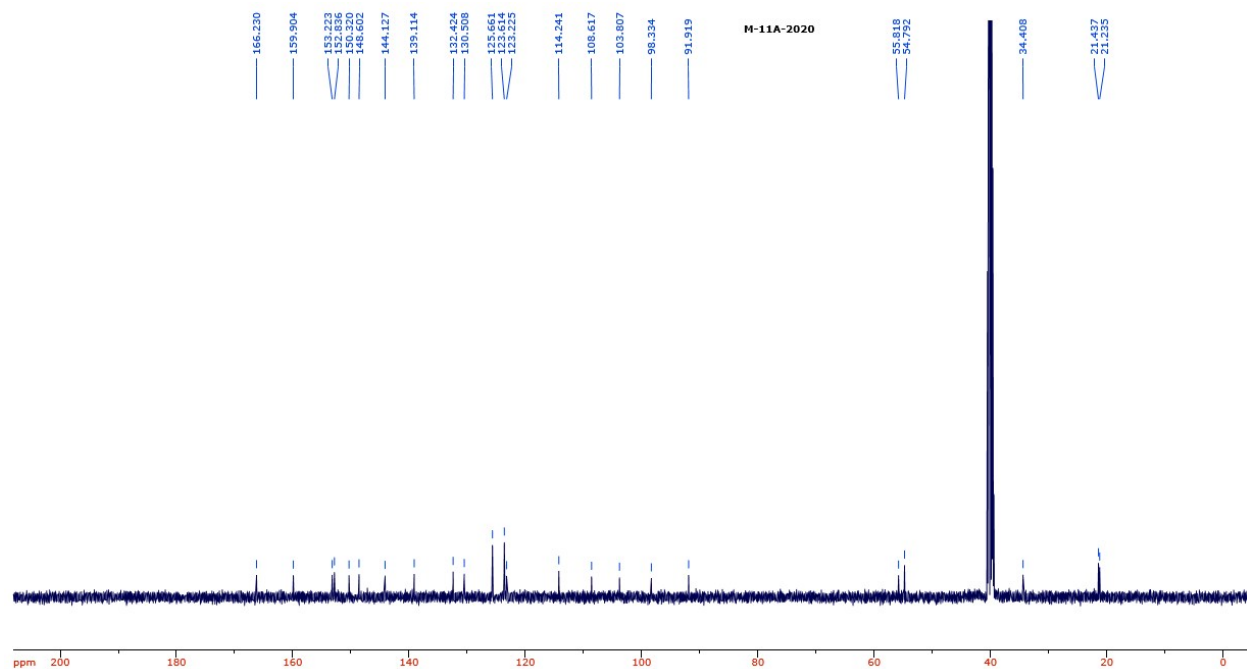
**Figure S38:**  $^{13}\text{C}$ -NMR spectra of 2,3-dimethoxy-11-methyl-7-phenyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



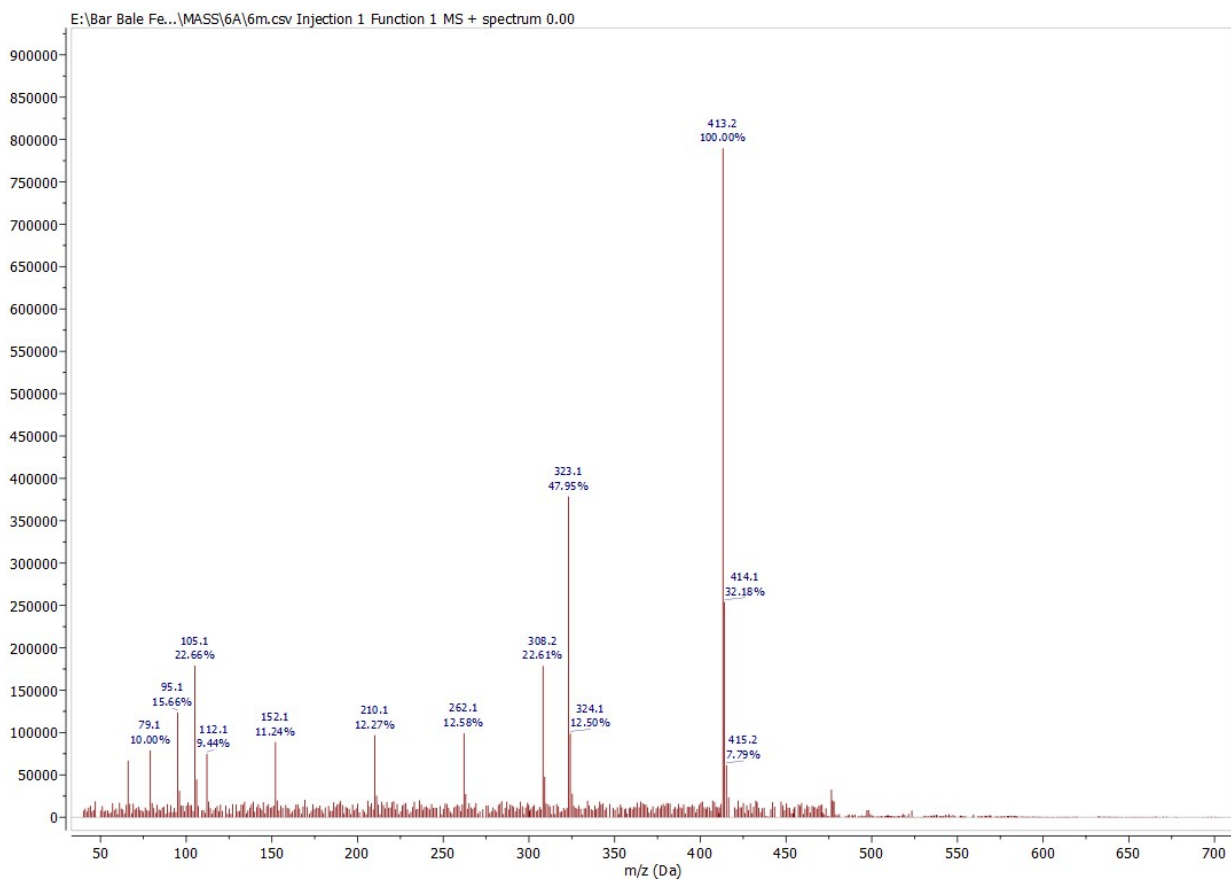
**Figure S<sub>39</sub>:** MASS spectra of 2,3-dimethoxy-11-methyl-7-phenyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



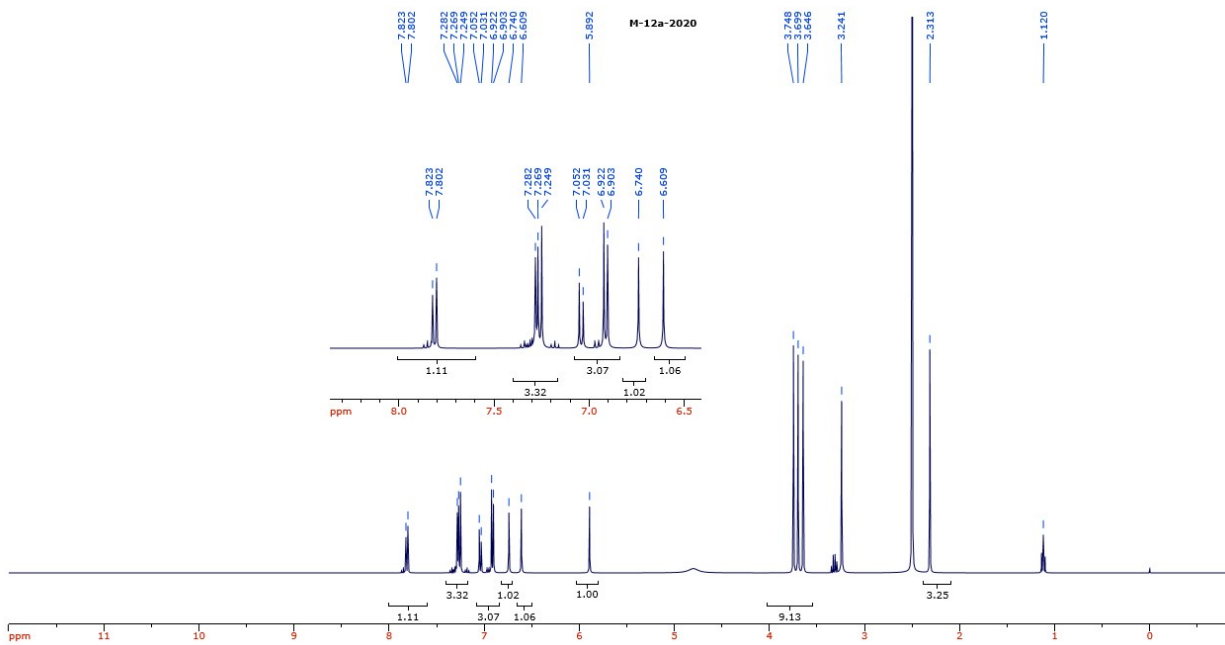
**Figure S<sub>40</sub>:** <sup>1</sup>H-NMR spectra of 2,3-dimethoxy-11-methyl-7-(*p*-tolyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



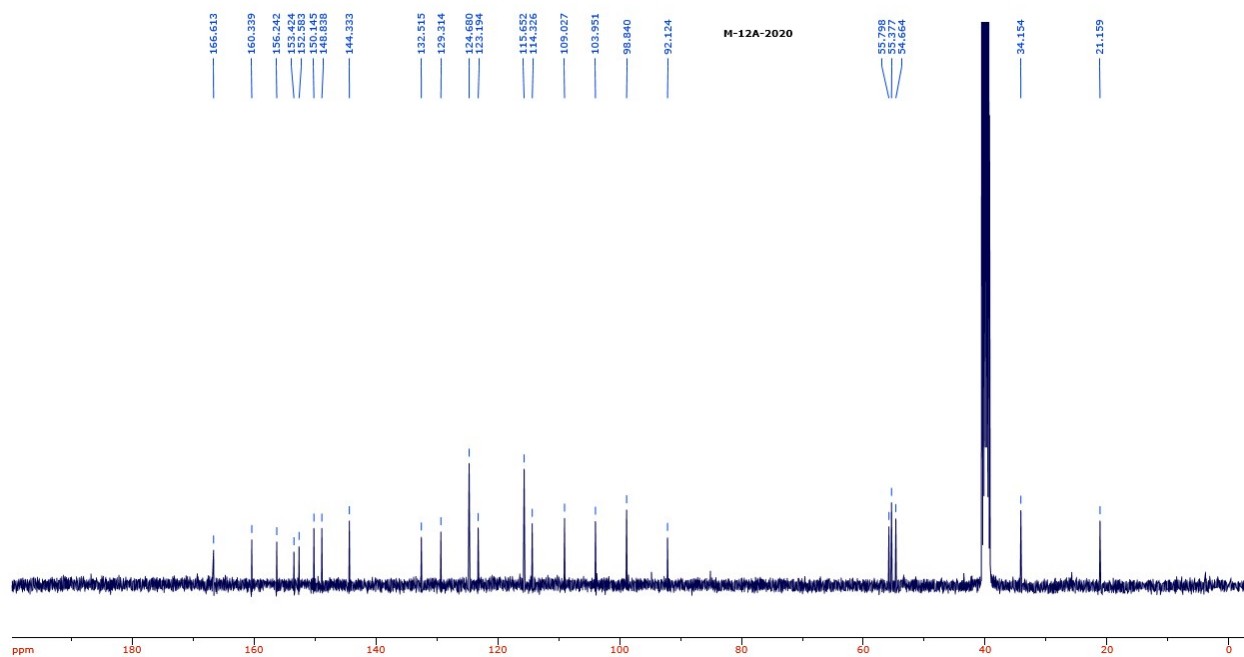
**Figure S<sub>41</sub>:** <sup>13</sup>C-NMR spectra of 2,3-dimethoxy-11-methyl-7-(*p*-tolyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



**Figure S<sub>42</sub>:** MASS spectra of 2,3-dimethoxy-11-methyl-7-(*p*-tolyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

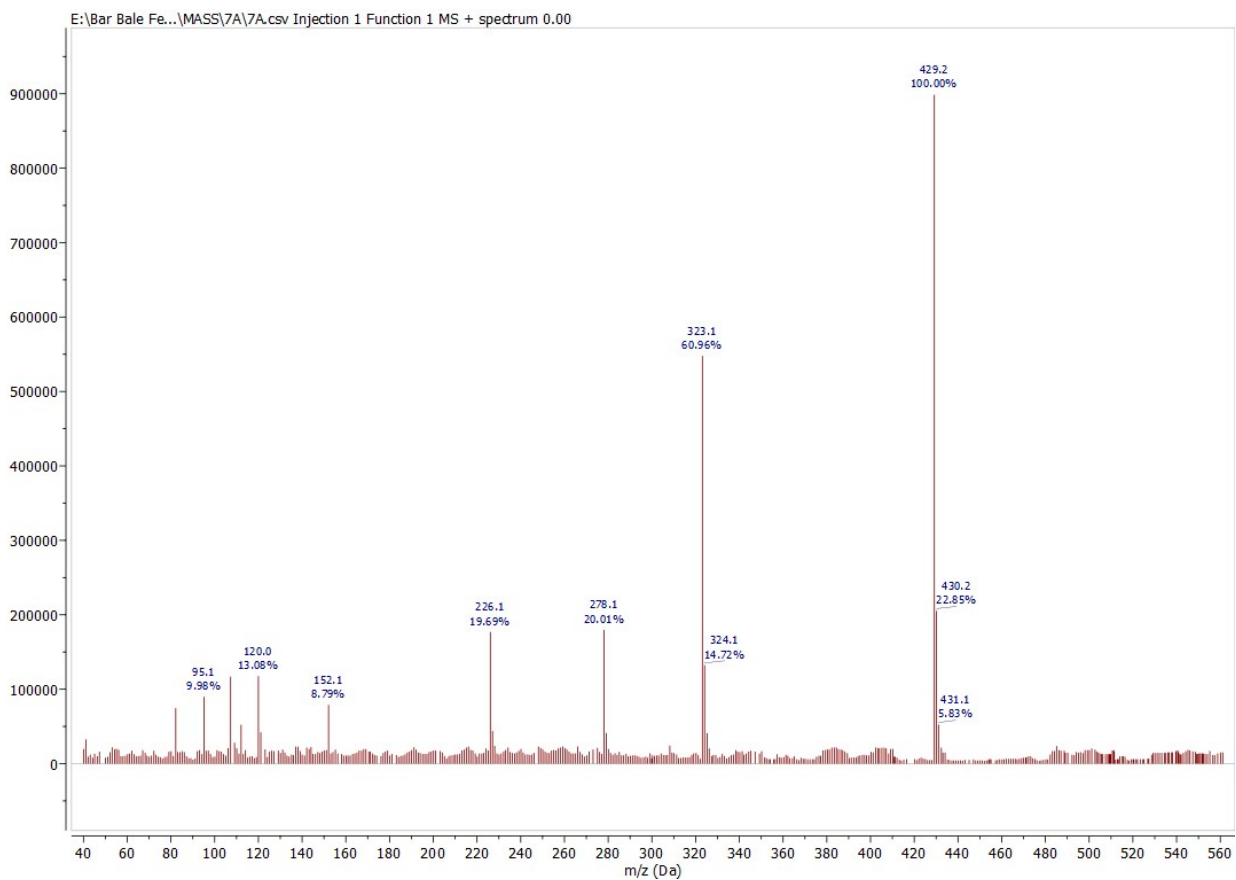


**Figure S43:** <sup>1</sup>H-NMR spectra of 2,3-dimethoxy-7-(4-methoxyphenyl)-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

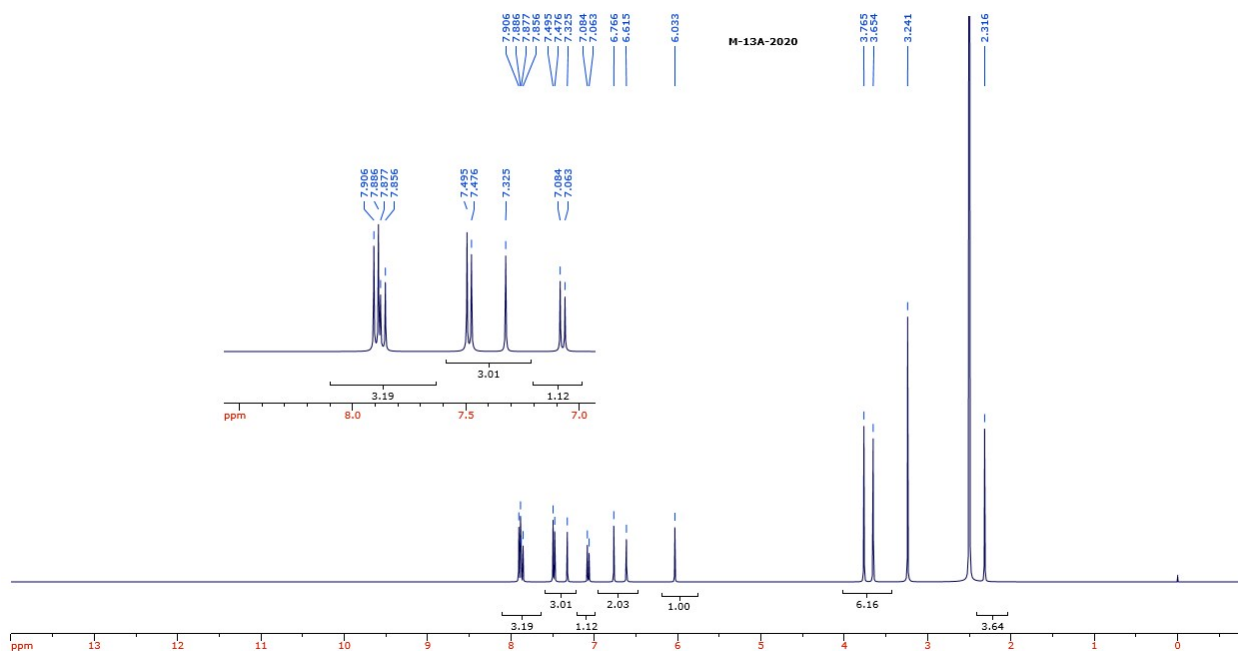


**Figure S<sub>44</sub>:** <sup>13</sup>C-NMR spectra of 2,3-dimethoxy-7-(4-methoxyphenyl)-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

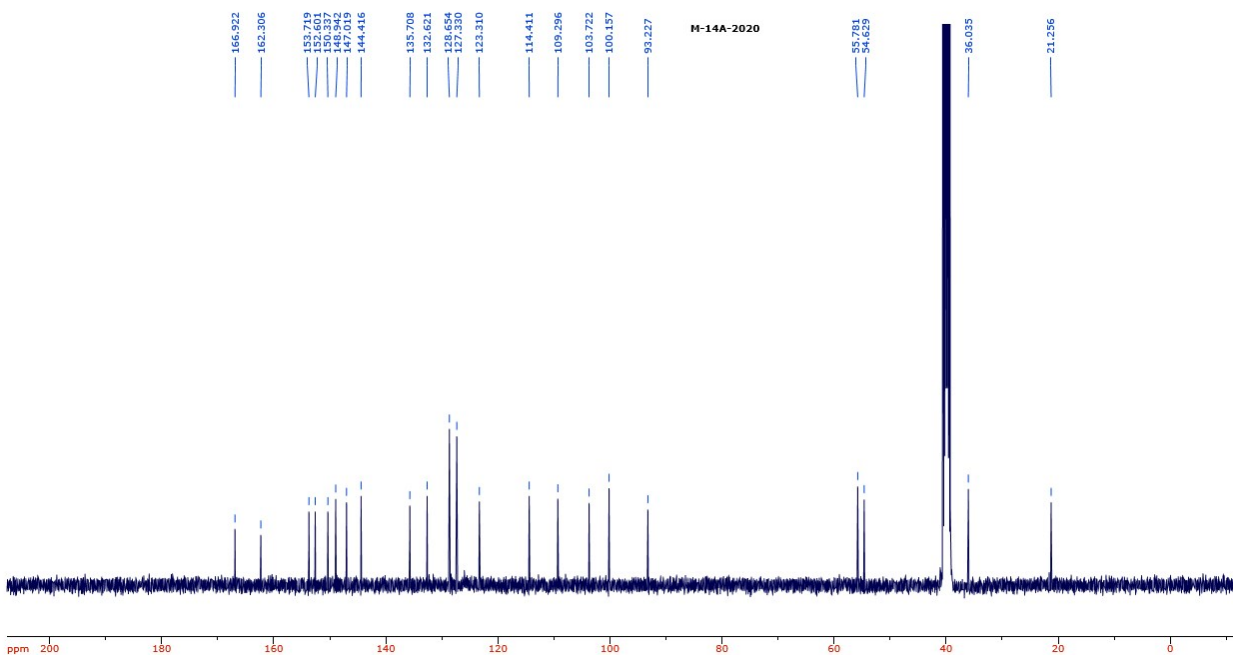




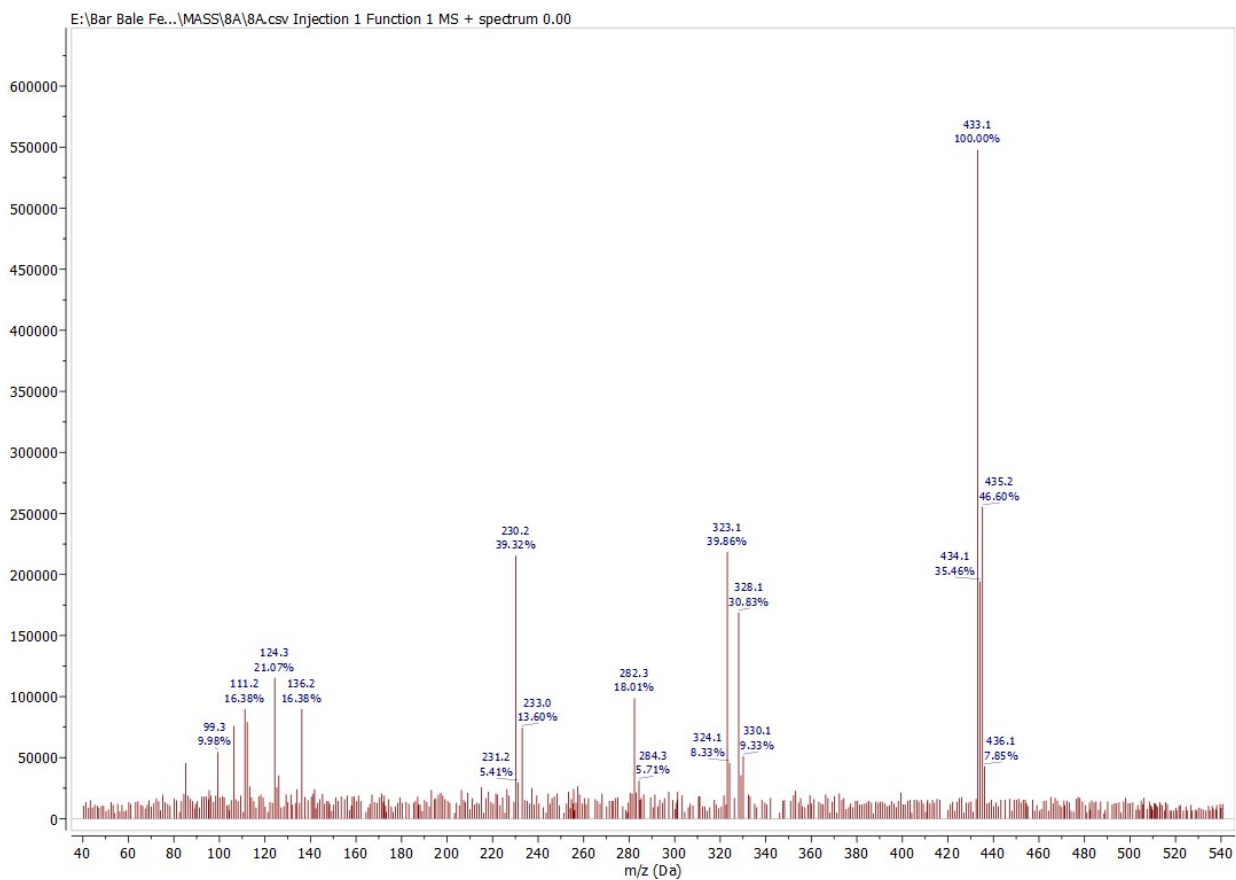
**Figure S<sub>45</sub>:** MASS spectra of 2,3-dimethoxy-7-(4-methoxyphenyl)-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



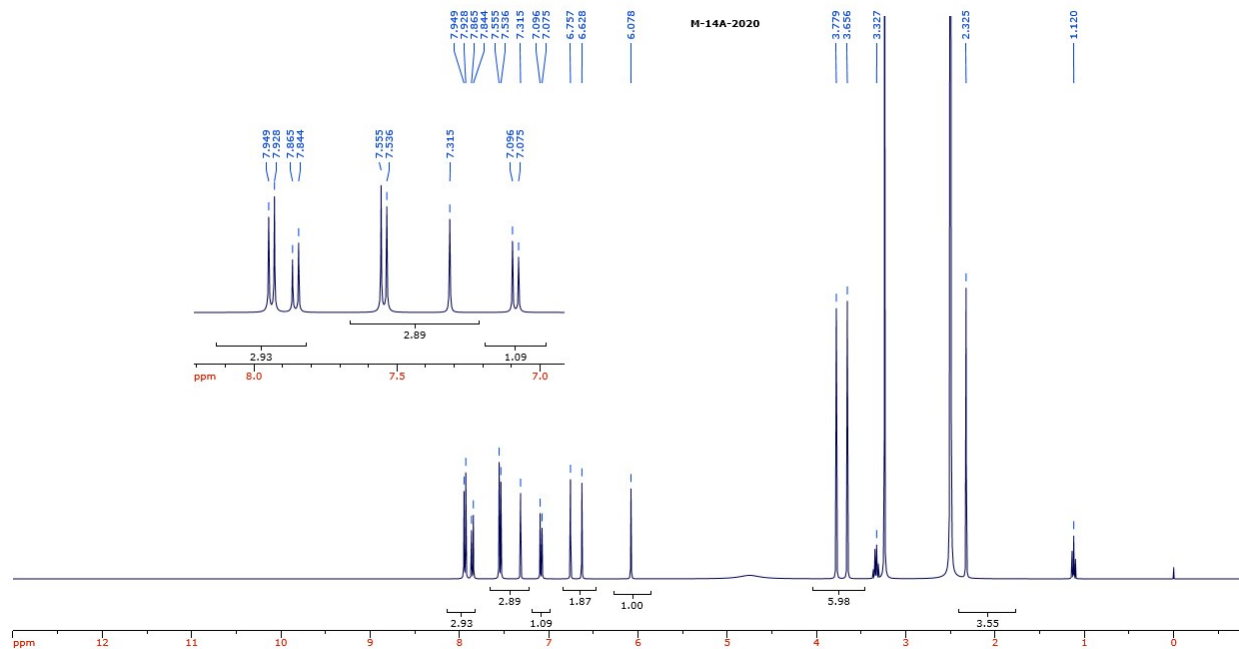
**Figure S<sub>46</sub>:** <sup>1</sup>H-NMR spectra of 7-(4-chlorophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



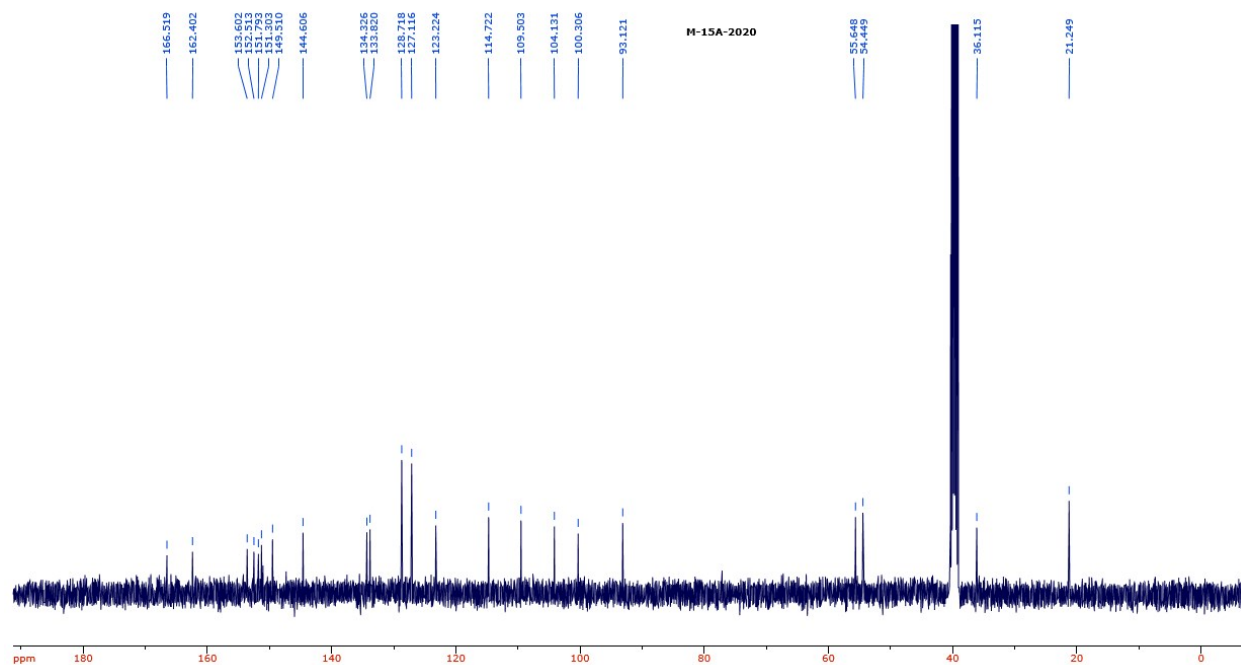
**Figure S<sub>47</sub>:**  $^{13}\text{C}$ -NMR spectra of 7-(4-chlorophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



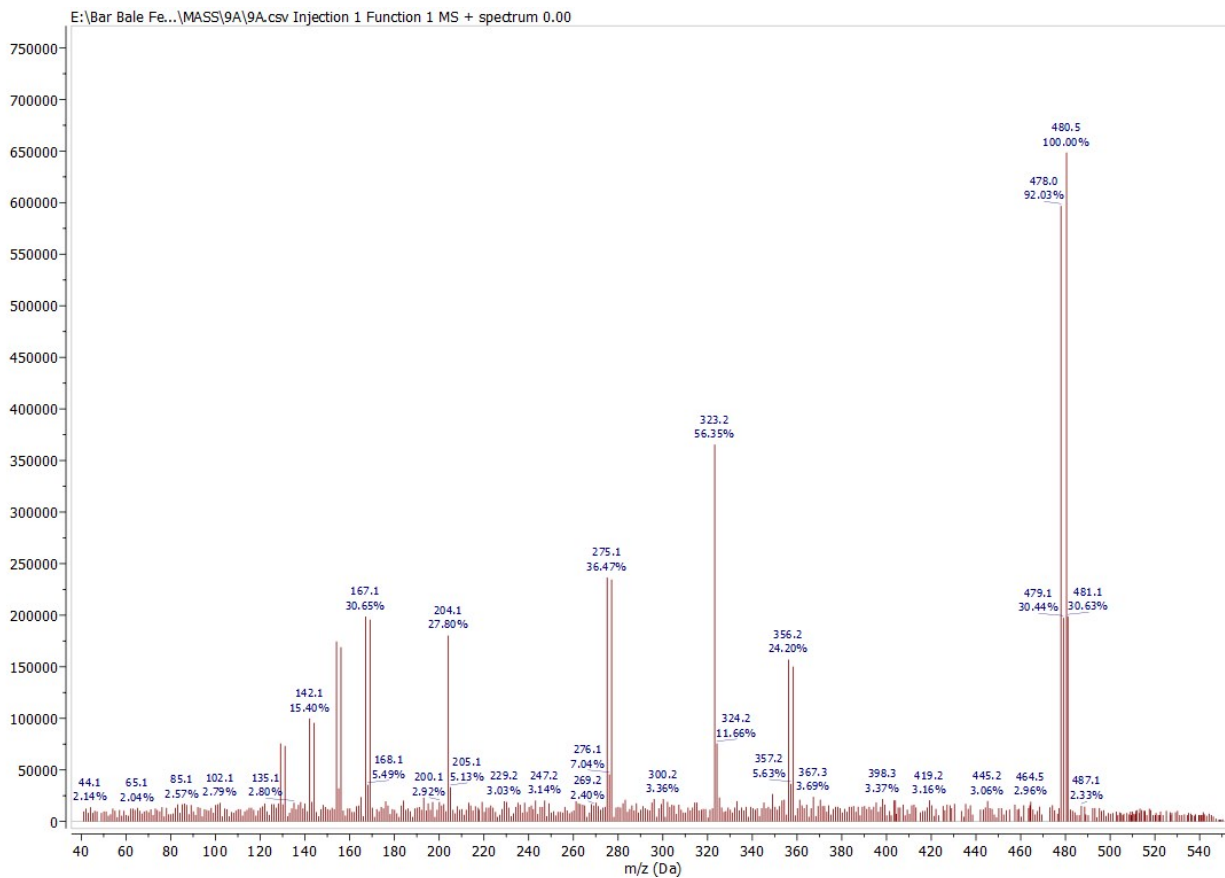
**Figure S<sub>48</sub>:** MASS spectra of 7-(4-chlorophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



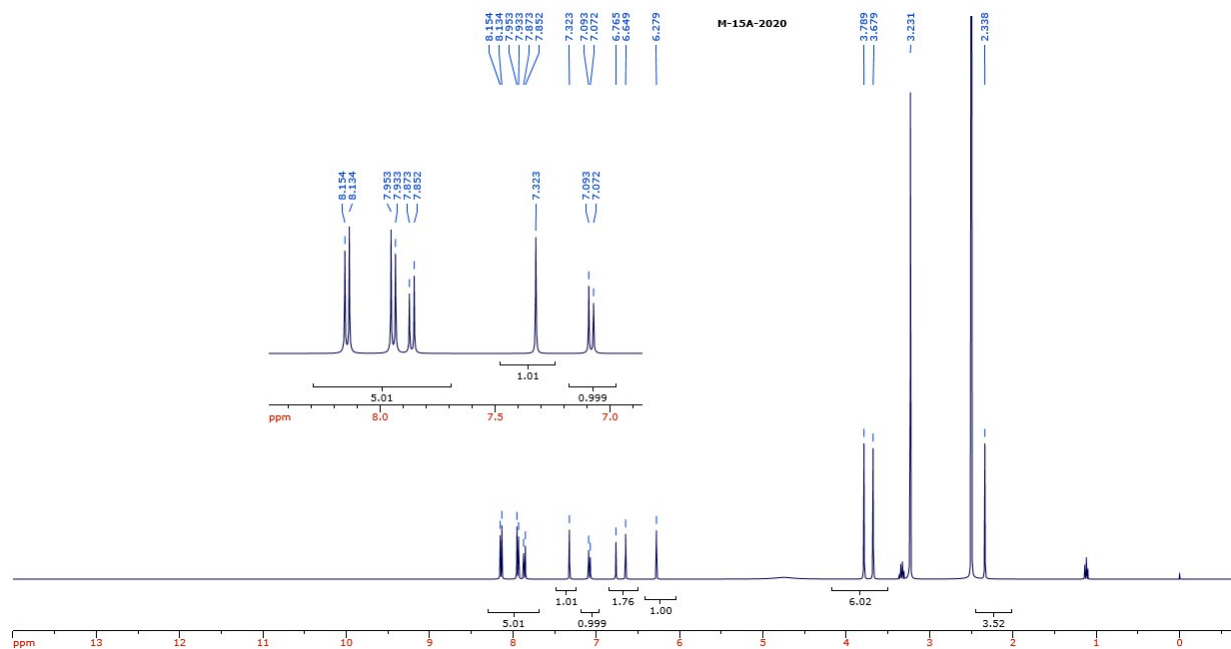
**Figure S<sub>49</sub>:** <sup>1</sup>H-NMR spectra of 7-(4-bromophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



**Figure S<sub>50</sub>:**  $^{13}\text{C}$ -NMR spectra of 7-(4-bromophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

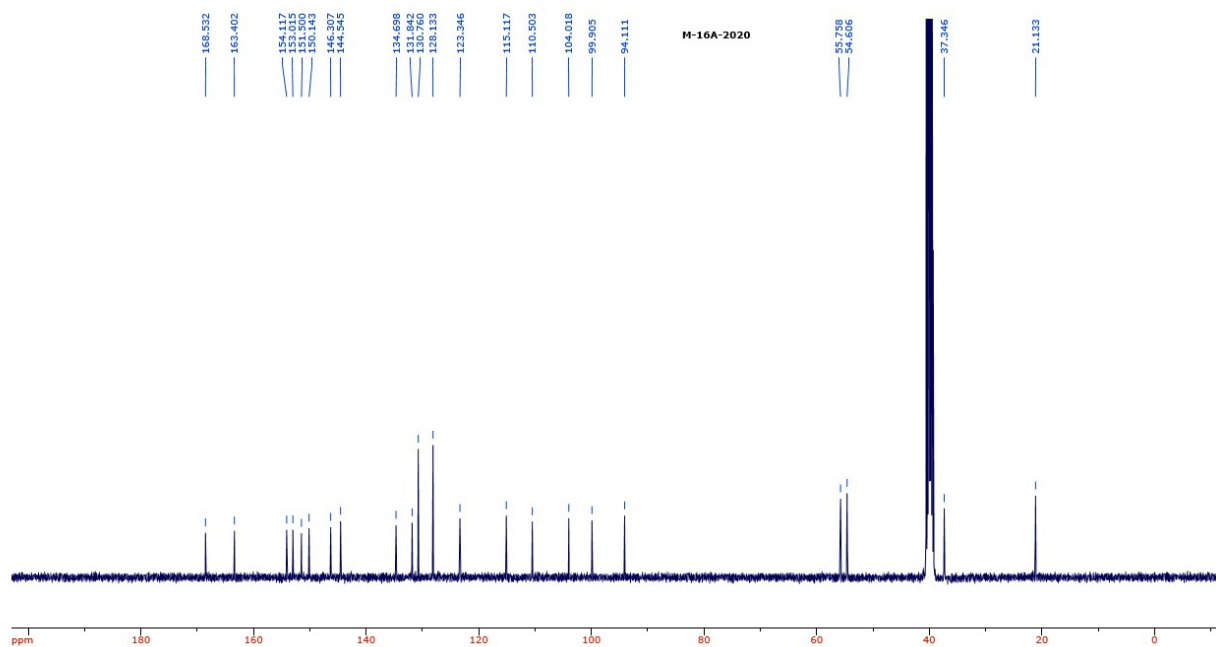


**Figure S<sub>51</sub>:** MASS spectra of 7-(4-bromophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

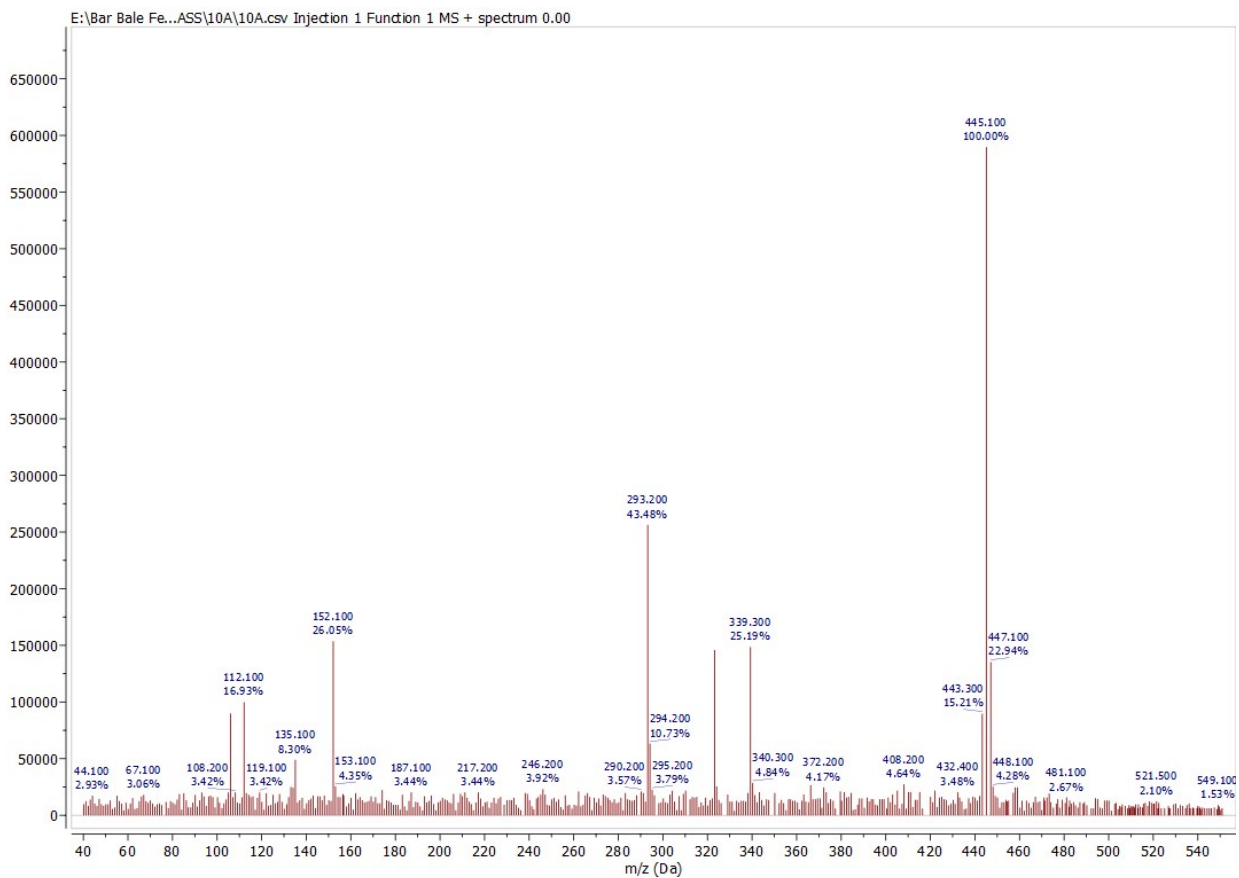


**Figure S<sub>52</sub>:**  $^1\text{H-NMR}$  spectra of 2,3-dimethoxy-11-methyl-7-(4-nitrophenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

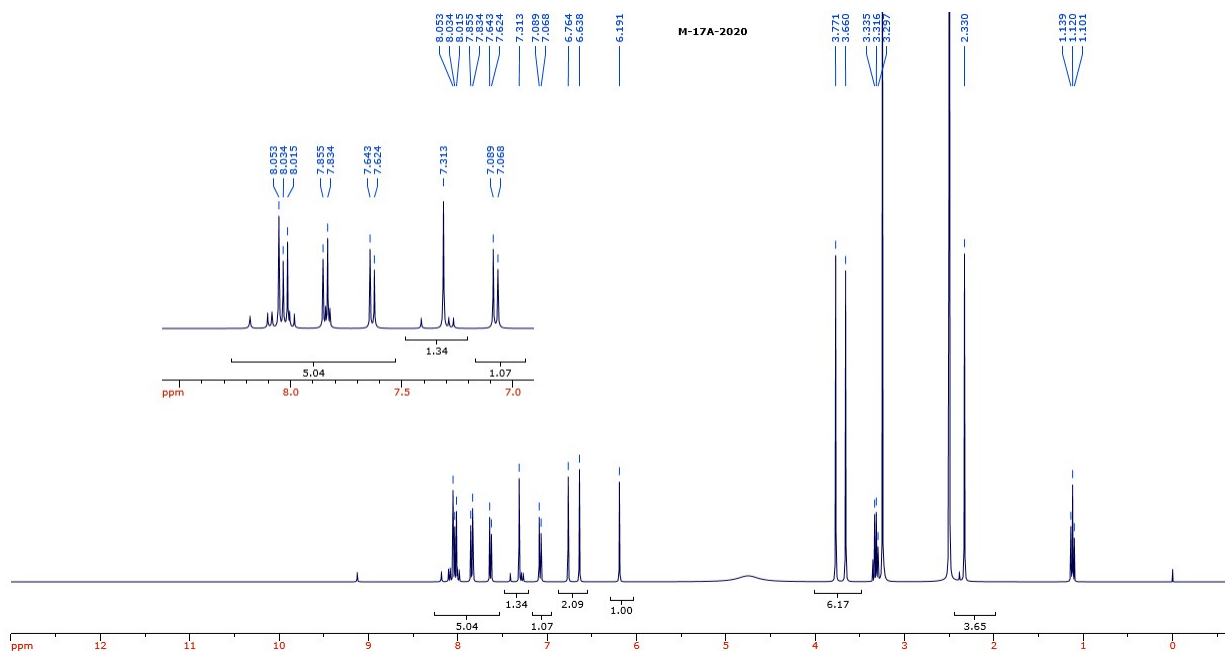




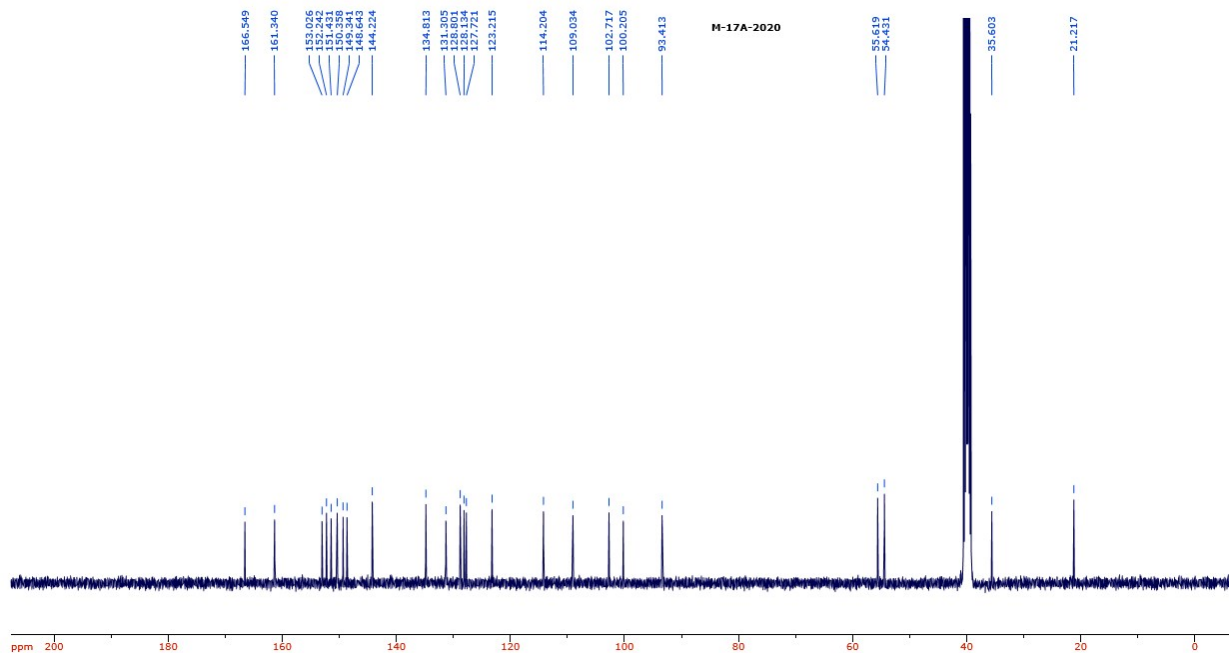
**Figure S<sub>53</sub>:**  $^{13}\text{C}$ -NMR spectra of 2,3-dimethoxy-11-methyl-7-(4-nitrophenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



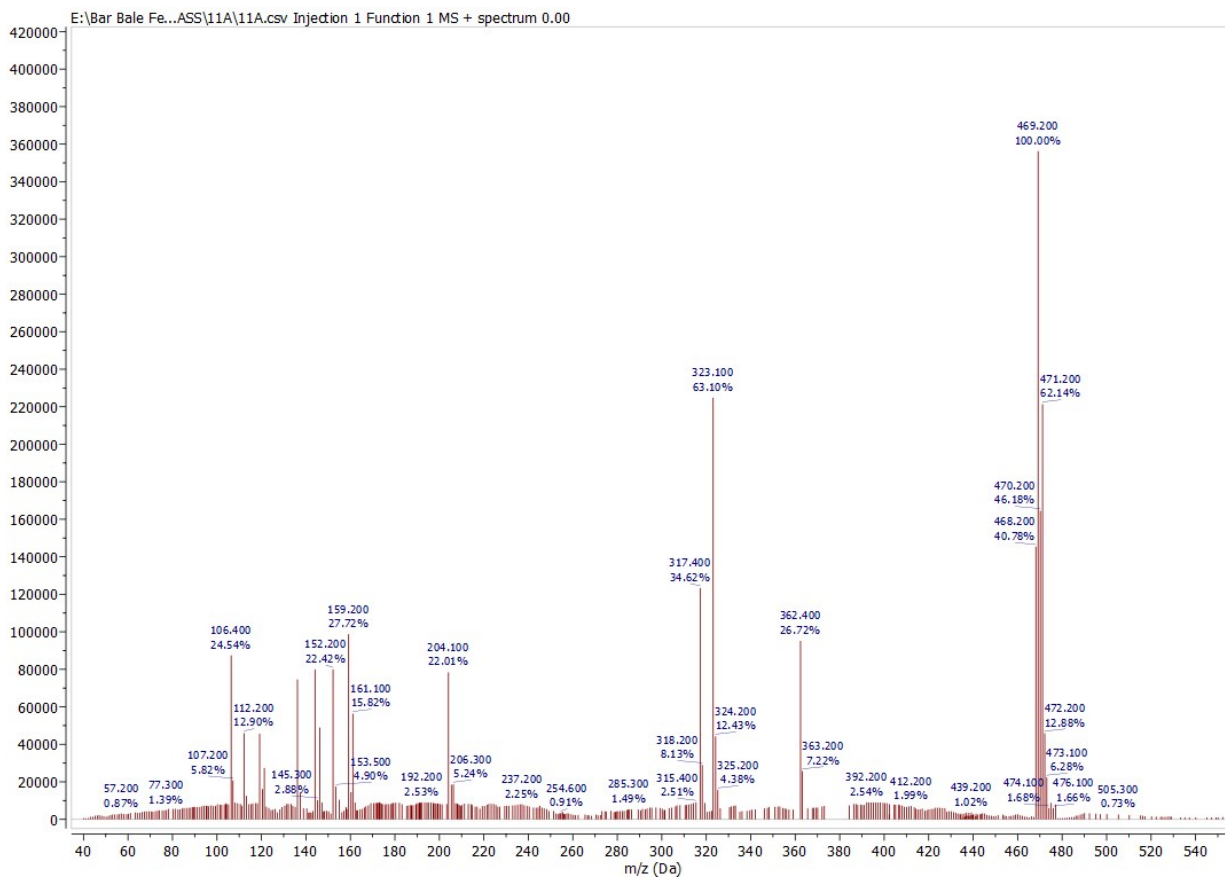
**Figure S<sub>54</sub>:** MASS spectra of 2,3-dimethoxy-11-methyl-7-(4-nitrophenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



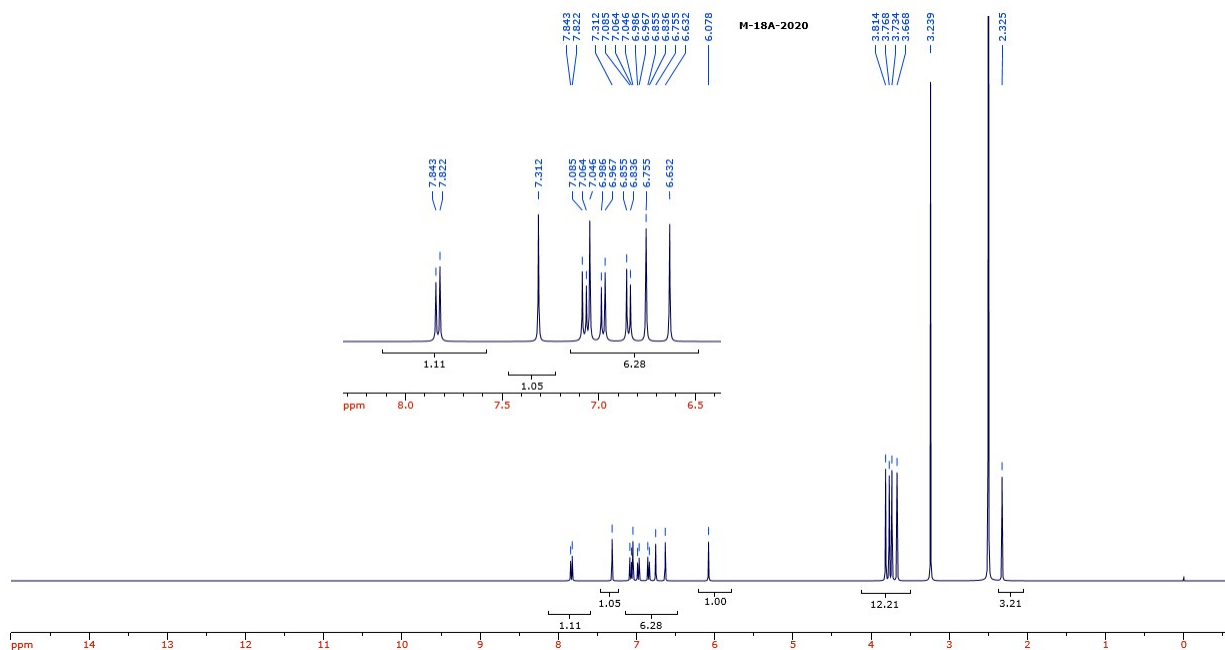
**Figure S<sub>55</sub>:** <sup>1</sup>H-NMR spectra of 7-(3,4-dichlorophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



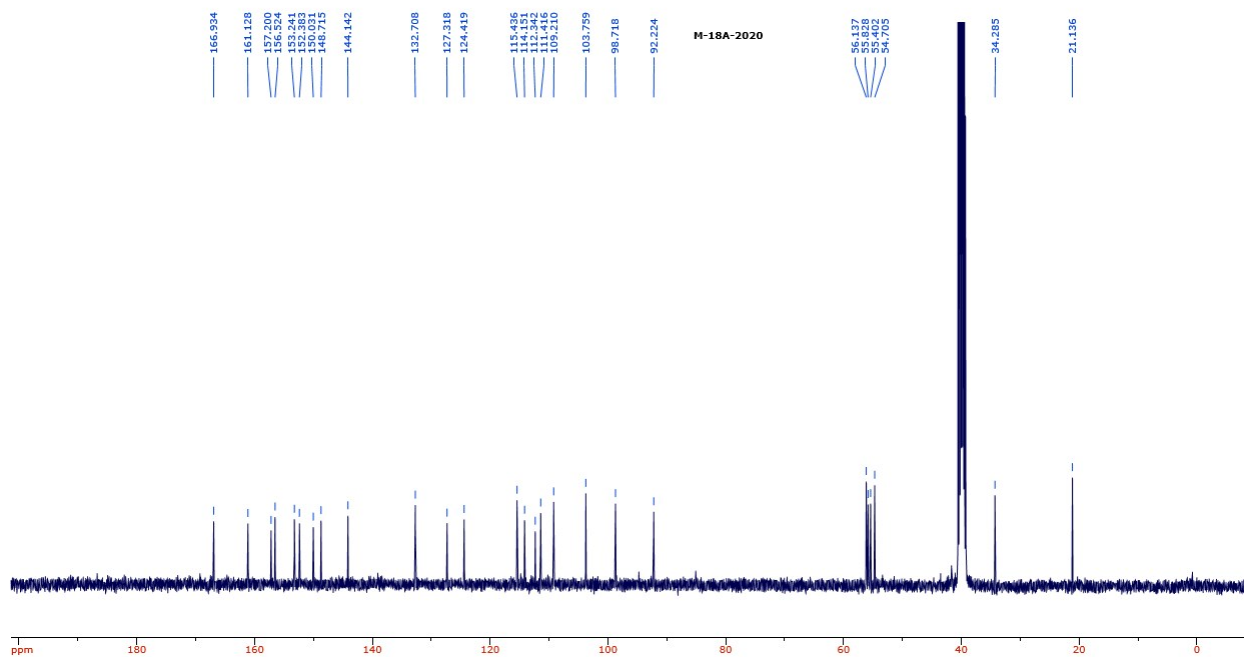
**Figure S<sub>56</sub>:** <sup>13</sup>C-NMR spectra of 7-(3,4-dichlorophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



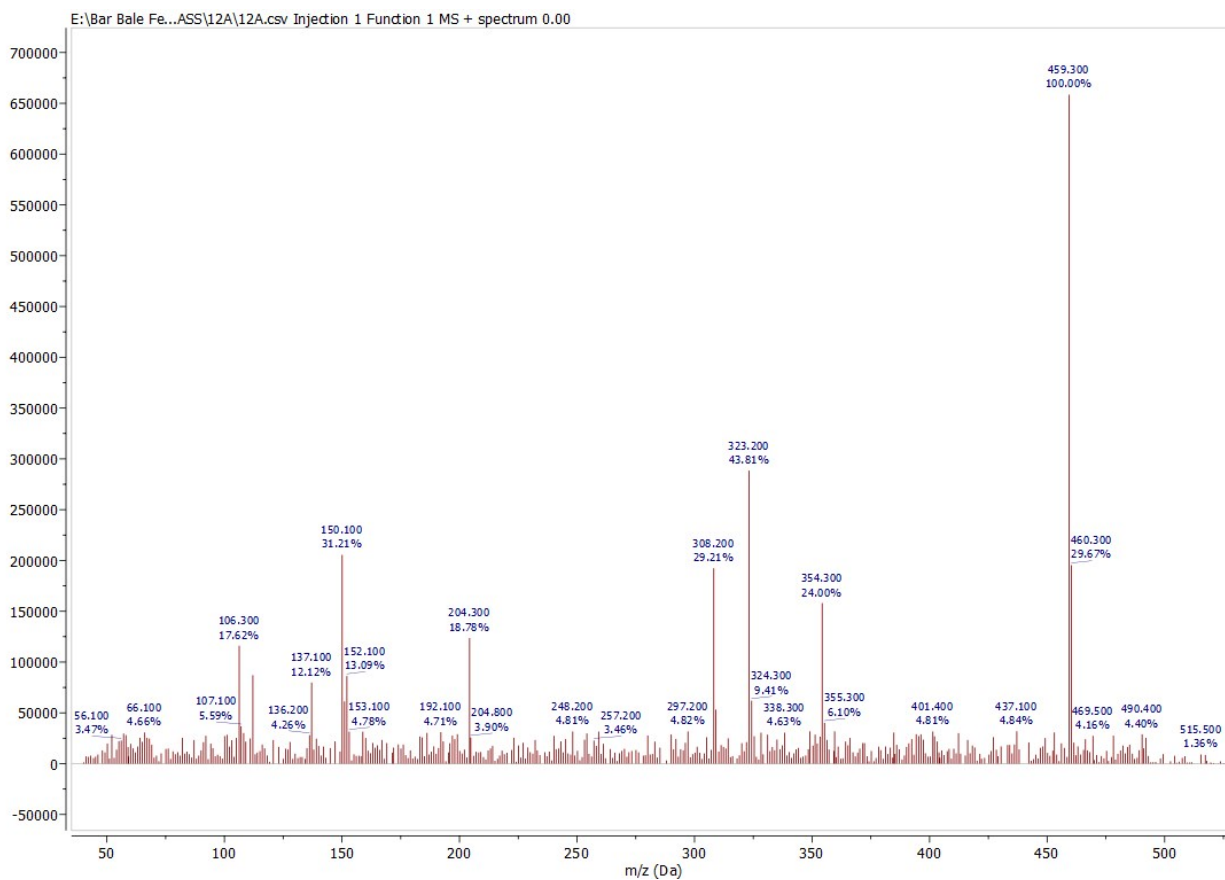
**Figure S<sub>57</sub>:** MASS spectra of 7-(3,4-dichlorophenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



**Figure S58:** <sup>1</sup>H-NMR spectra of 7-(3,4-dimethoxyphenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

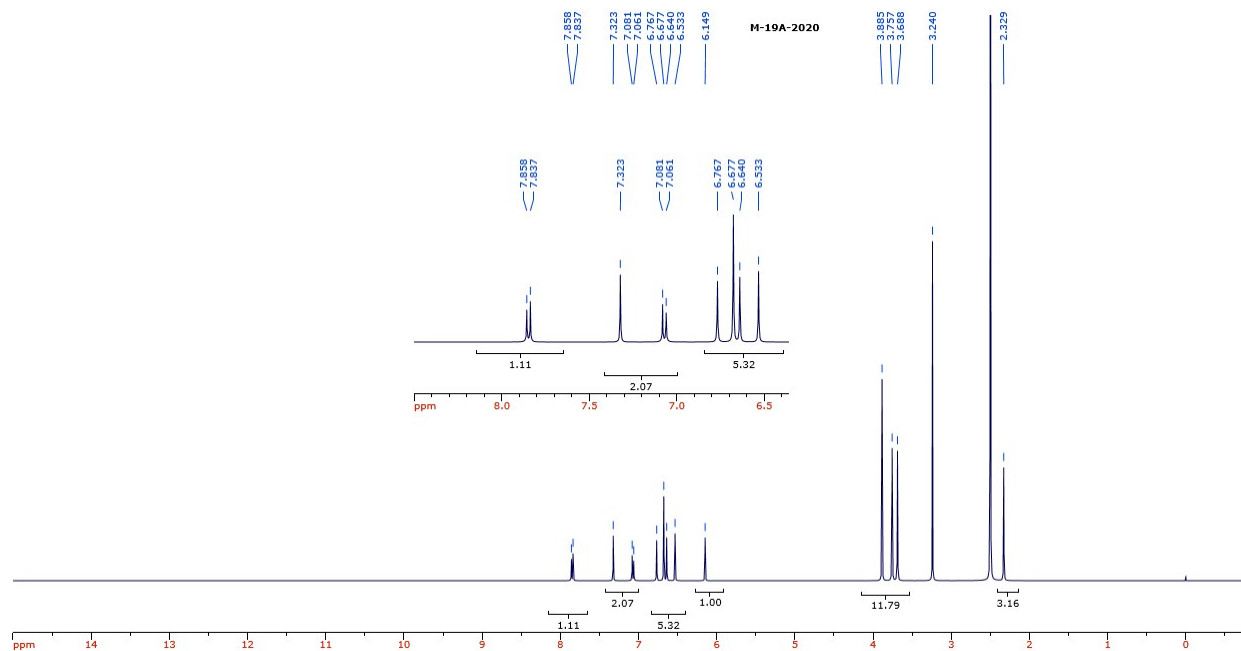


**Figure S<sub>59</sub>:** <sup>13</sup>C-NMR spectra of 7-(3,4-dimethoxyphenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

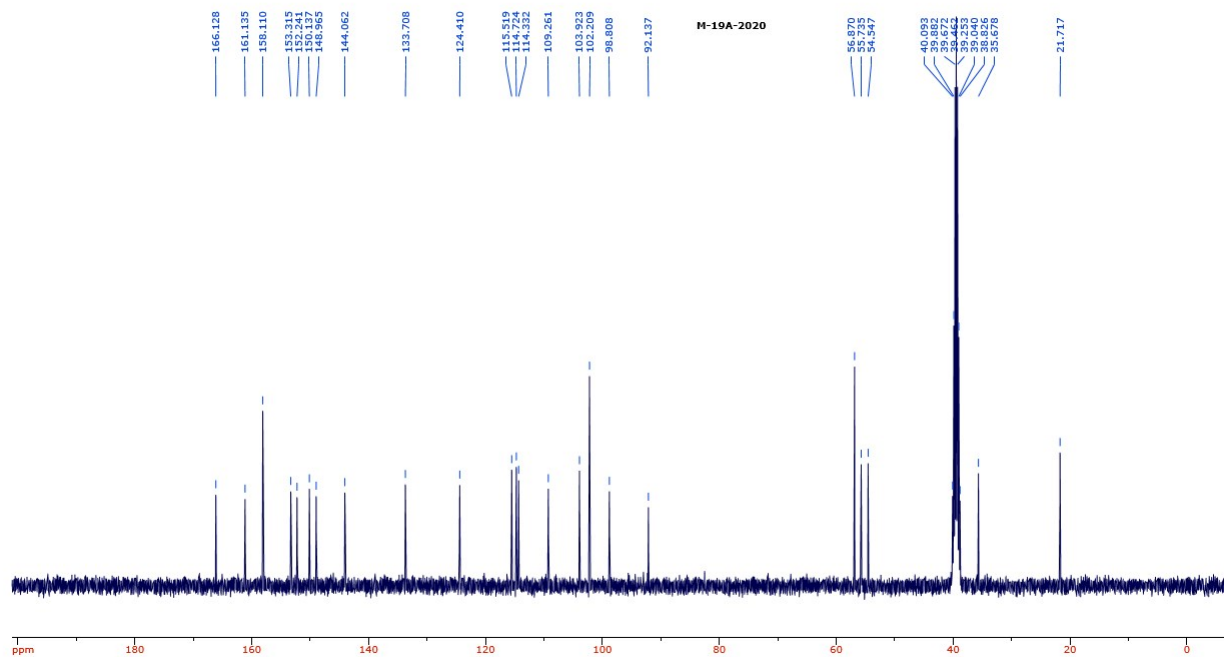


**Figure S<sub>60</sub>:** MASS spectra of 7-(3,4-dimethoxyphenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one

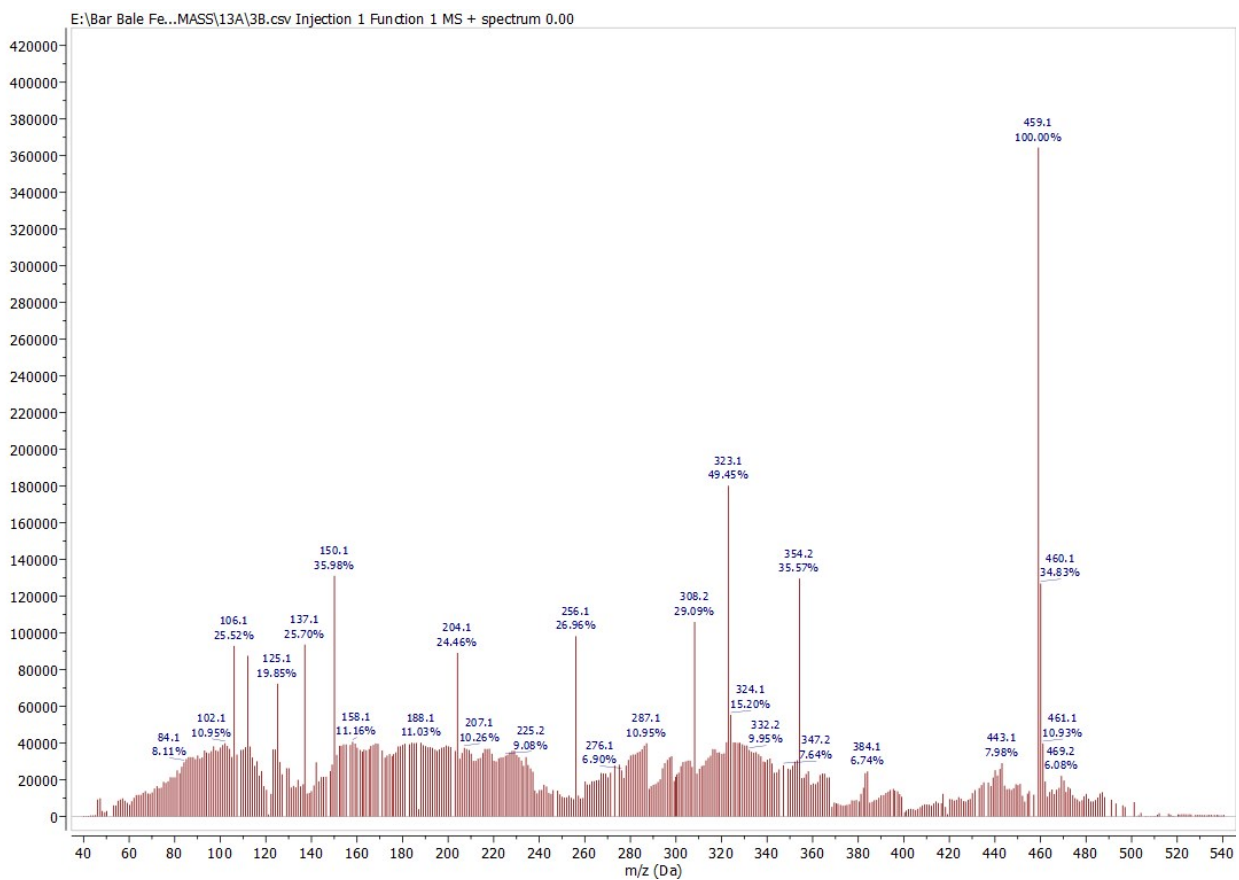




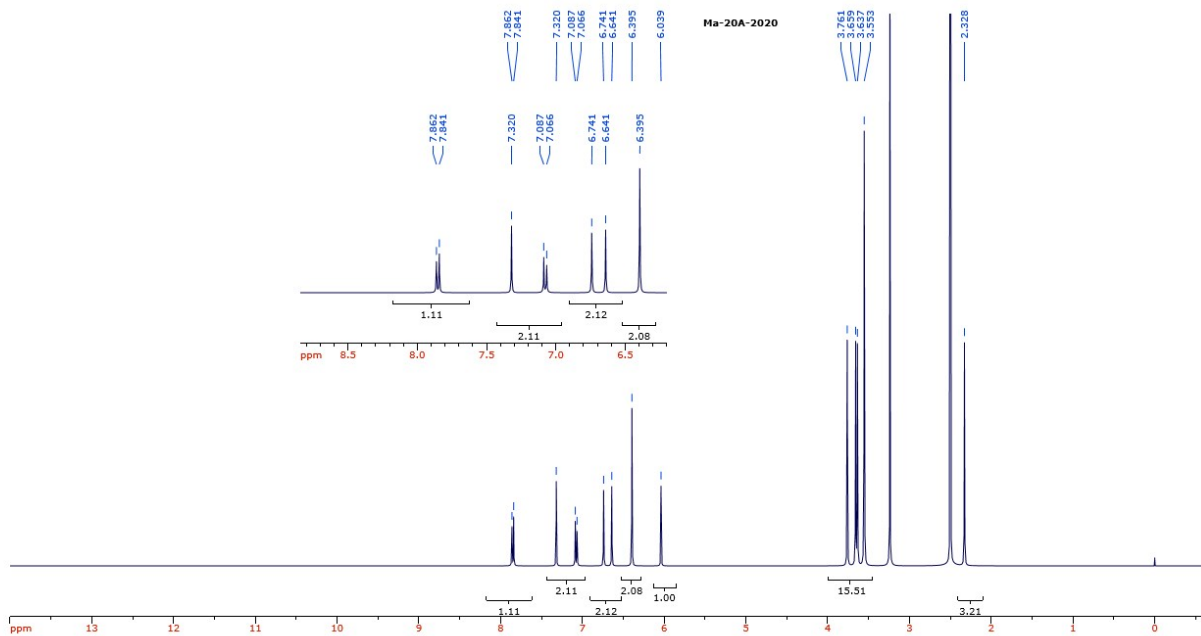
**Figure S<sub>61</sub>:** <sup>1</sup>H-NMR spectra of 7-(3,5-dimethoxyphenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



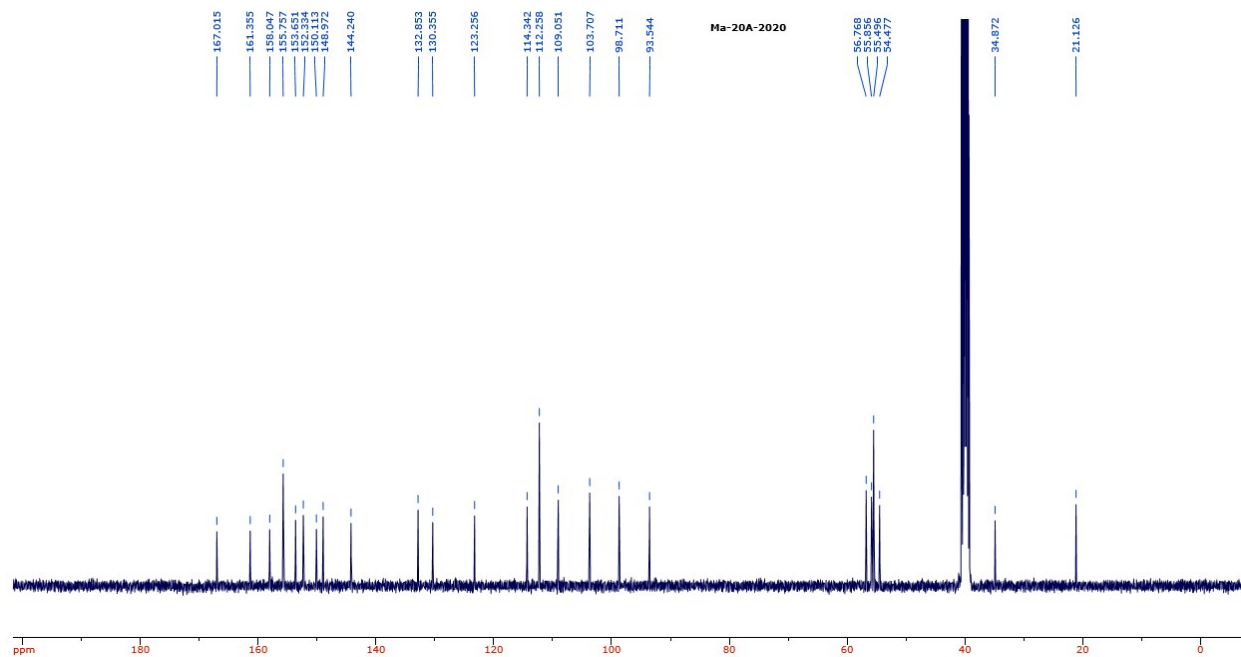
**Figure S<sub>62</sub>:** <sup>13</sup>C-NMR spectra of 7-(3,5-dimethoxyphenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



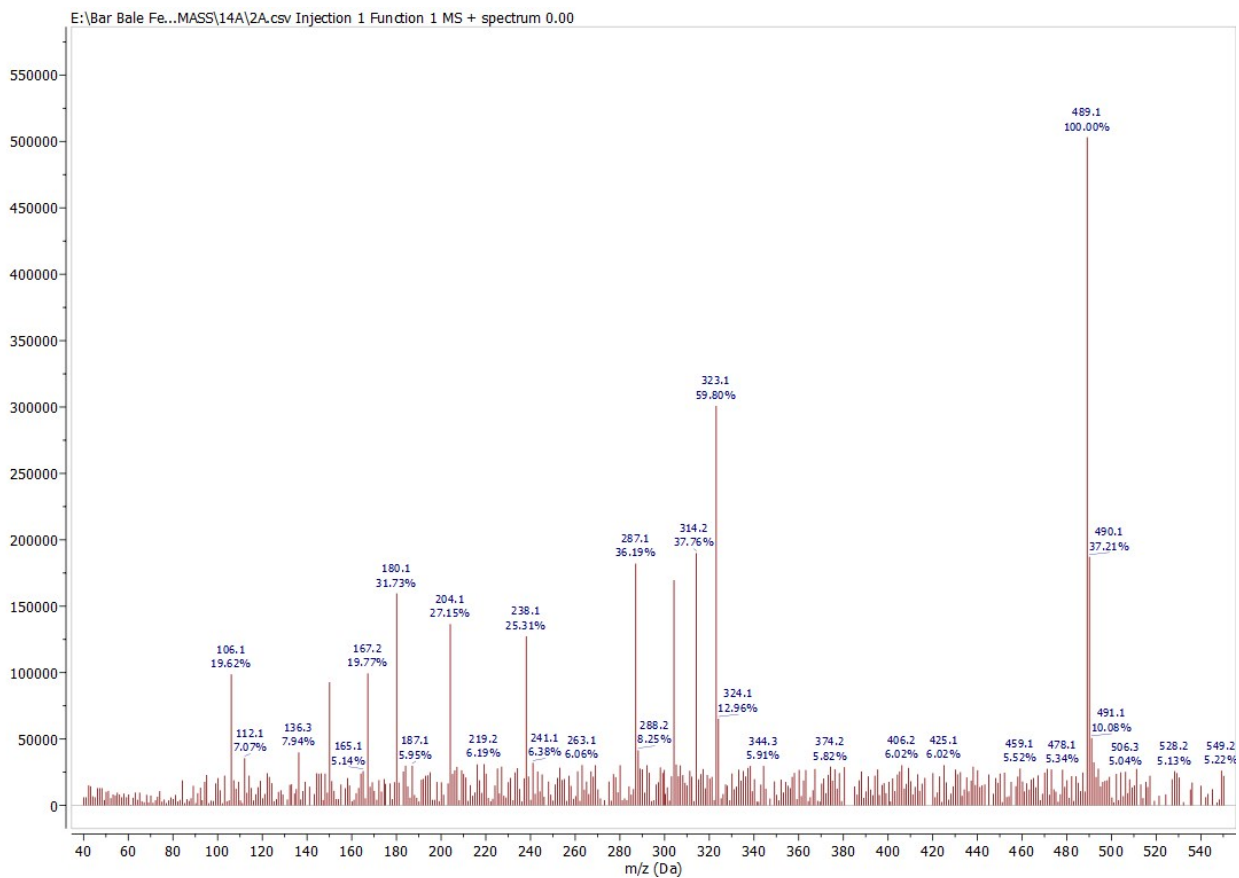
**Figure S<sub>63</sub>:** MASS spectra of 7-(3,5-dimethoxyphenyl)-2,3-dimethoxy-11-methyl-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



**Figure S<sub>64</sub>:** <sup>1</sup>H-NMR spectra of 2,3-dimethoxy-11-methyl-7-(3,4,5-trimethoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



**Figure S<sub>65</sub>:** <sup>13</sup>C-NMR spectra of 2,3-dimethoxy-11-methyl-7-(3,4,5-trimethoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one



**Figure S<sub>66</sub>:** MASS spectra of 2,3-dimethoxy-11-methyl-7-(3,4,5-trimethoxyphenyl)-6H,7H-chromeno[4,3-d]pyrido[1,2-a]pyrimidin-6-one