

Solvent dependent *regio*- and *stereo*- selective reactions of 3-formylchromones with 2-aminobenzothiazoles, transacetalization efficiency of the product 3-((benzo[d]thiazol-2-ylimino)butyl)-4H-chromen-4-one.

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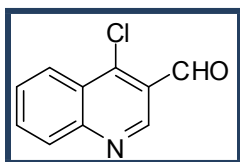
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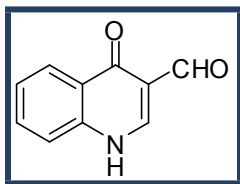
Spectral data for the Quinoline-, Quinolone- and Indole-3-carbaldehyde derivatives **Q1**, **Q2**, **Q4**, **Q5** and **Q7-Q11**.

4-chloroquinoline-3-carbaldehyde (**Q1**). Color & State: Wheat brown solid. M.P.: 274-276



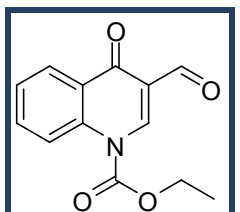
⁰C. ¹H NMR (CDCl₃, 500 MHz): δ 10.73 (s, 1H), 9.28 (s, 1H), 8.42 (dd, 1H, J₁ = 8.4 Hz, J₂ = 1.5 Hz), 8.19 (d, 1H, J = 8.4 Hz), 7.96-7.91 (m, 1H), 7.78-7.75 (m, 1H); ¹³C NMR (CDCl₃, 75 MHz): δ 189.0, 150.7, 148.5, 148.1, 133.2, 130.1, 128.6, 125.6, 125.0, 124.3; IR: ν_{max}, 2917, 1683, 1585, 1491, 1403, 1340, 754 cm⁻¹. EI-MS: M¹⁺, 191. EI-HRMS: calcd for. C₁₀ H₇ O N Cl = 192.0211. found: 192.0205.

1,4-dihydro-4-oxoquinoline-3-carbaldehyde (**Q2**). Color & State: Wheat brown solid. M.P.:



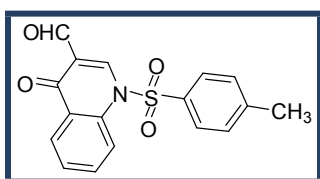
290-292 ⁰C. ¹H NMR (DMSO-d₆, 300 MHz): δ 10.19 (s, 1H), 8.48 (d, 1H, J = 6.8 Hz), 8.21 (d, 1H, J = 7.7 Hz), 7.80-7.72 (m, 1H), 7.66 (d, 1H, J = 7.9 Hz), 7.47 (t, 1H, J = 7.9 Hz); ¹³C NMR (DMSO-d₆, 75 MHz): δ 188.6, 176.2, 143.1, 139.3, 133.0, 127.7, 125.3, 125.2, 119.3, 116.2; IR: ν_{max}, 3438, 3128, 2735, 1665, 1619, 1559, 1466, 1387, 1337, 1280, 1193, 1102, 974, 853, 767 cm⁻¹. LC-MS: M-1, 172. EI-HRMS: calcd. for. C₁₀ H₈ O₂ N = 174.0550. found: 174.0543.

ethyl 3-formyl-4-oxoquinoline-1(4H)-carboxylate (**Q4**): Color & State: Pale yellow solid.



M.P.: **197-199** ⁰C. ¹H NMR (DMSO-d₆, 500 MHz): δ 10.44 (s, 1H), 9.01 (s, 1H), 8.60 (d, 1H, J = 8.7 Hz), 8.47 (dd, 1H, J₁ = 7.9 Hz, J₂ = 1.7 Hz), 7.76-7.71 (m, 1H), 7.52 (t, 1H, J = 8.1 Hz); ¹³C NMR (DMSO-d₆, 75 MHz): δ 188.9, 177.2, 150.7, 142.3, 137.8, 133.6, 127.8, 126.6, 126.5, 120.1, 117.9, 66.2, 14.0; IR: ν_{max}, 3401, 3105, 2981, 2937, 2855, 1755, 1691, 1648, 1603, 1560, 1464, 1371, 1345, 1279, 1218, 1093, 1031, 952, 938, 772 cm⁻¹. EI-MS: M-COOEt, 172. EI-HRMS: calcd for. C₁₀ H₈ O₂ N = 174.0550. found: 174.0544.

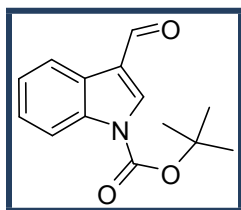
1,4-dihydro-4-oxo-1-tosylquinoline-3-carbaldehyde (**Q5**). Color & State: Off-white solid.



M.P.: **165-167** ⁰C. ¹H NMR (DMSO-d₆, 300 MHz): δ 10.16 (s, 1H), 8.45 (s, 1H), 8.20 (d, 1H, J = 7.9 Hz), 7.76 (t, 1H, J = 8.3 Hz), 7.65 (d, 1H, J = 8.1 Hz), 7.52-7.44 (m, 3H), 7.13 (d, 1H, J = 7.9 Hz), 2.28 (s, 3H); ¹³C NMR (DMSO-d₆, 75 MHz): δ 188.9, 176.5, 145.0, 143.4, 139.4, 138.3, 133.3, 128.3, 127.7, 125.6, 125.4, 119.5, 116.4, 20.9;

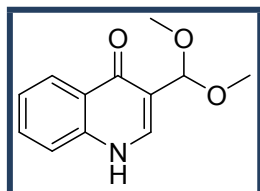
IR: ν_{\max} , 3089, 3052, 2982, 1688, 1662, 1606, 1464, 1379, 1178, 899, 760 cm^{-1} . EI-MS: M-Tosyl, 172. EI-HRMS: calcd for. $\text{C}_{10} \text{H}_8 \text{O}_2 \text{N} = 174.0550$. found: 174.0543.

tert-butyl 3-formyl-1H-indole-1-carboxylate (**Q7**): Color & State: White solid. M.P.: 130-132



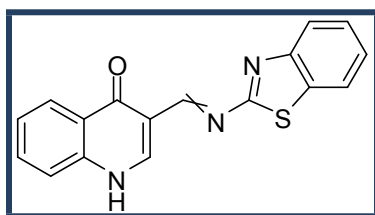
$^{\circ}\text{C}$. ^1H NMR (CDCl_3 , 400 MHz): δ 10.10 (s, 1H), 8.29 (dd, 1H, $J_1 = 6.8$ Hz, $J_2 = 1.6$ Hz), 8.23 (s, 1H), 8.15 (d, 1H, $J = 7.9$ Hz), 7.44-7.34 (m, 2H), 1.71 (s, 9H); ^{13}C NMR (CDCl_3 , 100 MHz): δ 185.7, 148.8, 136.5, 135.9, 126.1, 126.0, 124.6, 122.1, 121.6, 115.1, 85.6, 28.1; IR: ν_{\max} , 2925, 1743, 1679, 1452, 1400, 1372, 1360, 1243, 1158, 761 cm^{-1} ; ESI-MS: M+1, 246. ESI-HRMS: calcd. for $\text{C}_{14} \text{H}_{16} \text{O}_3 \text{N} = 246.1125$. found: 246.1120.

3-(dimethoxymethyl)quinolin-4(1H)-one (**Q8**): Color & State: Yellow solid. M.P.: 217-219



$^{\circ}\text{C}$. ^1H NMR (DMSO-d_6 , 300MHz): δ 8.11 (d, 1H, $J = 7.9$ Hz), 7.91 (s, 1H), 7.65 (t, 1H, $J = 7.7$ Hz), 7.56 (d, 1H, $J = 8.1$ Hz), 7.33 (t, 1H, $J = 7.2$ Hz), 5.54 (s, 1H), 3.27 (s, 6H); ^{13}C NMR (DMSO-d_6 , MHz): δ 174.9, 139.5, 137.3, 131.8, 125.4, 125.0, 123.4, 118.4, 116.8, 98.6, 53.2; IR: ν_{\max} , 3262, 3062, 1621, 1606, 1593, 1473, 1380, 1280, 1155, 755 cm^{-1} . ESI-MS: M-32 (MeOH), 187. ESI-HRMS: calcd for. $\text{C}_{11} \text{H}_{10} \text{O}_2 \text{N} = 188.0706$. found: 188.0700.

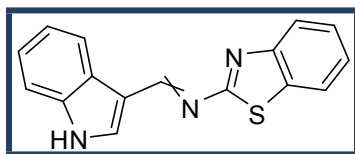
3-((benzo[d]thiazol-2-ylimino)methyl)quinolin-4(1H)-one (**Q9**). Color & State: Yellow solid.



M.P.: 316-318 $^{\circ}\text{C}$. ^1H NMR (DMSO-d_6 , 500 MHz): δ 10.19 (s, 1H), 8.47 (s, 1H), 8.21 (dd, 1H, $J_1=7.9\text{Hz}$, $J_2=1.2\text{Hz}$), 7.76 (t, 1H, $J=8.4\text{Hz}$), 7.68-7.62 (m, 2H), 7.50-7.42 (m, 3H), 7.32 (d, 1H, $J=7.5\text{Hz}$), 7.19 (t, 1H, $J = 8.4\text{Hz}$), 6.99 (t, 1H, $J=8.4\text{Hz}$); ^{13}C NMR (DMSO-d_6 , 125 MHz): δ 188.7, 176.3, 166.4, 152.7, 143.3, 139.4, 133.1, 130.9, 127.7, 125.4, 125.4, 125.3, 120.8, 120.8,

119.4, 117.7, 116.3; ESI-MS: M+1, 306. ESI-HRMS: calcd for. $\text{C}_{17} \text{H}_{12} \text{O}_3 \text{N}_3 \text{S} = 306.0696$. found: 306.0696.

N-((1H-indol-3-yl)methylene)benzo[d]thiazol-2-amine (**Q10**): Color & State: Yellow solid.

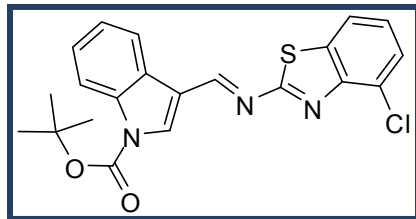


M.P.: 254-256 $^{\circ}\text{C}$. ^1H NMR (DMSO-d_6 , 500 MHz): δ 12.28 (s, 1H), 9.25 (s, 1H), 8.39-8.33 (m, 2H), 7.99 (d, 1H, $J = 7.9$ Hz), 7.85 (d, 1H, $J = 7.9$ Hz), 7.55 (d, 1H, $J = 6.9$ Hz), 7.46 (t, 1H, $J = 8.2$ Hz), 7.37-7.26 (m, 3H); ^{13}C NMR (DMSO-d_6 , 75 MHz): δ 173.3, 161.1,

151.6, 138.6, 137.5, 133.4, 126.1, 124.5, 124.2, 123.6, 122.0, 121.9, 121.6, 114.3, 112.5; IR:

ν_{\max} , 3436, 3109, 3053, 2853, 1606, 1585, 1472, 143, 1238, 741 cm^{-1} . ESI-MS: M+1, 277.
ESI-HRMS: Calcd. for $\text{C}_{16}\text{H}_{12}\text{N}_3\text{S}$ = 278.0746. Found: 278.0742.

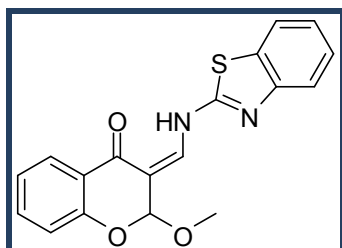
tert-butyl 3-((4-chlorobenzo[d]thiazol-2-ylimino)methyl)-1H-indole-1-carboxylate (**Q11**):



Color & State: Yellow solid. M.P.: 164-166 °C. ^1H NMR (CDCl_3 , 400 MHz): δ 9.30 (s, 1H), 8.57 (d, 1H, $J = 7.1$ Hz), 8.25 (s, 1H), 8.18 (d, 1H, $J = 7.8$ Hz), 7.72 (dd, 1H, $J_1 = 7.9$ Hz, $J_2 = 0.7$ Hz), 7.51-7.38 (m, 3H), 7.26 (s, 1H), 1.72 (s, 9H); ^{13}C NMR (CDCl_3 , 125 MHz): δ 173.5, 160.1, 148.9, 148.7, 136.2, 136.0, 135.4, 127.4, 126.8, 126.6, 126.1, 125.0, 124.4, 123.1,

120.1, 118.6, 115.1, 85.5, 28.1; IR: ν_{\max} , 2925, 1740, 1617, 1474, 1453, 1373, 1235, 1097, 759 cm^{-1} ; ESI-MS: M+1, 412.

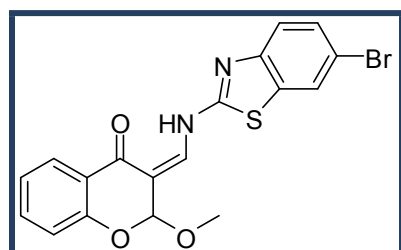
(Z)-3-((benzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (**3aa**): Color & State : Lemon



Yellow Solid. mp: 144-146 °C. ¹H NMR (CDCl₃, 500 MHz): δ 12.29 (d, 1H, *J* = 10.9 Hz), 8.05-7.95 (m, 2H), 7.79-7.71 (m, 2H), 7.52 (t, 1H, *J* = 8.4 Hz), 7.43 (t, 1H, *J* = 7.9 Hz), 7.28 (t, 1H, *J* = 7.6 Hz), 7.13 (t, 1H, *J* = 7.5 Hz), 7.06 (d, 1H, *J* = 8.1 Hz), 5.72 (s, 1H), 3.54 (s, 3H); ¹³C NMR (DMSO-*d*₆, 75 MHz): δ 188.3, 174.9, 166.4, 163.4, 155.6, 152.7, 135.2, 130.9, 126.7, 125.4, 125.3, 124.6, 120.8, 120.0, 118.8, 117.7, 48.6; IR: *v*_{max}, 2929, 1649, 1588, 1529, 1465, 1267, 1207, 1146, 1066, 1015, 967, 938, 752, 717 cm⁻¹. EI-MS: M-H, 337.

EI-HRMS: calcd for. C₁₈ H₁₄ N₂ O₃ S = 338.0725. found: 338.0724.

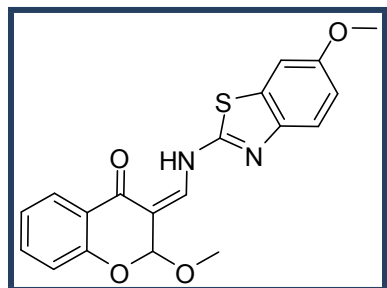
(Z)-3-((6-bromobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (**3ab**): Color & State :



Yellow Solid. mp: 153-155 °C. ¹H NMR (DMSO-*d*₆, 300 MHz): δ 10.11 (s, 1H), 8.91 (s, 1H), 8.15 (d, 1H, *J* = 7.9 Hz), 7.92-7.84 (m, 2H), 7.74 (d, 1H, *J* = 8.3 Hz), 7.63-7.55 (m, 3H), 7.32 (dd, 1H, *J*₁ = 8.7 Hz, *J*₂ = 1.9 Hz), 7.24 (d, 1H, *J* = 8.5 Hz), 3.16 (s, 3H); ¹H NMR (CDCl₃, 500 MHz): δ 12.31 (d, 1H, *J* = 10.8 Hz), 7.98 (s, 1H), 7.97-7.95 (m, 1H), 7.85 (d, 1H, *J* = 1.8 Hz), 7.61 (d, 1H, *J* = 8.7 Hz), 7.55-7.50 (m, 2H), 7.14 (t, 1H, *J* = 7.9 Hz), 7.07 (d, 1H, *J* = 7.9 Hz), 5.71 (s, 1H), 3.54 (s, 3H); ¹³C NMR

(DMSO-*d*₆, 75 MHz): δ 188.3, 174.9, 167.1, 163.4, 155.6, 152.0, 135.2, 133.0, 128.2, 126.7, 125.3, 124.6, 123.2, 120.0, 119.1, 118.9, 112.1, 48.6; ¹³C NMR (CDCl₃, 125 MHz): δ 183.0, 160.5, 156.4, 150.1, 140.6, 135.5, 133.3, 130.1, 126.7, 123.9, 122.4, 122.3, 122.2, 118.3, 116.8, 108.0, 101.1, 55.8; IR: *v*_{max}, 3082, 2926, 1648, 1590, 1530, 1473, 1412, 1372, 1270, 1221, 1147, 1062, 1021, 930, 811, 757 cm⁻¹. EI-MS: M-32, 384. EI-HRMS: calcd for. C₁₈ H₁₃ ⁸¹Br₁ N₂ O₃ S = 417.9810. found = 417.9807.

(Z)-2-methoxy-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**4ac**): Color & State :



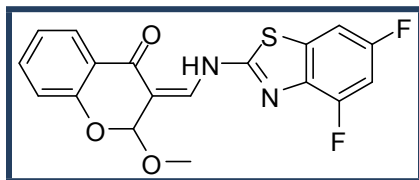
Yellow Solid. mp: 138-140 °C. ¹H NMR (DMSO-*d*₆, 300 MHz): δ 10.11 (s, 1H), 8.91 (s, 1H), 8.15 (d, 1H, *J* = 7.2 Hz), 7.89 (t, 1H, *J* = 7.6 Hz), 7.75 (d, 1H, *J* = 8.3 Hz), 7.59 (t, 1H, *J* = 7.2 Hz), 7.29-7.17 (m, 3H), 6.80 (dd, 1H, *J*₁ = 8.9 Hz, *J*₂ = 2.3 Hz), 3.72 (s, 3H), 3.16 (s, 3H); ¹³C NMR (DMSO-*d*₆, 75 MHz): δ 188.5, 175.0, 164.9, 163.6, 155.7, 154.3, 146.8, 135.3, 131.9, 126.8, 125.4, 124.7, 120.0, 119.0, 118.1, 113.0, 105.6, 55.6, 48.7; IR: *v*_{max}, 3422, 2919, 1647, 1605, 1536, 1466, 1367, 1257, 1223, 1185, 1067, 1014, 932, 830, 755 cm⁻¹. EI-MS: M-32, 336. EI-HRMS:

calcd for. C₁₉ H₁₆ N₂ O₄ S = 368.0831. found = 368.0820.

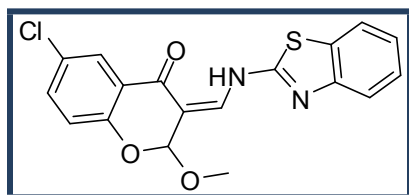
(Z)-3-((4,6-difluorobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (**3ad**): Color & State :

Lemon Yellow Solid. mp: 228-230 °C. ¹H NMR (DMSO-*d*₆, 300 MHz): δ 10.12 (s, 1H), 8.93 (s, 1H), 8.15 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 1.5 Hz), 7.89 (m, 1H), 7.76 (d, 1H, *J* = 7.9 Hz), 7.72-7.67 (brs, 2H), 7.62-7.55 (m, 1H),

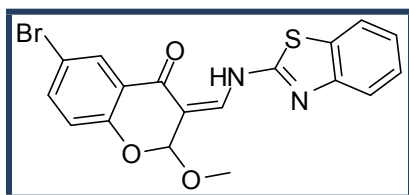
7.51-7.45 (m, 1H), 7.15-7.06 (m, 1H), 3.16 (s, 3H); ¹H NMR (CDCl₃, 500 MHz): δ 12.34 (d, 1H, *J* = 10.7 Hz), 8.03 (d, 1H, *J* = 10.7 Hz), 7.97 (dd, 1H, *J*₁ = 7.8 Hz, *J*₂ = 1.7 Hz), 7.55-7.50 (m, 1H), 7.26-7.24 (m, 1H), 7.14 (t, 1H, *J* = 7.9 Hz), 7.07 (d, 1H, *J* = 8.1 Hz), 6.99-6.93 (m, 1H), 5.72 (s, 1H), 7.53 (s, 3H); ¹³C NMR (DMSO-d₆, 75 MHz): δ 188.33, 174.9, 166.6, 163.4, 155.5, 154.5, 152.6, 149.1, 135.1, 133.8, 126.7, 125.2, 124.6, 122.2, 119.9, 118.8, 104.2, 104.1, 103.8, 103.7, 101.3, 101.0, 100.9, 100.6, 48.6; IR: ν_{max}, 3446, 3086, 2928, 1648, 1612, 1544, 1468, 1422, 1372, 1260, 1220, 1147, 1070, 988, 927, 849, 747 cm⁻¹. EI-MS: M-32, 342. EI-HRMS: calcd for. C₁₈ H₁₂ F₂ N₂ O S = 342.0638. found = 342.0635.



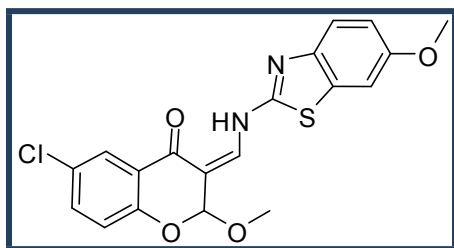
(Z)-3-((benzo[d]thiazol-2-ylamino)methylene)-6-chloro-2-methoxychroman-4-one (**3ae**): Color & State : Wheat Brown Solid. mp: 148-150 °C. ¹H NMR (DMSO-d₆, 300 MHz): δ 10.09 (s, 1H), 8.96 (s, 1H), 8.07 (d, 1H, *J* = 2.5 Hz), 7.94 (dd, 1H, *J*₁ = 9.1 Hz, *J*₂ = 2.6 Hz), 7.83 (d, 1H, *J* = 8.9 Hz), 7.63 (d, 1H, *J* = 8.1 Hz), 7.46 (s, 1H), 7.32 (s, 1H, *J* = 7.7 Hz), 7.19 (t, 1H, *J* = 7.9 Hz), 6.99 (t, 1H, *J* = 7.7 Hz), 3.17 (s, 3H); ¹³C NMR (DMSO-d₆, 75 MHz): δ 188.0, 173.8, 166.4, 163.7, 161.2, 154.1, 134.9, 131.1, 130.8, 126.4, 125.8, 125.5, 125.3, 124.2, 122.0, 121.3, 121.0, 120.8, 120.4, 119.9, 117.6, 55.1, 48.6; IR: ν_{max}, 2998, 1651, 1609, 1533, 1468, 1443, 1363, 1261, 1207, 1184, 1075, 1035, 977, 941, 753 cm⁻¹; EI-HRMS: calcd for. C₁₈ H₁₃ Cl N₂ O₃ S = 372.0335. found: 372.0334.



(Z)-3-((benzo[d]thiazol-2-ylamino)methylene)-6-bromo-2-methoxychroman-4-one (**3af**): Color & State: Green Solid. mp: 144-146 °C. ¹H NMR (DMSO-d₆, 500 MHz): δ 10.09 (s, 1H), 8.96 (s, 1H), 8.21 (d, 1H, *J* = 2.4 Hz), 8.05 (dd, 1H, *J*₁ = 8.8 Hz, *J*₂ = 2.6 Hz), 7.77 (d, 1H, *J* = 8.85 Hz), 7.64 (dd, 1H, *J*₁ = 7.8 Hz, *J*₂ = 0.9 Hz), 7.45 (s, 1H), 7.32 (dd, 1H, *J*₁ = 8.1 Hz, *J*₂ = 0.6 Hz), 7.21-7.17 (m, 1H), 7.01-6.97 (m, 1H), 3.16 (s, 3H). ¹³C NMR (DMSO-d₆, 75 MHz): δ 187.8, 173.5, 166.3, 163.5, 154.4, 152.6, 137.5, 130.8, 127.2, 126.1, 125.3, 123.7, 121.3, 120.7, 119.9, 119.0, 117.6, 48.5; IR: ν_{max}, 3062, 2927, 2825, 1651, 1604, 1589, 1527, 1466, 1440, 1370, 1260, 1209, 1148, 1065, 1031, 968, 932, 756 cm⁻¹; EI-MS: M-32, 384. EI-HRMS: calcd for. C₁₇ H₁₀ ⁷⁹Br N₂ O₂ S = 384.9646. found: 384.9644.

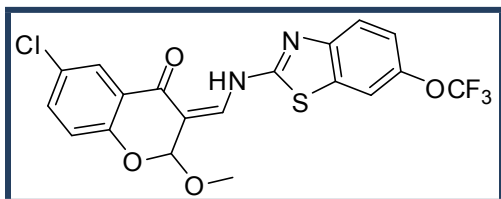


(Z)-6-chloro-2-methoxy-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3ag**): Color & State: Greenish yellow solid. M.P.: 117-119 °C. ¹H NMR (CDCl₃, 500MHz): δ 12.20 (d, 1H, *J* = 10.8 Hz), 7.98 (d, 1H, *J* = 11.1 Hz), 7.92 (d, 1H, *J* = 2.4 Hz), 7.66 (d, 1H, *J* = 8.8 Hz), 7.43 (dd, 1H, *J*₁ = 8.7 Hz, *J*₂ = 2.6 Hz), 7.05-6.98 (m, 2H), 5.60 (s, 1H), 3.86 (s, 3H), 3.51 (s, 3H); ¹³C NMR (CDCl₃, 100 MHz): δ 181.4, 157.7, 156.9, 154.6, 145.3, 141.7, 134.9, 133.0, 127.7, 126.1, 123.3, 121.7,



119.8, 115.2, 106.5, 104.8, 101.4, 55.8, 55.8; IR: ν_{\max} , 3439, 2923, 1652, 1605, 1591, 1462, 1255, 1065, 802 cm^{-1} . ESI-HRMS: calcd for. $\text{C}_{18}\text{H}_{12}\text{ClN}_2\text{O}_3\text{S}$: 371.02572. found: 371.02483.

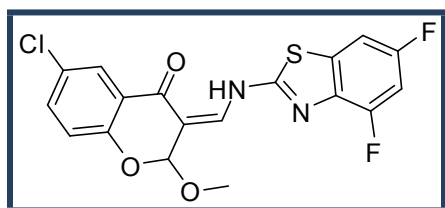
(Z)-6-chloro-2-methoxy-3-((6-(trifluoromethoxy)benzo[d]thiazol-2-ylamino)methylene)chroman-4-one



(3ah): Color & State : Yellow Solid. mp: 148-150 °C. ^1H NMR (DMSO- d_6 , 300 MHz): δ 10.10 (s, 1H), 8.92 (s, 1H), 8.07 (d, 1H, J = 2.6 Hz), 7.90 (dd, 1H, J_1 = 9.1 Hz, J_2 = 1.7 Hz), 7.80 (d, 1H, J = 9.1 Hz), 7.70 (brs, 1H), 7.59 (s, 2H), 7.34 (d, 1H, J = 8.7 Hz), 7.14 (d, 1H, J = 8.5 Hz), 4.12 (brs, 1.5 H), 3.16 (s, 1.5H); ^{13}C NMR (DMSO- d_6 , 125 MHz): δ 187.9, 173.8, 167.7, 163.5,

154.2, 151.8, 142.1, 134.9, 131.9, 131.3, 125.9, 124.3, 121.3, 119.9, 119.2, 118.8, 117.9, 114.3, 114.2, 48.6; IR: ν_{\max} , 3215, 2927, 1655, 1606, 1531, 1459, 1423, 1259, 1202, 1160, 1065, 1028, 933, 817 cm^{-1} ; EI-MS: M-32, 424. EI-HRMS: calcd for. $\text{C}_{18}\text{H}_8\text{ClF}_3\text{N}_2\text{O}_3\text{S}$ = 423.9896. found = 423.9892.

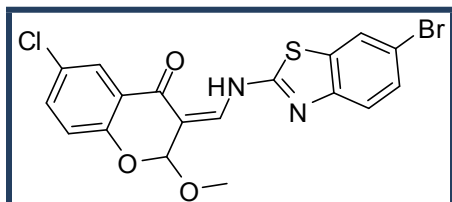
(Z)-6-chloro-3-((4,6-difluorobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (3ai):



Color & State : Yellow Solid. mp: 170-172 °C. ^1H NMR (DMSO- d_6 , 300 MHz): δ 10.09 (s, 1H), 8.95 (s, 1H), 8.07 (d, 1H, J = 2.5 Hz), 7.94 (dd, 1H, J_1 = 9.1 Hz, J_2 = 2.6 Hz), 7.83 (d, 1H, J = 8.9 Hz), 7.69 (brs, 1H), 7.48 (dd, 1H, J_1 = 8.3 Hz, J_2 = 1.5 Hz), 7.16-7.06 (m, 1H), 3.16 (s, 3H); ^{13}C NMR (DMSO- d_6 , 75 MHz): δ 188.0, 173.8, 166.6, 163.7, 154.1, 134.9, 133.8, 133.7, 133.6, 133.5, 131.1, 125.8,

124.2, 123.9, 121.3, 119.9, 104.1, 104.1, 103.8, 103.7, 101.2, 101.0, 100.9, 100.6, 48.5; IR: ν_{\max} , 3423, 3093, 2931, 1652, 1606, 1585, 1537, 1466, 1426, 1353, 1260, 1204, 1144, 1060, 983, 931, 851, cm^{-1} . EI-MS: M-32, 376. EI-HRMS: calcd for. $\text{C}_{18}\text{H}_{11}\text{ClF}_2\text{N}_2\text{O}_3\text{S}$ = 408.0147. found = 408.0144.

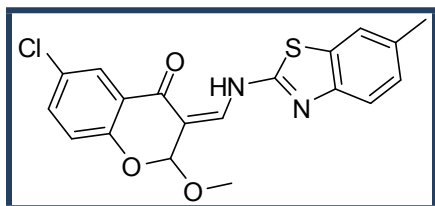
(Z)-3-((6-bromobenzo[d]thiazol-2-ylamino)methylene)-6-chloro-2-methoxychroman-4-one (3aj): Color &



State : Yellow Solid. mp: 164-166 °C. ^1H NMR (DMSO- d_6 , 300 MHz): δ 10.08 (s, 1H), 8.93 (s, 1H), 8.06 (d, 1H, J = 2.6 Hz), 7.95-7.78 (m, 3H), 7.61 (s, 1H), 7.33 (dd, 1H, J_1 = 8.5 Hz, J_2 = 2.1 Hz), 7.24 (d, 1H, J = 8.7 Hz), 3.16 (s, 3H); ^{13}C NMR (DMSO- d_6 , 75 MHz): δ 188.2, 167.3, 164.0, 154.3, 152.0, 135.1, 133.1, 131.3, 128.4, 126.0, 124.4, 123.4, 121.5, 120.0, 119.2, 112.2, 48.7; IR:

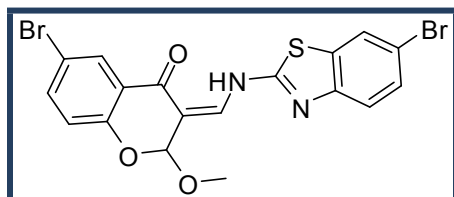
ν_{\max} , 3056, 2904, 1656, 1605, 1587, 1529, 1419, 1365, 1260, 1205, 1142, 1064, 1030, 975, 815, 732 cm^{-1} ; EI-MS: M-32, 418. EI-HRMS: calcd for. $\text{C}_{17}\text{H}_8\text{BrClN}_2\text{O}_2\text{S}$ = 417.9178. found = 417.9177.

(Z)-6-chloro-2-methoxy-3-((6-methylbenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3ak**): Color



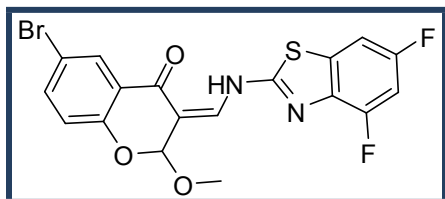
& State : Lemon Yellow Solid. mp: 149-151 °C. ¹H NMR (DMSO-d₆, 300 MHz): δ 10.09 (s, 1H), 8.94 (s, 1H), 8.08 (d, 1H, *J* = 2.5 Hz), 7.94 (dd, 1H, *J*₁ = 8.9 Hz, *J*₂ = 2.6 Hz), 7.83 (d, 1H, *J* = 8.9 Hz), 7.43 (s, 1H), 7.31 (s, 1H), 7.20 (d, 1H, *J* = 8.1 Hz), 7.00 (dd, 1H, *J*₁ = 7.0 Hz, *J*₂ = 0.9 Hz), 3.16 (s, 3H), 2.30 (s, 3H); ¹³C NMR (DMSO-d₆, 75 MHz): δ 188.1, 173.9, 165.9, 163.9, 154.2, 150.4, 135.0, 131.3, 130.9, 130.1, 127.8, 126.5, 125.9, 124.3, 121.7, 121.4, 121.1, 120.9, 120.0, 117.4, 48.7, 21.0, 20.8; IR: ν_{max}, 3423, 2916, 1654, 1605, 1592, 1526, 1470, 1420, 1371, 1260, 1204, 1183, 1064, 1029, 980, 935, 809 cm⁻¹; EI-MS: M-32, 354. EI-HRMS: calcd for. C₁₈ H₁₀ Cl N₂ O₂ S = 353.0151. found = 353.0151.

(Z)-6-bromo-3-((6-bromobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (**3al**): Color &



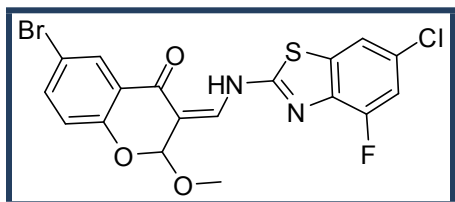
State : Greenish Solid. mp: 168-170 °C. ¹H NMR (DMSO-d₆, 300 MHz): δ 10.09 (s, 1H), 8.95 (s, 1H), 8.20 (d, 1H, *J* = 2.5 Hz), 8.04 (dd, 1H, *J*₁ = 8.9 Hz, *J*₂ = 2.5 Hz), 7.88 (d, 1H, *J* = 1.9 Hz), 7.76 (d, 1H, *J* = 8.9 Hz), 7.61 (s, 1H), 7.33 (dd, 1H, *J*₁ = 8.5 Hz, *J*₂ = 2.1 Hz), 7.24 (d, 1H, *J* = 8.5 Hz), 3.17 (s, 3H); ¹³C NMR (DMSO-d₆, 75 MHz): δ 187.9, 173.6, 167.1, 163.6, 154.5, 151.9, 137.6, 133.0, 128.2, 127.3, 126.1, 123.2, 121.4, 119.9, 119.1, 119.0, 112.0, 48.5; IR: ν_{max}, 3056, 2905, 1657, 1601, 1586, 1528, 1466, 1436, 1366, 1261, 1203, 1142, 1067, 1027, 974, 940, 815 cm⁻¹; EI-MS: M-32, 462. EI-HRMS: calcd for. C₁₇ H₈ ⁷⁹Br₂ N₂ O₂ S = 461.8673. found = 461.8672.

(Z)-6-bromo-3-((4,6-difluorobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (**3am**):



Color & State : Wheat Brown Solid. mp: 219-221 °C. ¹H NMR (DMSO-d₆, 300 MHz): δ 10.08 (s, 1H), 8.93 (s, 1H), 8.20 (d, 1H, *J* = 2.5 Hz), 8.04 (dd, 1H, *J*₁ = 8.9 Hz, *J*₂ = 2.5 Hz), 7.75 (d, 1H, *J* = 8.9 Hz), 7.69 (s, 1H), 7.50-7.44 (m, 1H), 7.15-7.05 (m, 1H), 3.16 (s, 3H); ¹³C NMR (DMSO-d₆, 75 MHz): δ 188.1, 173.8, 166.7, 163.8, 154.6, 137.7, 133.8, 133.7, 133.7, 127.4, 126.2, 121.5, 120.0, 119.2, 104.3, 104.2, 103.9, 101.4, 101.1, 101.0, 48.6; IR: ν_{max}, 3089, 2937, 1652, 1602, 1587, 1537, 1463, 1426, 1354, 1259, 1202, 1145, 1062, 1030, 981, 933 cm⁻¹; EI-MS: M-32, 420. EI-HRMS: calcd for. C₁₈ H₁₁ ⁸¹Br₁ F₂ N₂ O₃ S = 453.9621. found = 453.9615.

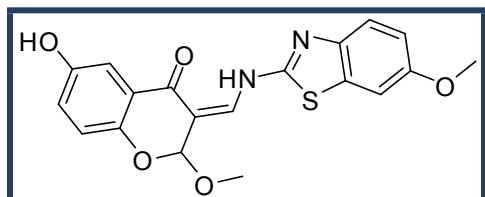
(Z)-6-bromo-3-((6-chloro-4-fluorobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one



(**3an**): Color & State : Brown Solid. mp: 217-219 °C. ¹H NMR (DMSO-d₆, 300 MHz): δ 10.09 (s, 1H), 8.95 (s, 1H), 8.19 (d, 1H, *J*₁ = 2.4 Hz), 8.04 (dd, 1H, *J*₁ = 8.9 Hz, *J*₂ = 2.6 Hz), 7.82-7.74 (m, 2H), 7.68-7.66 (brs, 1H), 7.45 (d, 1H, *J* = 6.6 Hz), 3.17 (s, 3H); ¹³C NMR (DMSO-d₆, 75 MHz): δ 188.0, 173, 167.7, 163.6, 154.5, 153.5,

149.9, 137.6, 130.5, 127.3, 126.2, 121.4, 120.0, 119.1, 117.8, 109.2, 108.8, 48.5; IR: ν_{\max} , 3422, 2935, 1649, 1604, 1542, 1453, 1363, 1230, 1204, 1074, 1034, 972, 941, 869, 819, 712 cm^{-1} ; EI-MS: M-32, 436. EI-HRMS: calcd for. $\text{C}_{17}\text{H}_7^{79}\text{Br}_1\text{Cl F N}_2\text{O}_2\text{S} = 435.9084$. found = 435.9084.

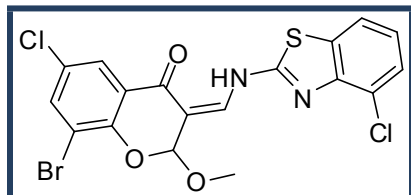
(Z)-6-hydroxy-2-methoxy-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3ao**):



Color & State: Yellow. M.P.: 162-164 °C. ^1H NMR (DMSO-d_6 , 500 MHz): δ 12.28 (s, 1H), 9.06 (s, 1H), 7.91 (s, 1H), 7.68-7.59 (m, 1H), 7.52-7.48 (m, 1H), 7.36 (d, 1H, $J=3.1$ Hz), 7.26 (s, 1H), 7.07-6.98 (m, 2H), 6.93-6.88 (m, 1H), 5.66 (s, 1H), 3.86 (s, 1H), 3.50 (s, 1H); ^{13}C NMR ($\text{CDCl}_3+\text{DMSO-d}_6$ (3:1), 75 MHz): δ 181.9, 157.6, 156.1, 151.8, 148.7, 144.6, 140.3, 132.3, 122.9, 122.0,

120.8, 118.3, 114.3, 110.4, 106.8, 104.3, 100.3, 55.2, 54.8; ESI-HRMS: calcd for. $\text{C}_{19}\text{H}_{15}\text{O}_5\text{N}_2\text{S}$: 383.0696. found: 383.0710.

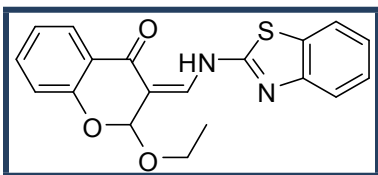
(Z)-8-bromo-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one



(**3ap**): Color & State : Lemon Yellow Solid. mp: 209-211 °C. ^1H NMR (DMSO-d_6 , 300 MHz): δ 10.08 (s, 1H), 9.04 (s, 1H), 8.37 (d, 1H, $J = 2.5$ Hz), 8.07 (d, 1H, $J = 2.5$ Hz), 7.8 (s, 1H), 7.62 (dd, 1H, $J_1 = 7.7$ Hz, $J_2 = 0.9$ Hz), 7.27 (dd, 1H, $J_1 = 7.9$ Hz, $J_2 = 0.9$ Hz), 6.98 (t, 1H, $J = 7.9$ Hz), 3.17 (s, 3H). ^{13}C NMR (DMSO-d_6 , 75 MHz): δ 187.8, 167.3,

163.8, 151.3, 149.4, 137.4, 132.1, 131.3, 126.9, 125.5, 124.0, 121.4, 121.2, 120.0, 119.8, 113.3, 48.6; IR: ν_{\max} , 3447, 3066, 2932, 1650, 1598, 1528, 1452, 1363, 1274, 1225, 1183, 1059, 970 935, 875, 817, 769, 711 cm^{-1} . EI-MS: M-32 (MeOH), 452. EI-HRMS: calcd for. $\text{C}_{17}\text{H}_7^{79}\text{Br Cl}_2\text{N}_2\text{O}_2\text{S} = 451.8789$. found = 451.8786.

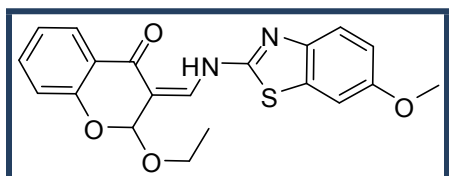
(Z)-3-((benzo[d]thiazol-2-ylamino)methylene)-2-ethoxychroman-4-one (**3aq**). Color & State: Yellow solid.



M.P.: 133-135 °C. ^1H NMR (CDCl_3 , 500 MHz): δ 12.31 (d, 1H, $J = 10.8$ Hz), 8.02 (d, 1H, $J = 11.0$ Hz), 7.98 (dd, 1H, $J_1 = 7.9$ Hz, $J_2 = 1.5$ Hz), 7.77 (d, 1H, $J = 8.1$ Hz), 7.73 (d, 1H, $J = 7.9$ Hz), 7.51 (t, 1H, $J = 8.5$ Hz), 7.43 (t, 1H, $J = 8.2$ Hz), 7.30-7.27 (m, 1H), 7.13 (t, 1H, $J = 7.6$ Hz), 7.04 (d, 1H, $J = 8.1$ Hz), 5.83 (s, 1H), 3.95-3.87 (m, 1H), 8.78-8.70 (m, 1H),

1.21 (t, 3H, $J = 7.2$ Hz); ^{13}C NMR (CDCl_3 , 125 MHz): δ 183.1, 160.3, 156.5, 151.2, 140.8, 135.3, 131.8, 126.7, 126.6, 124.0, 122.4, 122.2, 121.4, 121.1, 118.2, 107.8, 100.0, 64.1, 15.0; IR: ν_{\max} , 3447, 2972, 2915, 1648, 1608, 1522, 1472, 1371, 1270, 1078, 754 cm^{-1} . ESI-MS: M^{1+} , M-OEt, 307. EI-HRMS: calcd for. $\text{C}_{17}\text{H}_{11}\text{O}_2\text{N}_2\text{S} = 307.0536$. found: 307.0535.

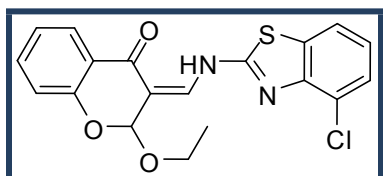
(Z)-2-methoxy-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3ar**). Color & State:



Yellow solid. M.P.: 150-152 °C. ¹H NMR (DMSO-d₆, 300 MHz): δ 10.11 (s, 1H), 8.91 (s, 1H), 8.15 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 1.5 Hz), 7.89 (t, 1H, *J* = 8.7 Hz), 7.75 (d, 1H, *J* = 1.2 Hz), 7.59 (t, 1H, *J* = 7.9 Hz), 7.29-7.17 (m, 4H), 6.80 (dd, 1H, *J*₁ = 8.7 Hz, *J*₂ = 2.6 Hz), 3.83-3.69 (m, 5H), 1.05 (t, 3H, *J* = 7.0 Hz); ¹³C NMR (DMSO-d₆, 75

MHz): δ 188.4, 164.8, 163.5, 155.6, 154.3, 146.8, 135.2, 131.9, 126.8, 125.3, 124.7, 120.0, 118.9, 118.1, 112.9, 105.5, 56.1, 55.5, 18.5; IR: ν_{max}, 3447, 3134, 2929, 1647, 1603, 1468. 1371, 1258, 1221, 1066, 1015, 751 cm⁻¹. EI-MS: M-OEt, 337. EI-HRMS: calcd for. C₁₈ H₁₃ O₃ N₂ S = 337.0641. found: 337.0633.

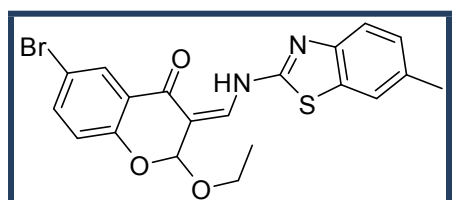
(Z)-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-ethoxychroman-4-one (**3as**): Color & State :



Lemon Yellow Solid. mp: 154-156 °C. ¹H NMR (CDCl₃, 500 MHz): δ 12.39 (d, 1H, *J* = 11.0 Hz), 8.05 (d, 1H, *J* = 11.0 Hz), 7.97 (dd, 1H, *J*₁ = 7.8 Hz, *J*₂ = 1.7 Hz), 7.62 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 1.1 Hz), 7.54-7.49 (m, 1H), 7.45 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 0.9 Hz), 5.85 (s, 1H), 3.95-3.88 (m, 1H), 3.79-3.71 (m, 1H), 1.21 (t, 3H, *J* = 7.2 Hz); ¹³C NMR (CDCl₃, 125

MHz): δ 183.1, 160.7, 156.5, 148.2, 140.4, 135.4, 132.8, 126.9, 126.6, 125.7, 124.4, 122.2, 122.2, 119.8, 118.2, 108.2, 99.9, 64.1, 15.0; IR: ν_{max}, 3447, 2969, 2911, 1646, 1606, 1524, 1468, 1366, 1256, 1216, 1147, 1070, 1011 cm⁻¹; LC-MS: M-45, i.e. M-OEt, 341. HRMS: calcd. for. C₁₇ H₁₀ O₂ N₂ Cl S : 341.0146. found: 341.0147.

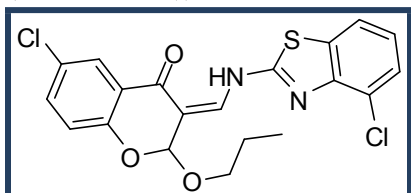
(Z)-6-bromo-2-ethoxy-3-((6-methylbenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3at**): Color &



State: Yellow Solid. M.P.: 140-142 °C. ¹H NMR (CDCl₃, 500 MHz): δ 12.20 (d, 1H, *J* = 10.9 Hz), 8.07 (d, 1H, *J* = 2.6 Hz), 8.00 (d, 1H, *J* = 11.1 Hz), 7.65 (d, 1H, *J* = 8.2 Hz), 7.57 (dd, 1H, *J*₁ = 8.7 Hz, *J*₂ = 2.6 Hz), 7.54 (s, 1H), 7.26-7.22 (m, 1H), 6.93 (d, 1H, *J* = 8.7 Hz), 5.81 (s, 1H), 3.92-3.84 (m, 1H), 3.76-3.68 (m, 1H), 2.46 (s, 3H), 1.20 (t, 3H, *J* = 7.0 Hz); ¹³C NMR (DMSO-d₆, 75 MHz): δ 188.0,

163.7, 154.5, 137.6, 129.8, 127.3, 126.3, 121.5, 121.0, 120.7, 120.0, 117.3, 55.9, 20.7, 18.5; IR: ν_{max}, 3222, 3059, 2971, 2917, 1647, 1598, 1525, 1461, 1262, 1200, 1070, 952, 811 cm⁻¹. EI-MS: M-OEt, 399. EI-HRMS: calcd for. C₁₈ H₁₂ O₂ N₂ Br S = 398.9797. found: 398.9790.

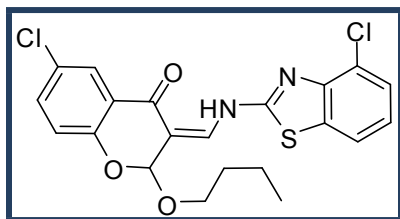
(Z)-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-propoxychroman-4-one (**3au**): Color



& State: Yellow solid. M.P.: 256-258 °C. ¹H NMR (CDCl₃, 400 MHz): δ 12.28 (d, 1H, *J* = 11.0 Hz), 8.05 (d, 1H, *J* = 11.0 Hz), 7.90 (d, 1H, *J* = 2.6 Hz), 7.62 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 1.0 Hz), 7.47-7.41 (m, 2H), 7.20 (t, 1H, *J* = 7.8 Hz), 6.99 (d, 1H, *J* = 8.8 Hz), 5.83 (s, 1H), 3.82-3.75 (m, 1H), 3.67-3.60 (m, 1H), 1.58 (sex, 2H, *J*

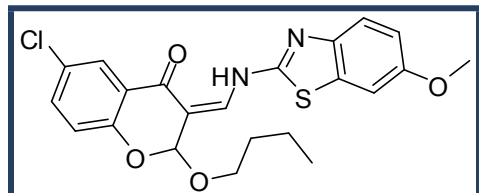
= 7.1 Hz), 0.85 (t, 3H, $J = 7.5$ Hz); ^{13}C NMR (CDCl_3 , 100 MHz): δ 182.1, 160.6, 155.0, 148.2, 140.9, 135.1, 132.9, 127.6, 127.0, 126.1, 125.9, 124.6, 123.3, 119.9, 107.9, 100.2, 70.5, 22.7, 10.5; IR: ν_{max} , 3457, 2962, 2935, 2875, 1647, 1606, 1586, 1525, 1466, 1420, 1255, 1204, 1105, 1071, 949, 812 cm^{-1} . ESI: M-59 (M-Propoxy), 375. ESI-HRMS: Calcd. for $\text{C}_{17}\text{H}_9\text{O}_2\text{N}_2\text{Cl}_2\text{S}$ = 374.9756. Found 374.9752.

(Z)-2-butoxy-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3av**): Color &



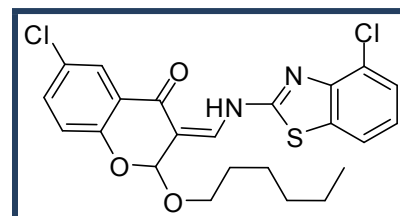
State: Pale yellow solid. M.P.: 259-261 °C. ^1H NMR (CDCl_3 , 400 MHz): δ 12.27 (d, 1H, $J = 10.9$ Hz), 8.04 (d, 1H, $J = 11.0$ Hz), 7.91 (d, 1H, $J = 2.7$ Hz), 7.62 (dd, 1H, $J_1 = 7.9$ Hz, $J_2 = 0.7$ Hz), 7.47-7.42 (m, 2H), 7.21 (t, 1H, $J = 7.9$ Hz), 6.99 (d, 1H, $J = 8.7$ Hz), 5.82 (s, 1H), 3.87-3.79 (m, 1H), 3.71-3.63 (m, 1H), 1.58-1.50 (m, 2H), 1.34-1.25 (m, 2H), 0.87 (t, 3H, $J = 7.5$ Hz); ^{13}C NMR (CDCl_3 , 100 MHz): δ 182.1, 160.6, 155.0, 148.2, 140.9, 135.1, 132.9, 127.6, 127.0, 126.1, 125.9, 124.6, 123.3, 119.9, 107.9, 100.2, 68.6, 31.4, 29.7, 19.2, 13.7; IR: ν_{max} , 3448, 2958, 2958, 2926, 2870, 1648, 1606, 1528, 1467, 1257, 1206, 1076, 947, 768 cm^{-1} ; ESI-MS: M-73 (M-Butoxy), 375. ESI-HRMS: Calcd. for $\text{C}_{17}\text{H}_9\text{O}_2\text{N}_2\text{Cl}_2\text{S}$ = 374.9756. Found: 374.9751.

(Z)-2-butoxy-6-chloro-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3aw**). Color



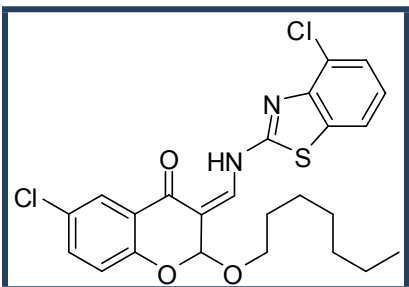
& State: Yellow solid. M.P.: 144-146 °C. ^1H NMR (CDCl_3 , 500 MHz): δ 12.21 (d, 1H, $J = 11.0$), 7.96 (d, 1H, $J = 11.1$ Hz), 7.92 (d, 1H, $J = 2.6$ Hz), 7.66 (d, 1H, $J = 8.8$ Hz), 7.43 (dd, 1H, $J_1 = 8.7$ Hz, $J_2 = 2.6$ Hz), 7.23 (d, 1H, $J = 2.3$ Hz), 7.03 (dd, 1H, $J_1 = 9.0$ Hz, $J_2 = 2.4$ Hz), 6.98 (d, 1H, $J = 8.7$ Hz), 5.79 (s, 1H), 3.90-3.78 (m, 4H), 3.69-3.62 (m, 1H), 1.56-1.50 (m, 1H), 1.33-1.23 (m, 3H), 0.87 (t, 3H, $J = 7.5$ Hz); ^{13}C NMR (CDCl_3 , 100 MHz): δ 181.7, 157.9, 156.9, 154.9, 145.3, 141.4, 134.9, 133.0, 127.6, 126.1, 123.4, 121.7, 119.8, 115.2, 106.9, 104.9, 100.4, 68.5, 55.8, 31.4, 19.2, 13.7; IR: ν_{max} , 3459, 2953, 2877, 1649, 1604, 1536, 1468, 12577, 1203, 1082, 962 cm^{-1} . ESI-MS: M-73 (M-Butoxy), 371. ESI-HRMS: Calcd. for $\text{C}_{18}\text{H}_{12}\text{O}_3\text{N}_2\text{Cl}\text{S}$ = 371.0252. Found: 371.0248.

(Z)-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-(hexyloxy)chroman-4-one (**3ax**):



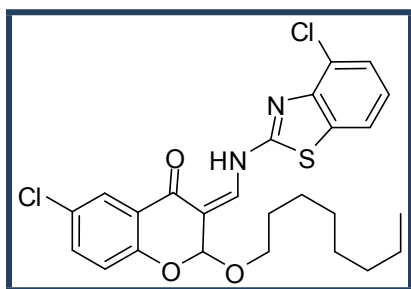
Color & State: Greenish yellow solid. M.P.: 132-134 °C and 270 °C. ^1H NMR (CDCl_3 , 400 MHz): δ 12.28 (d, 1H, $J = 10.9$ Hz), 8.05 (d, 1H, $J = 11.0$ Hz), 7.91 (d, 1H, $J = 2.6$ Hz), 7.63 (dd, 1H, $J_1 = 7.9$ Hz, $J_2 = 0.7$ Hz), 7.47-7.42 (m, 2H), 7.21 (t, 1H, $J = 7.9$ Hz), 6.99 (d, 1H, $J = 8.7$ Hz), 5.82 (s, 1H), 3.86-3.78 (m, 1H), 3.71-3.63 (m, 1H), 1.58-1.50 (m, 2H), 1.29-1.19 (m, 6H), 0.85 (t, 3H, $J = 7.0$ Hz); ^{13}C NMR (CDCl_3 , 100 MHz): δ 182.1, 160.6, 155.0, 148.2, 140.9, 135.1, 132.9, 127.6, 127.0, 126.1, 125.9, 124.6, 123.3, 119.9, 107.9, 100.2, 68.9, 31.4, 29.3, 25.7, 22.5, 14.0; IR: ν_{max} , 3445, 2928, 2862, 1643, 1606, 1529, 1468, 1272, 1258, 1206, 1077, 953, 734 cm^{-1} . ESI: M-101 (M-Hexyloxy), 375. ESI-HRMS: Calcd. for $\text{C}_{17}\text{H}_9\text{O}_2\text{N}_2\text{Cl}_2\text{S}$ = 374.9756. Found : 374.9752.

(Z)-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-(heptyloxy)chroman-4-one (**3ay**):



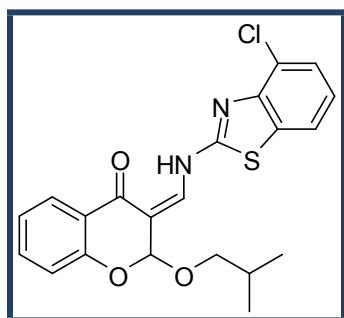
Color & State: Yellow solid. M.P.: 124-126 °C. ¹H NMR (CDCl₃, 400 MHz): δ 12.28 (d, 1H, *J* = 11.0 Hz), 8.04 (d, 1H, *J* = 10.9 Hz), 7.91 (d, 1H, *J* = 2.6 Hz), 7.63 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 1.0 Hz), 7.47-7.41 (m, 2H), 7.21 (t, 1H, *J* = 7.8 Hz), 6.99 (d, 1H, *J* = 8.8 Hz), 5.82 (d, 1H), 3.85-3.78 (m, 1H), 3.70-3.63 (m, 1H), 1.58-1.50 (m, 1H), 1.31-1.16 (m, 9H), 0.85 (t, 3H, *J* = 7.1 Hz); ¹³C NMR (CDCl₃, 100 MHz): δ 182.1, 160.6, 155.0, 148.2, 140.9, 135.1, 132.9, 127.6, 127.0, 126.1, 125.9, 124.6, 123.3, 119.9, 107.9, 100.2, 68.9, 31.7, 29.7, 29.4, 28.9, 26.0, 22.5, 14.0; IR: ν_{max}, 3456, 2924, 2853, 1639, 1606, 1525, 1469, 1420, 1340, 1258, 1202, 767 cm⁻¹; ESI-MS: M-115 (M-Heptyloxy), 375. ESI-HRMS: Calcd. for C₁₇ H₉ O₂ N₂ Cl₂ S = 374.9756. Found: 374.9753.

(Z)-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-(octyloxy)chroman-4-one (**3az**):



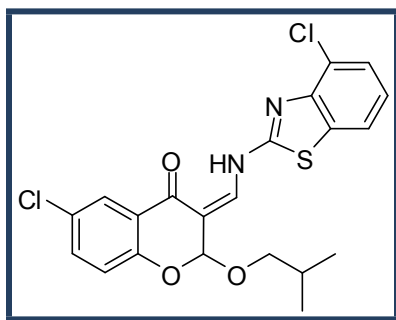
Color & State: Yellow solid. M.P.: 113-115 °C. ¹H NMR (CDCl₃, 400 MHz): δ 12.25 (d, 1H, *J* = 10.9 Hz), 8.03 (d, 1H, *J* = 11.0 Hz), 7.91 (d, 1H, *J* = 2.7 Hz), 7.62 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 1.0 Hz), 7.47-7.41 (m, 2H), 7.21 (t, 1H, *J* = 7.9 Hz), 6.99 (d, 1H, *J* = 8.7 Hz), 5.80 (s, 1H), 3.77-3.72 (m, 1H), 3.58-3.53 (m, 1H), 1.51-1.43 (m, 1H), 1.29-1.14 (m, 9H), 0.87-0.75 (m, 5H); ¹³C NMR (CDCl₃, 100 MHz): δ 182.2, 160.6, 155.0, 148.3, 140.7, 135.1, 132.9, 127.6, 127.0, 126.1, 125.9, 124.6, 123.3, 119.9, 108.0, 100.4, 100.4, 71.4, 71.2, 39.4, 39.3, 30.4, 30.3, 29.0, 28.7, 23.7, 23.6, 23.0, 14.0, 14.0, 11.1, 10.8; IR: ν_{max}, 3446, 2926, 1642, 1610, 1526, 1469, 1421, 1259, 1067, 607 cm⁻¹; ESI-MS: M-Octyloxy (M-129), 375. ESI-HRMS: Calcd. for C₁₇ H₉ O₂ N₂ Cl₂ S = 374.9756. Found: 374.9756.

(Z)-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-isobutoxychroman-4-one (**3ba**):



Color & State: Greenish yellow solid. M.P.: 149-151 °C. ¹H NMR (CDCl₃, 500 MHz): δ 12.36 (d, 1H, *J* = 10.8 Hz), 8.02 (d, 1H, *J* = 10.8 Hz), 7.97 (dd, 1H, *J*₁ = 7.8 Hz, *J*₂ = 1.7 Hz), 7.62 (dd, 1H, *J*₁ = 8.1 Hz, *J*₂ = 0.9 Hz), 7.53-7.48 (m, 1H), 7.44 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 0.9 Hz), 7.20 (t, 1H, *J* = 7.9 Hz), 7.12 (t, 1H, *J* = 7.9 Hz), 7.03 (d, 1H, *J* = 7.9 Hz), 5.82 (s, 1H), 3.65-3.60 (m, 1H), 3.48-3.44 (m, 1H), 1.84 (nonet, 1H, *J* = 6.7 Hz), 0.86 (d, 3H, *J* = 6.7 Hz), 0.80 (d, 3H, *J* = 6.6 Hz); ¹³C NMR (CDCl₃, 100 MHz): δ 183.4, 160.8, 156.6, 148.3, 140.2, 135.4, 132.9, 126.9, 126.6, 125.8, 124.4, 122.3, 122.1, 119.8, 118.3, 108.5, 100.1, 75.2, 28.3, 19.3, 19.2; IR: ν_{max}, 3423 (N-H, stretch), 3087 (=C-C-H, stretch), 2955 (C-H, stretch, Alkyl), 2900 (C-H, stretch, Alkyl), 2871 (C-H, stretch, Alkyl), 1641, 1607, 1523, 1467, 1420, 1275, 1256, 1203, 1063, 969 cm⁻¹; ESI-MS: M-73 (M-Isobutoxy), 341.

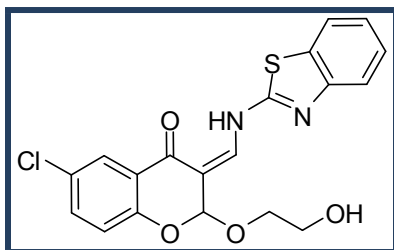
(Z)-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-isobutoxychroman-4-one (**3bb**): Color



& State: Pale yellow solid. M.P.: 146-148 °C. ¹H NMR (CDCl₃, 500 MHz): δ 12.27 (d, 1H, *J* = 10.8 Hz), 8.04 (d, 1H, *J* = 11.0 Hz), 7.92 (d, 1H, *J* = 2.6 Hz), 7.63 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 0.9 Hz), 7.46-7.42 (m, 2H), 7.21 (t, 1H, *J* = 7.9 Hz), 6.99 (d, 1H, *J* = 8.7 Hz), 5.81 (s, 1H), 3.62-3.58 (m, 1H), 3.47-3.43 (m, 1H), 1.83 (nonet, 1H, *J* = 6.7 HZ), 0.86 (d, 3H, *J* = 6.7 Hz), 0.80 (d, 3H, *J* = 6.7 Hz); ¹³C NMR (CDCl₃, 100 MHz): δ 182.0, 160.6, 154.9, 148.2, 140.7, 135.0, 132.9, 127.5, 126.9, 126.0, 125.9, 124.5, 123.2, 119.9, 119.8, 107.9, 100.3, 75.3, 28.3, 19.2; IR: ν_{max}, 3451, 2956, 2907, 2872, 1650, 1610, 1522,

1469, 131, 1220, 1067, 1018, 967, 945 cm⁻¹; ESI: M¹⁺. ESI-HRMS: Calcd. for. C₁₇H₉Cl₂N₂O₂S: 374.97618. Found: 374.97638.

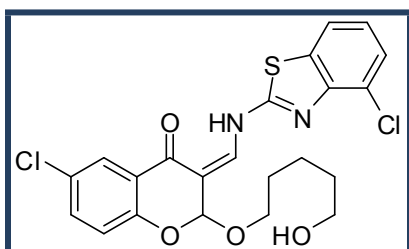
(Z)-3-((benzo[d]thiazol-2-ylamino)methylene)-6-chloro-2-(2-hydroxyethoxy)chroman-4-one (**3bc**): Color



& State: Yellow solid. M.P.: 116-118 °C. ¹H NMR (CDCl₃, 500 MHz): δ 12.22 (d, 1H, *J* = 11.0 Hz), 8.05 (d, 1H, *J* = 11.0 Hz), 7.91 (d, 1H, *J* = 2.6 Hz), 7.78-7.72 (m, 2H), 7.45-7.41 (m, 2H), 7.30 (t, 1H, *J* = 8.1 Hz), 6.99 (d, 1H, *J* = 8.7 Hz), 5.88 (s, 1H), 3.97-3.92 (m, 1H), 3.86-3.81 (m, 1H), 3.76-3.72 (m, 2H); ¹³C NMR (DMSO-d₆, 75 MHz): δ 188.0, 173.8, 166.4, 163.7, 154.1, 152.7, 134.9, 131.1, 130.8, 126.4, 125.9, 125.3, 124.2, 121.3, 120.8, 119.9, 117.7, 62.7; IR: ν_{max},

3425(br), 2925, 1651, 1607, 1521, 1468, 1441, 1260, 1205, 1123, 1031, 963, 753, 723 cm⁻¹. ESI-MS: M-[(2-Hydroxyethyl)oxy], i.e., M-61, 341.

(Z)-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-(5-hydroxypentyl)oxychroman-4-one

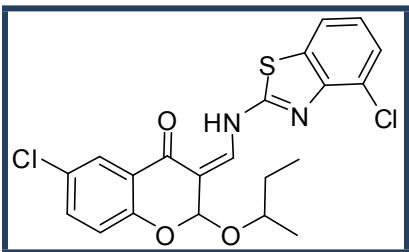


(**3bd**): Color & State: Yellow solid. M.P.: 140-142 °C. ¹H NMR (DMSO-d₆, 300 MHz): δ 10.08 (s, 1H), 8.93 (s, 1H), 8.05 (d, 1H, *J* = 2.6 Hz), 7.91 (dd, 1H, *J*₁ = 8.9 Hz, *J*₂ = 2.6 Hz), 7.84-7.78 (m, 3H), 7.60 (d, 1H, *J* = 7.7 Hz), 7.26 (d, 1H, *J* = 7.7 Hz), 6.98 (t, 1H, *J* = 7.7 Hz), 4.44-4.32 (m, 2H), 3.36 (t, 2H, *J* = 6.2 Hz), 1.46-1.34 (m, 4H), 1.33-1.22 (m, 2H); ¹³C NMR (DMSO-d₆, 75 MHz): δ 188.0, 173.8, 167.3, 163.8, 154.2, 149.4, 134.9, 132.1, 131.2, 125.9, 125.5,

124.2, 121.5, 121.4, 121.3, 119.9, 119.8, 60.7, 32.4, 22.0; IR: ν_{max}, 3430, 2934, 2864, 1644, 1607, 1468, 1422, 1257, 1205, 1073, 950, 823, 774 cm⁻¹. ESI-MS: M-[(5-hydroxypentyl)oxy], i.e., M-103, 375. ESI-HRMS: Calcd., for C₁₇H₉Cl₂N₂O₂S: 374.9762. Found: 374.9752.

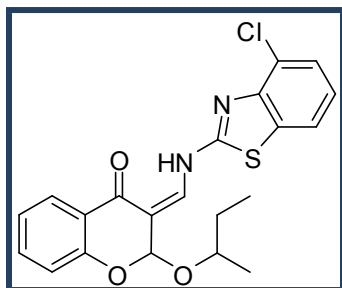
3-(sec-butoxy(4-chlorobenzo[d]thiazol-2-ylamino)methyl)-6-chloro-4H-chromen-4-one (**3be**): Color & State: Greenish yellow solid. M.P.: 257-259 °C. ¹H NMR (DMSO-d₆, 300 MHz): δ 10.09 (s, 1H), 8.92 (s, 1H), 8.04 (d, 1H, *J* = 2.6 Hz), 7.90 (dd, 1H, *J*₁ = 8.9 Hz, *J*₂ = 2.6 Hz), 7.83-7.77 (m, 1H), 7.60 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 0.9 Hz), 7.26 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 0.9 Hz), 6.97 (t, 1H, *J* = 7.9 Hz), 4.31 (d, 1H, *J* =

3.6 Hz), 3.53-3.44 (m, 1H), 1.39-1.24 (m, 2H), 1.01 (d, 3H, $J = 6.0$ Hz), 0.81 (t, 3H, $J = 7.4$ Hz); ^{13}C



NMR (DMSO- d_6 , 75 MHz): δ 188.0, 173.8, 167.3, 163.7, 154.1, 149.4, 134.9, 132.1, 131.1, 125.8, 125.5, 124.2, 121.4, 121.3, 121.2, 119.9, 119.7, 67.1, 31.6, 23.0, 10.0; IR: ν_{max} , 3435 (br), 2964, 2925, 2854, 1649, 1607, 1524, 1420, 1384, 1260, 1202, 1059, 960, 718 cm^{-1} . ESI-MS: M-73 (M-(2-Butoxy)), 375. ESI-HRMS: Calcd. for $\text{C}_{17}\text{H}_9\text{O}_2\text{N}_2\text{Cl}_2\text{S} = 374.9756$. Found: 374.9764.

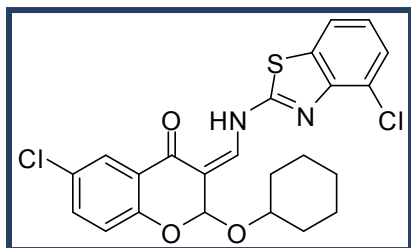
(Z)-2-sec-butoxy-3-((4-chlorobenzodithiazol-2-ylamino)methylene)chroman-4-one (**3bf**): Color & State:



Yellow solid. M.P.: 140-142 $^{\circ}\text{C}$. ^1H NMR (DMSO- d_6 , 300 MHz): δ 10.11 (s, 1H), 8.89 (s, 1H), 8.13 (dd, 1H, $J_1 = 7.9$ Hz, $J_2 = 1.5$ Hz), 7.90-7.81 (m, 2H), 7.73 (d, 1H, $J = 8.1$ Hz), 7.63-7.53 (m, 2H), 7.26 (dd, 1H, $J_1 = 7.9$ Hz, $J_2 = 0.9$ Hz), 6.97 (t, 1H, $J = 7.9$ Hz), 4.35 (d, 1H, $J = 4.5$ Hz), 3.55-3.47 (m, 1H), 1.37-1.24 (m, 2H), 1.01 (d, 3H, $J = 6.4$ Hz), 0.81 (t, 3H, $J = 7.4$ Hz); ^{13}C NMR (DMSO- d_6 , 75 MHz): δ 188.3, 174.9, 167.3, 163.4, 155.6, 149.4, 135.1, 132.1, 126.7, 125.5, 125.2, 124.6, 121.4, 121.2, 119.9, 119.7, 118.8, 67.1, 31.6, 23.0, 10.0; IR: ν_{max} , 3420, 3072, 2970, 2925, 1646, 1610,

1525, 140, 1369, 1272, 1061, 1016, 947 cm^{-1} .

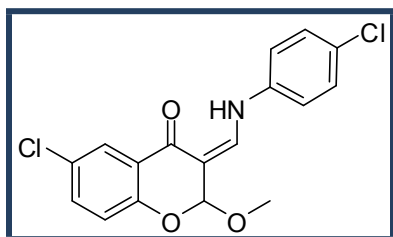
(Z)-6-chloro-3-((4-chlorobenzodithiazol-2-ylamino)methylene)-2-(cyclohexyloxy)chroman-4-one (**3ag**):



Color & State: Lemon yellow solid. M.P.: 260-262 $^{\circ}\text{C}$. ^1H NMR (CDCl $_3$, 500 MHz): δ 12.28 (d, 1H, $J = 10.8$ Hz), 7.99 (d, 1H, $J = 11.0$ Hz), 7.91 (d, 1H, $J = 2.6$ Hz), 7.62 (dd, 1H, $J_1 = 8.1$ Hz, $J_2 = 0.9$ Hz), 7.47-7.41 (m, 2H), 7.20 (t, 1H, $J = 7.9$ Hz), 6.96 (d, 1H, $J = 8.85$ Hz), 5.97 (s, 1H), 3.88-3.81 (m, 1H), 2.05-1.98 (m, 1H), 1.83-1.73 (m, 1H), 1.71-1.64 (m, 1H), 1.57-1.50 (m, 1H), 1.42-1.23 (m, 5H), 1.22-1.13 (m, 1H); ^{13}C NMR (CDCl $_3$, 100 MHz): δ 182.2,

160.7, 155.2, 148.2, 140.6, 135.1, 132.9, 127.5, 127.0, 126.1, 125.9, 124.5, 123.2, 119.9, 119.9, 108.3, 98.6, 76.9, 33.2, 32.0, 25.4, 24.1, 24.1; IR: ν_{max} , 3432, 3083, 2930, 2853, 1637, 1607, 1525, 1467, 1420, 1255, 1204, 1059, 958 cm^{-1} . ESI-MS: M-99 (M-Cyclohexyloxy), 375. ESI-HRMS: Calcd. for $\text{C}_{17}\text{H}_9\text{O}_2\text{N}_2\text{Cl}_2\text{S} = 374.9756$. Found : 374.9750.

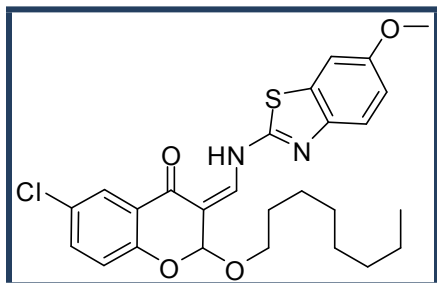
(Z)-6-chloro-3-((4-chlorophenylamino)methylene)-2-methoxychroman-4-one (**3bh**): Color & State:



Yellow solid. M.P.: 111-113 $^{\circ}\text{C}$. ^1H NMR (CDCl $_3$, 500 MHz): δ 12.07 (d, 1H, $J = 12.2$ Hz), 7.90 (d, 1H, $J = 2.6$ Hz), 7.44 (d, 1H, $J = 12.4$ Hz), 7.39 (dd, 1H, $J_1 = 8.7$ Hz, $J_2 = 2.6$ Hz), 7.31 (d, 2H, $J = 8.7$ Hz), 7.05 (d, 2H, $J = 8.8$ Hz), 6.98 (d, 1H, $J = 8.7$ Hz), 5.66 (s, 1H), 3.50 (s, 3H); ^{13}C NMR (CDCl $_3$, 100 MHz): δ 180.0, 154.0, 144.2, 138.0, 134.1, 129.8, 127.5, 125.8, 123.7, 119.4, 117.9, 103.4, 101.6, 55.5; ESI-MS: M-1, 348. ESI-

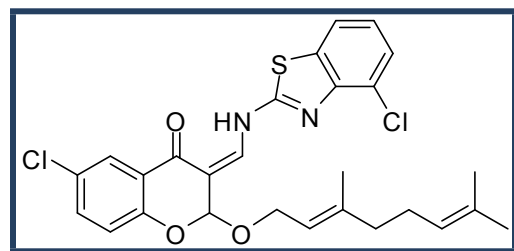
HRMS: calcd for. $\text{C}_{17}\text{H}_{12}\text{O}_3\text{NCl}_2$: 348.0188. found: 348.0199.

(Z)-6-chloro-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)-2-(octyloxy)chroman-4-one (**3bi**):



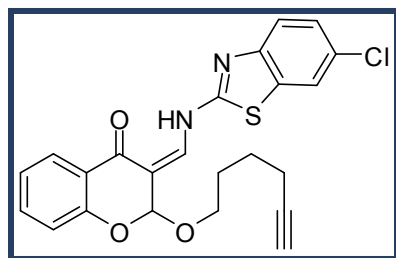
Color & State: Lemon yellow solid. M.P.: 127-129 °C and 210 °C. ¹H NMR (CDCl₃, 500 MHz): δ 12.18 (d, 1H, *J* = 11.1 Hz), 7.94 (d, 1H, *J* = 11.0 Hz), 7.91 (d, 1H, *J* = 2.6 Hz), 7.66 (d, 1H, *J* = 8.8 Hz), 7.42 (dd, 1H, *J*₁ = 8.7 Hz, *J*₂ = 2.6 Hz), 7.23 (d, 1H, *J* = 2.6 Hz), 7.02 (dd, 1H, *J*₁ = 8.8 Hz, *J*₂ = 2.4 Hz), 6.98 (d, 1H, *J* = 8.7 Hz), 5.76 (s, 1H), 3.90-3.81 (s, 3H), 3.76-3.71 (m, 1H), 3.56-3.51 (m, 1H), 1.31-1.13 (m, 9H), 0.86-0.76 (m, 6H); ¹³C NMR (CDCl₃, 125 MHz): δ 181.8, 157.9, 156.9, 154.9, 145.3, 141.2, 134.8, 133.0, 127.5, 126.0, 123.4, 121.7, 119.8, 115.1, 107.1, 104.9, 100.5, 100.5, 71.3, 71.1, 55.8, 39.4, 39.3, 30.4, 30.3, 29.0, 28.7, 23.7, 23.6, 23.0, 14.0, 11.1, 10.8; IR: ν_{max}, 3434, 2958, 2926, 2957, 1649, 1605, 1536, 1466, 1420, 125, 1202, 1065, 958, 827 cm⁻¹. ESI-MS: M-129 (M-Octyl), 371, ESI-HRMS: Calcd. for C₁₈H₁₂O₃N₂ClS = 371.0252. Found: 371.0259.

(Z)-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-((E)-3,7-dimethylocta-2,6-



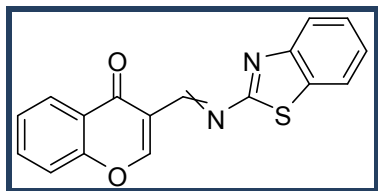
dienyloxy)chroman-4-one (**3bj**): Color & State: Yellow solid. M.P.: 121-123 °C. ¹H NMR (CDCl₃, 400 MHz): δ 12.29 (d, 1H, *J* = 10.9 Hz), 8.02 (d, 1H, *J* = 10.8 Hz), 7.91 (s, 1H), 7.62 (d, 1H, *J* = 7.8 Hz), 7.47-7.41 (m, 2H), 7.20 (t, 1H, *J* = 7.9 Hz), 7.01 (d, 1H, *J* = 8.7 Hz), 5.88 (s, 1H), 5.33 (t, 1H, *J* = 6.4 Hz), 5.08 (t, 1H, *J* = 6.2 Hz), 4.28 (d, 2H, *J* = 6.7 Hz), 2.15-2.01 (m, 4H), 1.73-1.65 (m, 6H), 1.59 (s, 3H); ¹³C NMR (CDCl₃, 100 MHz): δ 182.0, 160.6, 154.9, 148.2, 142.3, 141.1, 135.1, 132.9, 131.8, 127.7, 127.0, 126.2, 125.9, 124.6, 123.7, 123.3, 119.9, 119.0, 107.8, 98.9, 64.6, 39.6, 26.2, 25.7, 17.7, 16.5; ESI-MS: M-Geranyloxy (M-153), 375. ESI-HRMS: Calcd. for C₁₇H₉Cl₂N₂O₂S: 374.9762. Found: 374.9761.

Name: (E)-3-((6-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-(hex-5-ynyloxy)chroman-4-one (**3bk**):



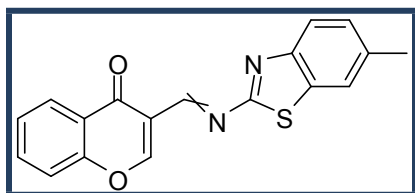
Color & State: Yellow color solid. M.P.: 132-134 °C. ¹H NMR (CDCl₃, 300 MHz): δ 12.30 (d, 1H, *J* = 10.9 Hz), 8.01 – 7.91 (m, 2H), 7.70 (d, 1H, *J* = 2.0 Hz), 7.66 (d, 1H, *J* = 8.7 Hz), 7.55 – 7.47 (m, 1H), 7.38 (dd, 1H, *J*₁ = 8.7 Hz, *J*₂ = 2.0 Hz), 7.12 (t, 1H, *J* = 7.2 Hz), 7.03 (d, 1H, *J* = 8.2 Hz), 5.80 (s, 1H), 3.79 (m, 2H), 2.14 (td, 1H, *J*₁ = 7.1 Hz, *J*₂ = 2.6 Hz), 1.93 (t, 1H, *J* = 2.6 Hz), 1.76 – 1.63 (m, 2H), 1.49 (m, 2H); ¹³C NMR (CDCl₃, 100 MHz): δ 183.2, 160.5, 156.5, 149.8, 140.3, 135.5, 132.9, 129.5, 127.3, 126.7, 122.3, 121.8, 121.0, 118.2, 108.2, 100.1, 84.1, 68.5, 67.9, 28.4, 24.9, 18.0; ESI-MS: M-(5-hexynyl-1-oxy) = 341.

3-((benzo[d]thiazol-2-ylimino)methyl)-4H-chromen-4-one (**4a**). Color & State: Pale yellow solid. M.P.:



264-266 °C. ^1H NMR (CDCl_3 , 400 MHz): δ 8.98 (s, 1H), 8.35-8.30 (m, 2H), 7.82 (t, 1H, $J = 8.7$ Hz), 7.71 (d, 1H, $J = 7.3$ Hz), 7.65 (d, 1H, $J = 8.2$ Hz), 7.54 (t, 1H, $J = 8.1$ Hz), 7.42-7.33 (m, 2H), 7.09 (d, 1H, $J = 7.5$ Hz); ^{13}C NMR (CDCl_3 , 100 MHz): δ 172.0, 171.8, 168.6, 156.8, 156.4, 136.5, 134.8, 127.4, 126.5, 126.3, 126.0, 124.8, 124.6, 123.0, 122.4, 118.6, 112.3; IR: ν_{max} , 3443, 3063, 2884, 1651, 1628, 1610, 1465, 1453, 1364, 1190, 1067, 766 cm^{-1} .

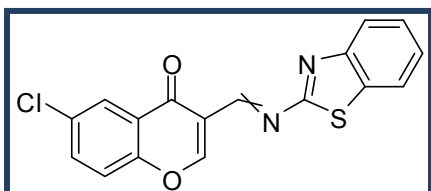
3-((6-methylbenzo[d]thiazol-2-ylimino)methyl)-4H-chromen-4-one (**4b**): Color & State : Wheat Brown



Solid. M.P.: 254-256 °C. ^1H NMR (CDCl_3 , 500 MHz): δ 8.96 (s, 1H), 8.30-8.34 (m, 2H), 7.74-7.79 (m, 1H), 7.64 (d, 1H, $J = 8.4$ Hz), 7.56-7.49 (m, 2H), 7.19 (d, 1H, $J = 8.2$ Hz), 6.98 (d, 1H, $J = 8.2$ Hz), 2.45 (s, 3H); ^1H NMR (DMSO-d_6 , 300 MHz): δ 9.06 (s, 1H), 8.81 (s, 1H), 8.14

(dd, 1H, $J_1 = 7.9$ Hz, $J_2 = 1.3$ Hz), 8.0-7.92 (m, 1H), 7.86 (d, 1H, $J = 7.9$ Hz), 7.70 (s, 1H), 7.63 (s, 1H, $J = 7.9$ Hz), 7.34 (s, 1H, $J = 8.3$ Hz), 7.26 (d, 1H, $J = 8.3$ Hz), 2.41 (s, 3H); ^{13}C NMR (DMSO-d_6 , 125 MHz): δ 171.8, 167.6, 158.5, 156.1, 134.7, 134.5, 128.7, 128.6, 127.7, 126.4, 125.4, 124.8, 123.9, 123.0, 122.9, 121.9, 20.7; IR: ν_{max} , 3418, 3068, 2926, 1657, 1609, 1452, 1346, 1191, 1065, 758 cm^{-1} .

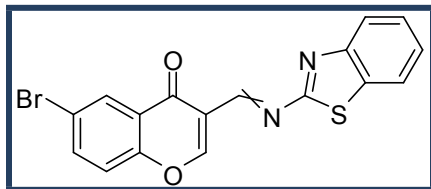
3-((benzo[d]thiazol-2-ylimino)methyl)-6-chloro-4H-chromen-4-one (**4c**). Color & State: Greenish Yellow



Solid. M.P.: 228-230 °C. ^1H NMR (DMSO-d_6 , 400 MHz): δ 9.13 (s, 1H), 8.84 (s, 1H), 8.09 (d, 1H, $J = 2.6$ Hz), 8.03 (dd, 1H, $J_1 = 8.9$ Hz, $J_2 = 2.7$ Hz), 8.00-7.93 (m, 2H), 7.51-7.38 (m, 3H); ^{13}C NMR (DMSO-d_6 , 100 MHz): δ 171.4, 170.8, 167.6, 158.9, 154.6, 136.5, 135.0, 130.8, 127.5, 125.0, 124.7, 124.2, 123.2, 121.8, 121.4,

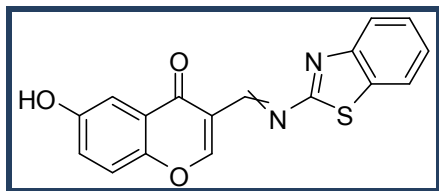
113.1; IR: ν_{max} , 3423, 3069, 1657, 1627, 1467, 1452, 1385, 1301, 1185, 1066, 752 cm^{-1} ;

3-((benzo[d]thiazol-2-ylimino)methyl)-6-bromo-4H-chromen-4-one (**4d**). Color & State: Wheat Brown



solid. M.P.: 260-262 °C. ^1H NMR (DMSO-d_6 , 300 MHz): δ 8.46 (s, 1H), 8.25-6.90 (m, 8H) (the solubility is very less even to get a reasonably good ^1H NMR); IR: ν_{max} , 3132, 1602, 1514, 1437, 1382, 1202, 1103, 742 cm^{-1} .

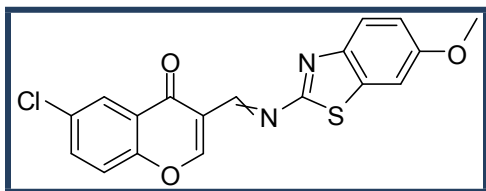
3-((benzo[d]thiazol-2-ylimino)methyl)-6-hydroxy-4H-chromen-4-one (**4e**): Color & State: Pale yellow



ν_{\max} , 3423, 3059, 1642, 1449, 1315, 1193, 1066, 751 cm^{-1} .

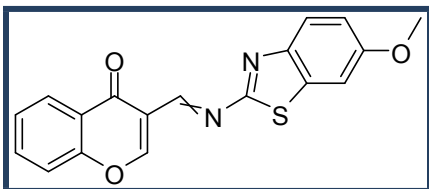
solid. M.P.: 267-269 °C. ^1H NMR (DMSO- d_6 , 500 MHz): δ 10.27 (s, 1H), 9.01 (s, 1H), 8.83 (s, 1H), 7.98 (d, 1H, $J = 7.9$ Hz), 7.74 (dd, 1H, $J_1 = 8.4$ Hz, $J_2 = 0.9$ Hz), 7.47-7.35 (m, 5H). ^{13}C NMR (DMSO- d_6 , 125 MHz): δ 171.4, 167.7, 158.0, 155.5, 149.7, 136.7, 127.5, 124.8, 124.7, 124.6, 123.9, 123.2, 120.7, 120.3, 113.0, 107.7. IR:

6-chloro-3-((6-methoxybenzo[d]thiazol-2-ylimino)methyl)-4H-chromen-4-one (**4f**): Color & State: Off-



white solid. M.P.: 262-264 °C. ^1H NMR (DMSO- d_6 , 500 MHz): δ 9.10 (s, 1H), 8.79 (s, 1H), 8.08 (d, 1H, $J = 2.4$ Hz), 8.01 (dd, 1H, $J_1 = 9.0$ Hz, $J_2 = 2.4$ Hz), 7.94 (d, 1H, $J = 9.0$ Hz), 7.62 (d, 1H, $J = 2.3$ Hz), 7.41 (d, 1H, $J = 9.0$ Hz), 7.03 (dd, 1H, $J_1 = 9.0$ Hz, $J_2 = 2.3$ Hz), 3.82 (s, 3H); ^1H NMR (CDCl_3 , 500 MHz): δ 8.93 (s, 1H), 8.31 (s, 1H), 8.27 (d, 1H, $J = 2.4$ Hz), 7.76 (dd, 1H, $J_1 = 9.0$ Hz, $J_2 = 2.6$ Hz), 7.60 (d, 1H, $J = 9.0$ Hz), 7.21 (s, 1H), 6.96 (s, 2H), 3.87 (s, 3H); ^{13}C NMR (DMSO- d_6 , 125 MHz): δ 171.1, 170.8, 167.2, 158.8, 156.9, 154.6, 135.0, 130.8, 130.4, 126.1, 125.1, 124.2, 121.9, 121.5, 115.2, 114.0, 107.1, 55.9; IR: ν_{\max} , 3458, 3068, 2925, 1663, 1609, 1469, 1456, 1244, 1184, 1060, 84, 791 cm^{-1} .

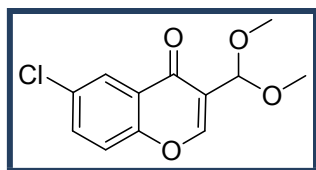
3-((6-methoxybenzo[d]thiazol-2-ylimino)methyl)-4H-chromen-4-one (**4g**): Color & State: White solid.



M.P.: 281-283 °C. ^1H NMR (CDCl_3 , 500 MHz): δ 8.94 (s, 1H), 8.34-8.30 (m, 2H), 7.82 (t, $J = 7.48$ Hz), 7.64 (d, 1H, $J = 8.55$ Hz), 7.54 (t, 1H, $J = 7.48$ Hz), 7.21 (s, 1H), 7.02-6.93 (m, 2H), 3.86 (s, 3H); ^{13}C NMR (CDCl_3 , 500 MHz): δ 172.0, 171.6, 168.2, 157.4, 156.8, 156.3, 134.7, 130.4, 127.2, 126.5, 126.3, 124.6, 122.5, 118.5, 115.3, 113.1, 106.7, 56.0; IR: ν_{\max} , 3068, 2923, 165, 1604, 1488, 1467, 1245, 1189, 1033, 756 cm^{-1} .

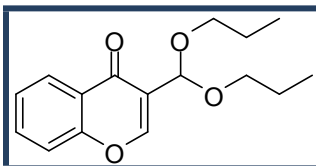
M.P.: 281-283 °C. ^1H NMR (CDCl_3 , 500 MHz): δ 8.94 (s, 1H), 8.34-8.30 (m, 2H), 7.82 (t, $J = 7.48$ Hz), 7.64 (d, 1H, $J = 8.55$ Hz), 7.54 (t, 1H, $J = 7.48$ Hz), 7.21 (s, 1H), 7.02-6.93 (m, 2H), 3.86 (s, 3H); ^{13}C NMR (CDCl_3 , 500 MHz): δ 172.0, 171.6, 168.2, 157.4, 156.8, 156.3, 134.7, 130.4, 127.2, 126.5, 126.3, 124.6, 122.5, 118.5, 115.3,

6-chloro-3-(dimethoxymethyl)-4H-chromen-4-one (**5a**). Color & State: Wheat brown solid. M.P.: 114-



116 °C. ¹H NMR (CDCl₃, 500 MHz): δ 8.19 (d, 1H, *J* = 2.6 Hz), 8.11 (s, 1H), 7.62 (dd, 1H, *J*₁ = 8.8 Hz, *J*₂ = 2.6 Hz), 7.43 (d, 1H, *J* = 8.8 Hz), 5.59 (s, 1H), 3.44 (s, 6H); ¹³C NMR (CDCl₃, 100 MHz): δ 174.9, 154.9, 154.5, 133.9, 131.2, 125.2, 125.1, 121.3, 119.8, 98.0, 54.1; IR: ν_{max}, 3091, 3068, 2931, 1649, 1463, 1311, 1098, 1060 cm⁻¹. ESI-MS: M+1, 255. ESI-HRMS: Calcd. for C₁₂ H₁₂ O₄ Cl = 255.0419. Found: 255.0414.

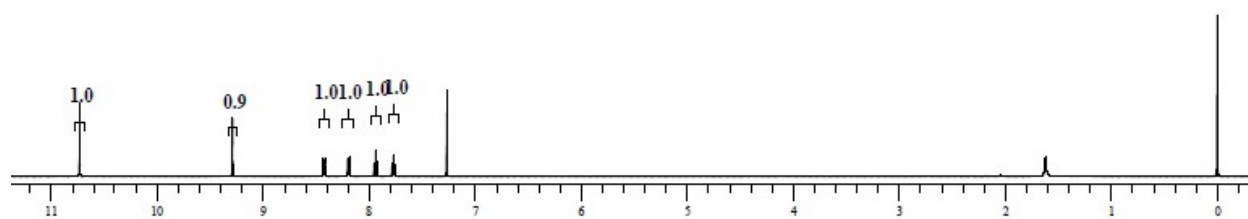
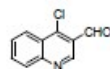
3-(dipropoxymethyl)-4H-chromen-4-one (**5b**). Color & State: Pale brown solid. M.P.: 107-109 °C. ¹H



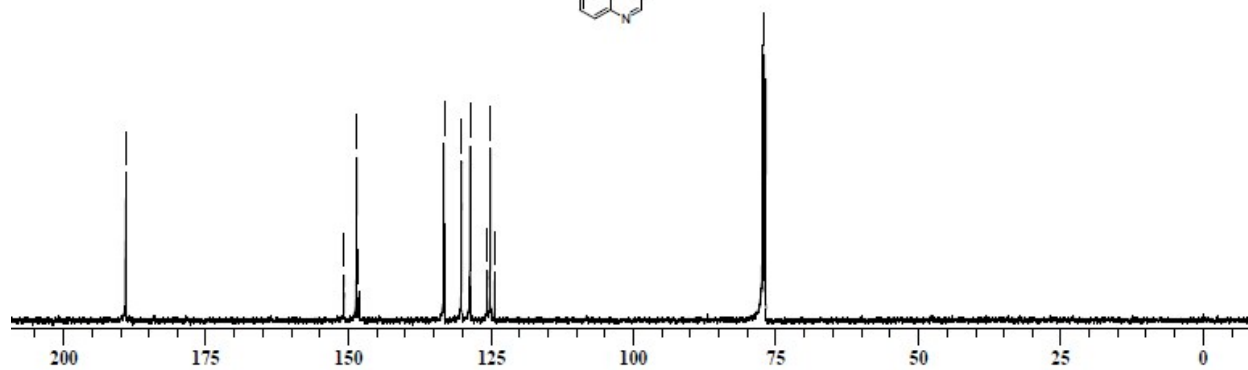
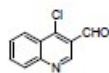
NMR (CDCl₃, 400 MHz): δ 8.24 (dd, 1H, *J*₁ = 7.9 Hz, *J*₂ = 1.6 Hz), 8.17 (d, 1H, *J* = 0.7 Hz), 7.69-7.64 (m, 1H), 7.46 (d, 1H, *J* = 8.4 Hz), 7.41 (t, 1H, *J* = 8.1 Hz), 5.72 (d, 1H, *J* = 0.7 Hz), 3.69-3.62 (m, 2H), 3.57-3.50 (m, 2H), 1.65 (sextet, 4H, *J* = 7.3 Hz), 0.95 (t, 6H, *J* = 7.5 Hz); ¹³C NMR (CDCl₃, 100 MHz): δ 176.2, 156.3, 154.7, 133.6, 125.9, 125.1, 124.3, 122.3, 118.1, 96.5, 69.1, 23.0;

4-chloroquinoline-3-carbaldehyde (**Q1**).

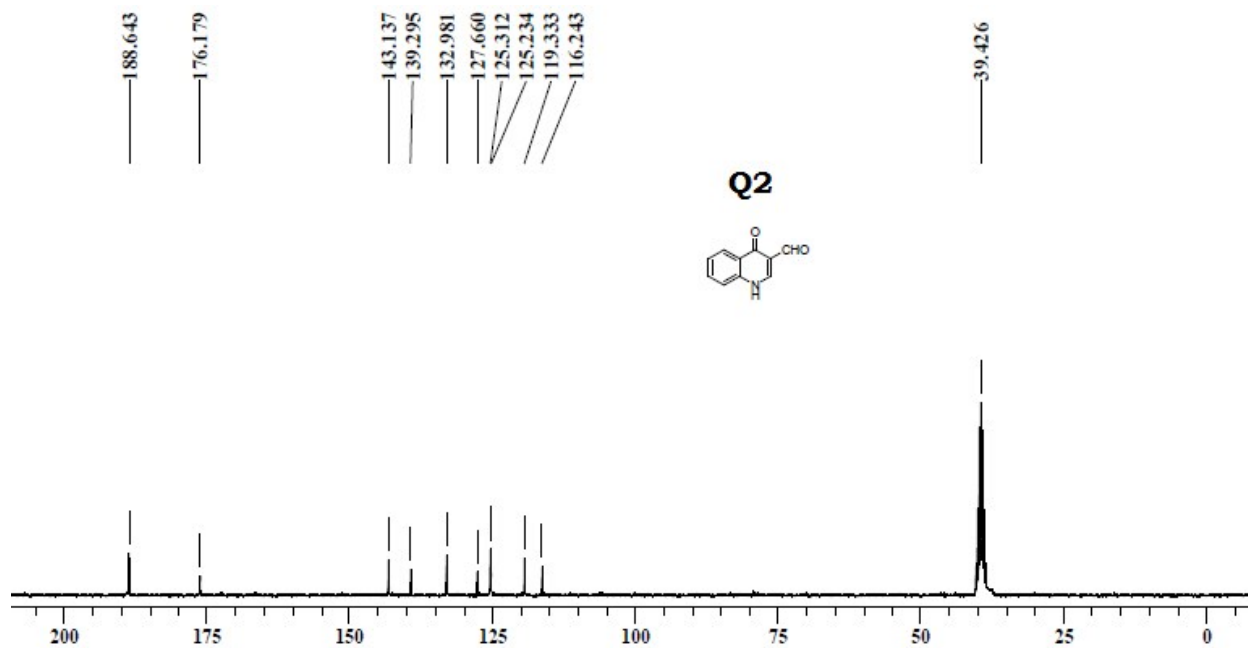
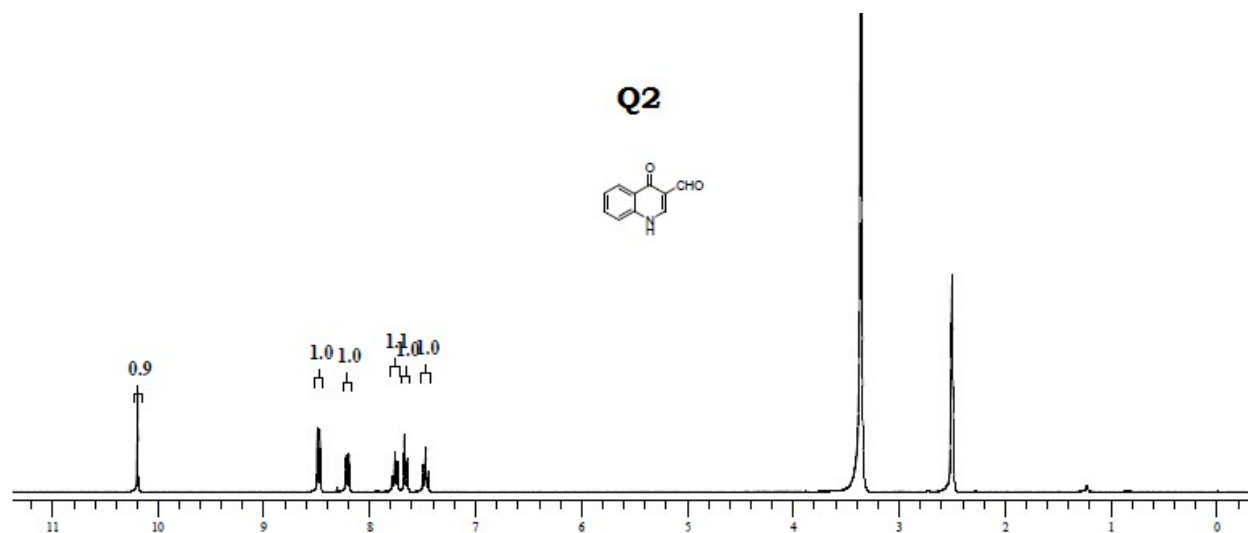
Q1



Q1

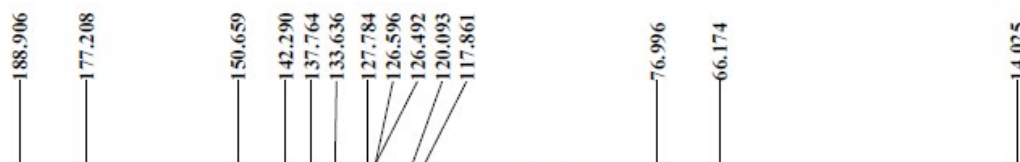
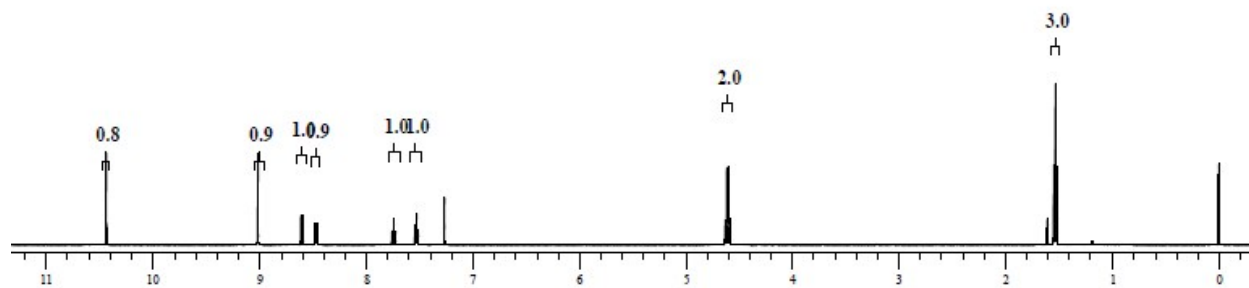
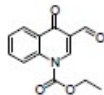


1,4-dihydro-4-oxoquinoline-3-carbaldehyde (Q2).

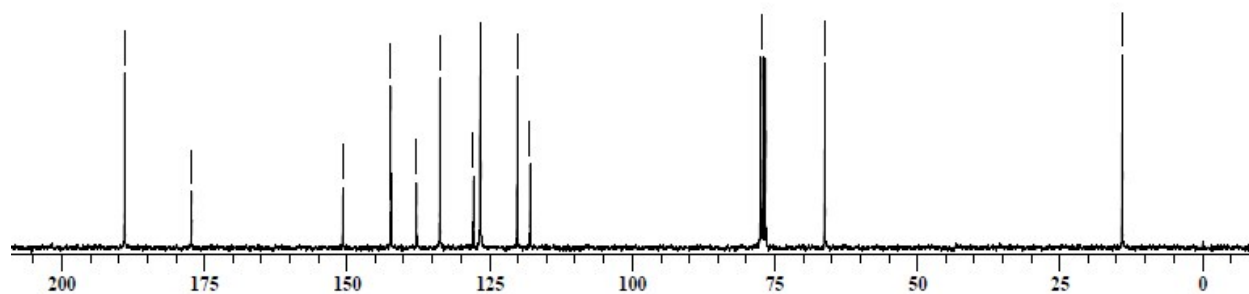
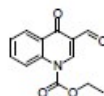


ethyl 3-formyl-4-oxoquinoline-1(4H)-carboxylate (Q4):

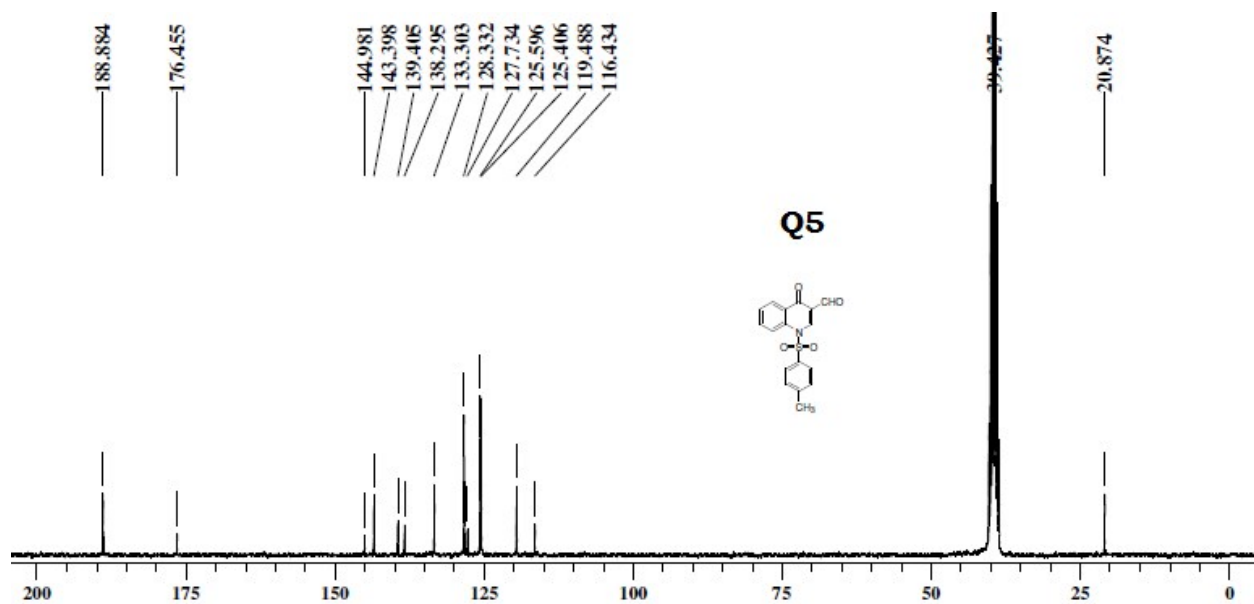
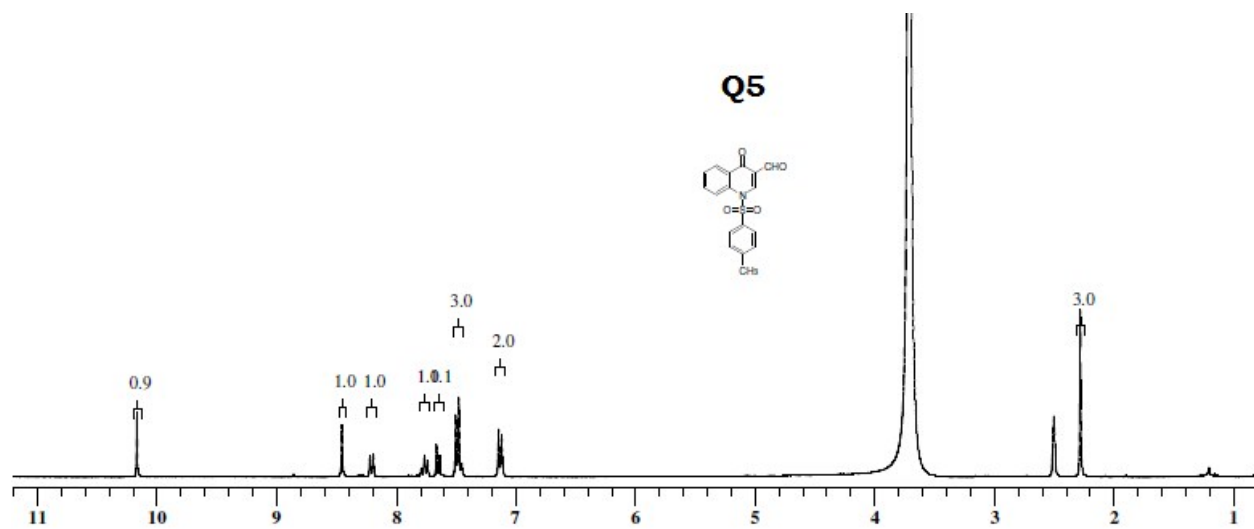
Q4



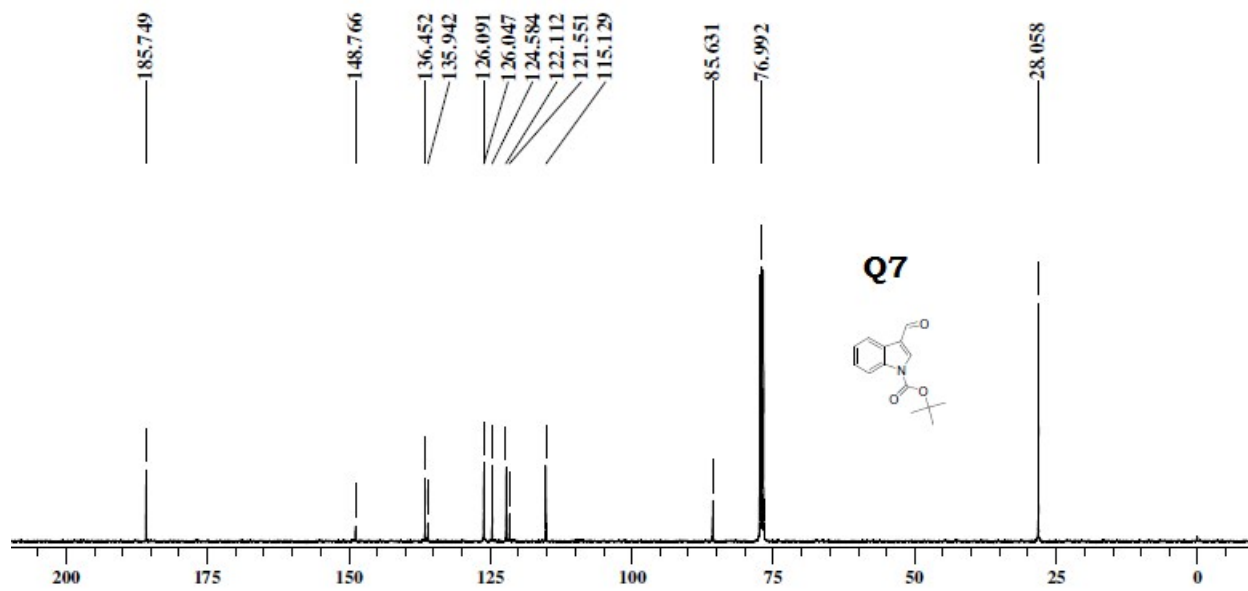
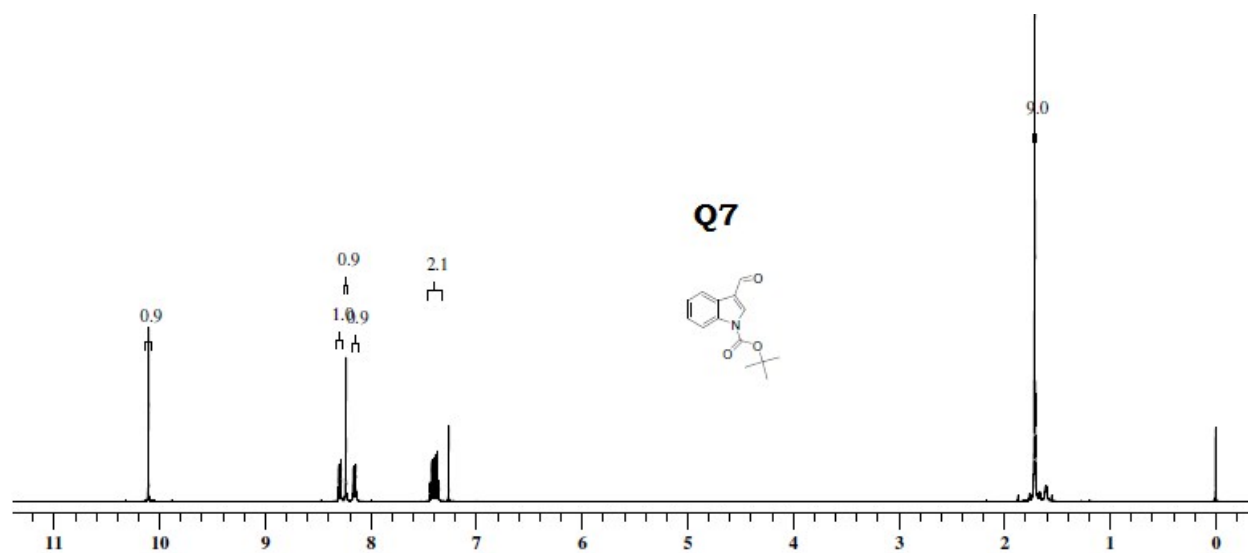
Q4



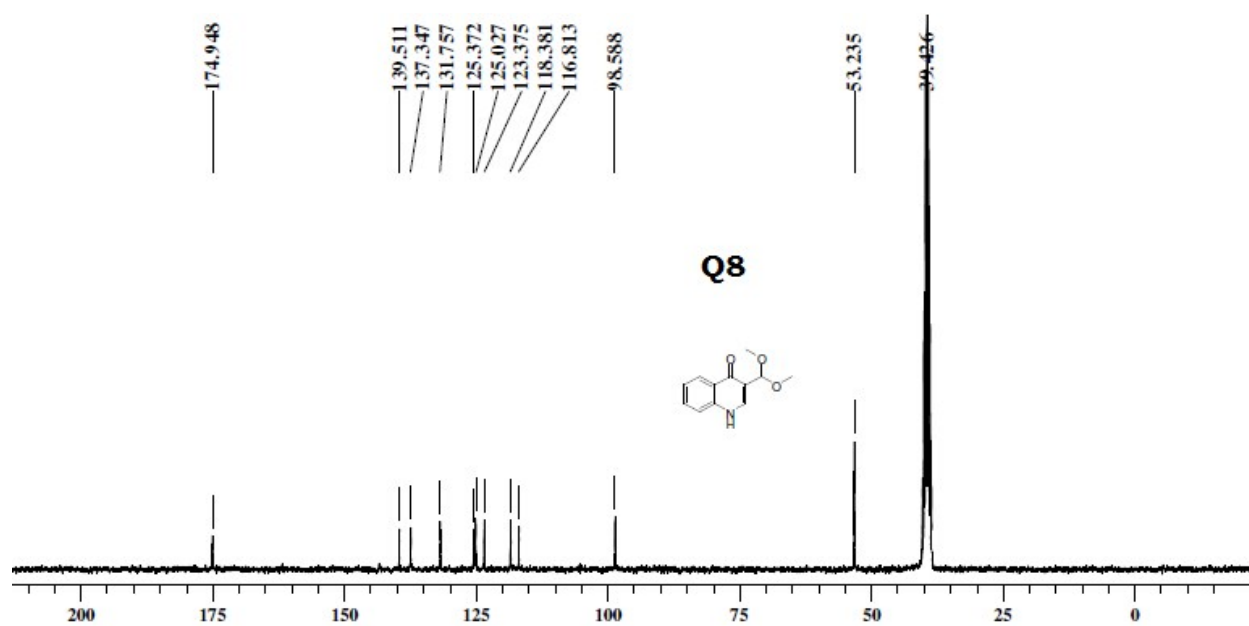
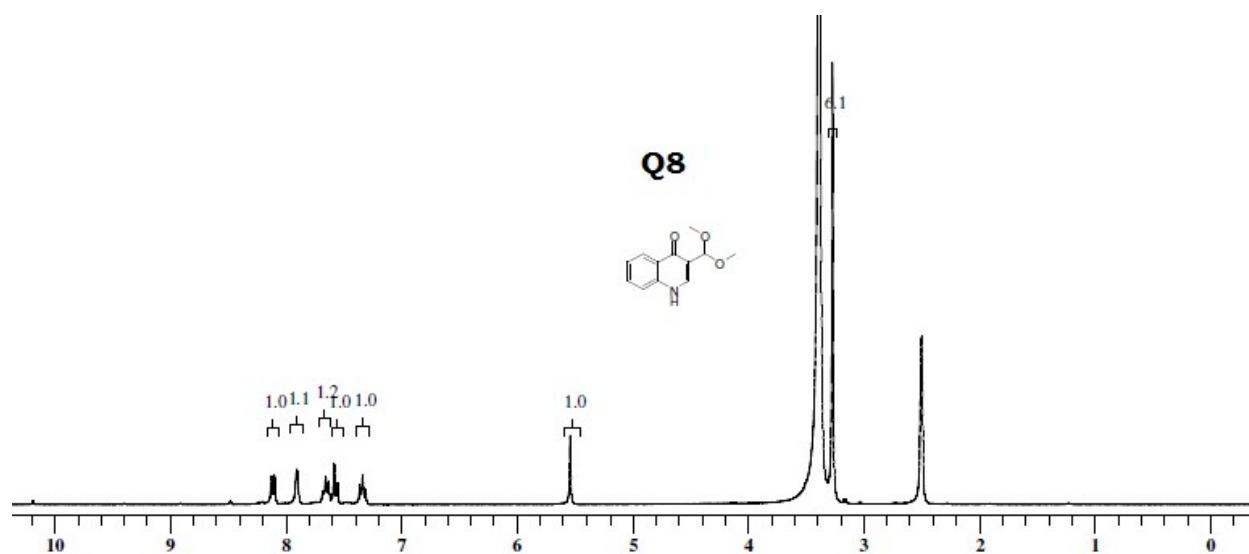
1,4-dihydro-4-oxo-1-tosylquinoline-3-carbaldehyde (Q5):



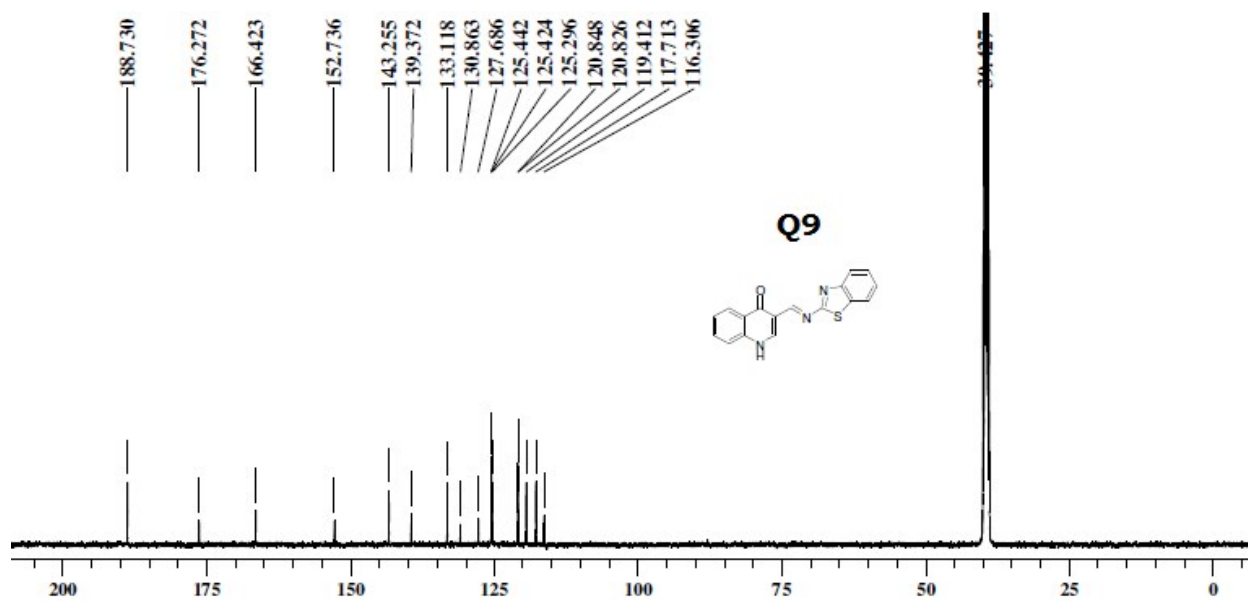
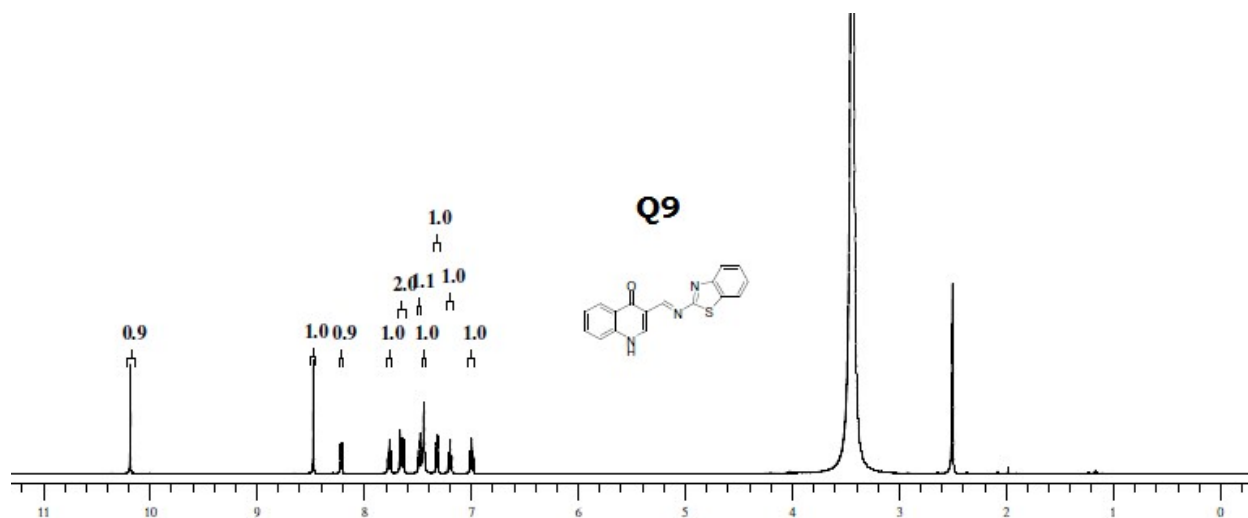
tert-butyl 3-formyl-1H-indole-1-carboxylate (**Q7**):



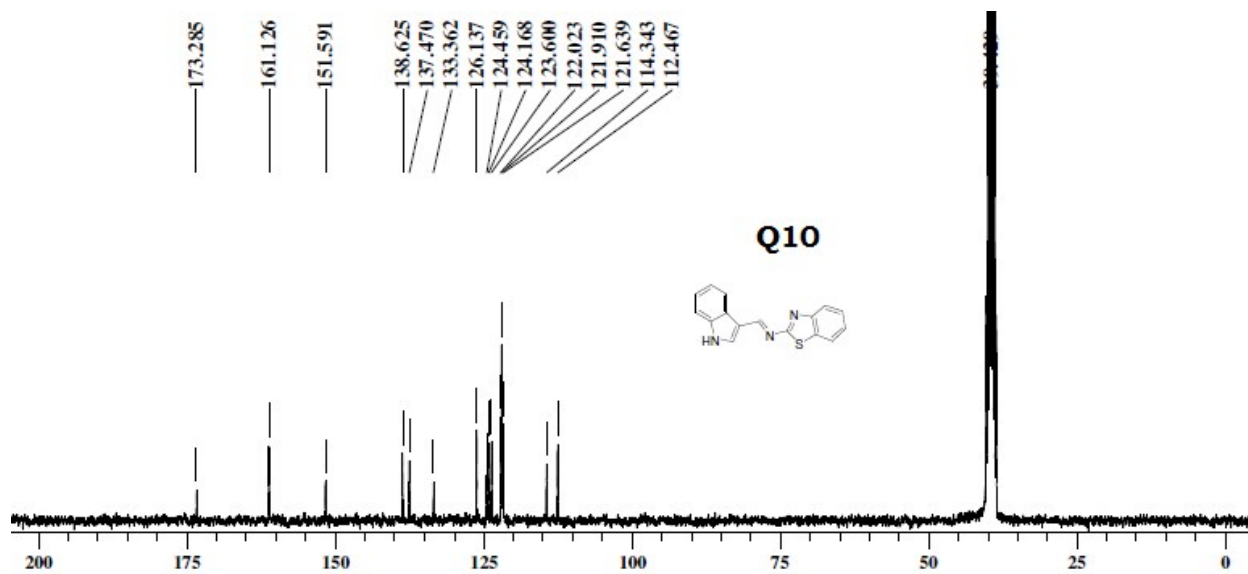
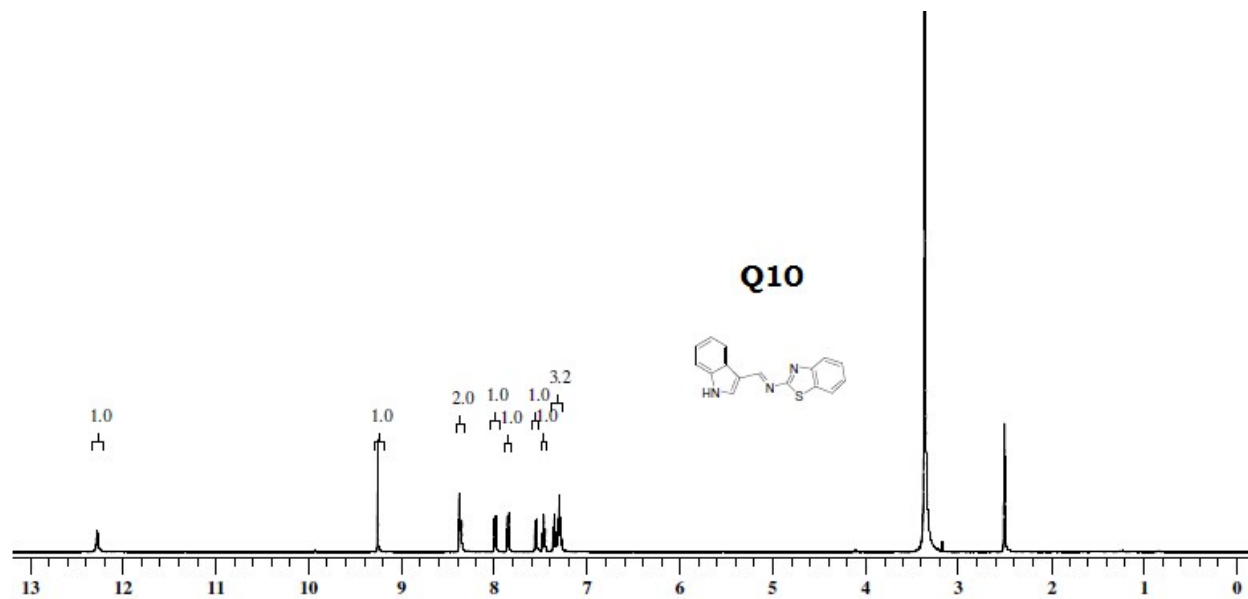
3-(dimethoxymethyl)quinolin-4(1H)-one (Q8).



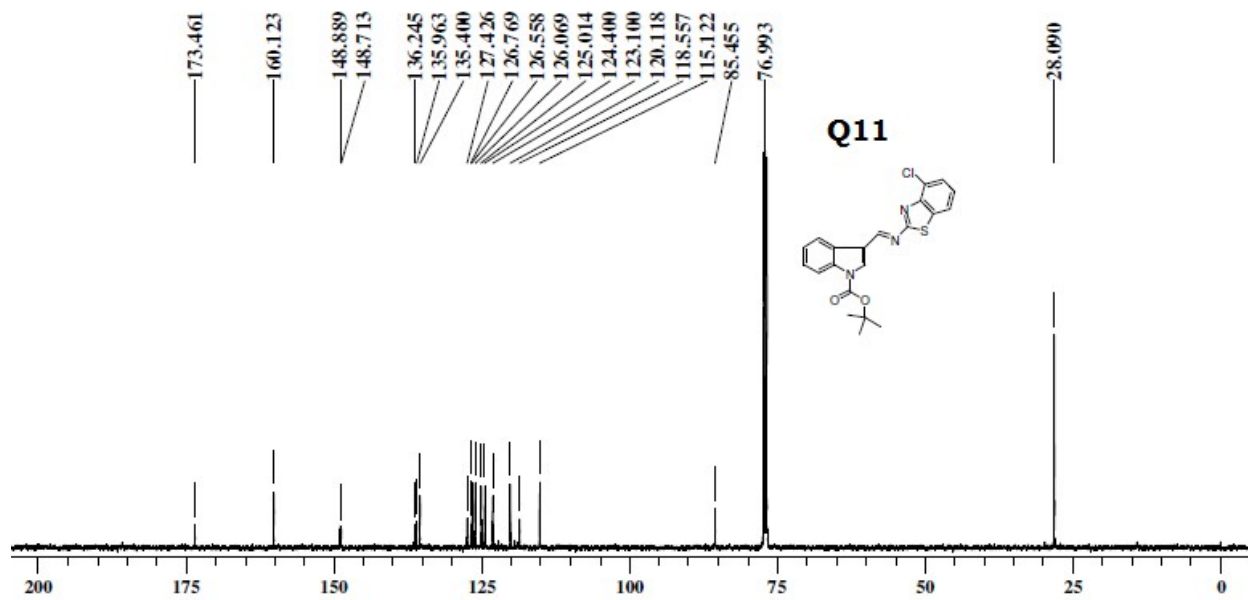
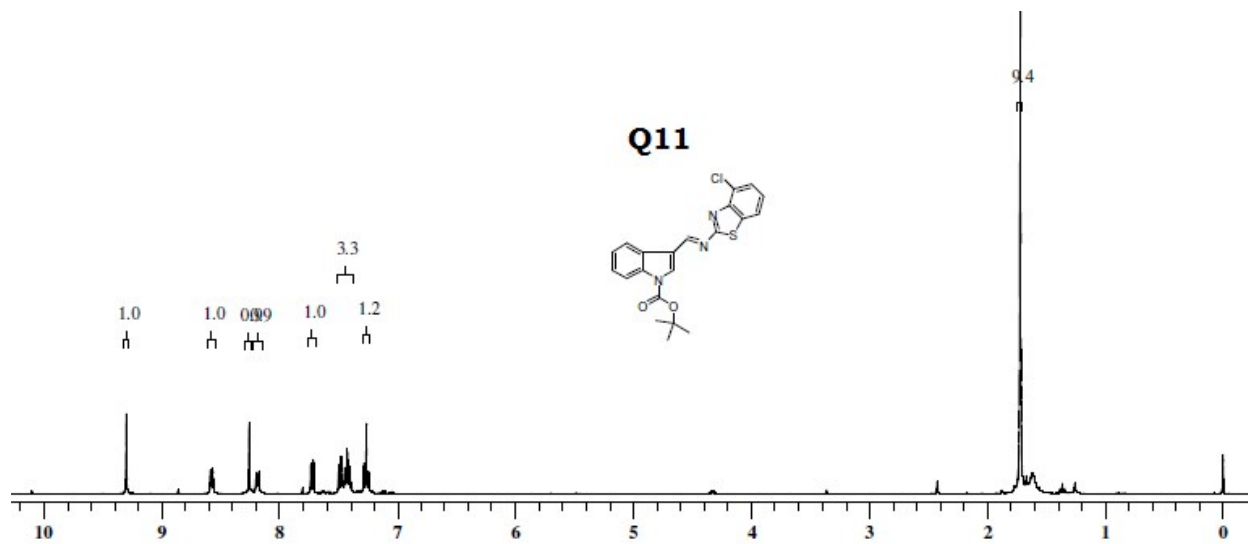
3-((benzo[d]thiazol-2-ylimino)methyl)quinolin-4(1H)-one (Q9):



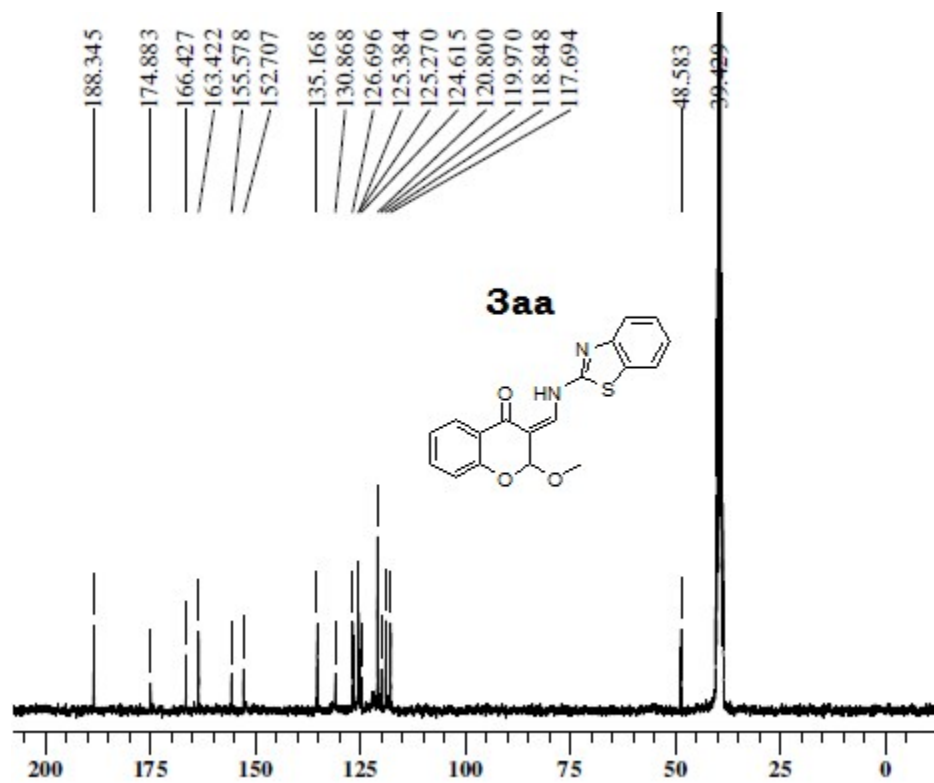
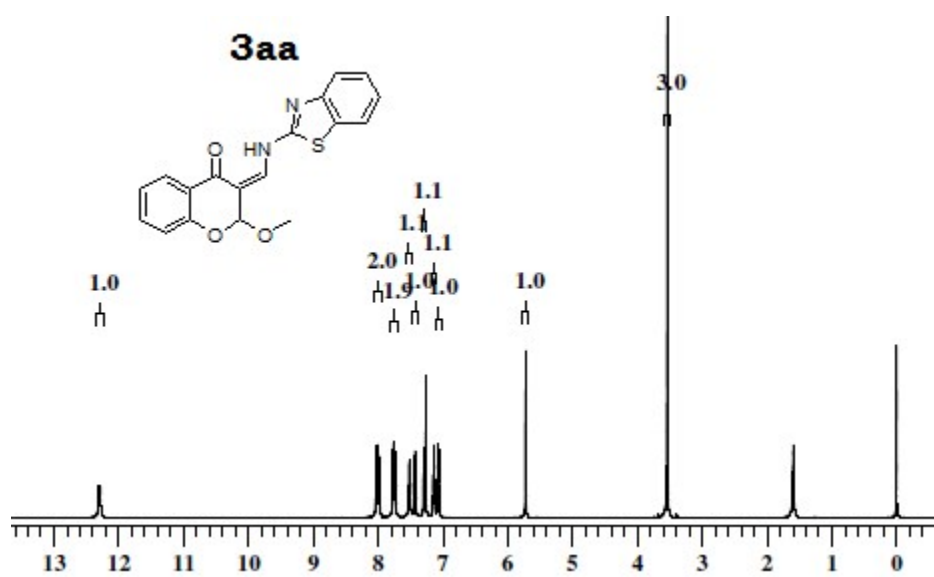
N-((1H-indol-3-yl)methylene)benzo[d]thiazol-2-amine (**Q10**):



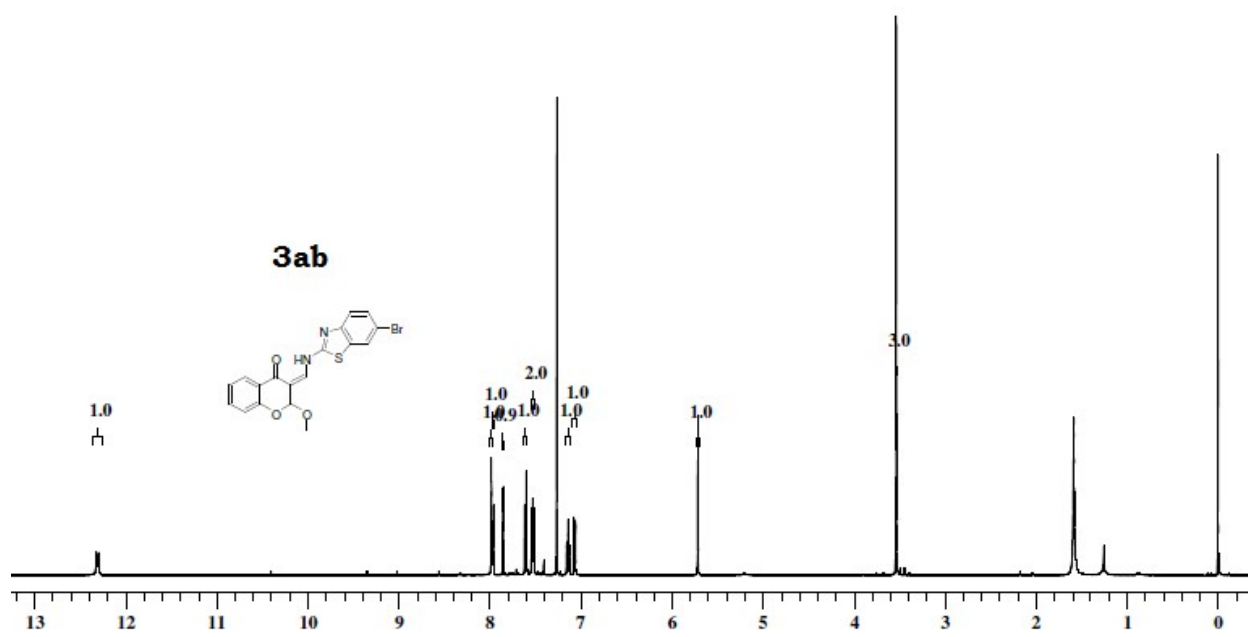
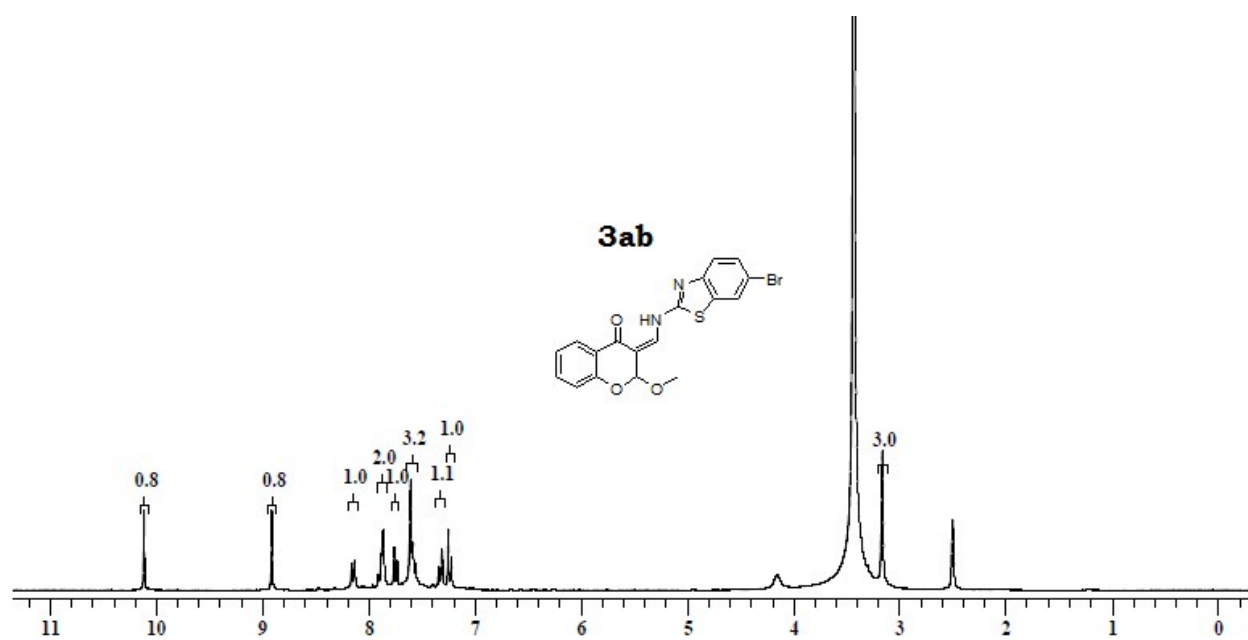
tert-butyl 3-((4-chlorobenzo[d]thiazol-2-ylimino)methyl)-1H-indole-1-carboxylate (**Q11**):

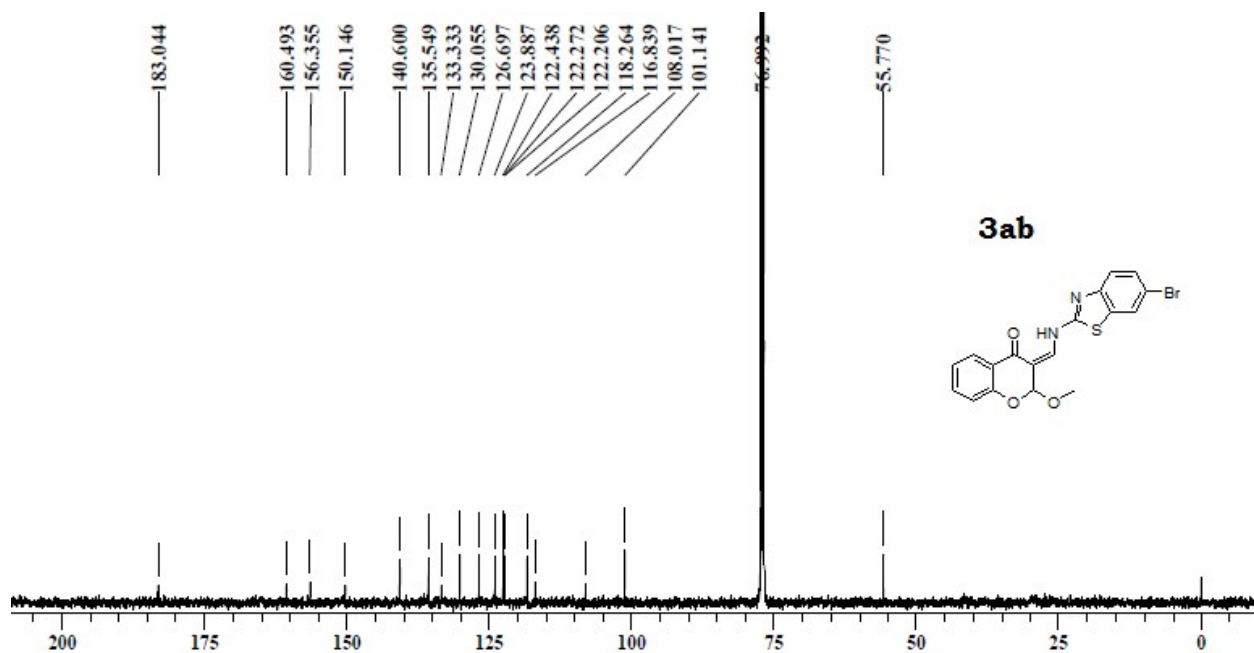
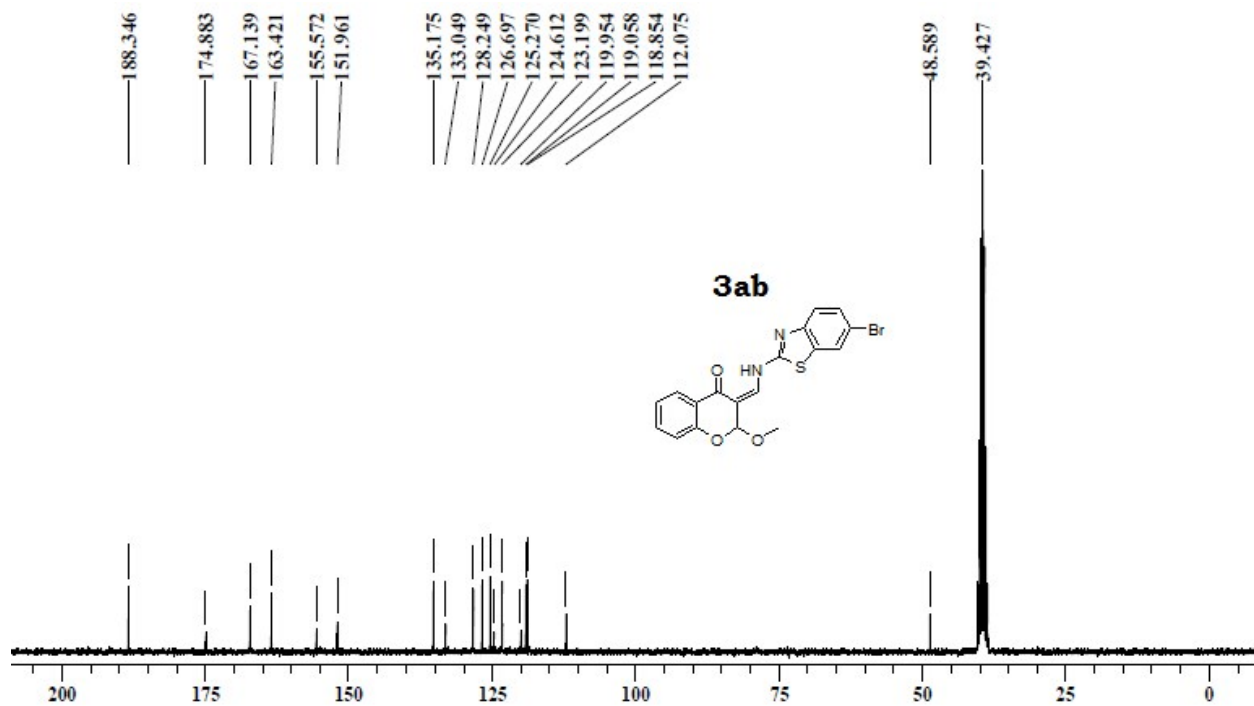


(Z)-3-((benzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (**3aa**):

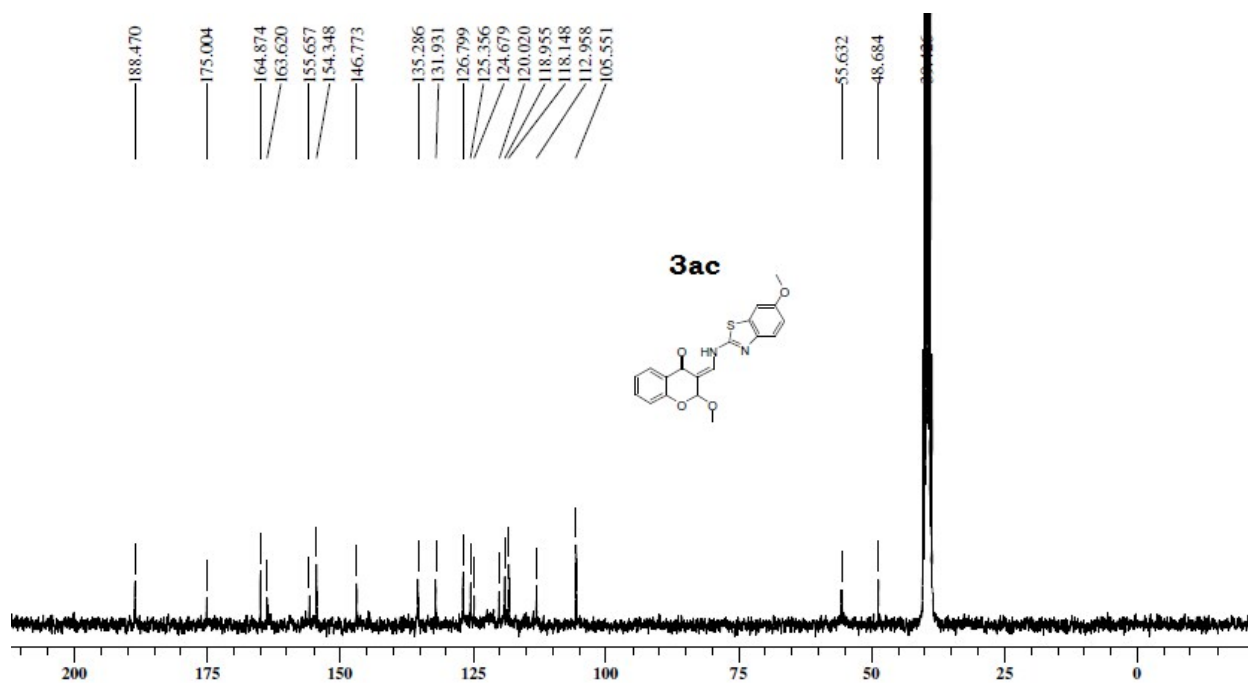
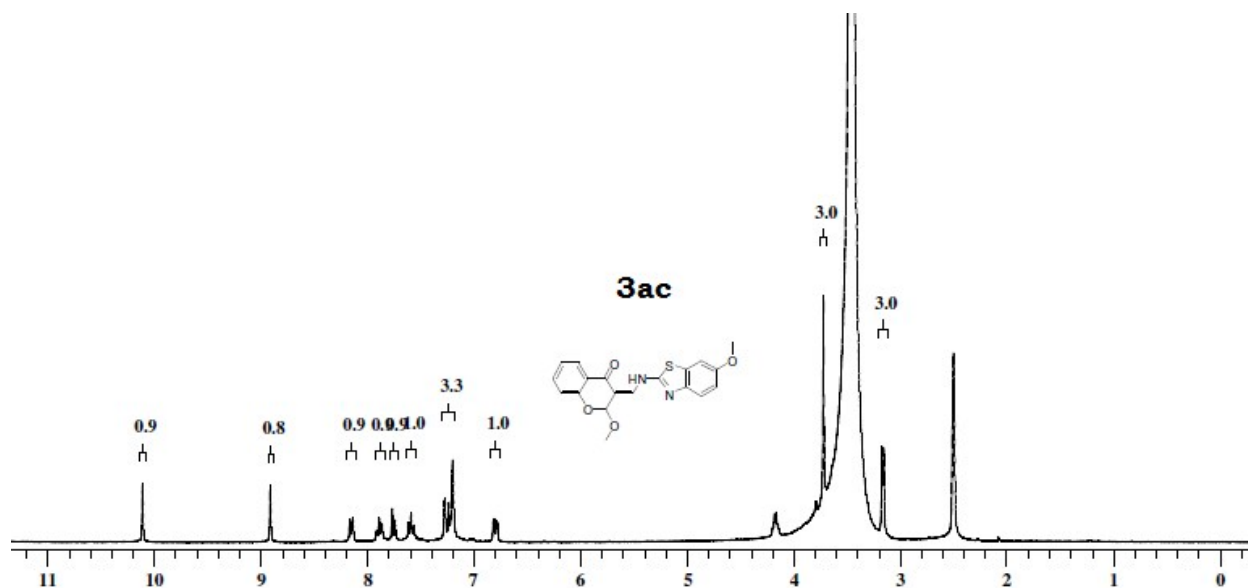


(Z)-3-((6-bromobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (**3ab**):

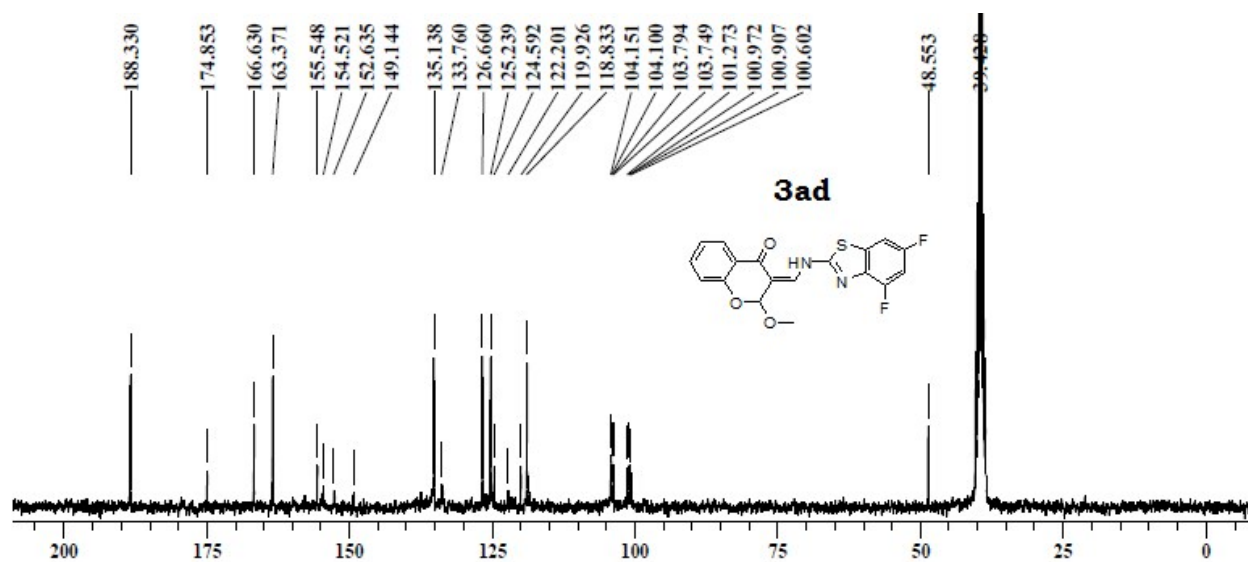
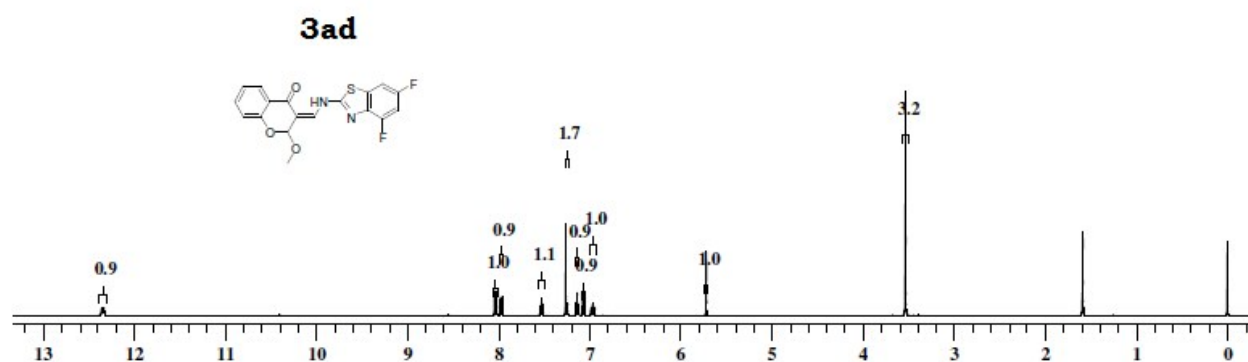
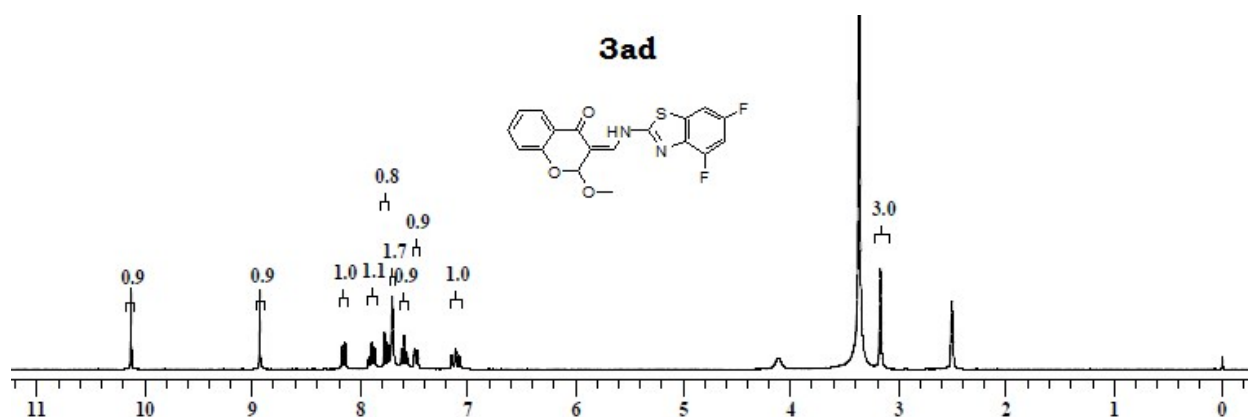




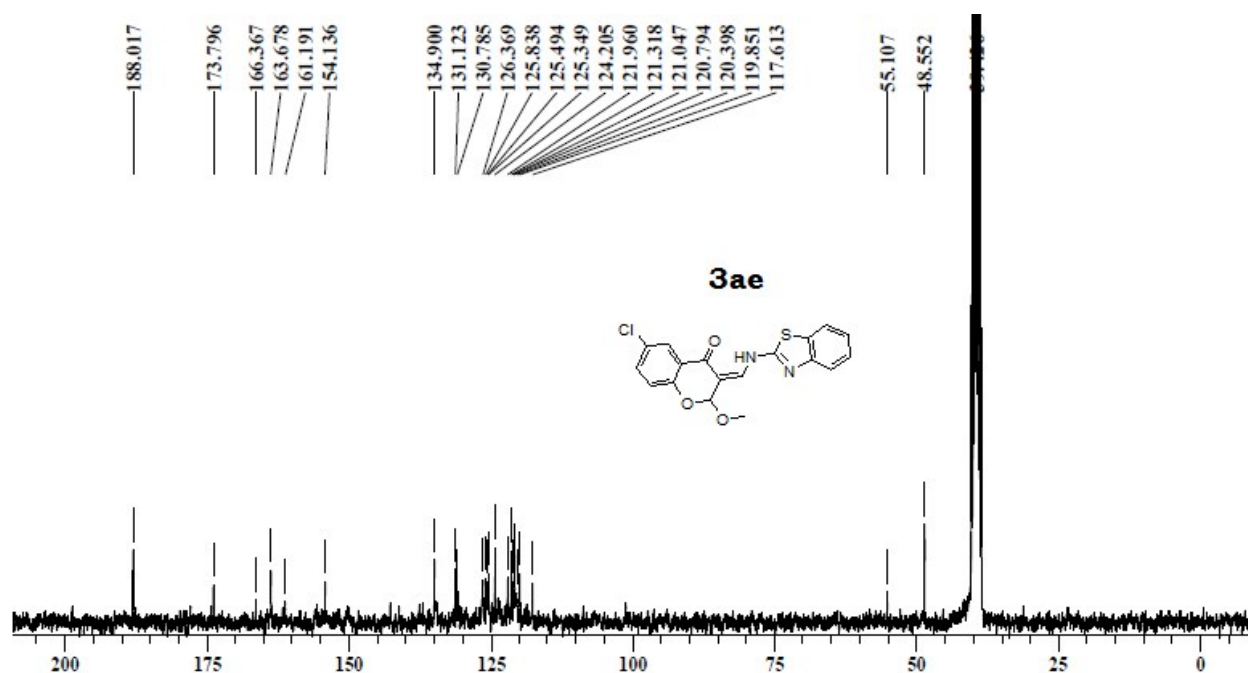
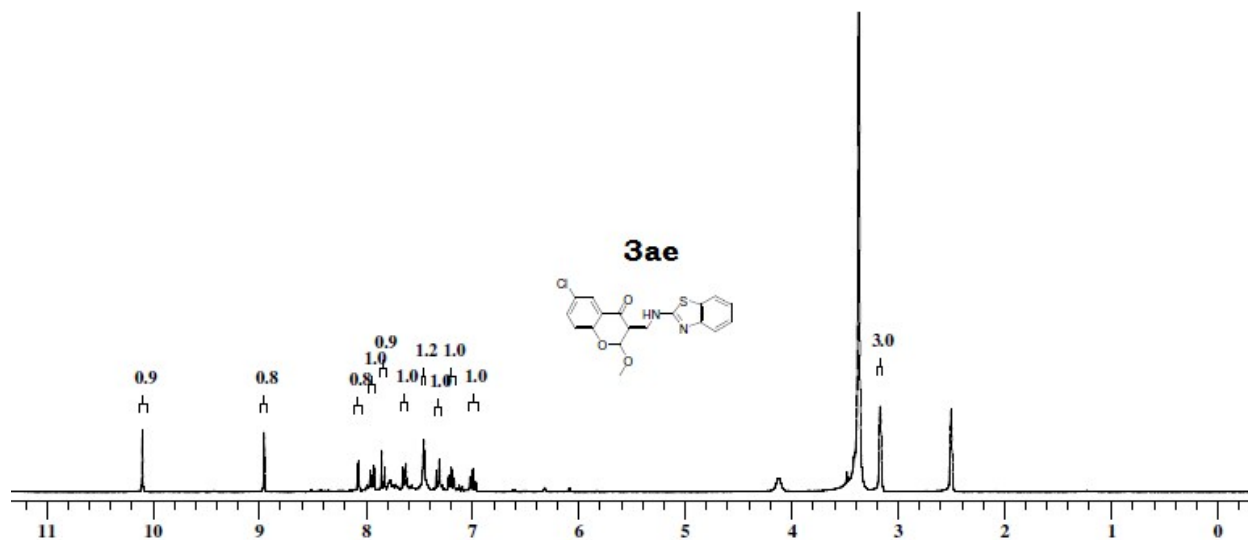
(Z)-2-methoxy-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3ac**):



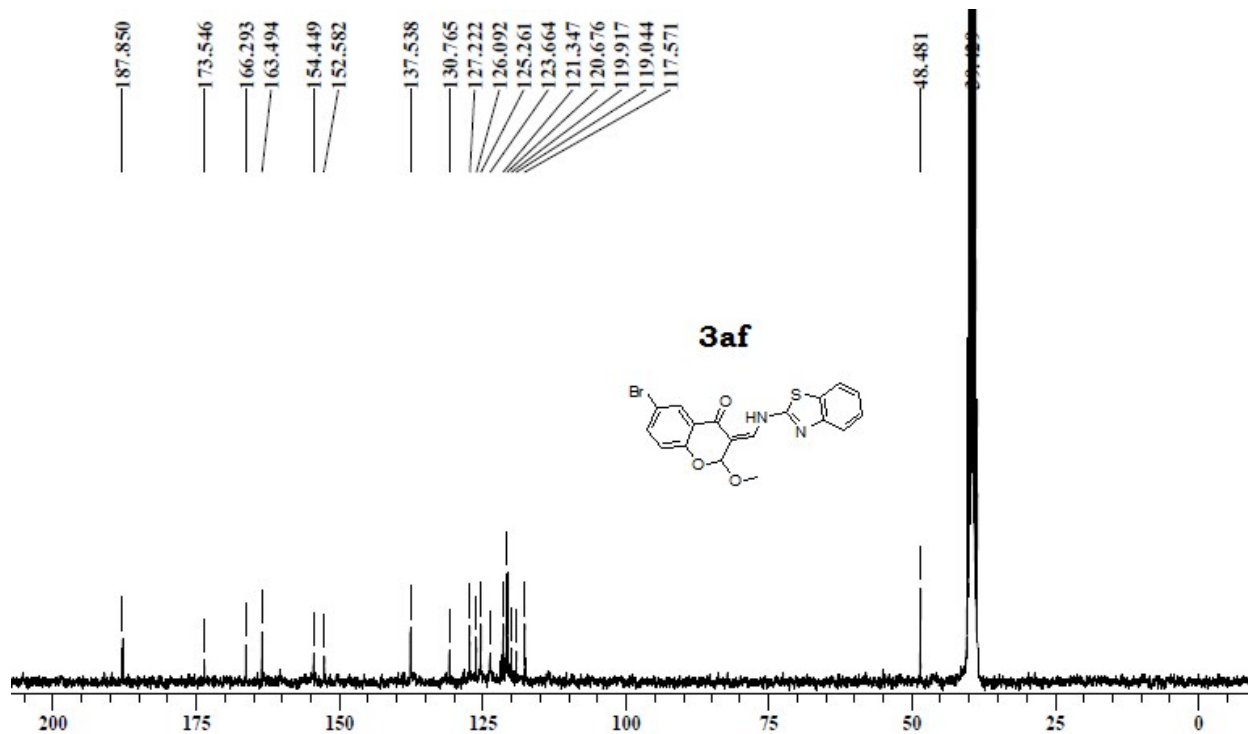
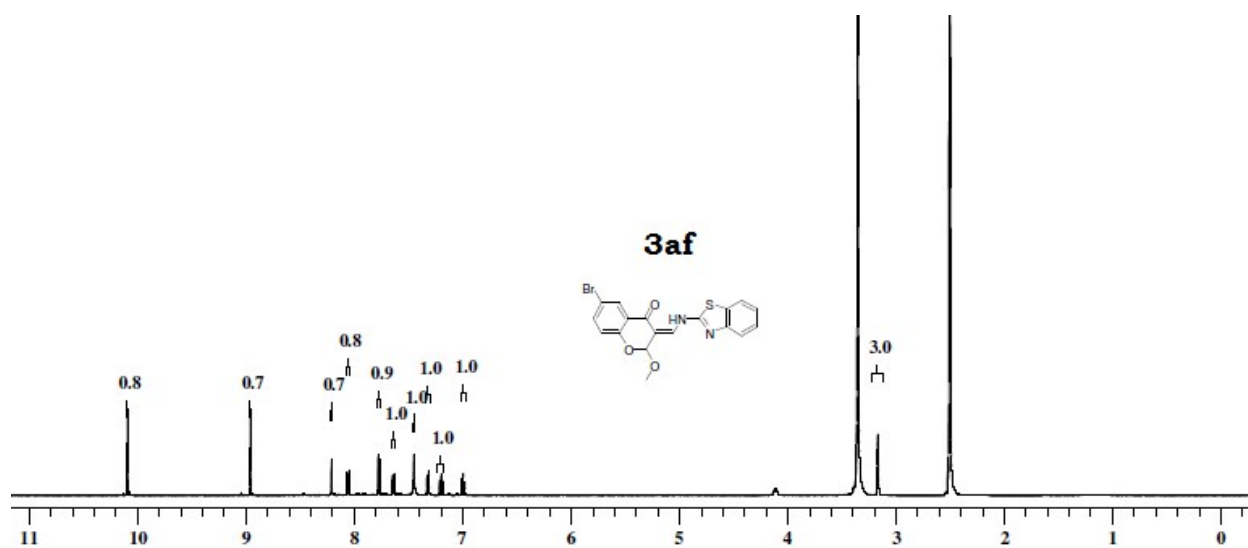
(Z)-3-((4,6-difluorobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (**3ad**):



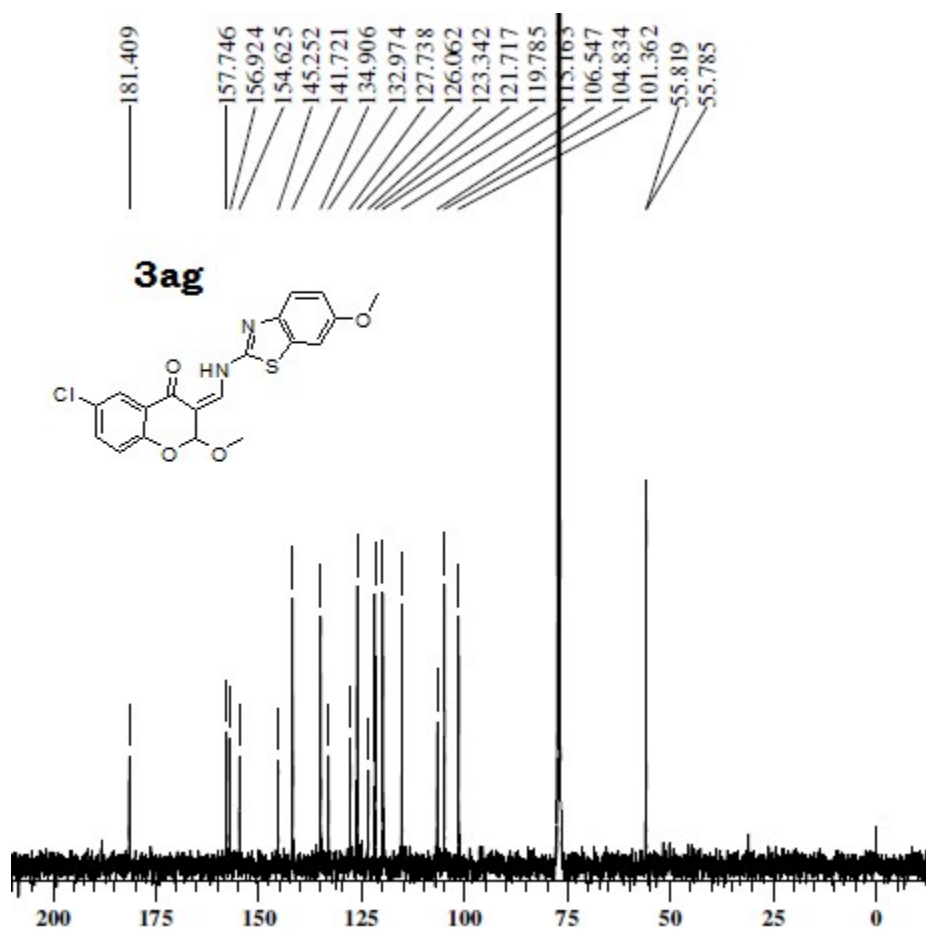
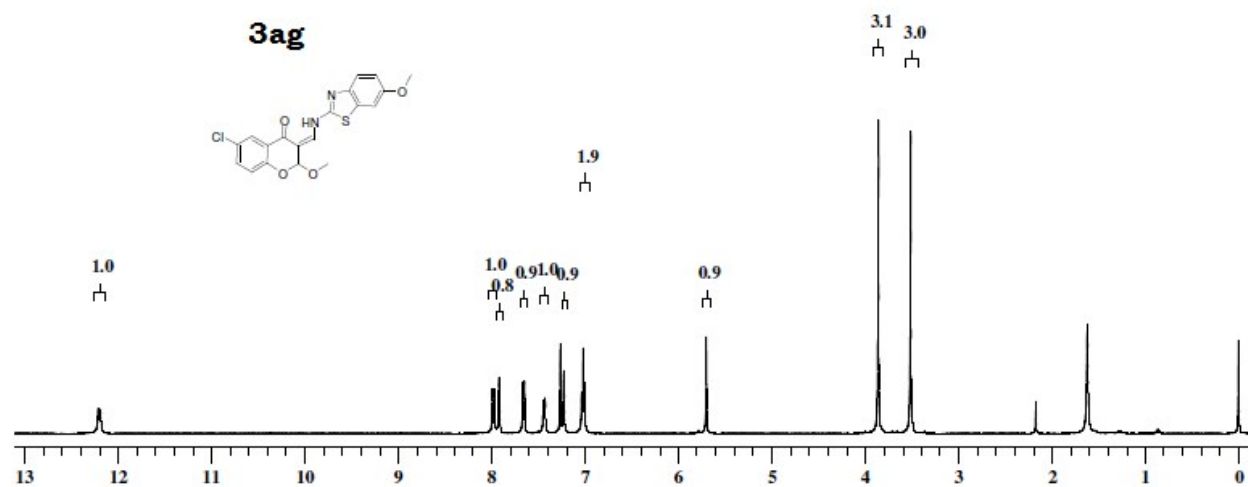
(Z)-3-((benzo[d]thiazol-2-ylamino)methylene)-6-chloro-2-methoxychroman-4-one (**3ae**):



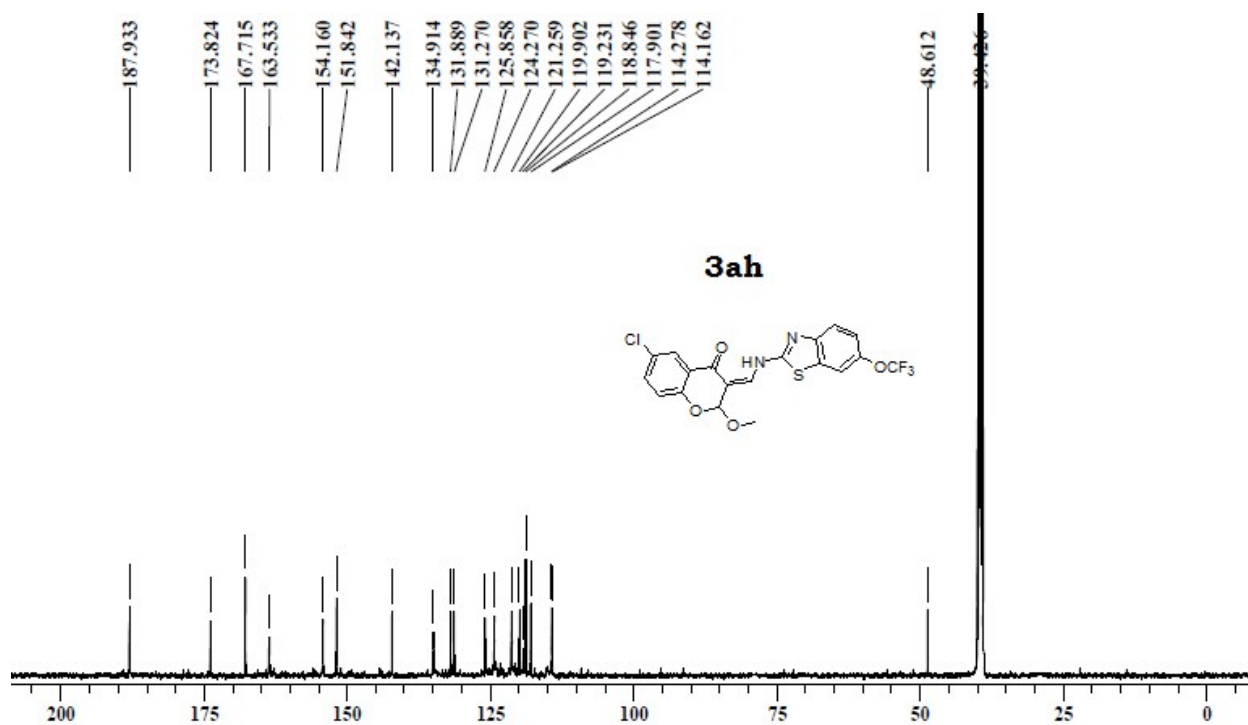
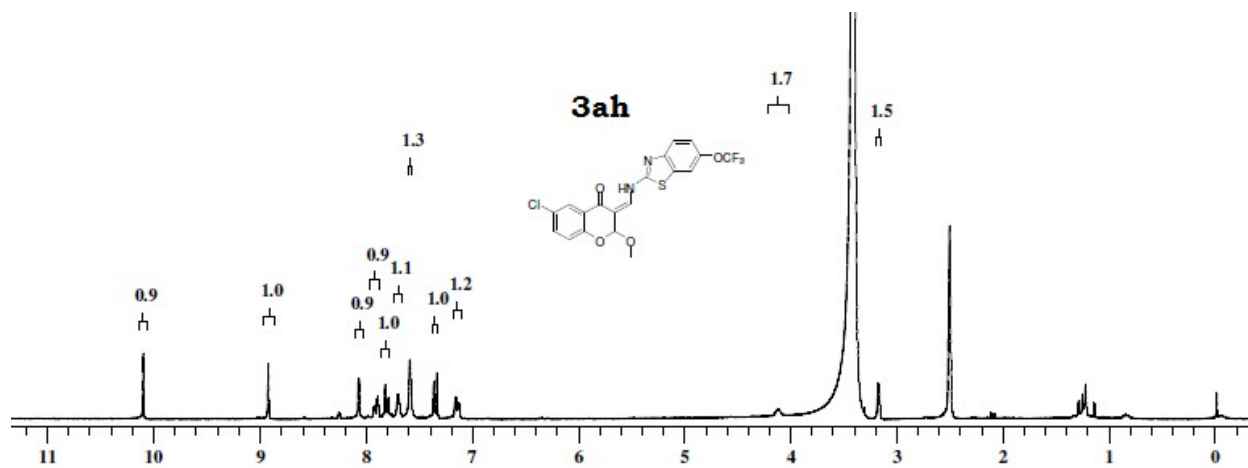
(Z)-3-((benzo[d]thiazol-2-ylamino)methylene)-6-bromo-2-methoxychroman-4-one (**3af**):



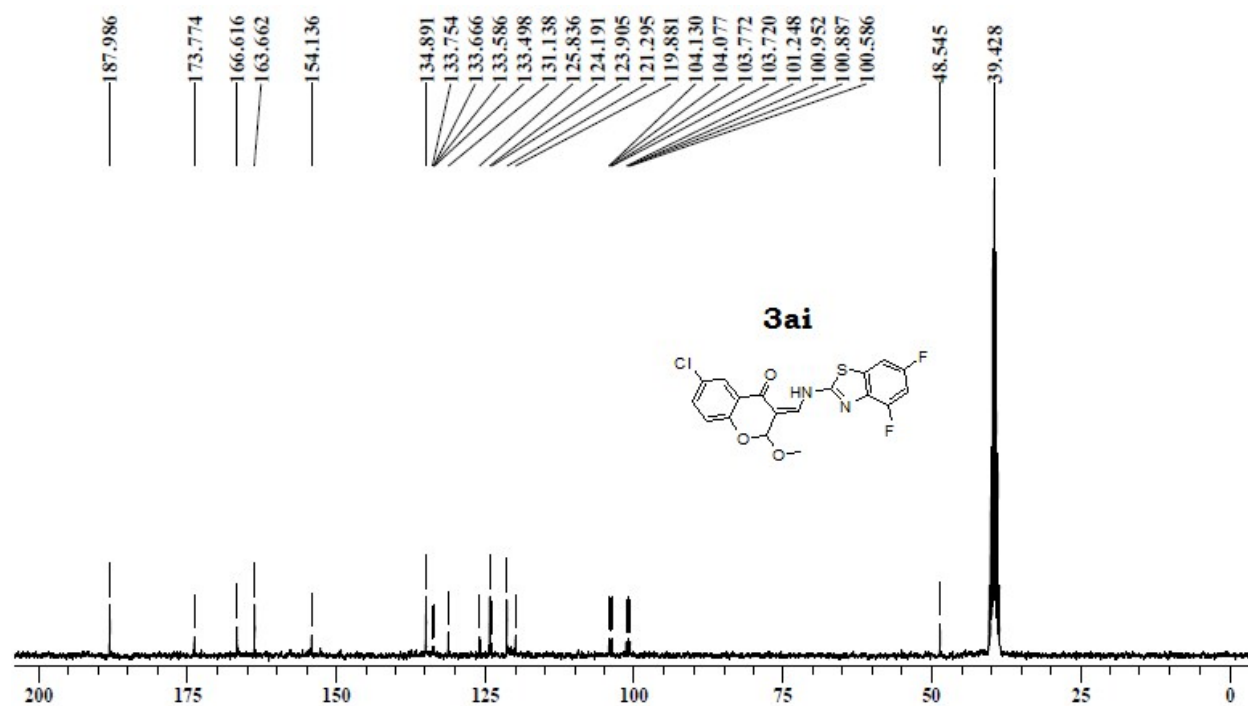
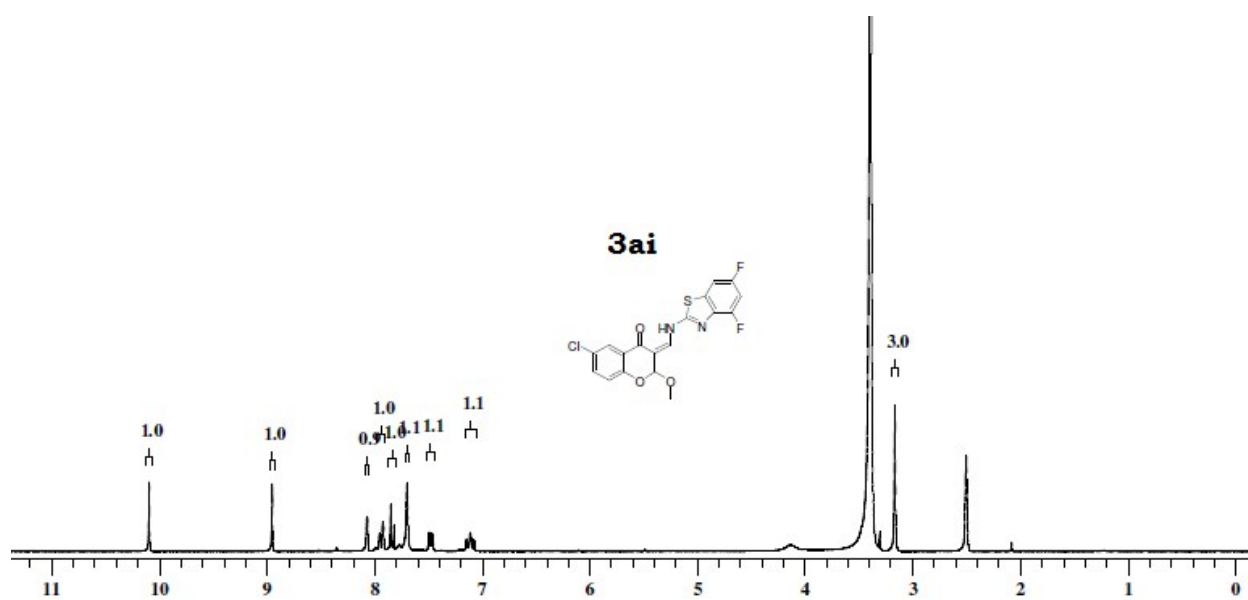
(Z)-6-chloro-2-methoxy-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3ag**):



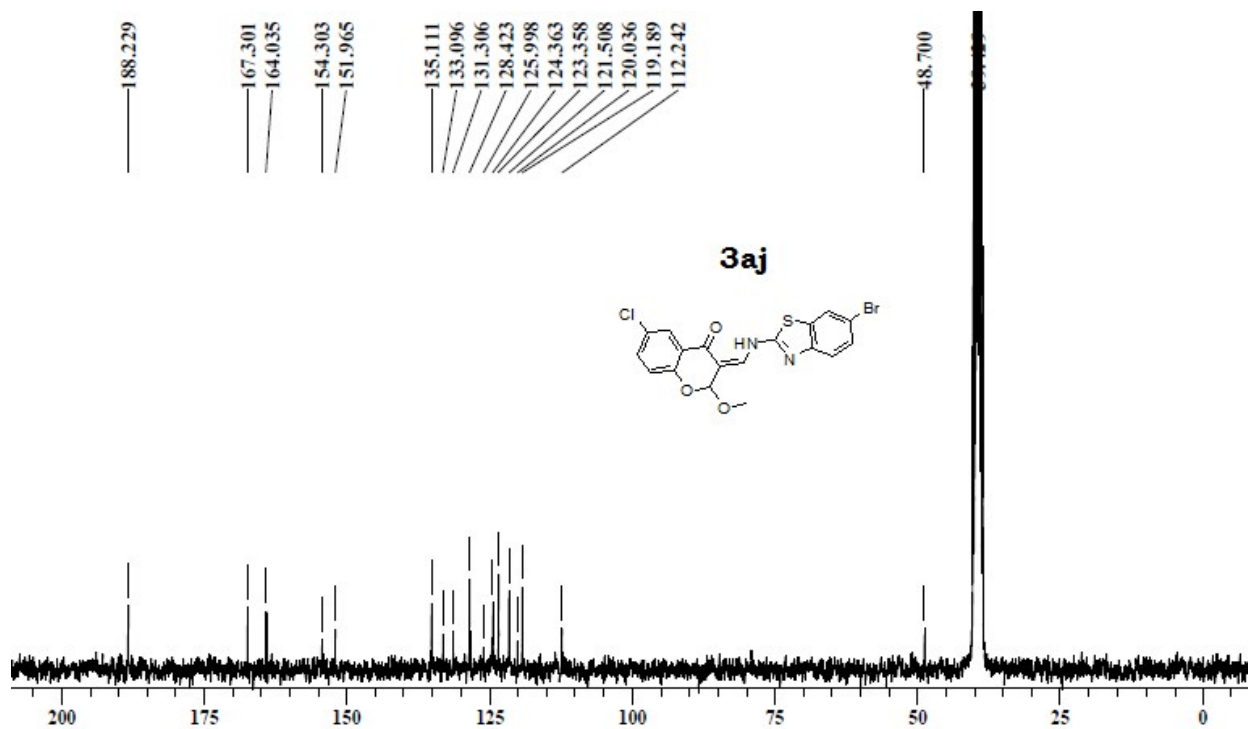
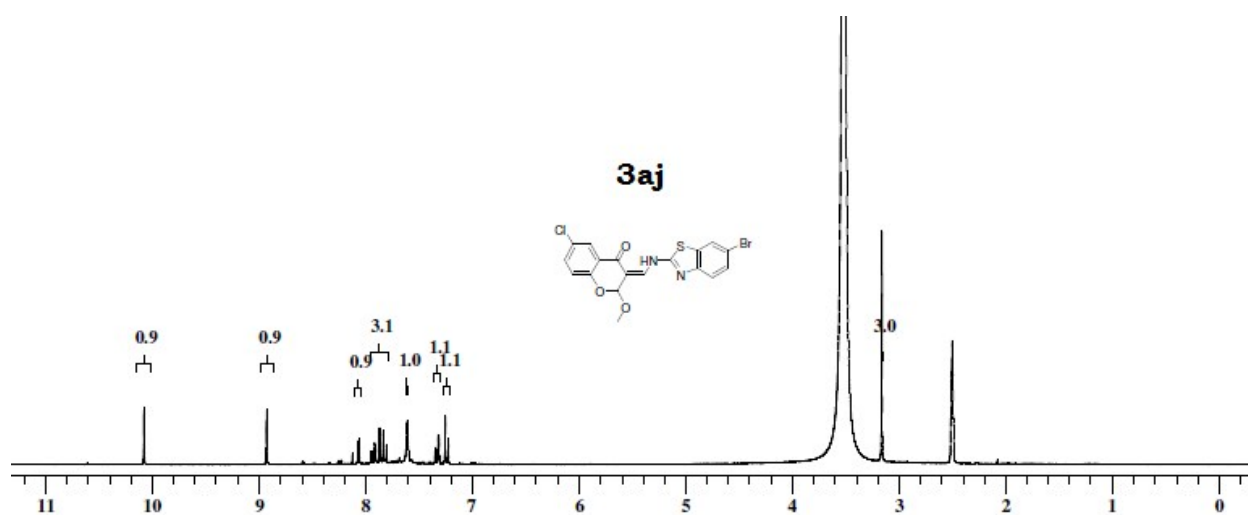
(Z)-6-chloro-2-methoxy-3-((6-(trifluoromethoxy)benzo[d]thiazol-2-ylamino)methylene)chroman-4-one
(3ah):



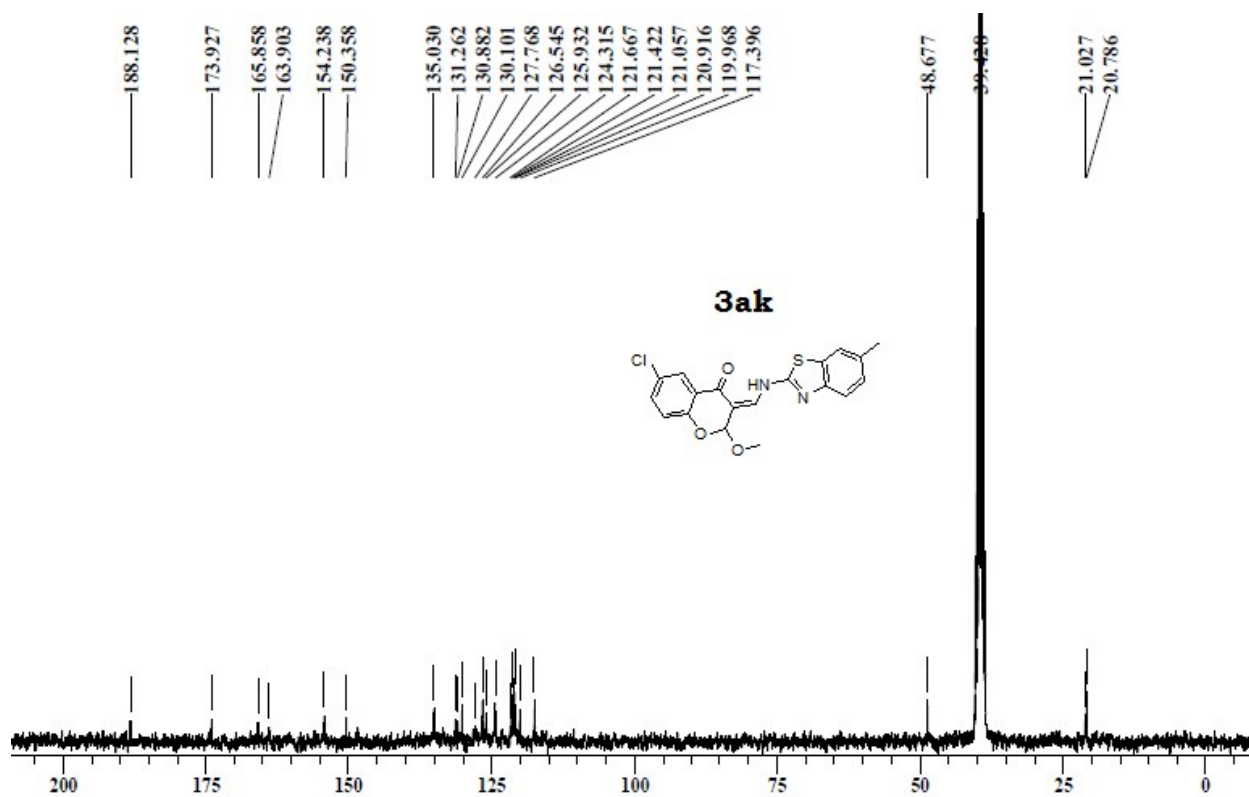
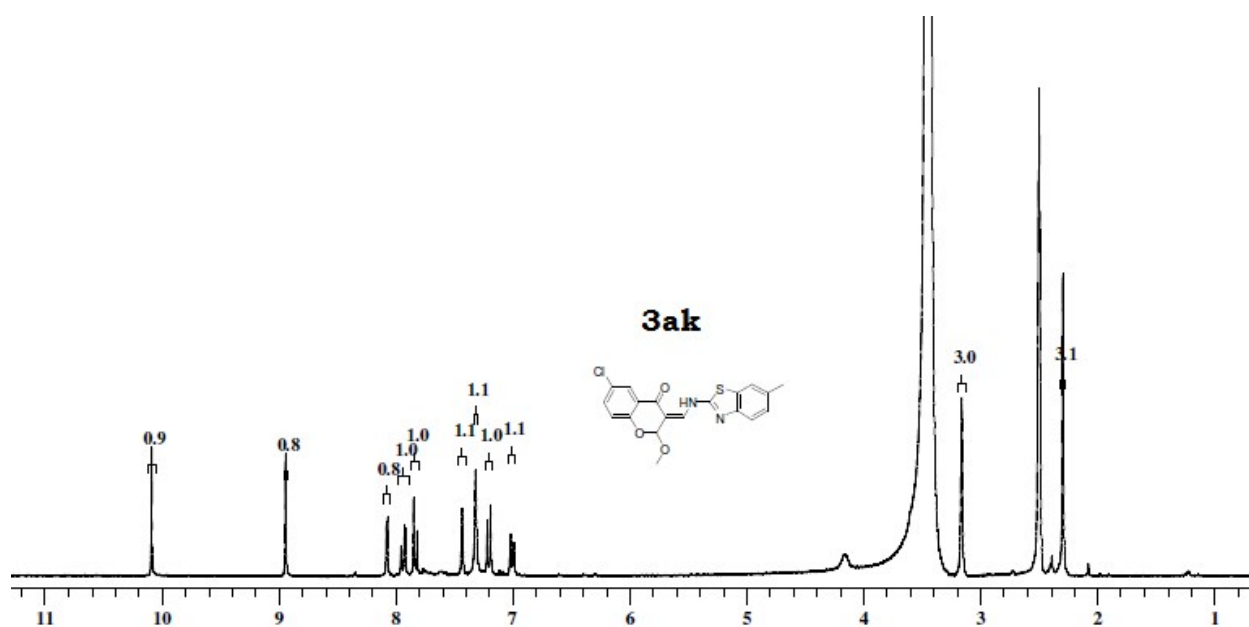
(Z)-6-chloro-3-((4,6-difluorobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (**3ai**):



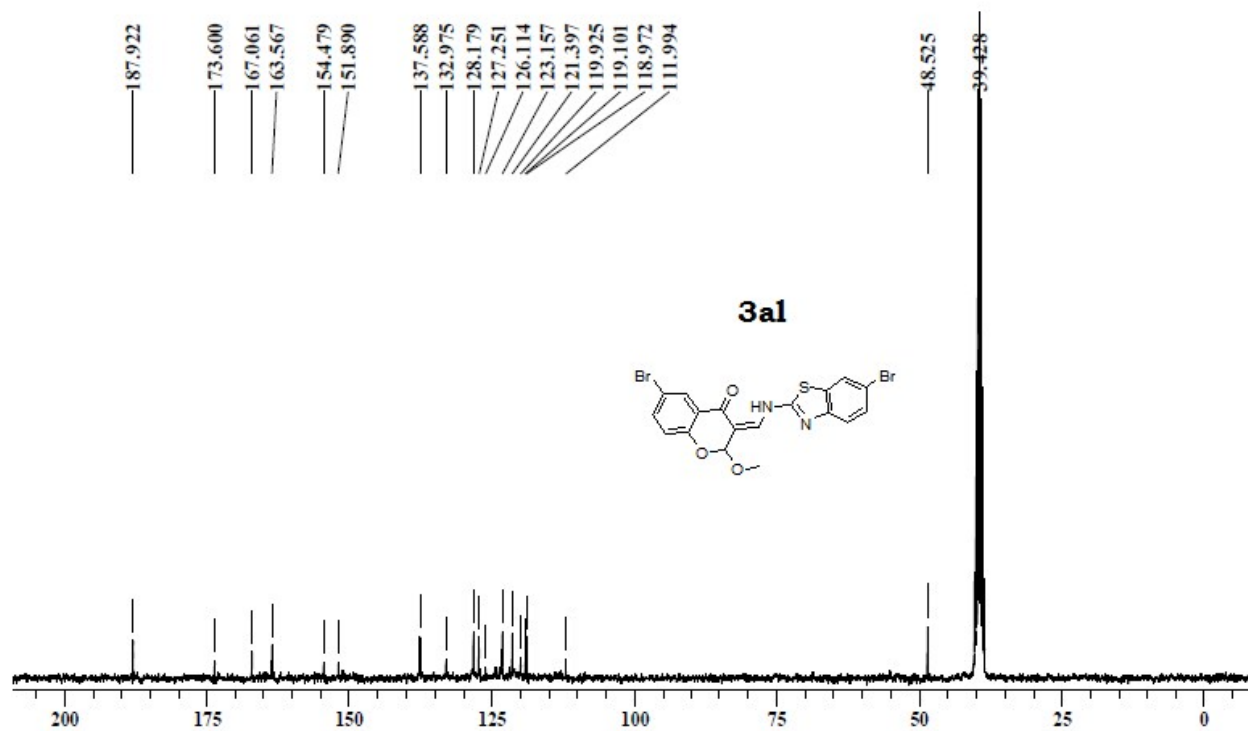
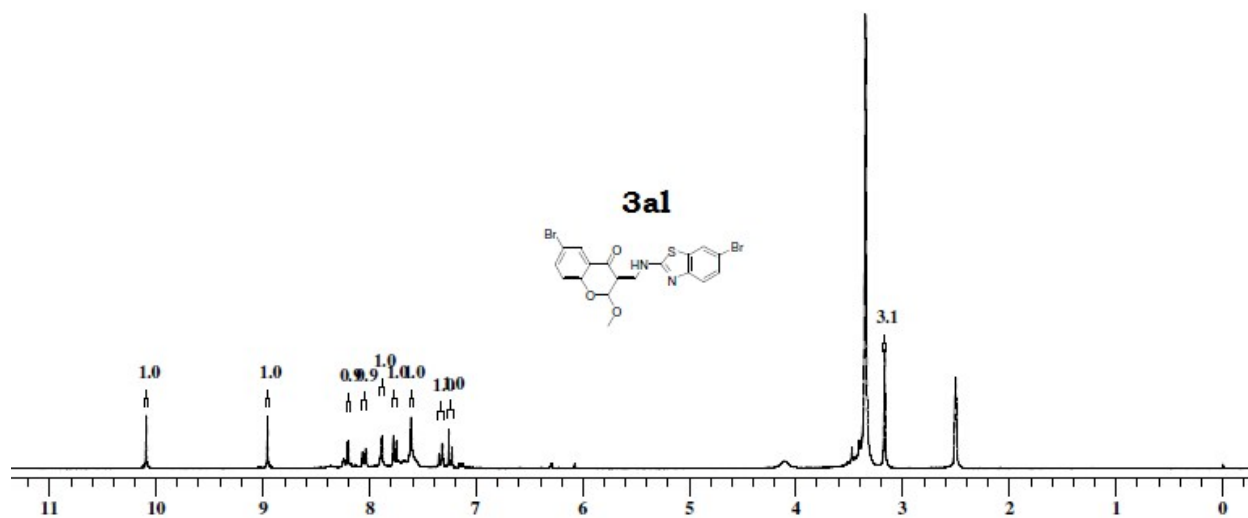
(Z)-3-((6-bromobenzo[d]thiazol-2-ylamino)methylene)-6-chloro-2-methoxychroman-4-one (**3aj**):



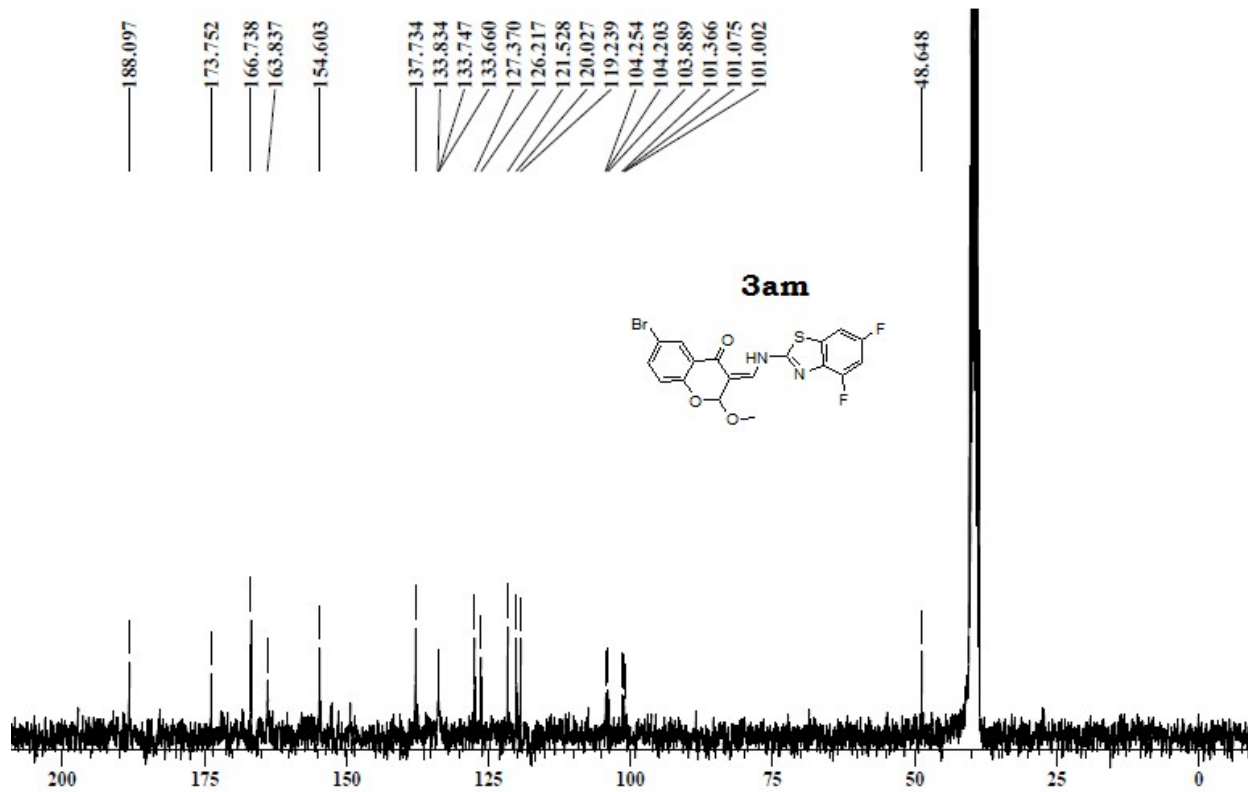
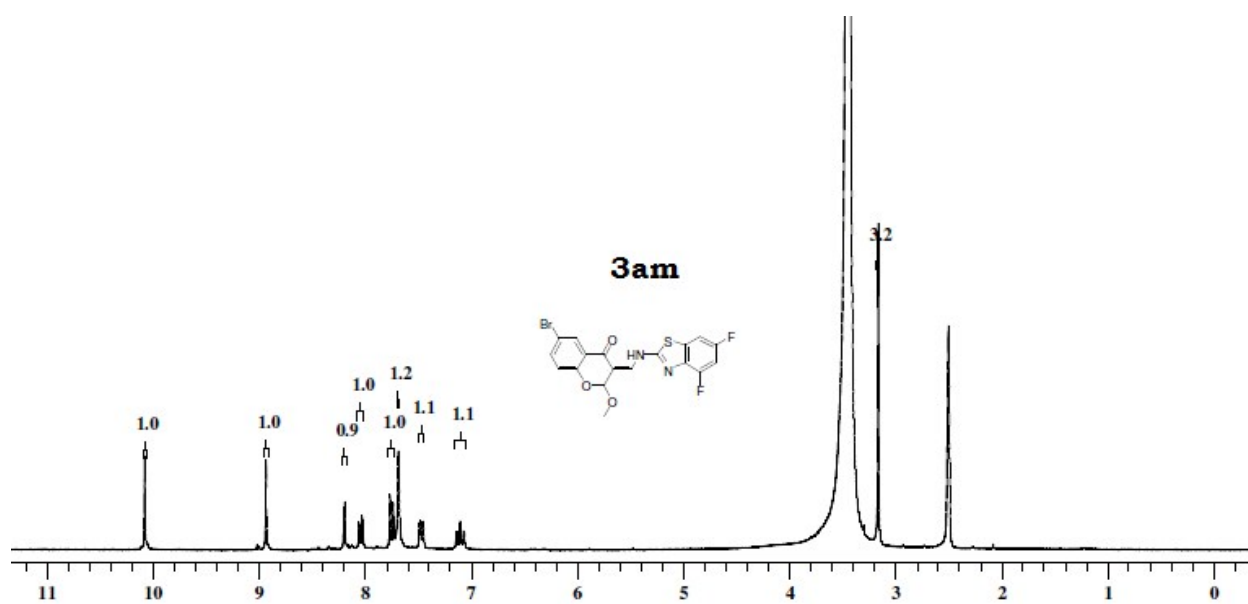
(Z)-6-chloro-2-methoxy-3-((6-methylbenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3ak**):



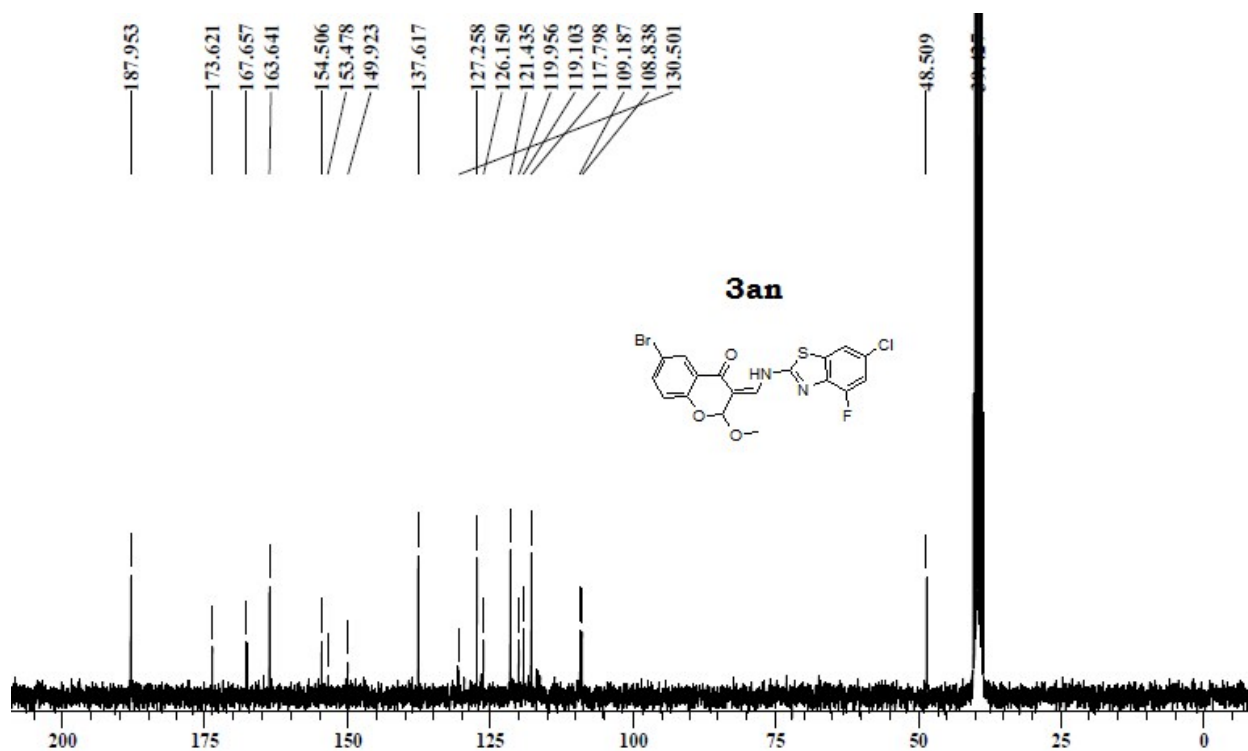
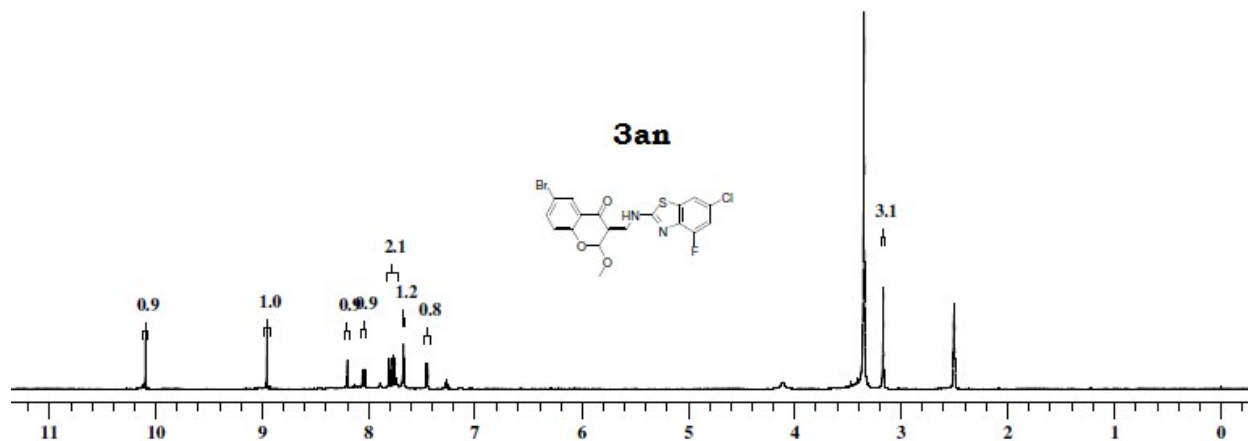
(Z)-6-bromo-3-((6-bromobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (**3al**):



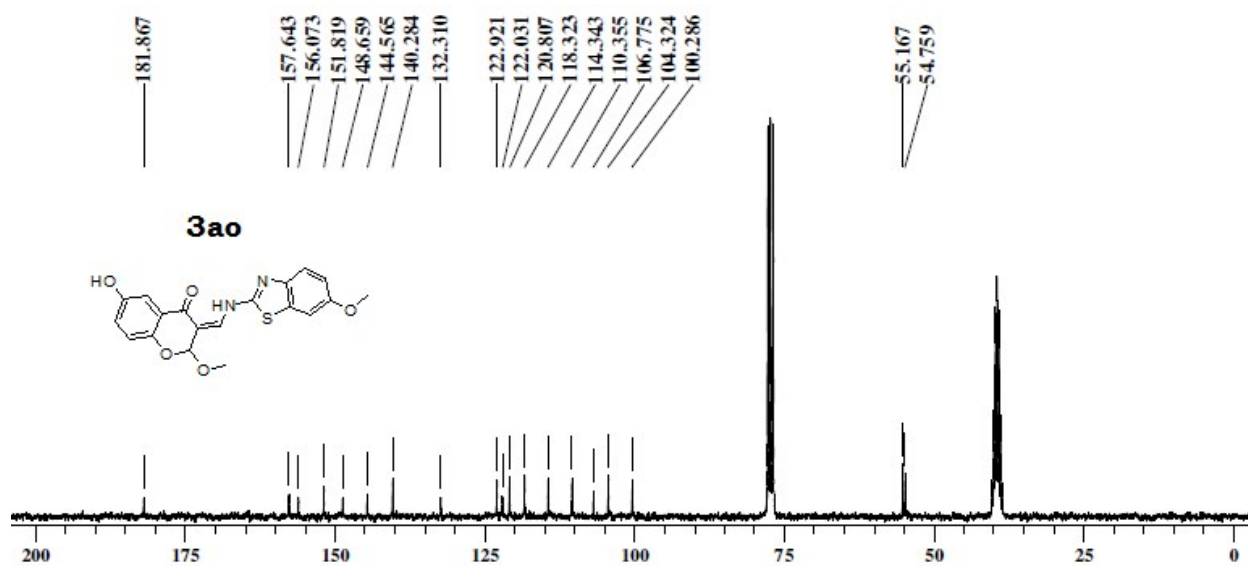
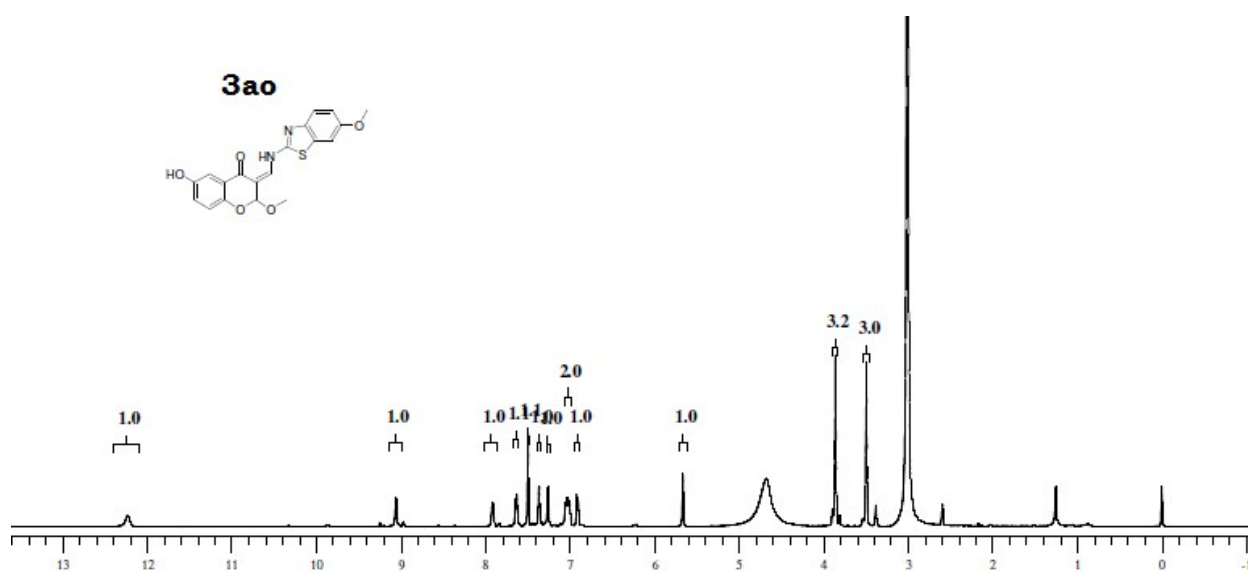
(Z)-6-bromo-3-((4,6-difluorobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one (**3am**):



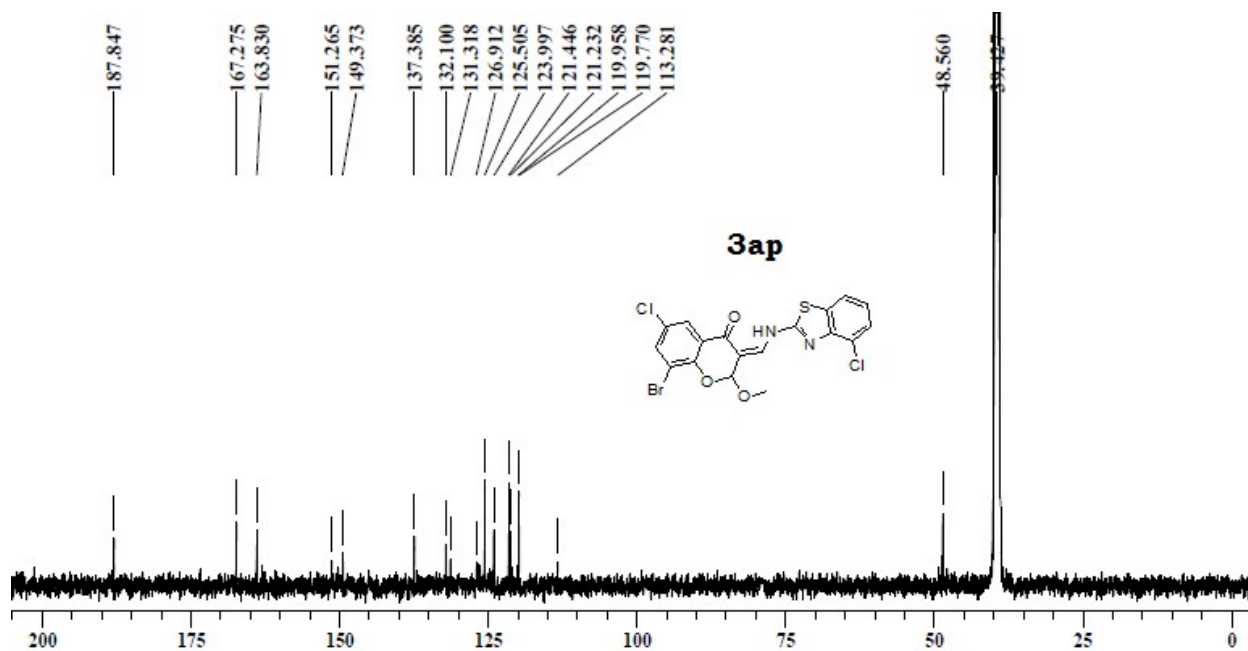
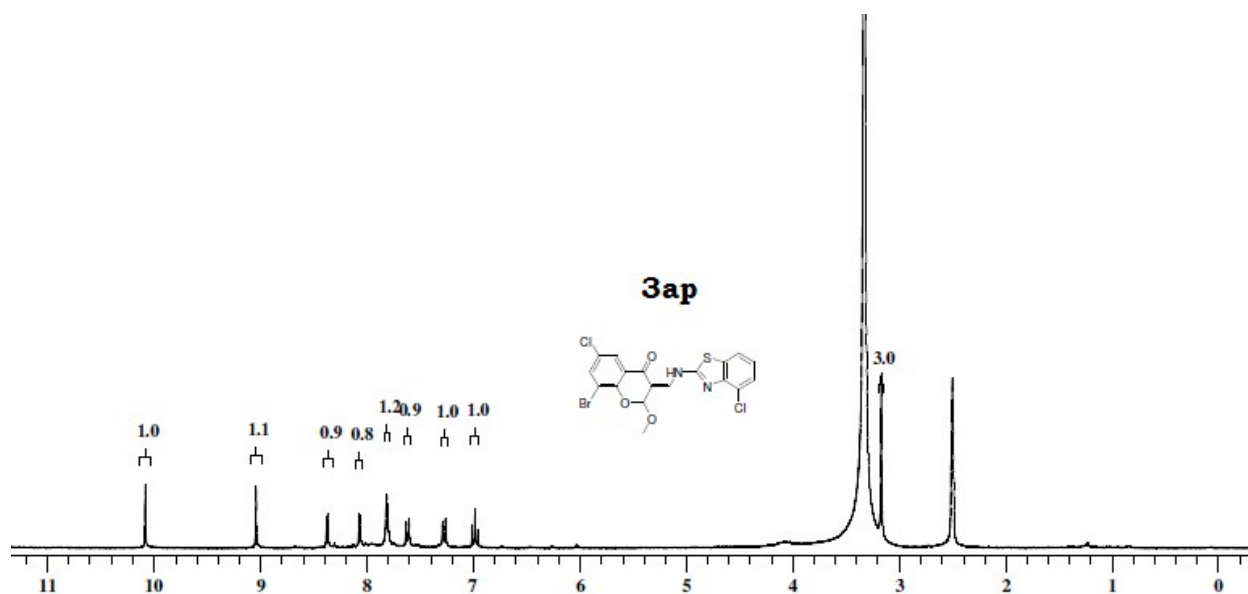
(Z)-6-bromo-3-((6-chloro-4-fluorobenzo[d]thiazol-2-ylamino)methylene)-2-methoxychroman-4-one
(3an):



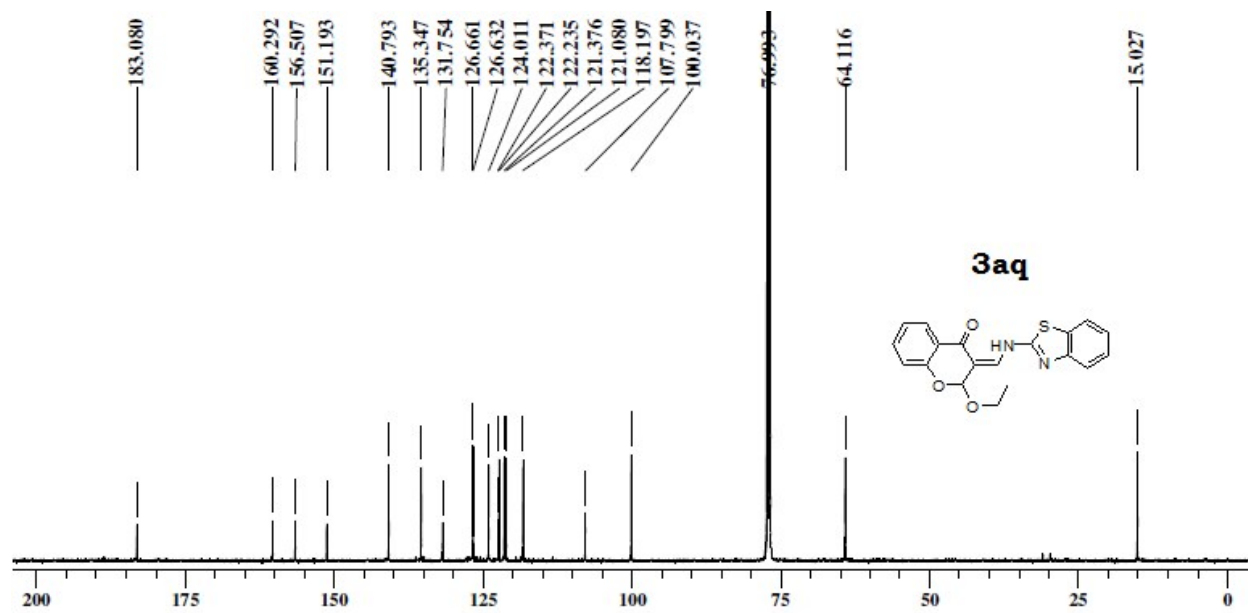
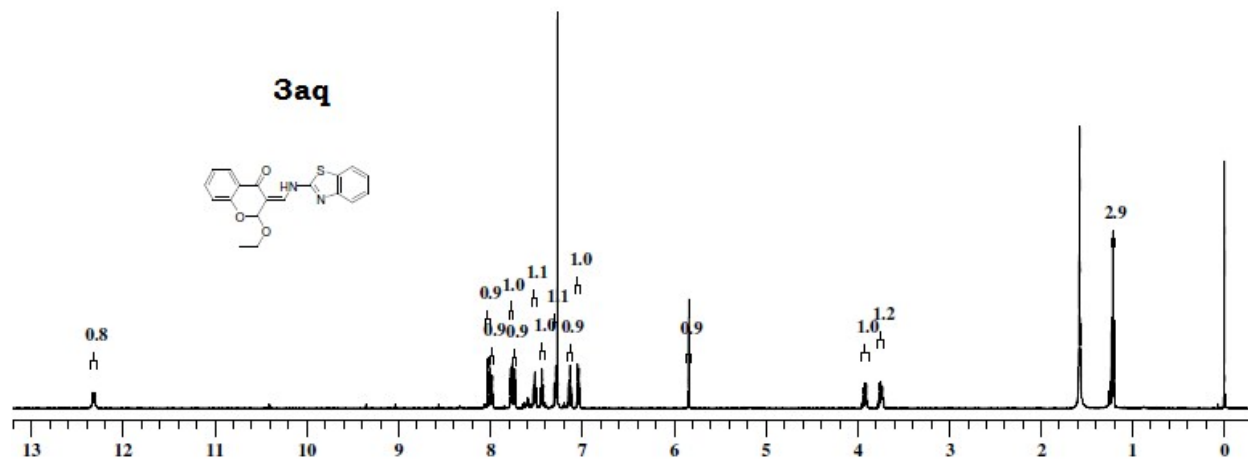
(Z)-6-hydroxy-2-methoxy-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3ao**):



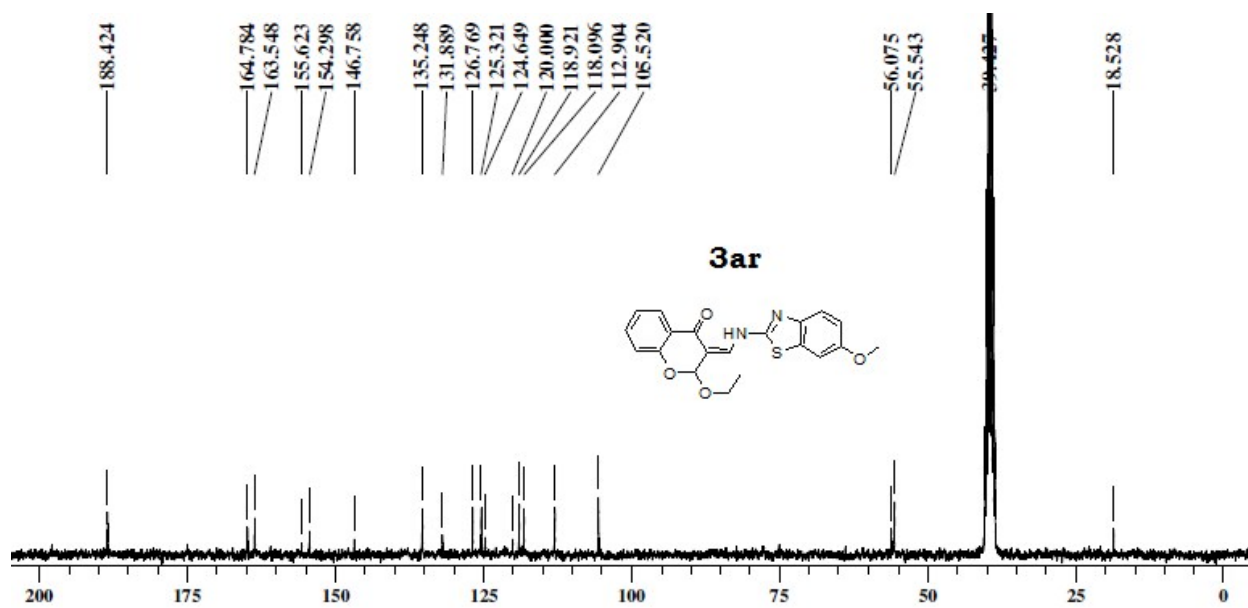
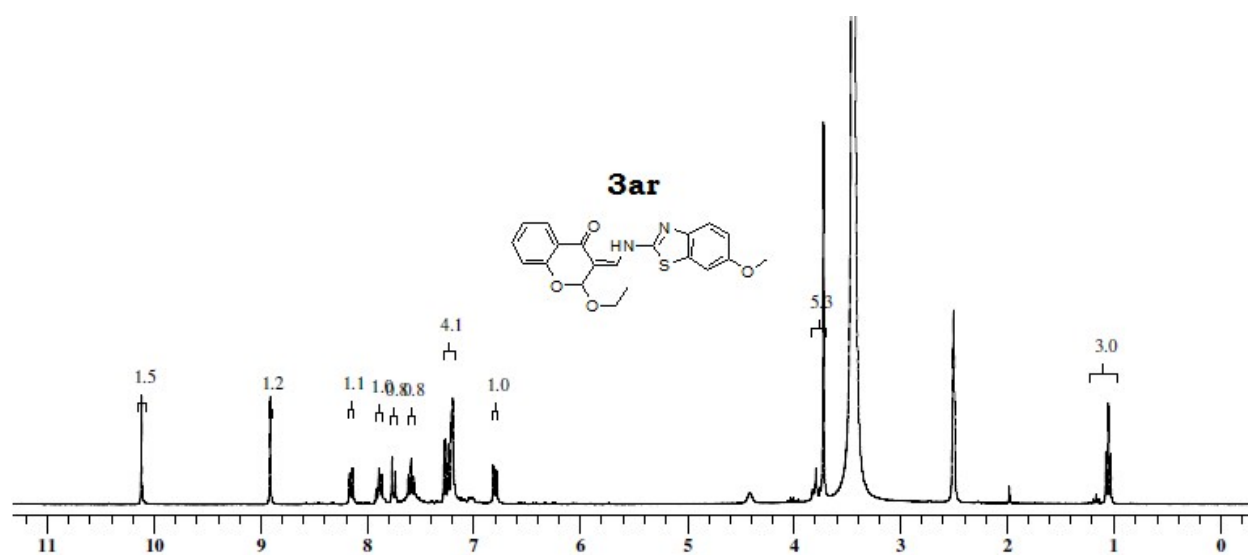
(Z)-8-bromo-6-chloro-3-((4-chlorobenzothiazol-2-ylamino)methylene)-2-methoxychroman-4-one
(3ap):



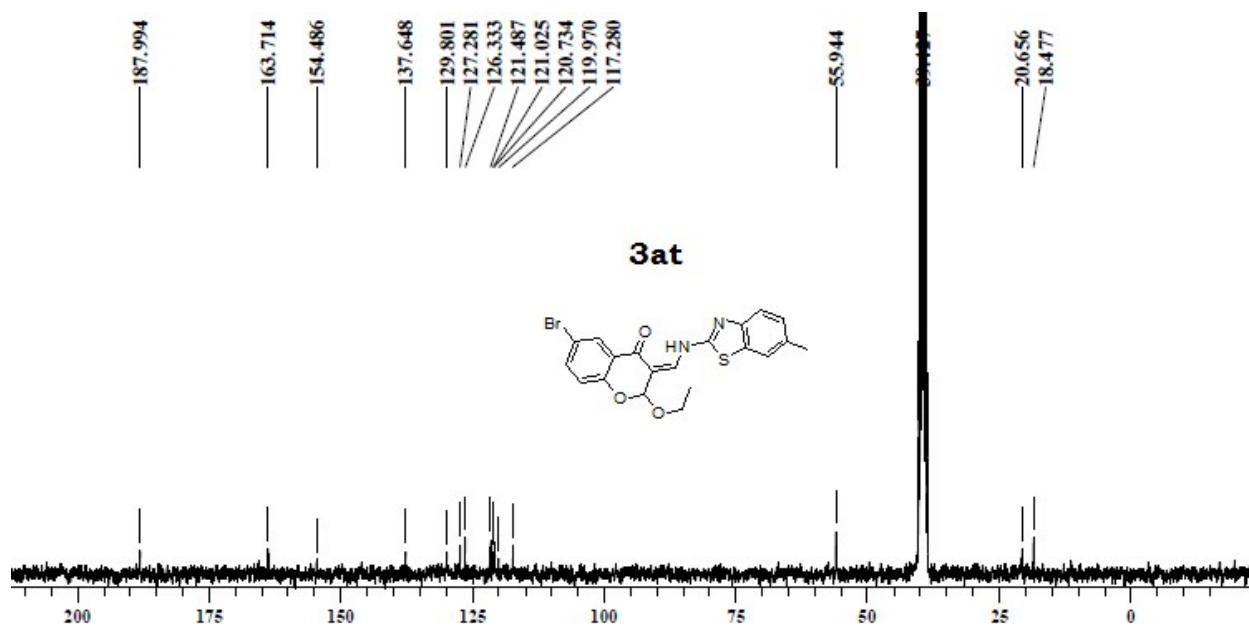
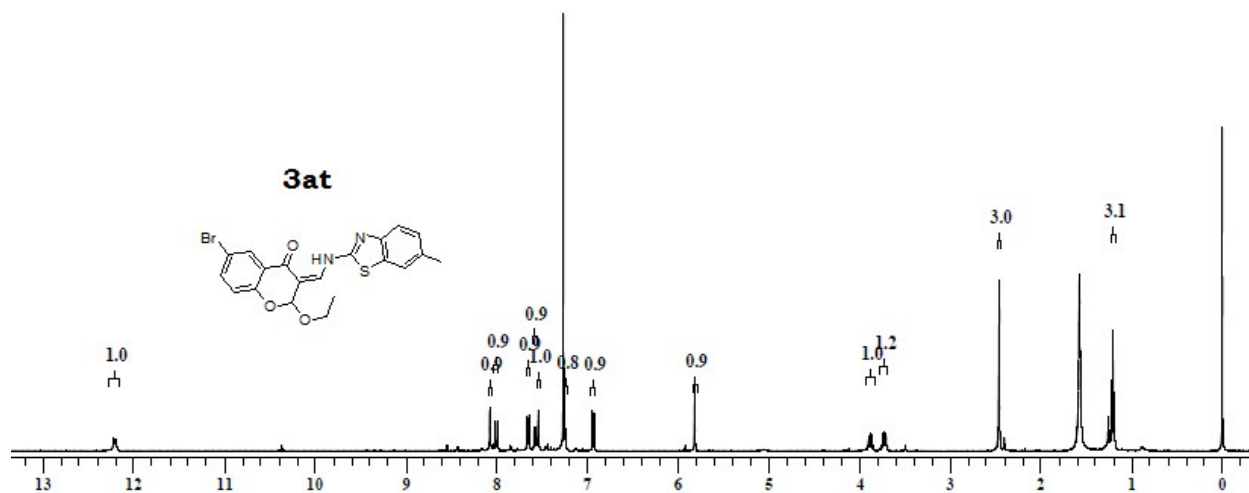
(Z)-3-((benzo[d]thiazol-2-ylamino)methylene)-2-ethoxychroman-4-one (**3aq**).



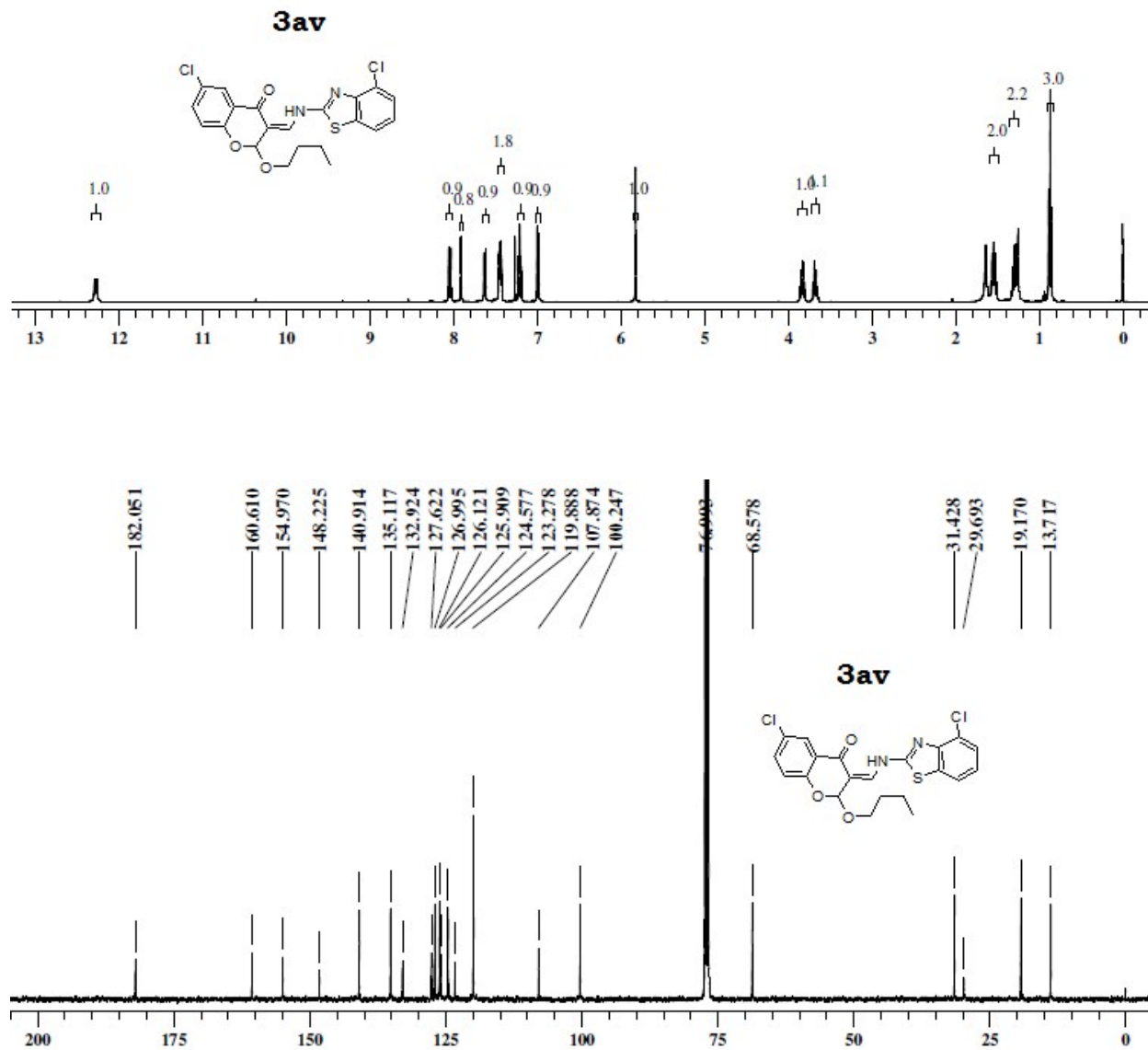
(Z)-2-methoxy-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3ar**).



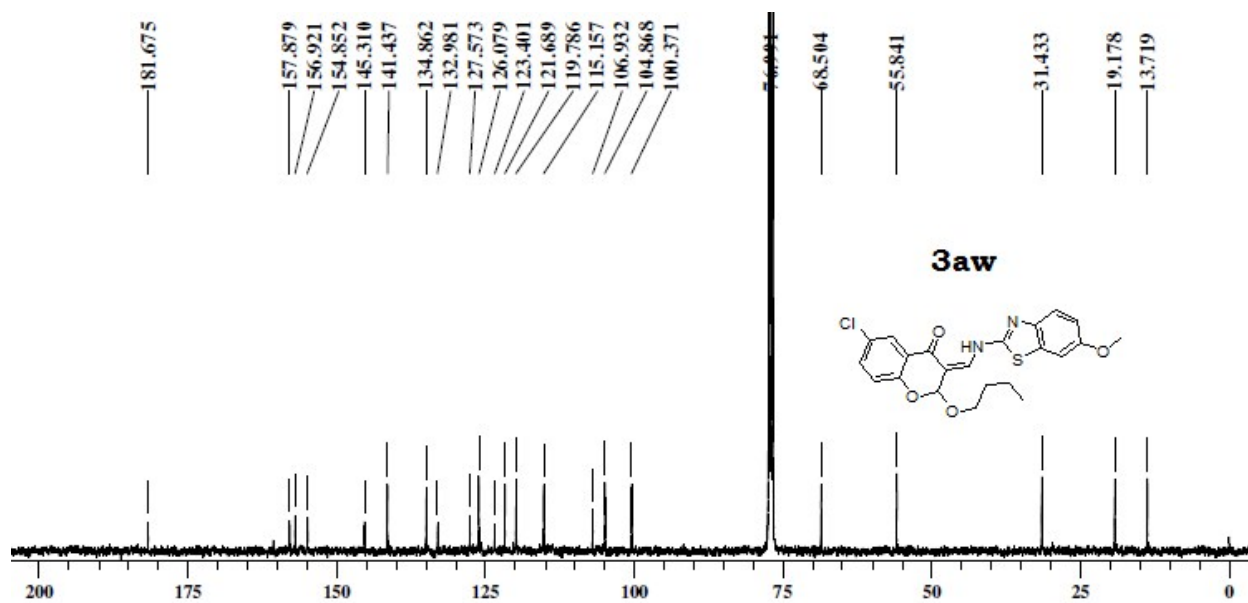
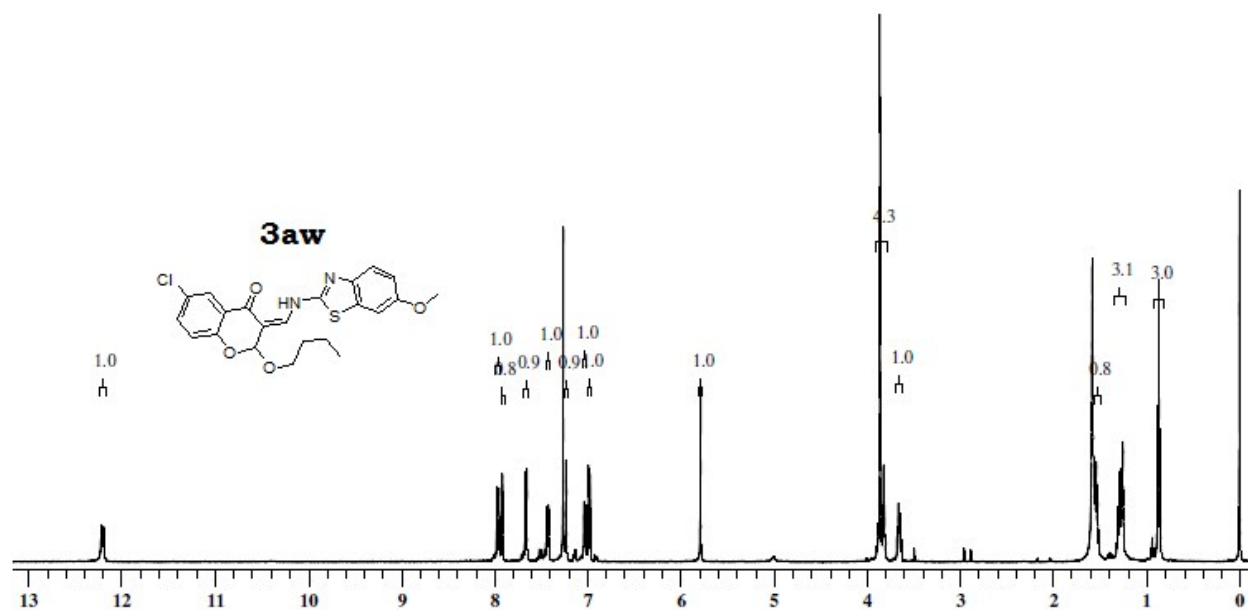
(Z)-6-bromo-2-ethoxy-3-((6-methylbenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3at**):



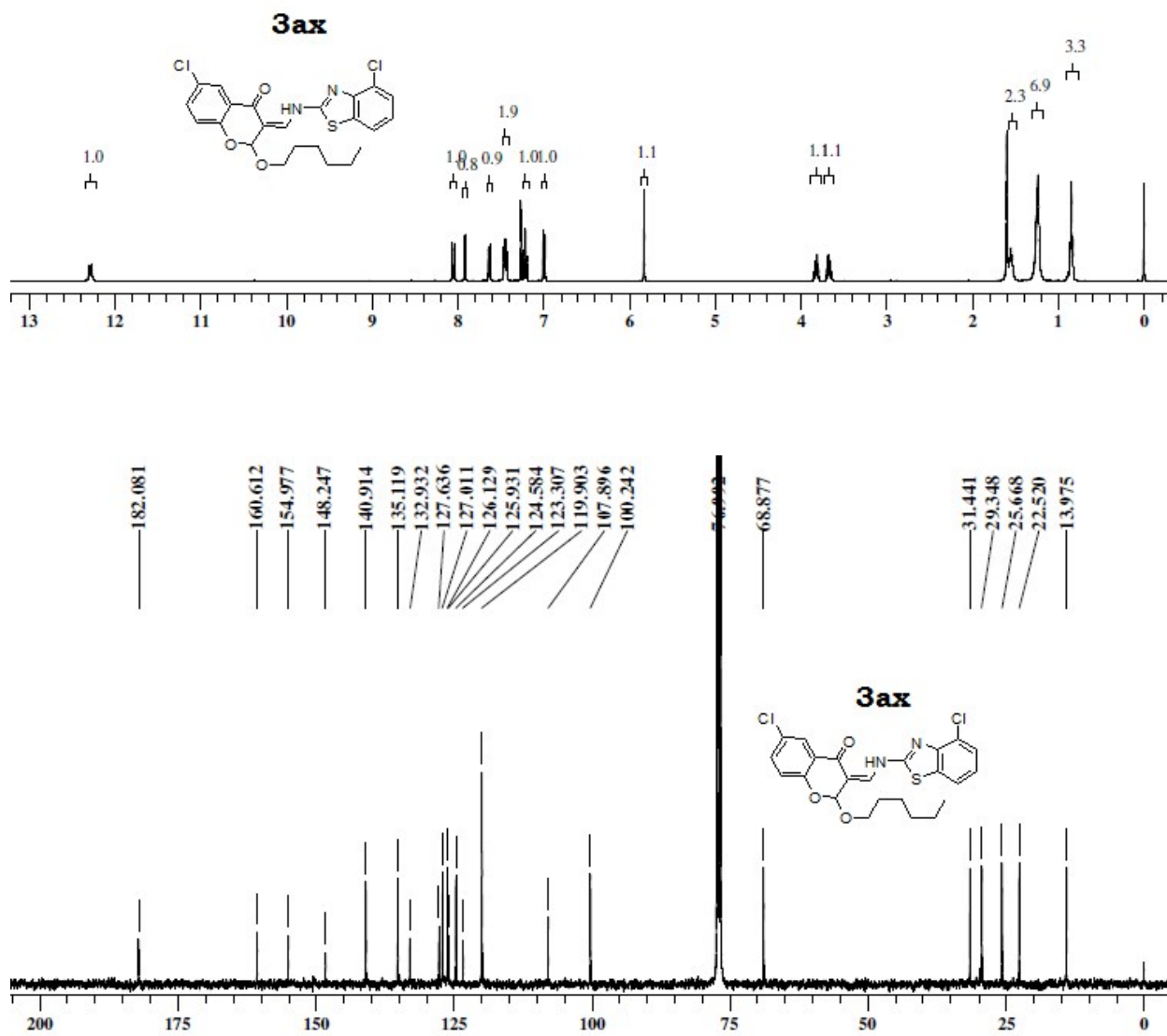
(Z)-2-butoxy-6-chloro-3-((4-chlorobenzothiazol-2-ylamino)methylene)chroman-4-one (**3av**):



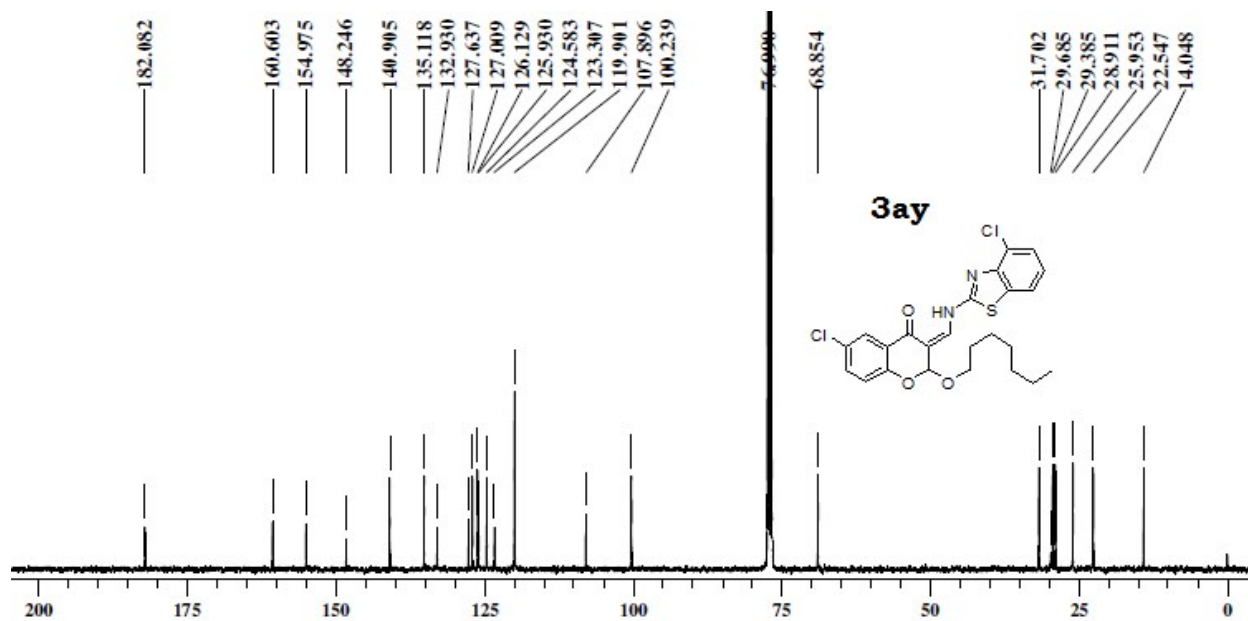
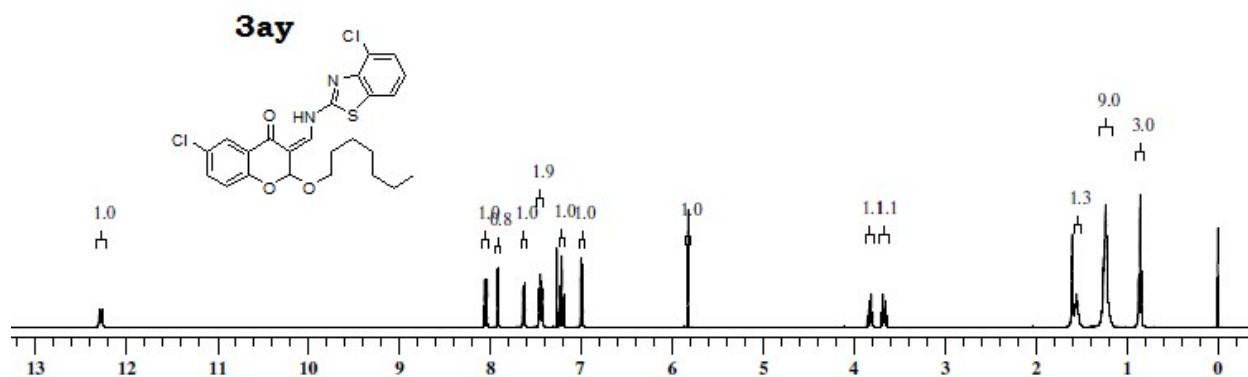
(Z)-2-butoxy-6-chloro-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)chroman-4-one (**3aw**).



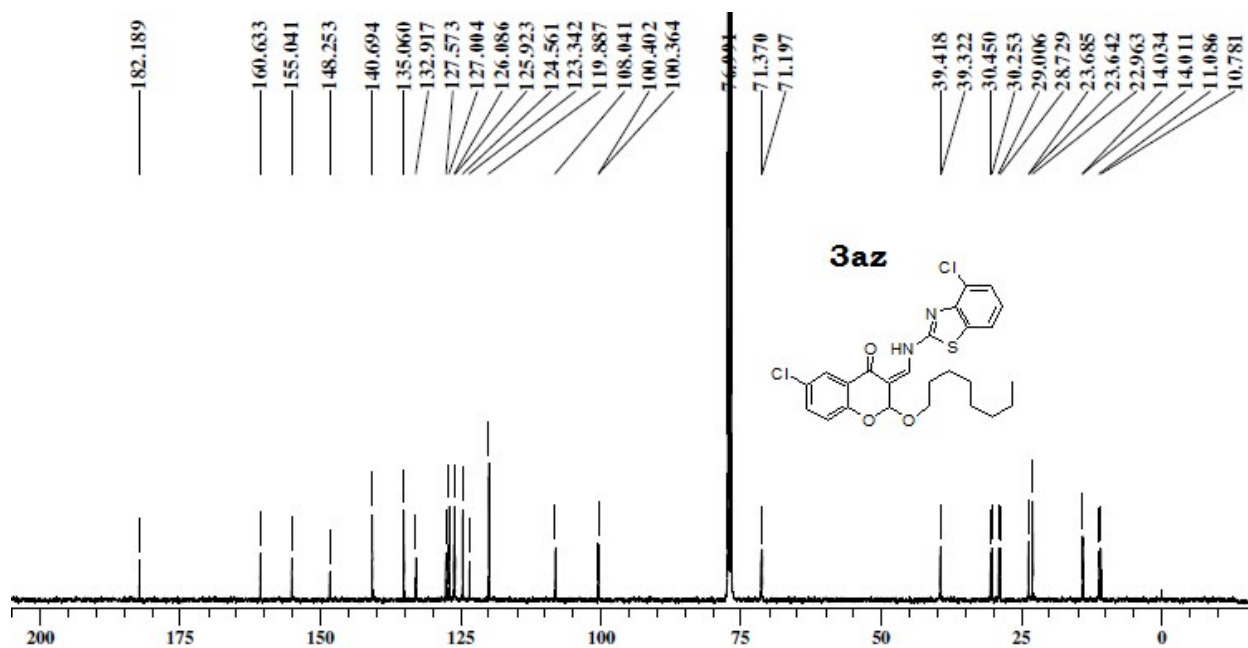
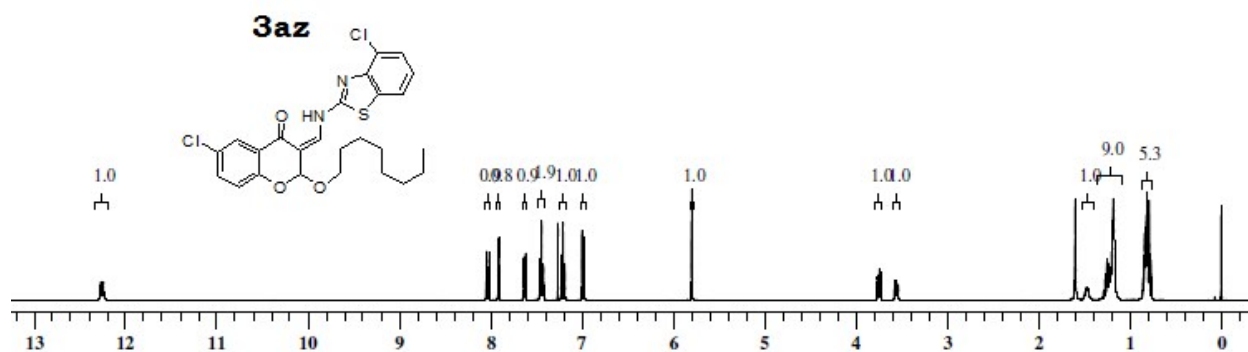
(Z)-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-(hexyloxy)chroman-4-one (**3ax**):



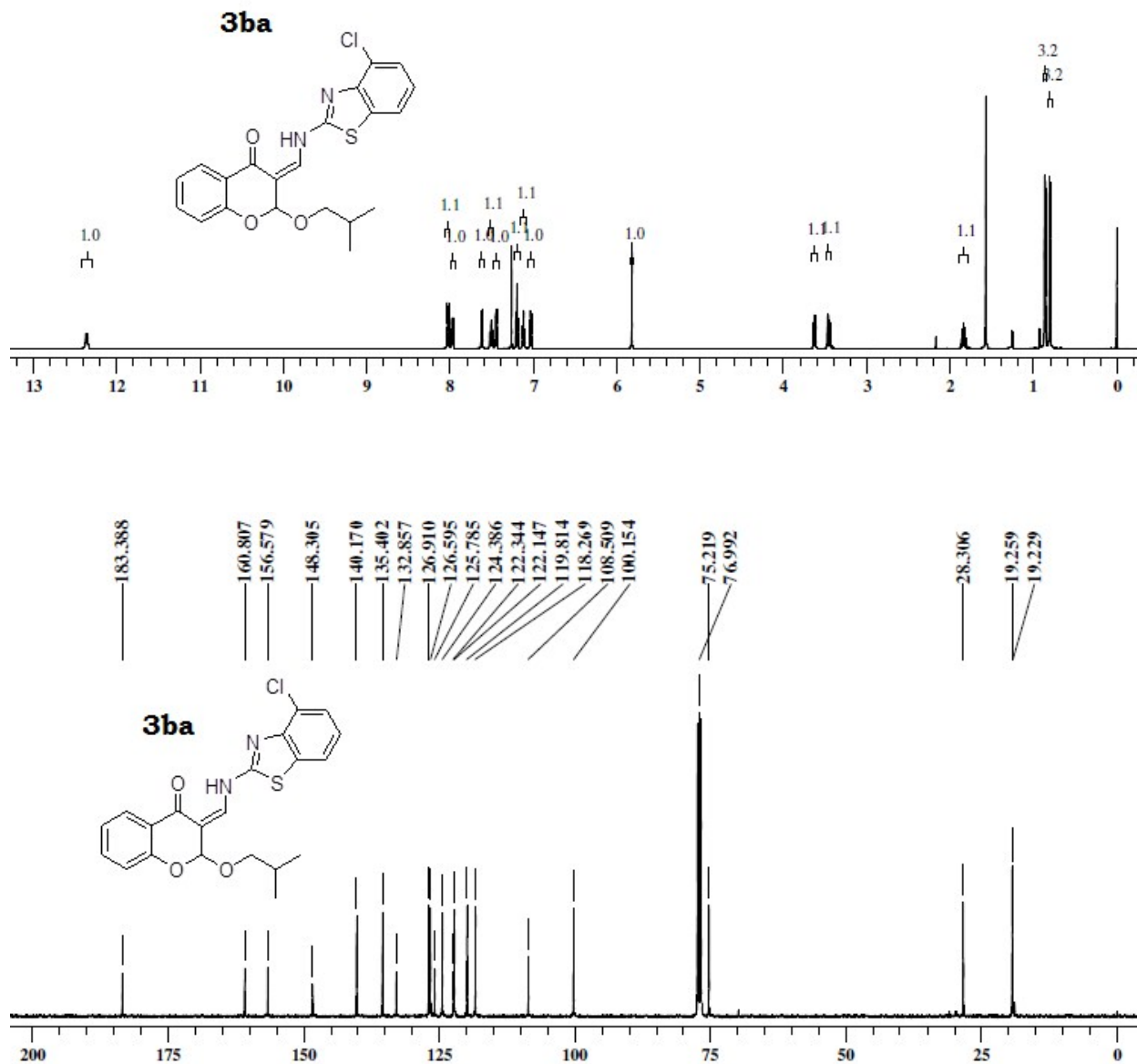
(Z)-6-chloro-3-((4-chlorobenzothiazol-2-ylamino)methylene)-2-(heptyloxy)chroman-4-one (**3ay**):



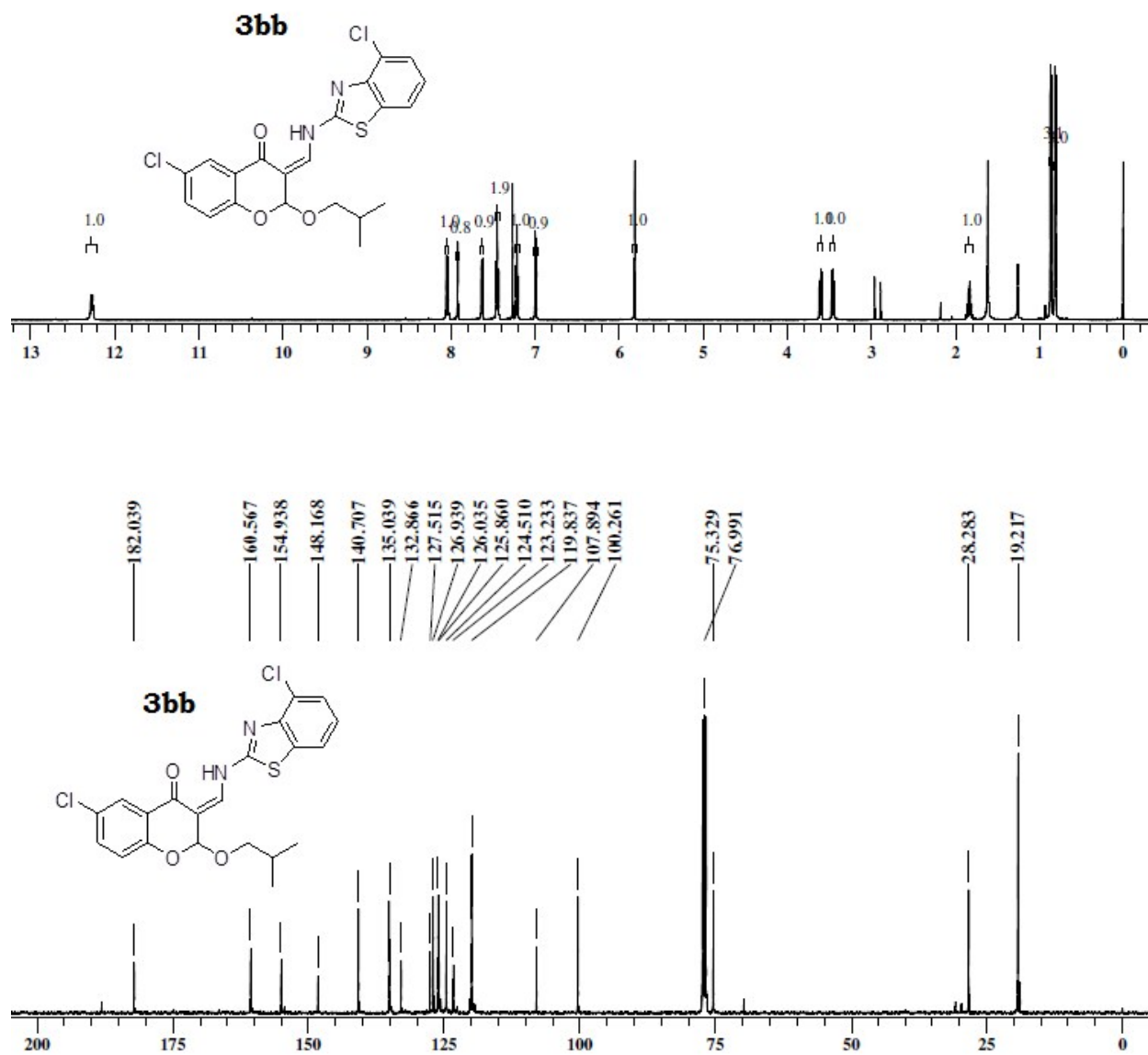
(Z)-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-(octyloxy)chroman-4-one (**3az**):



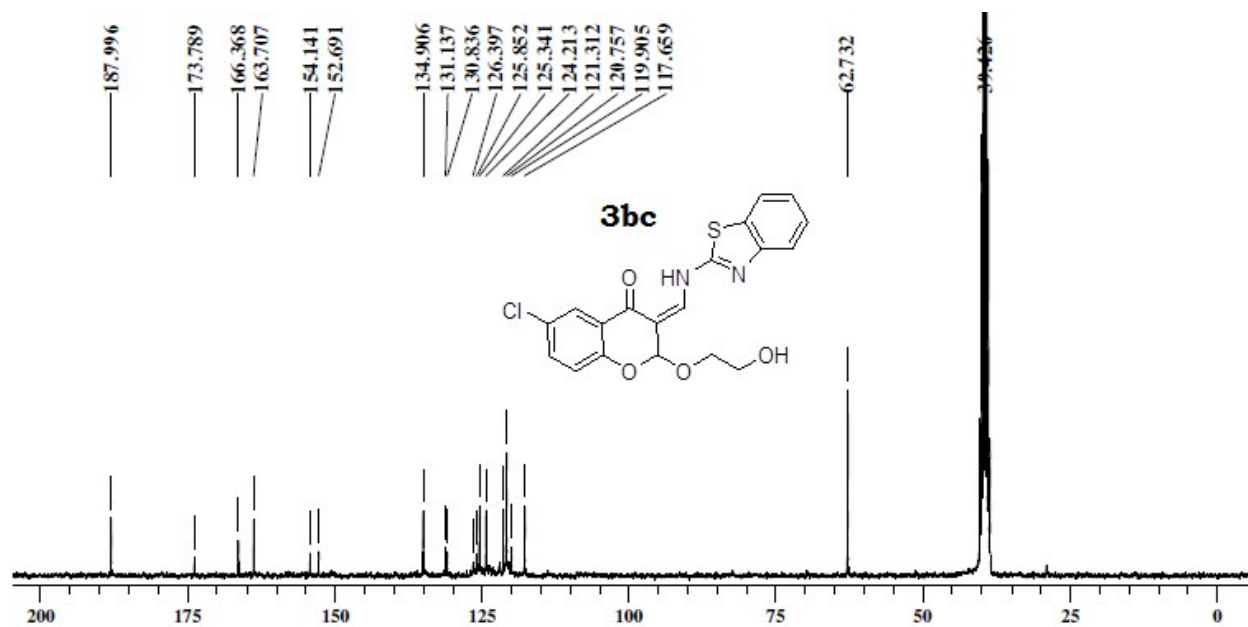
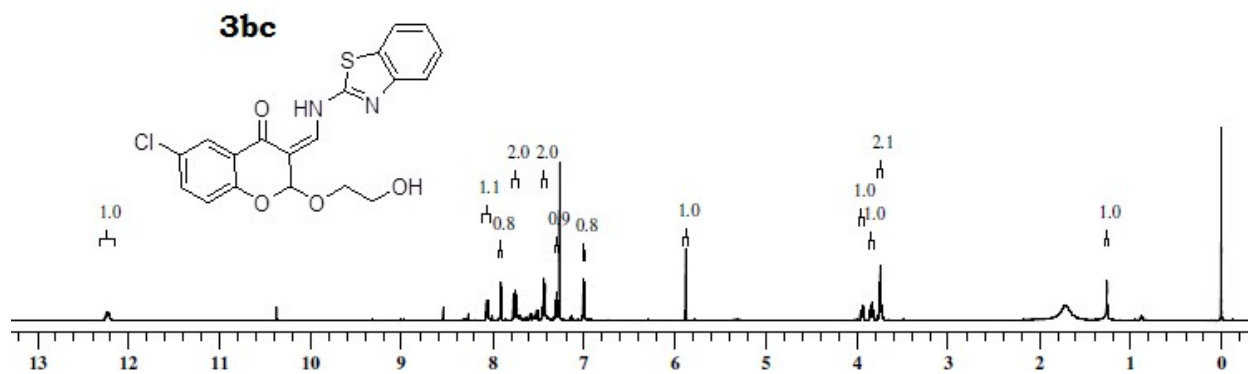
(Z)-3-((4-chlorobenzothiazol-2-ylamino)methylene)-2-isobutoxychroman-4-one (**3ba**):



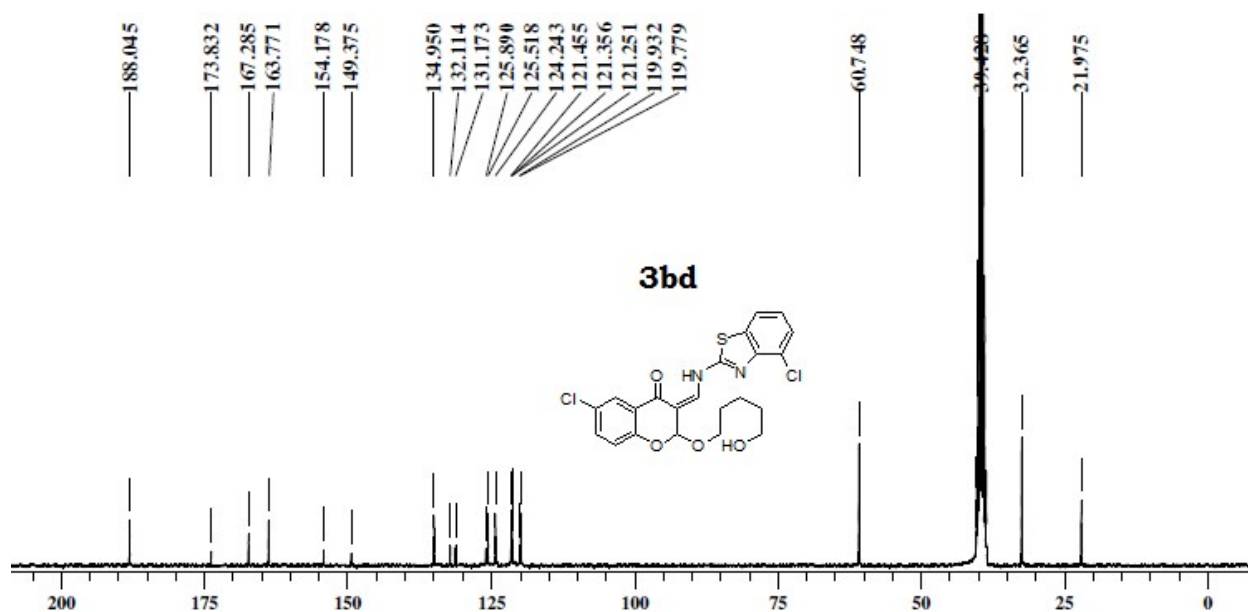
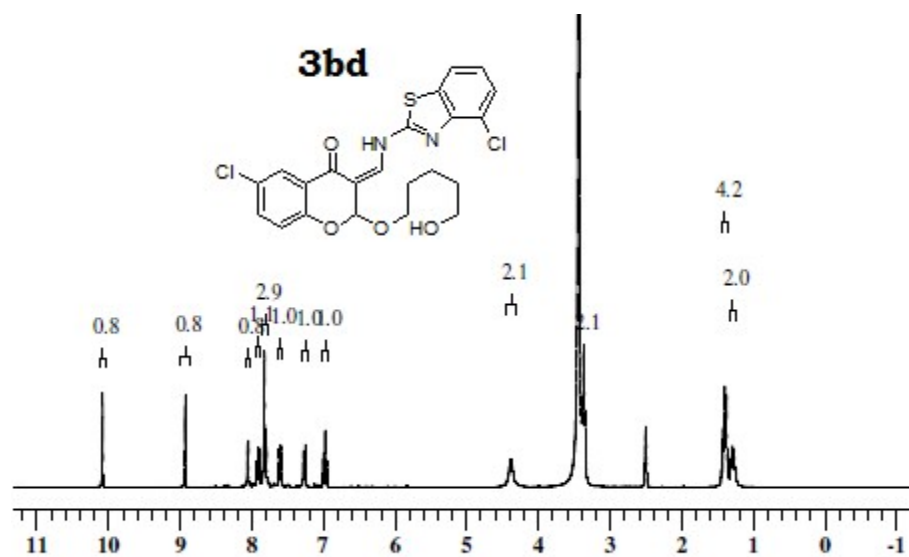
(Z)-6-chloro-3-((4-chlorobenzothiazol-2-ylamino)methylene)-2-isobutoxychroman-4-one (**3bb**):



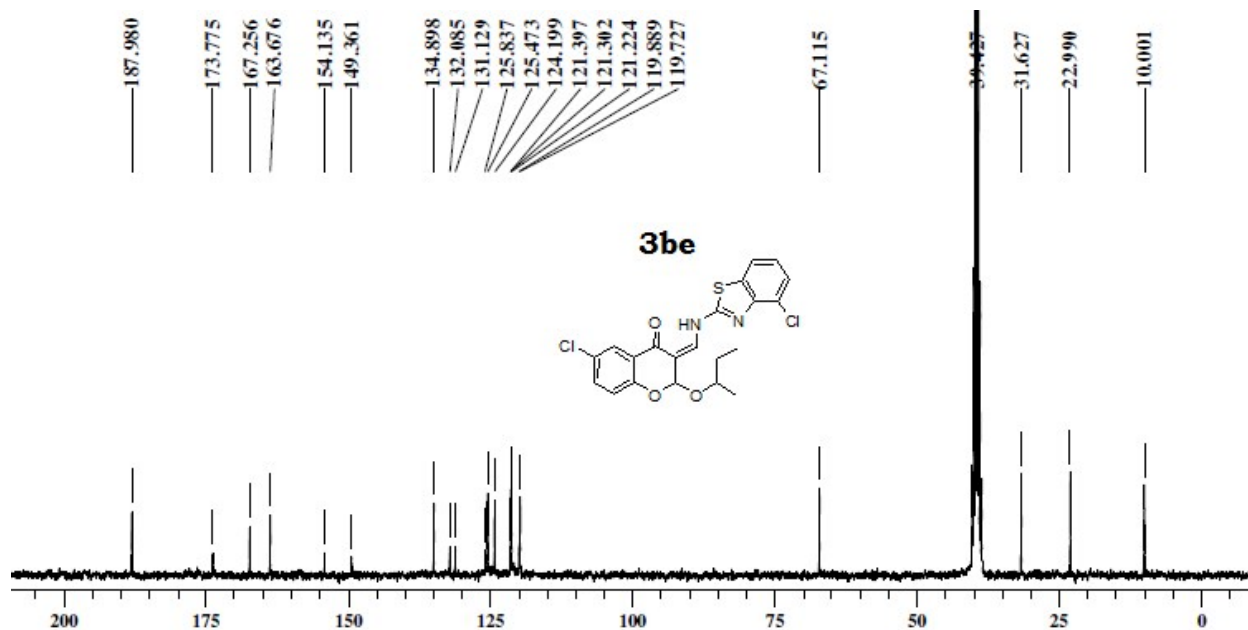
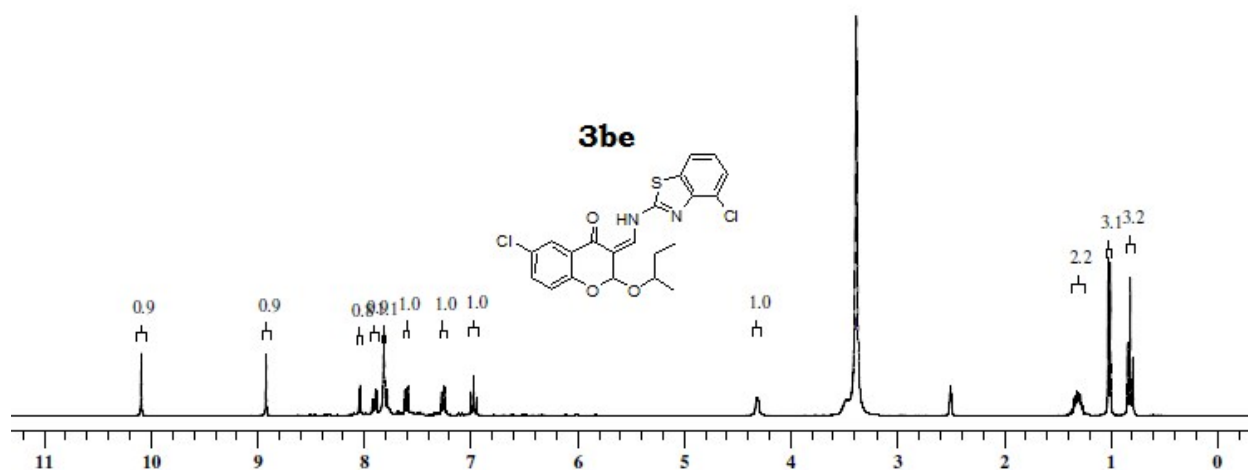
(Z)-3-((benzo[d]thiazol-2-ylamino)methylene)-6-chloro-2-(2-hydroxyethoxy)chroman-4-one (**3bc**):



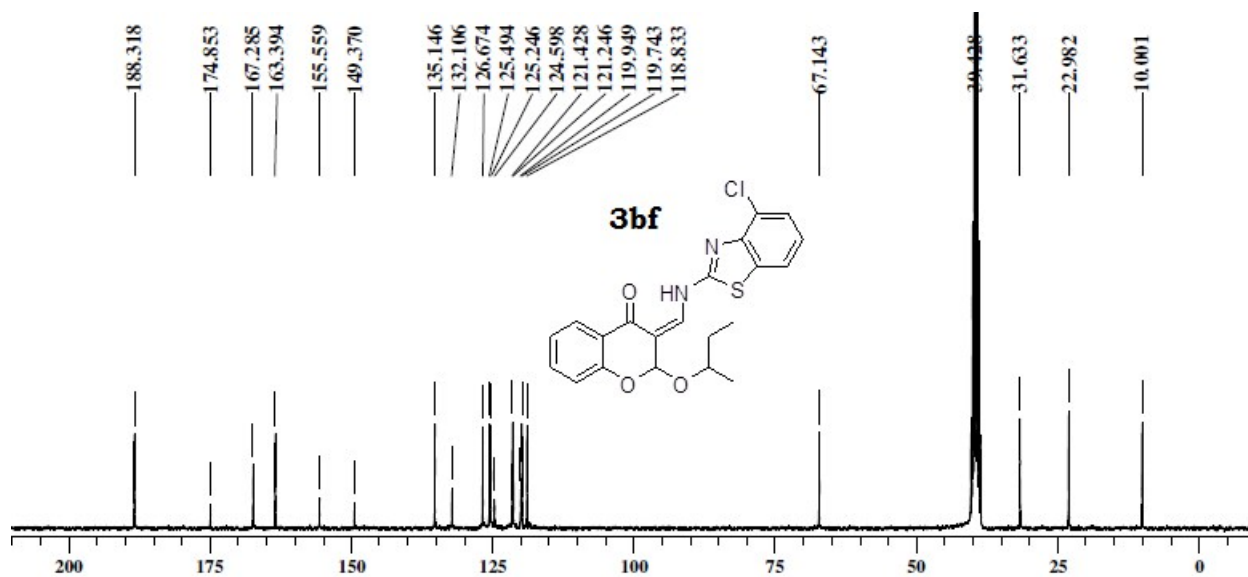
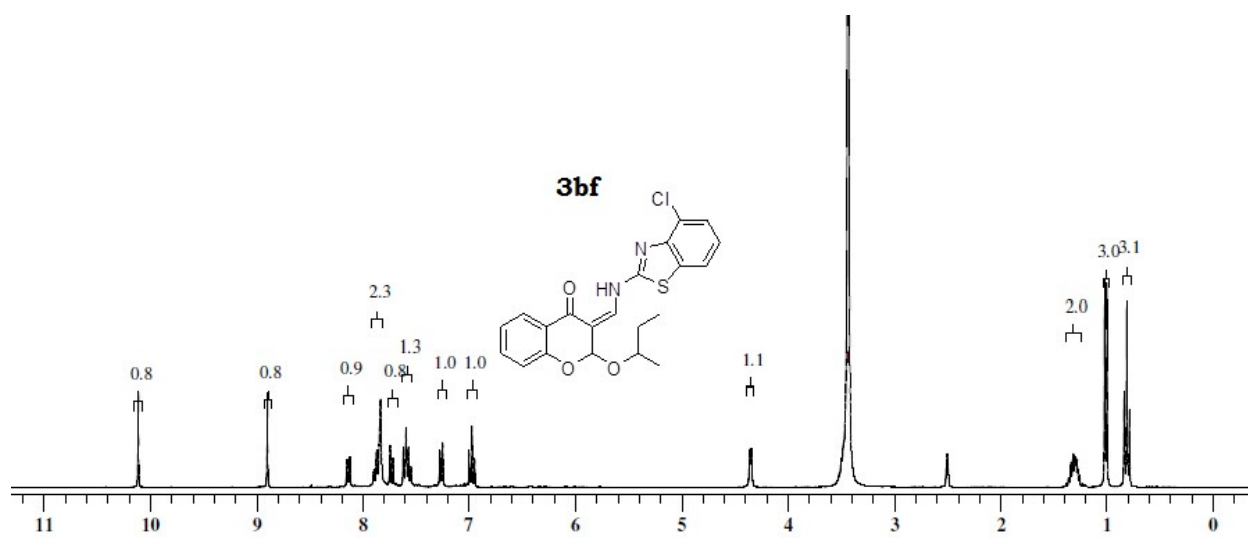
(Z)-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-(5-hydroxypentyloxy)chroman-4-one
(3bd):



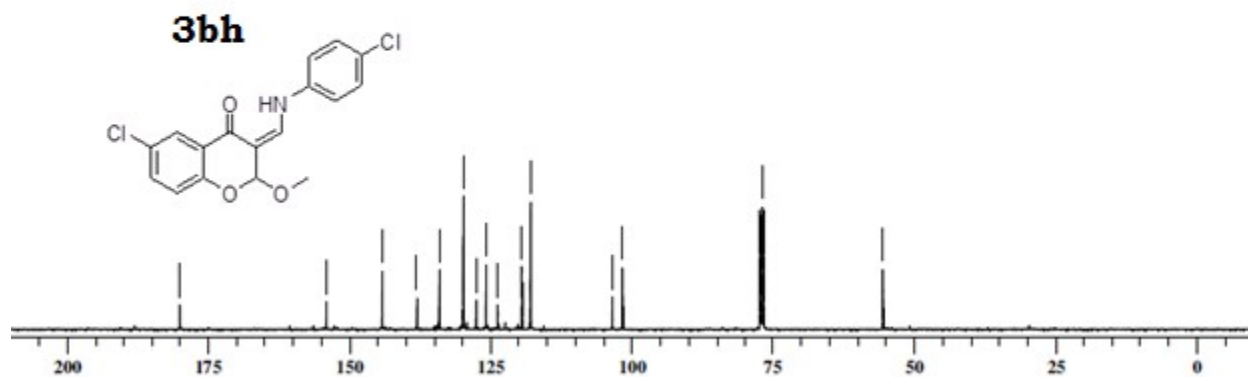
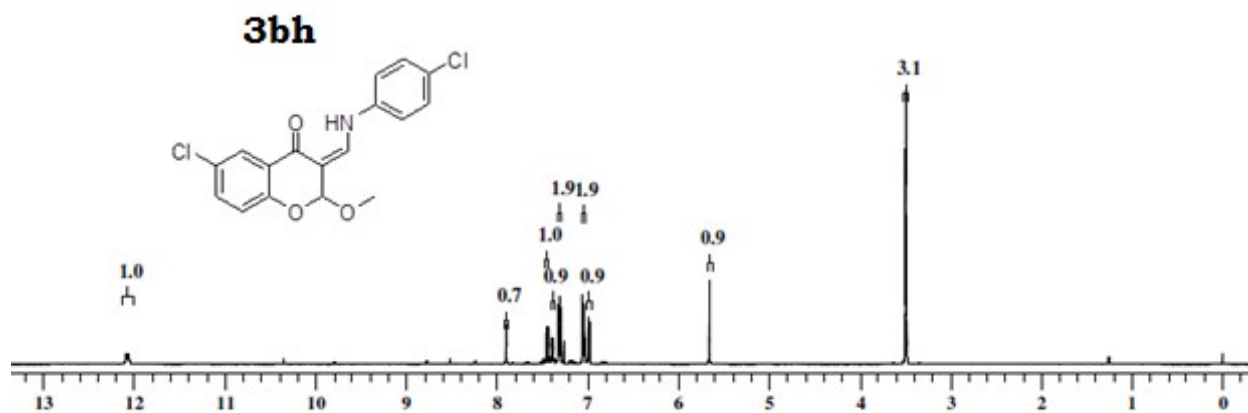
3-(sec-butoxy(4-chlorobenzo[d]thiazol-2-ylamino)methyl)-6-chloro-4H-chromen-4-one (**3be**):



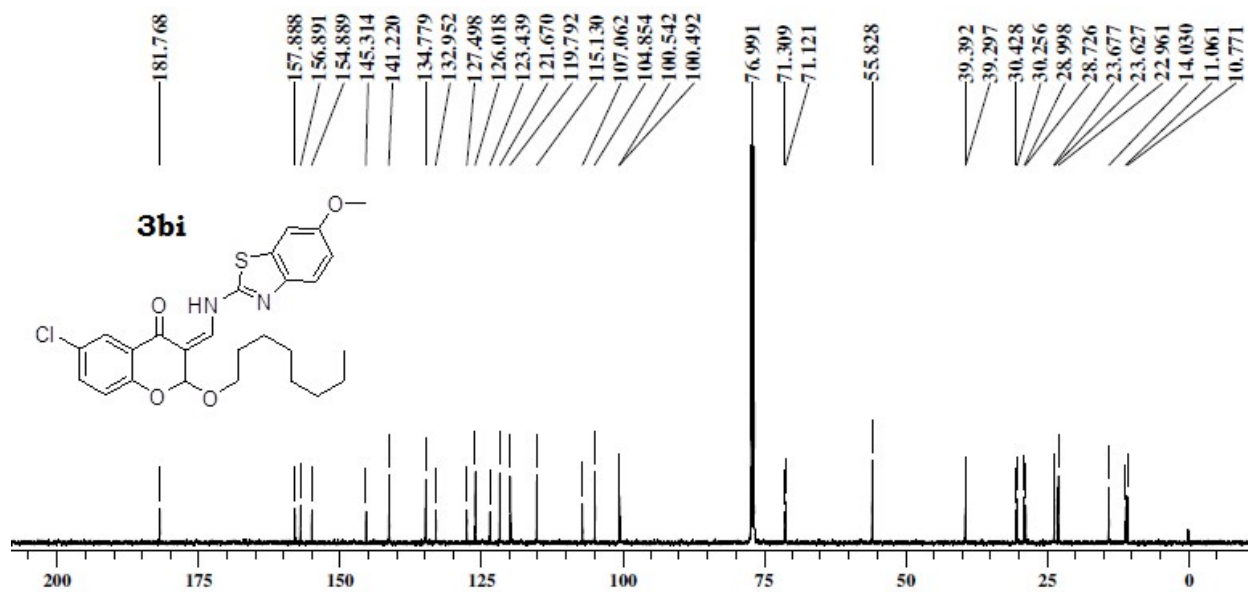
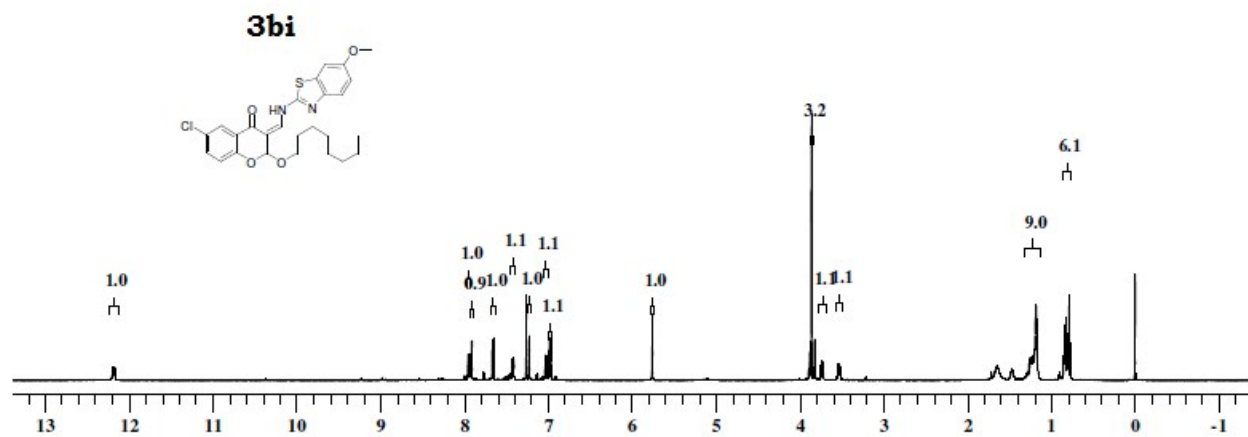
(Z)-2-sec-butoxy-3-((4-chlorophenyl)thiazol-2-ylamino)methylene)chroman-4-one (**3bf**):



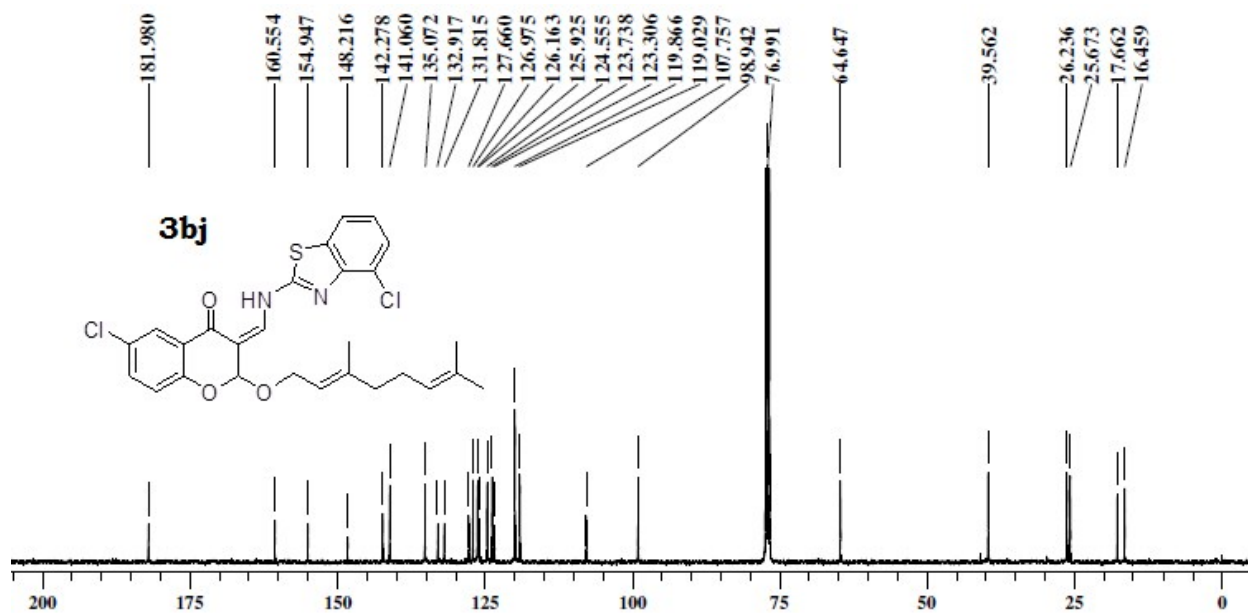
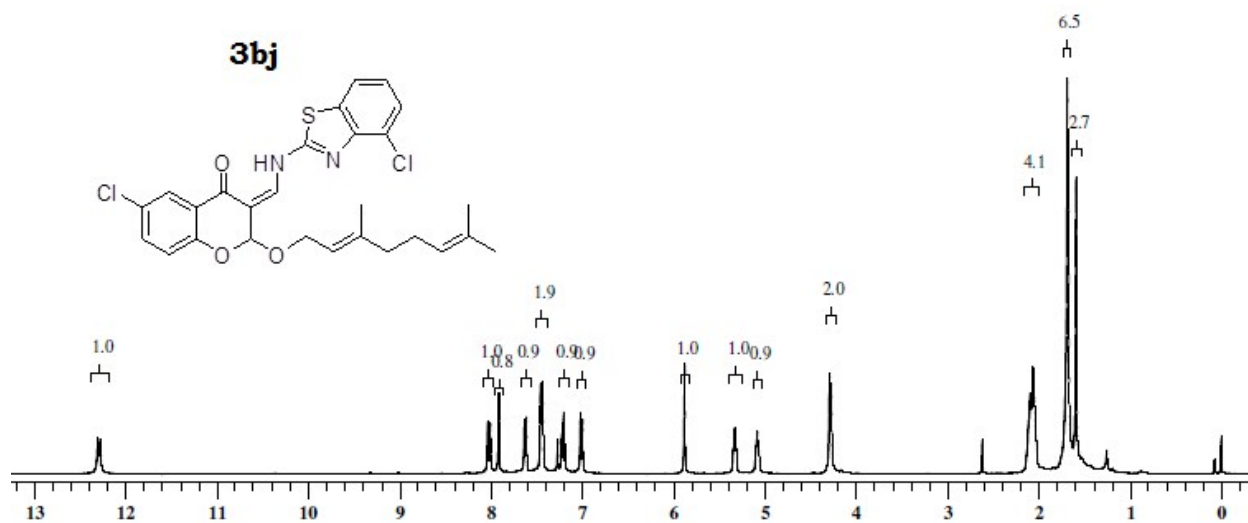
(Z)-6-chloro-3-((4-chlorophenylamino)methylene)-2-methoxychroman-4-one (**3bh**):



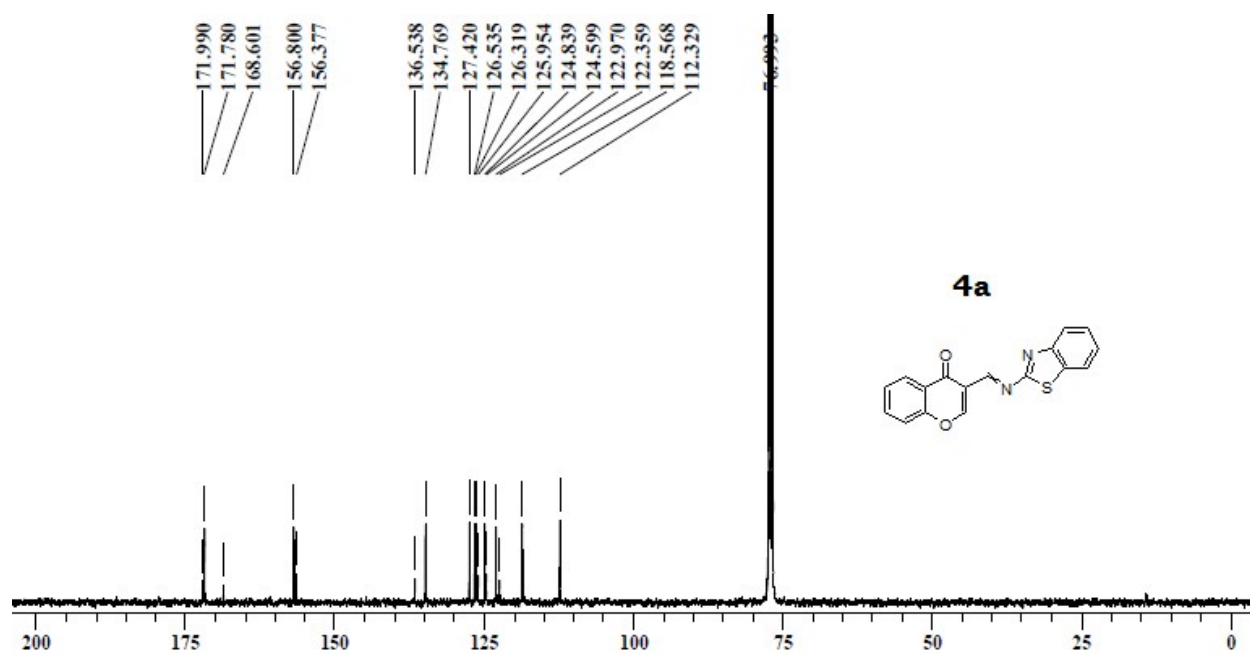
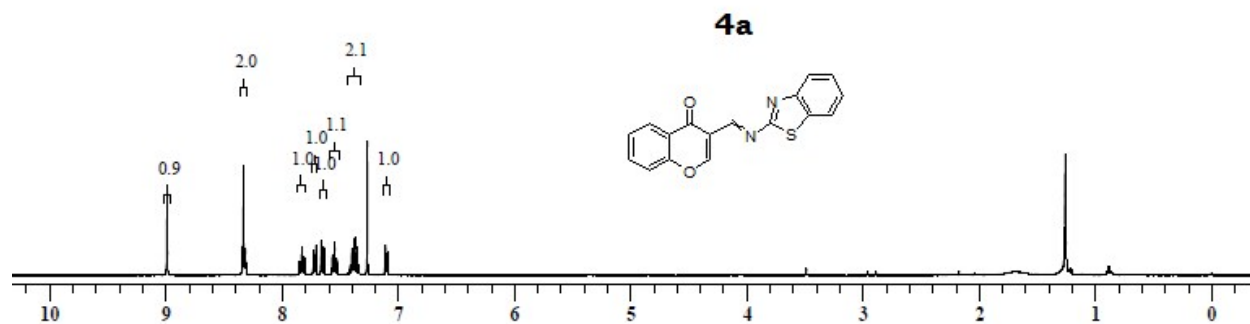
(Z)-6-chloro-3-((6-methoxybenzo[d]thiazol-2-ylamino)methylene)-2-(octyloxy)chroman-4-one (**3bi**):



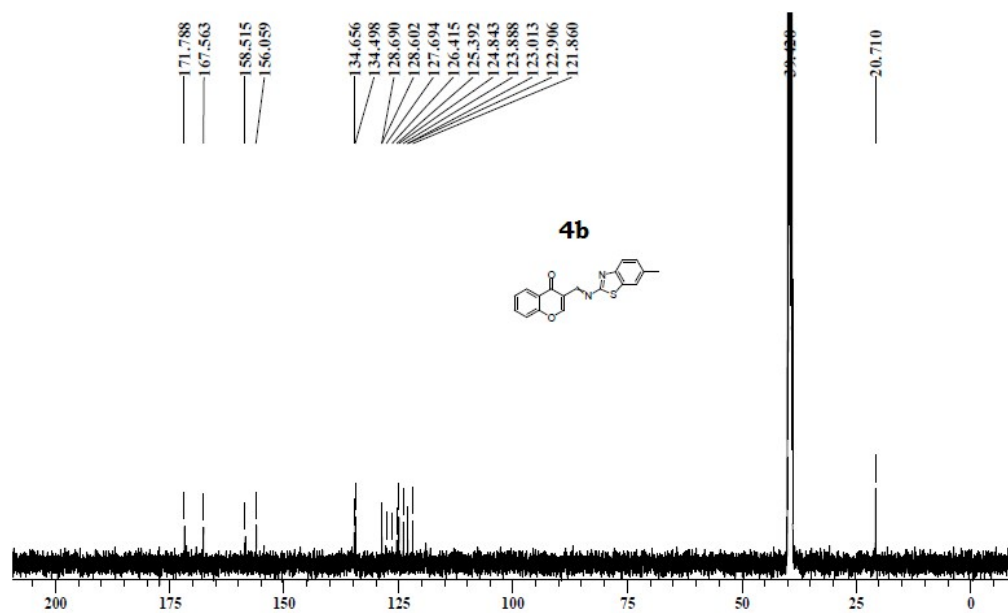
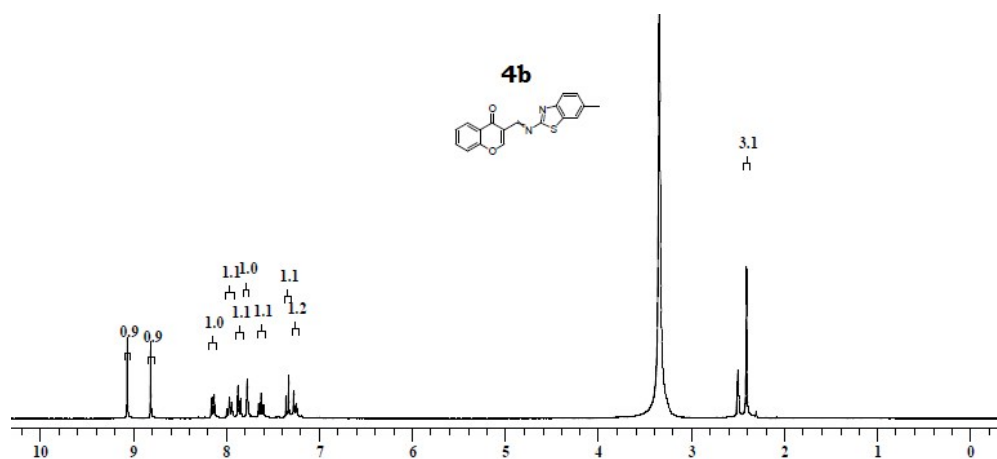
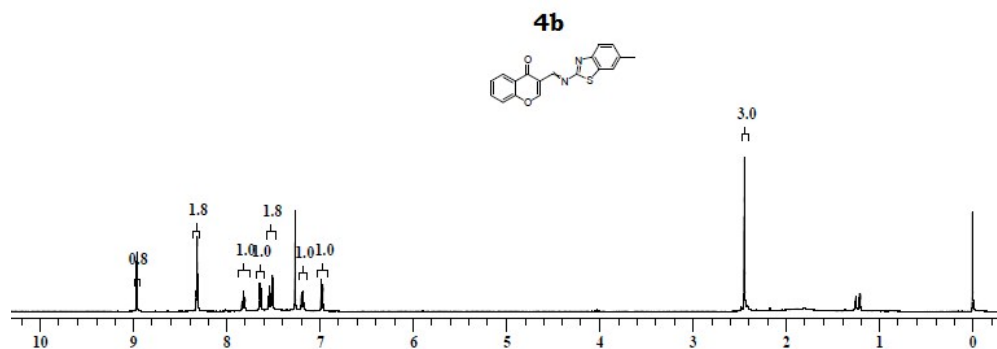
(Z)-6-chloro-3-((4-chlorobenzo[d]thiazol-2-ylamino)methylene)-2-((E)-3,7-dimethylocta-2,6-dienyloxy)chroman-4-one (**3bj**):



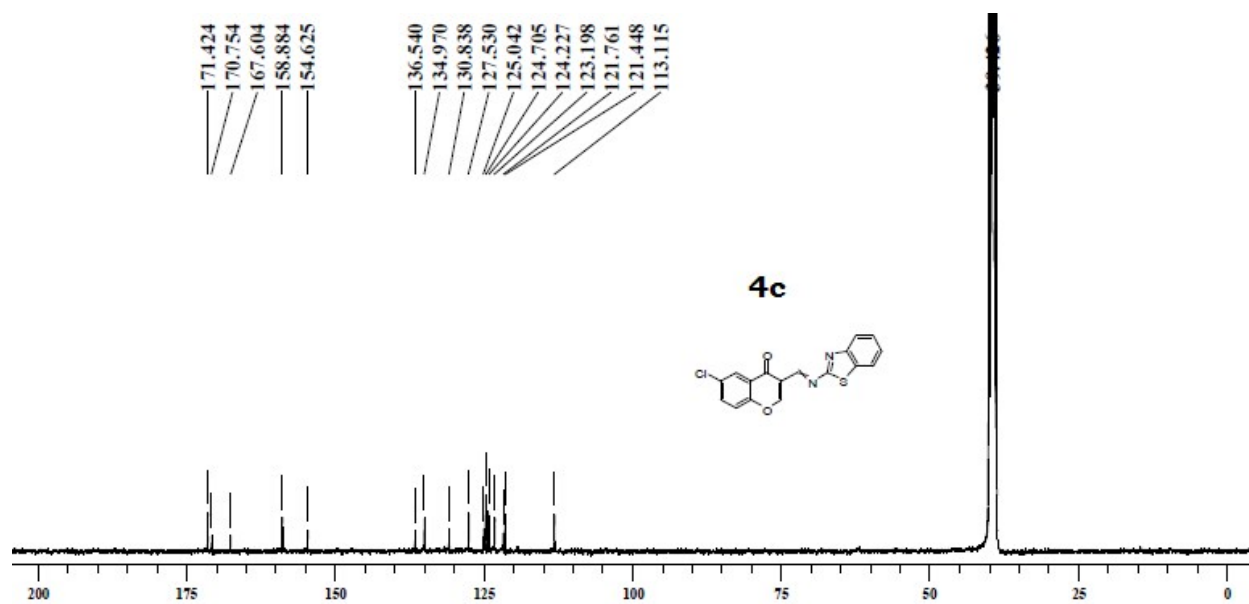
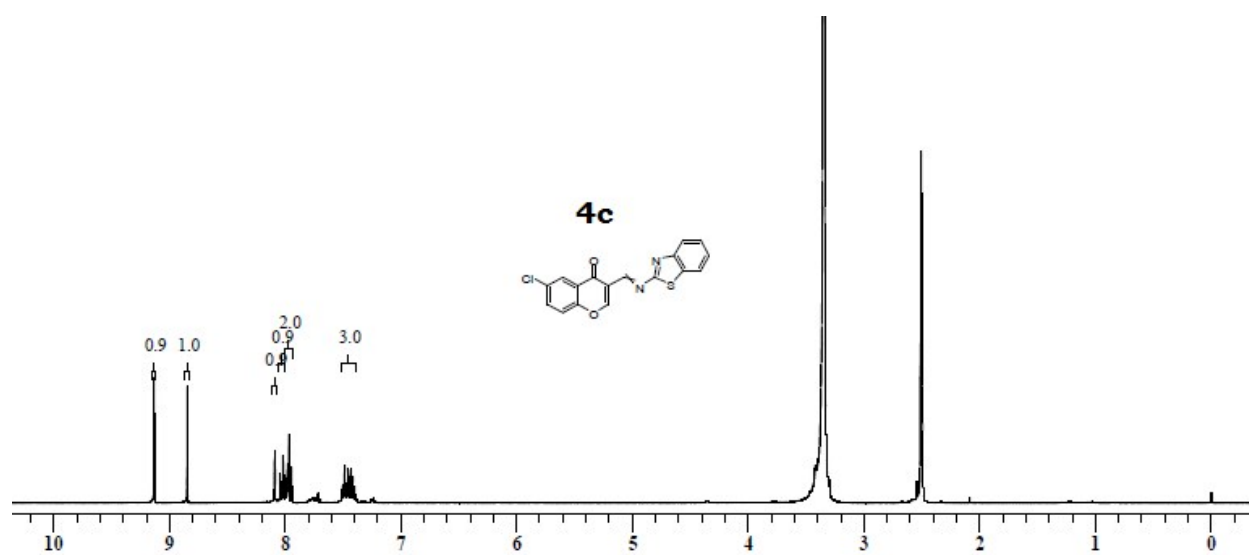
3-((benzo[d]thiazol-2-ylimino)methyl)-4H-chromen-4-one (**4a**).



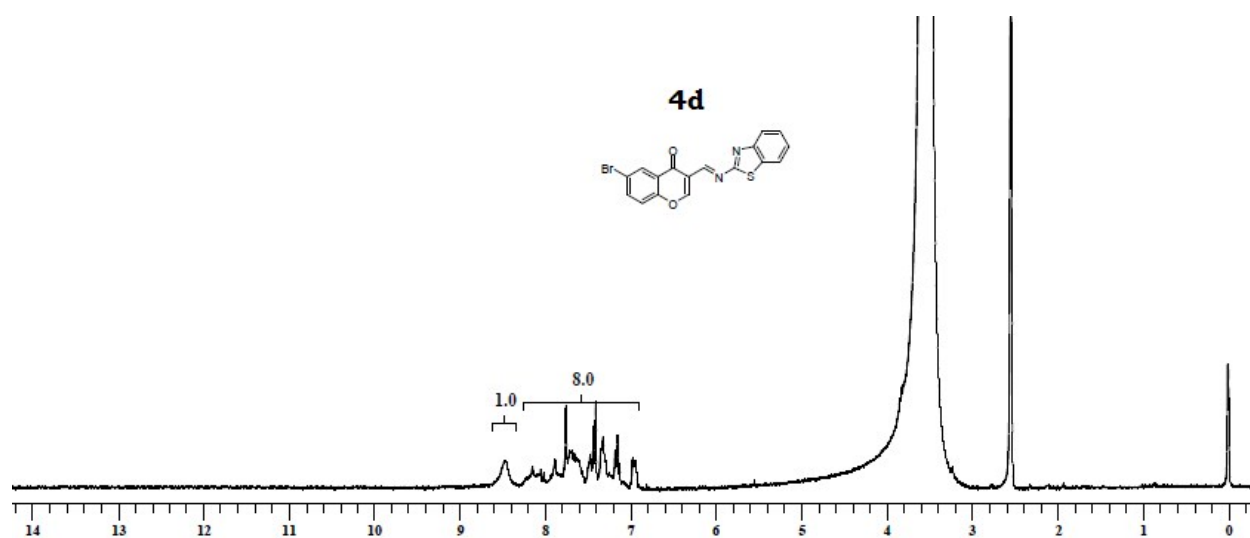
3-((6-methylbenzo[d]thiazol-2-ylimino)methyl)-4H-chromen-4-one (**4b**):



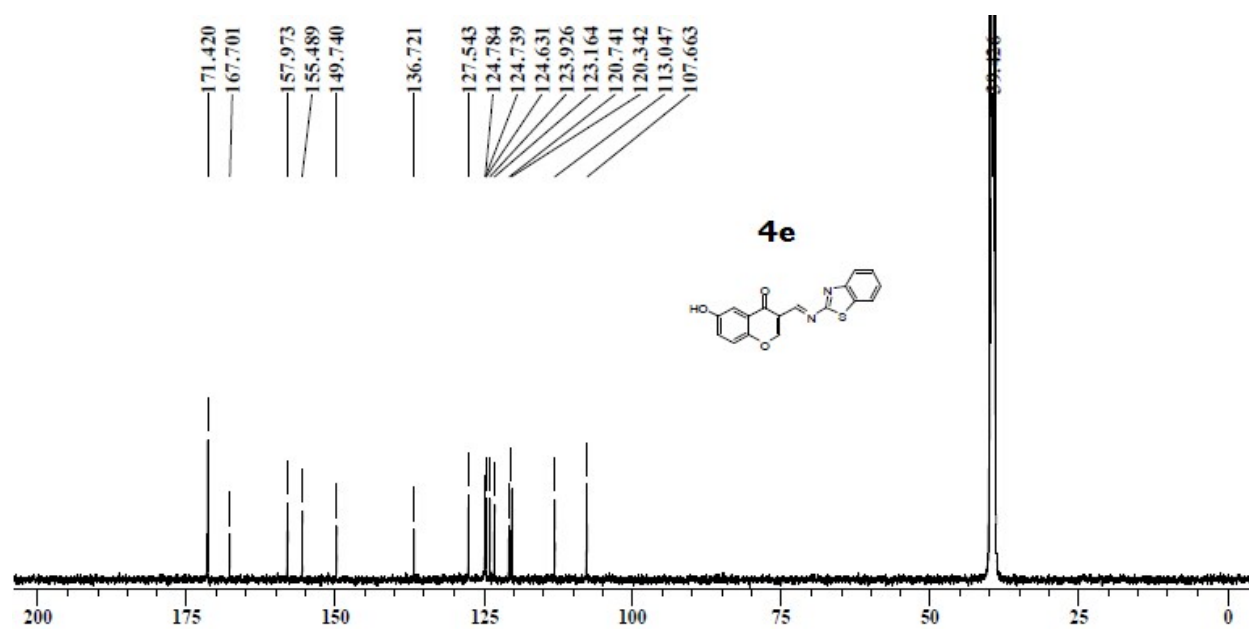
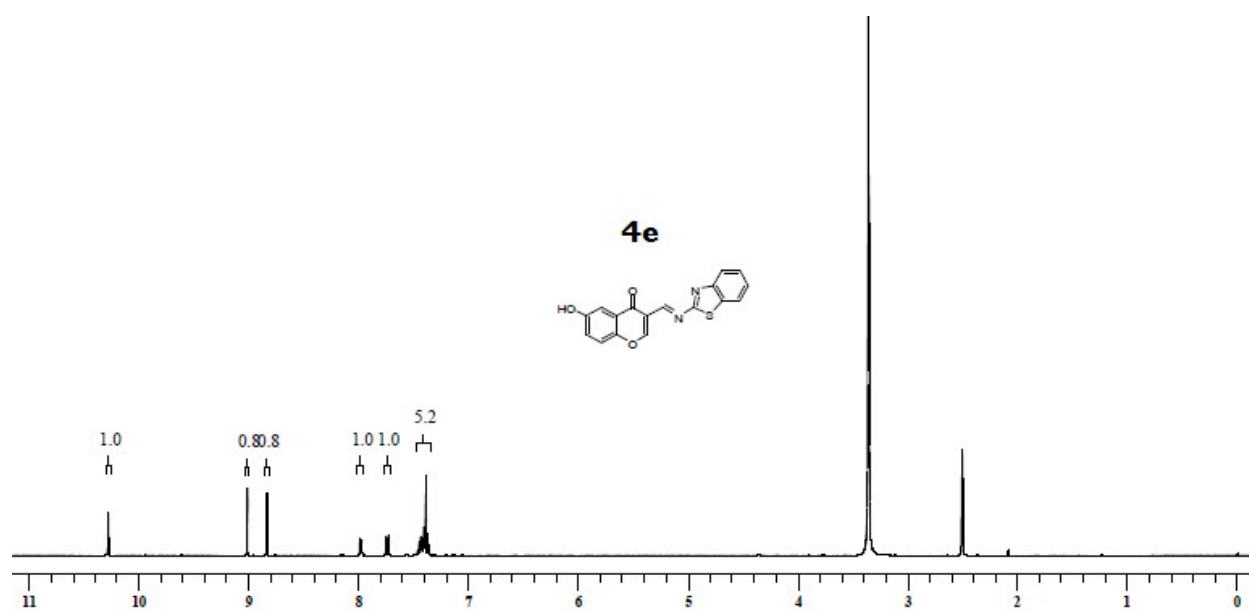
3-((benzo[d]thiazol-2-ylimino)methyl)-6-chloro-4H-chromen-4-one (**4c**):



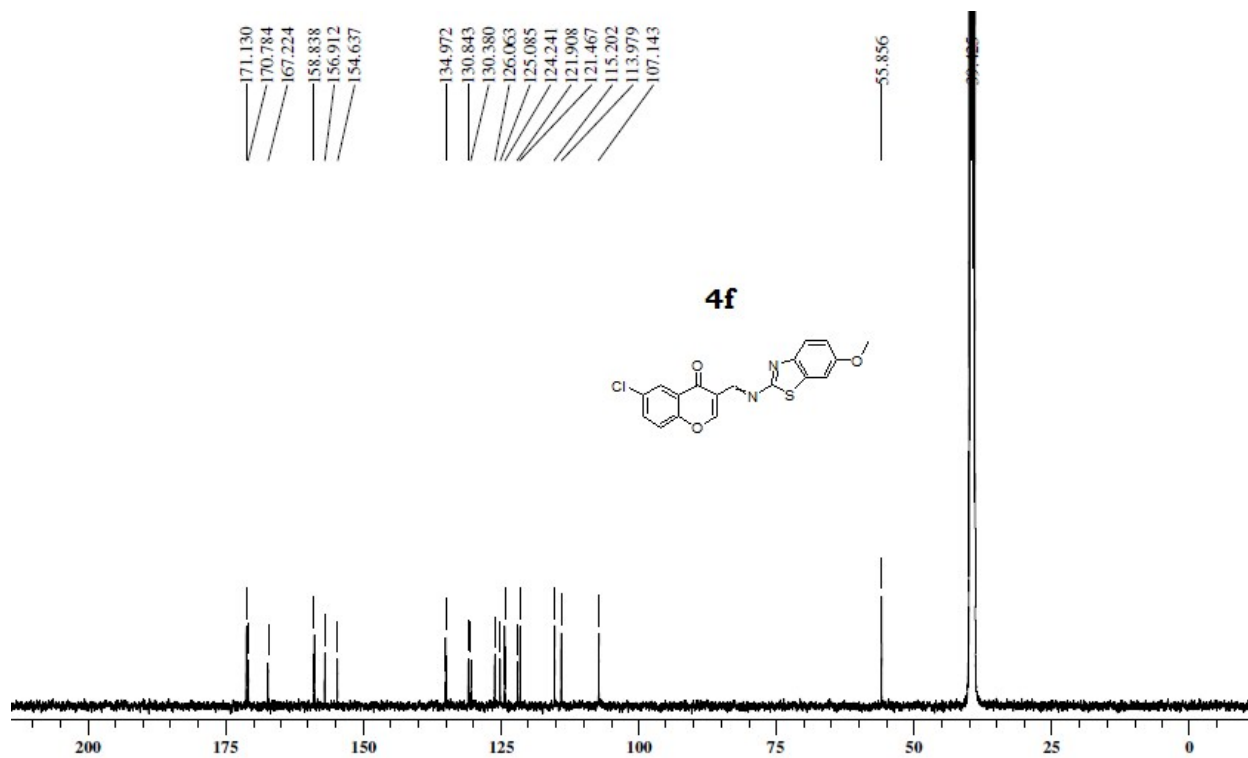
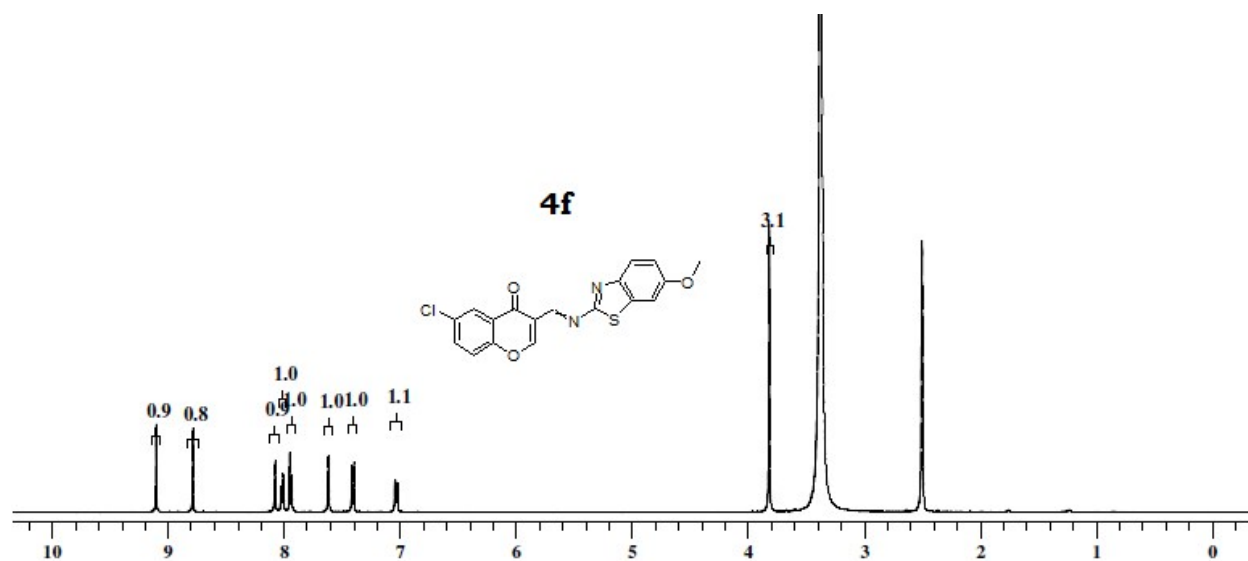
3-((benzo[d]thiazol-2-ylimino)methyl)-6-bromo-4H-chromen-4-one (**4d**):



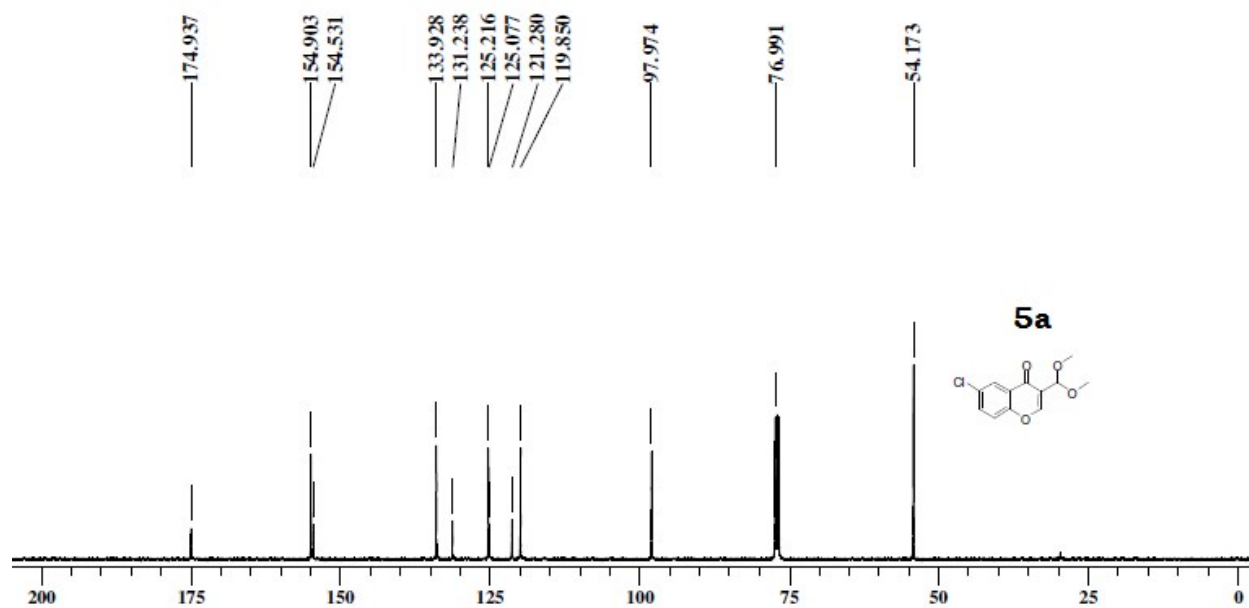
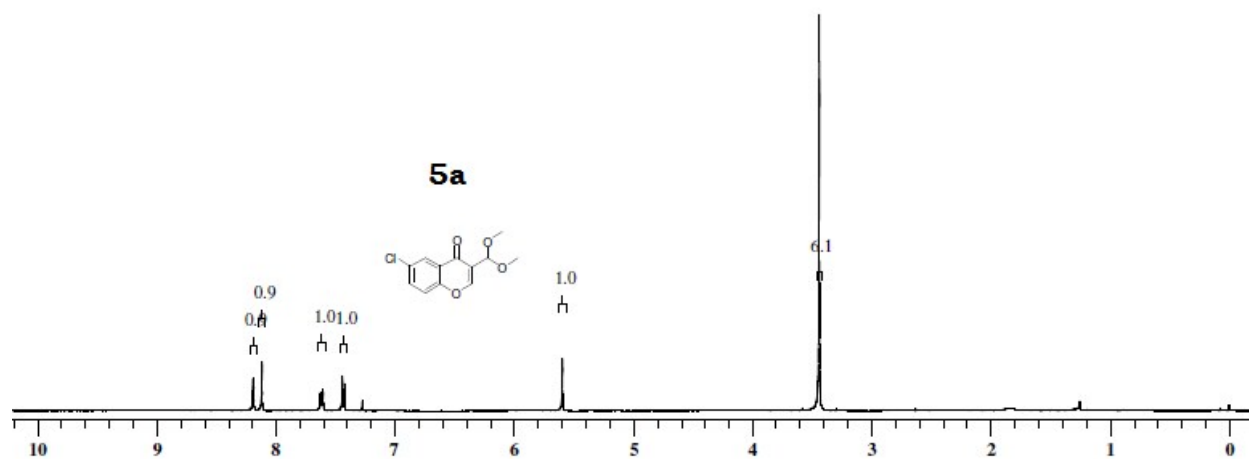
3-((benzo[d]thiazol-2-ylimino)methyl)-6-hydroxy-4H-chromen-4-one (**4e**):



6-chloro-3-((6-methoxybenzo[d]thiazol-2-ylimino)methyl)-4H-chromen-4-one (**4f**):



6-chloro-3-(dimethoxymethyl)-4H-chromen-4-one (**5a**):



3-(dipropoxymethyl)-4H-chromen-4-one (**5b**)

