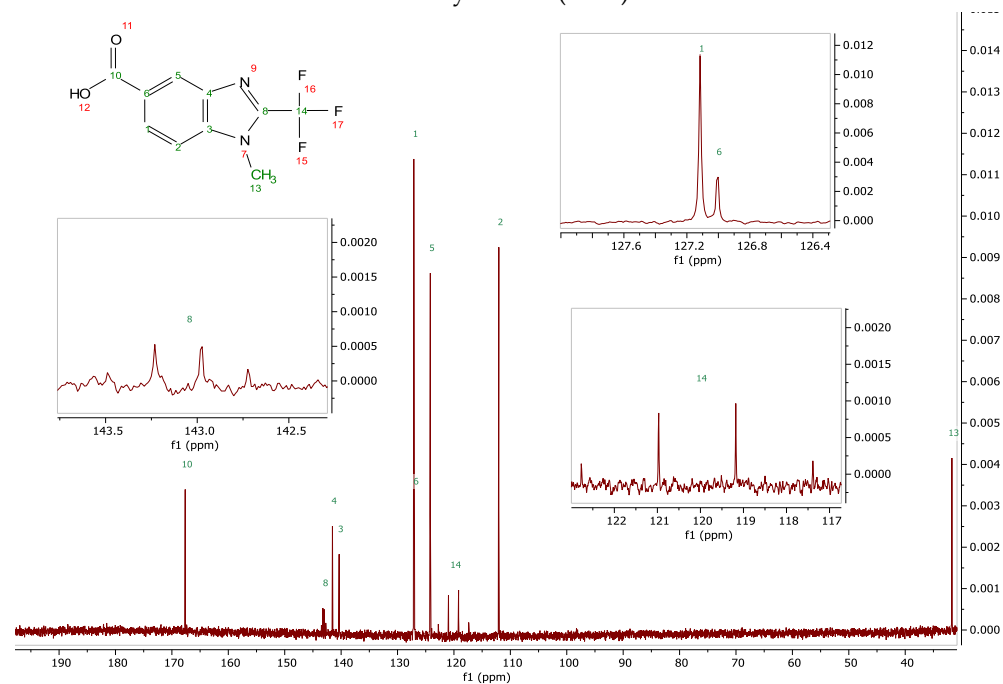
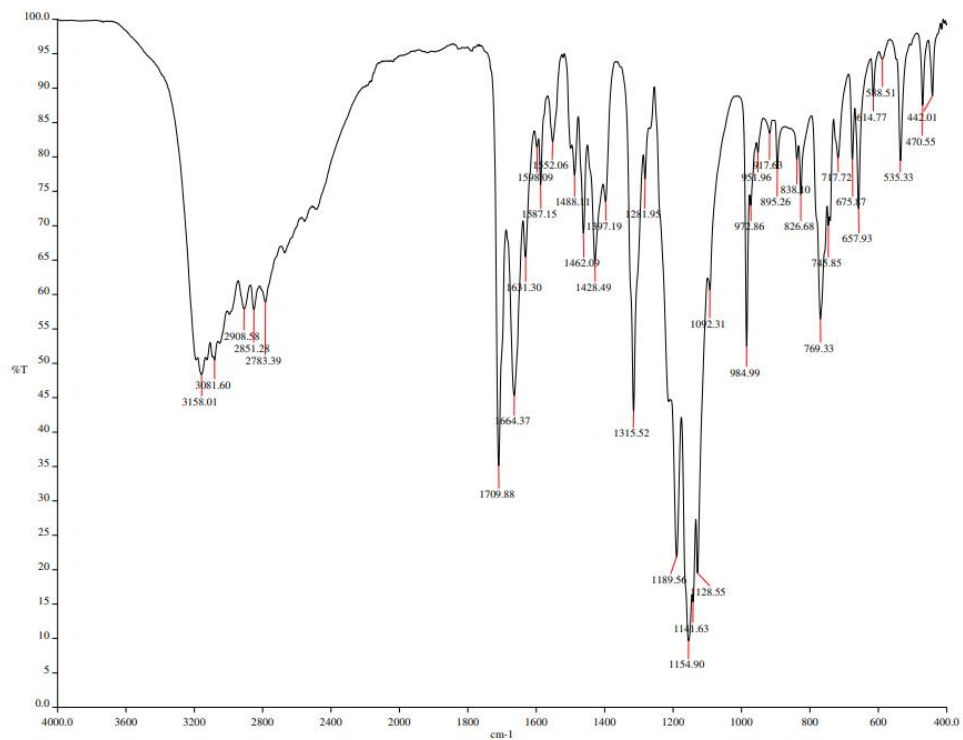


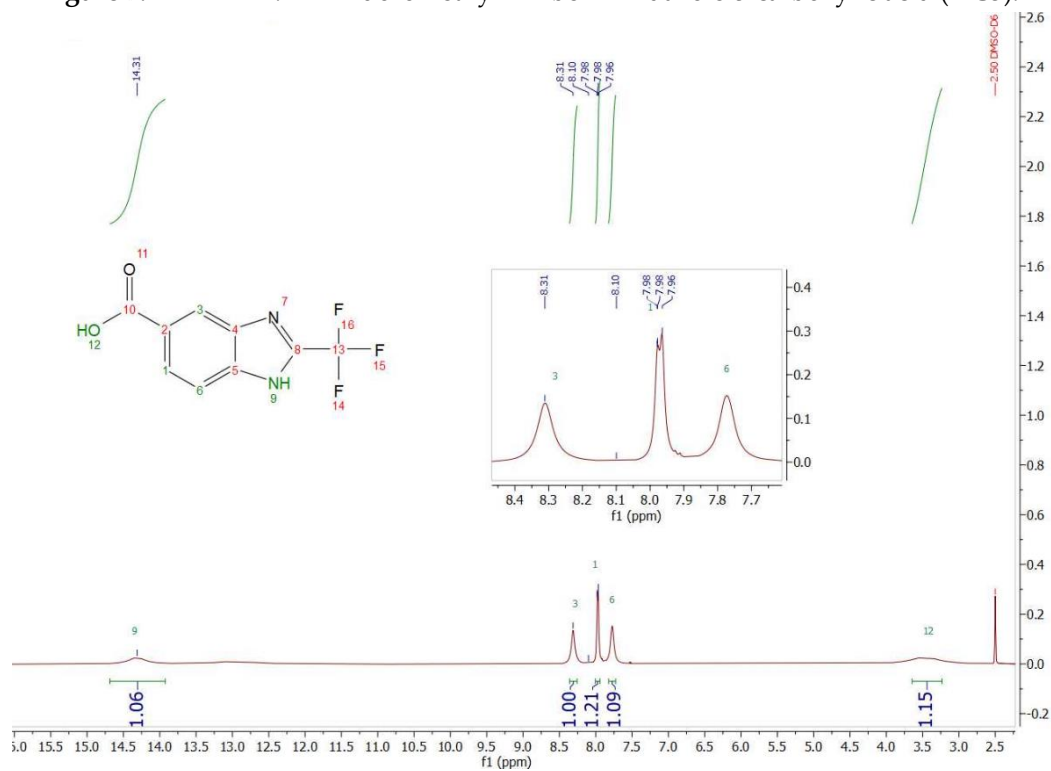
**Figure 5.**  $^1\text{H}$  NMR (DMSO- $d_6$ , 600 MHz): 1-Methyl-2-trifluoromethyl-1H-benzimidazole-5-carboxylic acid (1-C2).



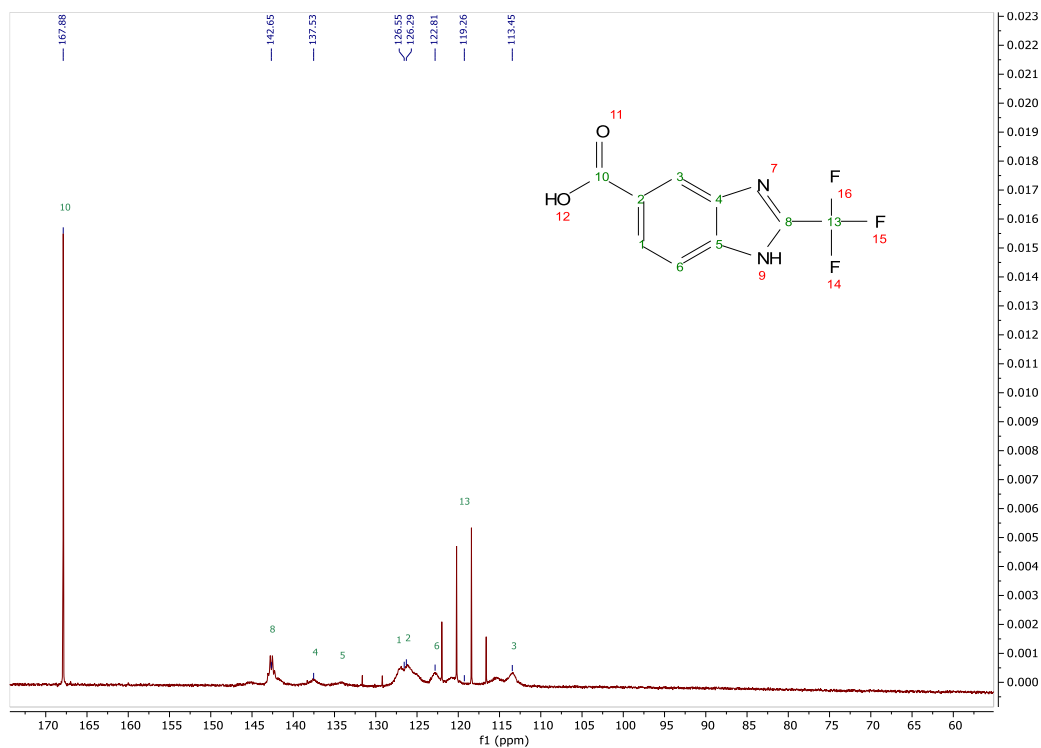
**Figure 6.**  $^{13}\text{C}$  NMR (DMSO- $d_6$ , 151 MHz): 1-Methyl-2-trifluoromethyl-1H-benzimidazole-5-carboxylic acid (1-C2).



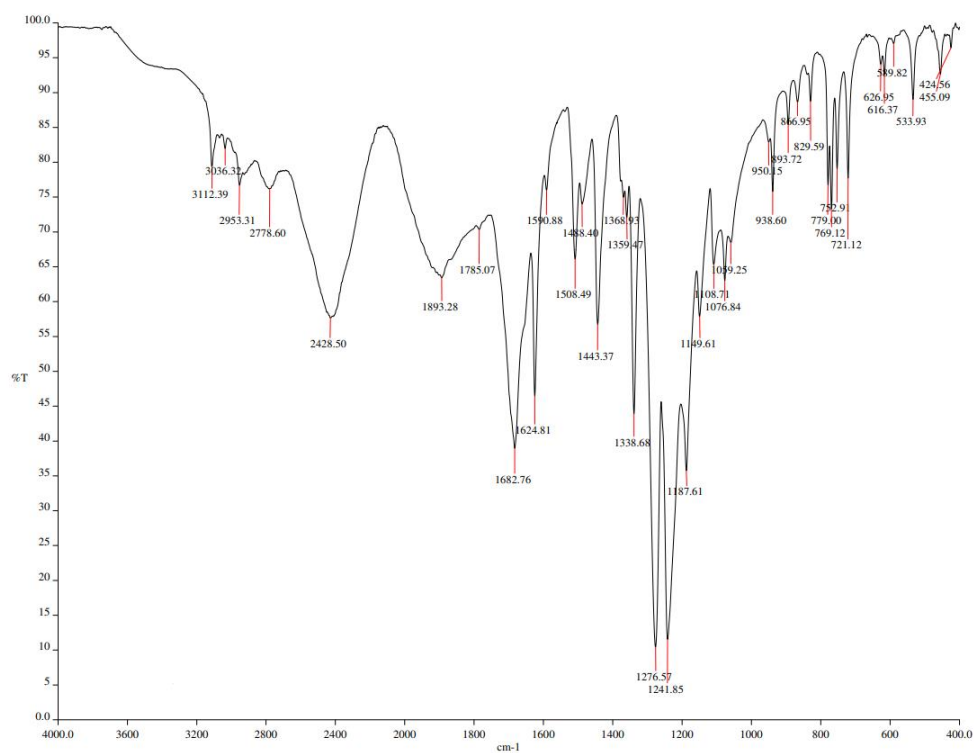
**Figure 7.** ATR-FTIR: 2-Trifluoromethyl-1H-benzimidazole-5-carboxylic acid (**1-C3**).



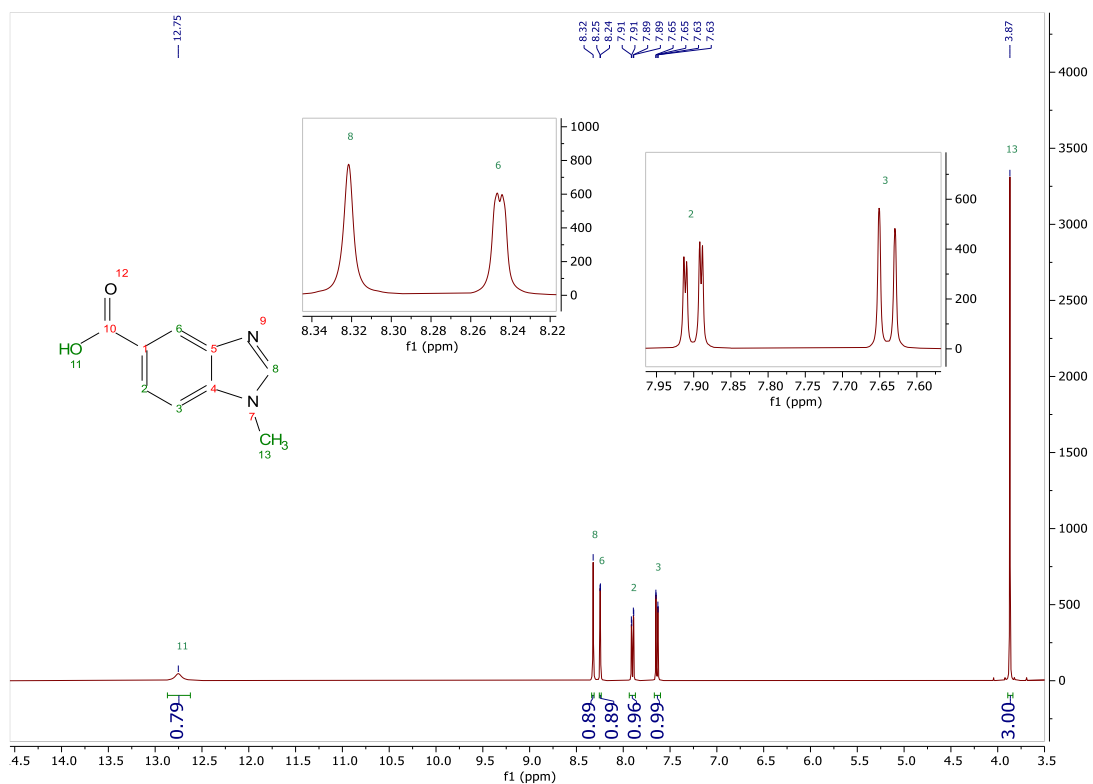
**Figure 8.**  $^1\text{H}$  NMR ( $\text{DMSO-}d_6$ , 600 MHz): 2-Trifluoromethyl-1H-benzimidazole-5-carboxylic acid (**1-C3**).



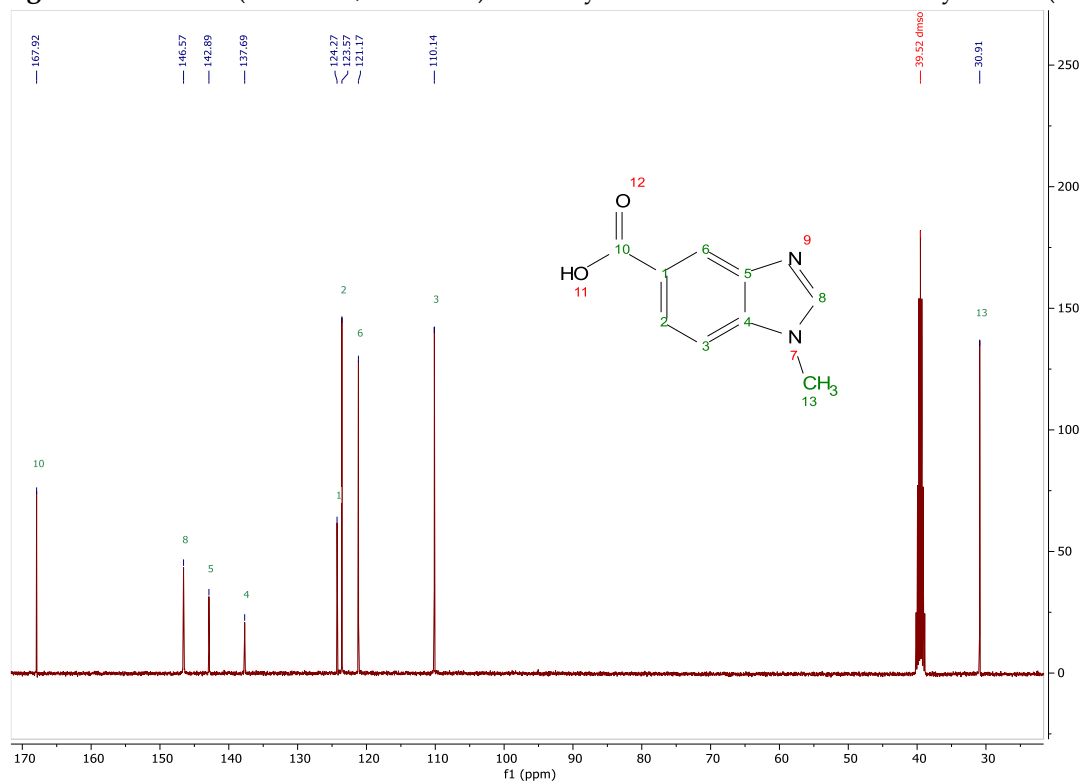
**Figure 9.** <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 151 MHz): 2-Trifluoromethyl-1*H*-benzimidazole-5-carboxylic acid (1-C3).



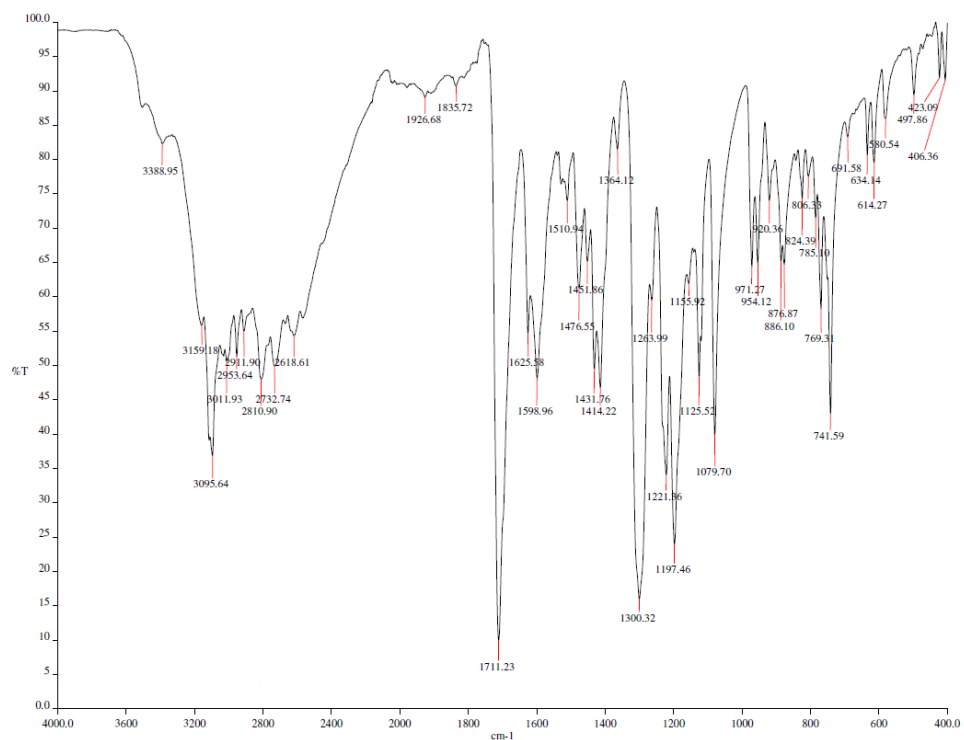
**Figure 10.** ATR-FTIR: 1-Methyl-1*H*-benzimidazole-5-carboxylic acid (1-C4).



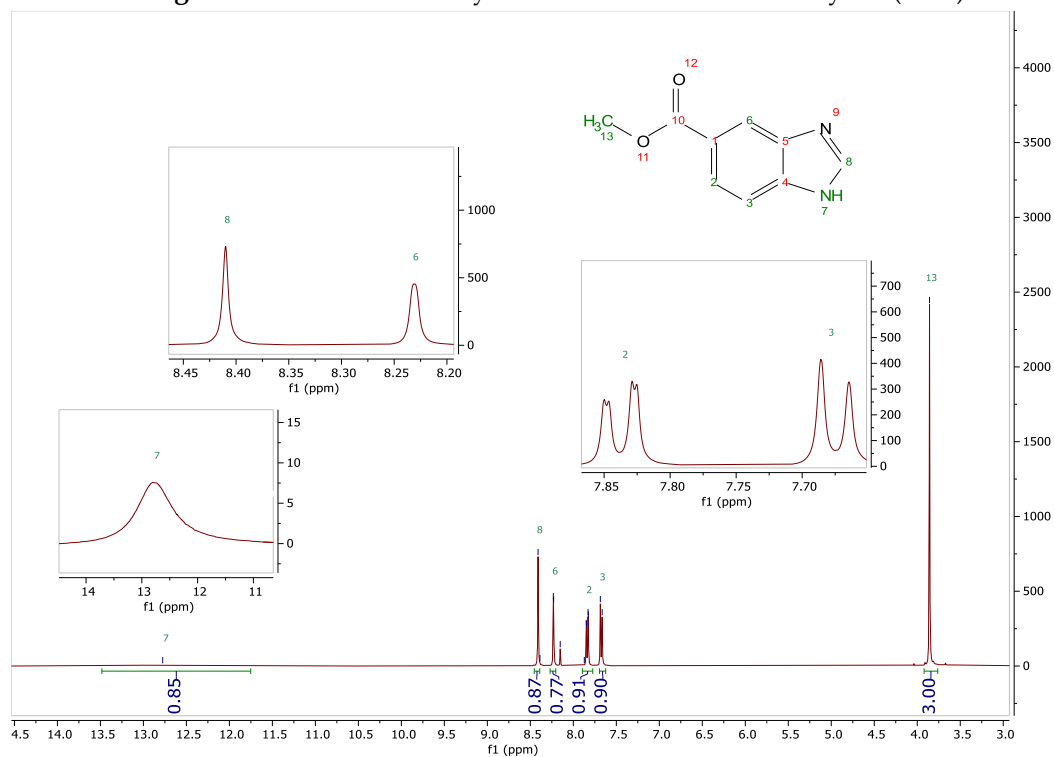
**Figure 11.**  $^1\text{H}$  NMR (DMSO- $d_6$ , 400 MHz): 1-Methyl-1H-benzimidazole-5-carboxylic acid (1-C4).



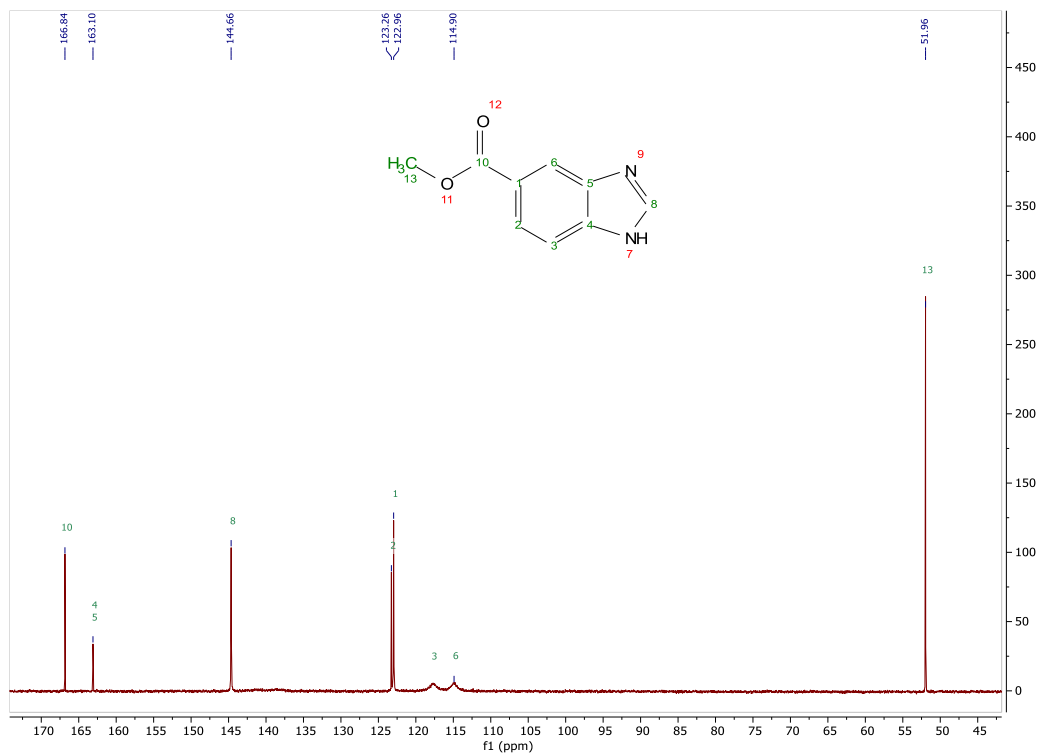
**Figure 12.**  $^{13}\text{C}$  NMR (DMSO- $d_6$ , 101 MHz): 1-Methyl-1H-benzimidazole-5-carboxylic acid (1-C4).



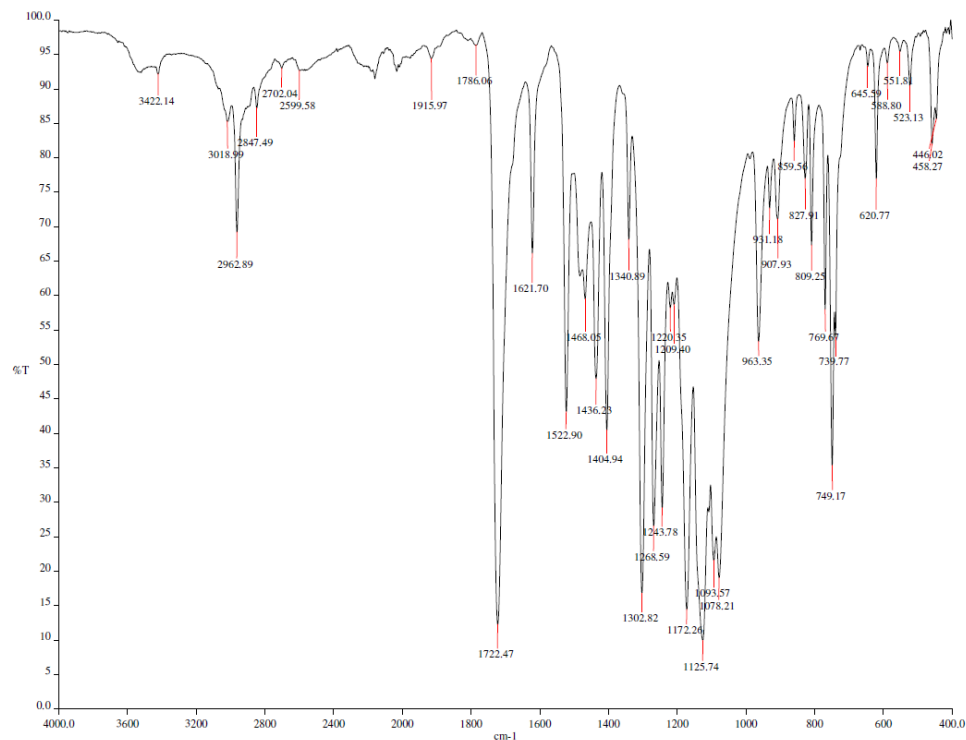
**Figure 13.** ATR-FTIR: Methyl 1H-benzimidazole-5-carboxylate (2-C1).



**Figure 14.** <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 400 MHz): Methyl 1H-benzimidazole-5-carboxylate (2-C1).

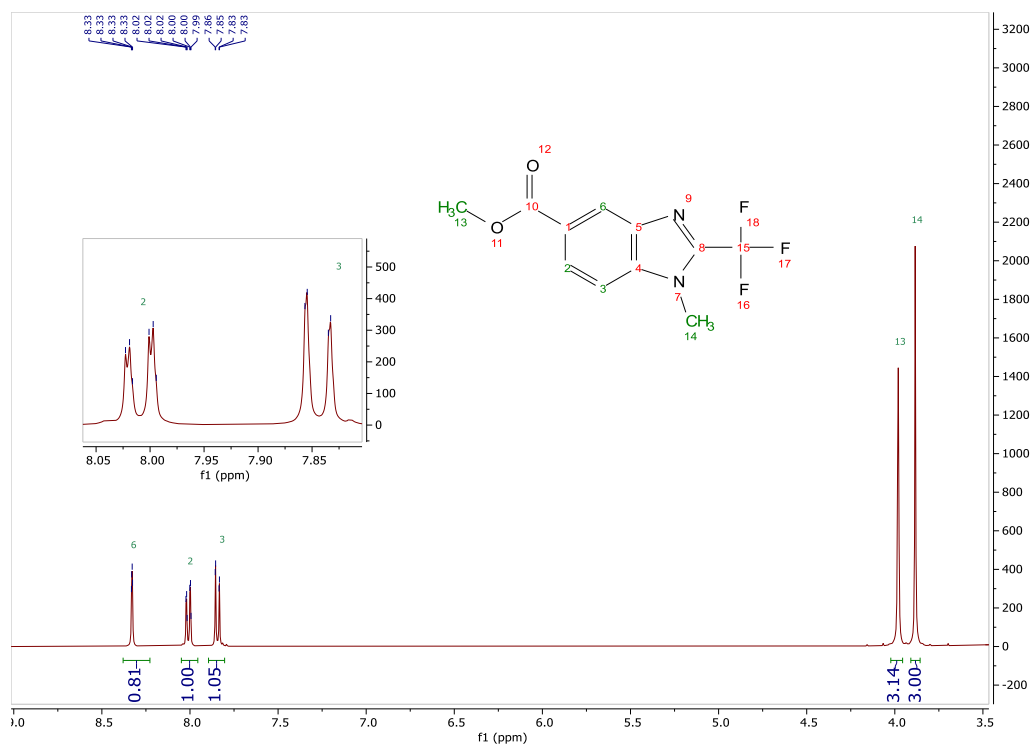


**Figure 15.**  $^{13}\text{C}$  NMR ( $\text{DMSO}-d_6$ , 400 MHz): Methyl 1H-benzimidazole-5-carboxylate (2-C1).

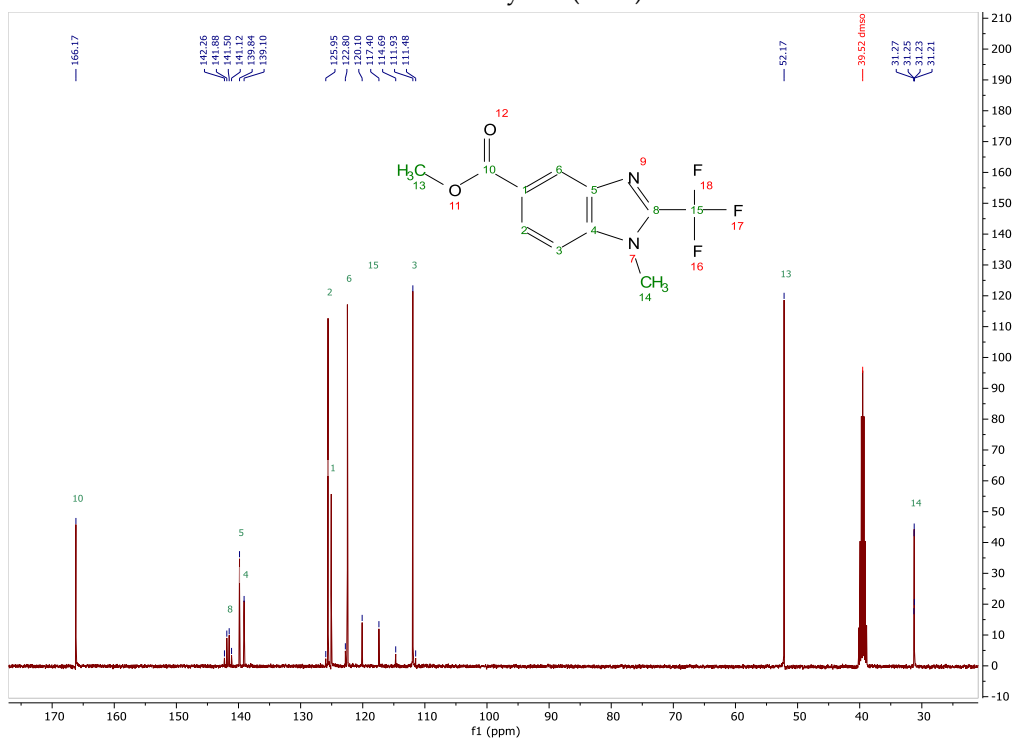


**Figure 16.** ATR-FTIR: Methyl 1-methyl-2-trifluoromethyl-1H-benzimidazole-5-carboxylate (2-C2).





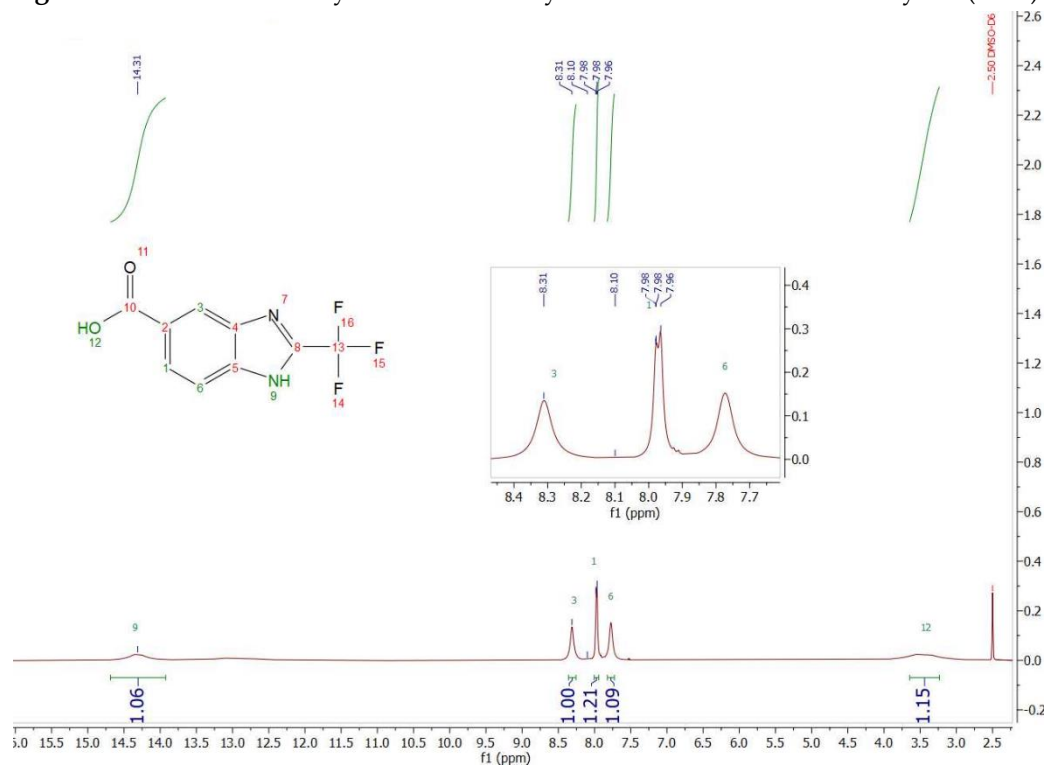
**Figure 17.** <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 600 MHz): Methyl 1-methyl-2-trifluoromethyl-1H-benzimidazole-5-carboxylate (2-C2).



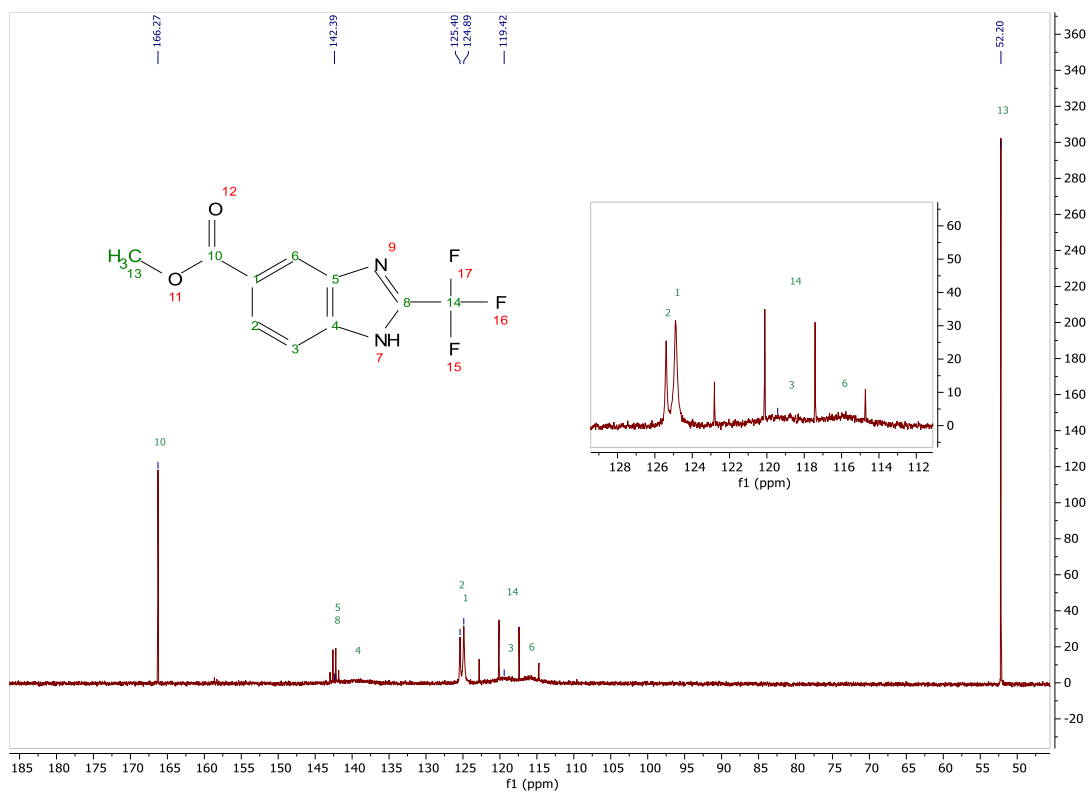
**Figure 18.** <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 151 MHz): Methyl 1-methyl-2-trifluoromethyl-1H-benzimidazole-5-carboxylate (2-C2).



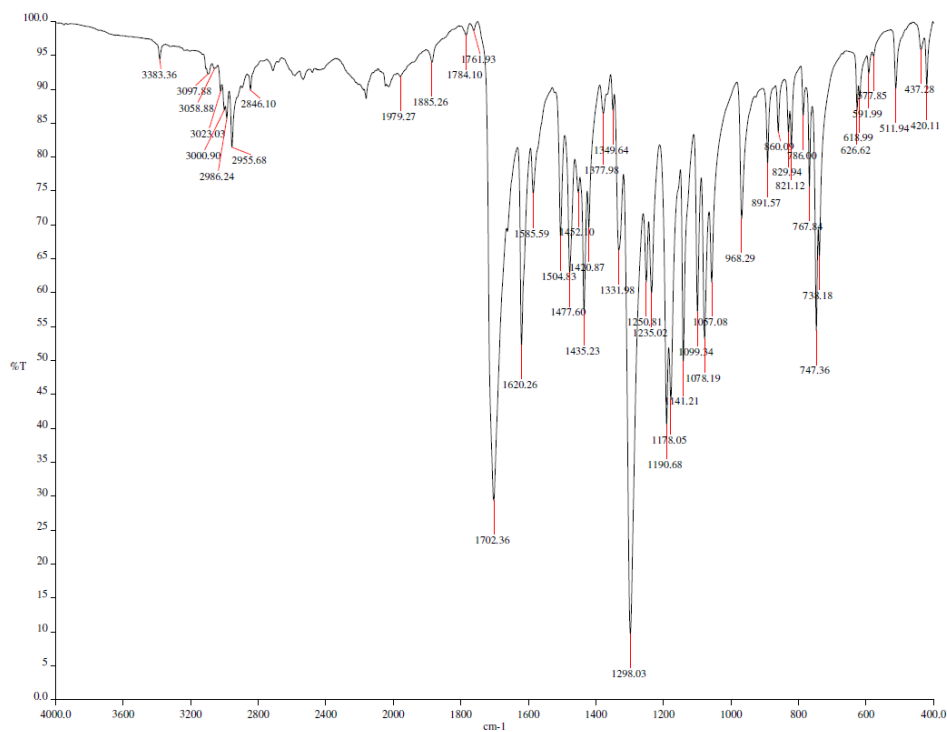
**Figure 19.** ATR-FTIR: Methyl 2-(trifluoromethyl)-1H-benzimidazole-5-carboxylate (2-C3).



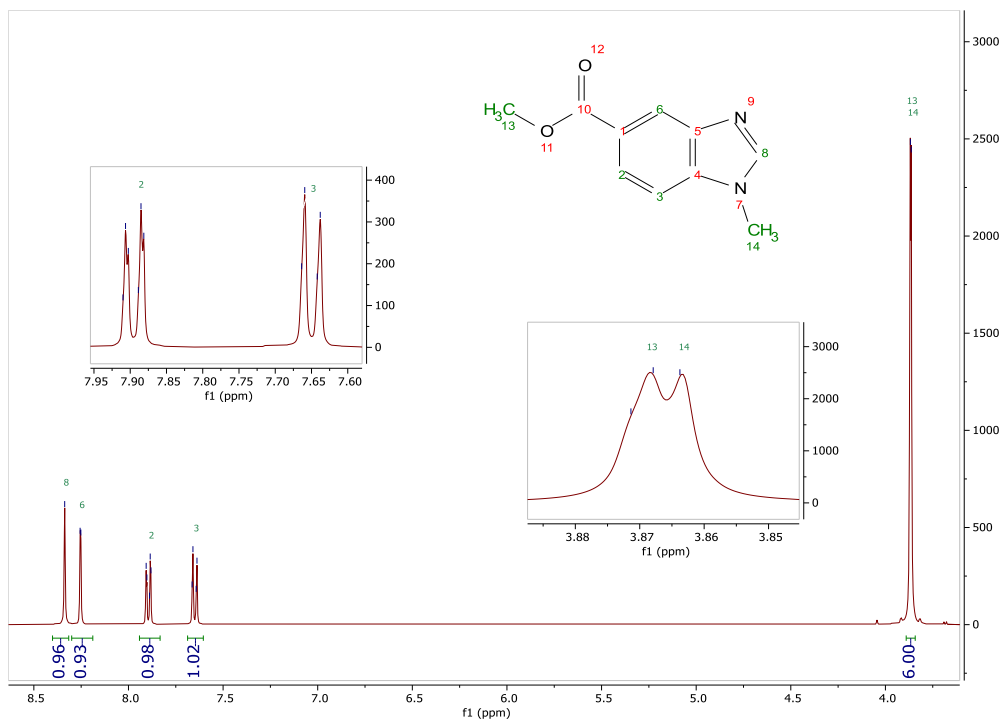
**Figure 20.** <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 600 MHz): Methyl 2-(trifluoromethyl)-1H-benzimidazole-5-carboxylate (2-C3).



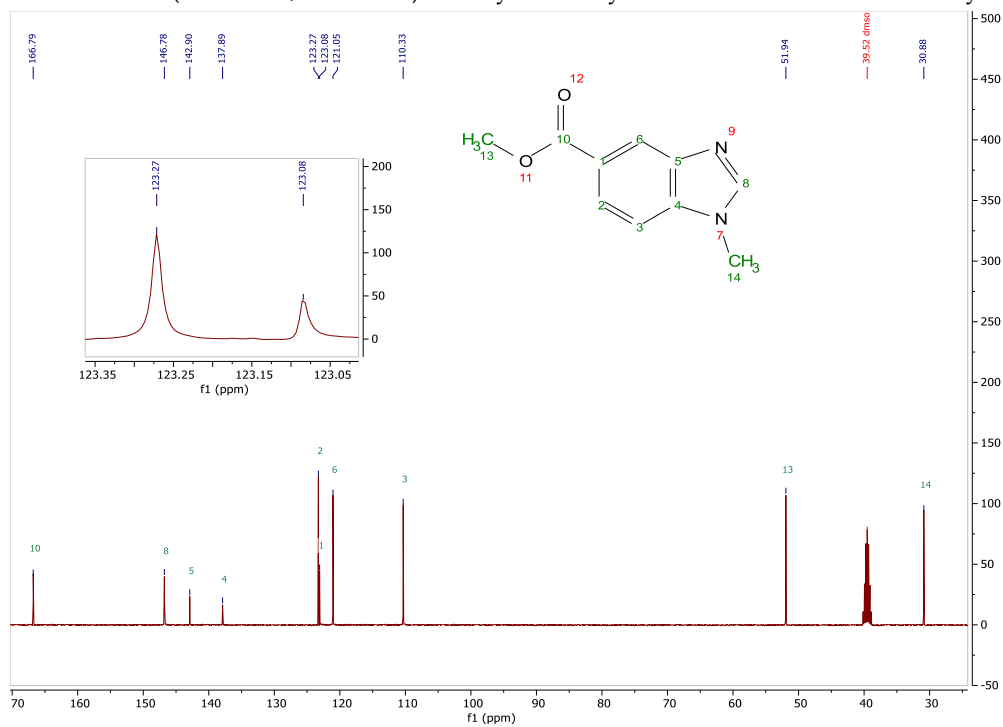
**Figure 21.** <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 101 MHz): Methyl 2-trifluoromethyl-1H-benzimidazole-5-carboxylate (2-C3).



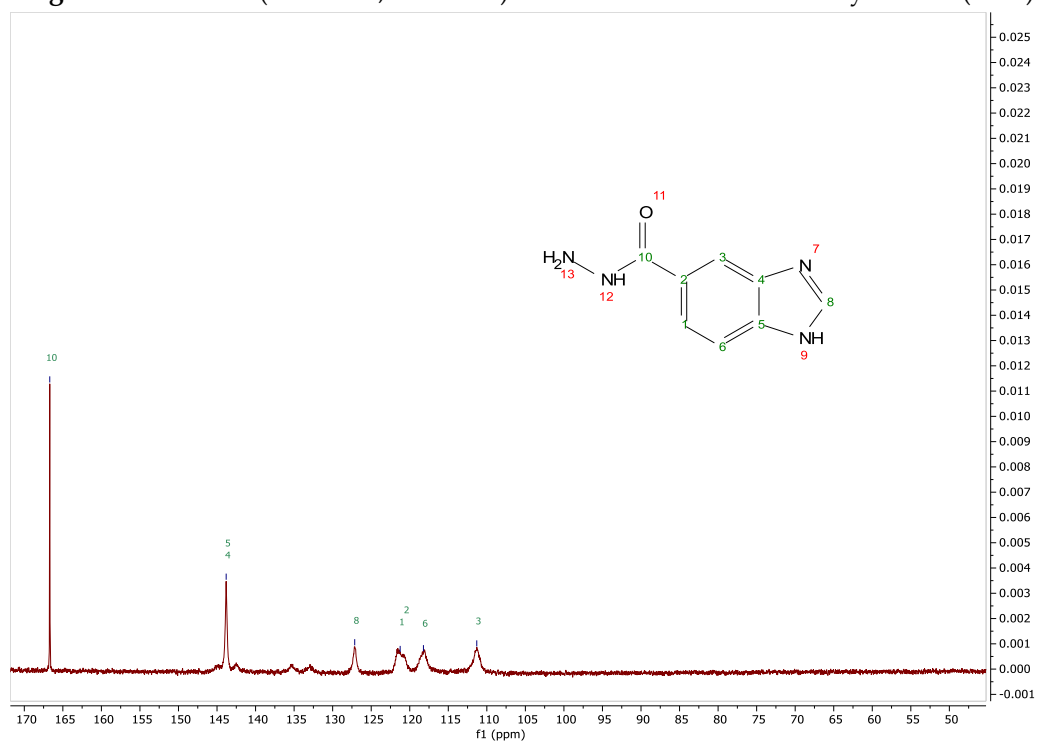
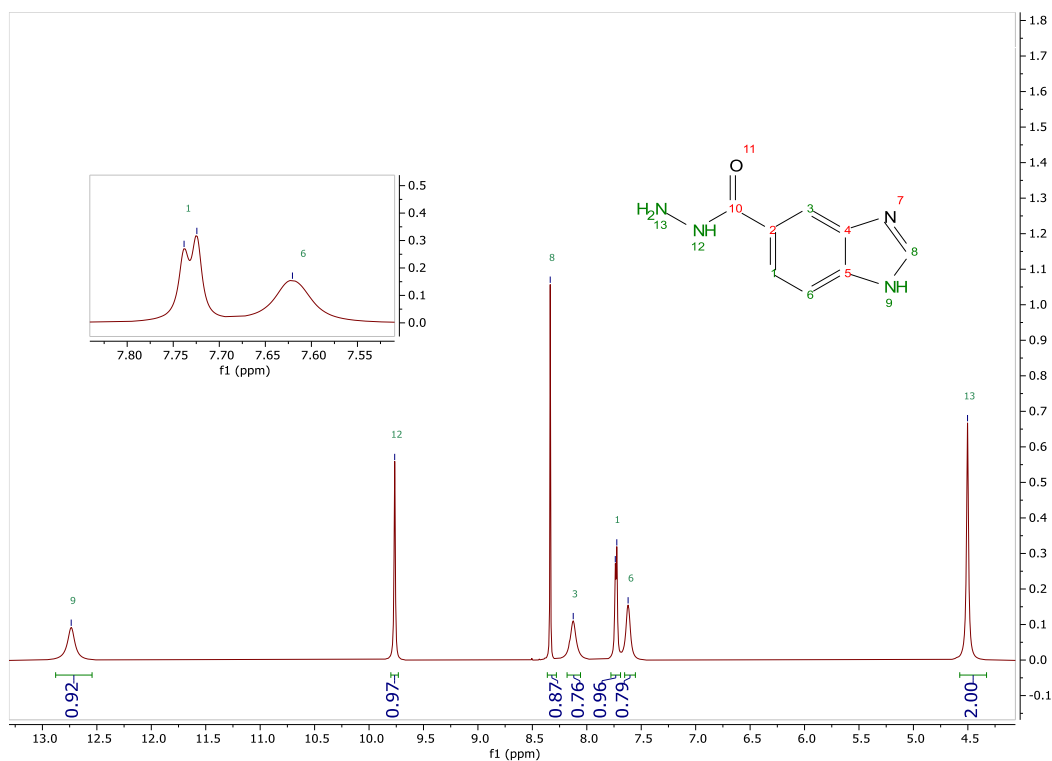
**Figure 22.** ATR-FTIR: Methyl 1-methyl-1H-benzimidazole-5-carboxylate (2-C4).

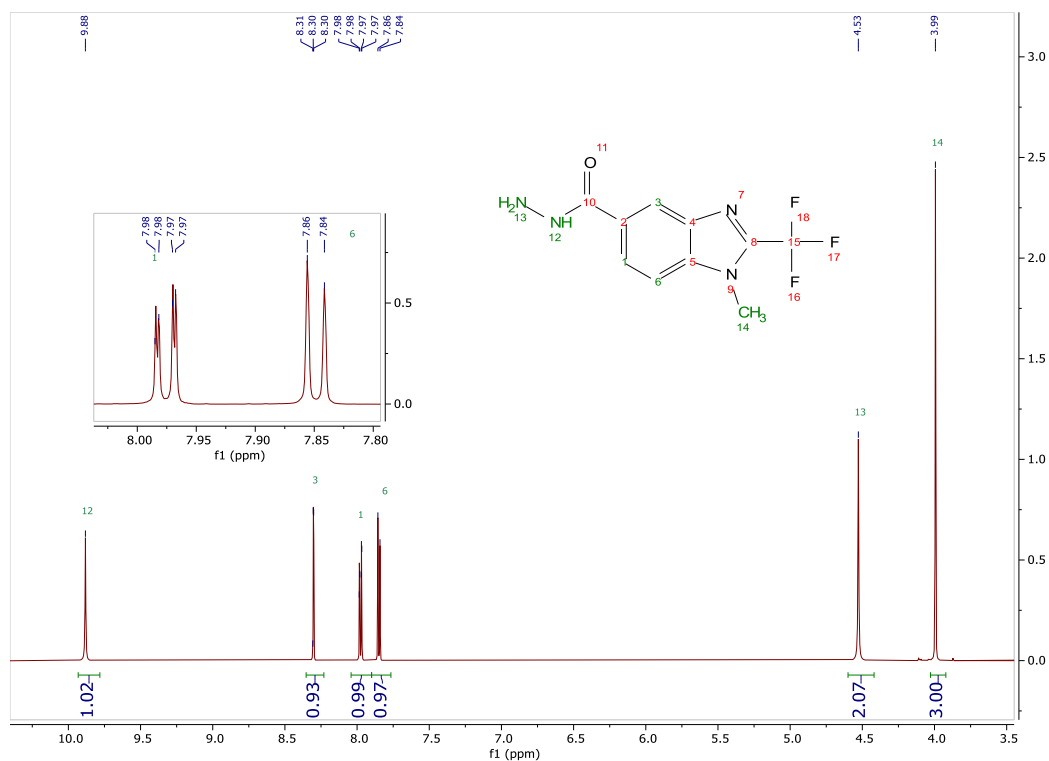


**Figure 23.**  $^1\text{H}$  NMR (DMSO- $d_6$ , 400 MHz): Methyl 1-methyl-1*H*-benzimidazole-5-carboxylate (2-C4).

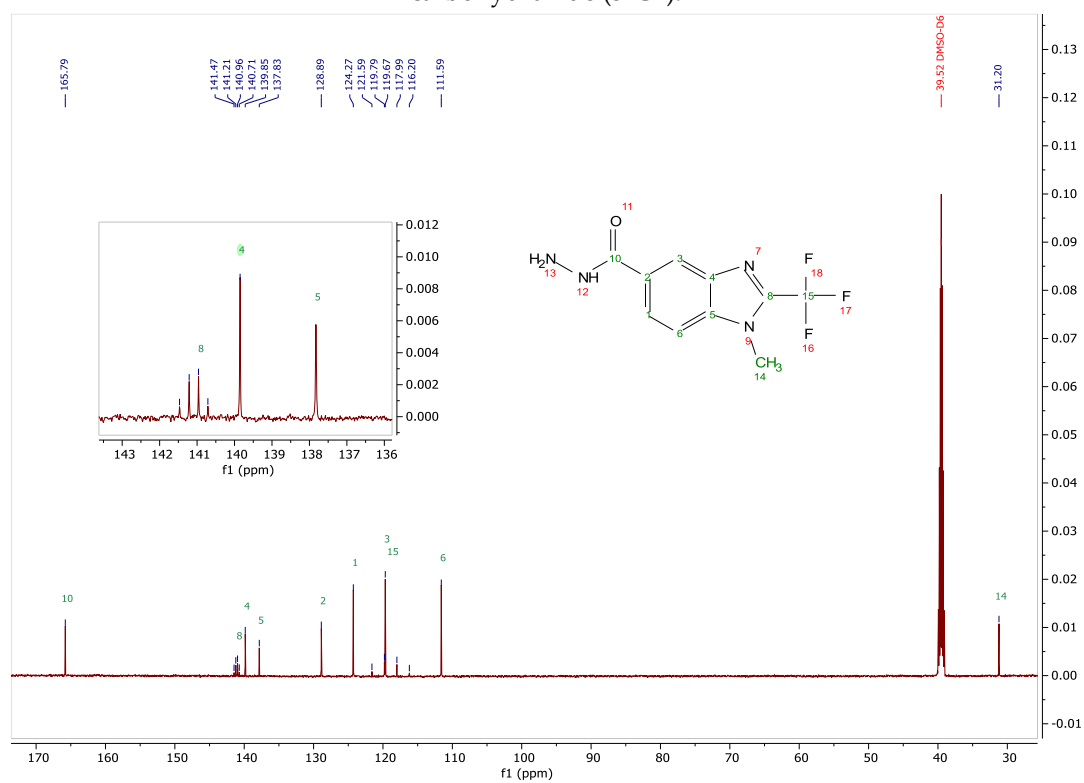


**Figure 24.**  $^{13}\text{C}$  NMR (DMSO- $d_6$ , 101 MHz): Methyl 1-methyl-1*H*-benzimidazole-5-carboxylate (2-C4).

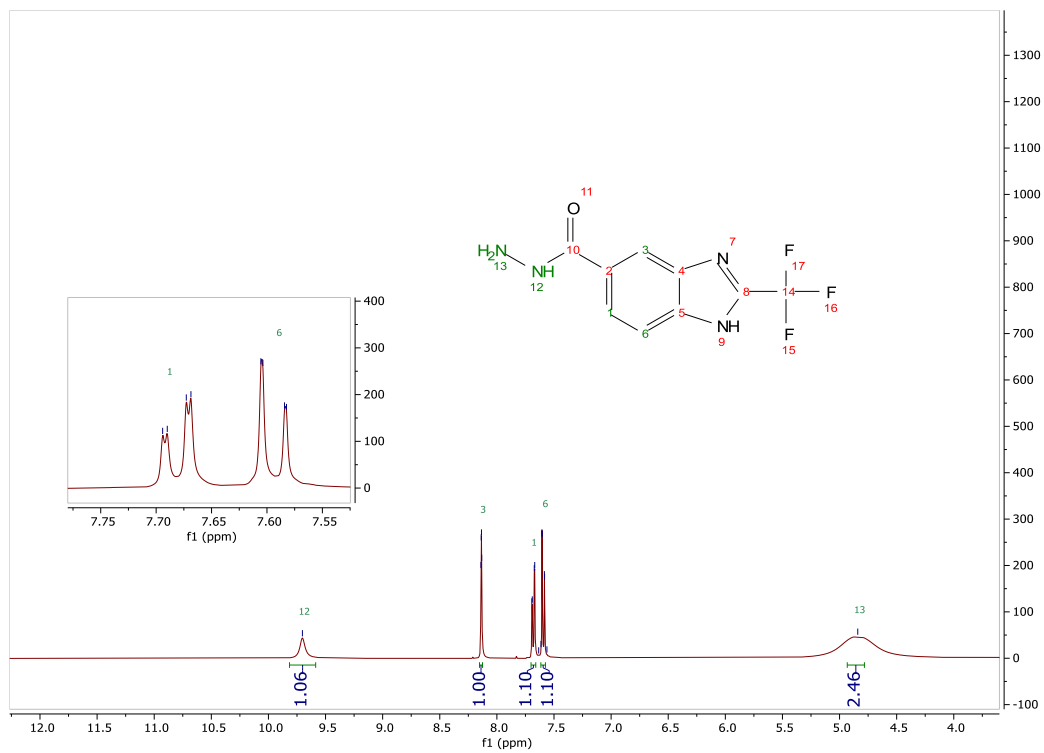




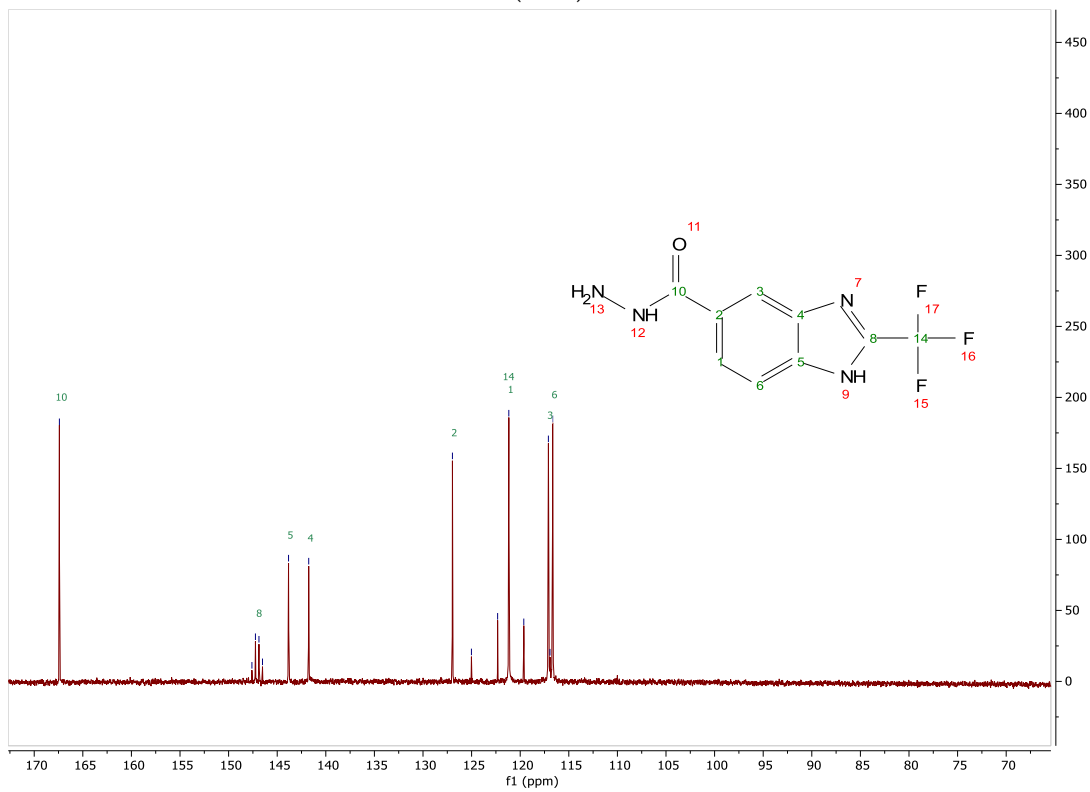
**Figure 27.**  $^1\text{H}$  NMR (DMSO- $d_6$ , 600 MHz): 1-Methyl-2-(trifluoromethyl)-1H-benzimidazole-5-carbohydrazide (3-C2).



**Figure 28.**  $^{13}\text{C}$  NMR (DMSO- $d_6$ , 151 MHz): 1-Methyl-2-(trifluoromethyl)-1H-benzimidazole-5-carbohydrazide (3-C2).



**Figure 29.** <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 400 MHz): 2-(Trifluoromethyl)-1*H*-benzimidazole-5-carbohydrazide (3-C3).



**Figure 30.** <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 101 MHz): 2-(Trifluoromethyl)-1*H*-benzimidazole-5-carbohydrazide (3-C3).

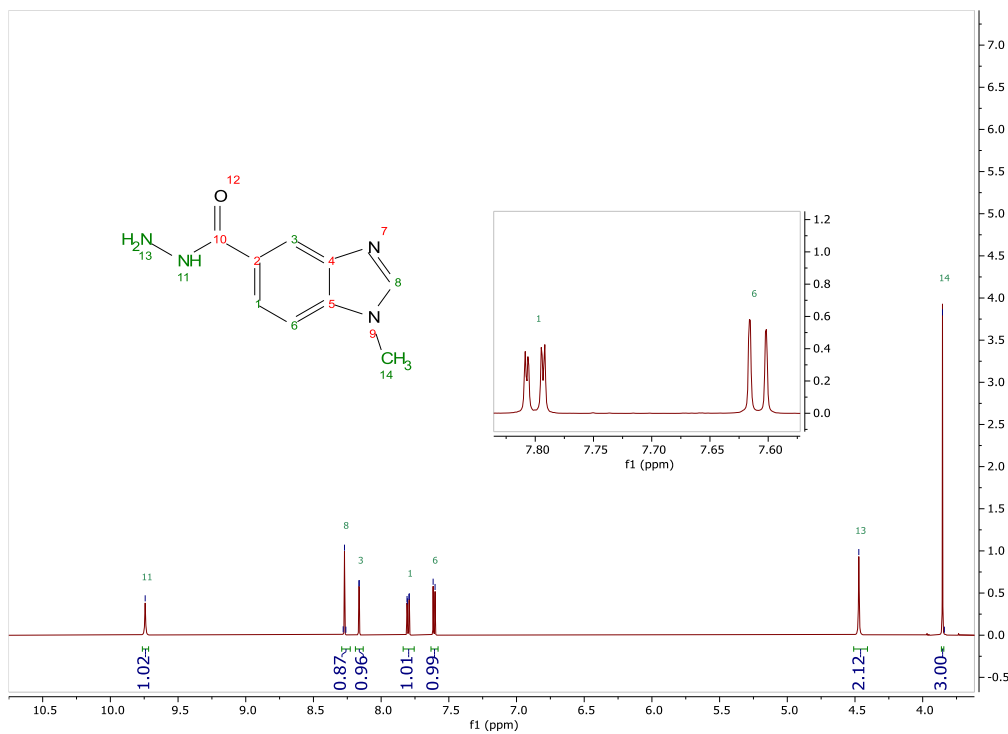


Figure 31.  $^1\text{H}$  NMR ( $\text{DMSO-}d_6$ , 600 MHz): 1-Methyl-1H-benzimidazole-5-carbohydrazide (3-C4).

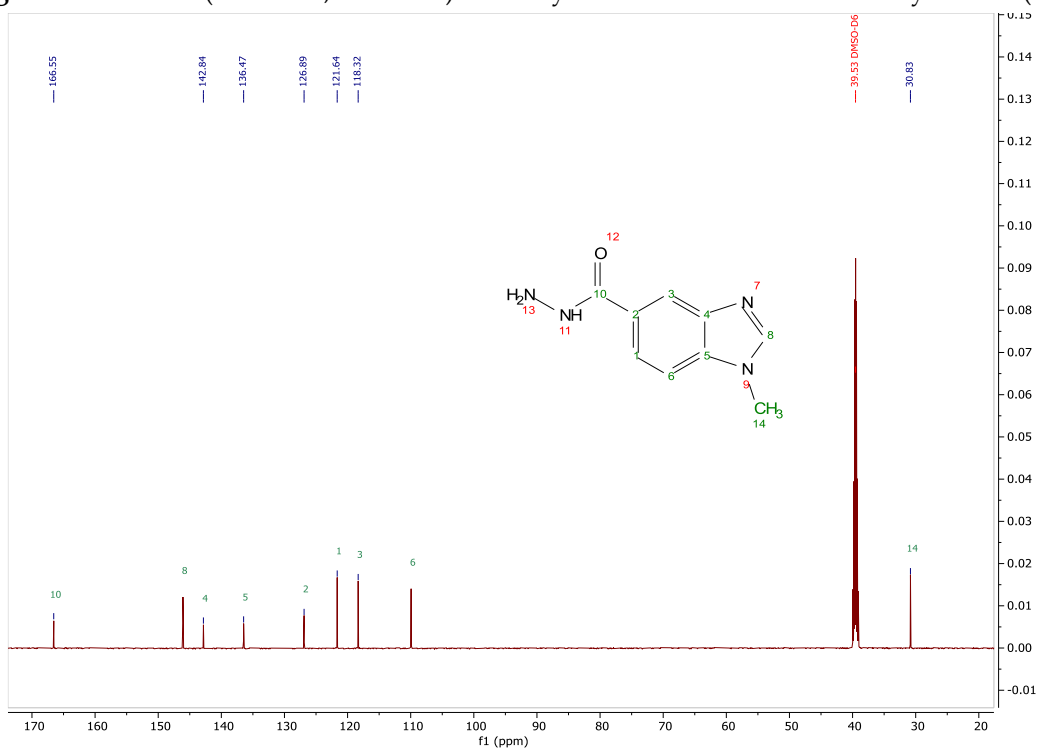
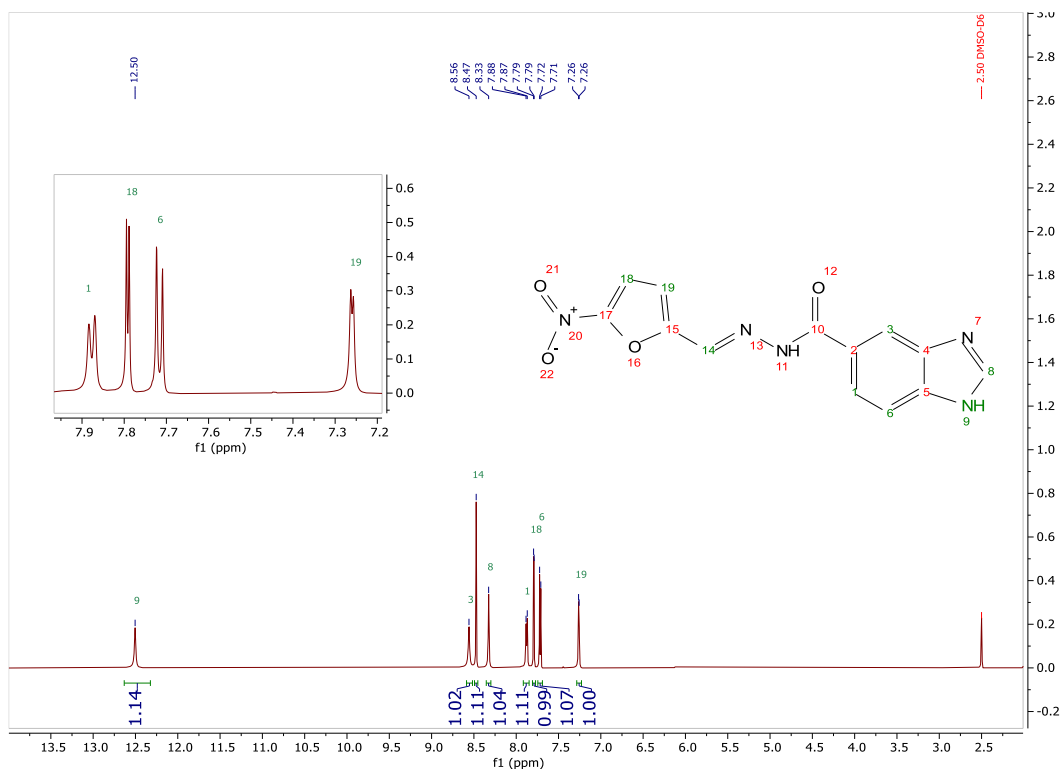
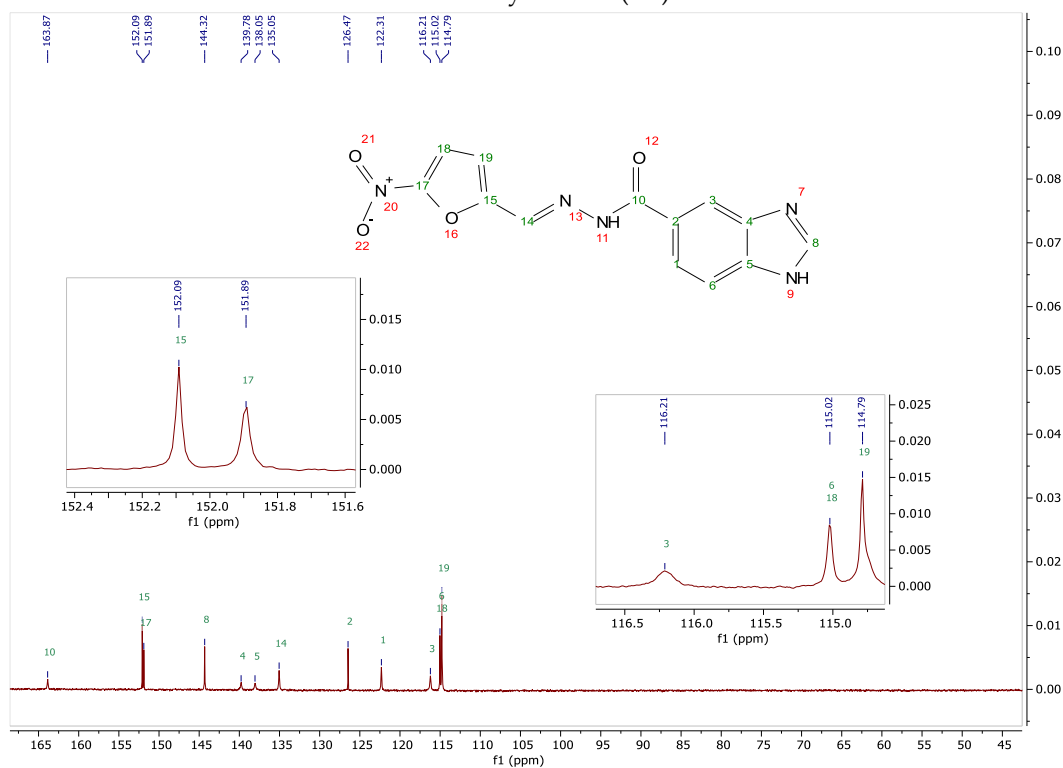


Figure 32.  $^{13}\text{C}$  NMR ( $\text{DMSO-}d_6$ , 151 MHz): 1-Methyl-1H-benzimidazole-5-carbohydrazide (3-C4).

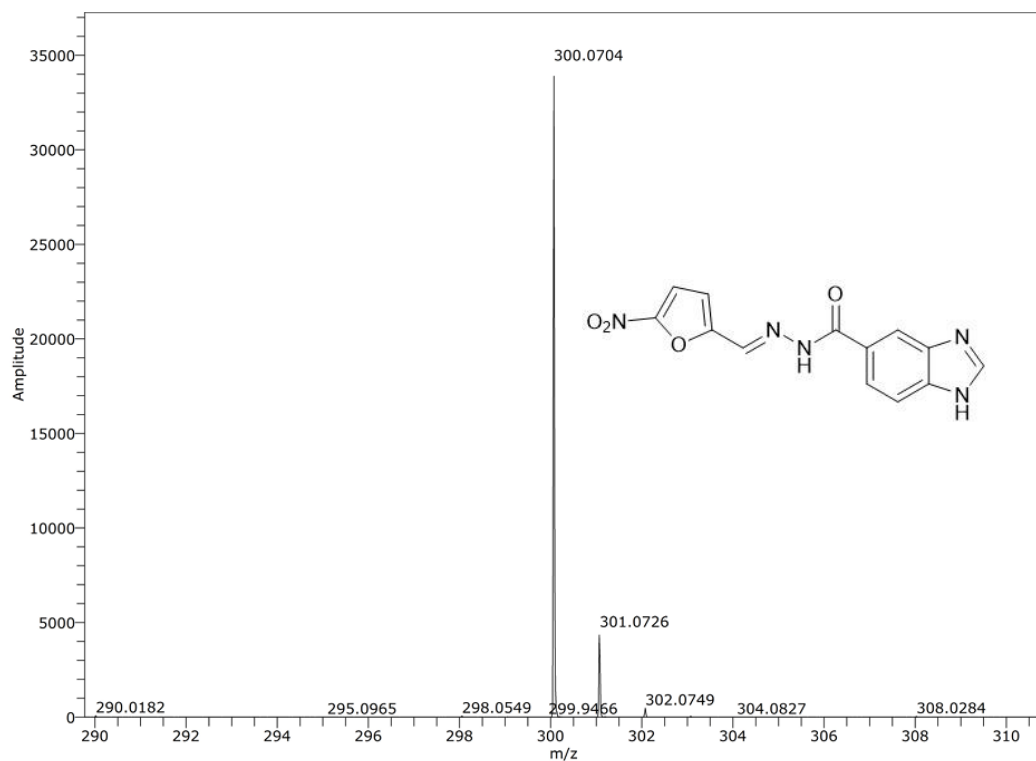




**Figure 33.** <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 600 MHz): *N'*-[(5-Nitrofur-2-yl)methylene]-1*H*-benzimidazole-5-carbohydrazide (C1).

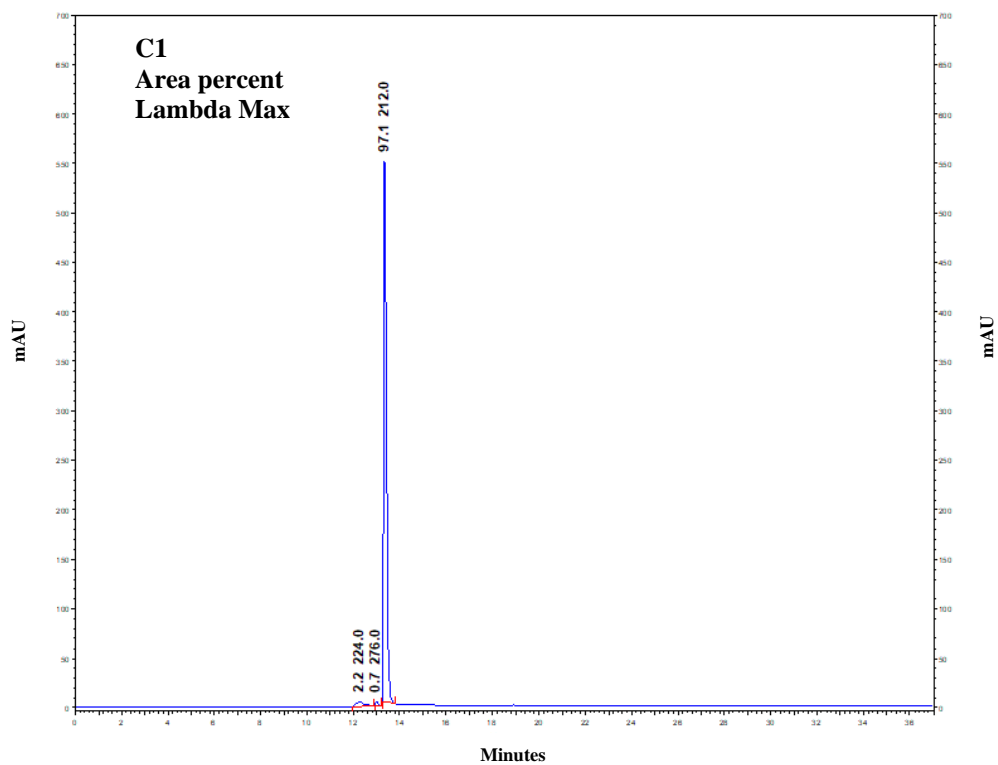


**Figure 34.** <sup>13</sup>C NMR (DMSO-*d*<sub>6</sub>, 151 MHz): *N'*-[(5-Nitrofur-2-yl)methylene]-1*H*-benzimidazole-5-carbohydrazide (C1).

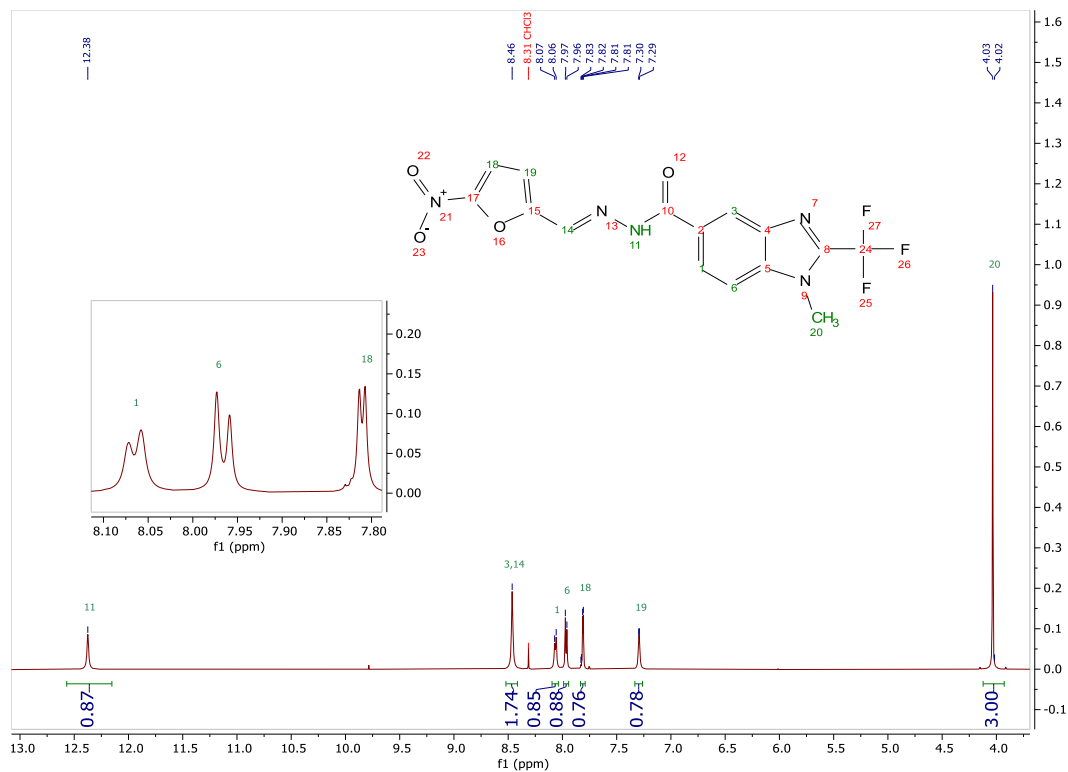


Formula	Calculated	Obtained	Obtained formula	%	ppM error	Score
C <sub>13</sub> H <sub>9</sub> N <sub>5</sub> O <sub>4</sub>	300.07273	300.0704	C <sub>13</sub> H <sub>9</sub> N <sub>5</sub> O <sub>4</sub> + H <sup>+</sup>	300.0704 (100), 301.0726 (18), 302.0749 (2)	-3.23	0.84

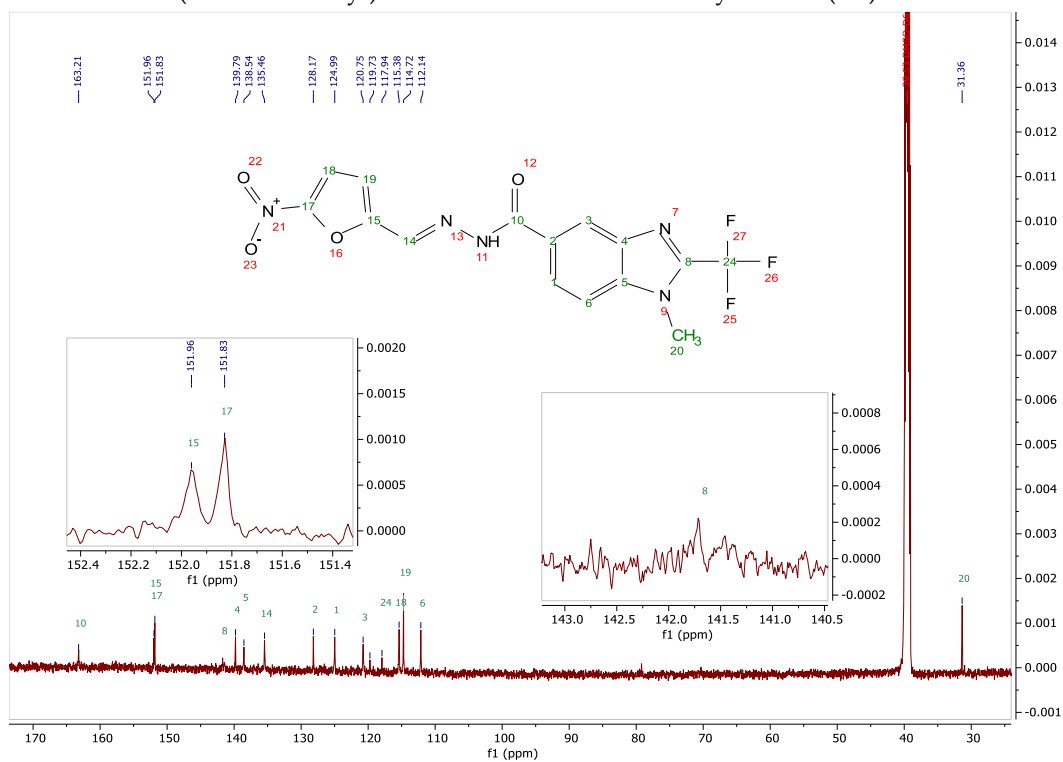
**Figure 35.** HRMS (APCI): *m/z* 300.0704 [M<sup>+</sup> + H] *N'*-[(5-Nitrofur-2-yl)methylene]-1*H*-benzimidazole-5-carbohydrazide (C1).



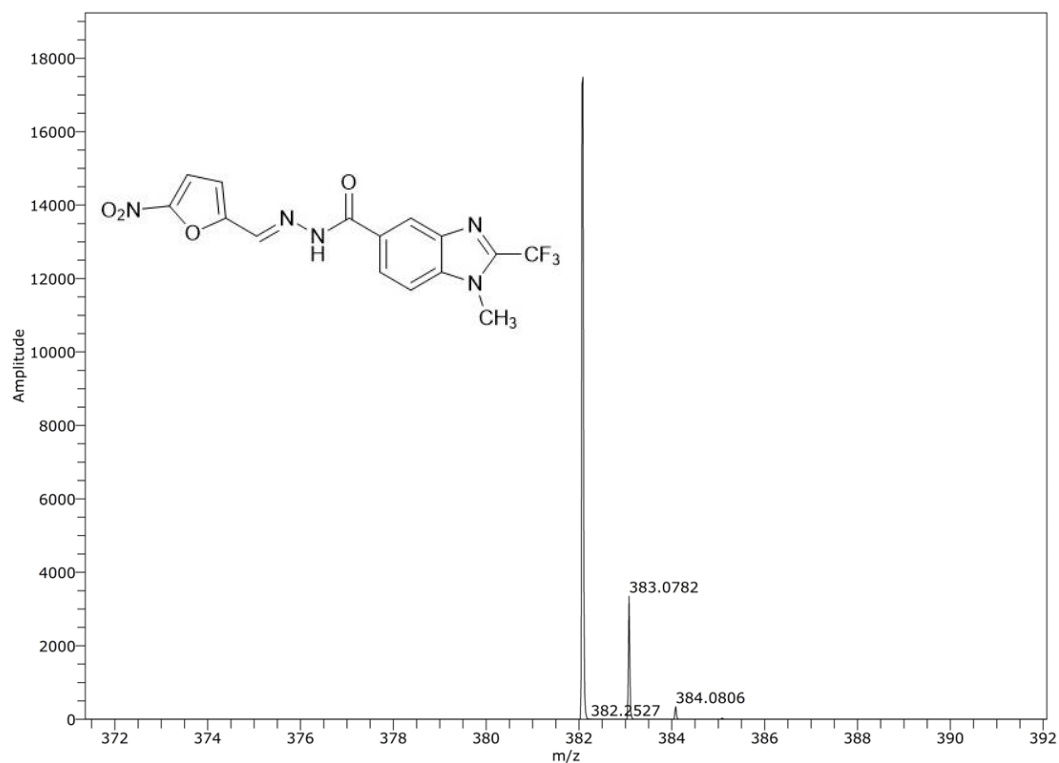
**Figure 36.** HPLC-DAD: 97.1% purity, with a  $\lambda_{\text{max}}$  of 212.0 nm as a result of scanning from 190 to 600 nm of *N'*-[5-Nitrofuran-2-yl)methylene]-1*H*-benzimidazole-5-carbohydrazide (**C1**).



**Figure 37.**  $^1\text{H}$  NMR (DMSO- $d_6$ , 600 MHz): 1-Methyl- $N'$ -[(5-nitrofur-2-yl)methylene]-2-(trifluoromethyl)-1H-benzimidazole-5-carbohydrazide (**C2**).

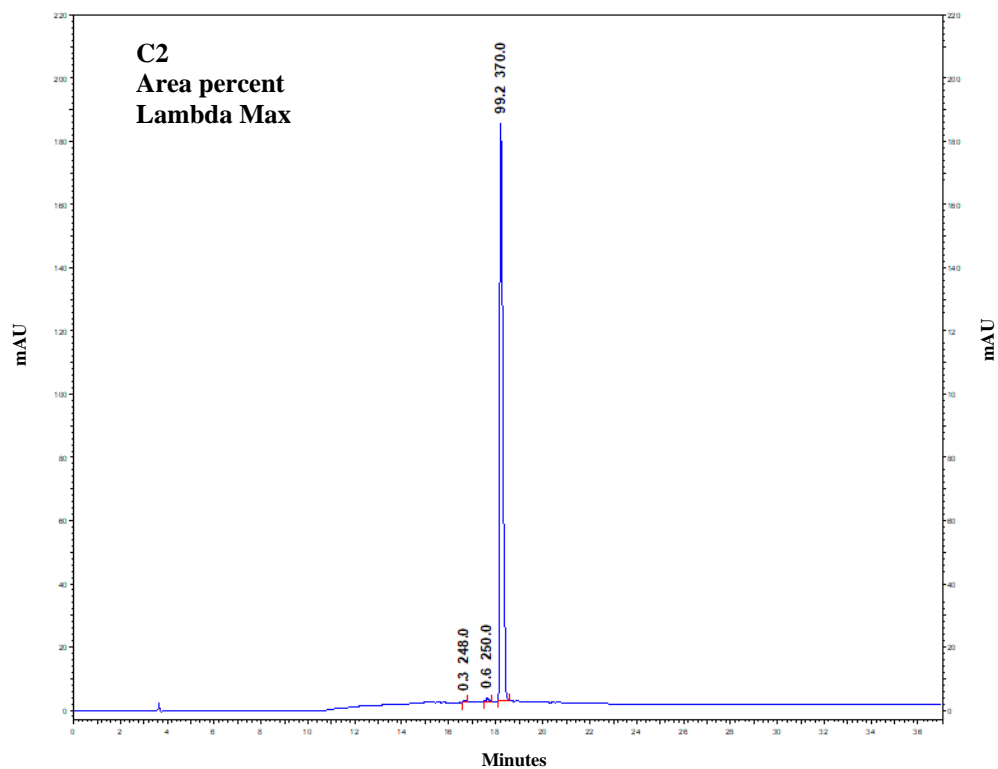


**Figure 38.**  $^{13}\text{C}$  NMR (DMSO- $d_6$ , 151 MHz): 1-Methyl- $N'$ -[(5-nitrofur-2-yl)methylene]-2-(trifluoromethyl)-1H-benzimidazole-5-carbohydrazide (**C2**).

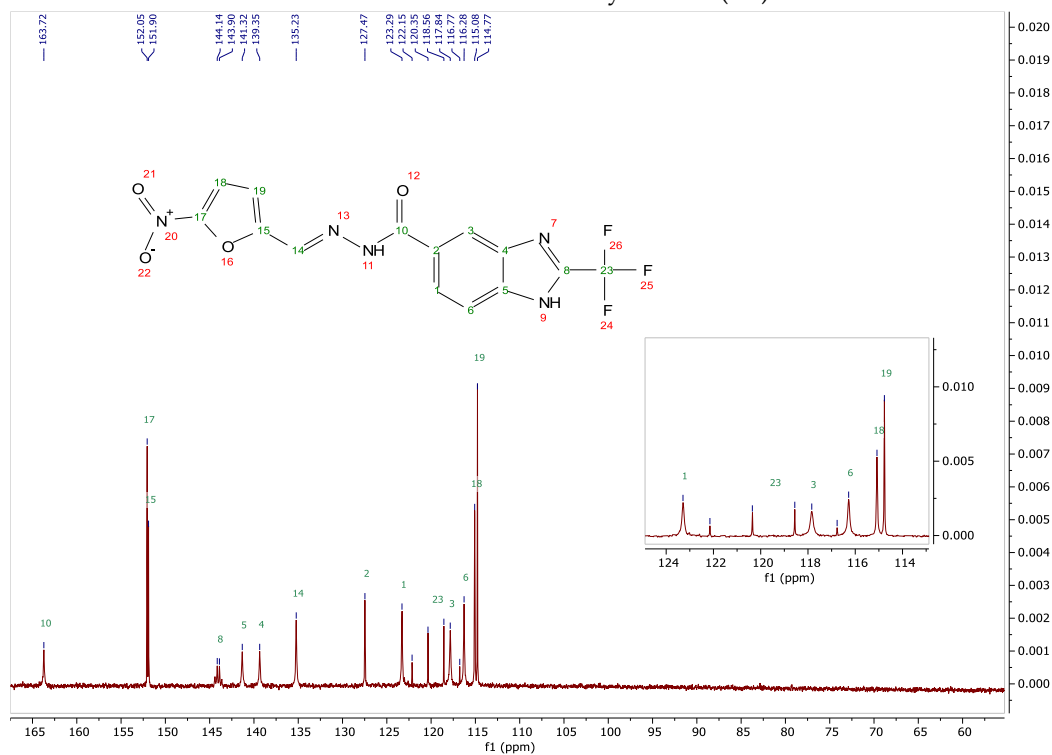
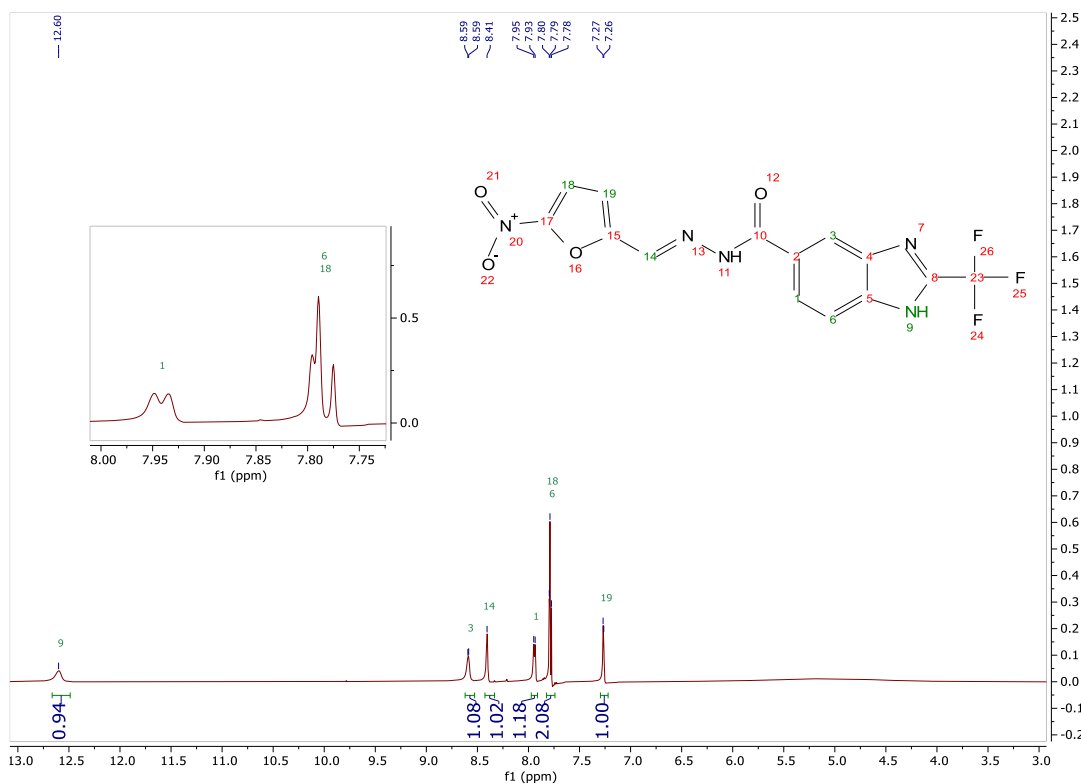


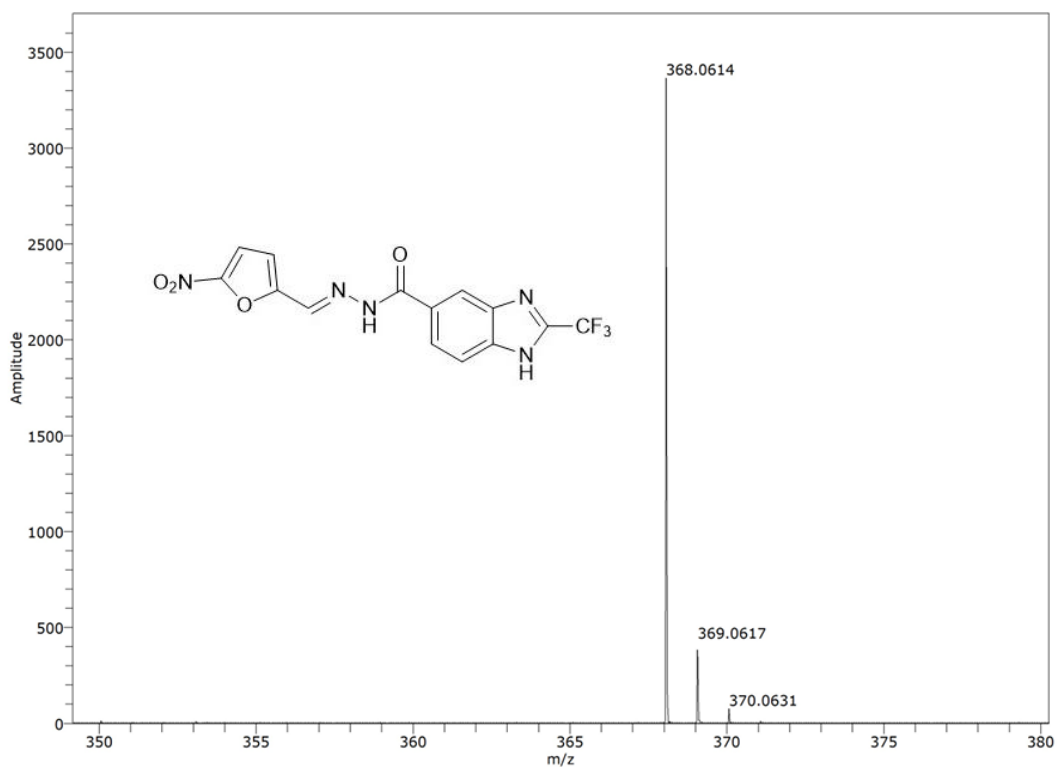
Formula	Calculated	Obtained	Obtained formula	%	ppM error	Score
$C_{15}H_{10}F_3N_5O_4$	382.07577	382.0761	$C_{15}H_{10}F_3N_5O_4 + H^+$	382.0761 (100), 383.0782 (18), 384.0806 (2)	-0.87	0.849

**Figure 39.** HRMS (APCI):  $m/z$  382.0761 [ $M^+ + H$ ] 1-Methyl-N'-[(5-nitrofuran-2-yl)methylene]-2-(trifluoromethyl)-1H-benzimidazole-5-carbohydrazide (C2).



**Figure 40.** HPLC-DAD: 99.2% purity, with a  $\lambda_{\text{max}}$  of 370.0 nm as a result of scanning from 190 to 600 nm of 1-Methyl-*N'*-[(5-nitrofur-2-yl)methylene]-2-(trifluoromethyl)-1*H*-benzimidazole-5-carbohydrazide (**C2**).

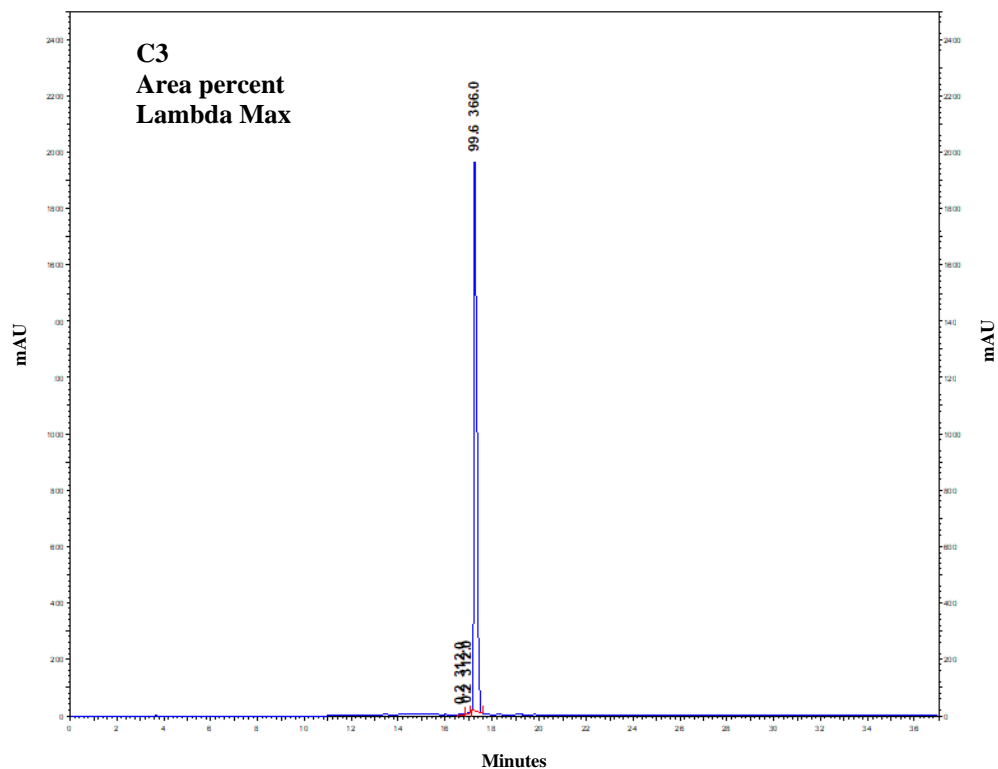




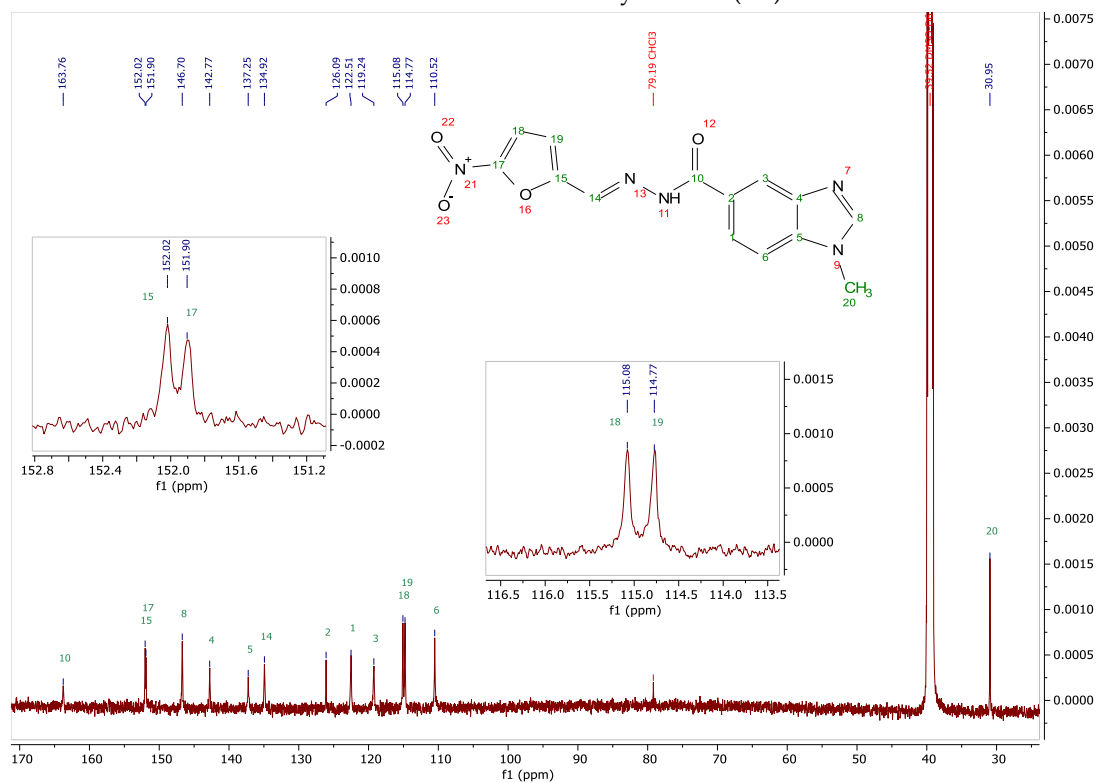
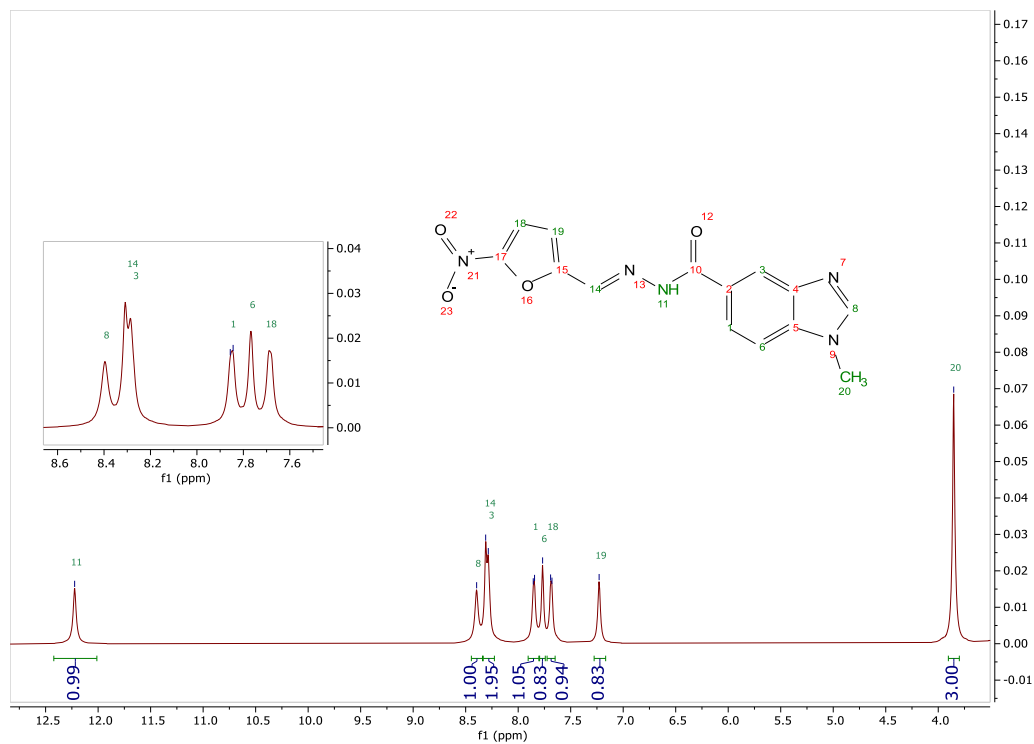
Formula	Calculated	Obtained	Obtained formula	%	ppM error	Score
C <sub>14</sub> H <sub>8</sub> F <sub>3</sub> N <sub>5</sub> O <sub>4</sub>	368.06012	368.0614	C <sub>14</sub> H <sub>8</sub> F <sub>3</sub> N <sub>5</sub> O <sub>4</sub> + H <sup>+</sup>	368.0614 (100), 369.0617 (18), 370.0631 (2)	-3.08	0.804

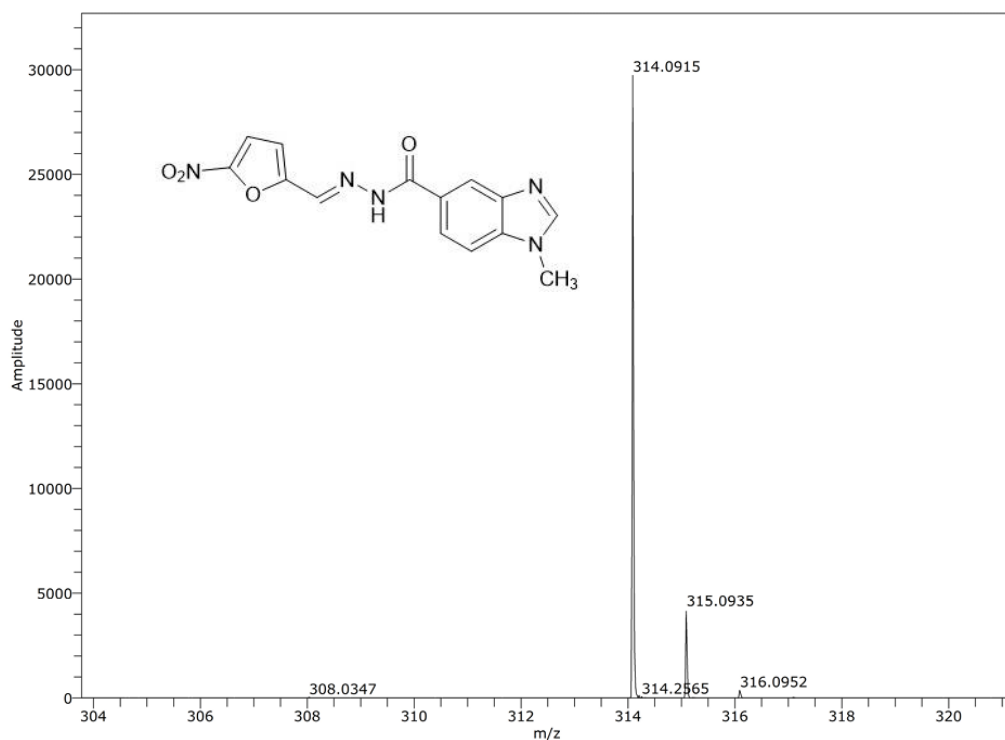
**Figure 43.** HRMS (APCI): *m/z* 368.0614 [M<sup>+</sup> + H] N'-[(5-Nitrofuran-2-yl)methylene]-2-(trifluoromethyl)-1*H*-benzimidazole-5-carbohydrazide (**C3**).





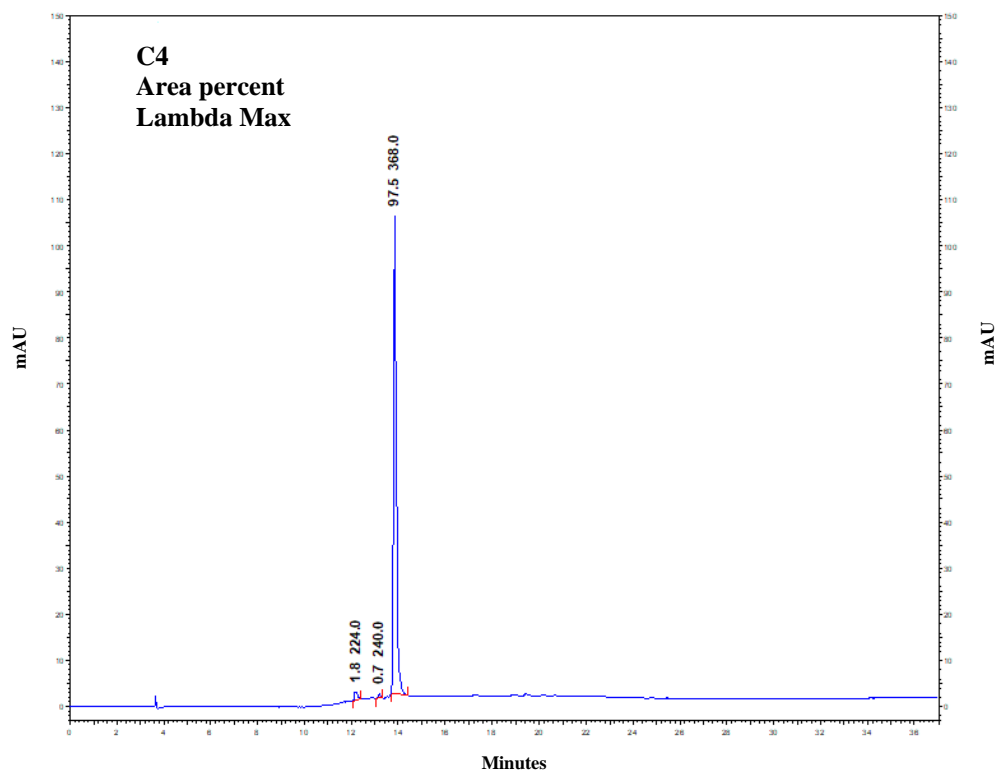
**Figure 44.** HPLC-DAD: 99.6% purity, with a  $\lambda_{\text{max}}$  of 366.0 nm as a result of scanning from 190 to 600 nm of *N'*-[(5-Nitrofur-2-yl)methylene]-2-(trifluoromethyl)-1*H*-benzimidazole-5-carbohydrazide (**C3**).





Formula	Calculated	Obtained	Obtained formula	%	ppM error	Score
C <sub>14</sub> H <sub>11</sub> N <sub>5</sub> O <sub>4</sub>	314.0915	314.08838	C <sub>14</sub> H <sub>11</sub> N <sub>5</sub> O <sub>4</sub> + H <sup>+</sup>	314.0915 (100), 315.0935 (18), 316.0952 (2)	-10	0.753

**Figure 47.** HRMS (APCI):  $m/z$  314.0915 [ $M^+ + H$ ] 1-Methyl- $N'$ -[(5-nitrofuran-2-yl)methylene]-1H-benzimidazole-5-carbohydrazide (**C4**).



**Figure 48.** HPLC-DAD: 97.5% purity, with a  $\lambda_{\text{max}}$  of 368.0 nm as a result of scanning from 190 to 600 nm of 1-Methyl-*N'*-[(5-nitrofur-2-yl)methylene]-1*H*-benzimidazole-5-carbohydrazide (**C4**).