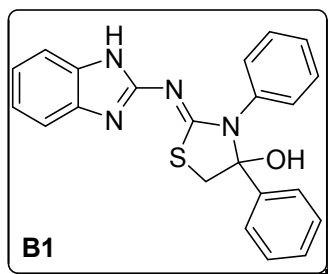


Characteristic Data

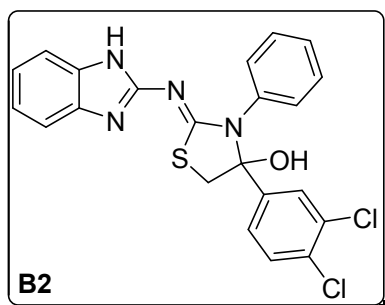


2-(1H-benzo[d]imidazol-2-ylimino)-3,4-diphenylthiazolidin-4-ol

White solid, yield: 80%, **Mp**: 145-147 °C.

Rf: 0.43 (EtOAc/Hexane: 30/70, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 10.01 (bs, 1H), 7.73-7.65 (m, 4H), 7.55-7.51 (m, 2H), 7.41-7.40 (m, 3H), 7.31 (t, *J* = 7.55 Hz, 2H), 7.19-7.16 (m, 2H), 7.00 (t, *J* = 7.36 Hz, 2H). **¹³C NMR (125 MHz, CDCl₃ + DMSO-*D*₆)** δ (ppm) 165.02, 154.98, 140.60, 138.60, 136.74, 128.69, 128.27, 127.75, 127.52, 126.23, 121.11, 120.68, 113.21, 44.13. **HRMS (ESI)** calcd. for C₂₂H₁₈N₄OS+H⁺: 387.1201, found: 387.1268.

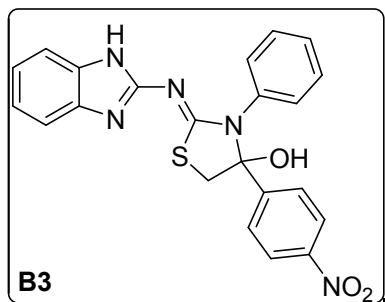


2-(1H-benzo[d]imidazol-2-ylimino)-4-(3,4-dichlorophenyl)-3-phenylthiazolidin-4-ol

White solid, yield: 76%, **Mp**: 136-138 °C.

Rf: 0.45 (EtOAc/Hexane: 30/70, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 7.80 (s, 1H), 7.68-7.64 (m, 2H), 7.44 (d, *J* = 8.49 Hz, 1H), 7.34-7.28 (m, 4H), 7.22 (t, *J* = 7.17 Hz, 1H), 7.13 (t, *J* = 6.79 Hz, 1H), 7.00-6.97 (m, 2H), 3.72 (d, *J* = 12.08 Hz, 1H), 3.55 (d, *J* = 11.89 Hz, 1H). **¹³C NMR (125 MHz, CDCl₃ + DMSO-*D*₆)** δ (ppm) 157.63, 144.19, 142.33, 138.57, 137.06, 133.95, 133.40, 130.68, 130.17, 129.40, 128.60, 128.13, 125.50, 124.76, 122.58, 122.30, 114.30, 141.22. **HRMS (ESI)** calcd. for C₂₂H₁₆Cl₂N₄OS+H⁺: 387.1201, found: 387.1268.

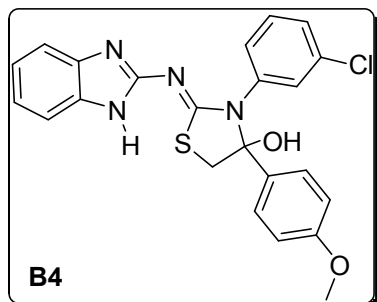


2-(1H-benzo[d]imidazol-2-ylimino)-4-(4-nitrophenyl)-3-phenylthiazolidin-4-ol

Yellow solid, yield: 89%, **Mp**: 111-113 °C.

Rf: 0.33 (EtOAc/Hexane: 70/30, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 8.23 (d, *J* = 8.90 Hz, 2H), 7.76 (d, *J* = 8.90 Hz, 2H), 7.42-7.35 (m, 4H), 7.22 (t, *J* = 7.91 Hz, 1H), 7.14-7.10 (m, 4H), 3.6 (br s, 2H). **¹³C NMR (125 MHz, CDCl₃+ DMSO-*D*₆)** δ (ppm) 164.38, 154.90, 148.51, 146.81, 143.54, 138.35, 137.21, 128.72, 127.94, 127.57, 126.49, 122.57, 120.38, 113.19, 43.59. **HRMS (ESI)** calcd. for C₂₂H₁₇N₅O₃S+H⁺: 432.1124, found: 432.1109.

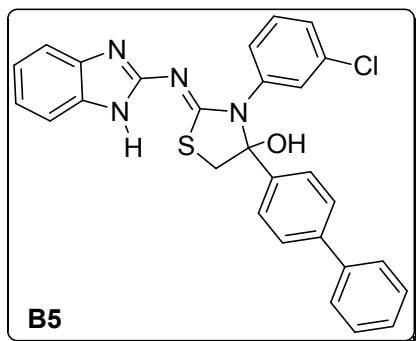


2-(1H-benzo[d]imidazol-2-ylimino)-3-(3-chlorophenyl)-4-(4-methoxyphenyl)thiazolidin-4-ol

White solid, yield: 72%, **Mp**: 91-93 °C..

Rf: 0.45 (EtOAc/Hexane: 70/30, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 8.01 (br s, 1H), 7.69 (s, 1H), 7.45 (d, *J* = 7.97 Hz, 1H), 7.37 (br m, 3H), 7.28-7.05 (m, 5H), 6.99-6.93 (m, 1H), 7.77 (d, *J* = 8.08 Hz, 1H), 4.67 (br s, 1H), 3.75 (s, 3H), 3.57 (d, *J* = 11.74 Hz, 1H). **¹³C NMR (125 MHz, CDCl₃ + DMSO-*D*₆)** δ (ppm) 164.20, 158.34, 154.41, 139.65, 129.63, 129.30, 128.34, 127.06, 126.64, 125.80, 125.19, 124.46, 120.70, 120.16, 113.08, 112.48, 54.68, 43.63. **HRMS (ESI)** calcd. for C₂₃H₁₉ClN₄O₂S+H⁺: 451.0990, found: 451.0991.

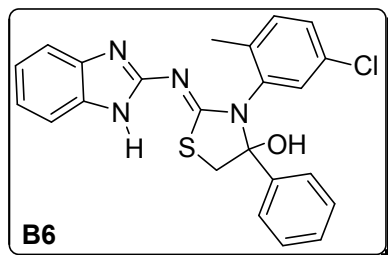


2-(1H-benzo[d]imidazol-2-ylimino)-4-(biphenyl-4-yl)-3-(3-chlorophenyl)thiazolidin-4-ol

White solid, yield: 78%, **Mp**: 109-111 °C.

Rf: 0.38 (EtOAc/Hexane: 30/70, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 7.69-7.59 (m, 3H), 7.55-7.49 (m, 3H), 7.42-7.41 (m, 5H), 7.33-7.32 (m, 1H), 7.27-7.25 (m, 1H), 7.14-7.09 (m, 4H). **¹³C NMR (125 MHz, CDCl₃ + DMSO-*D*₆)** δ (ppm) 164.64, 154.48, 139.93, 139.65, 139.27, 136.58, 132.58, 128.59, 128.29, 128.09, 126.81, 126.46, 126.17, 125.92, 120.50, 113.05, 43.84. **HRMS (ESI)** calcd. for C₂₈H₂₁ClN₄OS+H⁺: 497.1197, found: 497.1175.

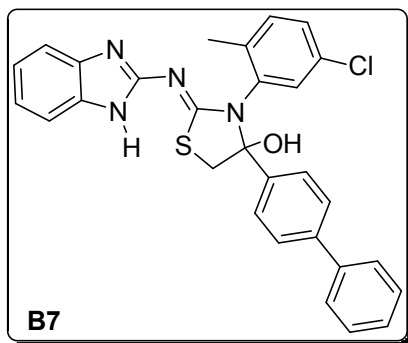


2-(1H-benzo[d]imidazol-2-ylimino)-3-(5-chloro-2-methylphenyl)-4-phenylthiazolidin-4-ol

White solid, yield: 45%, **Mp**: 124-126 °C.

Rf: 0.47 (EtOAc/Hexane: 30/70, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 7.70 (s, 2H), 7.43-7.36 (m, 5H), 7.25-7.12 (m, 5H), 3.93 (br s, 1H), 2.29 (s, 3H). **¹³C NMR (125 MHz, CDCl₃ + DMSO-*D*₆)** δ (ppm) 159.60, 150.06, 140.13, 133.74, 131.72, 130.58, 128.84, 128.67, 128.14, 128.00, 127.63, 126.32, 125.96, 123.64, 122.01, 113.85, 40.43, 17.58. **HRMS (ESI)** calcd. for C₂₃H₁₉ClN₄OS+H⁺: 435.1040, found: 435.1022.

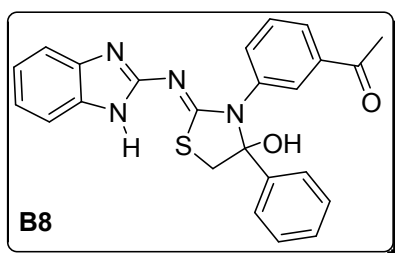


2-(1H-benzo[d]imidazol-2-ylimino)-4-(biphenyl-4-yl)-3-(5-chloro-2-methylphenyl)thiazolidin-4-ol

White solid, yield: 75%, **Mp**: 141-143 °C.

Rf: 0.50 (EtOAc/Hexane: 30/70, UV light and *p*-anisaldehyde solution).

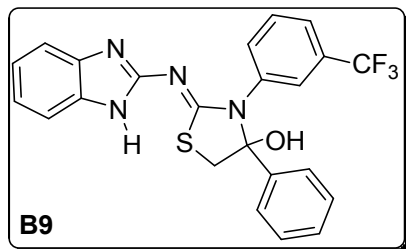
¹H NMR (300 MHz, CDCl₃) δ (ppm) 7.83 (s, 1H), 7.65 (d, J = 8.23 Hz, 2H), 7.59 (d, J = 7.31 Hz, 2H), 7.45 (t, J = 7.70 Hz, 2H), 7.40-7.36 (m 3H), 7.22-7.14 (m, 6H), 4.07 (br s, 1H), 2.30 (s, 3H). **¹³C NMR (125 MHz, CDCl₃ + DMSO-*D*₆)** δ (ppm) 159.71, 150.30, 143.59, 139.91, 131.75, 129.50, 128.97, 128.85, 128.45, 127.89, 127.33, 127.11, 126.98, 126.06, 123.92, 122.03, 113.83, 40.33, 17.64. **HRMS (ESI)** calcd. for C₂₃H₁₉ClN₄OS+H⁺: 511.1353, found: 511.1335.



1-(3-(2-(1H-benzo[d]imidazol-2-ylimino)-4-hydroxy-4-phenylthiazolidin-3-yl)phenyl)ethanone
White solid, yield: 30%, **Mp**: 82-84 °C.

Rf: 0.34 (EtOAc/Hexane: 70/30, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 7.62-7.58 (m, 3H), 7.53 (d, J = 7.43 Hz, 1H), 7.45-7.46 (m, 1H), 7.39 (s, 2H), 7.27-7.19 (m, 4H), 7.13 (s, 1H), 7.07-7.06 (m, 1H), 2.62-2.63 (m, 1H), 2.59-2.57 (m, 1H), 2.45 (s, 3H). **¹³C NMR (125 MHz, CDCl₃ + DMSO-*D*₆)** δ (ppm) 197.10, 172.92, 170.47, 164.89, 154.64, 140.34, 138.87, 136.52, 133.03, 128.78, 128.19, 128.03, 127.57, 126.18, 125.78, 122.82, 121.19, 120.41, 113.34, 43.98, 26.21. **HRMS (ESI)** calcd. for C₂₃H₁₉ClN₄OS+H⁺: 429.1379, found: 429.1358.

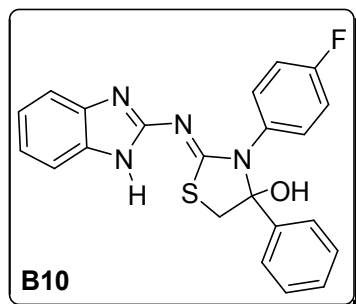


2-(1H-benzo[d]imidazol-2-ylimino)-4-phenyl-3-(3-(trifluoromethyl)phenyl)thiazolidin-4-ol
White solid, yield: 30%, **Mp**: 108-110 °C.

Rf: 0.40 (EtOAc/Hexane: 70/30, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 7.70-7.64 (m, 4H), 7.42-7.41 (m, 5H), 7.31 (d, *J* = 7.78 Hz, 2H), 7.17-7.15 (m, 2H), 3.92 (br s, 1H). **¹³C NMR (125 MHz, CDCl₃ + DMSO-*D*₆)** δ (ppm) 159.13, 149.52, 140.42, 130.38, 128.69, 127.16, 126.43, 126.12, 123.26, 122.10, 113.55, 40.69.

HRMS (ESI) calcd. for C₂₃H₁₇F₃N₄OS+H⁺: 455.1147, found: 455.1141.

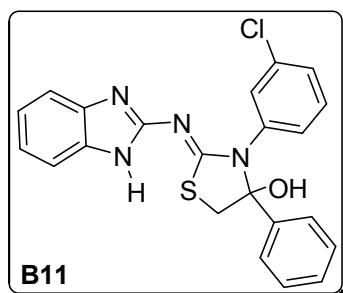


2-(1H-benzo[d]imidazol-2-ylimino)-3-(4-fluorophenyl)-4-phenylthiazolidin-4-ol
White solid, yield: 34%, **Mp**: 98-100 °C.

Rf: 0.47 (EtOAc/Hexane: 70/30, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 8.14-7.92 (m, 1H), 7.70-7.63 (m, 1H), 7.52 (s, 2H), 7.40 (s, 2H), 7.33-7.11 (m, 6H), 6.86 (s, 1H), 4.20 (d, *J* = 11.70 Hz, 1H), 3.96 (d, *J* = 10.92 Hz, 1H).

¹³C NMR (125 MHz, CDCl₃ + DMSO-*D*₆) δ (ppm) 169.57, 159.80, 150.86, 148.62, 138.78, 132.40, 129.93, 129.09, 128.37, 127.96, 127.44, 126.06, 123.52, 122.84, 114.58, 111.80, 111.02, 110.68, 43.44. **HRMS (ESI)** calcd. for C₂₂H₁₇FN₄OS+H⁺: 405.1179, found: 405.1166.

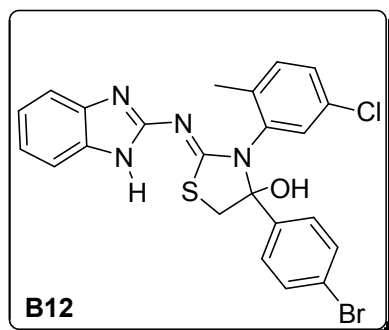


2-(1H-benzo[d]imidazol-2-ylimino)-3-(3-chlorophenyl)-4-phenylthiazolidin-4-ol

White solid, yield: 78%, **Mp**: 128-130 °C.

Rf: 0.46 (EtOAc/Hexane: 30/70, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 7.63 (s, 1H), 7.55 (d, *J* = 7.50 Hz, 2H), 7.41-7.55 (m, 3H), 7.27 (t, *J* = 7.76 Hz, 2H), 7.23-7.20 (m, 2H), 7.13 (t, *J* = 7.89 Hz, 1H), 7.09-7.07 (m, 2H), 3.82 (d, *J* = 12.04 Hz, 1H), 3.62 (d, *J* = 11.91 Hz, 1H). **¹³C NMR (125 MHz, CDCl₃ + DMSO-*D*₆)** δ (ppm) 164.38, 154.22, 139.98, 139.45, 136.25, 132.23, 128.35, 127.94, 127.31, 127.18, 126.56, 125.80, 125.67, 120.24, 112.75, 43.61. **HRMS (ESI)** calcd. for C₂₂H₁₇ClN₄OS+H⁺: 421.0884, found: 421.0869.

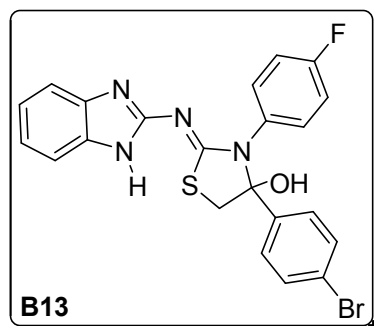


2-(1H-benzo[d]imidazol-2-ylimino)-4-(4-bromophenyl)-3-(5-chloro-2-methylphenyl)thiazolidin-4-ol

White solid, yield: 73%, **Mp**: 161-163 °C.

Rf: 0.49 (EtOAc/Hexane: 70/30, UV light and *p*-anisaldehyde solution).

¹H NMR (700 MHz, CDCl₃) δ (ppm) 7.67 (d, *J* = 9.83 Hz, 2H), 7.59-7.51 (m, 4H), 7.38 (d, *J* = 6.60 Hz, 1H), 7.29-7.17 (m, 4H), 4.32 (d, *J* = 11.78 Hz, 1H), 3.94 (d, *J* = 11.91 Hz, 1H), 2.08 (s, 3H). **¹³C NMR (176 MHz, CDCl₃ + DMSO-*D*₆)** δ (ppm) 167.64, 166.36, 150.88, 148.22, 137.53, 131.50, 130.60, 129.83, 128.79, 127.89, 127.20, 123.64, 123.20, 122.65, 112.23, 111.80, 43.11, 17.68. **HRMS (ESI)** calcd. for C₂₃H₁₈BrClN₄OS+H⁺: 513.0146, found: 513.0127.



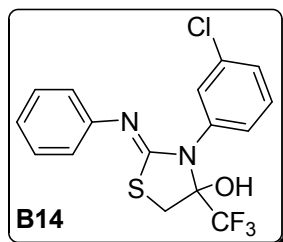
2-(1H-benzo[d]imidazol-2-ylimino)-4-(4-bromophenyl)-3-(4-fluorophenyl)thiazolidin-4-ol

White solid, yield: 72%, **Mp**: 109-111 °C.

Rf: 0.51 (EtOAc/Hexane: 70/30, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 7.44-7.40 (m, 4H), 7.37-7.34 (m, 2H), 7.26-7.11 (m, 4H), 6.63-6.60 (m, 2H), 3.96 (d, *J* = 12.04 Hz, 1H), 3.84 (d, *J* = 12.04 Hz, 1H). **¹³C NMR (125 MHz, CDCl₃)** δ (ppm) 171.55, 162.75, 160.73, 151.20, 137.90, 132.27, 131.51, 130.41, 130.04,

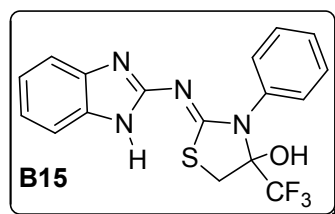
129.50, 128.50, 124.59, 123.30, 115.68, 115.50, 112.63, 43.89. **HRMS (ESI)** calcd. for $C_{22}H_{16}N_4OSBrF+H^+$: 483.0285, found: 483.0268.



3-(3-chlorophenyl)-2-(phenylimino)-4-(trifluoromethyl)thiazolidin-4-ol: Prepared by the above same procedure from 1-(3-chlorophenyl)-3-phenylthiourea and 3-bromo-1,1,1-trifluoropropan-2-one. White solid, yield: 83%, **Mp**: 120-122 °C.

Rf: 0.53 (EtOAc/Hexane: 30/70, UV light and *p*-anisaldehyde solution).

¹H NMR (300 MHz, CDCl₃) δ (ppm) 7.50-7.28 (m, 6H), 7.14 (d, *J* = 7.42 Hz, 1H), 7.98-7.87 (m, 2H), 3.74 (d, *J* = 12.27 Hz, 1H), 3.50 (d, *J* = 12.27 Hz, 1H). **¹³C NMR (125 MHz, CDCl₃)** δ (ppm) 159.03, 147.53, 137.24, 130.13, 128.21, 127.74, 126.79, 126.37, 123.98, 122.33, 121.09, 34.48. **HRMS (ESI)** calcd. for $C_{16}H_{12}N_2OSCIF_3+H^+$: 373.0389, found: 373.0382.



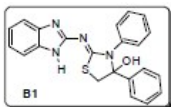
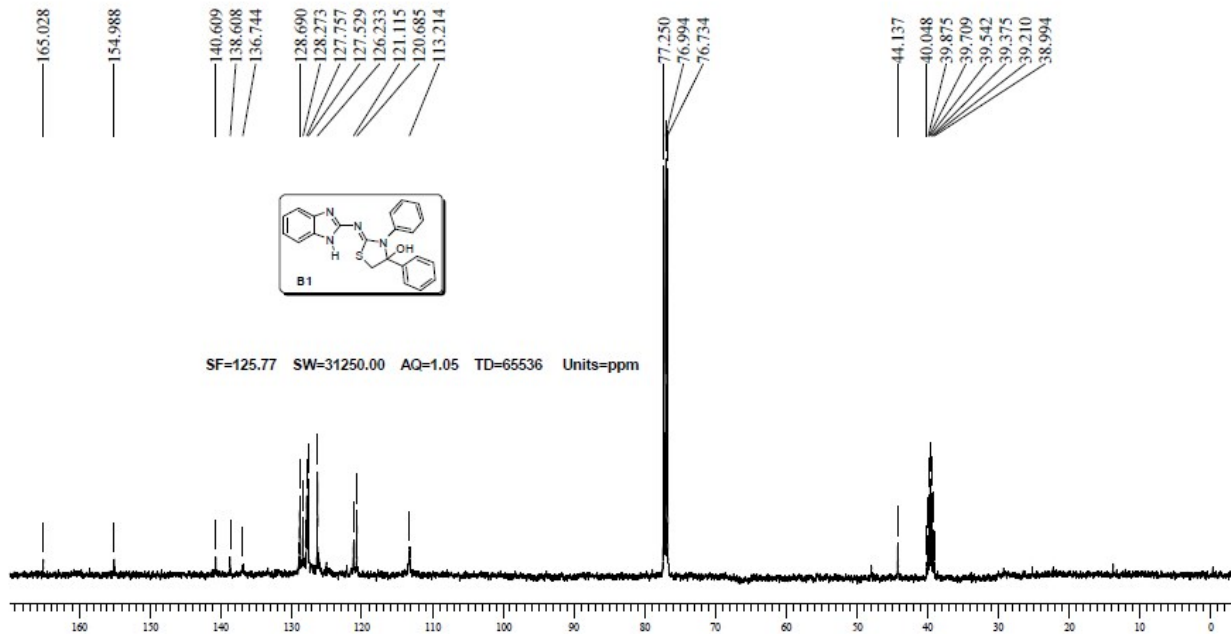
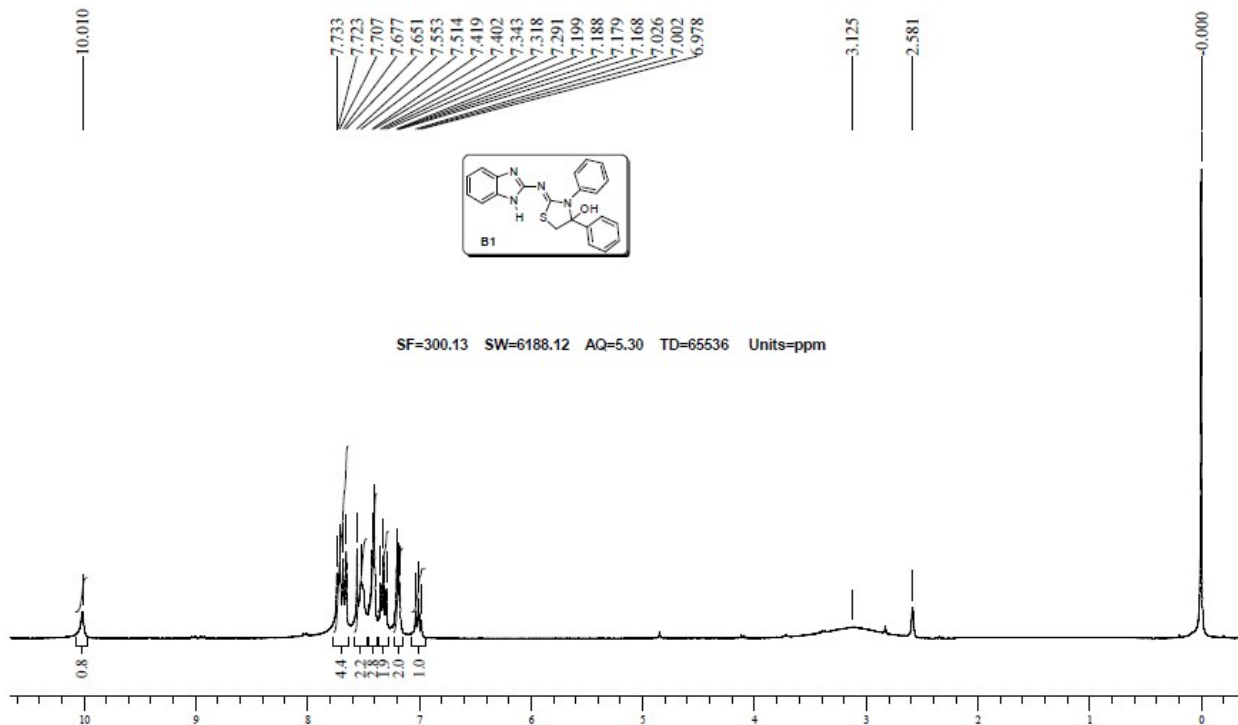
2-(1H-benzo[d]imidazol-2-ylimino)-3-phenyl-4-(trifluoromethyl)thiazolidin-4-ol

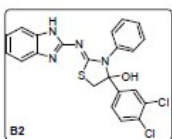
White solid, yield: 90%, **Mp**: 188-190 °C.

Rf: 0.25 (EtOAc/Hexane: 30/70, UV light and *p*-anisaldehyde solution).

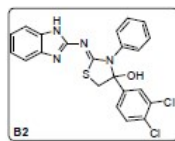
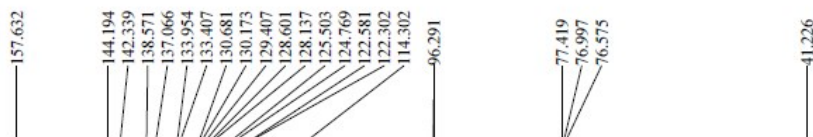
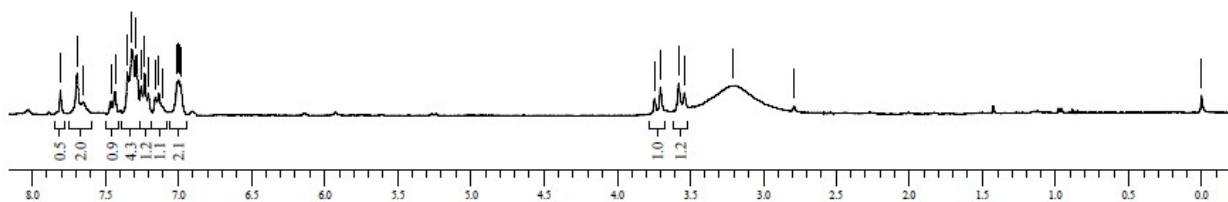
¹H NMR (300 MHz, CDCl₃) δ (ppm) 7.43-7.35 (m, 7H), 7.08-7.02 (m, 2H), 3.78 (d, *J* = 12.46 Hz, 1H), 3.53 (d, *J* = 12.46 Hz, 1H). **¹³C NMR (125 MHz, CDCl₃)** δ (ppm) 164.89, 154.57, 152.37, 147.91, 138.11, 137.47, 130.20, 128.20, 127.72, 122.66, 121.04, 120.45, 118.92, 113.32, 35.09. **HRMS (ESI)** calcd. for $C_{17}H_{13}N_4OSF_3+H^+$: 379.0834, found: 379.0836.

Spectral Data

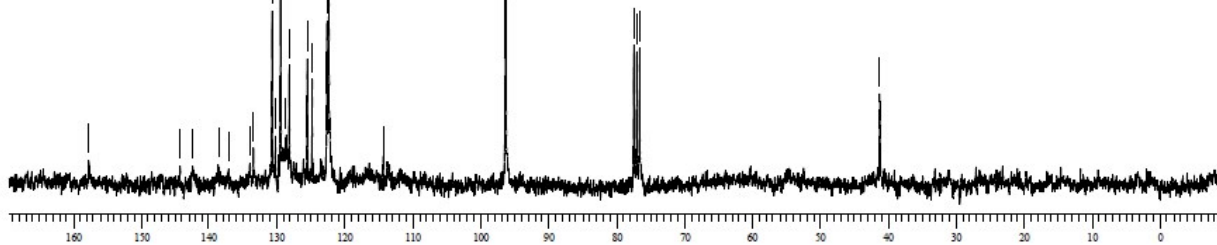


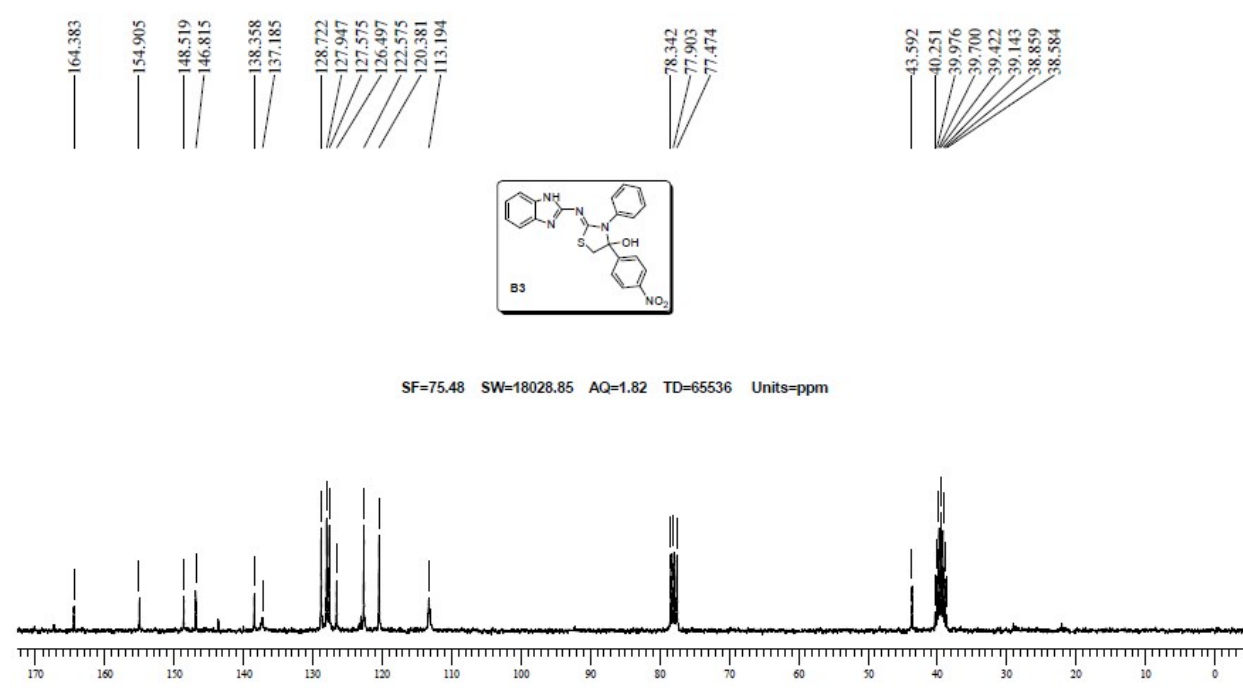
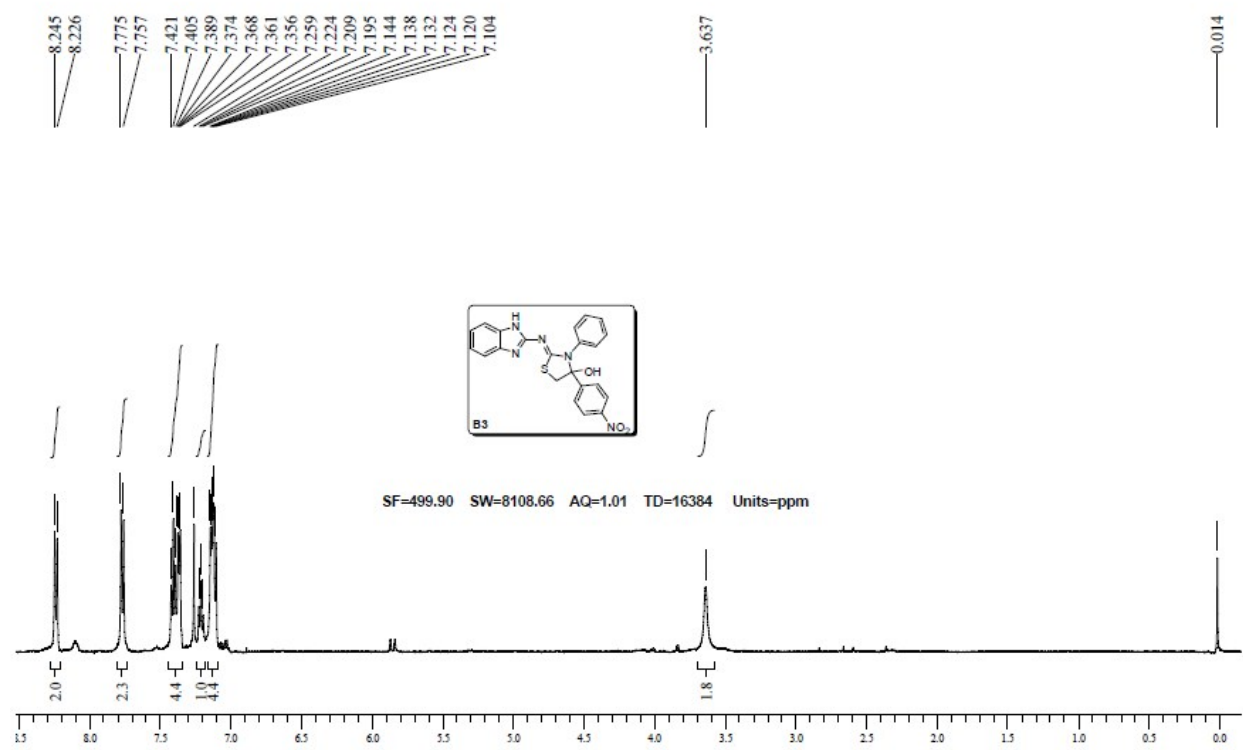


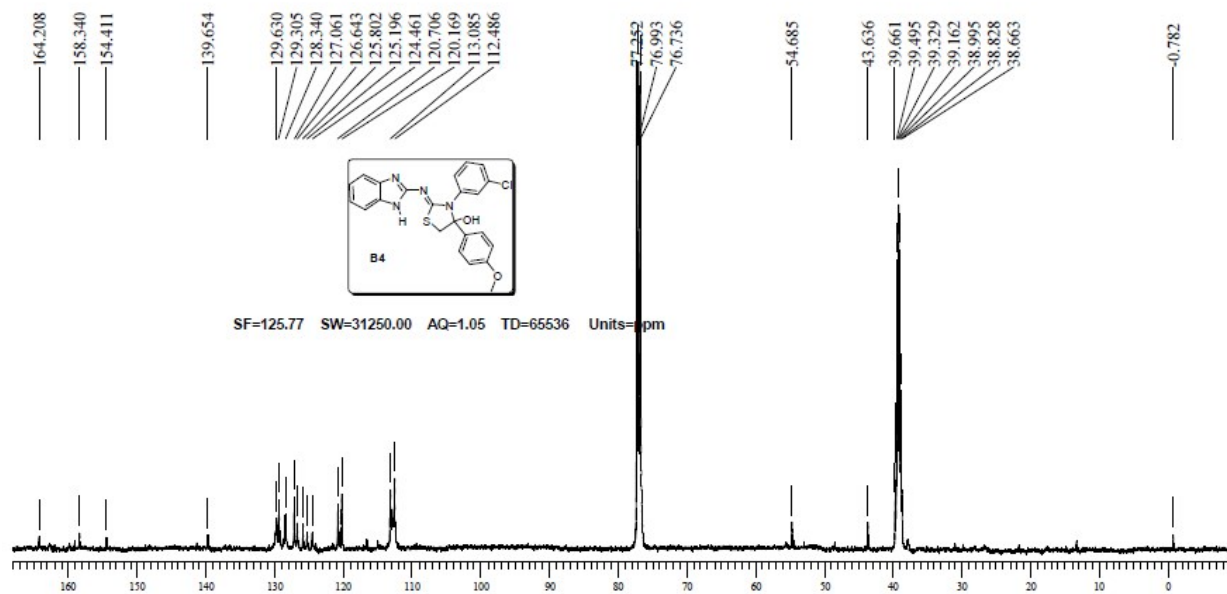
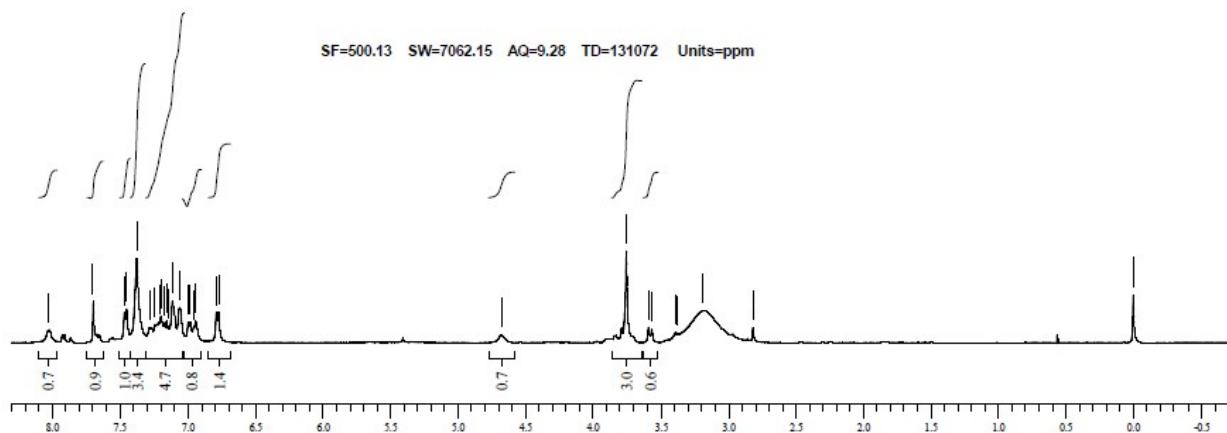
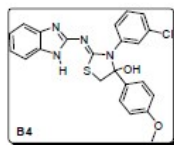
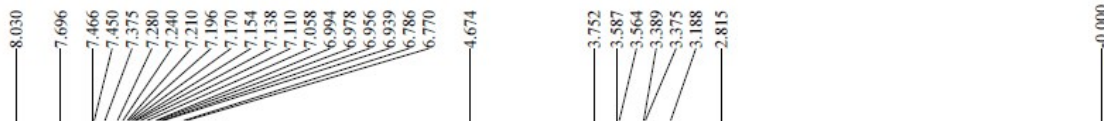
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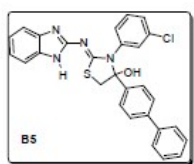
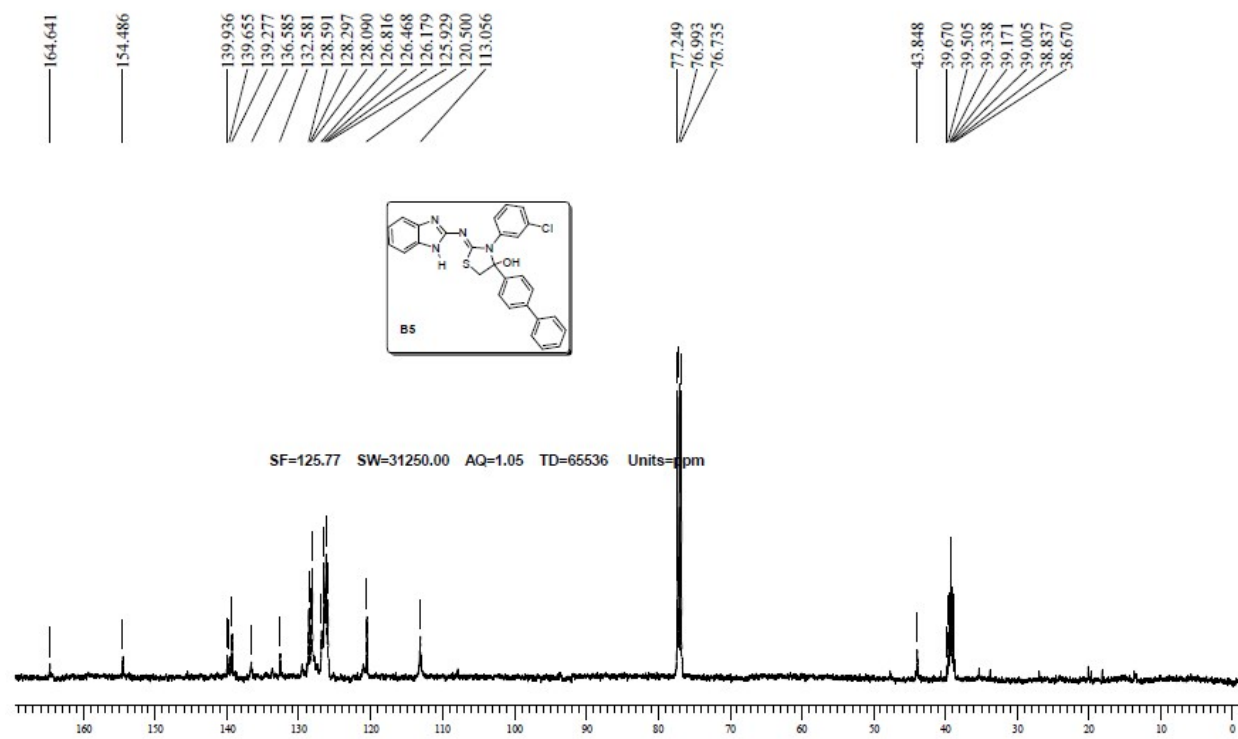
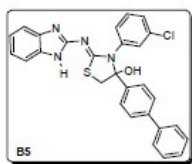
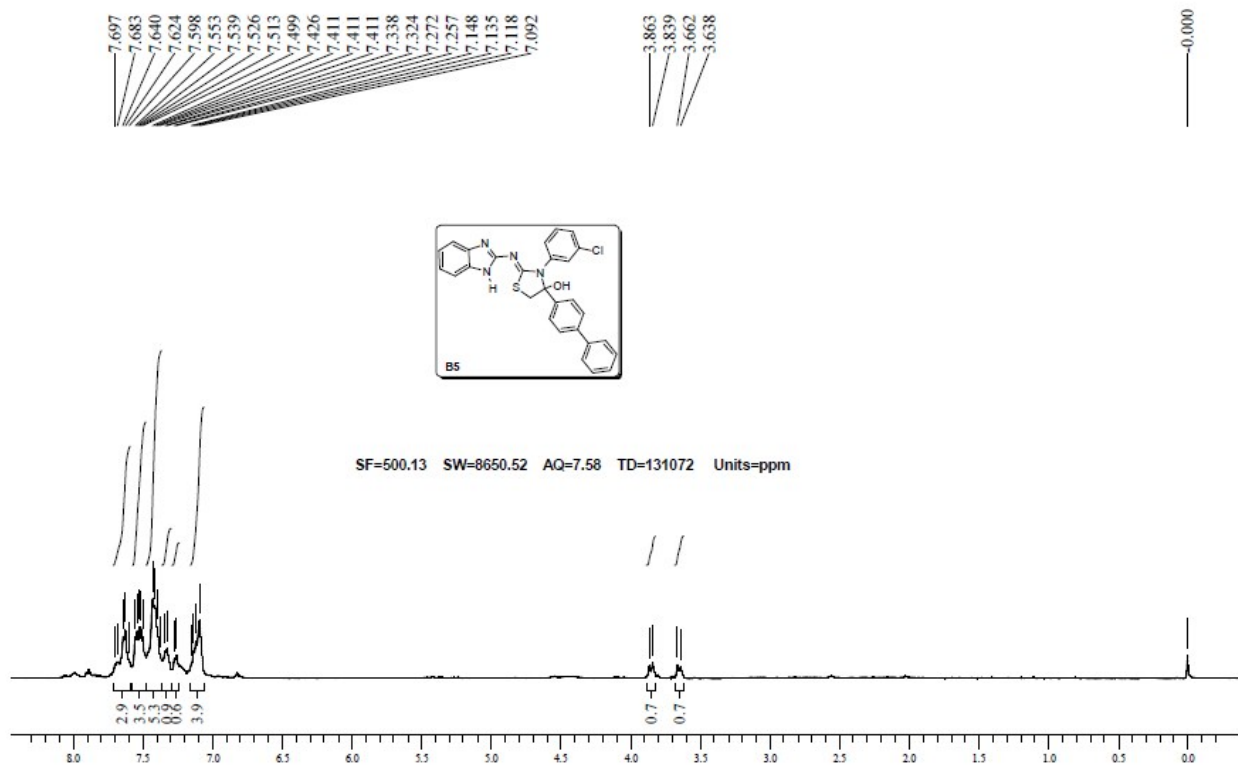


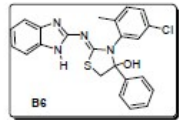
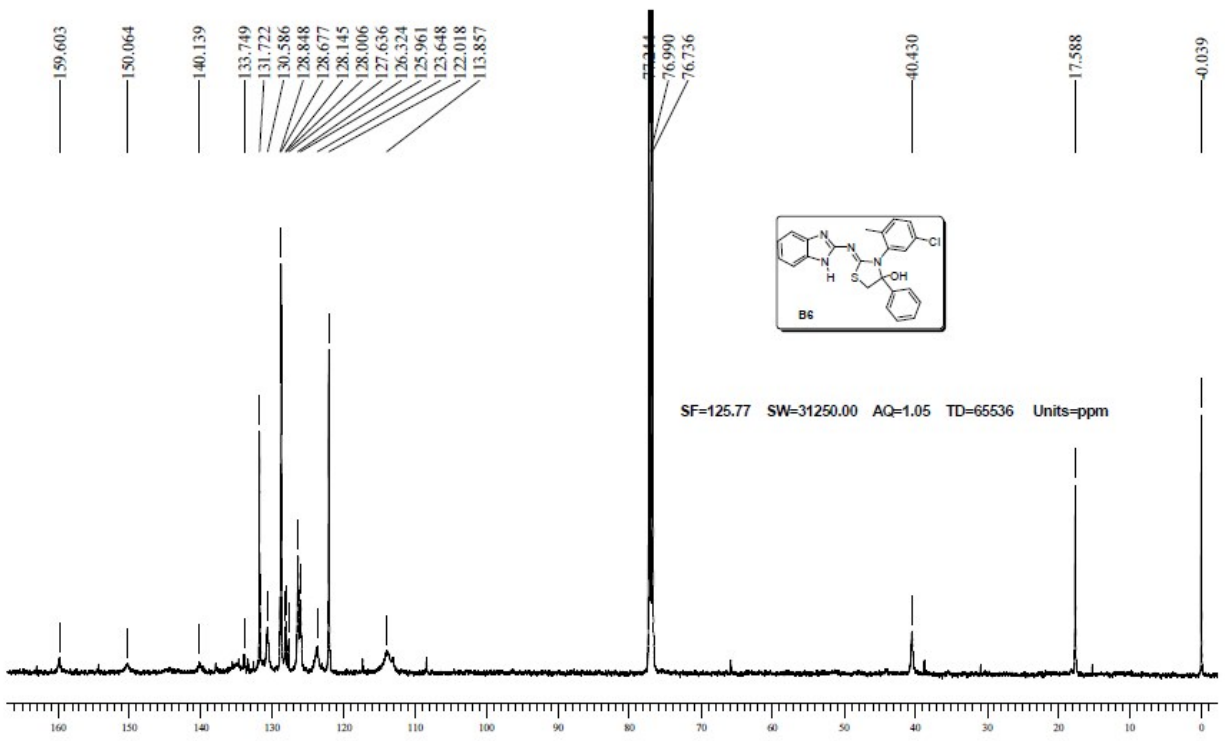
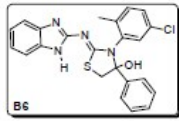
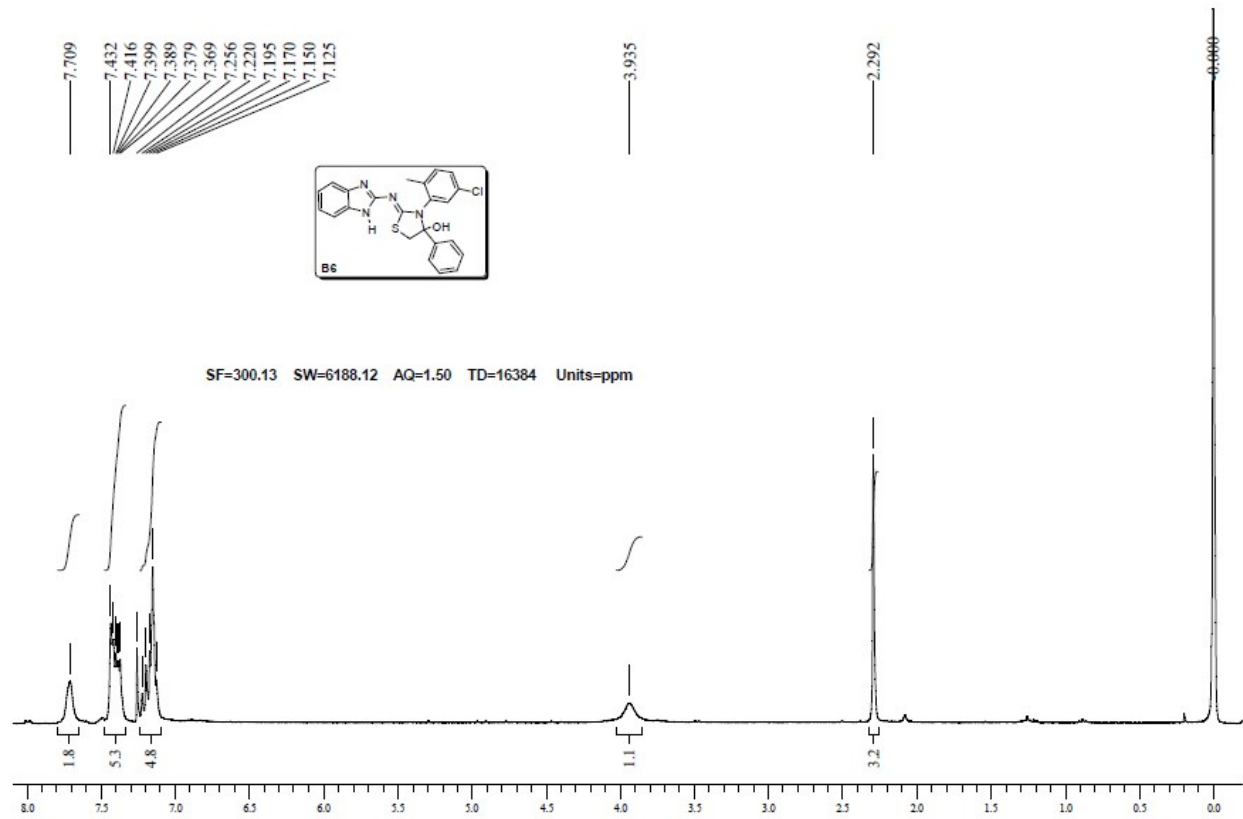
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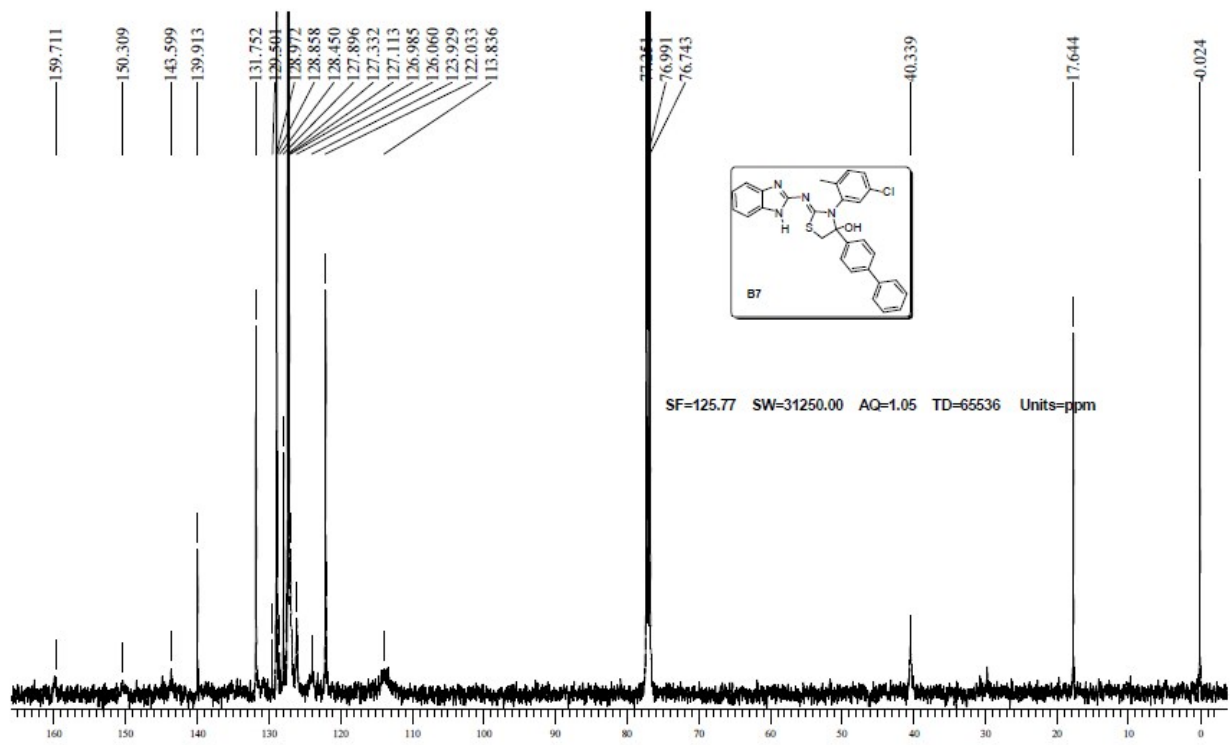
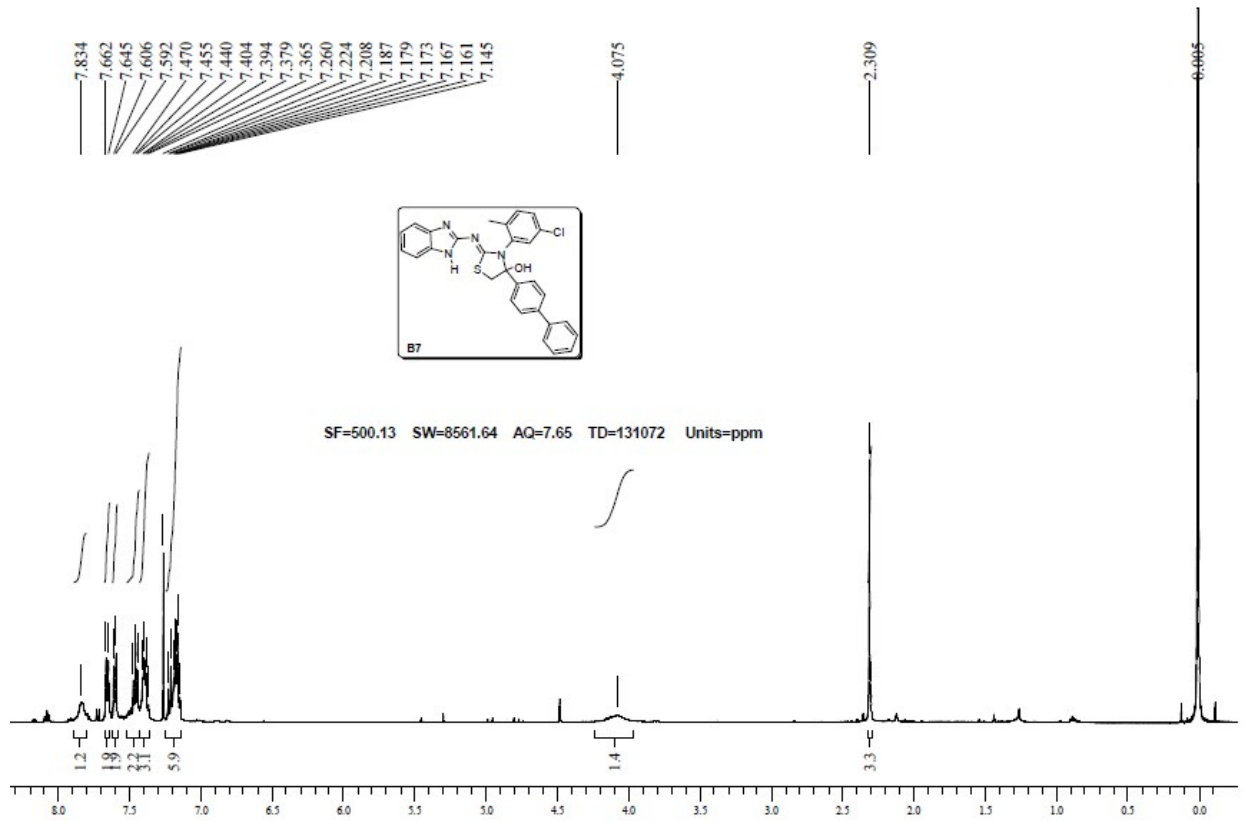








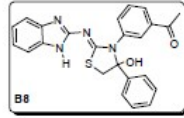




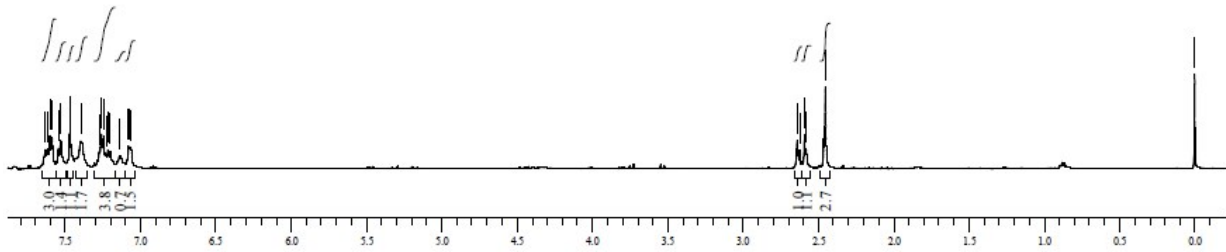
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7.213
7.199
7.137
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7.066
7.060

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2.622
2.590
2.578
2.451

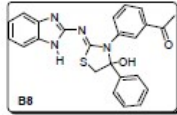
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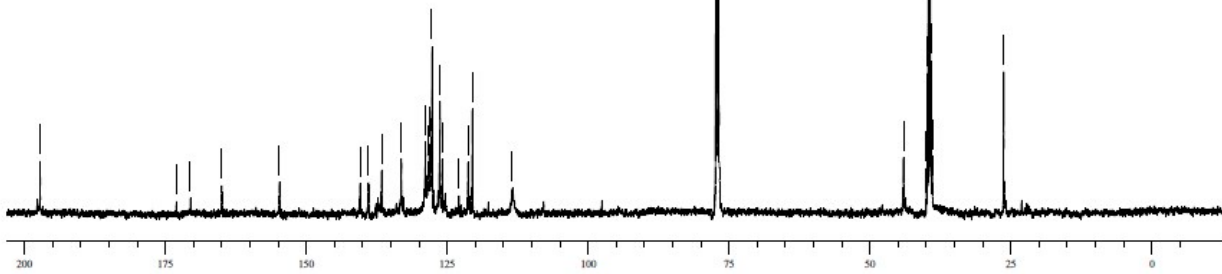
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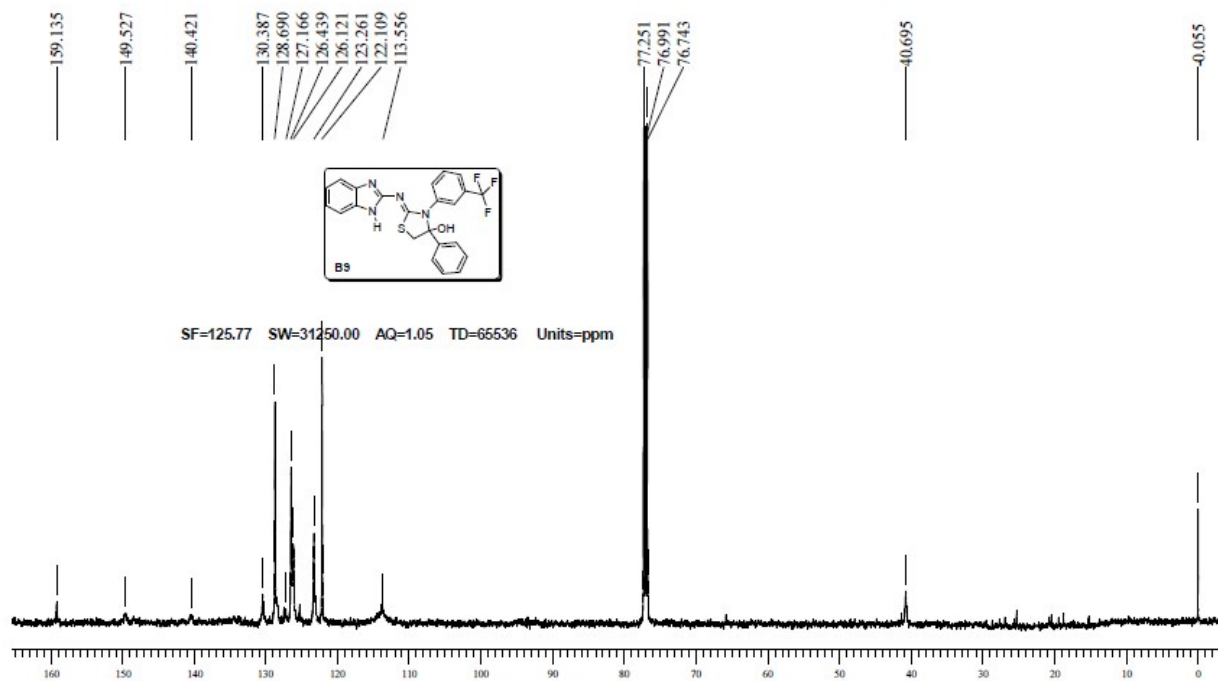
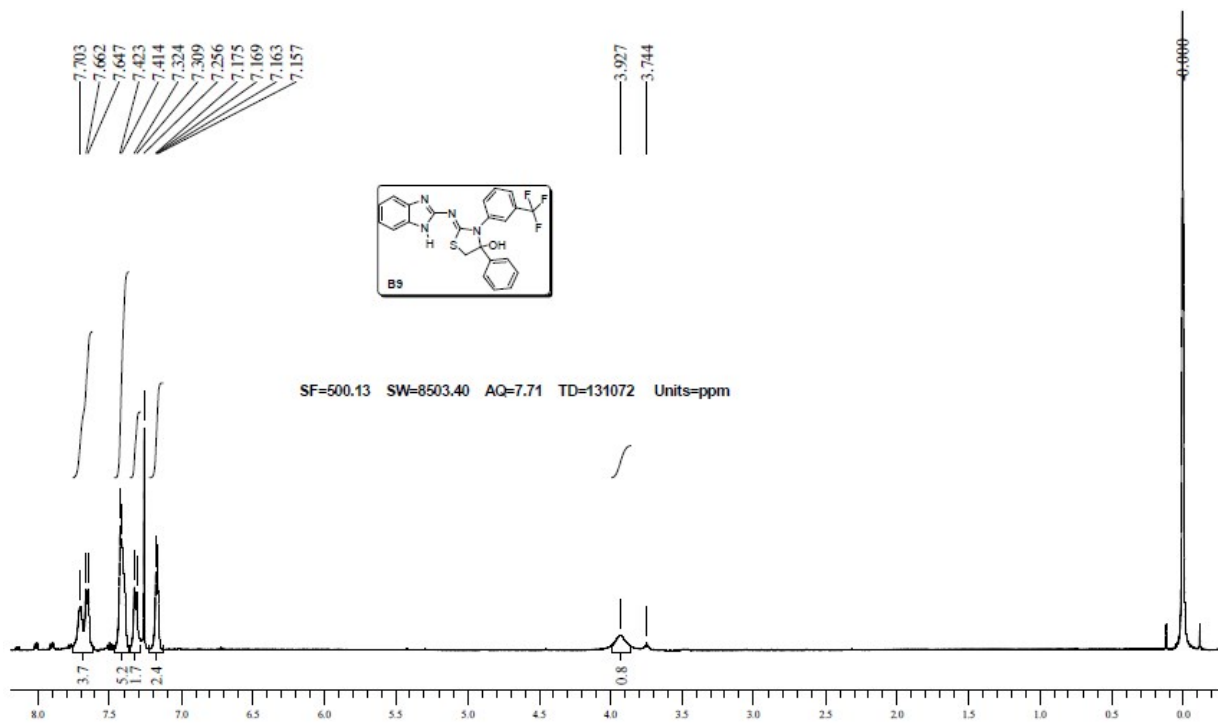


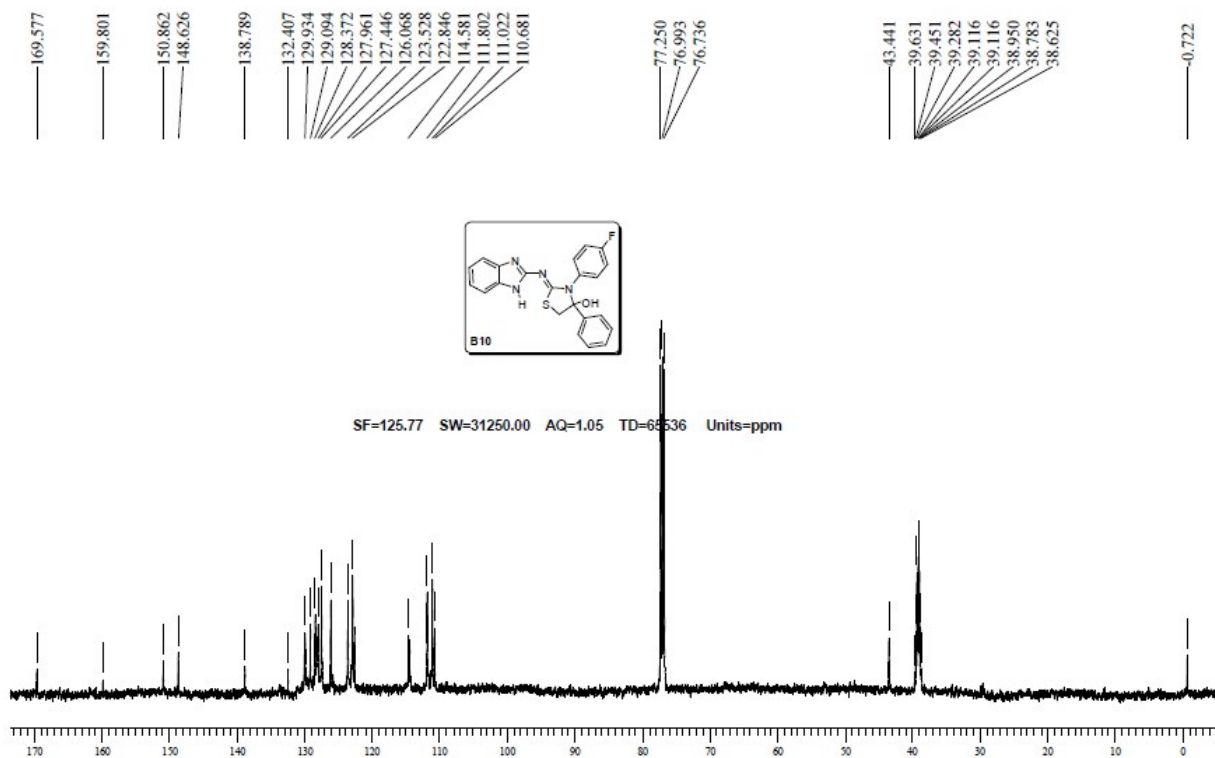
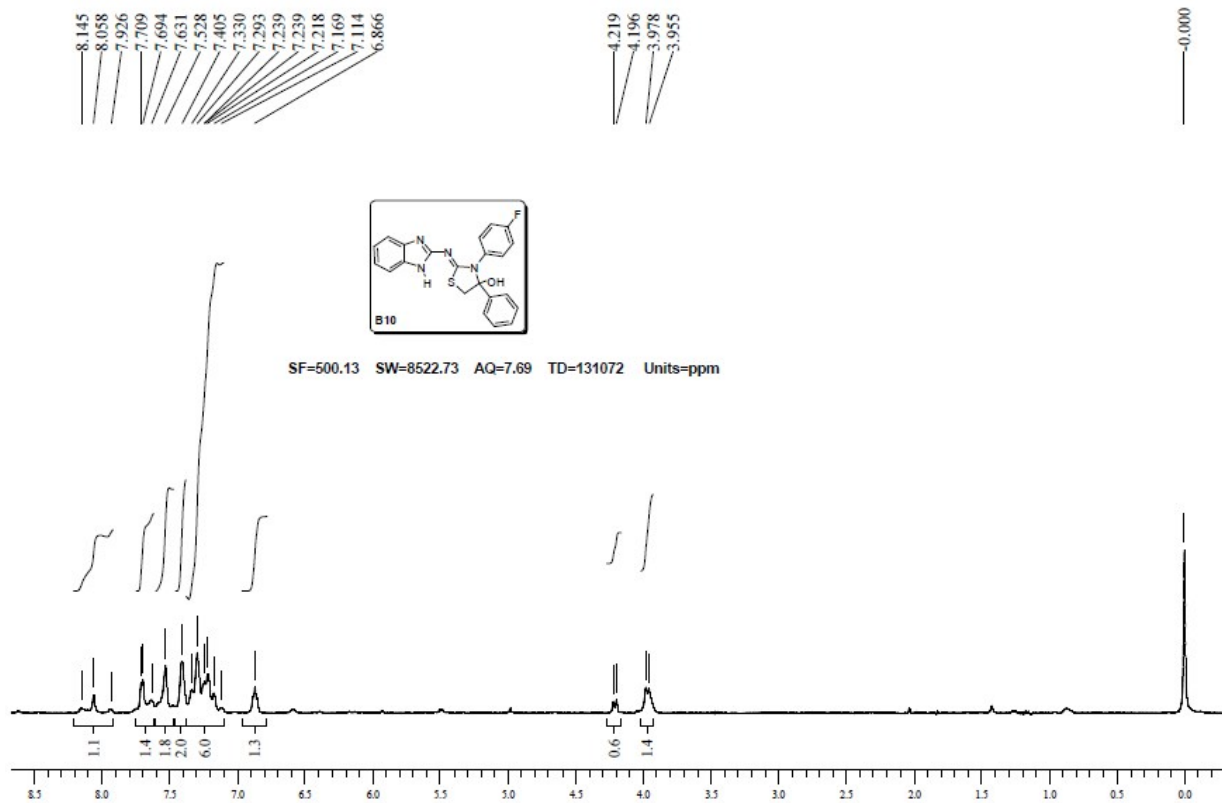
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128.031
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126.182
125.785
122.822
121.192
120.417
113.345
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26.217

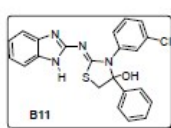
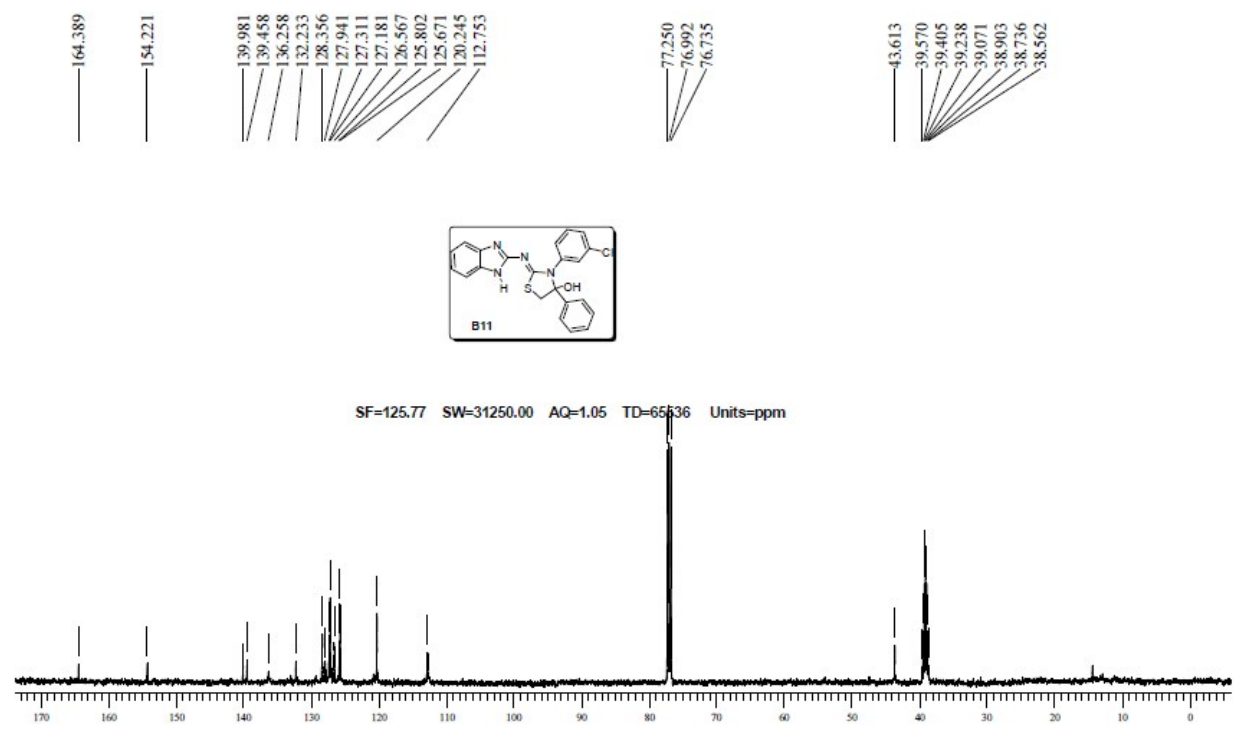
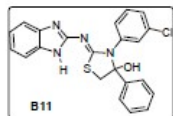
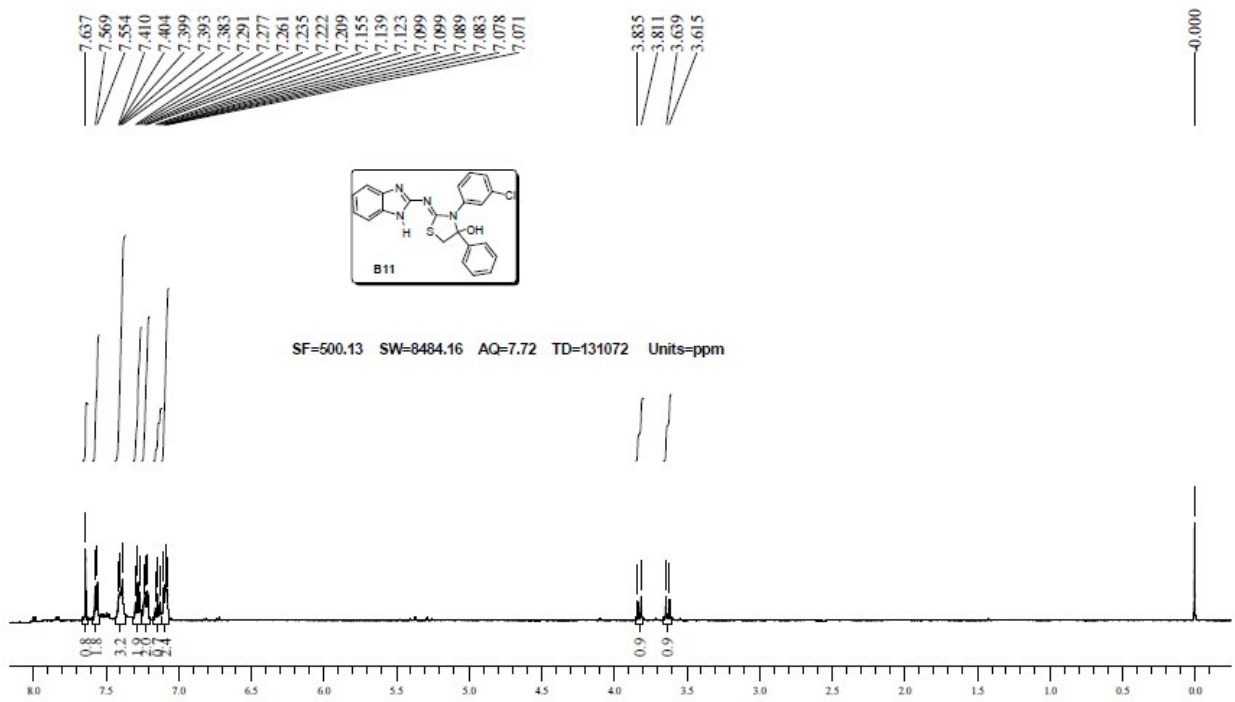


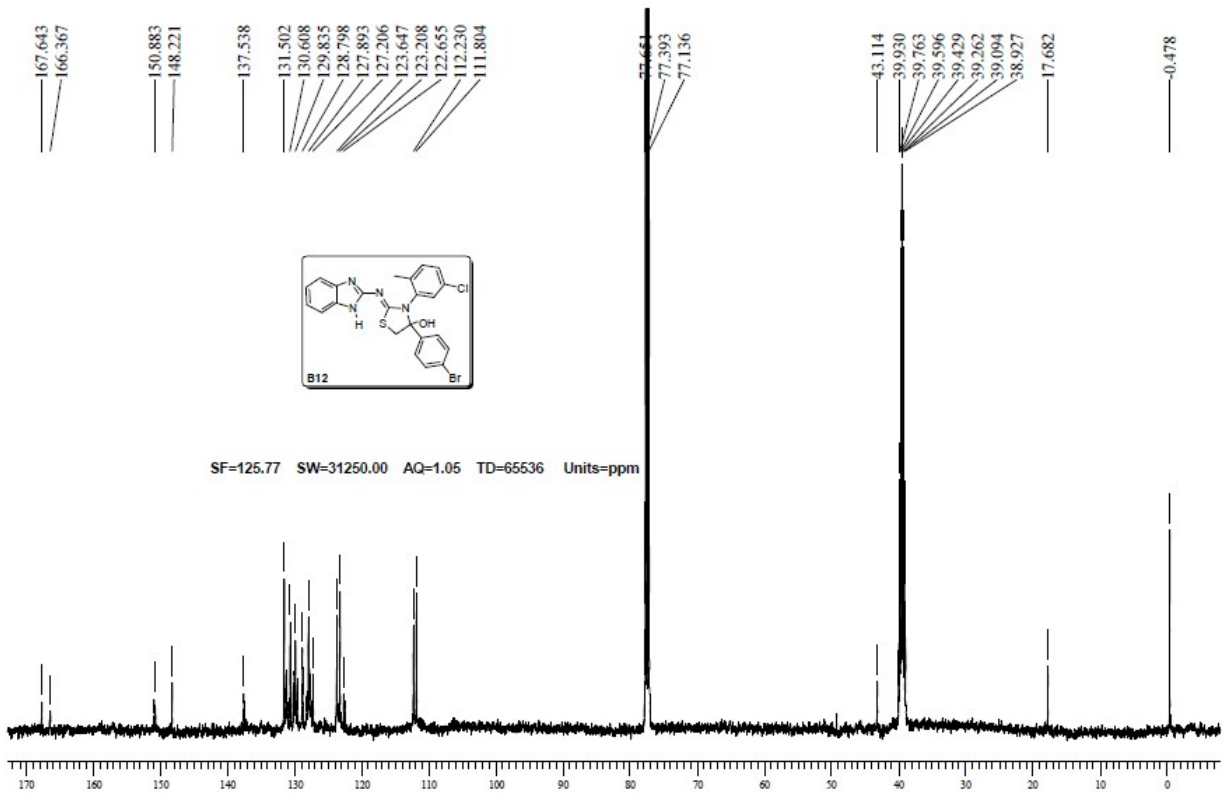
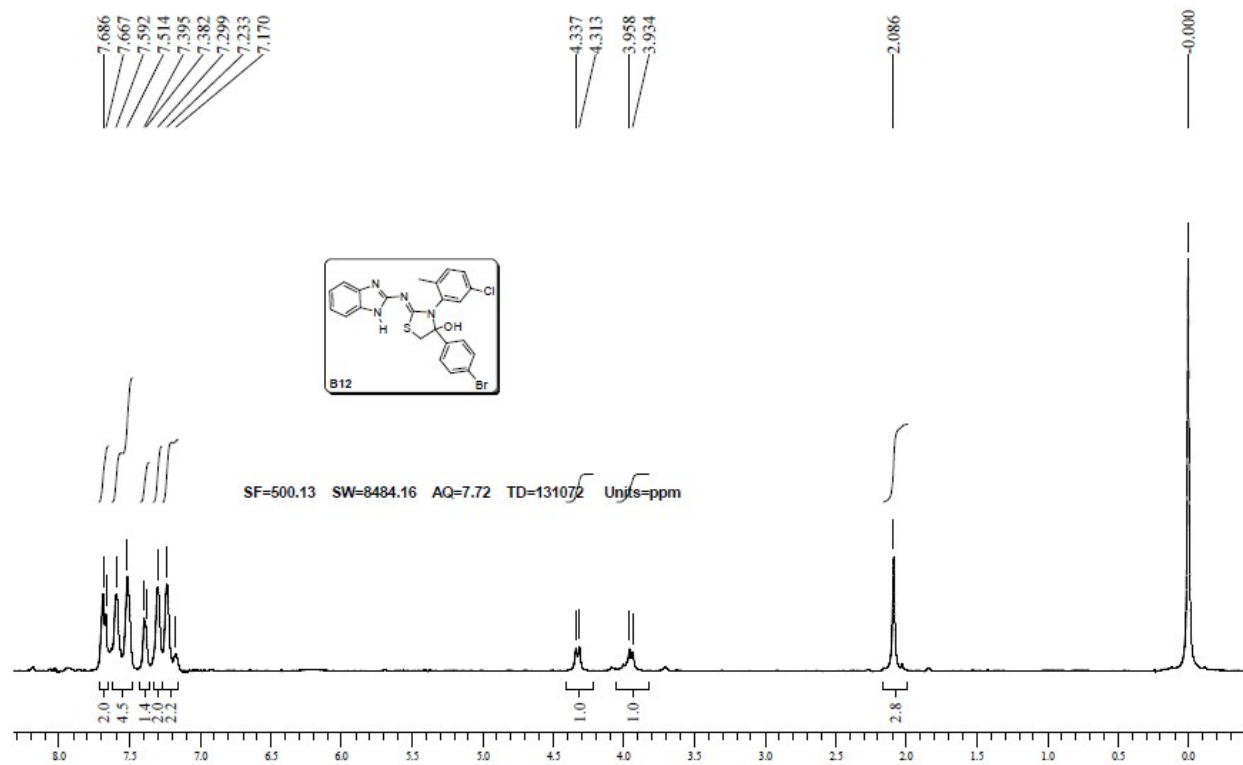
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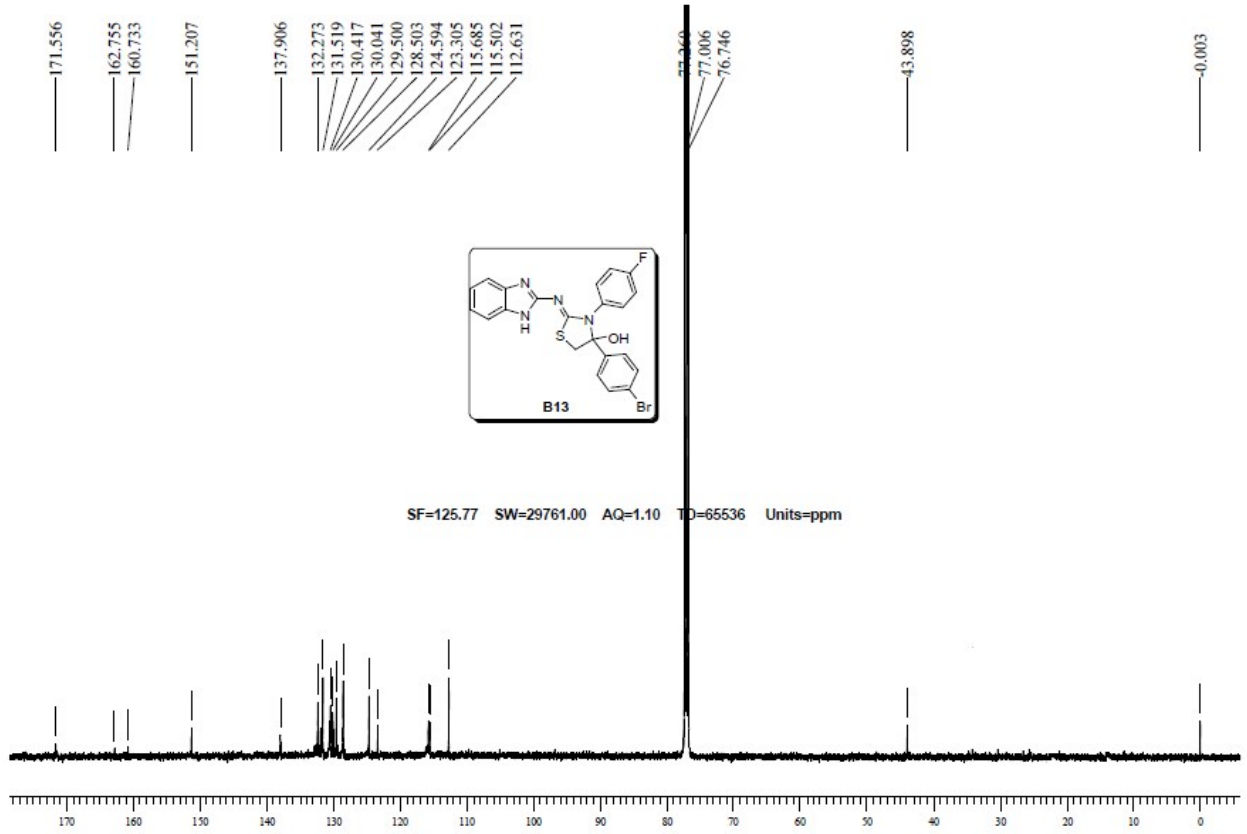
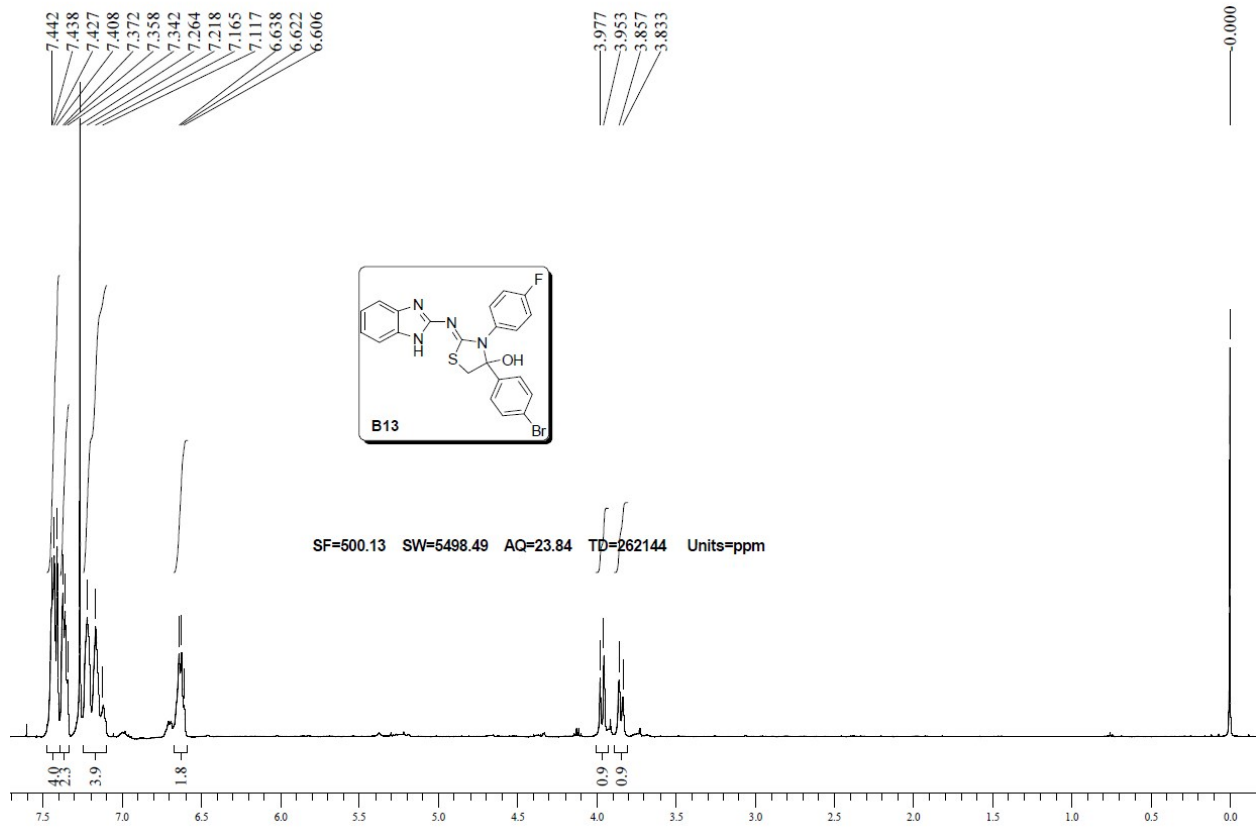


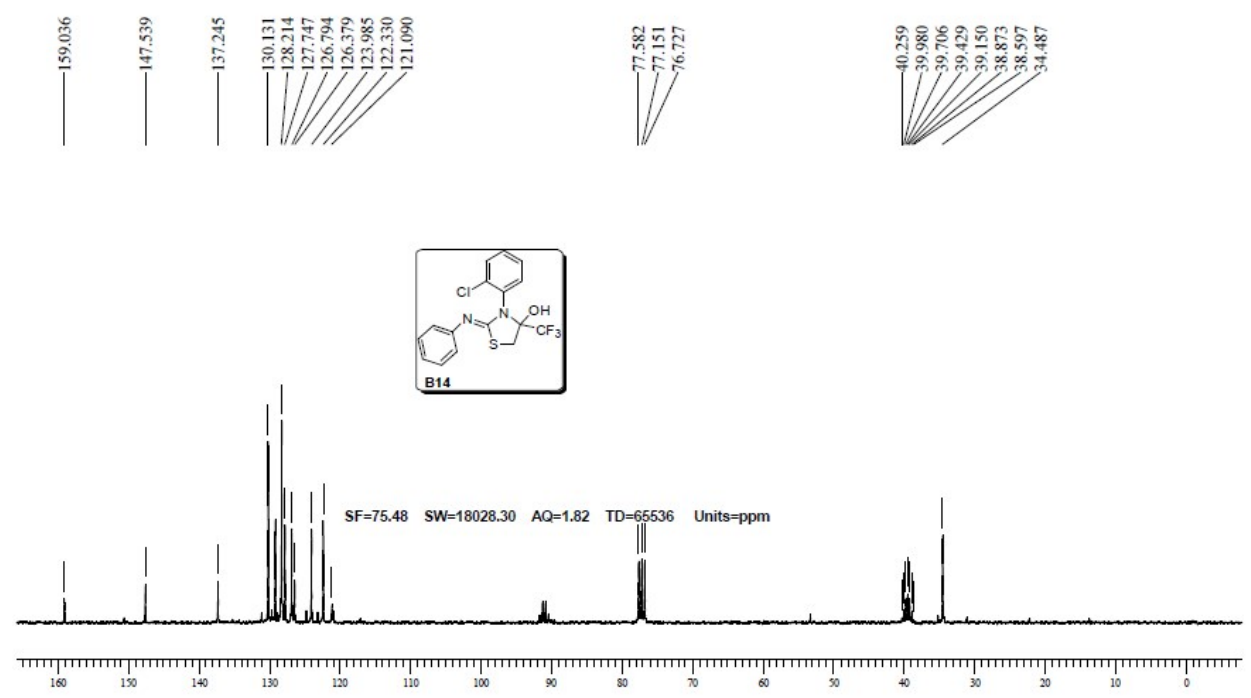
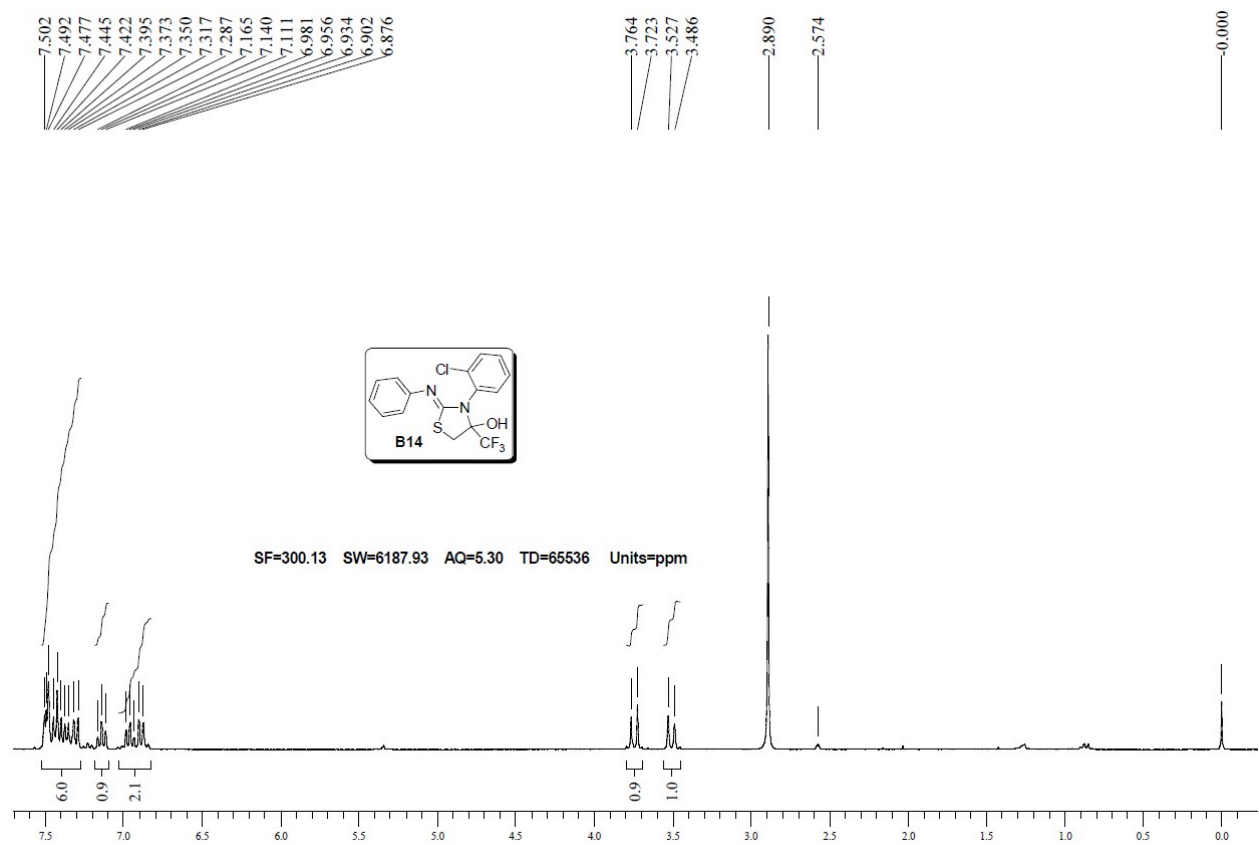


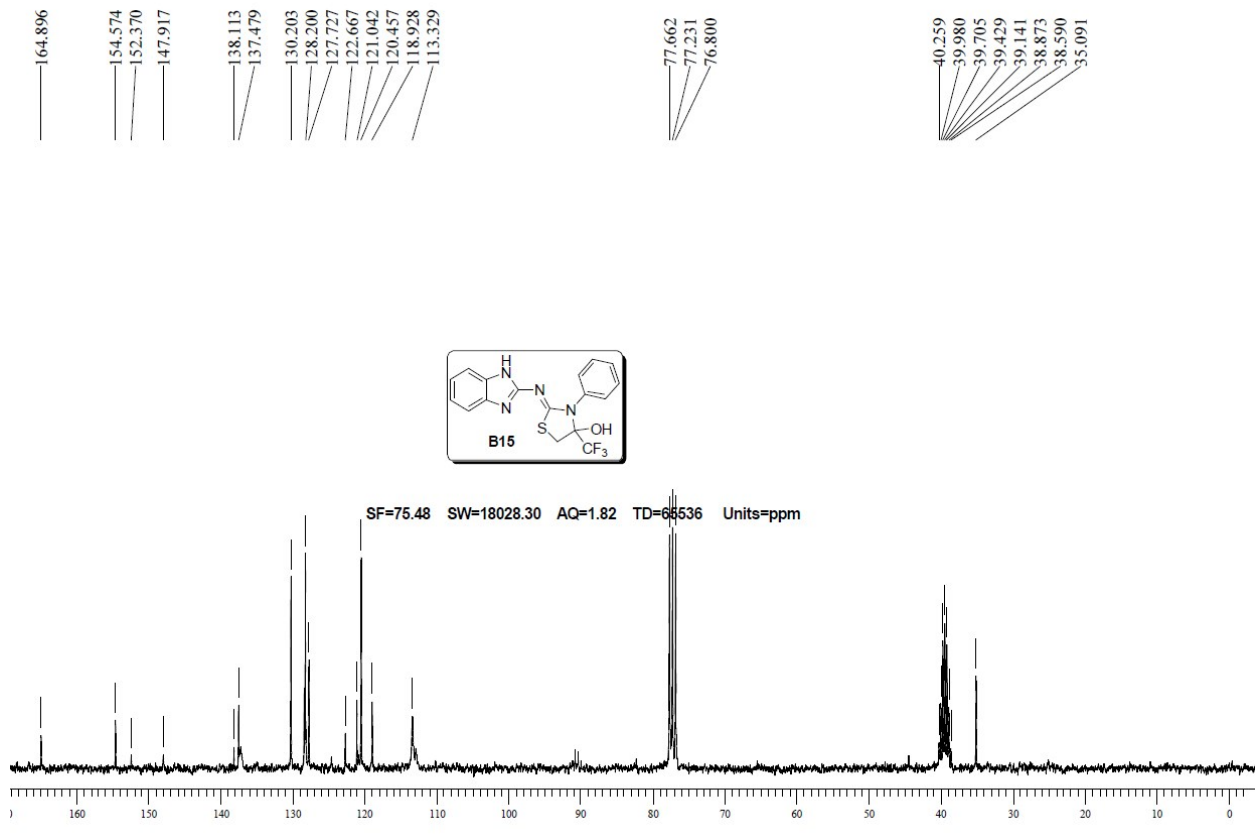
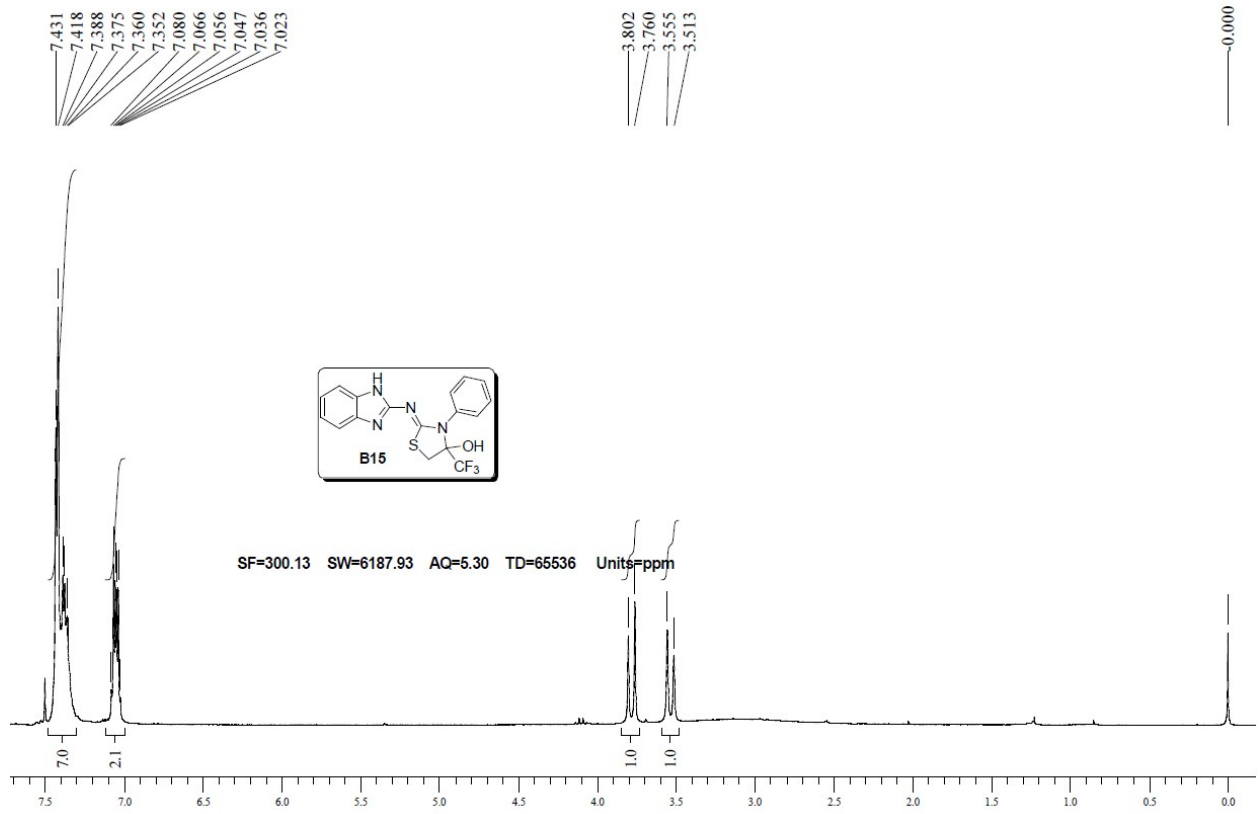




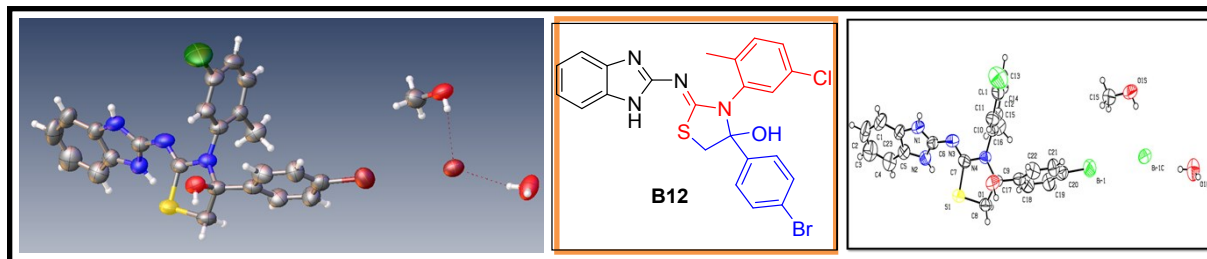








Crystal data with structure refinement for 2-(1H-benzo[d]imidazol-2-ylimino)-4-(4-bromophenyl)-3-(5-chloro-2-methylphenyl)thiazolidin-4-ol (B12).



X-ray analysis data of (B12).

CCDC No.	1041069
Empirical formula	C ₂₃ H ₁₈ BrCl N ₄ OS
Temperature	<i>T</i> = 293 K
Formula weight	512.30
Wavelength	1.54184 Å
Crystal system, space group	Triclinic, $P\bar{1}$ (No. 2)
Unit cell dimensions	<i>a</i> = 7.9404 (8) Å, <i>b</i> = 11.6089 (14) Å <i>c</i> = 15.7240 (18) Å, α = 71.877 (10) β = 79.537 (9) γ = 78.741 (10), $2\theta_{\max}$ = 70.857°
Volume	<i>V</i> = 1339.6 (3) Å ³
<i>Z</i> , Calculated density	<i>Z</i> = 2, <i>D</i> _c = 1.599 g/cm ³
Absorption coefficient	μ = 5.761 mm ⁻¹
<i>F</i> (000)	<i>F</i> 000 = 648
Absorption correction	Multi scan
Final GooF	1.192
Final R indices [<i>I</i> > 2σ(<i>I</i>)]	R1=0.0640 (3624), wR2=0.2408 (4826)
Largest diff. peak and hole	0.936 Å

Table 1: In vitro cytotoxicity of compounds B1 to B15 against human cancer cell lines.

IC₅₀ values^a(in μ M) for compounds in selected human cancer cell lines

Compounds	HT-29 Human colon cancer	DU-145 Human prostate cancer	A549 Human lung cancer	MDA MB-231 human breast cancer
B1	NA	NA	NA	NA
B2	63.09	36.54	12.73	42.30
B3	NA	NA	NA	NA
B4	37.78	18.19	15.84	30.19
B5	NA	NA	NA	NA
B6	NA	56.11	31.13	NA
B7	54.12	27.20	18.89	32.35
B8	NA	NA	NA	NA
B9	19.54	9.332	3.890	12.02
B10	16.12	7.595	2.798	7.795
B11	66.06	26.00	16.59	38.01
B12	63.67	44.73	27.26	77.62
B13	17.63	7.780	3.140	8.016
B14	33.76	10.39	8.912	13.48
B15	19.05	9.354	7.079	14.65
Doxorubicin	1.995	1.723	1.750	0.987

^a 50% Inhibitory concentration after 48 h of drug treatment and the values are average of three individual experiments.

^b Human colon cancer.

^c Human prostate cancer.

^d Human lung cancer.

^e human breast cancer.

NA-means not active and having IC₅₀ >100 μ M