

# Supporting Information

## Visible-light-promoted trifluoromethylselenolation of *ortho*- hydroxyarylenaminones

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## 1. General Information

Unless otherwise specified, all reagents and solvents were obtained from commercial suppliers and used without further purification. Reactions were monitored by thin layer chromatography (TLC) using silicycle pre-coated silica gel plates.  $^1\text{H}$  NMR spectra were recorded at 400 MHz and  $^{13}\text{C}$  NMR spectra were recorded at 100 MHz by using a Bruker Avance 400 spectrometer.  $^{19}\text{F}$  NMR were recorded on the same instrument. Chemical shifts were reported in parts per million ( $\delta$ ) relative to tetramethylsilane (TMS). The following abbreviations were used to describe peak splitting patterns when appropriate: s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet, brs = broad singlet. High resolution mass spectroscopic were obtained using GCT-TOF instrument with EI or ESI source. The reactions were irradiated in Roger RLH-18-22 parallel reaction apparatus equipped with 10 W blue LEDs (455 nm).

## 2. Experiment Section

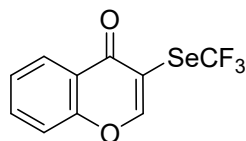
### General Procedure for the Synthesis of trifluoromethylselenyl chromones 2

In a 10 ml Schlenk tube charged with a magnetic stir bar, *o*-hydroxyphenyl enaminone **1** (0.3 mmol),  $\text{TsSeCF}_3$  (0.33 mmol),  $\text{Et}_3\text{N}$  (0.3 mmol), DMSO (1.0 mL) were added. The tube was put into a blue LEDs reactor, and stirred at ambient temperature under visible-light irradiation for 6 h. After the reaction completed, water (5 mL) was added to give an emulsion, which was extracted with ethyl acetate ( $3 \times 5$  mL). The combined organic phase was washed with brine and dried over by anhydrous  $\text{Na}_2\text{SO}_4$ . The solvent was removed in vacuo, and the residue was purified by silica gel chromatography, eluting with petroleum ether/ethyl acetate (from 40:1 to 5:1), to afford the product **2**.

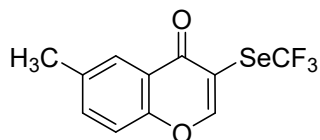
### Procedure for the Gram-scale Synthesis

To a Schlenk tube equipped with a magnetic stir bar are added **1a** (7.0 mmol), TsSeCF<sub>3</sub> (7.7 mmol, 1.1 equiv.), Et<sub>3</sub>N (7.0 mmol), and anhydrous dimethyl sulfoxide (7.0 mL). The reaction is stirred under blue LEDs irradiation for 8 hours. The reaction mixture is partitioned between ethyl acetate and water. The aqueous layer is extracted with ethyl acetate and the combined organic layers are dried over MgSO<sub>4</sub>, filtered and concentrated to dryness. The crude residue is purified by chromatography to afford the desired product **2a**.

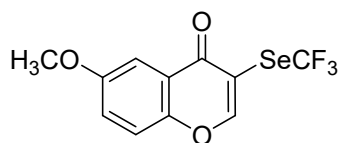
### 3. Characterization Data



**3-((trifluoromethyl)selenanyl)-4H-chromen-4-one (2a):** White solid, m.p. 129-131 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.42 (s, 1H), 8.26 (d, *J* = 7.6 Hz, 1H), 7.75–7.72 (m, 1H), 7.51–7.46 (m, 2H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 174.2, 161.2 (q, *J* = 1 Hz), 156.2, 134.5, 126.6, 126.3, 123.5, 121.8 (q, *J* = 332 Hz), 118.2, 110.9 (q, *J* = 1 Hz). <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>) δ -35.66 (s, 3F). HRMS (ESI) *m/z* Calculated for C<sub>10</sub>H<sub>5</sub>F<sub>3</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 294.9480, found 294.9487.

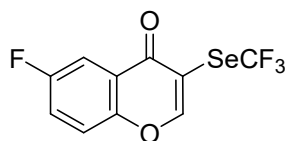


**6-methyl-3-((trifluoromethyl)selenanyl)-4H-chromen-4-one (2b):** White solid, m.p. 151-153 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.39 (s, 1H), 8.03 (s, 1H), 7.53 (d, *J* = 8.4 Hz, 1H), 7.39 (d, *J* = 8.4 Hz, 1H), 2.46 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 174.3, 161.1 (q, *J* = 1 Hz), 154.5, 136.5, 135.7, 125.9, 123.2, 121.8 (q, *J* = 332 Hz), 117.9, 110.6 (q, *J* = 1 Hz), 20.9. <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>) δ -35.79 (s, 3F). HRMS (ESI) *m/z* Calculated for C<sub>11</sub>H<sub>7</sub>F<sub>3</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 308.9636, found 308.9639.

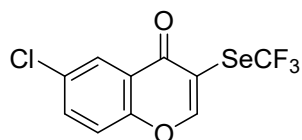


**6-methoxy-3-((trifluoromethyl)selenanyl)-4H-chromen-4-one (2c):** White solid, m.p. 194-195 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.40 (s, 1H), 7.61 (d, *J* = 3.2 Hz, 1H), 7.43 (d, *J* = 8.8 Hz, 1H), 7.30 (dd, *J* = 3.2 Hz, *J* = 8.8 Hz, 1H), 3.90 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 174.1, 160.9 (q, *J* = 1 Hz), 157.7, 151.1, 124.4, 124.2, 121.8 (q, *J* = 333 Hz), 119.6, 109.9 (q, *J* = 1 Hz), 105.6, 56.0. <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>) δ -

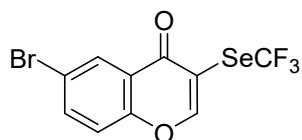
35.76 (s, 3F). HRMS (ESI)  $m/z$  Calculated for  $C_{11}H_7F_3O_3Se$   $[M+H]^+$  324.9585, found 324.9591.



**6-fluoro-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2d):** Light yellow oil.  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  8.43 (s, 1H), 7.88 (dd,  $J = 2.8$  Hz,  $J = 8.0$  Hz, 1H), 7.55–7.51 (m, 1H), 7.48–7.43 (m, 1H).  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$  173.5 (d,  $J = 2.2$  Hz), 161.3 (q,  $J = 1$  Hz), 158.8, 152.5, 124.7 (d,  $J = 7.3$  Hz), 122.8 (d,  $J = 25.5$  Hz), 121.7 (q,  $J = 332$  Hz), 120.5 (d,  $J = 8.8$  Hz), 111.6 (d,  $J = 24.1$  Hz), 110.3 (q,  $J = 1$  Hz).  $^{19}F$  NMR (376 MHz,  $CDCl_3$ )  $\delta$  -35.59 (s, 3F), -112.99 (s, 1F). HRMS (ESI)  $m/z$  Calculated for  $C_{10}H_4F_4O_2Se$   $[M+H]^+$  312.9385, found 312.9388.

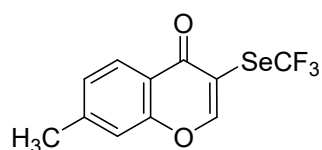


**6-chloro-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2e):** Light yellow solid, m.p. 158–159 °C.  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  8.42 (s, 1H), 8.21 (d,  $J = 2.4$  Hz, 1H), 7.67 (dd,  $J = 2.4$  Hz,  $J = 8.8$  Hz, 1H), 7.47 (d,  $J = 8.8$  Hz, 1H).  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$  173.1, 161.2 (q,  $J = 1$  Hz), 154.6, 134.7, 132.4, 126.0, 124.4, 121.7 (q,  $J = 332$  Hz), 120.0, 110.9 (q,  $J = 1$  Hz).  $^{19}F$  NMR (376 MHz,  $CDCl_3$ )  $\delta$  -35.55 (s, 3F). HRMS (ESI)  $m/z$  Calculated for  $C_{10}H_4ClF_3O_2Se$   $[M+H]^+$  328.9090, found 328.9094.

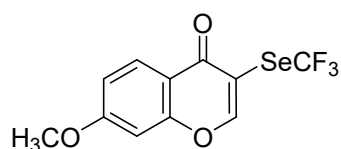


**6-bromo-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2f):** White solid, m.p. 171–172 °C.  $^1H$  NMR (400 MHz,  $CDCl_3$ )  $\delta$  8.42 (s, 1H), 8.36 (d,  $J = 2.4$  Hz, 1H), 7.81 (dd,  $J = 2.4$  Hz,  $J = 8.8$  Hz, 1H), 7.41 (d,  $J = 8.8$  Hz, 1H).  $^{13}C$  NMR (100 MHz,  $CDCl_3$ )  $\delta$  173.0, 161.2 (q,  $J = 1$  Hz), 155.0, 137.5, 129.2, 124.7, 121.7 (q,  $J = 332$  Hz),

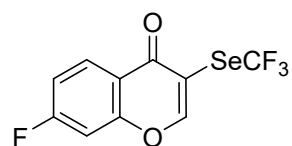
120.2, 119.8, 111.0 (q,  $J = 1$  Hz).  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -35.53 (s, 3F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{10}\text{H}_4\text{BrF}_3\text{O}_2\text{Se}$   $[\text{M}+\text{H}]^+$  372.8585, found 372.8593.



**7-methyl-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2g):** Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.37 (s, 1H), 8.13 (d,  $J = 8.8$  Hz, 1H), 7.28 (t,  $J = 3.6$  Hz, 2H), 2.50 (s, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  174.0, 161.0 (q,  $J = 1$  Hz), 156.4, 146.1, 127.8, 126.8, 121.8 (q,  $J = 332$  Hz), 121.2, 117.9, 110.8 (q,  $J = 1$  Hz), 21.8.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -35.74 (s, 3F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{11}\text{H}_7\text{F}_3\text{O}_2\text{Se}$   $[\text{M}+\text{H}]^+$  308.9636, found 308.9641.

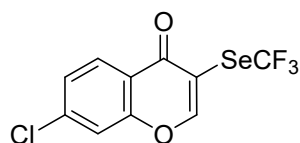


**7-methoxy-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2h):** White solid, m.p. 158-159 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.34 (s, 1H), 8.17 (d,  $J = 8.8$  Hz, 1H), 7.03 (dd,  $J = 2.4$  Hz,  $J = 8.8$  Hz, 1H), 6.87 (d,  $J = 2.4$  Hz, 1H), 3.92 (s, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  173.5, 164.6, 160.6 (q,  $J = 1$  Hz), 158.1, 128.1, 121.8 (q,  $J = 333$  Hz), 117.3, 115.4, 111.0 (q,  $J = 1$  Hz), 100.4, 56.0.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -35.72 (s, 3F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{11}\text{H}_7\text{F}_3\text{O}_3\text{Se}$   $[\text{M}+\text{H}]^+$  324.9585, found 324.9588.

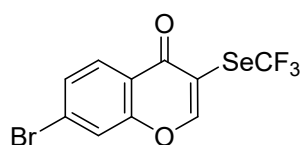


**7-fluoro-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2i):** White solid, m.p. 137-138 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.39 (s, 1H), 8.29 (dd,  $J = 6.4$  Hz,  $J = 8.8$  Hz, 1H), 7.24-7.18 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  173.2, 164.6, 161.1 (q,  $J = 1$  Hz), 157.2 (d,  $J = 13.9$  Hz), 129.3 (d,  $J = 11.0$  Hz), 121.7 (q,  $J = 332$  Hz), 120.3 (d,  $J = 2.2$  Hz), 115.1 (d,  $J = 22.6$  Hz), 111.3 (q,  $J = 1$  Hz), 105.0 (d,  $J = 25.5$  Hz).  $^{19}\text{F}$

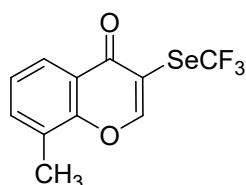
NMR (376 MHz, CDCl<sub>3</sub>)  $\delta$  -35.53 (s, 3F), -100.76 (s, 1F). HRMS (ESI)  $m/z$  Calculated for C<sub>10</sub>H<sub>4</sub>F<sub>4</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 312.9385, found 312.9391.



**7-chloro-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2j):** White solid, m.p. 159-160 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  8.39 (s, 1H), 8.19 (d,  $J$  = 8.8 Hz, 1H), 7.52 (d,  $J$  = 1.6 Hz, 1H), 7.28 (dd,  $J$  = 1.6 Hz,  $J$  = 8.8 Hz, 1H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  173.4, 161.0 (q,  $J$  = 1 Hz), 156.3, 140.7, 128.0, 127.2, 122.0, 121.8 (q,  $J$  = 332 Hz), 118.3, 111.4 (q,  $J$  = 1 Hz). <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>)  $\delta$  -35.49 (s, 3F). HRMS (ESI)  $m/z$  Calculated for C<sub>10</sub>H<sub>4</sub>ClF<sub>3</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 328.9090, found 328.9098.

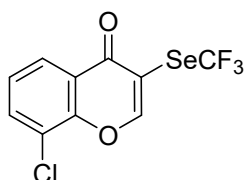


**7-bromo-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2k):** White solid, m.p. 171-172 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  8.38 (s, 1H), 8.11 (d,  $J$  = 8.8 Hz, 1H), 7.69 (d,  $J$  = 1.6 Hz, 1H), 7.59 (dd,  $J$  = 1.6 Hz,  $J$  = 8.8 Hz, 1H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  173.5, 160.9 (q,  $J$  = 1 Hz), 156.2, 130.0, 128.9, 128.0, 122.3, 121.8 (q,  $J$  = 332 Hz), 121.3, 111.4 (q,  $J$  = 1 Hz). <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>)  $\delta$  -35.46 (s, 3F). HRMS (ESI)  $m/z$  Calculated for C<sub>10</sub>H<sub>4</sub>BrF<sub>3</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 372.8585, found 372.8596.

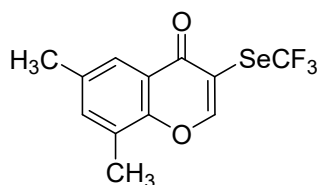


**8-methyl-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2l):** White solid, m.p. 129-130 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  8.46 (s, 1H), 8.10 (dd,  $J$  = 7.6 Hz,  $J$  = 2.4 Hz, 1H), 7.55 (d,  $J$  = 7.6 Hz, 1H), 7.36 (t,  $J$  = 7.6 Hz, 1H), 2.49 (s, 3H). <sup>13</sup>C NMR

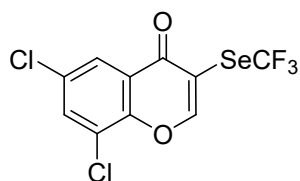
(100 MHz, CDCl<sub>3</sub>)  $\delta$  174.5, 160.9 (q,  $J = 1$  Hz), 154.8, 135.5, 127.8, 125.9, 124.2, 123.5, 121.8 (q,  $J = 333$  Hz), 110.7 (q,  $J = 1$  Hz), 15.5. <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>)  $\delta$  -35.67 (s, 3F). HRMS (ESI)  $m/z$  Calculated for C<sub>11</sub>H<sub>7</sub>F<sub>3</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 308.9636, found 308.9640.



**8-chloro-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2m):** White solid, m.p. 152-153 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  8.48 (s, 1H), 8.17 (dd,  $J = 1.6$  Hz,  $J = 8.0$  Hz, 1H), 7.79 (dd,  $J = 1.6$  Hz,  $J = 8.0$  Hz, 1H), 7.42 (t,  $J = 8.0$  Hz, 1H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  173.6, 160.7 (q,  $J = 1$  Hz), 152.0, 134.8, 126.4, 125.2, 124.8, 123.3, 121.7 (q,  $J = 332$  Hz), 111.4 (q,  $J = 1$  Hz). <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>)  $\delta$  -35.37 (s, 3F). HRMS (ESI)  $m/z$  Calculated for C<sub>10</sub>H<sub>4</sub>ClF<sub>3</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 328.9090, found 328.9093.

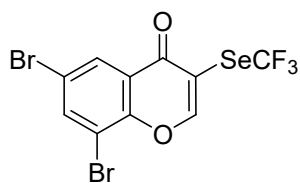


**6,8-dimethyl-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2n):** White solid, m.p. 198-200 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>)  $\delta$  8.43 (s, 1H), 7.89 (s, 1H), 7.39 (s, 1H), 2.46 (s, 3H), 2.43 (s, 3H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>)  $\delta$  174.6, 160.8 (q,  $J = 1$  Hz), 153.1, 136.8, 136.0, 127.5, 123.6, 123.3, 121.8 (q,  $J = 333$  Hz), 110.6 (q,  $J = 1$  Hz), 20.9, 15.4. <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>)  $\delta$  -35.77 (s, 3F). HRMS (ESI)  $m/z$  Calculated for C<sub>12</sub>H<sub>9</sub>F<sub>3</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 322.9793, found 322.9796.

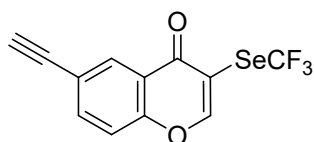




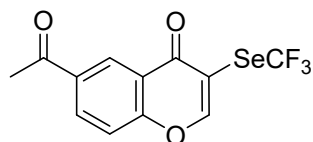
**6,8-dichloro-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2o):** White solid, m.p. 177-178 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.47 (s, 1H), 8.13 (d, *J* = 2.4 Hz, 1H), 7.77 (d, *J* = 2.4 Hz, 1H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 172.5, 160.7 (q, *J* = 1 Hz), 150.7, 134.7, 132.1, 125.2, 124.7, 124.6, 121.7 (q, *J* = 333 Hz), 111.5 (q, *J* = 1 Hz). <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>) δ -35.25 (s, 3F). HRMS (ESI) *m/z* Calculated for C<sub>10</sub>H<sub>3</sub>Cl<sub>2</sub>F<sub>3</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 362.8700, found 362.8707.



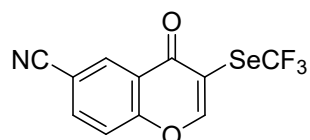
**6,8-dibromo-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2p):** White solid, m.p. 191-193 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.47 (s, 1H), 8.30 (d, *J* = 2.8 Hz, 1H), 8.05 (d, *J* = 2.8 Hz, 1H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 172.4, 160.8 (q, *J* = 1 Hz), 152.0, 140.2, 128.5, 125.4, 121.6 (q, *J* = 333 Hz), 119.7, 113.0, 111.4 (q, *J* = 1 Hz). <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>) δ -35.21 (s, 3F). HRMS (ESI) *m/z* Calculated for C<sub>10</sub>H<sub>3</sub>Br<sub>2</sub>F<sub>3</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 450.7690, found 450.7699.



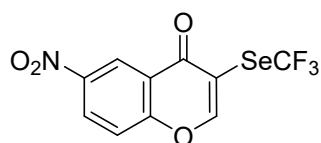
**6-ethynyl-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2q):** White solid, m.p. 139-140 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.40 (s, 1H), 8.36 (d, *J* = 2.4 Hz, 1H), 7.79 (dd, *J* = 8.8 Hz, *J* = 2.4 Hz, 1H), 7.46 (d, *J* = 8.8 Hz, 1H), 3.18 (s, 1H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 173.3, 161.1 (q, *J* = 1 Hz), 155.8, 137.6, 130.5, 123.4, 122.1 (q, *J* = 333 Hz), 120.8, 118.6, 111.2 (q, *J* = 1 Hz), 81.4, 79.1. <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>) δ -35.52 (s, 3F). HRMS (ESI) *m/z* Calculated for C<sub>12</sub>H<sub>3</sub>F<sub>3</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 318.9480, found 318.9487.



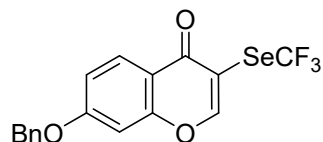
**6-acetyl-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2r):** White solid, m.p. 166-168 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.79 (d,  $J = 2.4$  Hz, 1H), 8.44 (s, 1H), 8.35 (dd,  $J = 8.8$  Hz,  $J = 2.4$  Hz, 1H), 7.58 (d,  $J = 8.8$  Hz, 1H), 2.70 (s, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  196.0, 173.8, 161.1 (q,  $J = 1$  Hz), 158.7, 134.9, 133.6, 127.9, 123.0, 121.7 (q,  $J = 333$  Hz), 119.1, 111.6 (q,  $J = 1$  Hz), 26.6.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -35.37 (s, 3F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{12}\text{H}_7\text{F}_3\text{O}_3\text{Se}$   $[\text{M}+\text{H}]^+$  336.9585, found 336.9591.



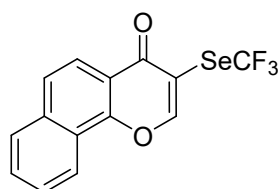
**4-oxo-3-((trifluoromethyl)selanyl)-4H-chromene-6-carbonitrile (2s):** White solid, m.p. 157-158 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.59 (d,  $J = 2.0$  Hz, 1H), 8.45 (s, 1H), 7.97 (dd,  $J = 2.0$  Hz,  $J = 8.8$  Hz, 1H), 7.65 (d,  $J = 8.8$  Hz, 1H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  172.5, 161.1 (q,  $J = 1$  Hz), 157.9, 136.8, 132.2, 123.9, 121.7 (q,  $J = 332$  Hz), 120.0, 117.0, 112.1 (q,  $J = 1$  Hz), 110.7.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -35.19 (s, 3F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{11}\text{H}_4\text{F}_3\text{NO}_2\text{Se}$   $[\text{M}+\text{H}]^+$  319.9432, found 319.9436.



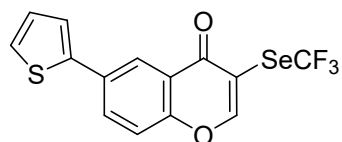
**6-nitro-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2t):** White solid, m.p. 173-174 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  9.12 (d,  $J = 2.8$  Hz, 1H), 8.57 (dd,  $J = 2.8$  Hz,  $J = 9.2$  Hz, 1H), 8.47 (s, 1H), 7.70 (d,  $J = 9.2$  Hz, 1H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  172.8, 161.0 (q,  $J = 1$  Hz), 158.9, 145.5, 128.8, 123.6, 123.3, 121.7 (q,  $J = 332$  Hz), 120.2, 112.0 (q,  $J = 1$  Hz).  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -35.13 (s, 3F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{10}\text{H}_4\text{F}_3\text{NO}_4\text{Se}$   $[\text{M}+\text{H}]^+$  339.9330, found 339.9334.



**7-(benzyloxy)-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2u):** Light yellow solid, m.p. 211-213 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.32 (s, 1H), 8.18 (d, *J* = 9.2 Hz, 1H), 7.46–7.36 (m, 5H), 7.11 (dd, *J* = 9.2 Hz, *J* = 2.4 Hz, 1H), 6.95 (d, *J* = 2.4 Hz, 1H), 5.18 (s, 2H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 173.4, 163.6, 160.6 (q, *J* = 1 Hz), 158.0, 135.4, 128.8, 128.5, 128.2, 127.5, 121.8 (q, *J* = 333 Hz), 117.5, 115.9, 111.8 (q, *J* = 1 Hz), 101.6, 70.7. <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>) δ -35.68 (s, 3F). HRMS (ESI) *m/z* Calculated for C<sub>17</sub>H<sub>11</sub>F<sub>3</sub>O<sub>3</sub>Se [M+H]<sup>+</sup> 400.9898, found 400.9906.

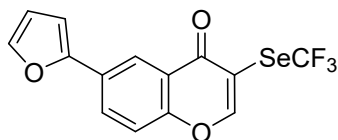


**3-((trifluoromethyl)selanyl)-4H-benzo[h]chromen-4-one (2v):** White solid, m.p. 215-217 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.57 (s, 1H), 8.46 (d, *J* = 8.0 Hz, 1H), 8.16 (d, *J* = 8.8 Hz, 1H), 7.95 (d, *J* = 7.6 Hz, 1H), 7.82 (d, *J* = 8.8 Hz, 1H), 7.77–7.69 (m, 2H). <sup>13</sup>C NMR (100 MHz, CDCl<sub>3</sub>) δ 174.0, 159.6 (q, *J* = 1 Hz), 153.9, 136.0, 129.8, 128.2, 127.6, 126.5, 123.6, 122.2, 121.9 (q, *J* = 332 Hz), 121.0, 119.9, 112.7 (q, *J* = 1 Hz). <sup>19</sup>F NMR (376 MHz, CDCl<sub>3</sub>) δ -35.31 (s, 3F). HRMS (ESI) *m/z* Calculated for C<sub>14</sub>H<sub>7</sub>F<sub>3</sub>O<sub>2</sub>Se [M+H]<sup>+</sup> 344.9636, found 344.9641.

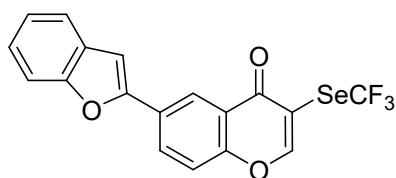


**6-(thiophen-2-yl)-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2w):** Light yellow solid, m.p. 204-205 °C. <sup>1</sup>H NMR (400 MHz, CDCl<sub>3</sub>) δ 8.46 (d, *J* = 2.4 Hz, 1H), 8.42 (s, 1H), 7.96 (dd, *J* = 8.8 Hz, *J* = 2.4 Hz, 1H), 7.53 (d, *J* = 8.8 Hz, 1H), 7.43 (d, *J* = 3.6 Hz, 1H), 7.37 (d, *J* = 5.2 Hz, 1H), 7.13 (dd, *J* = 3.6 Hz, *J* = 5.2 Hz, 1H).

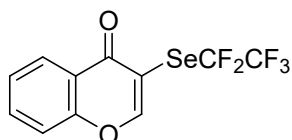
$^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  174.1, 161.0 (q,  $J = 1$  Hz), 155.4, 141.9, 133.1, 132.1, 128.4, 126.2, 124.5, 123.8, 122.8, 121.8 (q,  $J = 333$  Hz), 118.9, 111.0 (q,  $J = 1$  Hz).  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -35.57 (s, 3F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{14}\text{H}_7\text{F}_3\text{O}_2\text{SSe}$   $[\text{M}+\text{H}]^+$  376.9357, found 376.9360.



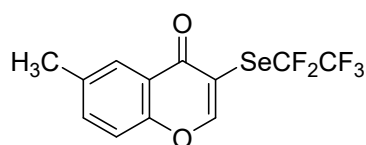
**6-(furan-2-yl)-3-((trifluoromethyl)selenanyl)-4H-chromen-4-one (2x):** Light yellow solid, m.p. 181-183 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.49 (d,  $J = 2.4$  Hz, 1H), 8.41 (s, 1H), 8.05 (dd,  $J = 8.8$  Hz,  $J = 2.4$  Hz, 1H), 7.54–7.51 (m, 2H), 6.81 (d,  $J = 3.2$  Hz, 1H), 6.52 (dd,  $J = 1.6$  Hz,  $J = 3.6$  Hz, 1H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  174.1, 161.0 (q,  $J = 1$  Hz), 155.2, 151.9, 143.1, 129.9, 129.4, 123.8, 121.8 (q,  $J = 333$  Hz), 121.0, 118.8, 112.1, 110.9 (q,  $J = 1$  Hz), 106.8.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -35.60 (s, 3F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{14}\text{H}_7\text{F}_3\text{O}_3\text{Se}$   $[\text{M}+\text{H}]^+$  360.9585, found 360.9587.



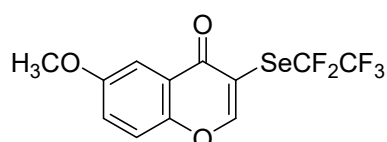
**6-(benzofuran-2-yl)-3-((trifluoromethyl)selenanyl)-4H-chromen-4-one (2y):** Light brown solid, m.p. 221-223 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.70 (d,  $J = 2.4$  Hz, 1H), 8.42 (s, 1H), 8.21 (dd,  $J = 8.8$  Hz,  $J = 2.4$  Hz, 1H), 7.63–7.54 (m, 3H), 7.34 (t,  $J = 7.2$  Hz, 1H), 7.27 (t,  $J = 7.2$  Hz, 1H), 7.17 (s, 1H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  173.9, 161.0 (q,  $J = 1$  Hz), 155.1, 153.6, 152.1, 130.8, 129.0, 128.9, 125.1, 123.9, 123.3, 122.5, 122.1, 121.8 (q,  $J = 333$  Hz), 121.3, 119.0, 111.3, 111.1 (q,  $J = 1$  Hz), 103.0.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -35.53 (s, 3F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{18}\text{H}_9\text{F}_3\text{O}_3\text{Se}$   $[\text{M}+\text{H}]^+$  410.9742, found 410.9750.



**3-((perfluoroethyl)selanyl)-4H-chromen-4-one (3a):** Colorless oil.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.42 (s, 1H), 8.27 (dd,  $J = 8.0$  Hz,  $J = 1.6$  Hz, 1H), 7.77–7.72 (m, 1H), 7.52–7.48 (m, 2H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  174.2, 162.2, 156.2, 134.5, 130.0, 126.8, 126.4, 123.6, 118.2, 115.0, 109.8 (q,  $J = 1$  Hz).  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -82.90 (t, 3F), -91.25 (q, 2F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{11}\text{H}_5\text{F}_5\text{O}_2\text{Se}$   $[\text{M}+\text{H}]^+$  344.9448, found 344.9451.



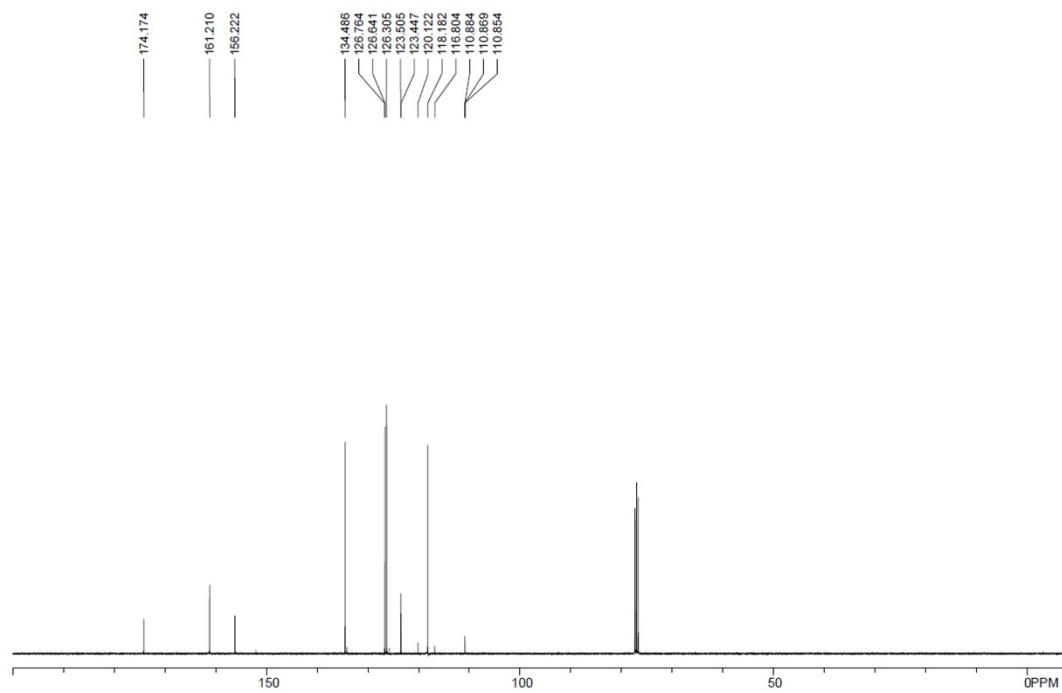
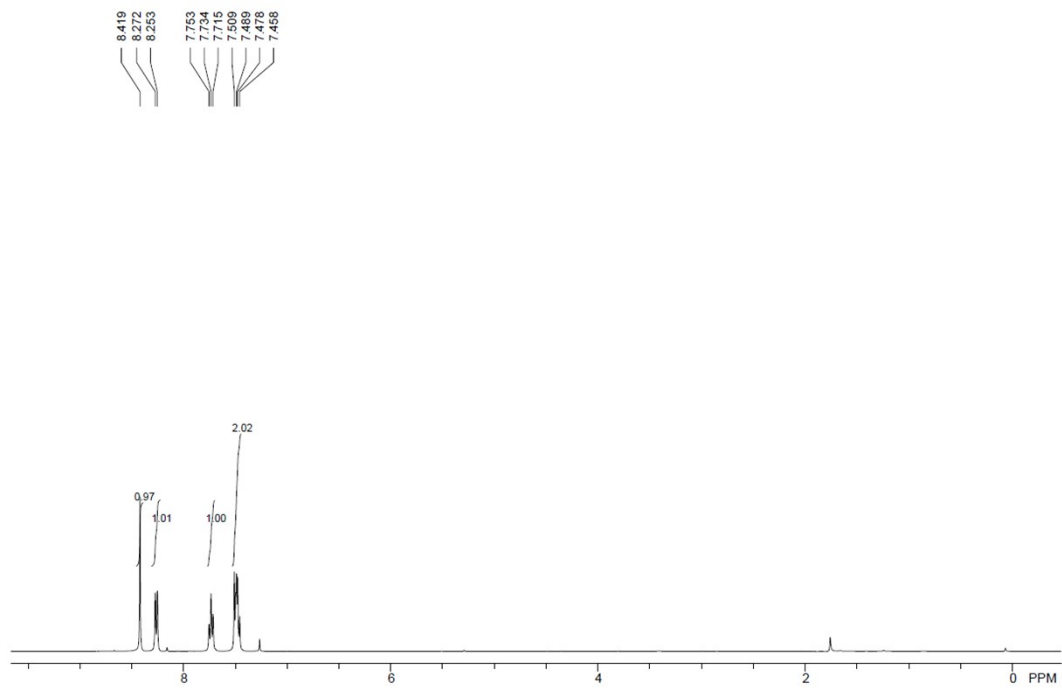
**6-methyl-3-((perfluoroethyl)selanyl)-4H-chromen-4-one (3b):** White solid, m.p. 169-171 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.40 (s, 1H), 8.05 (s, 1H), 7.54 (dd,  $J = 8.4$  Hz,  $J = 2.0$  Hz, 1H), 7.40 (d,  $J = 8.4$  Hz, 1H), 2.47 (s, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  174.3, 162.1, 154.5, 136.6, 135.7, 126.1, 123.2, 120.1, 117.9, 115.0, 109.6 (q,  $J = 1$  Hz), 21.0.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -82.90 (t, 3F), -91.38 (q, 2F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{12}\text{H}_7\text{F}_5\text{O}_2\text{Se}$   $[\text{M}+\text{H}]^+$  358.9604, found 358.9609.

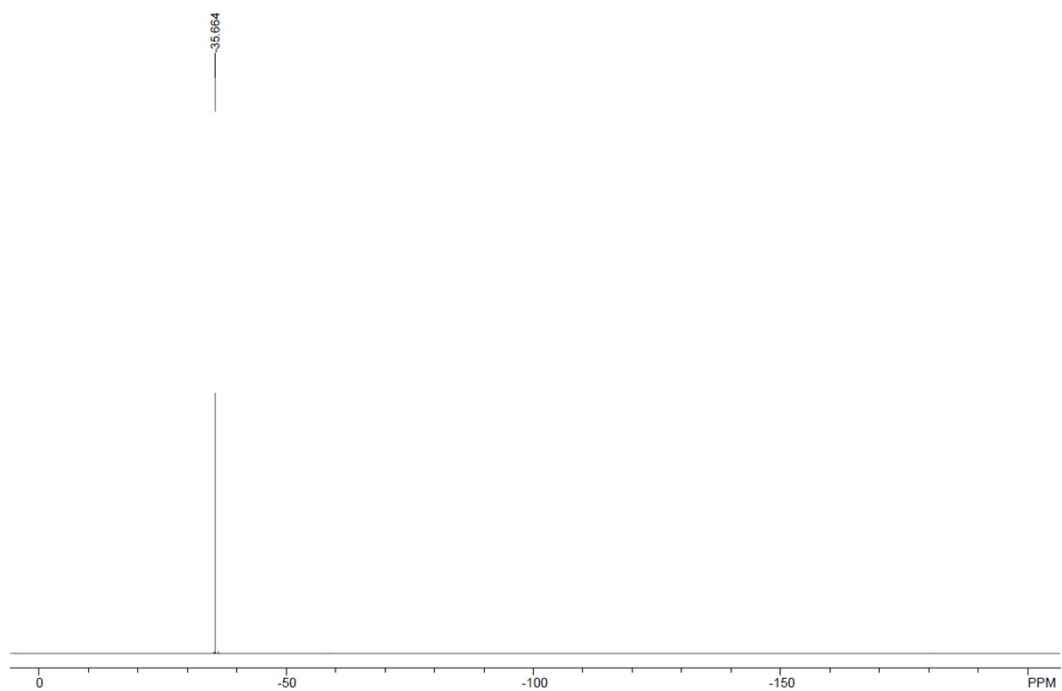


**6-methoxy-3-((perfluoroethyl)selanyl)-4H-chromen-4-one (3c):** White solid, m.p. 181-183 °C.  $^1\text{H}$  NMR (400 MHz,  $\text{CDCl}_3$ )  $\delta$  8.40 (s, 1H), 7.62 (d,  $J = 3.2$  Hz, 1H), 7.44 (d,  $J = 8.8$  Hz, 1H), 7.31 (dd,  $J = 3.2$  Hz,  $J = 8.8$  Hz, 1H), 3.90 (s, 3H).  $^{13}\text{C}$  NMR (100 MHz,  $\text{CDCl}_3$ )  $\delta$  174.2, 161.8, 157.7, 151.1, 124.5, 124.3, 119.7, 115.0, 108.9 (q,  $J = 1$  Hz), 105.8, 56.0.  $^{19}\text{F}$  NMR (376 MHz,  $\text{CDCl}_3$ )  $\delta$  -82.91 (t, 3F), -91.35 (q, 2F). HRMS (ESI)  $m/z$  Calculated for  $\text{C}_{12}\text{H}_7\text{F}_5\text{O}_3\text{Se}$   $[\text{M}+\text{H}]^+$  374.9553, found 374.9555.

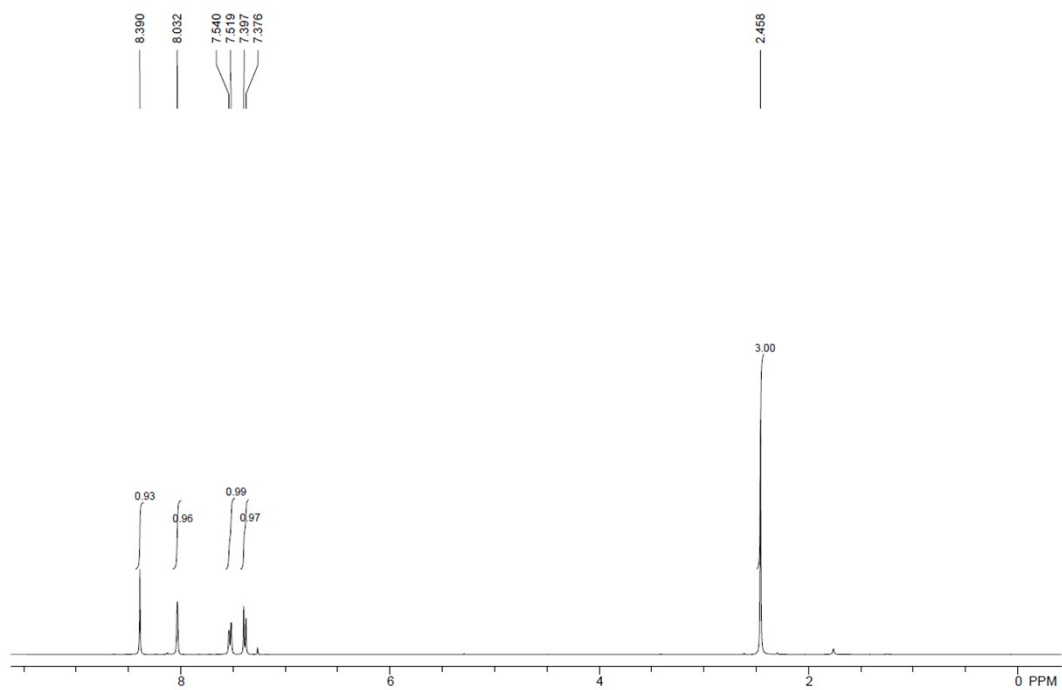
## 4. $^1\text{H}$ and $^{13}\text{C}$ NMR spectra

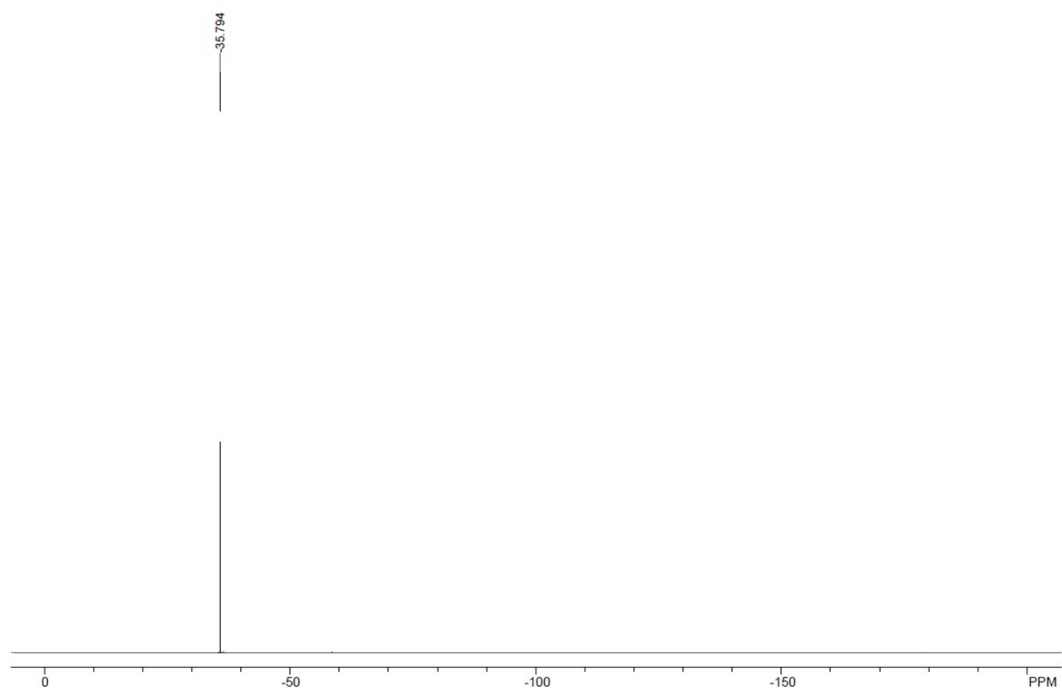
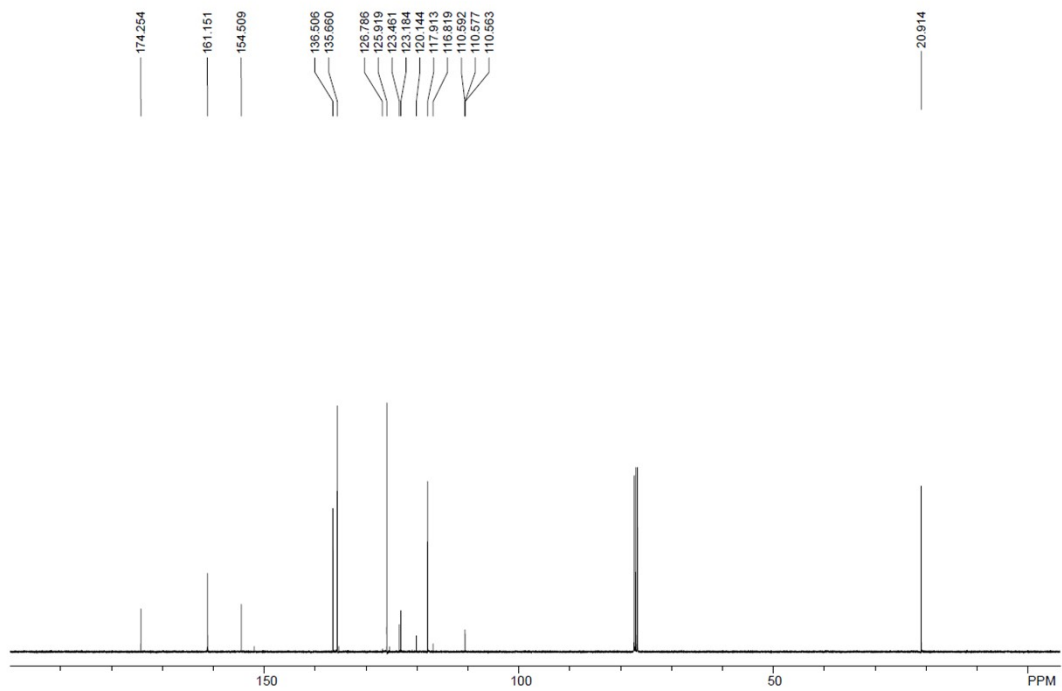
### 3-((trifluoromethyl)sulanyl)-4*H*-chromen-4-one (2a)





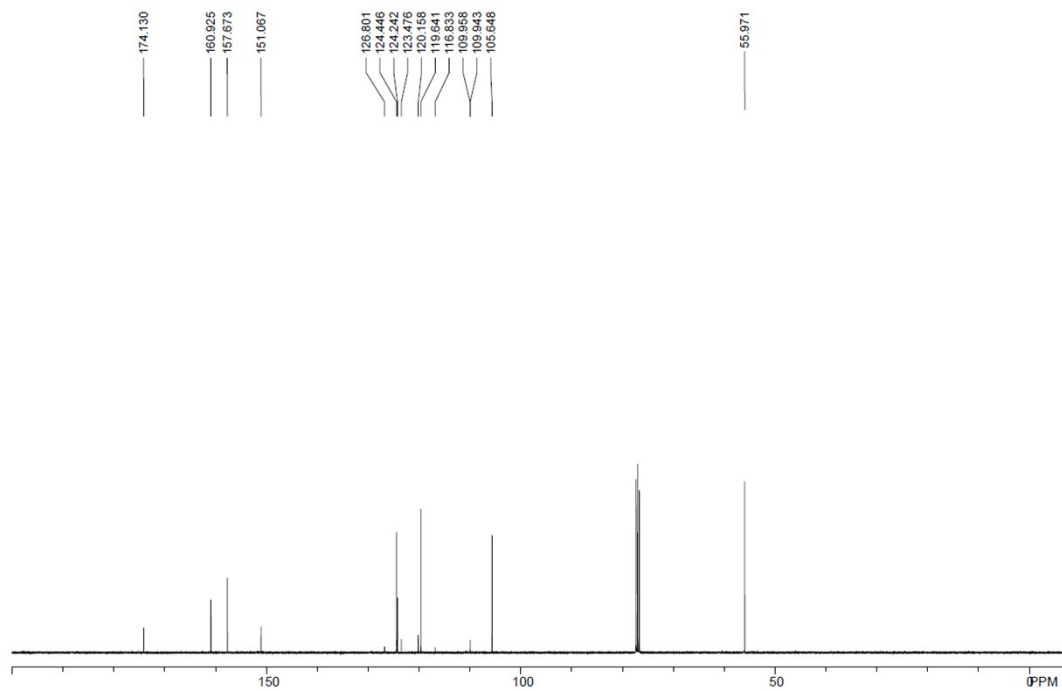
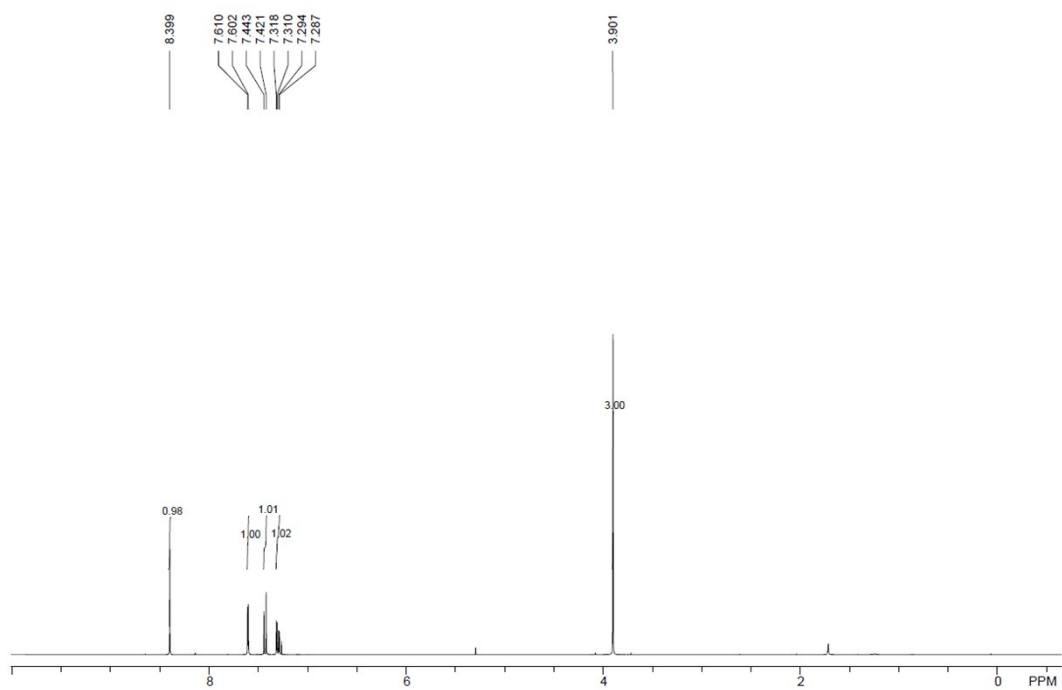
**6-methyl-3-((trifluoromethyl)selenanyl)-4H-chromen-4-one (2b)**

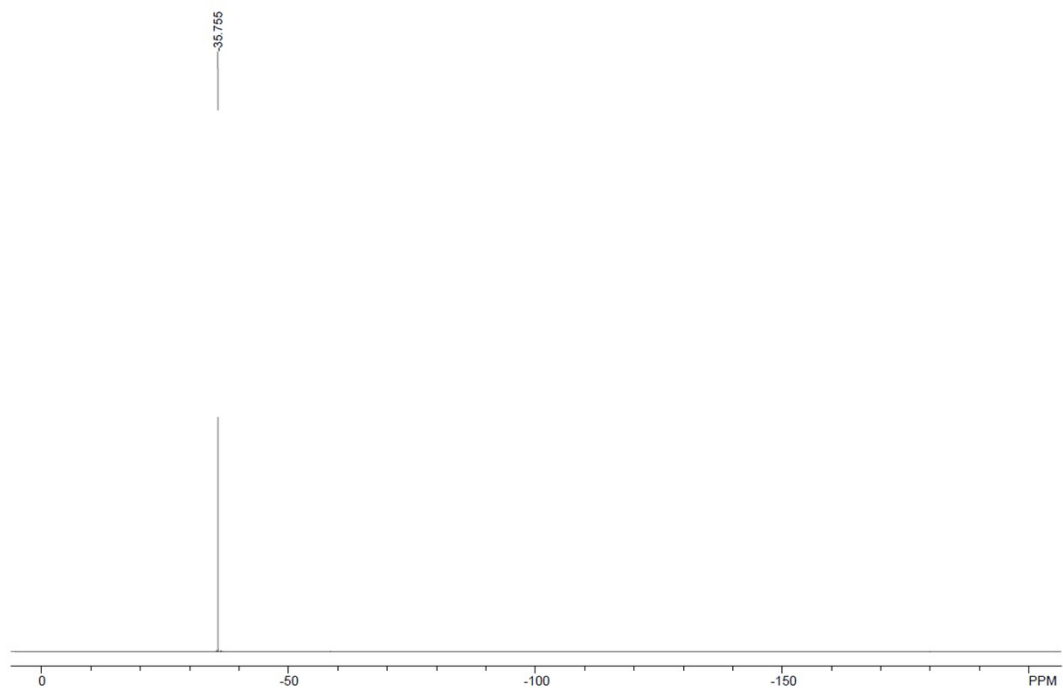




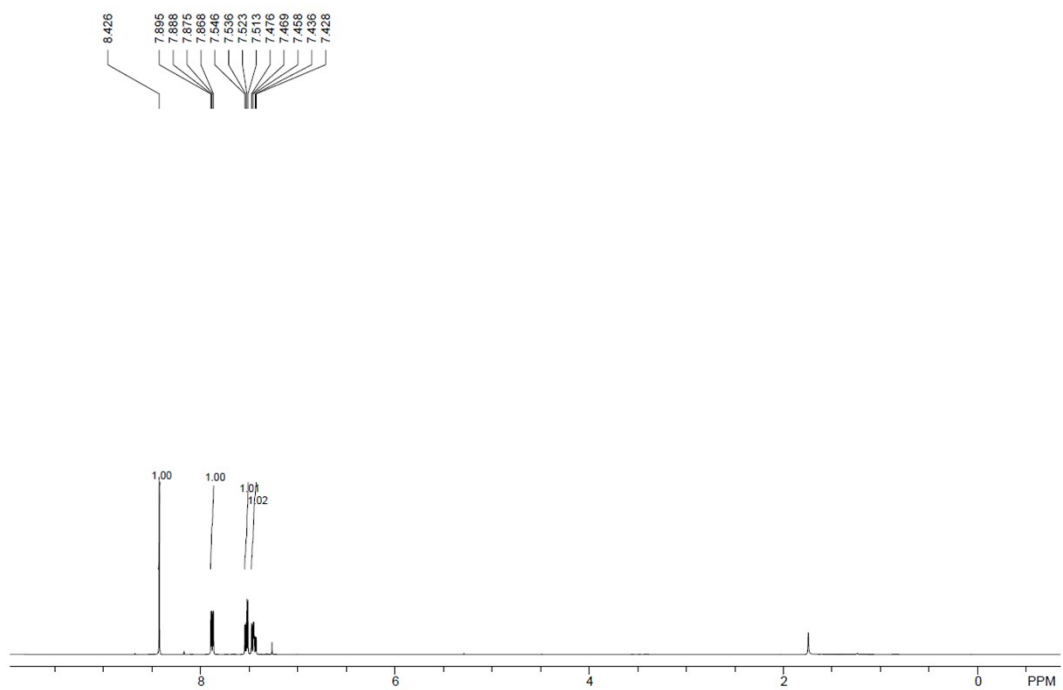


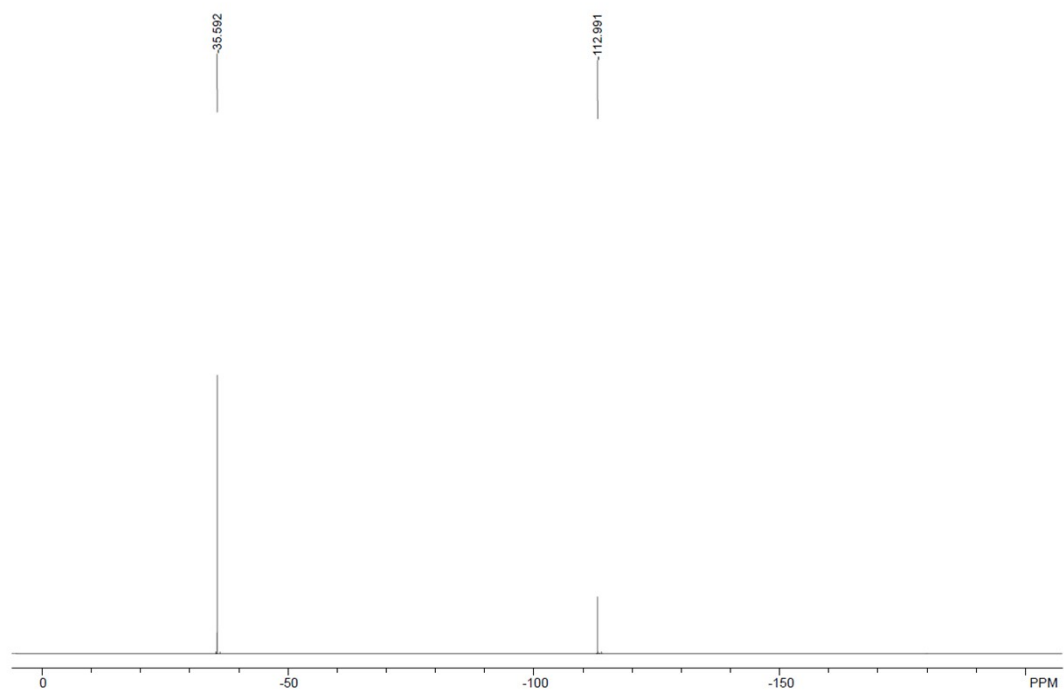
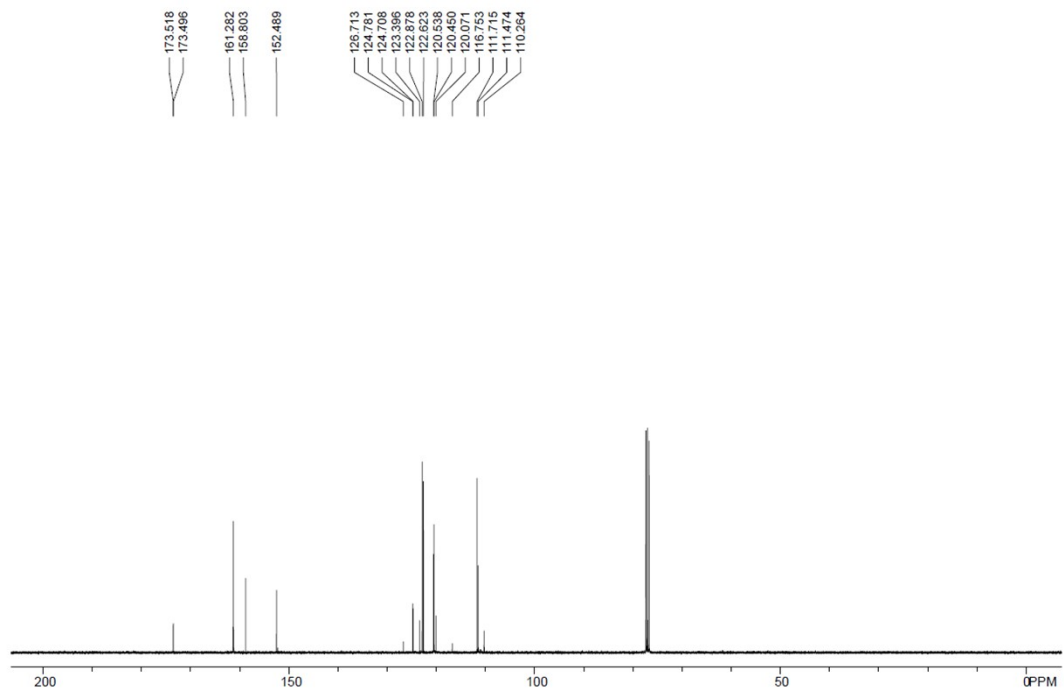
6-methoxy-3-((trifluoromethyl)sulanyl)-4H-chromen-4-one (2c)



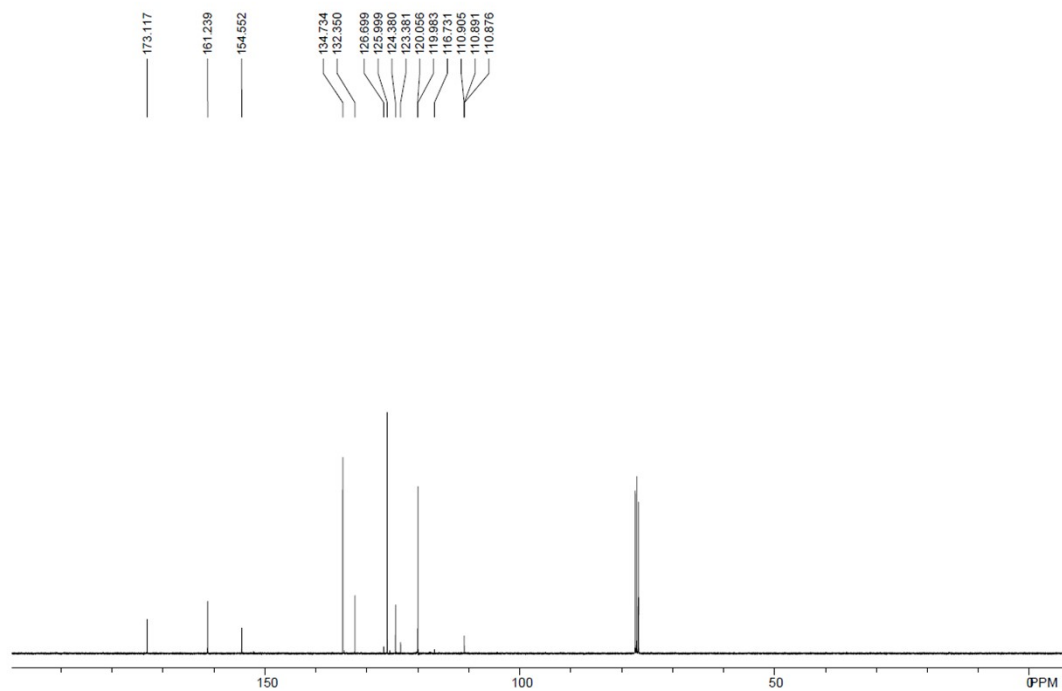
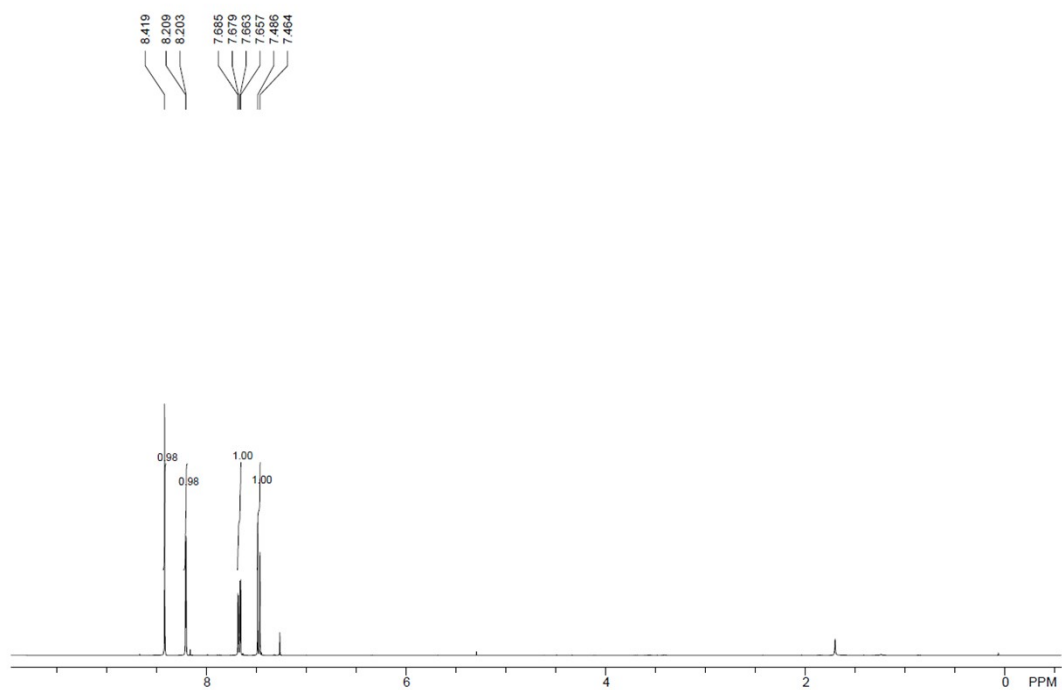


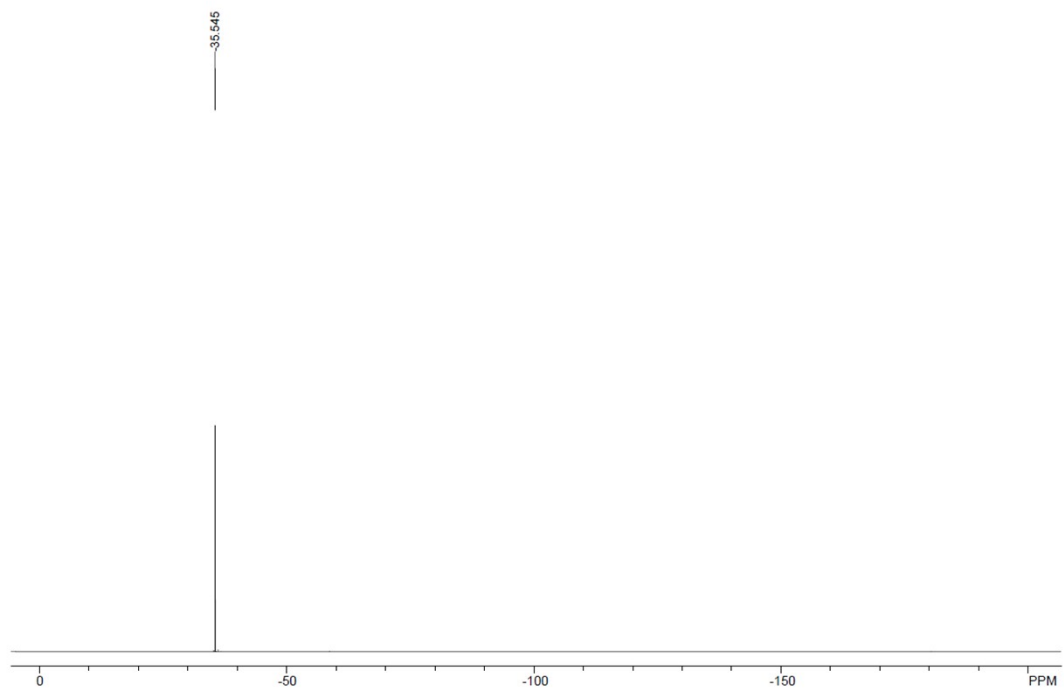
**6-fluoro-3-((trifluoromethyl)sulanyl)-4H-chromen-4-one (2d)**



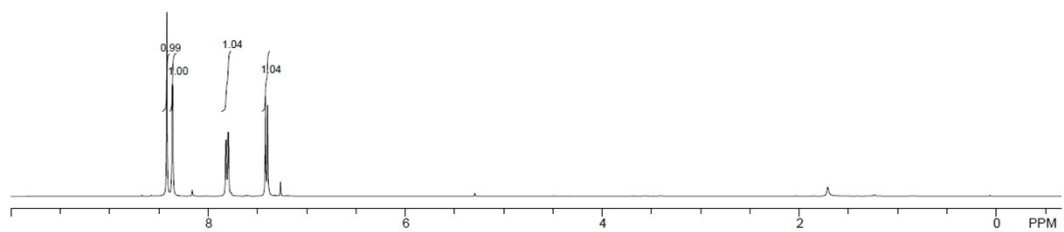
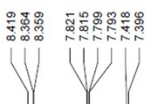


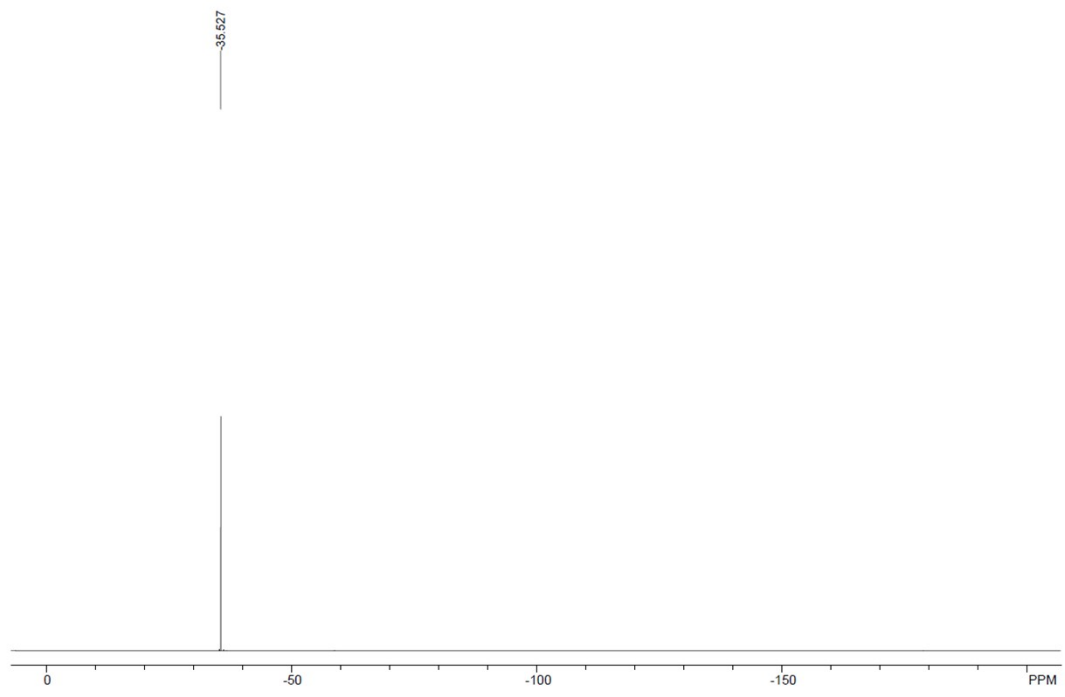
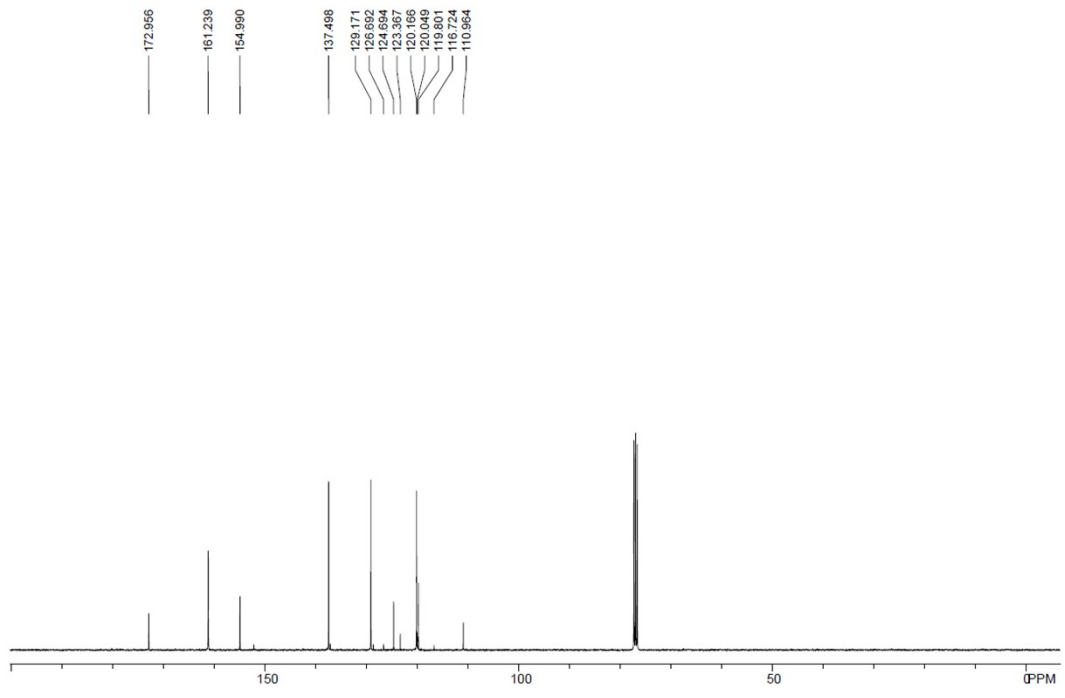
6-chloro-3-((trifluoromethyl)sulanyl)-4*H*-chromen-4-one (2e)



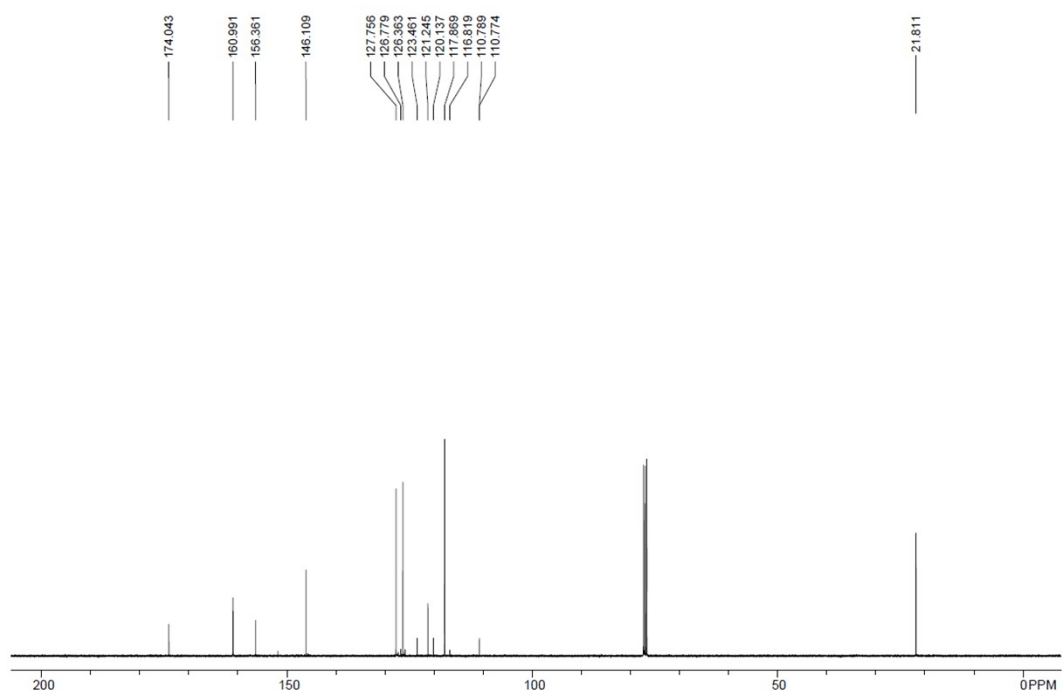
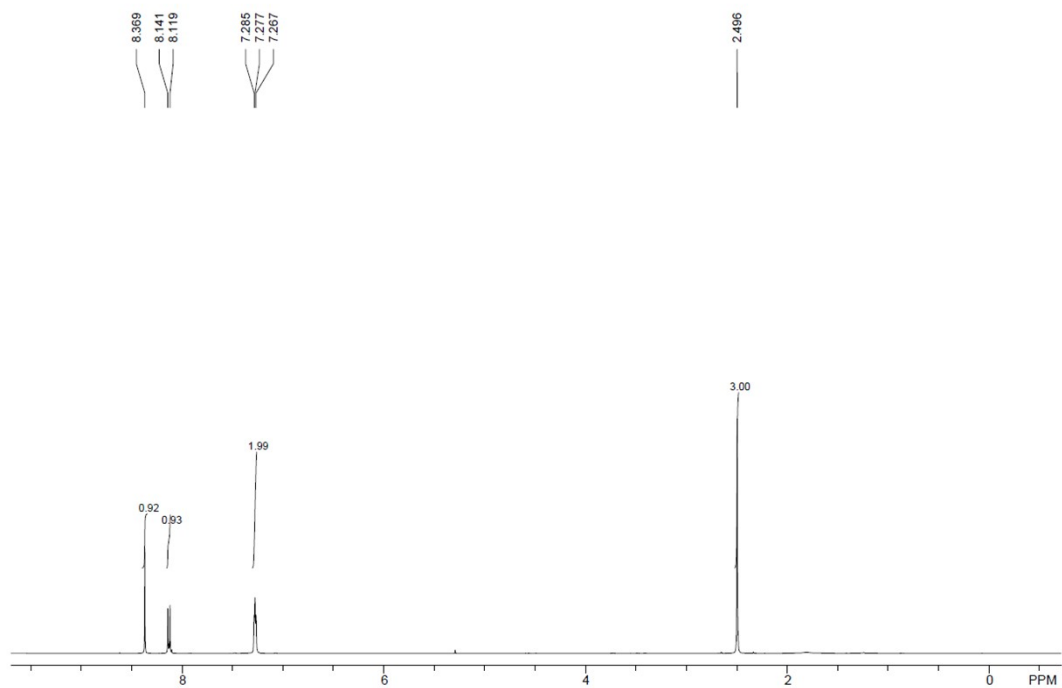


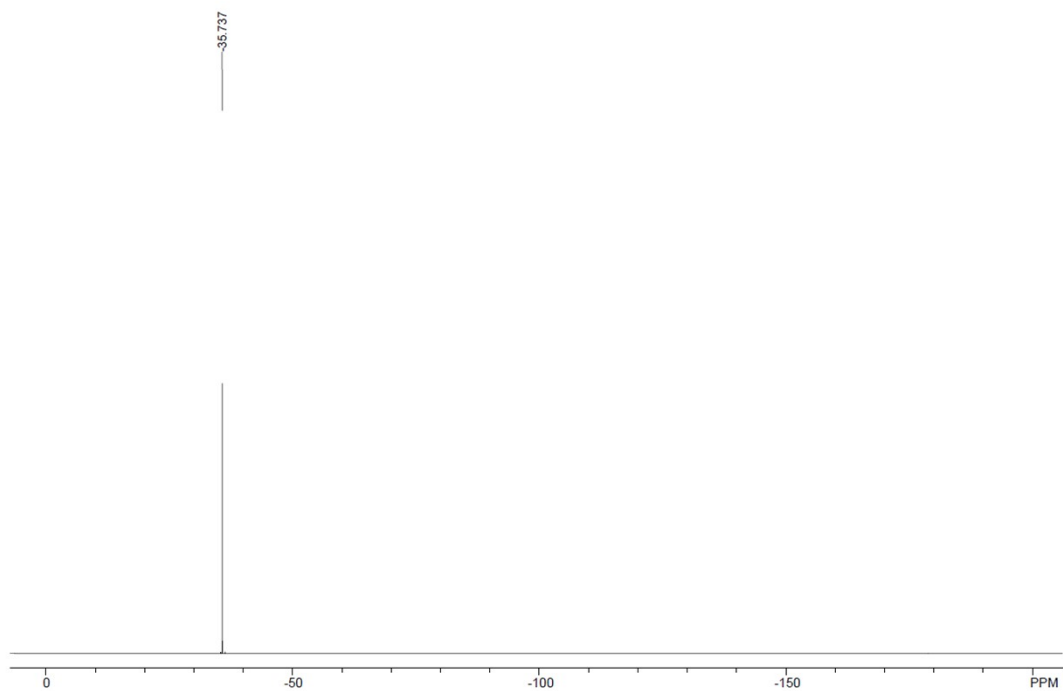
**6-bromo-3-((trifluoromethyl)sulanyl)-4H-chromen-4-one (2f)**



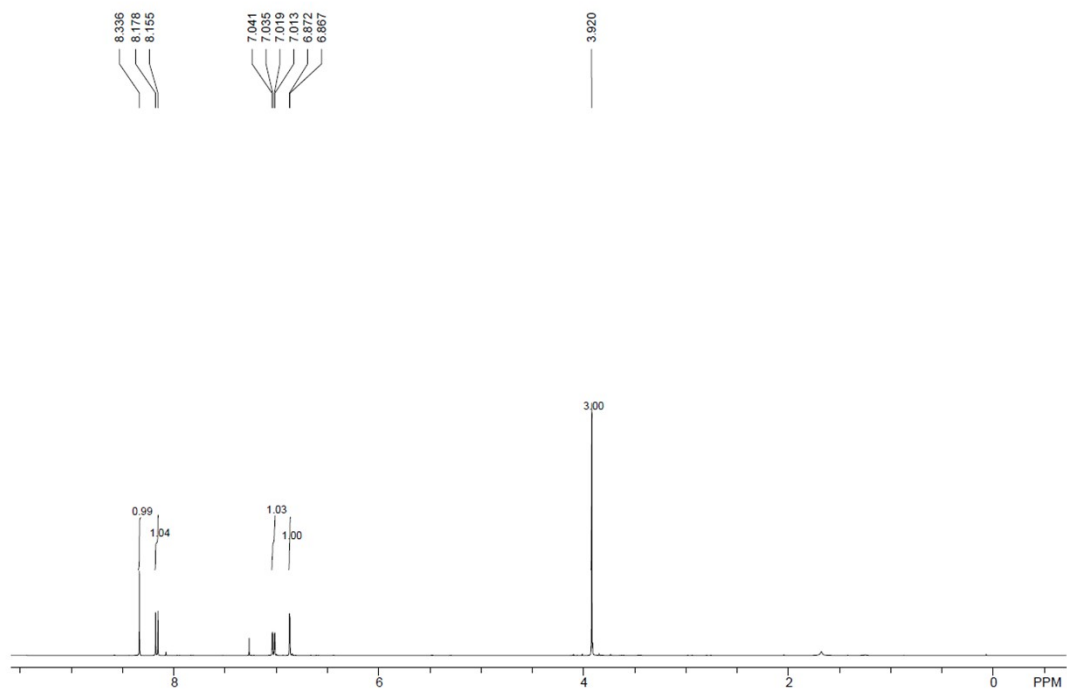


7-methyl-3-((trifluoromethyl)selanyl)-4H-chromen-4-one (2g)

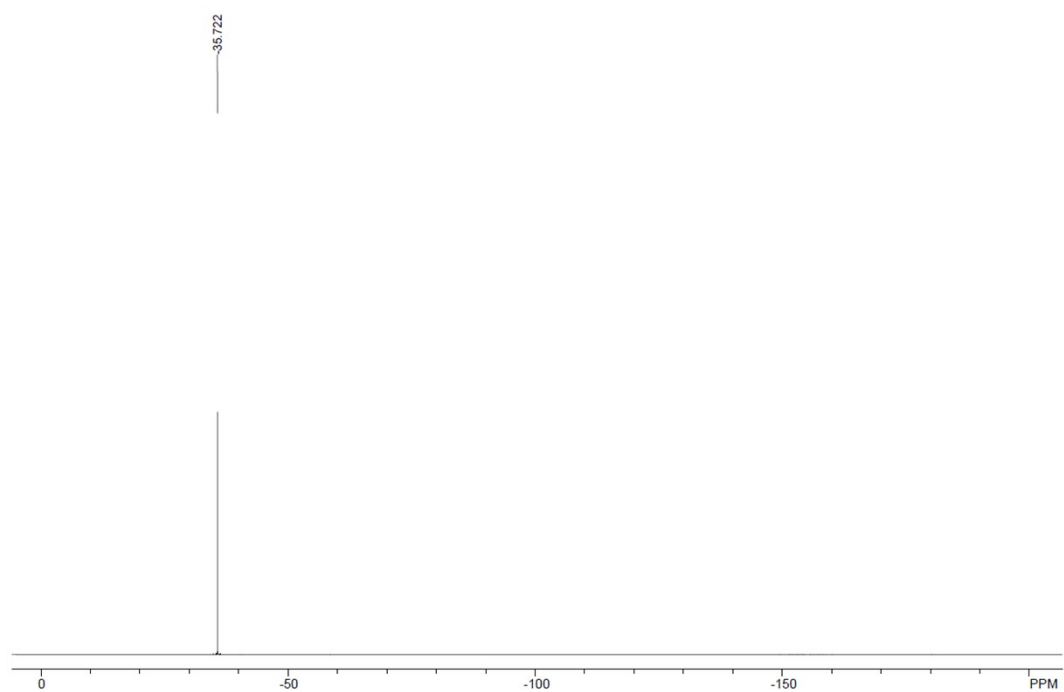
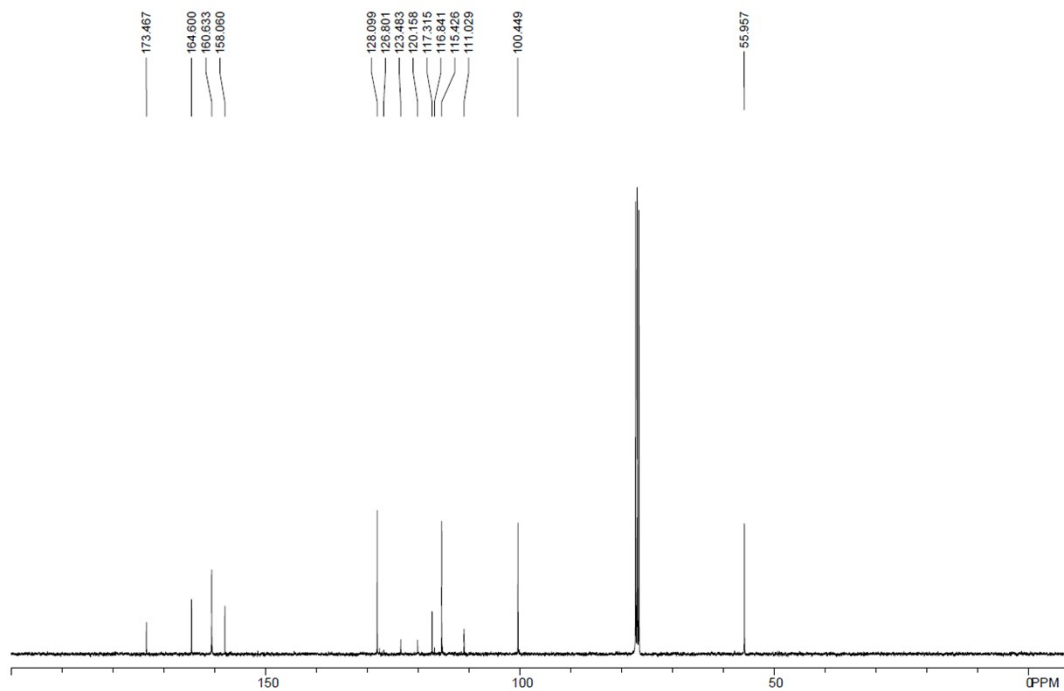




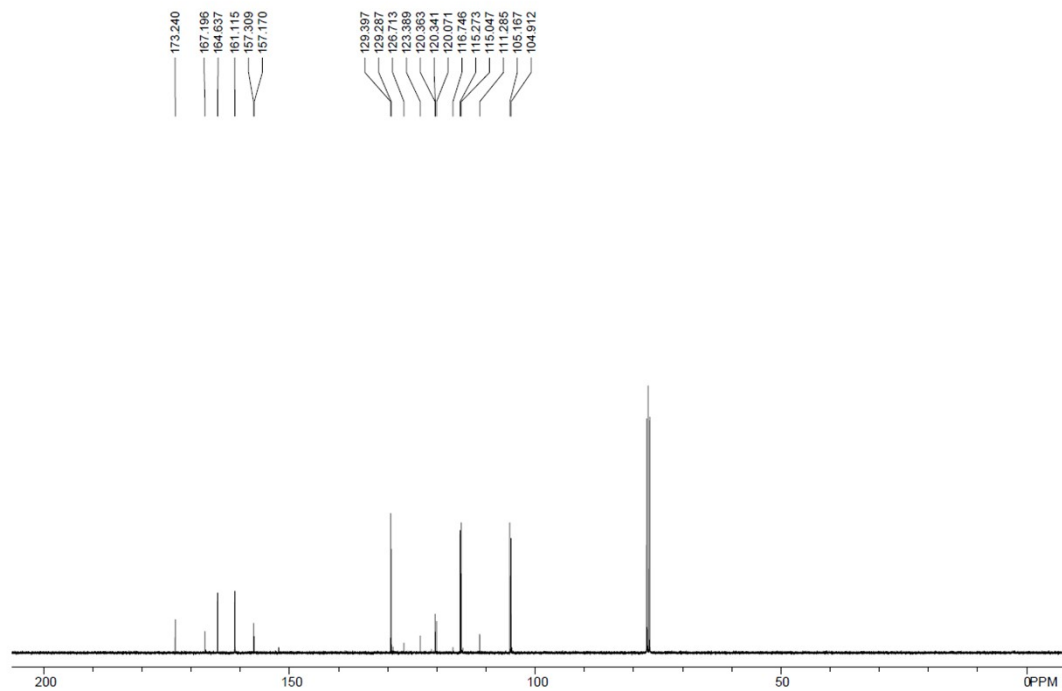
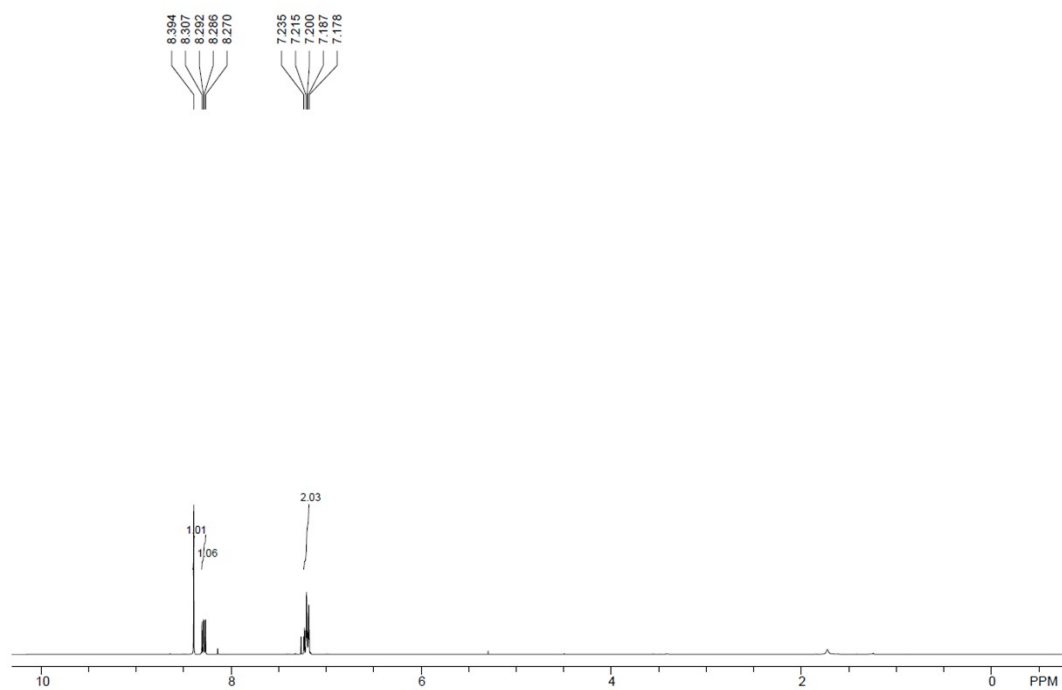
**7-methoxy-3-((trifluoromethyl)sulanyl)-4H-chromen-4-one (2h)**

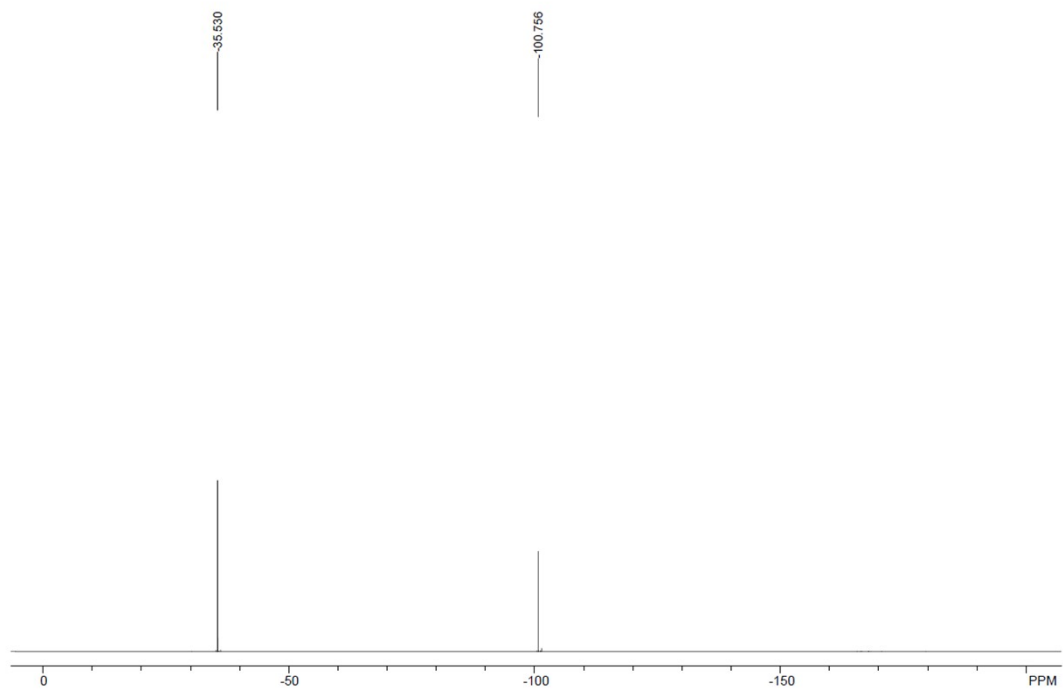




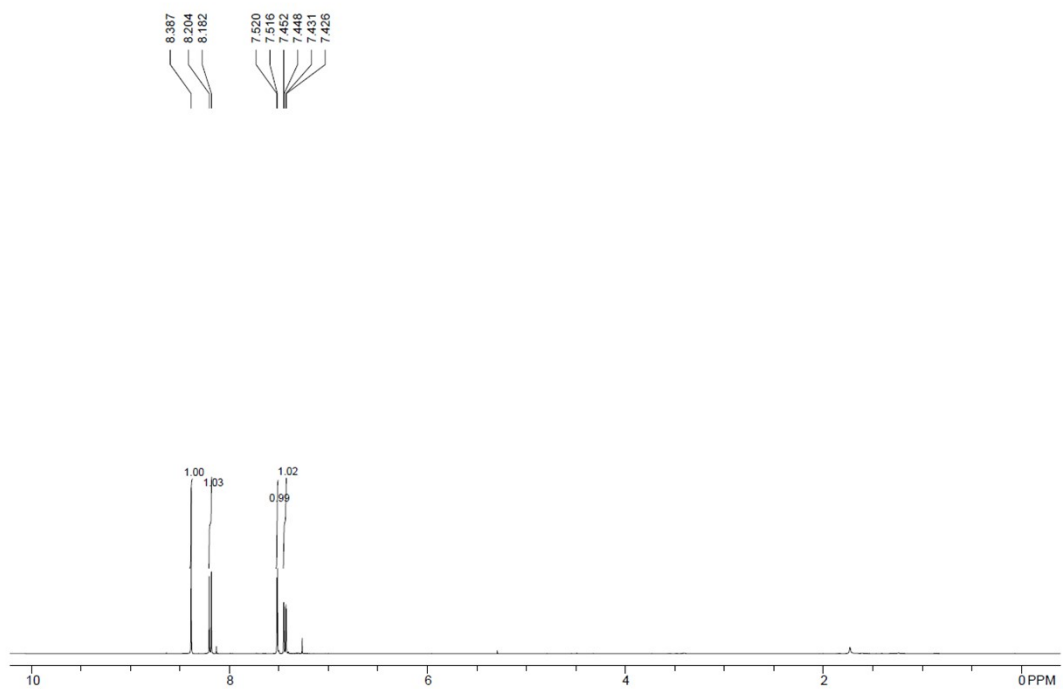


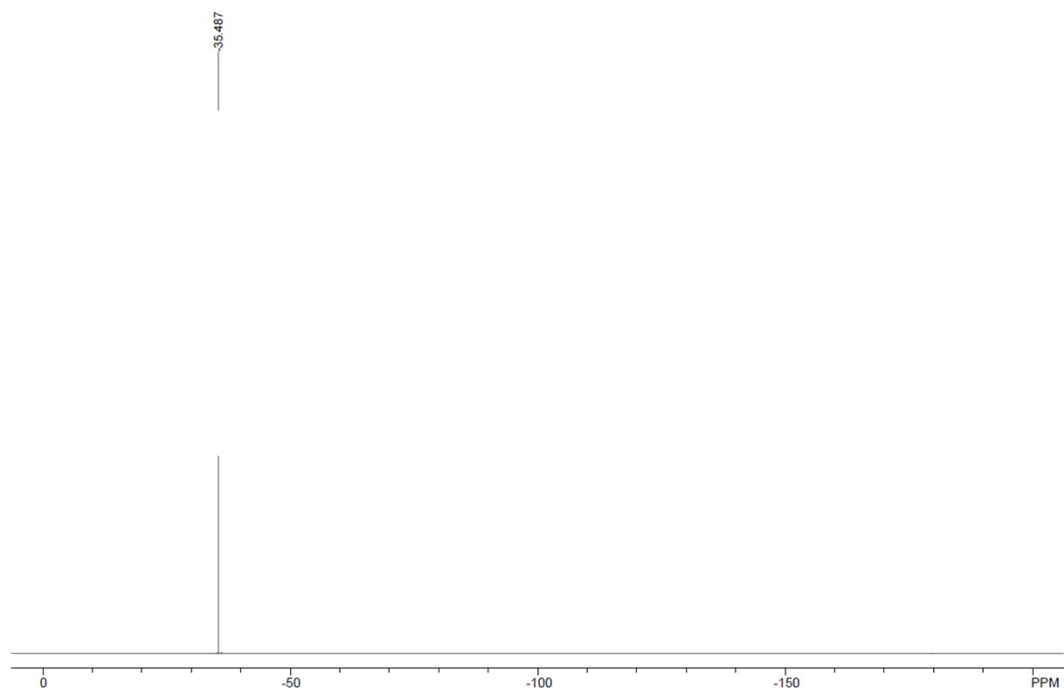
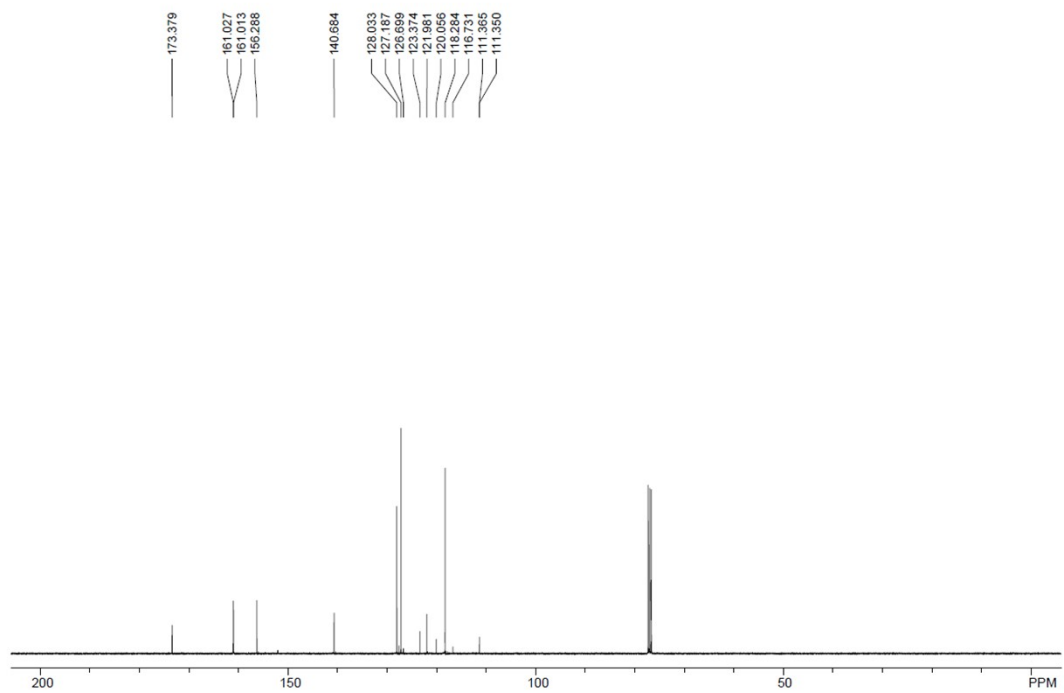
**7-fluoro-3-((trifluoromethyl)sulanyl)-4*H*-chromen-4-one (2i)**



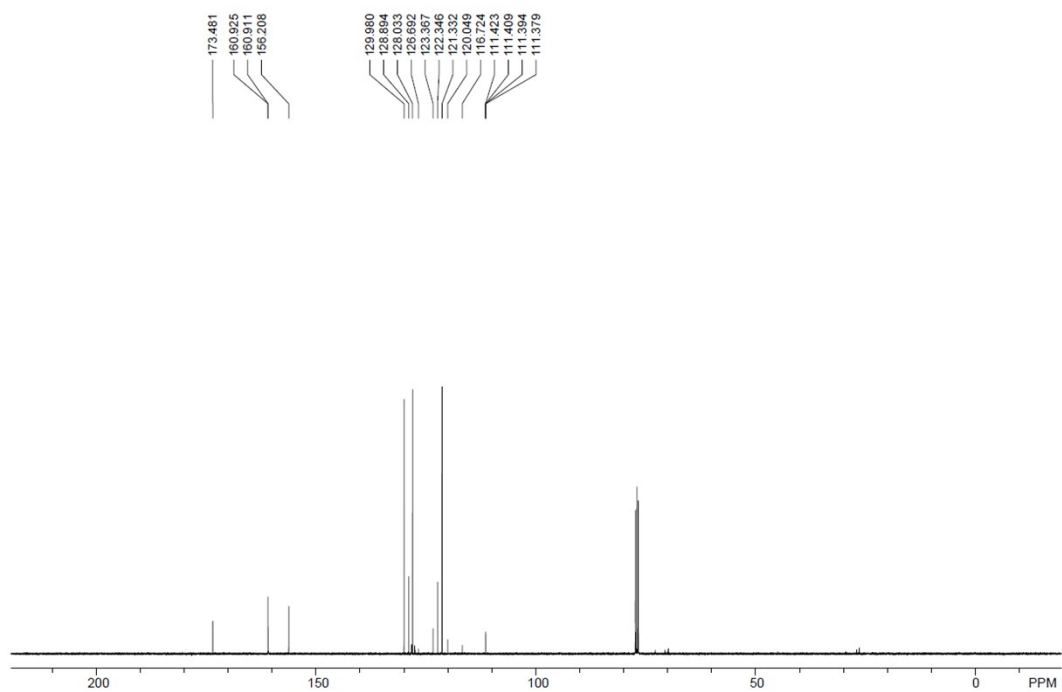
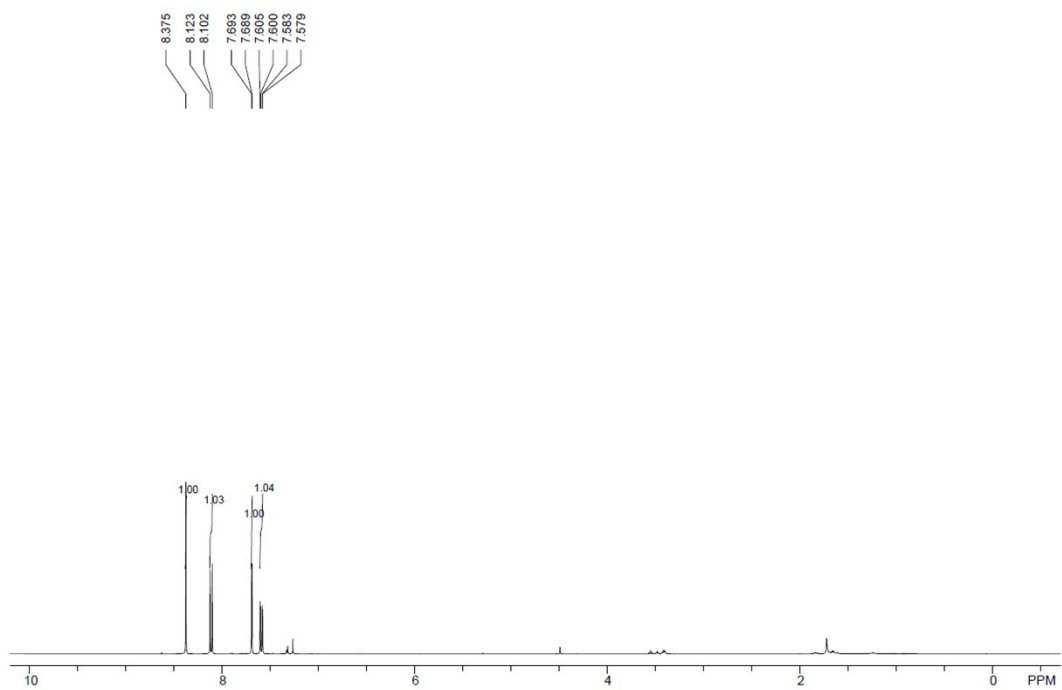


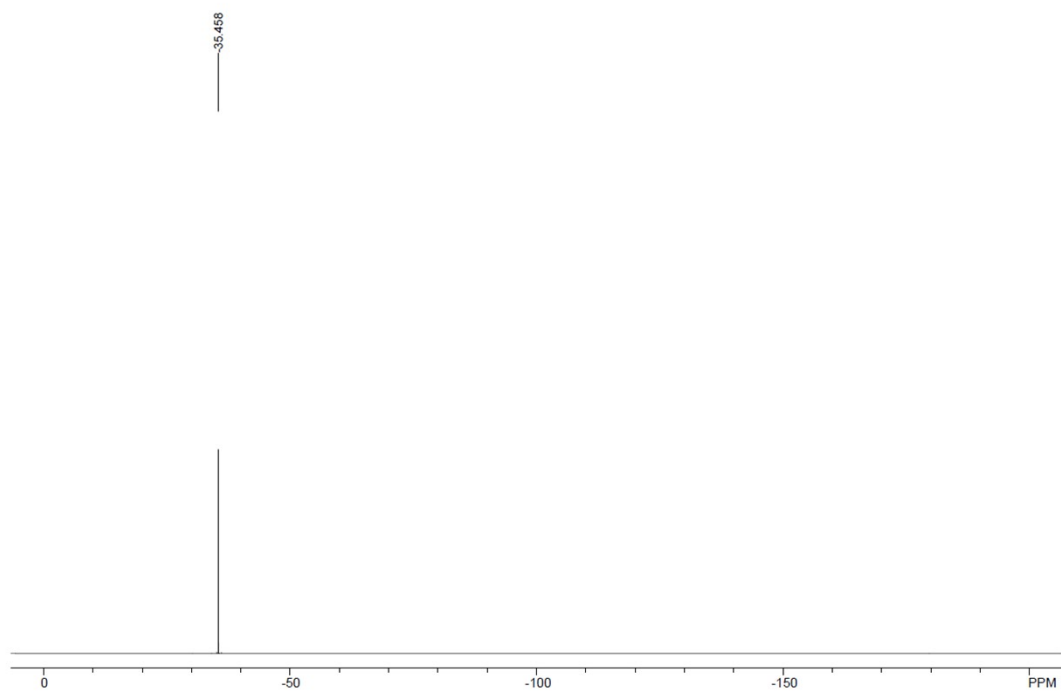
**7-chloro-3-((trifluoromethyl)selenanyl)-4*H*-chromen-4-one (2j)**



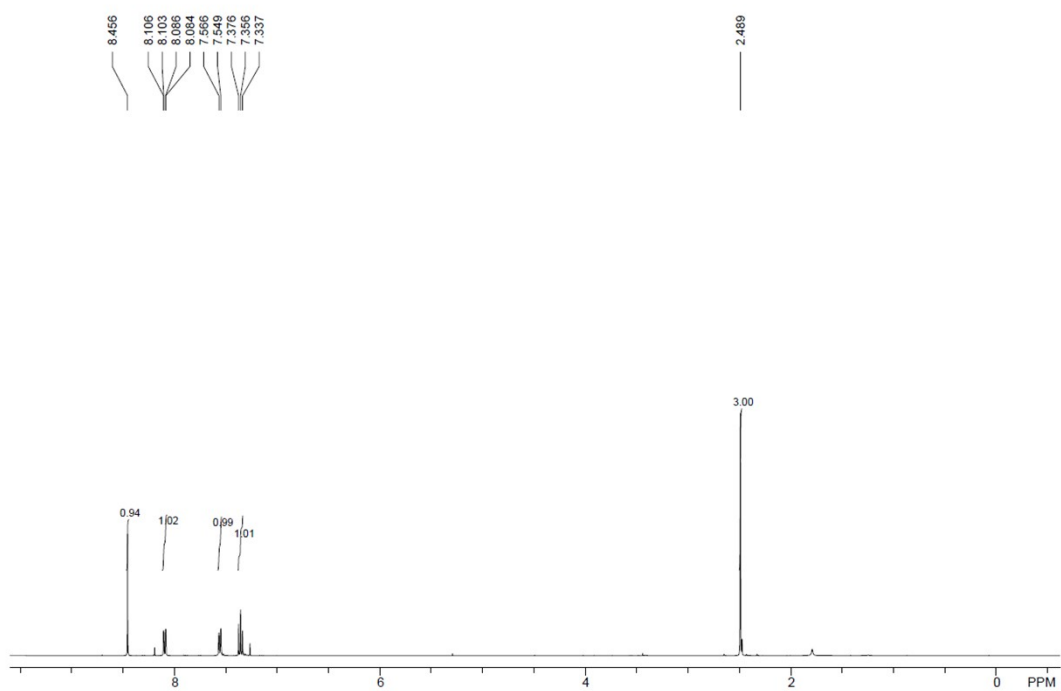


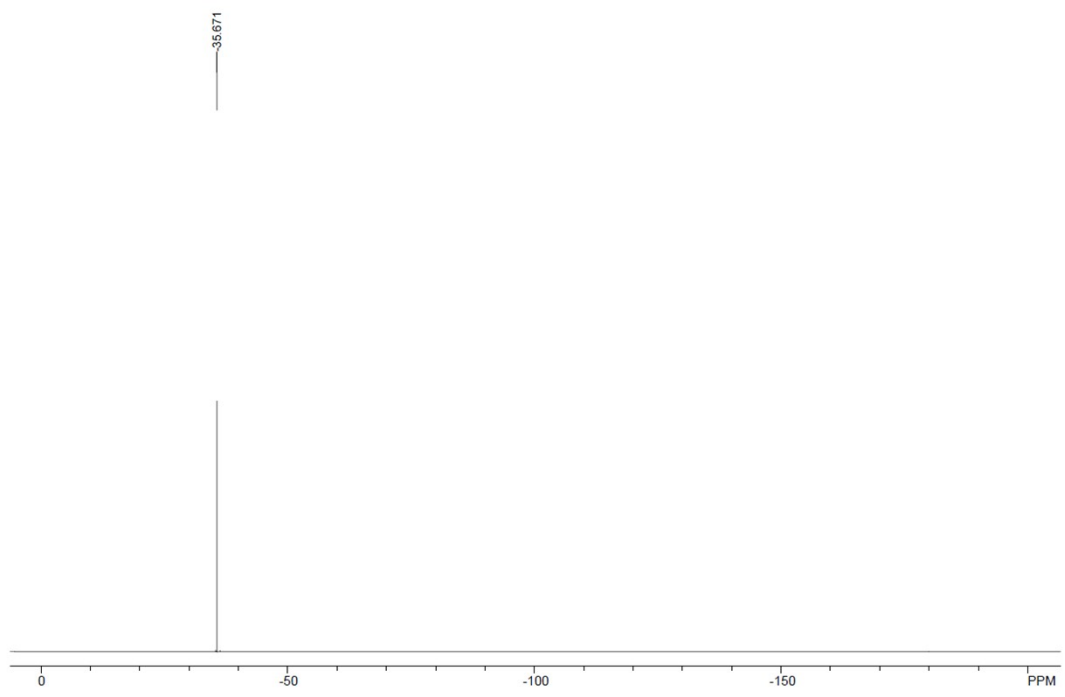
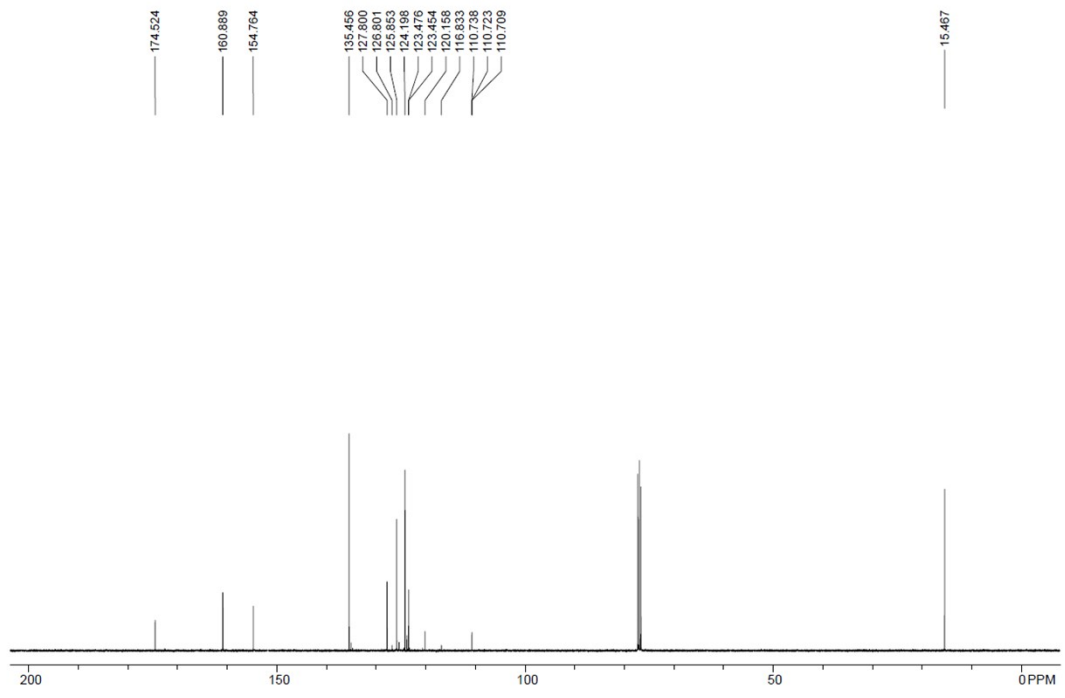
7-bromo-3-((trifluoromethyl)sulanyl)-4*H*-chromen-4-one (2k)



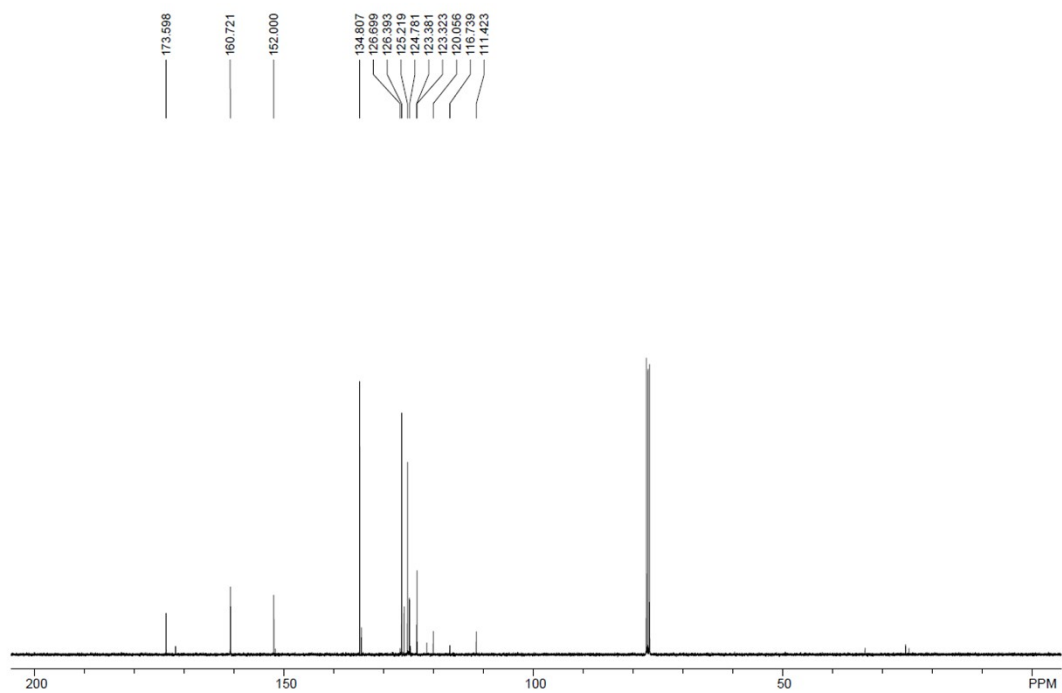
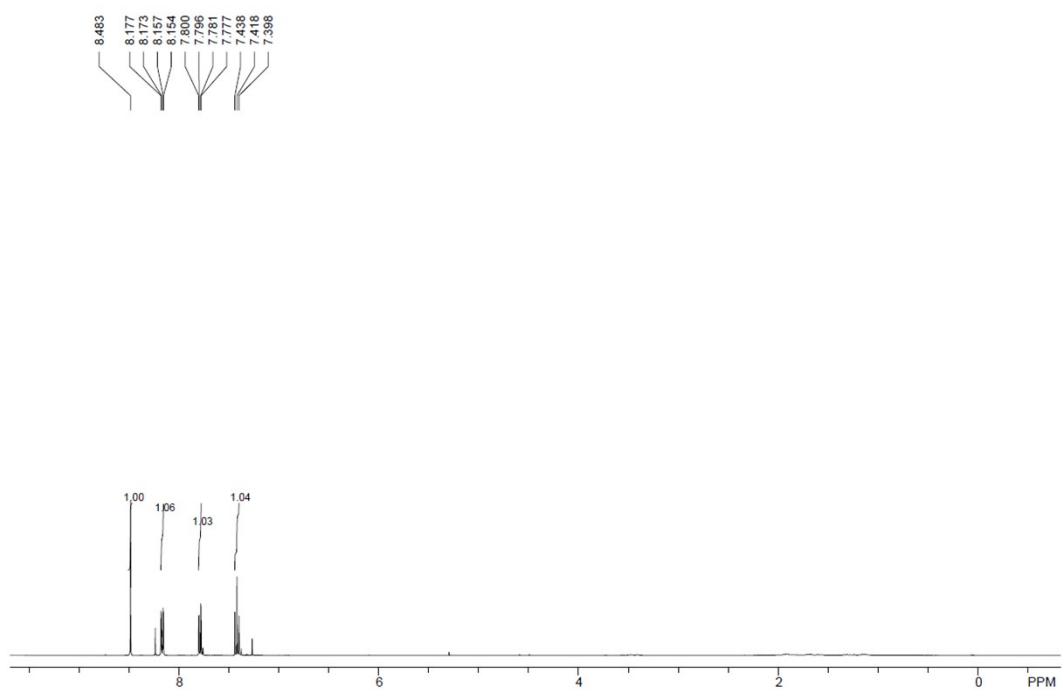


**8-methyl-3-((trifluoromethyl)selenanyl)-4H-chromen-4-one (2l)**

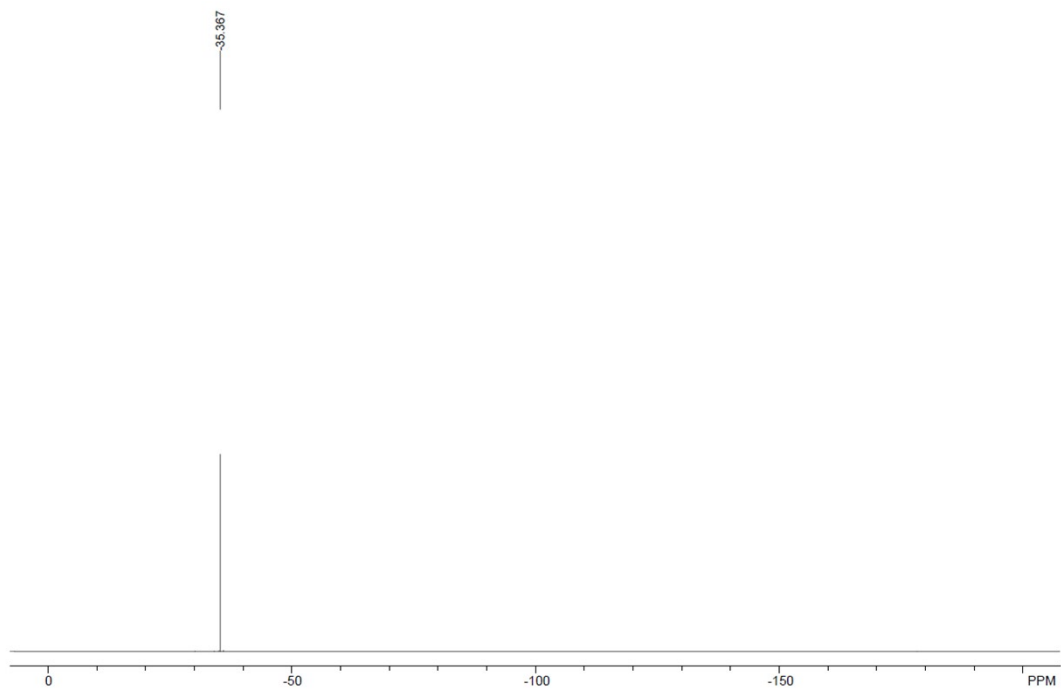




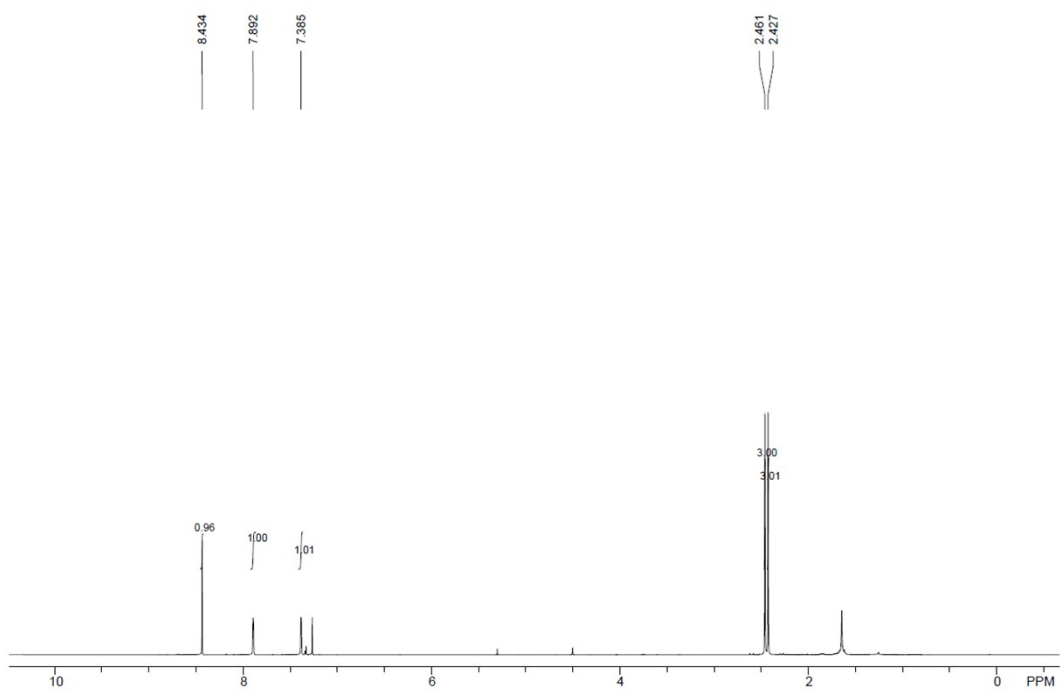
8-chloro-3-((trifluoromethyl)sulanyl)-4*H*-chromen-4-one (2m)

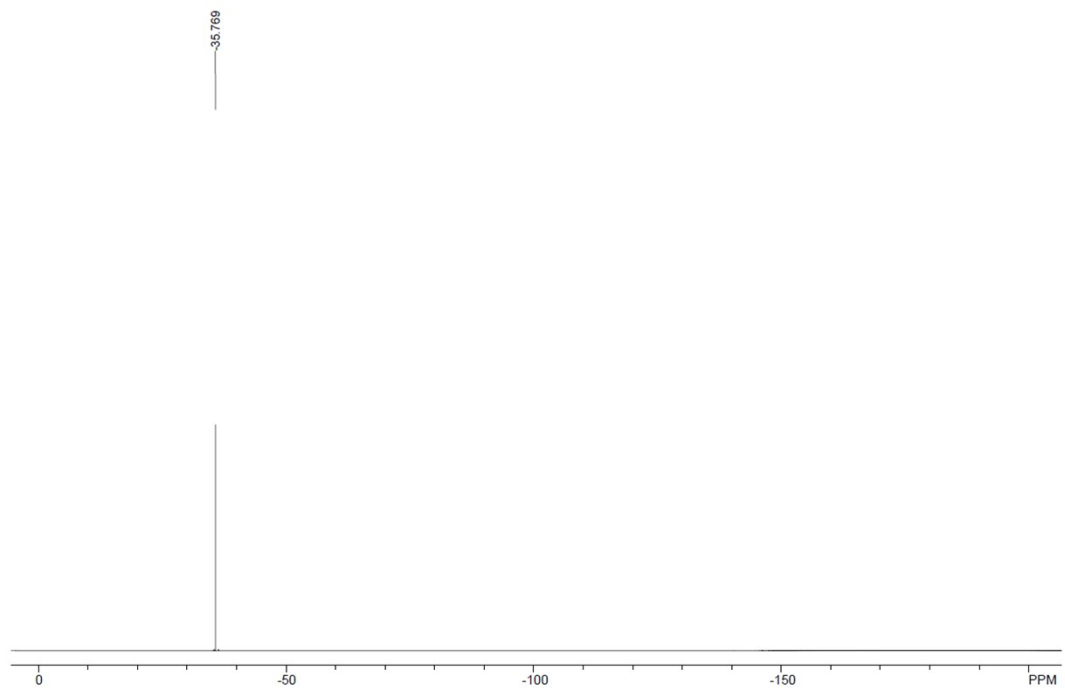
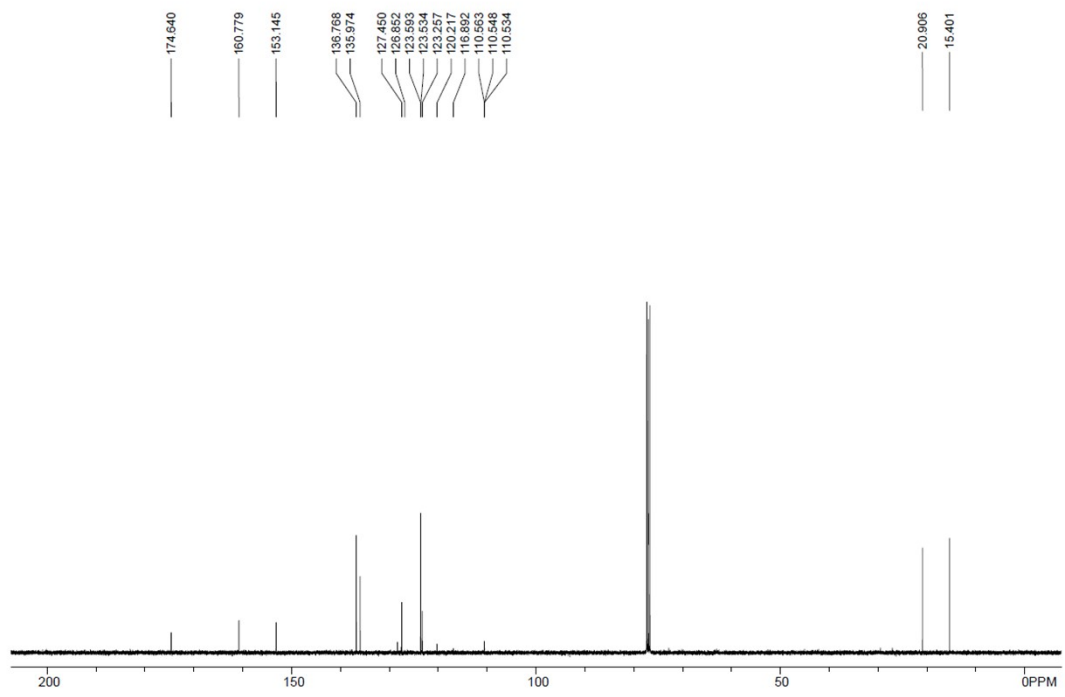




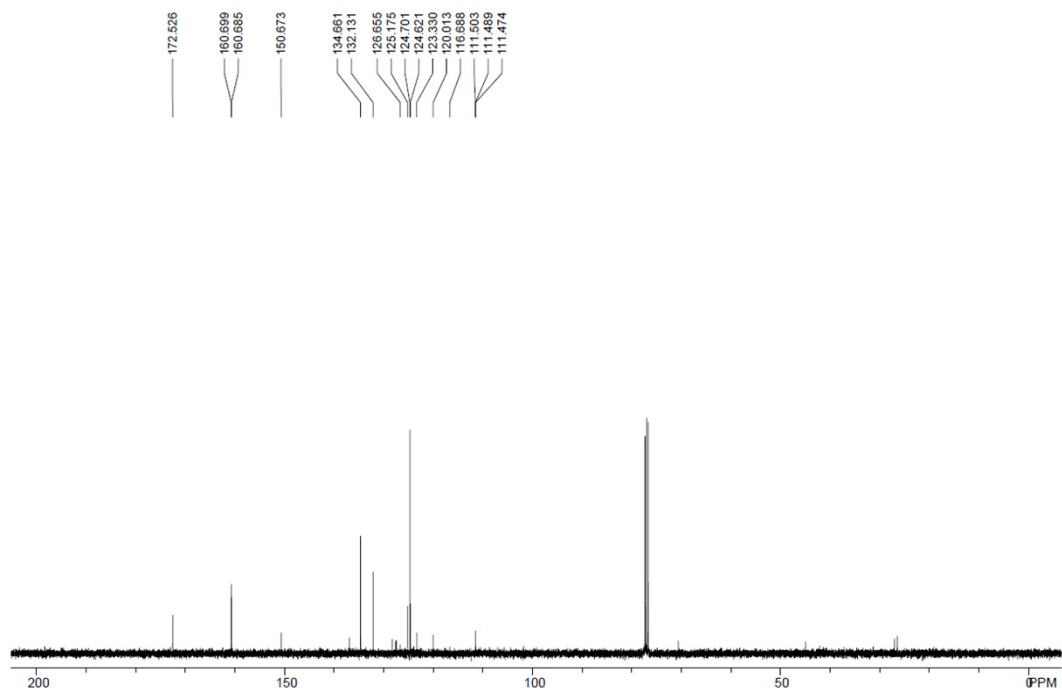
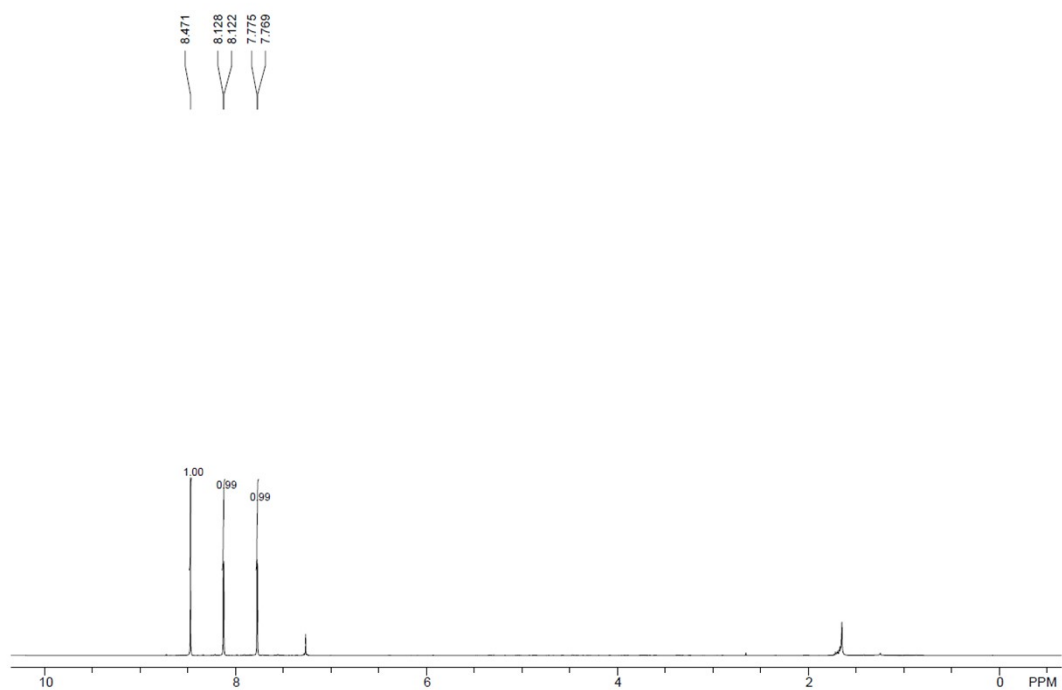


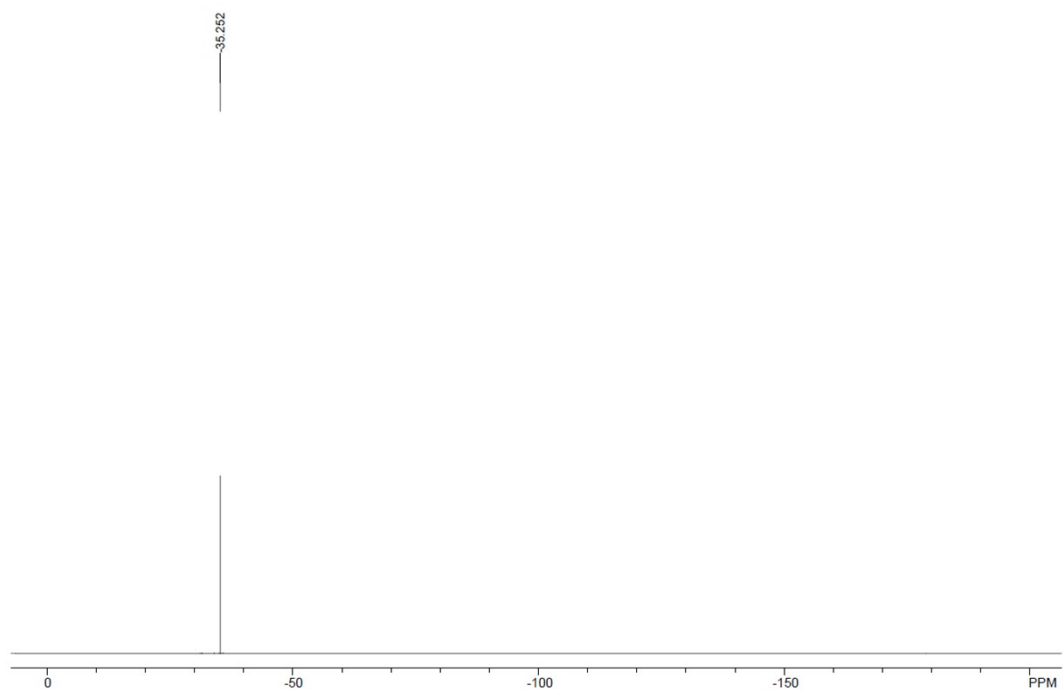
**6,8-dimethyl-3-((trifluoromethyl)sulanyl)-4H-chromen-4-one (2n)**



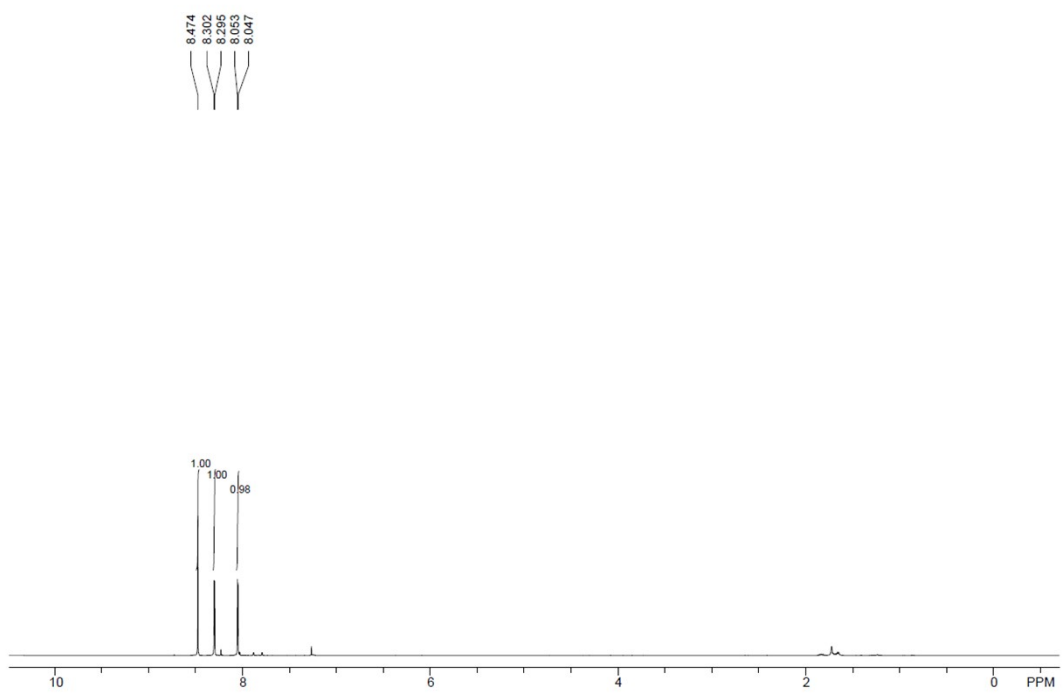


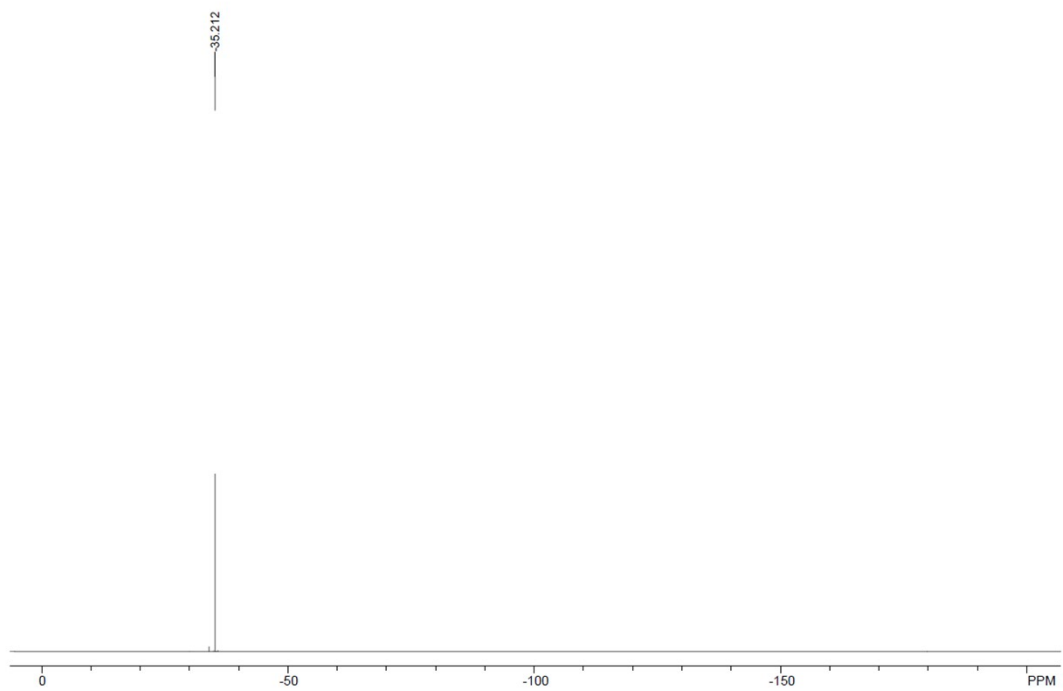
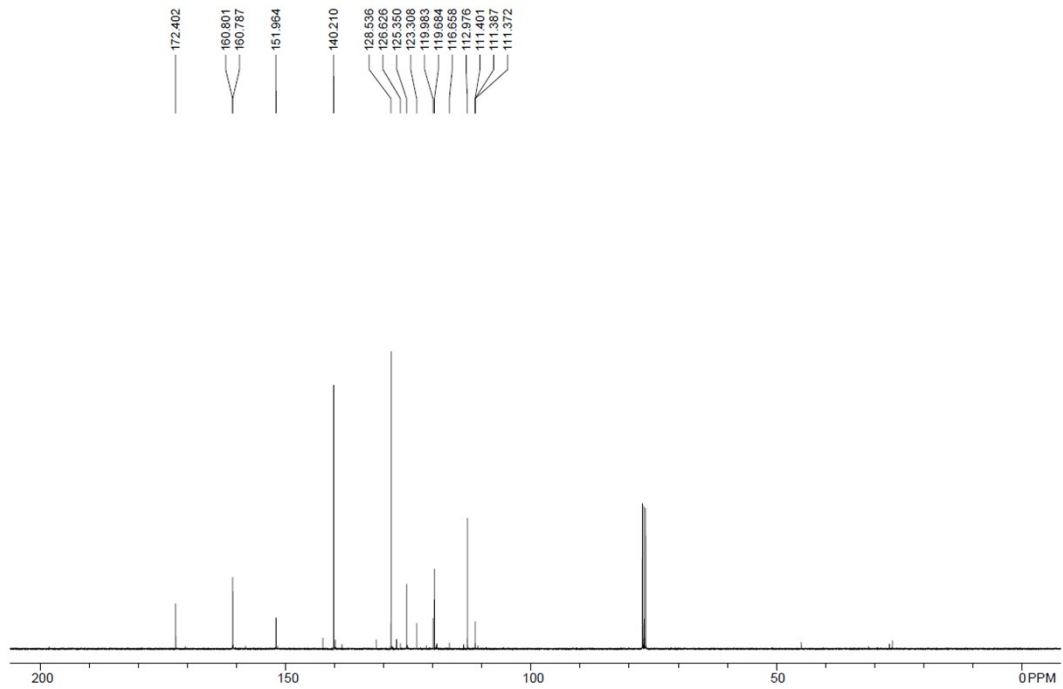
6,8-dichloro-3-((trifluoromethyl)sulanyl)-4H-chromen-4-one (2o)



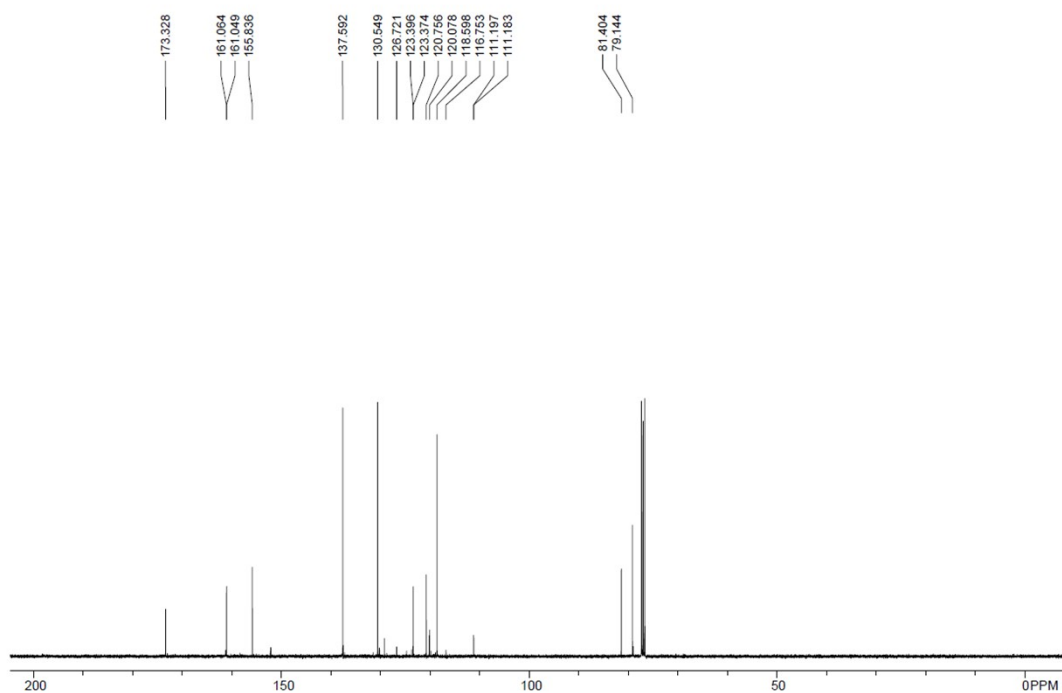
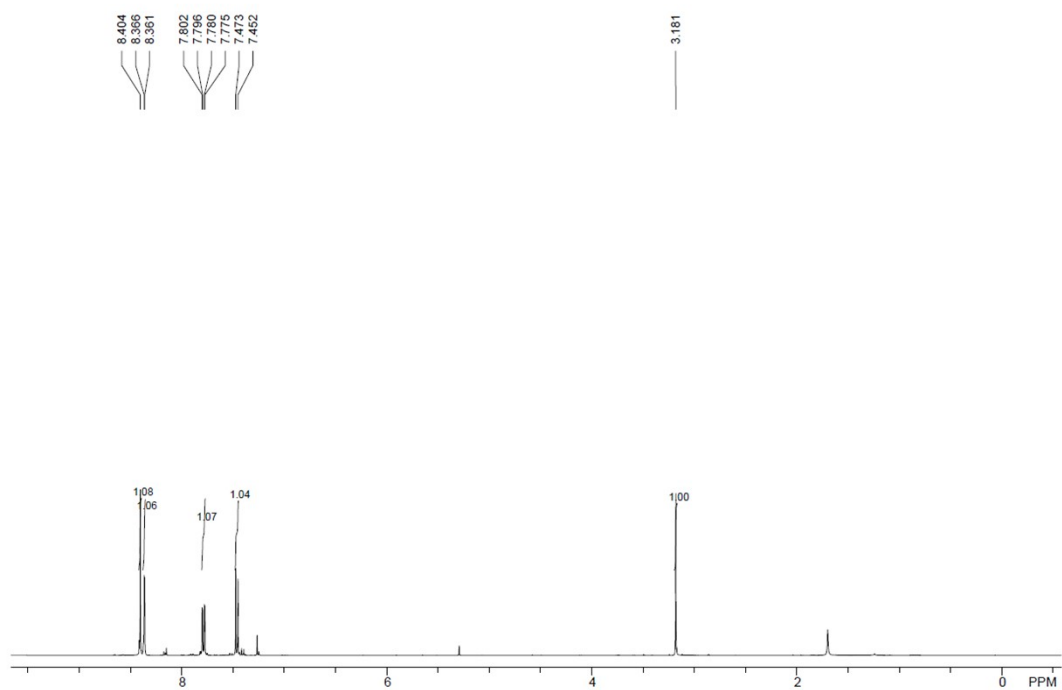


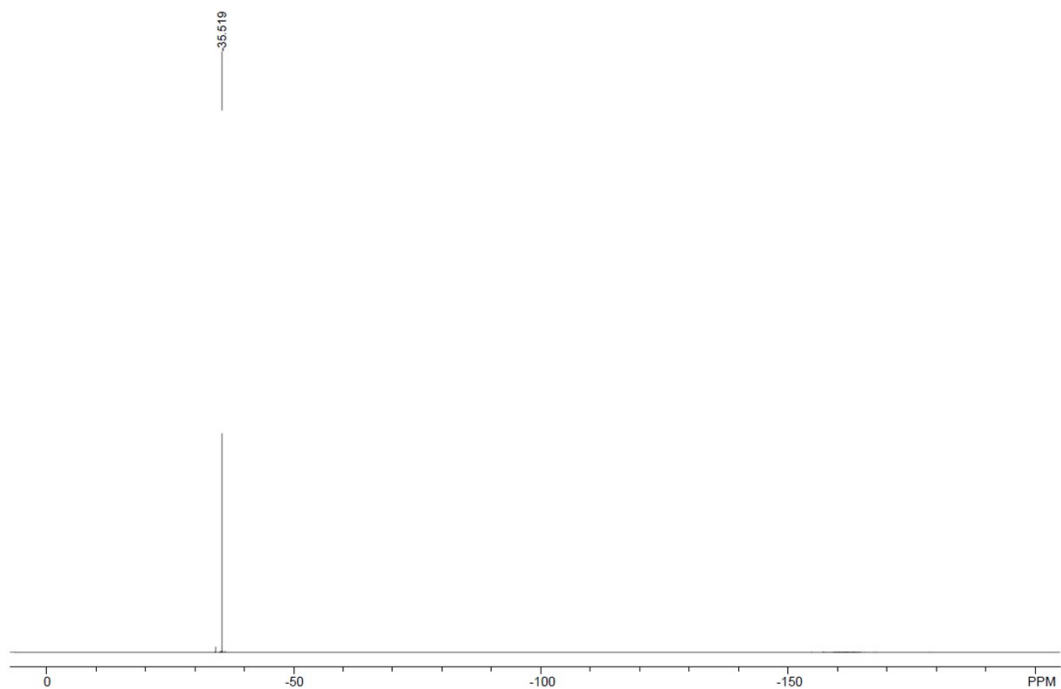
**6,8-dibromo-3-((trifluoromethyl)sulanyl)-4H-chromen-4-one (2p)**



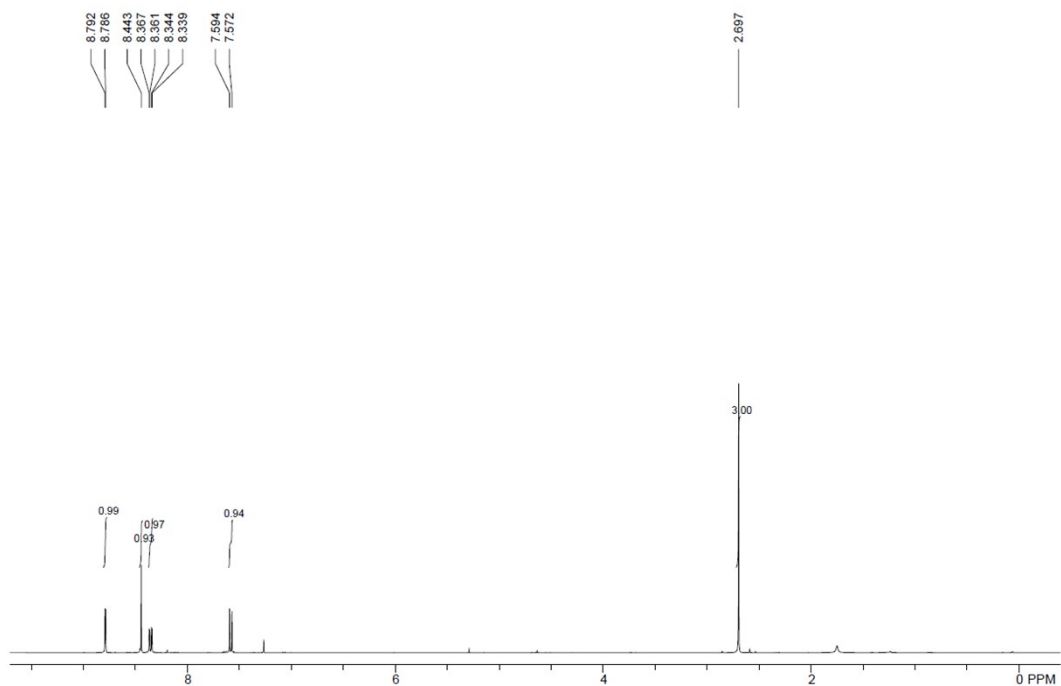


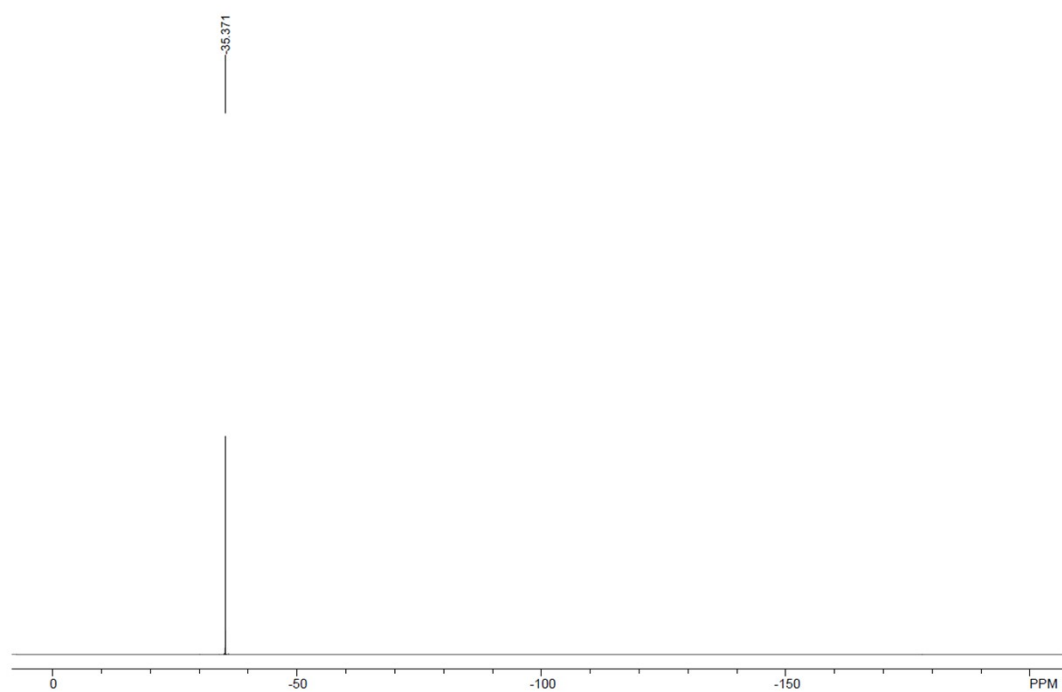
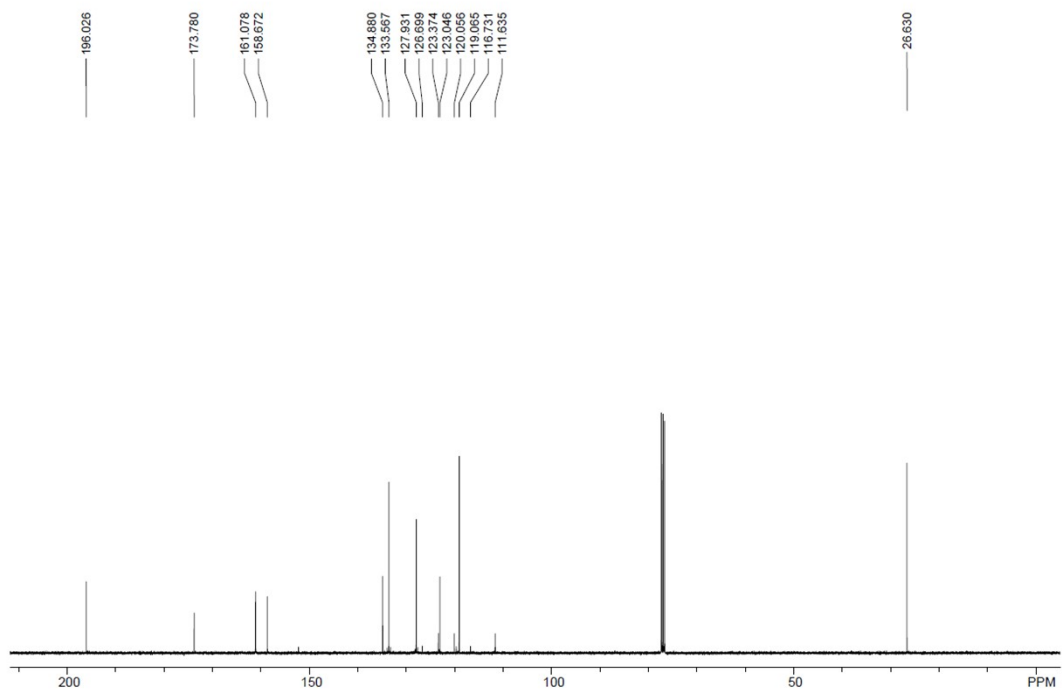
6-ethynyl-3-((trifluoromethyl)selenanyl)-4H-chromen-4-one (2q)





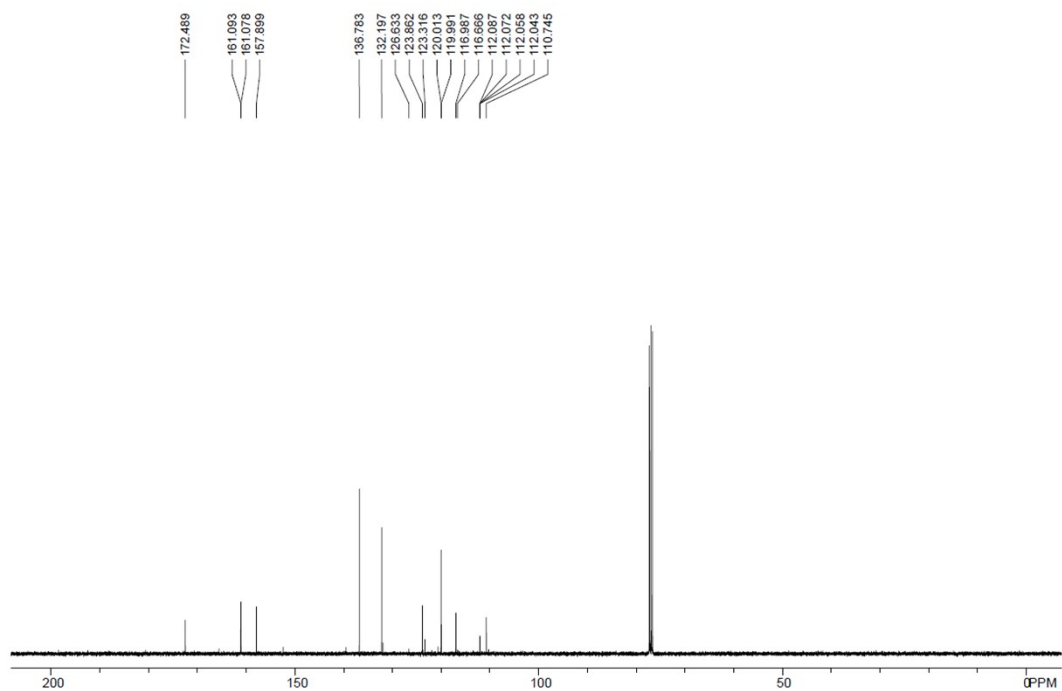
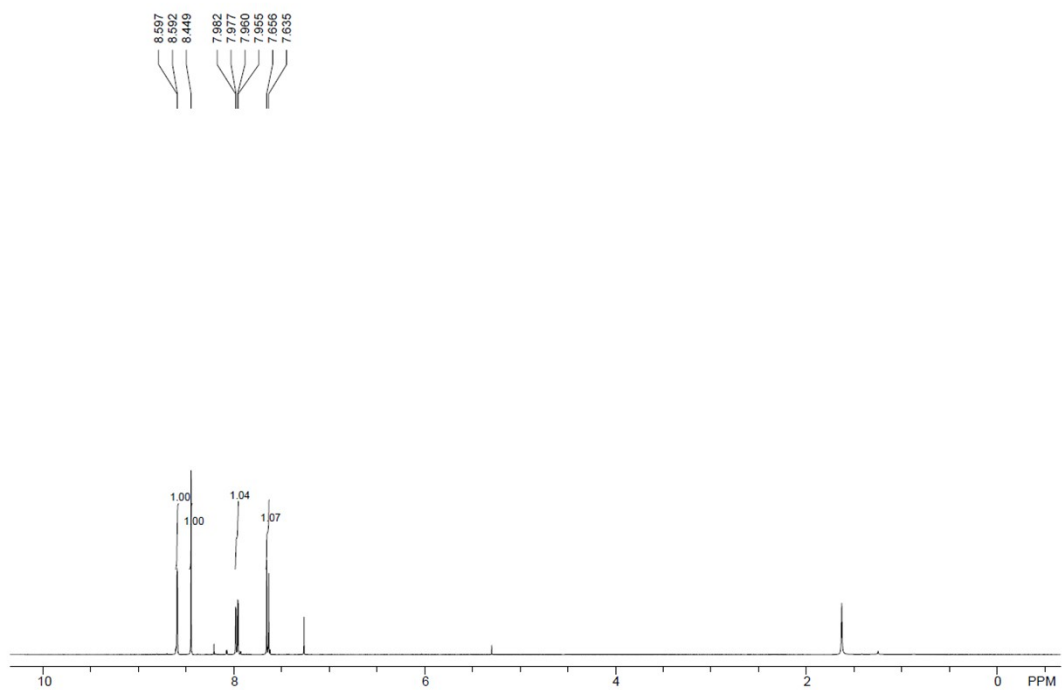
**6-acetyl-3-((trifluoromethyl)sulanyl)-4H-chromen-4-one (2r)**

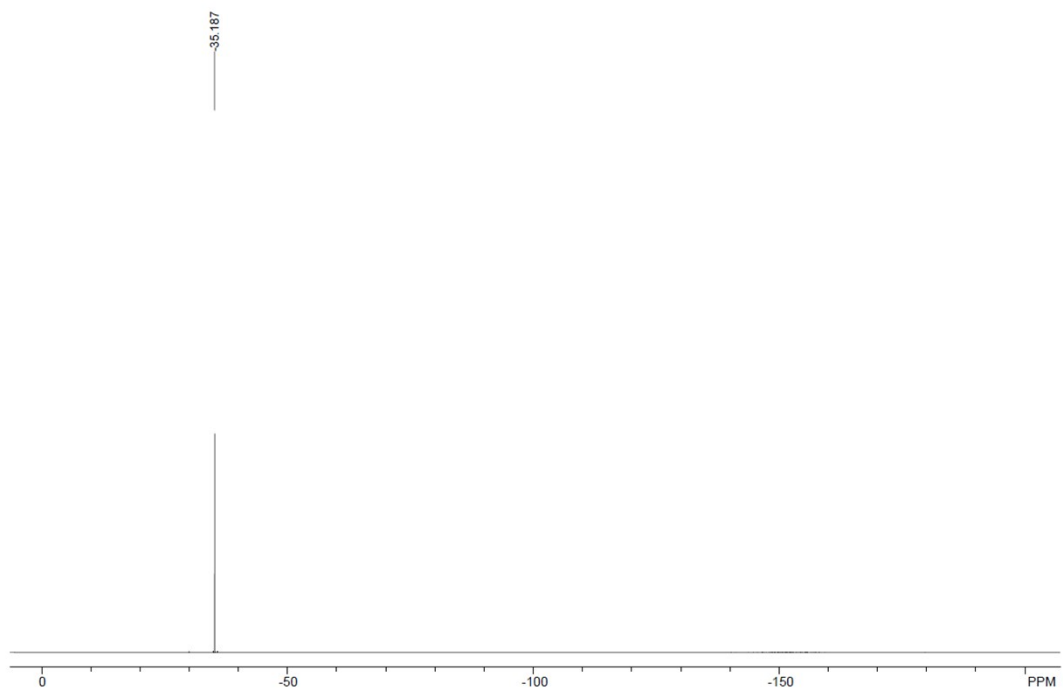




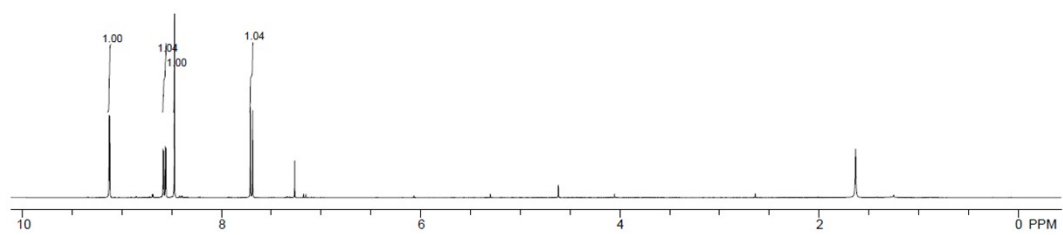
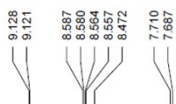


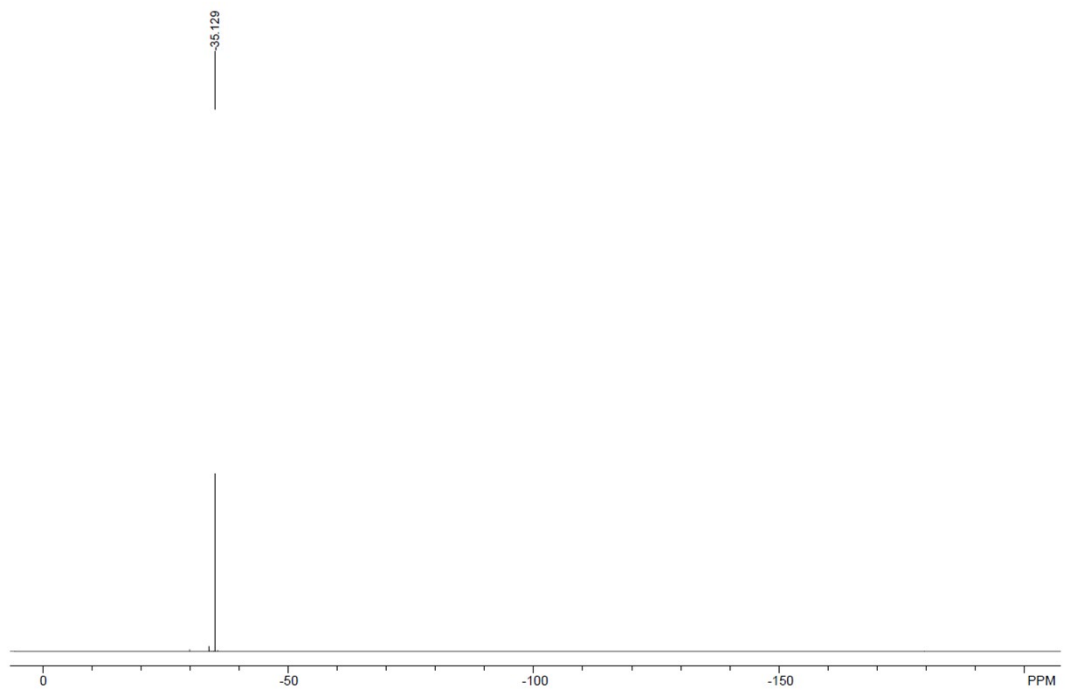
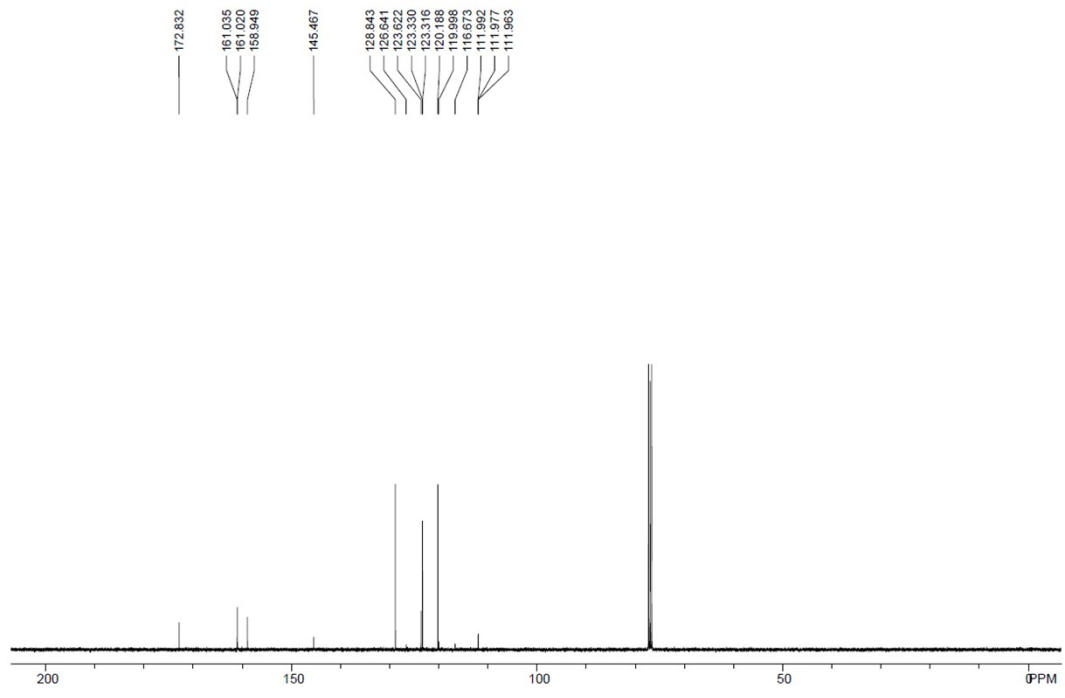
4-oxo-3-((trifluoromethyl)selanyl)-4*H*-chromene-6-carbonitrile (2s)



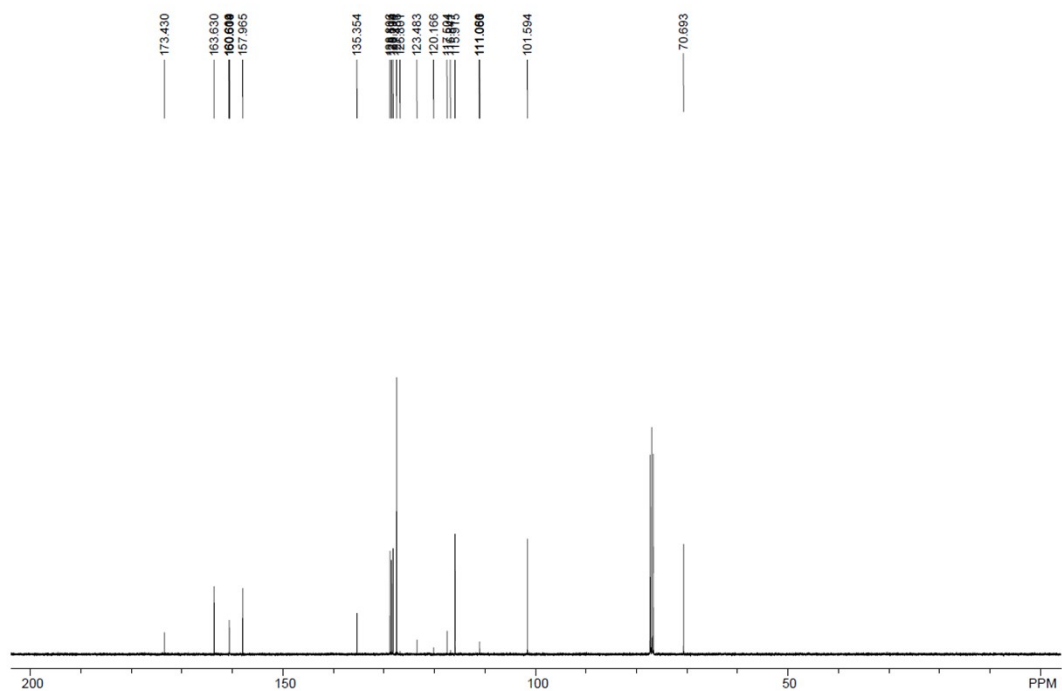
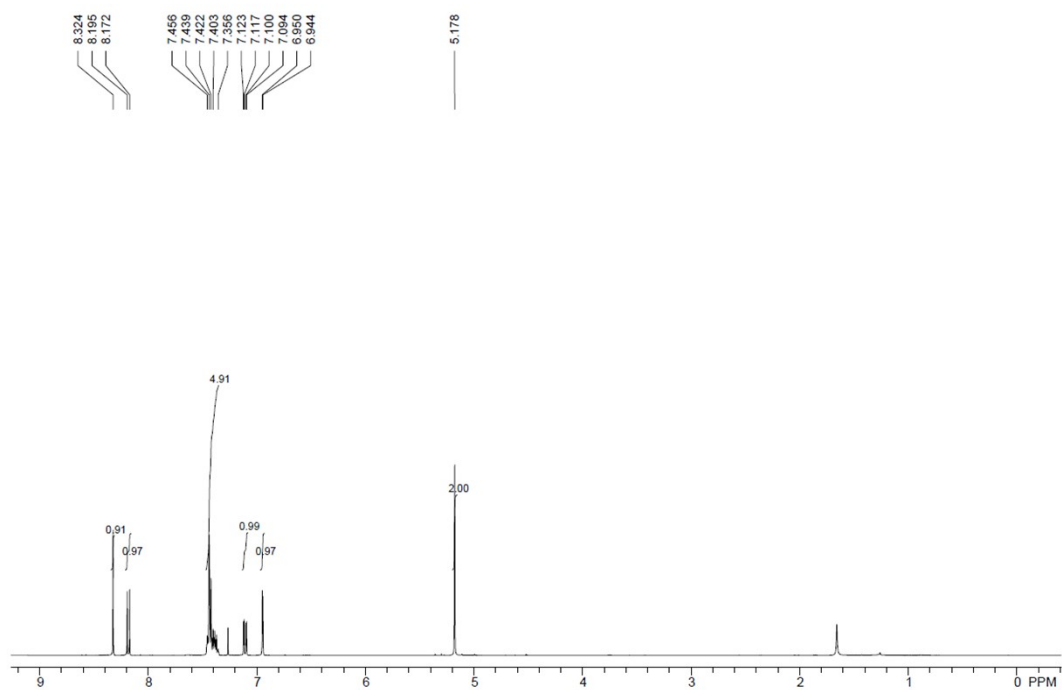


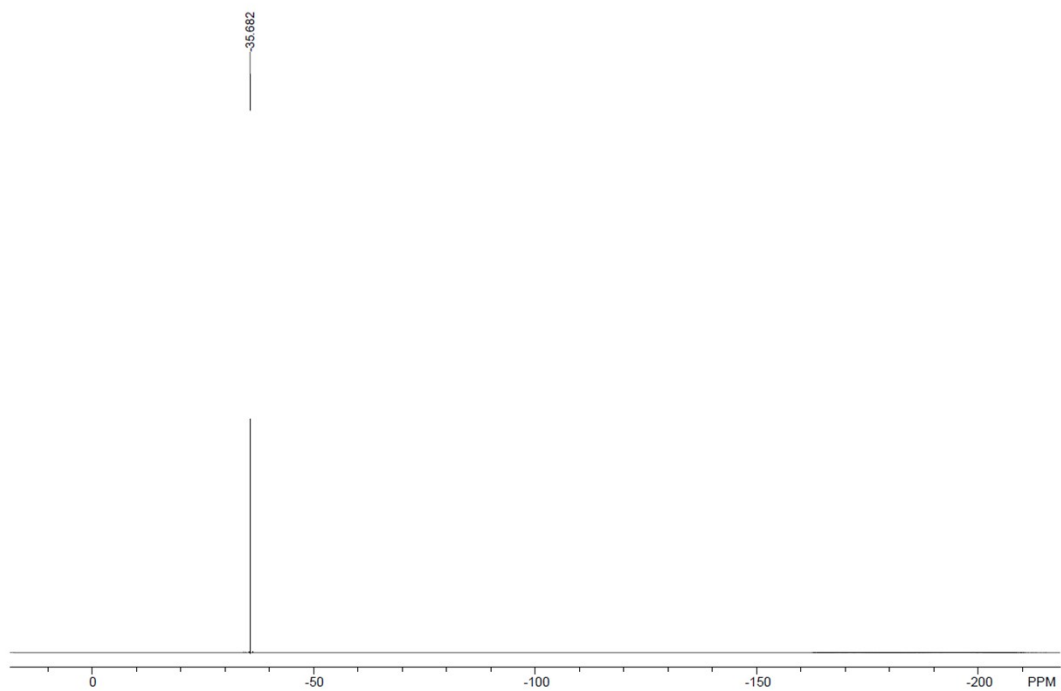
**6-nitro-3-((trifluoromethyl)sulanyl)-4H-chromen-4-one (2t)**



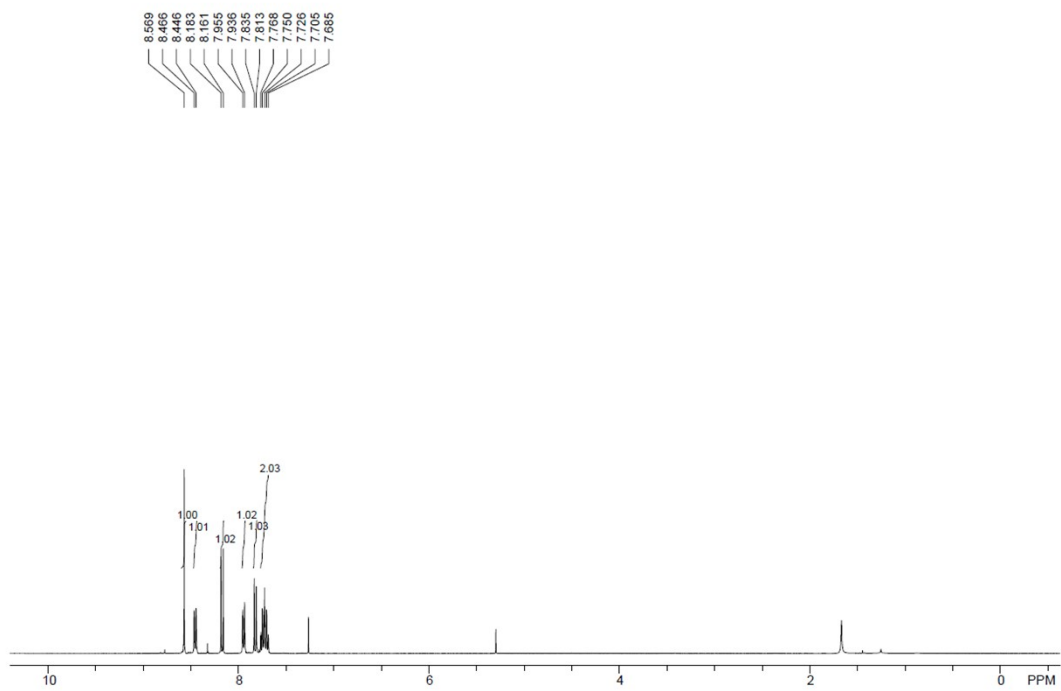


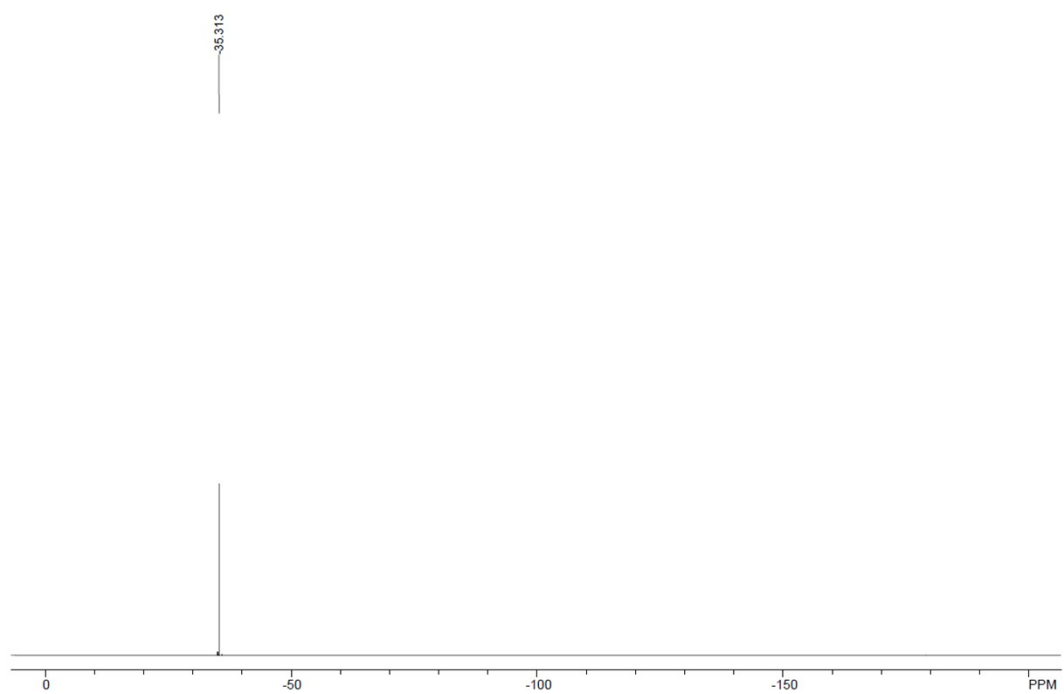
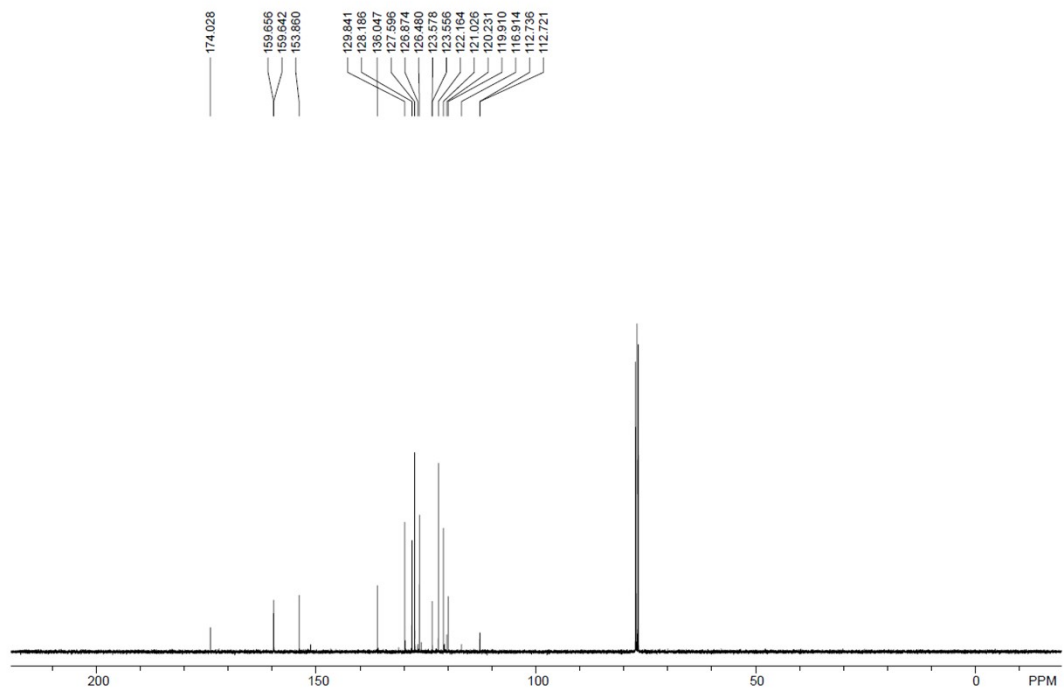
7-(benzyloxy)-3-((trifluoromethyl)sulanyl)-4*H*-chromen-4-one (2u)



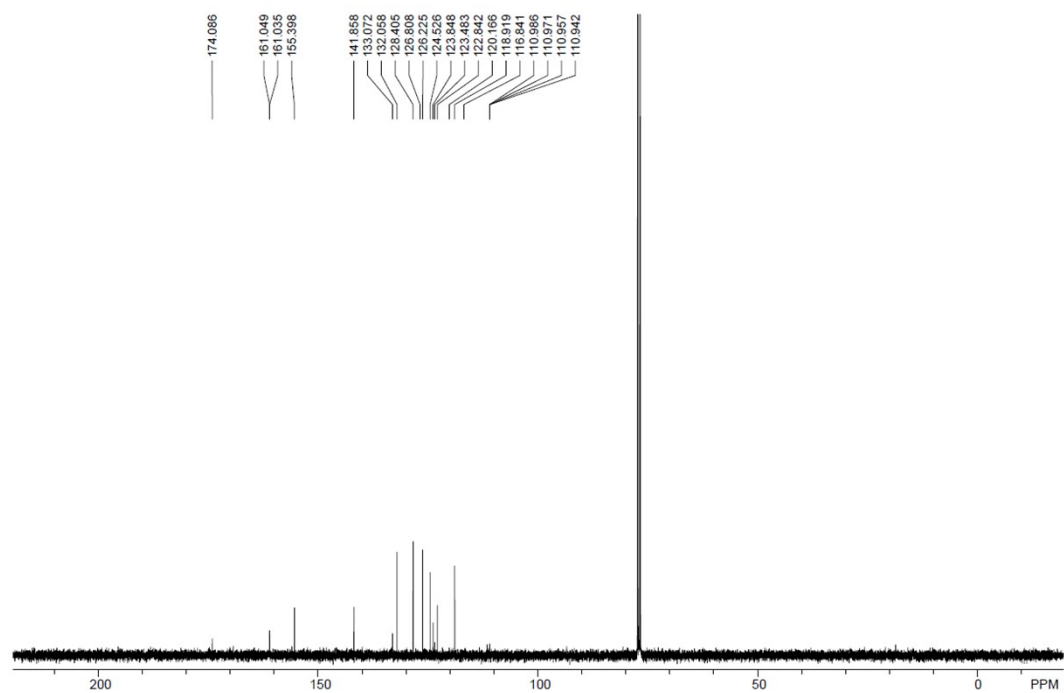
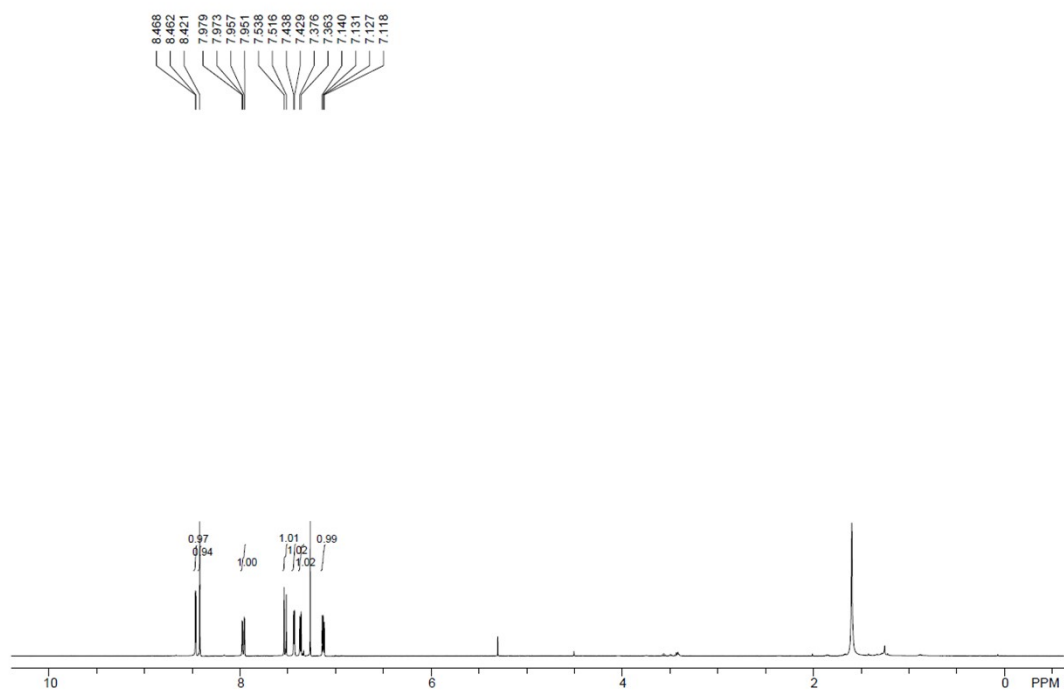


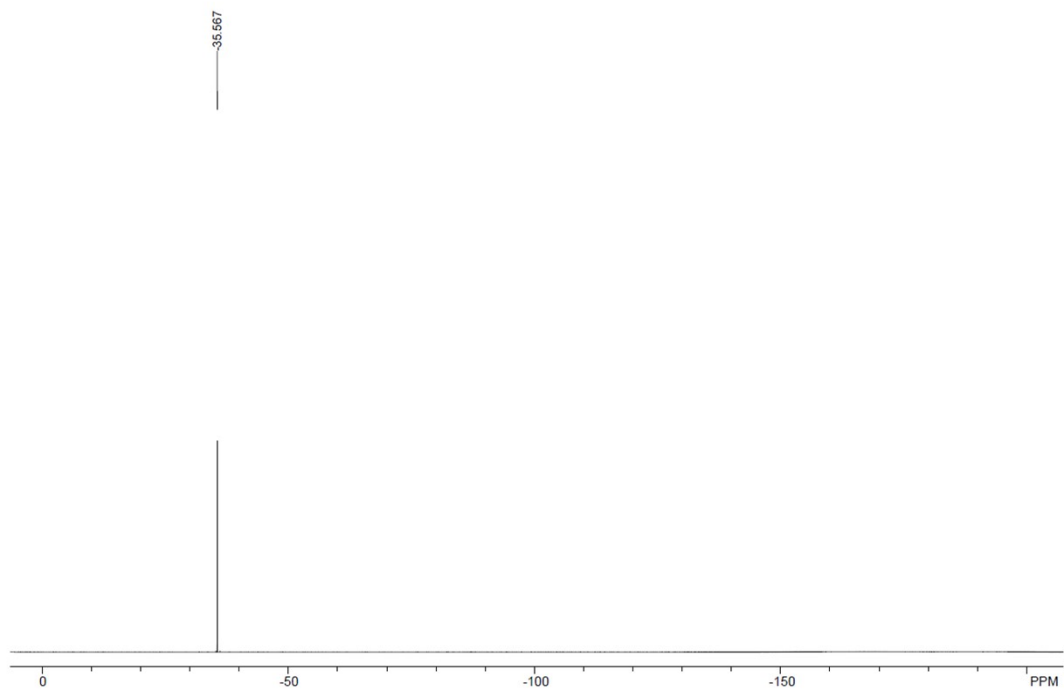
**3-((trifluoromethyl)selenanyl)-4*H*-benzo[*h*]chromen-4-one (2v)**



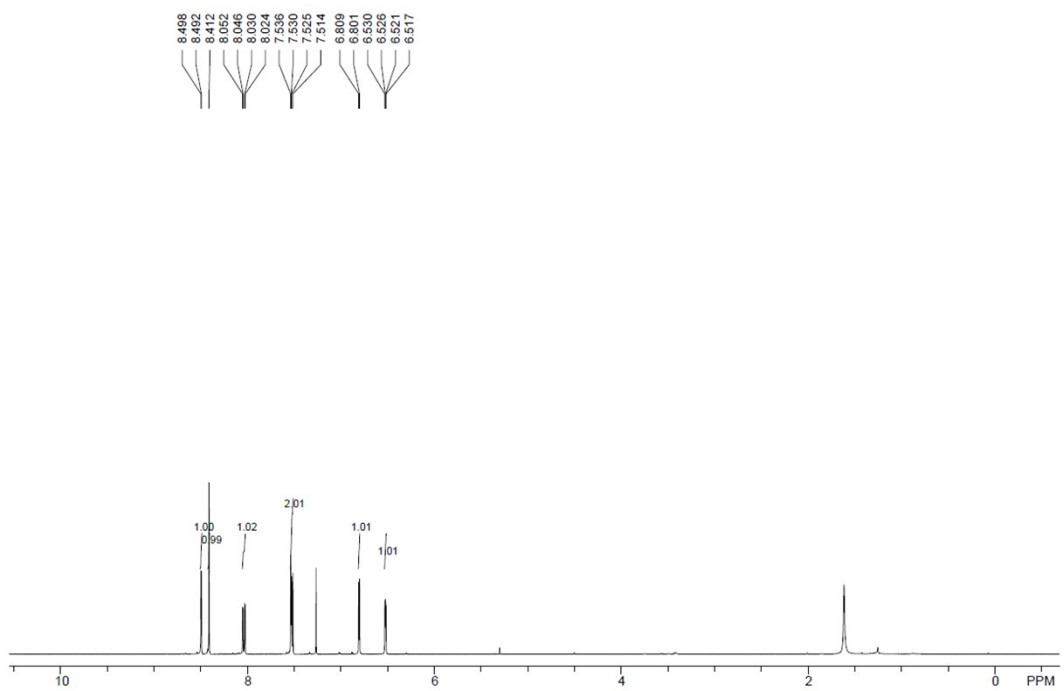


6-(thiophen-2-yl)-3-((trifluoromethyl)sulanyl)-4H-chromen-4-one (2w)

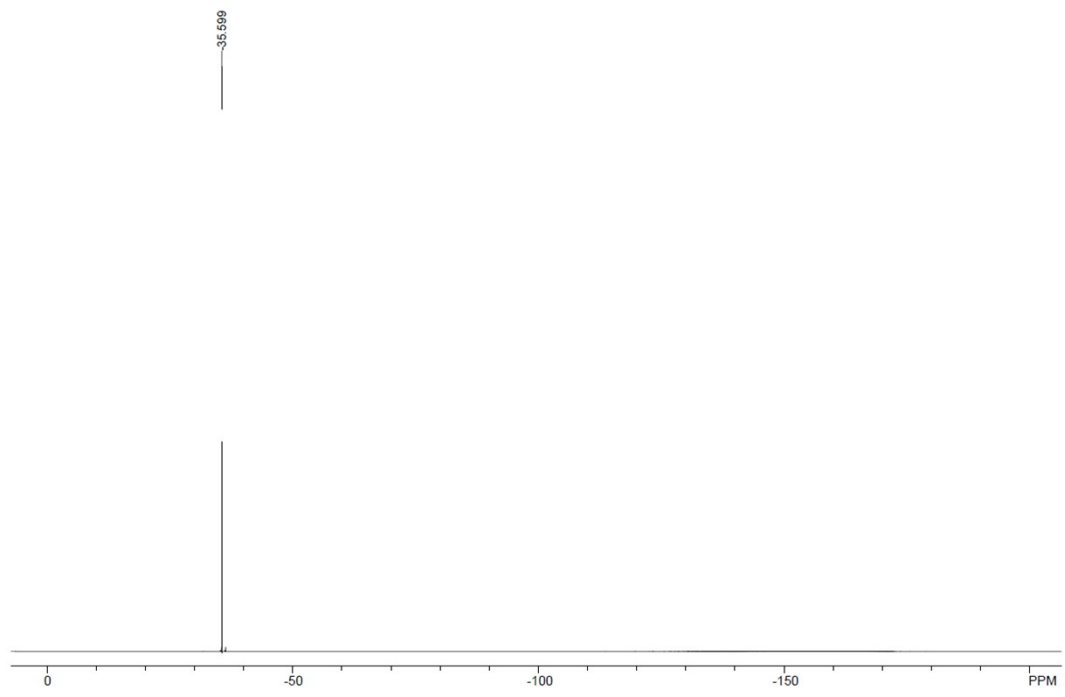
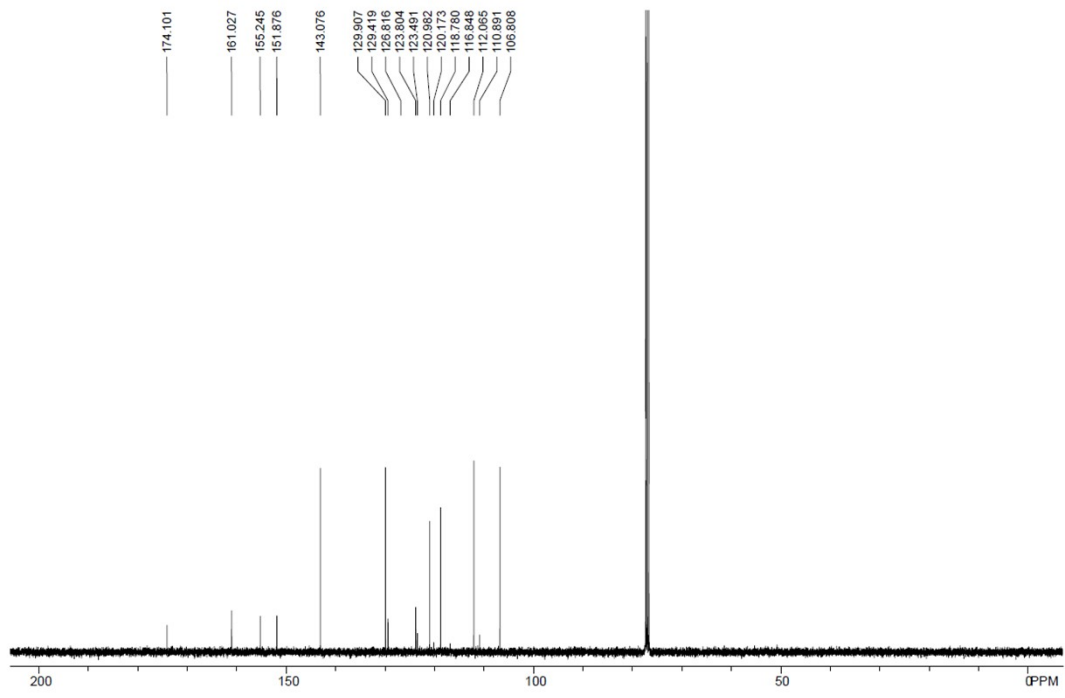




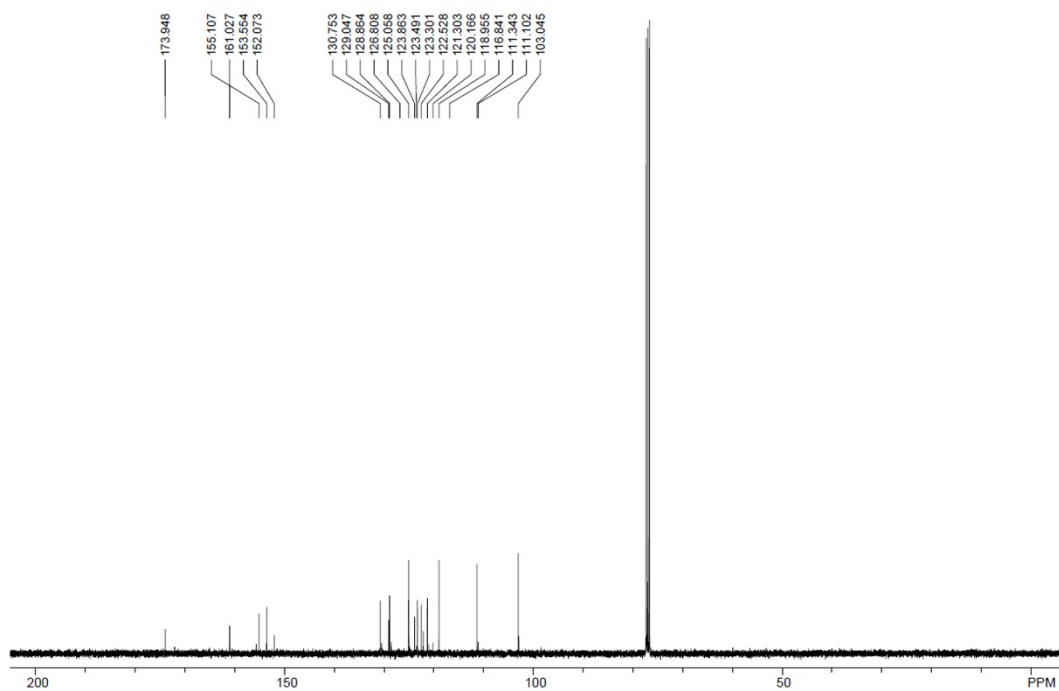
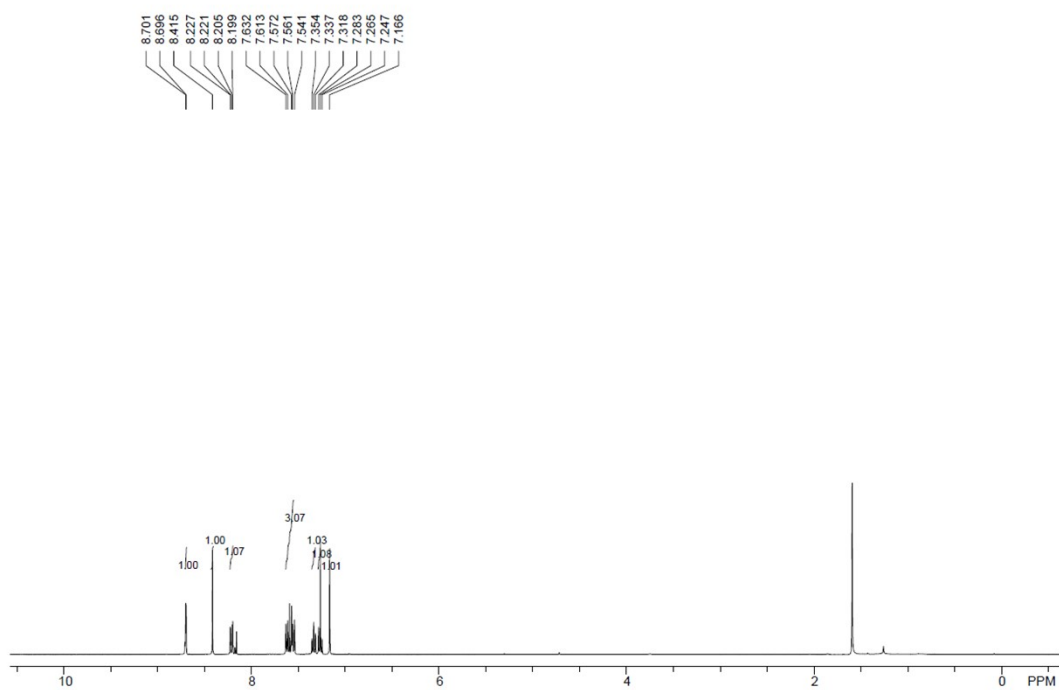
**6-(furan-2-yl)-3-((trifluoromethyl)sulanyl)-4*H*-chromen-4-one (2x)**

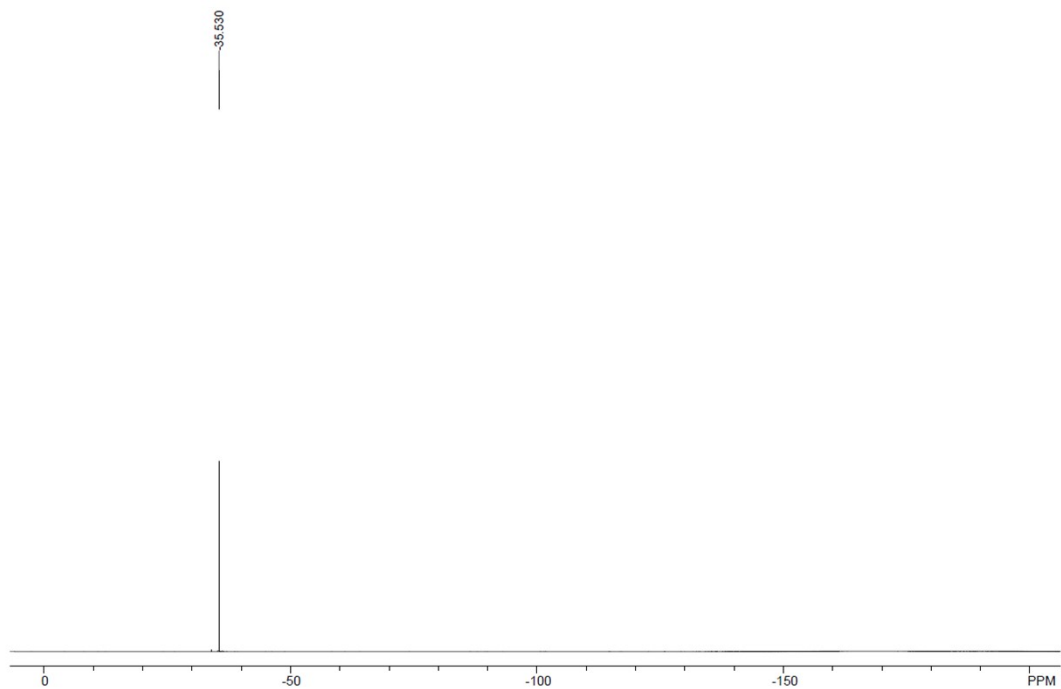




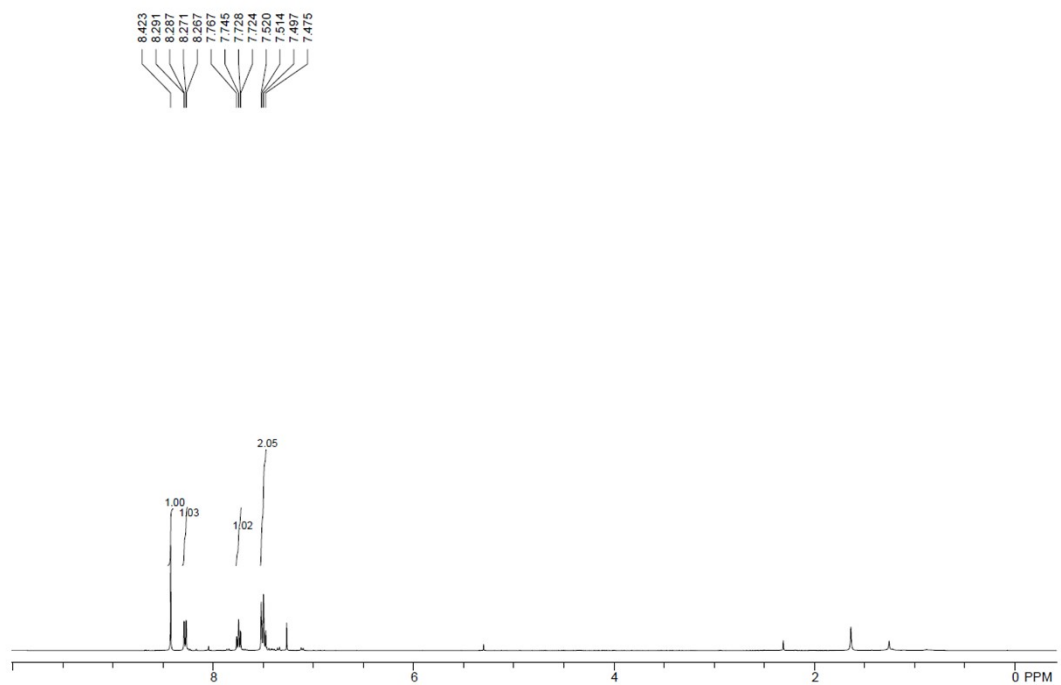


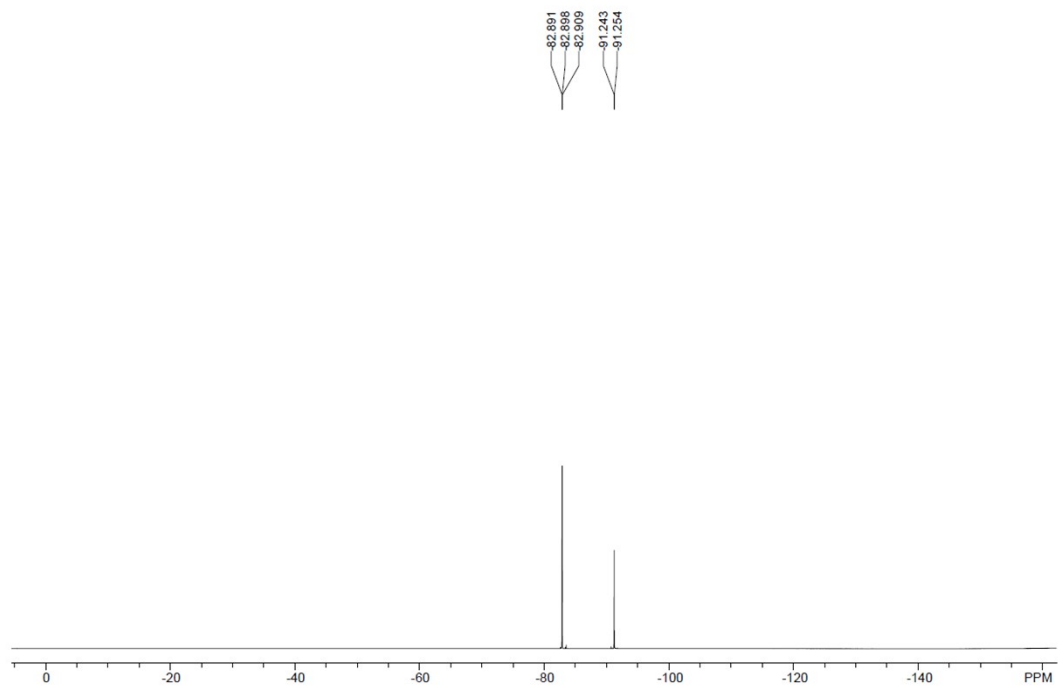
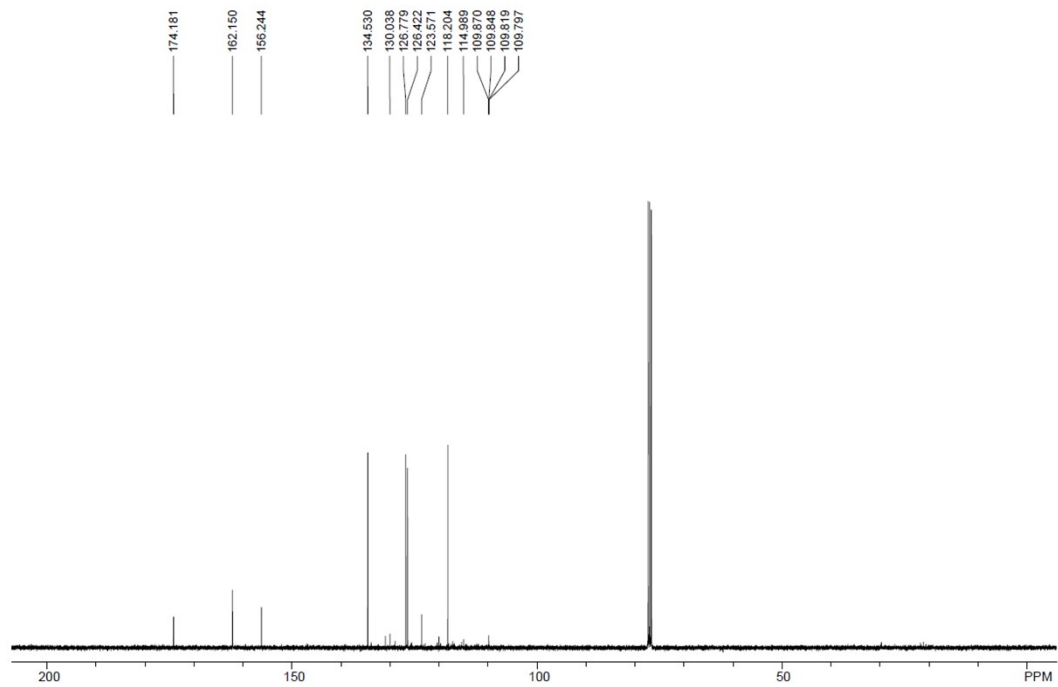
6-(benzofuran-2-yl)-3-((trifluoromethyl)sulanyl)-4H-chromen-4-one (2y)



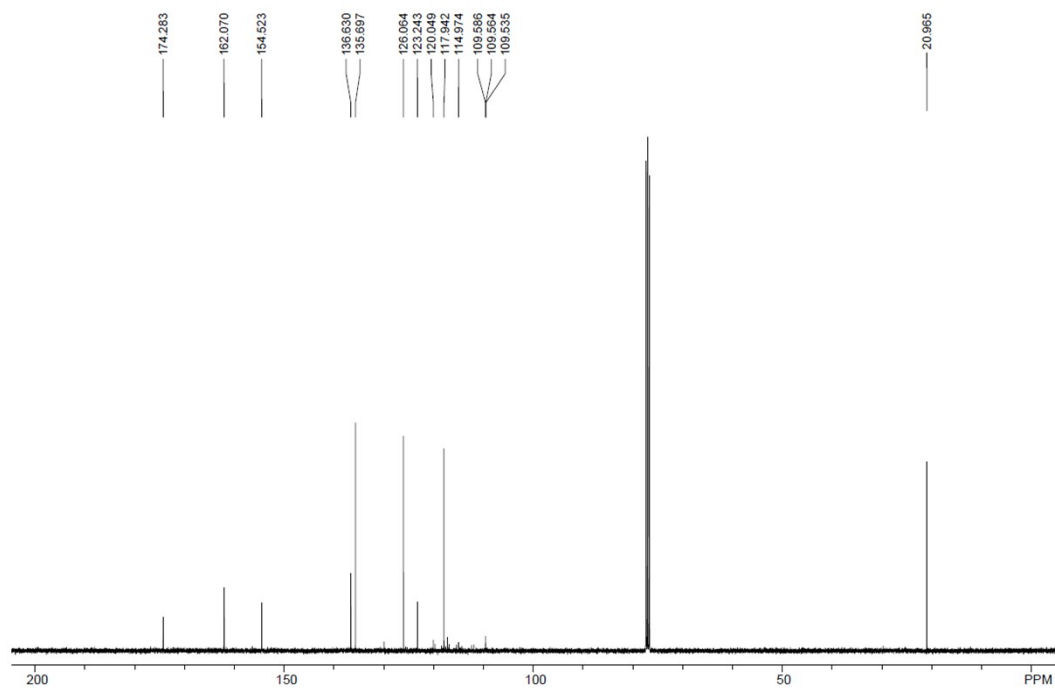
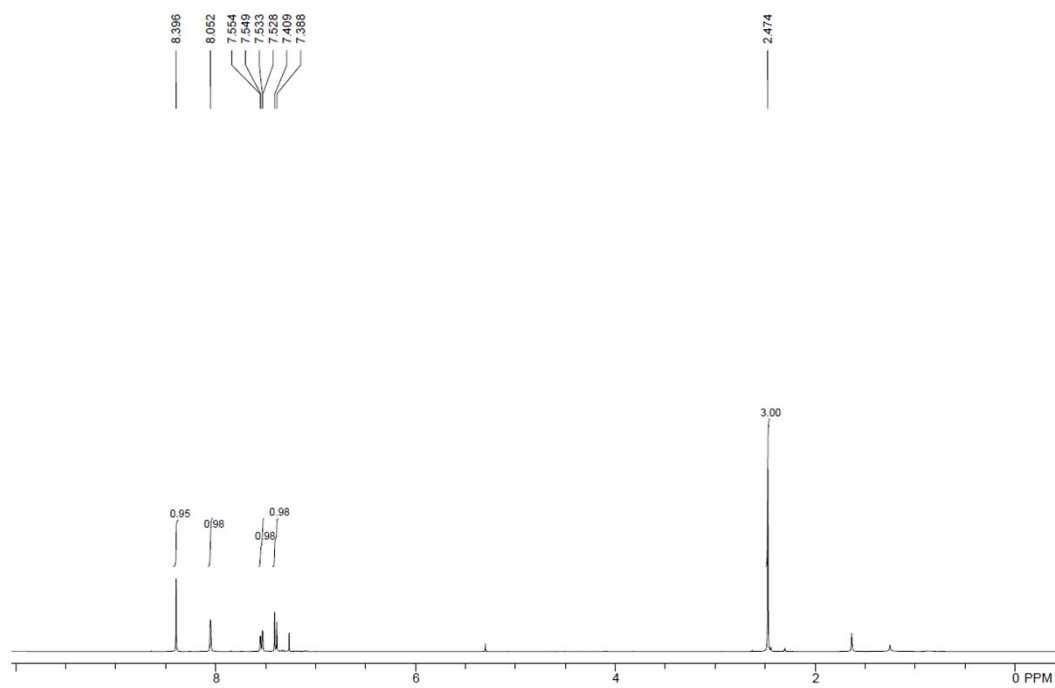


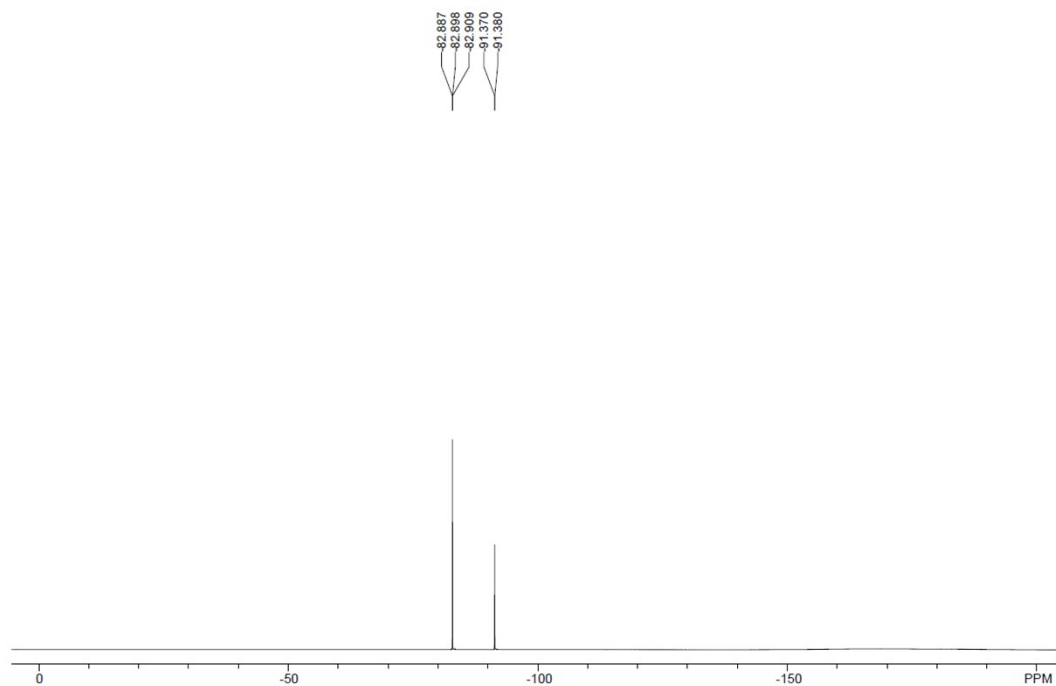
**3-((perfluoroethyl)selenanyl)-4*H*-chromen-4-one (3a)**





**6-methyl-3-((perfluoroethyl)selenyl)-4*H*-chromen-4-one (3b)**





**6-methoxy-3-((perfluoroethyl)selenanyl)-4*H*-chromen-4-one (3c)**

