Experimental procedures for

Syntheses of 4-Aryl Chromanes-A rearrangement Approach

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General procedure for Synthesis of (2a-2o)

Ether preparation with NaH/DMSO method-----given in main paper

4-(Naphthalen-1-yloxy)-chroman (2a)

Mp:70.8-73.8°C; IR (In KBr, Cm^{-1}) 3051.5, 2879.42, 1626.0, 1578.41, 1397, 1267.75; ^1H NMR (CDCl_3 , 400MHz) δ = 2.47 (m, 2H), 4.50 (m, 2H), 5.61 (t, 1H, J = 5.8 Hz), 7.0 (d, 1H, J = 4.1 Hz), 7.04 (d, 1H, J = 7.8 Hz), 7.12 (d, 1H, J = 7.35 Hz), 7.57 (m, 6H), 7.89 (d, 1H, J = 7.98 Hz), 8.31 (d, 1H, J = 8.21 Hz); ^{13}C NMR (CDCl_3 , 100MHz) δ = 27.57, 62.44, 69.24, 106.14, 117.15, 118.12, 120.62, 120.94, 121.27, 122.46, 125.41, 125.71, 126.60, 127.54, 130.10, 134.89, 153.14, 155.30; Mass for $\text{C}_{19}\text{H}_{16}\text{O}_2$: 277.0; Yield: 60%; Anal. Calcd for $\text{C}_{19}\text{H}_{16}\text{O}_2$: C, 82.58; H, 5.84; Found: C, 82.61; H, 5.80;

8-Methyl-4-(naphthalen-1-yloxy)-chroman (2b)

Light yellow color liquid; IR (neat, Cm^{-1}) 2925, 1627, 1578, 1477, 1263, 1093, 759; ^1H NMR (400 MHz, CDCl_3) δ = 2.38 (1H, m), 2.50 (4H, m), 4.48 (1H, m), 5.6 (1H, t, J = 3.81 Hz), 7.02 (1H, t, J = 7.44 Hz), 7.15 (1H, d, J = 7.50 Hz), 7.32 (1H, d, J = 7.18 Hz), 7.36 (1H, d, J = 7.61 Hz), 7.64 (4H, m), 7.96 (1H, d, J = 8.11 Hz), 7.42 (1H, d, J = 8.33 Hz); ^{13}C NMR (100 MHz, CDCl_3) δ = 15.08, 18.41, 61.72, 65.5, 112.35, 113.62, 114.91, 116.55, 119.77, 121.79, 122.15, 122.29, 122.93, 128.28, 129.40, 138.42, 139.78, 154.44, 155.33, 156.85; Mass for $\text{C}_{20}\text{H}_{18}\text{O}_2$: 291.0; Yield: 72%; Anal. Calcd for: $\text{C}_{20}\text{H}_{18}\text{O}_2$: C, 82.73; H, 6.25; Found: C, 82.69; H, 6.28;

7-Methyl-4-(naphthalen-1-yloxy)-chroman (2c)

Mp: 72-74.2 °C; IR (In KBr, Cm^{-1}) 3051.8, 2923.11, 1594.8, 1578.57, 1396.43, 1264.02, 1092.05, 1060.94, 771.84; ^1H NMR (CDCl_3 , 400MHz) δ = 2.29 (m, 1H), 2.34 (s, 3H), 2.71 (m, 1H), 4.94 (m, 1H), 4.44 (m, 1H), 5.64 (t, 1H, J = 4.04 Hz), 7.11 (d, 1H, J = 7.59 Hz), 7.14 (d, 1H, J = 8.4 Hz), 7.27 (t, 2H, J = 8.72 Hz), 7.59 (m, 4H), 7.91 (d, 1H, J = 8.0 Hz), 8.38 (d, 1H, J = 8.28 Hz); ^{13}C NMR (CDCl_3 , 100MHz) δ = 20.92, 22.87, 67.57, 73.95, 110.0, 123.6, 124.58, 125.49, 126.61, 126.96, 126.97, 127.0, 127.62, 129.76, 130.38, 131.64, 132.14, 133.68, 138.67,

155.24; Mass for C₂₀H₁₈O₂: 291.0; Yield: 58%; Anal. Calcd for: C₂₀H₁₈O₂: C, 82.73; H, 6.25; Found: C, 82.70; H, 6.29;

5-Methyl-4-(naphthalen-1-yloxy)-chroman (2d)

Mp:131.3-132.8; IR (In KBr, Cm⁻¹) 2876, 1586, 1474, 1396, 1258, 1069, 774; ¹H NMR (CDCl₃, 400MHz) δ = 2.28 (1H, m), 2.35 (3H, s), 2.50 (2H,m), 4.42 (2H, m), 5.69 (1H, t, *J* = 3.35 Hz), 6.97 (2H, m), 7.16 (1H, d, *J* = 8.0 Hz), 7.33 (1H, t, *J* = 8.42 Hz), 7.58 (4H, m), 7.91 (1H, d, *J* = 8.0 Hz), 8.35 (1H, d, *J* = 8.0 Hz); ¹³C NMR (100 MHz, CDCl₃) δ = 18.52, 27.43, 61.71, 66.18, 105.34, 115.12, 119.41, 120.69, 122.50, 122.51, 125.44, 125.91, 126.43, 126.72, 127.60, 129.82, 135.02, 140.15, 152.71, 155.73; Yield: 62%; Mass for C₂₀H₁₈O₂: 291.0; Anal. Calcd for: C₂₀H₁₈O₂: C, 82.73; H, 6.25; Found: C, 82.70; H, 6.28;

6-Ethyl-4-(naphthalen-1-yloxy)-chroman (2e)

Mp:78.1-80.0°C; IR (In KBr, Cm⁻¹) 3055.8, 2935.11, 1598.8, 1588.57, 1386.43, 1264.02, 1092.05, 1060.94, 771.84; ¹H NMR (CDCl₃, 400MHz) δ = 2.29 (m, 1H), 2.34 (s, 3H), 2.71 (m, 1H), 2.94 (m, 1H), 3.44 (m, 1H), 5.64 (t, 1H, *J* = 4.04 Hz), 7.11 (d, 1H, *J* = 7.59 Hz), 7.14 (d, 1H, *J* = 8.4 Hz), 7.27 (t, 2H, *J* = 8.72 Hz), 7.59 (m, 4H), 7.91 (d, 1H, *J* = 8.0 Hz), 8.38 (d, 1H, *J* = 8.28 Hz); ¹³C NMR (CDCl₃, 100MHz) δ = 20.92, 22.87, 25.50, 27.57, 72.95, 107.0, 121.0,

122.57, 125.49, 125.91, 126.66, 126.77, 126.85, 127.62, 129.76, 130.38, 131.64, 132.14, 133.98, 134.97, 153.24; Mass for $C_{21}H_{20}O_2$: 305.21; Yield: 55%; Anal. Calcd for: $C_{21}H_{20}O_2$: C, 82.86; H, 6.62; Found: C, 82.82; H, 6.66;

5, 8-Dimethyl-4-(naphthalen-1-yloxy)-chroman (2f)

Mp:123.9-125.5 °C; IR (In KBr, Cm^{-1}) 2922, 1579, 1395, 1265, 1069, 776; 1H NMR ($CDCl_3$, 400MHz) δ = 2.25 (7H, m), 2.44 (1H, m), 4.33 (2H, m), 5.62 (1H, t, J = 3.56 Hz), 6.75 (1H, d, J = 7.41 Hz), 7.10 (2H, t, J = 6.35 Hz), 7.51 (4H, m), 7.82 (1H, d, J = 8.10 Hz), 8.25 (1H, d, J = 8.36 Hz); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 18.52, 25.26, 27.43, 61.71, 66.18, 105.34, 115.12, 119.41, 120.69, 122.50, 122.51, 125.44, 125.91, 126.43, 126.72, 127.60, 129.82, 135.02, 140.15, 152.71, 155.73; Mass for $C_{21}H_{20}O_2$: 305.21; Yield: 65%; Anal. Calcd for: $C_{21}H_{20}O_2$: C, 82.86; H, 6.62; Found: C, 82.81; H, 6.68;

6-Fluoro-4-(naphthalen-1-yloxy)-chroman (2g)

Mp:101-102.3°C; IR (In KBr, Cm^{-1}) 3053.12, 2884.34, 1578.26, 1483.7, 1396.66, 1265.46, 1095.9, 772.21; 1H NMR ($CDCl_3$, 400MHz) δ = 2.31 (m, 2H), 4.39 (m, 2H), 5.55 (t, 1H, J = 3.6 Hz), 6.94 (d, 1H, J = 4.75 Hz), 7.0 (s, 1H), 7.03 (d, 1H, J = 3.07 Hz), 7.41 (m, 4H), 7.86 (d, 1H, J = 8.0 Hz), 8.26 (d, 1H, J = 8.25 Hz); ^{13}C NMR ($CDCl_3$, 100MHz) δ = 27.31, 62.50, 69.0,

106.6, 116.0, 116.25, 116.80, 117.0, 118.0, 121.03, 121.99, 122.06, 122.18, 125.40, 125.60, 126.54, 127.46, 134.78, 151.20, 152.80, 155.49, 157.86; Mass for C₁₉H₁₅FO₂: 295.0; Yield: 62%; Anal. Calcd for: C₁₉H₁₅FO₂: C, 77.54; H, 5.14; Found: C, 77.55; H, 5.18;

6-Chloro-4-(naphthalen-1-yloxy)-chroman (2h)

Mp:103.3-104.5°C; IR (In KBr, Cm⁻¹) 3055.12, 288.43, 1578.7, 1483.2, 139.66, 1265.46, 1095.46, 1095.9, 772.21; ¹H NMR (CDCl₃, 400MHz) δ = 1.47 (m, 2H); 4.42 (m, 2H), 5.52 (t, 1H, *J* = 5.86 Hz), 6.92 (d, 1H, *J* = 8.77 Hz), 7.04 (d, 1H, *J* = 7.46 Hz), 7.28 (d, 1H *J* = 8.5 Hz), 7.36 (s, 1H), 7.46 (t, 2H, *J* = 7.64 Hz), 7.53 (t, 2H, *J* = 7.86 Hz), 7.85 (d, 1H, *J* = 8.0 Hz), 8.24 (d, 1H, *J* = 8.25 Hz); ¹³C NMR (CDCl₃, 100MHz) δ = 27.13, 62.48, 68.017, 106.58, 118.47, 121.0, 122.16, 122.51, 125.18, 125.39, 125.57, 126.37, 126.53, 127.45, 129.95, 130.11, 134.77, 152.68, 153.76; Mass for C₁₉H₁₅ClO₂: 312.0; Yield: 71%; Anal. Calcd for: C₁₉H₁₅ClO₂: C, 73.43; H, 4.86; Found: C, 73.40; H, 4.90;

5-Chloro-4-(naphthalen-1-yloxy)-chroman (2i)

Red color liquid; IR (In neat, Cm⁻¹) 2927, 1675, 1577, 1398, 1207; ¹H NMR (400 MHz, CDCl₃) δ = 1.38 (2H, m), 4.40 (2H, m), 5.55 (1H, t, *J* = 3.85 Hz), 6.92 (1H, d, *J* = 8.77 Hz), 7.04 (1H, d, *J* = 7.46 Hz), 7.28 (1H, d, *J* = 8.52 Hz), 7.36 (1H, s), 7.46 (2H, t, *J* = 7.64 Hz), 7.53 (2H, t, *J* =

7.46 Hz), 7.85 (1H, d, $J = 8.0$ Hz), 8.24 (1H, d, $J = 8.25$ Hz); ^{13}C NMR (CDCl_3 , 100MHz) $\delta =$ 26.31, 61.85, 67.25, 105.28, 119.25, 121.23, 122.84, 122.91, 125.35, 125.41, 125.61, 126.22, 126.51, 127.54, 129.98, 130.22, 134.75, 152.36, 155.11; Mass for $\text{C}_{19}\text{H}_{15}\text{ClO}_2$: 312.0; Yield: 66%; Anal. Calcd for: $\text{C}_{19}\text{H}_{15}\text{ClO}_2$: C, 73.43; H, 4.86; Found: C, 73.45; H, 4.91;

7-Chloro-4-(naphthalen-1-yloxy)-chroman (2j)

Red color liquid; IR (In neat, Cm^{-1}) 2930, 1682, 1565, 1375, 1208, 775; ^1H NMR (400 MHz, CDCl_3) $\delta =$ 2.29 (1H, m), 2.42 (1H, m), 4.36 (1H, m), 4.40 (1H, m), 5.55 (1H, t, $J = 3.32$ Hz), 6.96 (1H, d, $J = 8.9$ Hz), 7.04 (1H, d, $J = 7.56$ Hz), 7.23 (1H, d, $J = 8.2$ Hz), 7.26 (2H, d, $J = 7.82$ Hz), 7.44 (2H, t, $J = 4.28$ Hz), 7.51 (2H, t, $J = 8.32$ Hz), 7.82 (1H, d, $J = 8.08$ Hz), 8.19 (1H, d, $J = 8.32$ Hz); ^{13}C NMR (CDCl_3 , 100MHz) $\delta =$ 25.33, 62.55, 66.38, 104.22, 118.33, 122.23, 123.25, 123.97, 125.42, 125.51, 125.68, 126.44, 126.51, 127.38, 129.98, 130.22, 134.75, 152.45, 155.55; Mass for $\text{C}_{19}\text{H}_{15}\text{ClO}_2$: 312.0; Yield: 55%; Anal. Calcd for: $\text{C}_{19}\text{H}_{15}\text{ClO}_2$: C, 73.43; H, 4.86; Found: C, 73.47; H, 4.91;

7,8-Dichloro-4-(naphthalen-1-yloxy)-chroman (2k)

Mp: 136.6-145.0 °C; IR (In KBr, cm^{-1}) 2893, 1578, 1465, 1267, 1238, 1035, 775; ^1H NMR (400 MHz, CDCl_3) δ = 2.30 (1H, m), 2.47 (1H, m), 4.50 (2H, m), 5.57 (1H, t, J = 3.45 Hz), 7.05 (2H, d, J = 5.61 Hz), 7.18 (1H, d, J = 8.47 Hz), 7.52 (4H, m), 7.83 (1H, d, J = 7.98 Hz), 8.17 (1H, d, J = 8.32 Hz); ^{13}C NMR (100 MHz, CDCl_3) δ = 23.31, 61.85, 67.32, 105.22, 119.55, 123.32, 124.88, 124.98, 125.44, 125.68, 126.66, 126.78, 127.11, 127.38, 130.12, 135.21, 153.11, 155.22; Mass for $\text{C}_{19}\text{H}_{14}\text{Cl}_2\text{O}_2$: 346.2; Yield: 50%; Anal. Calcd for: $\text{C}_{19}\text{H}_{14}\text{Cl}_2\text{O}_2$: C, 66.10; H, 4.09; Found: C, 66.06; H, 4.12;

6-tert-Butyl-4-(naphthalen-1-yloxy)-chroman (2l)

Yellow color liquid; IR (neat, cm^{-1}) 2953, 1598, 1588, 1386, 1264, 1092, 1060, 771; ^1H NMR (400 MHz, DMSO) δ = 1.16 (9H, m), 2.23 (2H, m), 4.27 (2H, m), 5.72 (1H, t, J = 3.06 Hz), 6.81 (1H, d, J = 8.51 Hz), 7.29- 7.24 (3H, m), 7.55-7.41 (4H, m), 7.87 (1H, d, J = 8.08 Hz), 8.04 (1H, d, J = 8.25 Hz); ^{13}C NMR (100 MHz, DMSO) δ = 35.35, 22.88, 27.57, 75.25, 108.2, 121.22, 122.65, 125.55, 125.88, 126.89, 126.91, 127.02, 127.55, 129.54, 130.22, 131.25, 132.45, 133.87, 134.65, 153.28; Mass for $\text{C}_{23}\text{H}_{24}\text{O}_2$: 333.0; Yield: 70%; Anal. Calcd for: $\text{C}_{23}\text{H}_{24}\text{O}_2$: C, 83.10; H, 7.28; Found: C, 83.14; H, 7.32;

4-(Naphthalen-1-yloxy)-thiochroman (2m)

Yellow color liquid. IR (Neat) 3053.2, 2924.55, 1577.18, 1396.18, 1235.54, 1091.85; ^1H NMR (CDCl_3 , 400MHz) δ = 2.31 (m, 1H); 2.68 (m, 1H), 2.94 (m, 1H), 3.40 (m, 1H), 5.61 (t, 1H, J = 5.7 Hz), 7.0 (d, 2H, J = 7.30 Hz), 7.23 (t, 2H, J = 6.64 Hz), 7.82 (d, 1H, J = 8.0 Hz), 7.50 (m, 5H), 8.25 (d, 1H, J = 8.26 Hz); ^{13}C NMR (CDCl_3 , 400MHz) δ = 22.49, 27.49, 73.0, 107.32, 121.17, 122.60, 124.40, 125.62, 126.0, 126.76, 126.8, 127.0, 127.73, 128.83, 131.0, 132.44, 134.11, 135.04, 153.29; Mass for $\text{C}_{19}\text{H}_{16}\text{OS}$: 293.0; Yield: 75%; Anal. Calcd for: $\text{C}_{19}\text{H}_{16}\text{OS}$: C, 78.05; H, 5.52; S, 10.97; Found: C, 78.00; H, 5.57; S, 11.02;

6-Methyl-4-(naphthalen-1-yloxy)-thiochroman (2n)

Mp: 66.2-68.0 °C; IR (In KBr, cm^{-1}) 3051.8, 2923.11, 1594.8, 1578.57, 1396.43, 1264.02, 1092.05, 1060.94, 771.84; ^1H NMR (CDCl_3 , 400MHz) δ = 2.29 (1H, m), 2.34 (3H, s), 2.71 (1H, m), 2.94 (1H, m), 3.44 (1H, m), 5.64 (1H, t, J = 4.04 Hz), 7.11 (1H, d, J = 7.59 Hz), 7.14 (1H, d, J = 8.4 Hz), 7.27 (2H, t, J = 8.72 Hz), 7.59 (4H, m), 7.91 (1H, d, J = 8.0 Hz), 8.38 (1H, d, J = 8.28 Hz), ppm; ^{13}C NMR (CDCl_3 , 100MHz) δ = 20.92, 22.87, 27.57, 72.95, 107.0, 121.0, 122.57, 125.49, 125.91, 126.66, 126.77, 126.85, 127.67, 129.76, 130.38, 131.64, 132.14, 133.98, 134.97, 153.24; Mass for $\text{C}_{20}\text{H}_{18}\text{OS}$: 307.0; Yield: 77%; Anal. Calcd for: $\text{C}_{20}\text{H}_{18}\text{OS}$: C, 78.39; H, 5.92; S, 10.46; Found: C, 78.43; H, 5.94; S, 10.50;

6, 8-Dimethyl-4-(naphthalen-1-yloxy)-thiochroman (2o)

Mp: 78.2-80.0 °C; IR (In KBr, cm^{-1}) 3052.8, 2925.11, 1584.8, 1588.57, 1496.43, 1264.02, 1092.05, 1070.94, 771.84; ^1H NMR (CDCl_3 , 400MHz) δ = 2.29 (1H, m), 2.35 (3H, s), 2.76 (1H, m), 3.0 (1H, m), 3.49 (1H, m), 5.6 (1H, t, J = 3.33 Hz), 7.09 (1H, s), 7.14 (1H, d, J = 7.52 Hz), 7.18 (1H, s), 7.54 (2H, t, J = 7.72 Hz), 7.60 (2H, t, J = 8.28 Hz), 7.92 (1H, d, J = 8.0 Hz), 8.40 (1H, d, J = 8.30 Hz); ^{13}C NMR (CDCl_3 , 100MHz) δ = 20.11, 20.87, 22.31, 27.17, 73.3, 106.98, 120.94, 122.64, 125.47, 125.59, 126.66, 127.63, 129.48, 129.90, 131.21, 132.0, 133.15, 134.66, 135.0, 153.26;

Mass for $\text{C}_{21}\text{H}_{20}\text{OS}$: 321.0; Yield: 68%; Anal. Calcd for: $\text{C}_{21}\text{H}_{20}\text{OS}$: C, 78.71; H, 6.29; S, 10.01; Found: C, 78.68; H, 6.27; S, 9.98;

General procedure for Synthesis of (2p-2z)

Ether preparations with KOH/DMSO Method

6-Chloro-4-m-tolyloxy-chroman (2p)

To a stirred solution of **3p** (30.0 g, 0.2 mol) and DMSO (200 mL) in RB flask, KOH (56 g, 1.0 mol) was added at RT. Temperature rose to 70-75 °C and 3-fluorotoluene (44.0 g, 0.4 mol) was added over a period of 15 min. The reaction temperature was raised to 110-115 °C and maintained for 4 h, after completion of the reaction (monitored by TLC), the reaction mass was cooled to RT and reaction mixture quenched into DM water (350 mL), and extracted with ethyl acetate (2X200 mL), the aq layer again extracted with ethyl acetate (200 mL), both the organic layers were combined and washed with brine solution (200 mL). The organic layer was dried over sodium sulphate and concentrated under reduced pressure to obtain crude product. Crude product was purified by silica gel chromatography to get pure **2p** (28.0 g, 45 %) colorless liquid; IR (neat, cm^{-1}) 2929, 1602, 1582, 1486, 1253, 1056, 772; ^1H NMR (400 MHz, DMSO) δ = 2.14 (2H, m), 2.27 (3H, s), 4.18 (1H, m), 4.27 (1H, t, J = 3.56 Hz), 5.46 (1H, s(br)), 6.80 (1H, d, J = 7.22 Hz), 6.88 (2H, d, J = 8.45 Hz), 6.90 (1H, s), 7.20 (1H, t, J = 7.82 Hz), 7.31 (1H, d, J = 8.4 Hz), 7.41 (1H, s); ^{13}C NMR (100 MHz, DMSO) δ = 22.62, 27.28, 62.25, 69.75, 113.68, 117.45, 118.84, 122.45, 123.70, 123.90, 127.04, 129.70, 130.03, 139.57, 153.57, 157.12; Mass for $\text{C}_{16}\text{H}_{15}\text{ClO}_2$ – 275.0; Yield: 75%; Anal. Calcd for: $\text{C}_{16}\text{H}_{15}\text{ClO}_2$: C, 69.95; H, 5.50; Found: C, 69.90; H, 5.49;

6-Fluoro-4-m-tolyloxy-chroman (2q)

Brown color liquid; IR (neat, cm^{-1}) 2931, 1583, 1435, 1261, 1209, 1060, 818; ^1H NMR (400 MHz, CDCl_3) δ = 2.23 (2H, m), 2.39 (3H, s), 4.32 (2H, m), 5.32 (1H, t, J = 3.29 Hz), 6.68 (4H, m), 7.0 (2H, d, J = 8.41 Hz), 7.27 (2H, d, J = 8.28 Hz); ^{13}C NMR (100 MHz, CDCl_3) δ = 22.66,

27.29, 62.20, 68.75, 113.11, 116.0, 117.31, 118.02, 121.99, 122.48, 123.43, 129.39, 139.82, 151.0, 155.40, 157.82; Mass for $C_{16}H_{15}FO_2$ -259.0; Yield: 62%; Anal. Calcd for: $C_{16}H_{15}FO_2$: C, 74.40; H, 5.85; Found: C, 74.42; H, 5.89;

7-Chloro-4-m-tolyloxy-chroman (2r)

Light yellow color liquid; IR (neat, Cm^{-1}) 2963, 1606, 1487, 1419, 1253, 1153, 1056, 861; 1H NMR (400 MHz, $CDCl_3$) δ = 2.20 (1H, m), 2.36 (4H, m), 5.30 (1H, t, J = 3.42 Hz), 6.91-6.81 (5H, m), 7.23-7.19 (2H, m); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 23.11, 27.29, 61.85, 68.88, 113.21, 116.20, 117.41, 118.78, 121.85, 122.55, 123.22, 128.32, 139.68, 150.2, 154.32, 156.21; Mass for $C_{16}H_{15}ClO_2$ - 275; Yield: 58%; Anal. Calcd for: $C_{16}H_{15}ClO_2$: C, 69.95; H, 5.50; Found: C, 69.90; H, 5.55;

4-m-Tolyloxy-thiochroman (2s)

Liquid; IR (neat, Cm^{-1}) 2923, 1584, 1487, 1253, 1152, 743; 1H NMR (400 MHz, $CDCl_3$) δ = 2.20 (1H, m), 2.40 (3H, s), 2.59 (1H, m), 2.29 (1H, m), 3.37 (1H, m), 5.40 (1H, q), 6.89 (3H, m), 7.12-7.08 (1H, m), 7.27 (3H, m), 7.35 (1H, m); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 21.64, 22.83, 27.33, 72.69, 113.51, 117.67, 122.46, 124.56, 126.87, 128.62, 129.46, 130.91, 132.27, 133.85,

139.83, 157.43; Mass for C₁₆H₁₆OS: 257.0; Yield: 68%; Anal. Calcd for C₁₆H₁₆OS: C, 74.96; H, 6.29; O, 6.24; S, 12.51; Found: C, 74.91; H, 6.24; S, 12.55;

6-Methyl-4-m-tolyloxy-thiochroman (2t)

IR (neat, CM⁻¹) 2935, 1588, 1496, 1352, 1222, 755; ¹H NMR (400 MHz, CDCl₃) δ = 2.18 (1H, m), 2.28 (3H, s), 2.36 (3H, s), 2.55 (1H, m), 2.85 (1H, m), 3.33 (1H, m), 5.34 (1H, t, *J* = 3.37 Hz), 6.86 (3H, m), 7.03 (1H, d, *J* = 8.06 Hz), 7.10 (1H, d, *J* = 8.03 Hz), 7.16 (1H, m), 7.23 (1H, t, *J* = 7.67 Hz); ¹³C NMR (100 MHz, CDCl₃) δ = 20.27, 21.51, 21.88, 27.32, 72.50, 113.27, 117.45, 122.26, 126.64, 127.26, 129.34, 129.50, 130.07, 131.40, 133.81, 139.70, 157.29; Mass for C₁₇H₁₈OS- 271.12; Yield: 76%; Anal. Calcd for C₁₇H₁₈OS: C, 75.51; H, 6.71; S, 11.86; Found: C, 74.55; H, 6.70; S, 11.90;

6-Chloro-4-p-tolyloxy-chroman (2w)

IR (neat, Cm⁻¹) 2893, 1578, 1465, 1267, 1238, 1035, 785; ¹H NMR (400 MHz, DMSO) δ = 2.10 (2H, m), 2.24 (3H, s), 4.10 (1H, dd, *J*₁ = 4.14 Hz, *J*₂ = 4.27 Hz), 4.27 (1H, m), 5.43 (1H, t, *J* = 3.68 Hz), 6.88 (1H, d, *J* = 8.76 Hz), 6.99, (2H, d, *J* = 8.37 Hz), 7.12 (2H, d, *J* = 8.35 Hz), 7.31 (1H, m), 7.77 (1H, m); ¹³C NMR (100 MHz, DMSO) δ = 22.27, 23.56, 23.95, 73.02, 112.32,

117.25, 122.35, 126.54, 128.45, 128.98, 129.26, 129.31, 130.21, 131.25, 133.25, 139.58, 156.66;

Mass for $C_{16}H_{15}ClO_2$ - 275.20; Yield: 63%; Anal. Calcd for $C_{16}H_{15}ClO_2$: C, 69.95; H, 5.50;

Found: C, 69.89; H, 5.55;

6-Fluoro-4-p-tolyloxy-chroman (2x)

IR (neat, Cm^{-1}) 2931, 1615, 1496, 1221, 1059, 772; 1H NMR (400 MHz, DMSO) δ = 2.31 (2H, m), 2.33 (3H, s), 4.30 (2H, m) 5.25 (1H, t, J = 3.76 Hz), 6.86 (1H, m), 7.02 (4H, m), 7.15 (2H, d, J = 8.28 Hz); ^{13}C NMR (100 MHz, DMSO) δ = 21.35, 22.46, 22.58, 72.30, 113.32, 117.45, 123.35, 126.54, 128.75, 128.97, 129.65, 129.96, 130.21, 131.85, 133.47, 139.97, 155.87; Mass for $C_{16}H_{15}FO_2$ - Wt.: 259.0; Yield: 59%; Anal. Calcd for $C_{16}H_{15}FO_2$; C, 74.40; H, 5.85; Found: C, 74.45; H, 5.80;

4-p-Tolyloxy-thiochroman (2y)

Liquid; IR (neat, Cm^{-1}) 2925, 1565, 1475, 1248, 1122, 775; 1H NMR (400 MHz, $CDCl_3$) δ = 2.20 (1H, m), 2.40 (3H, s), 2.59 (1H, m), 2.29 (1H, m), 3.37 (1H, m), 5.40 (1H, q), 6.89 (3H, m), 7.12-7.08 (1H, m), 7.27 (3H, m), 7.35 (1H, m); ^{13}C NMR (100 MHz, $CDCl_3$) δ = 21.64, 22.83, 27.33, 72.69, 113.51, 117.67, 122.46, 124.56, 126.87, 128.62, 129.46, 130.91, 132.27, 133.85,

139.83, 157.43; Mass for C₁₆H₁₆OS- 257.0; Yield: 61%; Anal. Calcd for C₁₆H₁₆OS: C, 74.96; H, 6.29; S, 12.51; Found: C, 75.0; H, 6.25; S, 12.55;

6-Methyl-4-p-tolyloxy-thiochroman (2z)

IR (neat, CM⁻¹) 2935, 1588, 1496, 1352, 1222, 755; ¹H NMR (400 MHz, CDCl₃) δ = 2.18 (1H, m), 2.28 (3H, s), 2.36 (3H, s), 2.55 (1H, m), 2.85 (1H, m), 3.33 (1H, m), 5.34 (1H, t, *J* = 3.37 Hz), 6.86 (3H, m), 7.03 (1H, d, *J* = 8.06 Hz), 7.10 (1H, d, *J* = 8.03 Hz), 7.16 (1H, m), 7.23 (1H, t, *J* = 7.67 Hz); ¹³C NMR (100 MHz, CDCl₃) δ = 21.27, 21.74, 21.88, 27.54, 73.50, 114.27, 118.25, 122.26, 126.64, 127.36, 129.34, 129.99, 130.22, 131.26, 133.17, 139.67, 157.33; Mass for C₁₇H₁₈OS- 271.39; Yield: 66%; Anal. Calcd for C₁₇H₁₈OS: C, 75.51; H, 6.71; S, 11.86; Found: C, 75.55; H, 6.68; S, 11.91;

Ether rearrangements with BF₃·OEt₂

General procedure given in mainpaper (5a-5z)

4-Nitro-benzenesulfonic acid 2-chroman-4-yl-naphthalen-1-yl ester (5a)

Mp:168.2-170.6 °C; IR (In KBr, Cm^{-1}) 3437, 1530, 1347, 1190, 1042, 779; ^1H NMR (DMSO, 400 MHz) δ = 2.12 (2H, t, J = 4Hz), 4.04 (1H, t, J = 8.4 Hz), 4.28 (1H, d, J = 10.8 Hz), 4.51 (1H, t, J = 7.6 Hz), 6.50 (1H, d, J = 4.0 Hz), 6.91 (1H, t, J = 6.0 Hz), 6.80 (1H, d, J = 7.60 Hz), 7.06 (2H, q), 7.55 (2H, s), 7.77 (1H, d, J = 7.4 Hz), 7.89 (1H, D, J = 8.4 Hz), 7.95 (1H, d, J = 7.6 Hz), 8.40 (2H, d, J = 8.4 Hz), 8.46 (2H, d, J = 8.4 Hz); ^{13}C NMR (DMSO, 100 MHz) δ = 30.36, 35.42, 65.11, 117.0, 120.45, 122.2, 124.5, 125.7, 126.98, 127.31, 127.37, 127.93, 128.38, 128.40, 128.65, 130.24, 130.26, 133.35, 135.57, 141.01, 143.33, 151.67, 155.33; Mass for $\text{C}_{25}\text{H}_{19}\text{NO}_6\text{S}$: 462.0; Yield: 32%; Anal. Calcd for $\text{C}_{25}\text{H}_{19}\text{NO}_6\text{S}$: C, 65.07; H, 4.15; N, 3.04; S, 6.95; Found: C, 64.99; H, 4.18; N, 3.11; S, 6.99;

4-Nitro-benzenesulfonic acid 4-chroman-4-yl-naphthalen-1-yl ester (6a)

Mp:182.2-187.5 °C; IR (In KBr, Cm^{-1}) 1532, 1379, 1188, 1024, 850; ^1H NMR (DMSO, 400 MHz) δ = 1.99 (1H, d, J = 5.56 Hz), 2.30 (1H, d, J = 5.6 Hz), 3.92 (1H, t, J = 8.4 Hz), 4.077 (1H, t, J = 5.6 Hz), 4.92 (1H, t, J = 7.6 Hz), 6.67 (2H, d, J = 8.4 Hz), 6.80 (2H, d, J = 7.2 Hz), 7.04 (2H, d, J = q), 7.52-7.42 (2H, m), 8.10 (2H, d, J = 8.8 Hz), 8.15 (2H, d, J = 7.6 Hz), 8.30 (2H, d, J = 7.6 Hz); ^{13}C NMR (DMSO, 100 MHz) δ = 29.41, 36.2, 68.21, 110.0, 113.51, 116.21, 116.82, 117.74, 119.93, 120.41, 124.76, 126.92, 12.36, 130.30, 132.21, 140.66, 141.90, 151.35, 155.56, 158.01, 158.73, 159.27; Mass for $\text{C}_{25}\text{H}_{19}\text{NO}_6\text{S}$: 462.0; Yield: 20%; Anal. Calcd for $\text{C}_{25}\text{H}_{19}\text{NO}_6\text{S}$: C, 65.07; H, 4.15; N, 3.04; S, 6.95; Found: C, 65.04; H, 4.20; N, 2.99; S, 6.98;

4-Nitro-benzenesulfonic acid 2-(8-methyl-chroman-4-yl)-naphthalen-1-yl ester (5b)

Mp: 142.4-144.0 °C; IR (In KBr, cm^{-1}) 2864, 1531, 1346, 1188, 1038, 779; ^1H NMR (DMSO, 400 MHz) δ = 2.21 (5H, s(br)), 4.05 (1H, d, J = 8.5 Hz), 4.3 (1H, d, J = 10.5 Hz), 4.5 (1H, t, J = 7.0 Hz), 6.3 (1H, d, J = 7.3 Hz), 6.5 (1H, t, J = 7.2 Hz), 6.9 (1H, d, J = 6.8 Hz), 7.1 (1H, d, J = 8.5 Hz), 7.5 (2H, t, J = 3.75 Hz), 7.8 (1H, d, J = 7.4 Hz), 7.86 (1H, d, J = 8.4 Hz), 7.9 (1H, d, J = 6.1 Hz), 8.39 (2H, d, J = 8.44 Hz), 8.4 (2H, d, J = 8.42 Hz); ^{13}C NMR (DMSO, 100 MHz) δ = 16.4, 30.3, 35.5, 65.2, 120.0, 122.2, 123.8, 125.5, 125.7, 127.0, 127.2, 127.3, 127.9, 128.3, 128.5, 129.3, 130.2, 133.7, 135.7, 141.0, 143.3, 15.6, 153.3; Mass for $\text{C}_{26}\text{H}_{21}\text{NO}_6\text{S}$: 476.0; Yield: 40%; Anal. Calcd for $\text{C}_{26}\text{H}_{21}\text{NO}_6\text{S}$: C, 65.67; H, 4.45; N, 2.95; S, 6.74; Found: C, 65.71; H, 4.49; N, 2.90; S, 6.70;

4-(8-Methyl-chroman-4-yl)-naphthalen-1-ol (6b)

Mp: 138.6-140.2 °C; IR (In KBr, cm^{-1}) 3529, 2919, 1593, 1475, 1203; ^1H NMR (DMSO, 400 MHz) δ = 2.119 (2H, m), 2.17 (3H, s), 4.04 (1H, m), 6.76 (1H, m), 4.85 (1H, t, J = 7.6 Hz), 6.66 (2H, d, J = 7.8 Hz), 6.76 (2H, t, J = 8.80 Hz), 6.89 (1H, d, J = 8.60 Hz), 7.52-7.40 (2H, m), 8.07 (1H, d, J = 6.82 Hz), 8.21 (1H, d, J = 7.62 Hz), 10.10 (1H, s, **OH**); ^{13}C NMR (DMSO, 100 MHz) δ = 16.5, 29.92, 36.30, 63.85, 108.52, 118.72, 119.91, 123.32, 123.62, 124.84, 125.11,

125.20, 125.51, 126.81, 127.84, 128.91, 132.20, 152.41, 153.61; Mass for C₂₀H₁₈O₂: 291.0;
Yield: 22%; Anal. Calcd for C₂₀H₁₈O₂: C, 87.46; H, 6.99; Found: C, 87.48; H, 6.97;

2-(7-Methyl-chroman-4-yl)-naphthalen-1-ol (5c)

Mp:128.7-130.5 °C; IR (In KBr, Cm⁻¹) 3432, 29197, 1575, 1505, 1223, 1055, 806; ¹H NMR (CDCl₃, 400 MHz) δ = 2.34 (5H, m), 4.27 (1H, d(br)), 4.36 (1H, q), 4.52 (1H, t, *J* = 7.4 Hz), 5.25 (1H, s, OH), 6.70 (1H, d, *J* = 7.76 Hz), 6.81 (1H, s), 6.88 (1H, d, *J* = 7.6 Hz), 7.22 (1H, d, *J* = 8.4), 7.46 (1H, d, *J* = 8.4 Hz), 7.51 (2H, q), 7.80 (1H, t, *J* = 5.1 Hz), 8.14 (1H, t, *J* = 4.62 Hz); ¹³C NMR (CDCl₃, 100 MHz) δ = 21.24, 29.8, 37.4, 65.3, 117.8, 119.9, 120.6, 121.1, 122.2, 123.9, 125.5, 126.0, 127.7, 128.3, 129.6, 133.6, 138.8, 148.6, 155.1; Mass for C₂₀H₁₈O₂: 291.0;
Yield: 28%; Anal. Calcd for C₂₀H₁₈O₂: C, 87.46; H, 6.99; Found: C, 87.51; H, 7.02;

4-(7-Methyl-chroman-4-yl)-naphthalen-1-ol (6c)

Mp:178.4-180.2 °C; IR(In KBr, Cm⁻¹) 3332, 2887, 1625, 1589, 1378, 1049; ¹H NMR (DMSO, 400 MHz) δ = 1.97 (1H s(br)), 2.21 (1H s(br)), 2.22 (3H, s, CH₃), 4.1 (2H, m), 4.79 (1H, s(br)), 6.7 (5H, m), 7.48 (2H, t, *J* = 7.4 Hz), 8.06 (1H, s), 8.21 (1H, d, *J* = 7.3 Hz), 10.0 (1H, s); ¹³C NMR (DMSO, 100 MHz) δ = 21.11, 29.9, 39.3, 63.3, 107.6, 117.0, 121.6, 122.3, 123.3, 123.6,

124.7, 125.5, 126.7, 127.7, 130.7, 132.0, 132.1, 137.2, 152.4, 155.3; Mass for C₂₀H₁₈O₂: 292.0;

Yield: 42%; Anal. Calcd for C₂₀H₁₈O₂: C, 87.46; H, 6.99; Found: C, 87.51; H, 6.96;

2-(5-Methyl-chroman-4-yl)-naphthalen-1-ol (5d)

Mp:133.4- 134.9 °C; IR (In KBr, Cm⁻¹) 3367, 2907, 1583, 1471, 1356, 1243, 1062, 767; ¹H

NMR (CDCl₃, 400 MHz) δ = 1.99 (3H, s, CH₃), 2.19 (1H, dd, J_1 = 2.4 Hz, J_2 = 2.4 Hz), 2.4 (1H, q), 4.12 (1H, q), 4.24 (1H, t, J = 2.4 Hz), 4.58 (1H, t, J = 3.5 Hz), 5.58 (1H, s), 6.82 (1H, d, J = 8.0 Hz), 6.91 (1H, d, J = 8.0 Hz), 7.0 (1H, d, J = 8.8 Hz), 7.21 (1H, t, J = 7.75 Hz), 7.39 (1H, d, J = 8.4 Hz), 7.52 (2H, q), 7.82 (1H, t, J = 7.4 Hz), 8.08 (1H, d, J = 8.0 Hz); ¹³C NMR (CDCl₃, 100 MHz) δ = 19.1, 29.8, 33.4, 62.4, 115.1, 120.46, 120.49, 121.1, 122.7124.10, 124.5, 125.6, 125.9, 127.6, 127.9, 128.2, 133.4, 138.7, 148.1, 155.5; Mass for C₂₀H₁₈O₂: 292.0; Yield: 26%; Anal. Calcd for: C₂₀H₁₈O₂: C, 82.73; H, 6.25; Found: C, 82.70; H, 6.21;

4-(5-Methyl-chroman-4-yl)-naphthalen-1-ol (6d)

Mp:227.5-228.9 °C; IR (In KBr, Cm⁻¹) 3486, 2887, 1580, 1472, 1381, 1254, 1353, 785; ¹H NMR(DMSO, 400 MHz) δ = 1.78 (3H, s), 1.86 (1H, d, J = 13.4 Hz), 2.31 (1H, m), 3.8 (1H, t, J = 12 Hz), 4.07 (1H q), 4.86 (1H, t, J = 8.0 Hz), 6.53 (1H, d, J = 8.0 Hz), 6.74 (3H, q), 7.07 (1H,

t, $J = 8.0$ Hz), 7.50 (1H, t, $J = 7.4$ Hz), 8.26 (2H, d, $J = 7.92$ Hz), 10.04 (1H, s, OH); ^{13}C NMR (DMSO, 100MHz) $\delta = 18.74, 29.18, 32.8, 61.3, 107.4, 114.6, 122.4, 123.0, 123.2, 123.5, 124.8, 125.6, 126.8, 127.0, 127.7, 131.0, 131.8, 138.2, 152.4, 155.5$; ; Mass for $\text{C}_{20}\text{H}_{18}\text{O}_2$: 291.0; Yield: 32%; Anal. Calcd for $\text{C}_{20}\text{H}_{18}\text{O}_2$: C, 82.73; H, 6.25; Found: C, 82.77; H, 6.21;

4-Nitro-benzenesulfonic acid 2-(6-ethyl-chroman-4-yl)-naphthalen-1-yl ester (5e)

Mp: 131.4-133.0 °C; IR (In KBr, cm^{-1}) 2944, 1532, 1381, 1188, 1028, 821; ^1H NMR (CDCl_3 400 MHz) $\delta = 1.31$ (3H, t, $J = 7.37$ Hz), 2.12 (1H, d, $J = 12.1$ Hz), 2.50 (3H, m), 3.99 (1H, m), 4.04 (1H, m), 4.72 (1H, t, $J = 8.20$ Hz), 6.97 (1H, s), 6.86 (1H, d, $J = 8.31$ Hz), 6.93 (1H, d, $J = 7.74$ Hz), 7.03 (1H, d, $J = 8.16$ Hz), 7.08 (1H, d, $J = 7.96$ Hz), 7.59 (2H, t, $J = 8.8$ Hz), 7.96 (1H, d, $J = 8.30$ Hz), 8.17 (3H, m), 8.36 (2H, d, $J = 8.0$ Hz); ^{13}C NMR (CDCl_3 100 MHz); 15.76, 27.86, 30.74, 35.58, 64.88, 116.6, 121.84, 123.56, 124.41, 126.48, 126.89, 126.92, 127.21, 127.47, 127.83, 127.86, 129.35, 129.55, 133.64, 135.85, 136.27, 142.24, 143.44, 150.98, 153.25; Mass for $\text{C}_{27}\text{H}_{23}\text{NO}_6\text{S}$: 490.0; Yield: 20%; Anal. Calcd for $\text{C}_{27}\text{H}_{23}\text{NO}_6\text{S}$: C, 66.24; H, 4.74; N, 2.86; S, 6.55; Found: C, 66.26; H, 4.78; N, 2.90; S, 6.50;

4-Nitro-benzenesulfonic acid 4-(6-ethyl-chroman-4-yl)-naphthalen-1-yl ester (6e)

Mp: 141.5-143.6 °C; IR (In KBr, cm^{-1}) 3097, 2866, 1603, 1534, 1380, 1187, 1039, 796; ^1H NMR (CDCl_3 , 400 MHz) δ = 1.08 (3H, t, J = 7.62 Hz), 2.18 (1H, dd, J_1 = 2.9 Hz, J_2 = 2.92 Hz), 2.34 (1H, m), 2.43 (2H, q), 4.14 (1H, q), 4.29 (1H, q), 4.92 (1H, t, J = 6.18 Hz), 6.51 (1H, s), 6.81 (1H, d, J = 8.32 Hz), 6.96 (1H, d, J = 1.2 Hz), 7.16 (1H, d, J = 8.6 Hz), 7.41 (1H, d, J = 7.67 Hz), 7.49 (1H, s), 7.73 (2H, t, J = 8.2 Hz), 8.26 (2H, d, J = 8.12 Hz), 8.43 (2H, d, J = 8.21 Hz); ^{13}C NMR (CDCl_3 , 100 MHz) δ = 16.76, 28.86, 32.63, 38.2, 69.52, 118.4, 122.6, 123.44, 125.61, 126.58, 126.75, 126.88, 127.8, 127.92, 128.0, 128.06, 129.35, 129.55, 132.54, 135.65, 136.27, 142.04, 143.21, 151.2, 153.48; Mass for $\text{C}_{27}\text{H}_{23}\text{NO}_6\text{S}$: 490.1; Yield: 50%; Anal. Calcd for $\text{C}_{27}\text{H}_{23}\text{NO}_6\text{S}$: C, 66.24; H, 4.74; N, 2.86; S, 6.55; Found: C, 66.29; H, 4.78; N, 2.80; S, 6.52;

4-Nitro-benzenesulfonic acid 2-(5, 8-dimethyl-chroman-4-yl)-naphthalen-1-yl ester (5f)

Mp: 196.9-200 °C; IR (In KBr, cm^{-1}) 2957, 1530, 1371, 1035; ^1H NMR (CDCl_3 , 400 MHz) δ = 1.65, (3H, s), 2.23 (5H, 3), 3.92 (1H, m), 4.18 (1H, m), 4.72 (1H, t, J = 8.7 Hz), 6.67 (1H, d, J = 7.43 Hz), 7.02 (2H, q), 7.44 (1H, t, J = 7.60 Hz), 7.50 (1H, t, J = 6.99 Hz), 7.67 (1H, d, J = 8.53 Hz), 7.72 (1H, d, J = 8.36 Hz), 7.83 (1H, d, J = 8.0 Hz), 8.36 (2H, d, J = 8.45 Hz), 8.50 (2H, d, J = 8.46 Hz); ^{13}C NMR (CDCl_3 , 100 MHz) δ = 16.11, 19.03, 29.26, 33.43, 61.74, 120.12, 121.69,

121.71, 123.63, 124.59, 126.39, 127.10, 127.29, 127.54, 127.87, 129.11, 129.25, 133.09, 133.54, 135.83, 142.78, 143.23, 150.95, 153.58; Mass for C₂₇H₂₃NO₆S: 491.0; Yield: 25%; Anal. Calcd for C₂₇H₂₃NO₆S: C, 66.24; H, 4.74; N, 2.86; S, 6.55; Found: C, 66.28; H, 4.69; N, 2.82; S, 6.58;

4-(5,8-Dimethyl-chroman-4-yl)-naphthalen-1-ol (6f)

Mp:192.8-196.5 °C; IR (In KBr, Cm⁻¹) 3429, 1585, 1380, 1245, 1045; ¹H NMR (CDCl₃, 400 MHz) δ = 1.86 (3H, m), 2.07 (1H, m), 2.27 (3H, s), 2.45 (1H, m), 4.0 (1H, m), 4.21 (1H, m), 4.86 (1H, t, *J* = 8.40 Hz), 5.27 (1H, s, **OH**), 6.68 (3H, d, *J* = 7.5 Hz), 7.03, (1H, d, *J* = 7.40 Hz), 7.58 (1H, t, *J* = 7.72 Hz), 7.66 (1H, t, *J* = 7.26 Hz), 8.25 (1H, d, *J* = 8.45 Hz), 8.32 (2H, d, *J* = 8.26 Hz); ¹³CNMR (CDCl₃, 100 MHz) δ = 16.20, 18.51, 28.79, 33.45, 61.52, 107.59, 121.46, 121.71, 122.67, 122.81, 123.20, 124.90, 126.69, 126.75, 128.59, 131.01, 132.85, 135.60, 150.20, 153.53; Mass for C₂₇H₂₃NO₆S: 492.0; Yield: 48%; Anal. Calcd for C₂₇H₂₃NO₆S: C, 82.86; H, 6.62; Found: C, 82.88; H, 6.58;

4-Nitro-benzenesulfonic acid 7-fluoro-1,2,3,4-tetrahydro-[1,2']binaphthalenyl-1'-yl ester (5g)

Mp:164.4-166.1 °C; IR (In KBr, Cm^{-1}) 3100, 1944, 1603, 1531, 1190, 1042, 780; ^1H NMR (CDCl_3 , 400 MHz) δ = 2.20 (1H, s(br)), 2.40 (1H, s(br)), 4.18 (1H, q), 4.36 (1H, q), 4.82 (1H, t, J = 7.6 Hz), 6.45 (1H, d, J = 8.8 Hz), 6.84 (2H, d, J = 6.0 Hz), 7.15 (1H, d, J = 8.60 Hz), 7.36 (1H, t, J = 7.64 Hz), 7.49 (1H, t, J = 7.20 Hz), 7.57 (1H, d, J = 8.42 Hz), 7.75 (1H, d, J = 8.56 Hz), 7.83 (1H, d, J = 8.12 Hz), 8.23 (2H, d, J = 8.70 Hz), 8.42 (2H, d, J = 8.71 Hz); ^{13}C NMR (Acetone, 100 MHz) δ = 30.28, 35.61, 64.8, 114.7, 115.7, 117.8, 122.0, 124.9, 125.48, 126.29, 126.72, 127.17, 127.32, 127.81, 128.11, 129.77, 133.79, 134.94, 141.51, 143.42, 151.63, 155.24, 157.59; Mass for $\text{C}_{25}\text{H}_{18}\text{FNO}_6\text{S}$: 480.0; Yield: 35%; Anal. Calcd for $\text{C}_{25}\text{H}_{18}\text{FNO}_6\text{S}$: C, 62.62; H, 3.78; N, 2.92; S, 6.69; Found: C, 62.66; H, 3.81; N, 2.89; S, 6.66;

4-Nitro-benzenesulfonic acid 4-(6-fluoro-chroman-4-yl)-naphthalen-1-yl ester (6g)

Mp:167.8- 171.0 °C; IR (In KBr, Cm^{-1}) ^1H NMR (Acetone, 400 MHz) δ = 2.02 (1H, s(br)), 2.11 (1H, m(br)), 4.18 (2H, m), 5.06 (1H, t, J = 5.04 Hz), 6.59 (1H, dd, J_1 = 2.21 Hz, J_2 = 2.27 Hz), 6.91 (3H, m), 7.20 (1H, d, J = 7.97 Hz), 7.59 (1H, d, J = 7.93 Hz), 7.61 (1H, d, J = 7.74 Hz), 8.02 (1H, d, J = 8.18 Hz), 8.26 (3H, d, J = 8.70 Hz), 8.46 (2H, d, J = 8.72 Hz); ^{13}C NMR

(Acetone, 100 MHz) δ = 31.08, 36.51, 69.2, 115.2, 115.65, 118.2, 122.65, 125.6, 125.7, 126.56, 126.92, 127.2, 127.4, 128.9, 129.2, 131.5, 133.25, 135.0, 143.24, 144.87, 152.45, 155.62, 158.7; Mass for C₂₅H₁₈FNO₆S: 481.0; Yield: 20%; Anal. Calcd for C₂₅H₁₈FNO₆S: C, 62.62; H, 3.78; N, 2.92; S, 6.69; Found: C, 62.63; H, 3.81; N, 2.88; S, 6.64;

2-(6-Chloro-chroman-4-yl)-naphthalen-1-ol (5h)

Mp:158.5-160.0 °C; IR (In KBr, Cm⁻¹) 3549, 2899, 1571, 1481, 1391, 1235, 1179, 825, 637; ¹H NMR (DMSO, 400 MHz) δ = 2.17 (2H, m), 4.26 (2H, m), 4.8 (1H, t, J = 7.0 Hz), 6.66 (1H, d, J = 1.7 Hz), 6.8 (1H, d, J = 8.8 Hz), 6.94 (1H, d, J = 8.4 Hz), 7.1 (1H, dd, J_1 = 2.1 Hz J_2 = 2.2 Hz), 7.3 (1H, d, J = 8.4 Hz), 7.5 (2H m), 7.8 (1H, d, J = 7.3 Hz), 8.2 (1H, d, J = 8.1 Hz), 9.4 (1H, s, **OH**); ¹³C NMR (DMSO, 100 MHz) δ = 29.1, 34.3, 65.1, 118.6, 120.0, 124.4, 123.9, 125.4, 125.43, 125.6, 126.0, 127.15, 127.5, 127.9, 127.99, 129.3, 133.4, 150.0, 54.2; Mass for C₁₉H₁₅ClO₂: 312.0; Yield: 23%; Anal. Calcd for C₁₉H₁₅ClO₂: C, 73.43; H, 4.86; Found: C, 73.40; H, 4.88;

4-Nitro-benzenesulfonic acid 4-(6-chloro-chroman-4-yl)-naphthalen-1-yl ester (6h)

Mp:150.0-152.0 °C; IR (In KBr, Cm^{-1}) 3073, 2885, 1533, 1369, 1186, 1039, 874, 595; ^1H NMR (400 MHz, DMSO) δ = 2.14 (2H, m), 4.0 (1H, m), 4.3 (1H, m), 4.5 (1H, q), 6.4 (1H, d, J = 1.8 Hz), 6.8 (1H, d, J = 8.7 Hz), 7.1 (2H, d, J = 8.6 Hz), 7.6 (2H, m), 7.7 (1H, d, J = 8.0 Hz), 7.9 (1H, d, J = 8.6 Hz), 7.91 (1H, d, J = 7.5 Hz), 8.4 (2H, d, J = 8.7 Hz), 8.4 (2H, d, J = 8.6); ^{13}C NMR (DMSO 100 MHz) δ = 29.8, 35.3, 65.2, 118.8, 122.2, 124.0, 125.5, 126.4, 126.6, 127.2, 127.3, 127.8, 128.2, 128.29, 128.7, 129.2, 130.1, 133.7, 134.7, 140.7, 143.1, 151.5, 154.1; Mass for $\text{C}_{25}\text{H}_{18}\text{ClNO}_6\text{S}$: 497.0; Yield: 48%; Anal. Calcd for $\text{C}_{25}\text{H}_{18}\text{ClNO}_6\text{S}$: C, 60.55; H, 3.66; N, 2.82; S, 6.47; Found: C, 60.58; H, 3.71; N, 2.78; S, 6.44;

2-(5-Chloro-chroman-4-yl)-naphthalen-1-ol (5i)

Mp:143.4-144.9 °C; IR (In KBr, Cm^{-1}) 3446, 2977, 1529, 1379, 1188; ^1H NMR (CDCl_3 , 400 MHz) δ = 2.02 (1H, m), 2.37 (1H, m), 4.13 (1H, m), 5.02 (1H, d, J = 4.68 Hz), 6.50 (1H, d, J = 7.8 Hz), 6.72 (1H, d, J = 7.84 Hz), 6.85 (1H, d, J = 8.2 Hz), 6.91 (1H, d, J = 7.72 Hz), 7.14 (1H, t, J = 4.72 Hz), 7.47 (1H, t, J = 7.5 Hz), 7.57 (1H, t, J = 7.44 Hz), 8.17 (1H, d, J = 8.44 Hz), 8.31 (1H, d, J = 8.2 Hz), 9.58 (1H, s, **OH**); ^{13}C NMR (CDCl_3 , 100 MHz) δ = 33.04, 38.44, 66.51, 111.8, 120.15, 125.89, 127.03, 127.29, 128.12, 129.06, 130.34, 131.27, 131.40, 132.97, 134.75, 136.20, 139.57, 157.0, 161.36; Mass for $\text{C}_{19}\text{H}_{15}\text{ClO}_2$: 312.0; Yield: 40%; Anal. Calcd for $\text{C}_{19}\text{H}_{15}\text{ClO}_2$: C, 73.43; H, 4.86; Found: C, 73.46; H, 4.82;

4-(5-Chloro-chroman-4-yl)-naphthalen-1-ol (6i)

Mp: 233.0-236.2 °C; IR (In KBr, cm^{-1}) 3560, 3375, 2878, 1571, 1448, 1380, 1264; ^1H NMR (CDCl_3 , 400 MHz) δ = 2.10 (1H, m), 2.41 (1H, m), 3.99 (1H, m), 4.17 (1H, m), 5.09 (1H, t, J = 8.50 Hz), 5.23 (s, 1H, **OH**), 6.60 (1H, d, J = 7.68 Hz), 6.66 (1H, d, J = 7.72 Hz), 6.90 (1H, d, J = 8.28 Hz), 6.98 (1H, d, J = 7.72 Hz), 7.18 (1H, t, J = 8.12 Hz), 7.58 (1H, t, J = 7.72 Hz), 7.66 (1H, t, J = 7.0 Hz), 8.24 (1H, d, J = 8.48 Hz), 8.31 (1H, d, J = 8.36 Hz); Mass for $\text{C}_{19}\text{H}_{15}\text{ClO}_2$: 312.0; Yield: 27%; Anal. Calcd for $\text{C}_{19}\text{H}_{15}\text{ClO}_2$: C, 73.43; H, 4.86; Found: C, 73.44; H, 4.82;

4-Nitro-benzenesulfonic acid 2-(7-chloro-chroman-4-yl)-naphthalen-1-yl ester (5j)

Mp: 149.8-151.2 °C; IR (In KBr, cm^{-1}) 2896, 1540, 1364, 1191, 767; ^1H NMR (CDCl_3 , 400 MHz) δ = 2.20 (1H, m), 2.36 (m, 1H), 4.17 (1H, m), 4.36 (1H, m), 4.78 (1H, q), 6.66 (1H, d, J = 8.28 Hz), 6.73 (1H, d, J = 6.7 Hz), 6.90 (1H, s), 7.12 (1H, d, J = 8.52 Hz), 7.35 (1H, m), 7.47 (1H, m), 7.55 (1H, d, J = 8.48 Hz), 7.74 (1H, d, J = 8.56 Hz), 7.83 (1H, d, J = 8.16 Hz), 8.24 (2H, d, J = 8.46 Hz), 8.44 (2H, d, J = 8.46 Hz); ^{13}C NMR (CDCl_3 , 100 MHz) δ = 30.31, 35.21, 65.31, 116.94, 120.73, 121.70, 122.75, 124.50, 126.49, 126.67, 127.04, 127.08, 127.88, 128.10, 129.60, 129.76, 131.20, 133.05, 133.68, 135.68, 135.21, 142.0, 143.41, 151.0, 155.89; Mass for $\text{C}_{25}\text{H}_{18}\text{ClNO}_6\text{S}$: 497.0; Yield: 23%; Anal. Calcd for C, 60.55; H, 3.66; N, 2.82; S, 6.47; Found: C, 60.51; H, 3.70; N, 2.84; S, 6.44;

4-Nitro-benzenesulfonic acid 4-(7-chloro-chroman-4-yl)-naphthalen-1-yl ester (6j)

Mp: 143.5-146.3 °C; IR (In KBr, cm^{-1}) 2933, 1606, 1530, 1350, 1192; ^1H NMR (CDCl_3 , 400 MHz) δ = 2.16 (1H, m), 2.45 (1H, m), 4.13 (1H, q), 4.21 (1H, m), 4.81 (1H, m), 6.82-6.76 (2H, m), 6.90 (1H, d, J = 7.28 Hz), 6.94 (1H, s), 7.08 (1H, d, J = 7.94 Hz), 7.60-7.52 (2H, m), 7.97 (1H, d, J = 8.31 Hz), 8.15 (3H, d, J = 8.64 Hz), 8.37 (2H, d, J = 8.64 Hz); ^{13}C NMR (CDCl_3 , 100 MHz) δ = 29.21, 33.11, 68.31, 118.64, 119.45, 122.70, 122.75, 124.50, 126.49, 126.67, 127.04, 127.08, 127.88, 128.10, 129.60, 129.76, 131.20, 133.05, 133.68, 135.68, 135.21, 142.0, 143.41, 151.0, 155.89; Mass for $\text{C}_{25}\text{H}_{18}\text{ClNO}_6\text{S}$: 497.0; Yield: 28%; Anal. Calcd for $\text{C}_{25}\text{H}_{18}\text{ClNO}_6\text{S}$: C, 60.55; H, 3.66; N, 2.82; S, 6.47; Found: C, 60.54; H, 3.70; N, 2.77; S, 6.44;

4-Nitro-benzenesulfonic acid 2-(7,8-dichloro-chroman-4-yl)-naphthalen-1-yl ester (5k)

Mp: 211.9-213.8 °C; IR (In KBr, cm^{-1}) 2897, 1536, 1413, 1365, 1192, 1039, 775, 643; ^1H NMR (Acetone, 400 MHz) δ = 2.24 (1H, m), 2.33 (1H, m), 4.40 (1H, m), 4.50 (1H, m), 4.75 (1H, m), 6.64 (1H, d, J = 8.45 Hz), 6.96 (1H, d, J = 8.50 Hz), 7.22 (1H, d, J = 8.60 Hz), 7.55 (1H, d, J =

7.89 Hz), 7.58 (1H, d, $J = 7.90$ Hz), 7.91 (2H, q), 7.98 (1H, d, $J = 7.95$ Hz), 8.46 (2H, d, $J = 7.9$ Hz), 8.58 (2H, d, $J = 8.74$ Hz); ^{13}C NMR (Acetone, 100 MHz) $\delta = 35.37, 59.50, 66.04, 119.84, 120.91, 122.10, 124.77, 126.27, 126.77, 127.19, 127.36, 127.78, 128.17, 128.85, 129.76, 131.03, 133.86, 134.42, 141.44, 143.47, 151.52, 152.44$; Mass for $\text{C}_{25}\text{H}_{18}\text{ClNO}_6\text{S}$: 531.0; Yield: 44%; Anal. Calcd for: $\text{C}_{25}\text{H}_{18}\text{ClNO}_6\text{S}$: C, 60.36; H, 3.57; N, 1.60; S, 3.66; Found: C, 60.33; H, 3.52; N, 1.55; S, 3.64;

4-(7,8-Dichloro-chroman-4-yl)-naphthalen-1-ol (6k)

Mp: 201.6-206.4 °C; IR (In KBr, cm^{-1}) 3522, 1590, 1414, 1043, 1030, 765; ^1H NMR (Acetone, 400 MHz) $\delta = 2.60$ (1H, m), 2.70 (1H, m), 4.21 (1H, m), 4.43 (1H, m), 6.75 (1H, d, $J = 6.98$ Hz), 6.87 (2H, q), 7.01 (1H, d, $J = 8.41$ Hz), 7.57 (2H, t, $J = 7.70$ Hz), 8.12 (1H, m), 8.35 (1H, d, $J = 8.36$ Hz), 9.08 (1H, s, **OH**); ^{13}C NMR (Acetone, 100 MHz) $\delta = 34.41, 64.30, 65.67, 107.12, 119.65, 120.10, 120.82, 122.97, 124.40, 124.74, 125.42, 126.45, 126.81, 127.52, 127.64, 129.40, 130.59, 131.20, 131.9, 152.46$; Mass for $\text{C}_{19}\text{H}_{14}\text{Cl}_2\text{O}_2$: 346.0; Yield: 23%; Anal. Calcd for $\text{C}_{19}\text{H}_{14}\text{Cl}_2\text{O}_2$: C, 66.10; H, 4.09; Found : C, 66.14; H, 4.04;

4-Nitro-benzenesulfonic acid 2-(6-tert-butyl-chroman-4-yl)-naphthalen-1-yl ester (5l)

Mp:152- 159.8 °C; IR (In KBr, Cm^{-1}) 2961, 1534, 1363, 1233, 1192, 1035, 782; ^1H NMR (DMSO, 400 MHz) δ = 1.0 (9H, s), 2.1 (2H, m), 4.0 (1H, m), 4.4 (1H, m), 4.5 (1H, t, J = 7.5 Hz), 6.5 (1H, d, J = 1.3 Hz), 6.7 (1H, d, J = 8.6 Hz), 7.1 (1H, d, J = 8.6 Hz), 7.22 (1H, d, J = 2.4 Hz), 7.5 (2H, m), 7.7 (1H, d, J = 6.5 Hz), 7.8 (1H, d, J = 8.6 Hz), 7.9 (1H, d, J = 7.2 Hz), 8.4 (2H, d, J = 8.7 Hz), 8.7 (2H, d, J = 8.7 Hz); ^{13}C NMR (DMSO, 100 MHz) δ = 30.5, 31.4, 33.8, 35.5, 64.7, 116.3, 122.1, 123.4, 125.1, 125.5, 126.7, 126.9, 127.1, 127.2, 127.7, 128.24, 128.26, 130.0, 133.5, 135.7, 141.0, 142.5, 143.2, 151.4, 153.0; Yield: 33%; Anal. Calcd for $\text{C}_{29}\text{H}_{27}\text{NO}_6\text{S}$: C, 67.29; H, 5.26; N, 2.71; S, 6.20; Found: C, 67.24; H, 5.20; N, 2.68; S, 6.24;

4-Nitro-benzenesulfonic acid 4-(6-tert-butyl-chroman-4-yl)-naphthalen-1-yl ester (6l)

Mp:132.0-133.3 °C; IR (In KBr, Cm^{-1}) 3105, 2961, 1533, 1381, 1237, 1189, 1028, 824, 742; ^1H NMR (DMSO, 400 MHz) δ = 1.08 (9H, s), 1.9 (1H, m), 2.3 (1H, m), 3.9 (1H, t, J = 9.4 Hz), 4.1 (1H, t, J = 5.5 Hz), 5.0 (1H, t, J = 7.86), 6.7 (1H, d, J = 3.1 Hz), 6.79 (1H, s), 6.8 (1H, d, J = 7.2 Hz), 7.09 (1H, d, J = 8.0 Hz), 7.15 (1H, dd, J_1 = 2.0 Hz, J_2 = 2.12 Hz), 7.67 (2H, q), 7.97 (1H, d, J = 8.0 Hz), 8.24 (2H, d, J = 8.22 Hz), 8.25 (1H, m), 8.42 (2H, d, J = 8.44 Hz); ^{13}C NMR (DMSO, 100 MHz) δ = 32.8, 33.54, 35.8, 37.5, 69.7, 118.7, 123.1, 124.8, 125.8, 125.9, 126.7, 126.9, 127.4, 127.6, 127.7, 128.34, 128.46, 130.0, 134.5, 135.9, 141.8, 142.7, 143.8, 151.7, 154.8; Yield: 22%; Anal. Calcd for $\text{C}_{29}\text{H}_{27}\text{NO}_6\text{S}$: C, 67.29; H, 5.26; N, 2.71; S, 6.20; Found: C, 67.30; H, 5.28; N, 2.74; S, 6.24;

4-Nitro-benzenesulfonic acid 2-thiochroman-4-yl-naphthalen-1-yl ester (5m)

Mp: 16.5-161.5 °C; IR (In KBr, cm^{-1}) 3435, 3108, 2925, 1607, 1536, 370, 1192, 1043, 885, 778, 740; ^1H NMR (DMSO, 400 MHz) δ = 2.18 (2H, q), 3.08 (2H, m), 4.33 (1H, s), 6.57 (1H, d, J = 8.0 Hz), 6.89 (1H, t, J = 5.8 Hz), 7.13 (3H, m), 7.5 (2H, s), 7.83 (1H, d, J = 4.8 Hz), 7.91 (1H, d, J = 8.8 Hz), 7.97 (1H, d, J = 4.4 Hz), 8.43 (2H, d, J = 8.4 Hz), 8.41 (2H, d, J = 8.4 Hz); ^{13}C NMR (DMSO, 100 MHz) δ = 25.1, 30.11, 38.7, 122.3, 124.6, 125.5, 126.8, 127.2, 127.3, 127.5, 128.0, 128.3, 128.5, 130.0, 130.4, 133.7, 135.2, 135.5, 141.0, 142.9, 151.4; Yield: 18%; Anal. Calcd for $\text{C}_{25}\text{H}_{19}\text{NO}_5\text{S}_2$: C, 62.88; H, 4.01; N, 2.93; S, 13.43; Found: C, 62.82; H, 3.96; N, 2.93; S, 13.40;

4-Thiochroman-4-yl-naphthalen-1-ol (6m)

Mp: 179-180.9 °C; IR (In KBr, cm^{-1}) 33196, 2928, 1939, 1822, 1586, 1473, 1381, 1271, 1050, 774, 576; ^1H NMR (CDCl_3 , 400 MHz) δ = 2.39 (1H, m), 2.51 (1H, s), 2.89 (2H, m), 4.96 (1H, t,

$J = 4.4$ Hz), 5.22 (1H, s), 6.69 (1H, d, $J = 7.6$ Hz), 6.75 (1H, d, $J = 7.6$ Hz), 6.93 (2H, m), 7.13 (1H, t, $J = 3.2$ Hz), 7.20 (1H, d, $J = 7.6$ Hz), 7.26 (1H, s), 7.58 (2H, m), 8.12 (1H, d, $J = 8.4$), 8.29 (1H, d, $J = 8.0$ Hz); ^{13}C NMR (DMSO, 100 MHz) $\delta = 23.5, 29.1, 39.3, 107.6, 123.3, 123.8, 124.4, 124.7, 125.5, 126.4, 126.8, 127.14, 128.0, 131.1, 131.6, 131.9, 133.7, 136.7, 15.4$; Yield: 40%; Anal. Calcd for $\text{C}_{19}\text{H}_{16}\text{OS}$: C, 78.05; H, 5.52; S, 10.97; Found: C, 78.02; H, 5.48; S, 11.0;

2-Thiochroman-4-yl-naphthalen-1-ol (5n)

Mp: 124.0-126.2 °C; IR (In KBr, Cm^{-1}) 3352.2, 2917, 1571, 1386, 1228, 806; ^1H NMR (DMSO, 400 MHz) $\delta = 2.05$ (3H, s), 2.21 (1H, m), 2.37 (1H, m), 2.96 (2H, m), 4.86 (1H, t, $J = 4.3$ Hz), 6.60 (1H, s), 6.89 (2H, t, $J = 9.0$ Hz), 7.06 (1H, d, $J = 8.0$ Hz), 7.29 (1H, d, $J = 8.4$ Hz), 7.42 (1H, t, $J = 7.0$ Hz), 7.4 (1H, t, $J = 8.0$ Hz), 7.39 (1H, d, $J = 8.0$ Hz), 8.36 (1H, d, $J = 8.0$), 9.48 (1H, s); ^{13}C NMR (DMSO, 100 MHz) $\delta = 20.8, 24.1, 29.3, 37.4, 119.6, 122.6, 125.3, 125.8, 125.9, 126.5, 127.9, 128.0, 128.04, 130.3, 131.7, 133.3, 133.4, 136.2, 149.3$; Yield: 22%; Anal. Calcd for $\text{C}_{20}\text{H}_{18}\text{OS}$: C, 78.39; H, 5.92; S, 10.46; Found: C, 78.42; H, 6.02; S, 10.40;

4-(6-Methyl-thiochroman-4-yl)-naphthalen-1-ol (6n)

Mp: 183.5-185.3 °C; IR (In KBr, Cm^{-1}) 334, 2923, 1585, 1379, 1266, 1052, 770; ^1H NMR (DMSO, 400 MHz); 2.04 (3H, s), 2.22 (2H, m), 2.7 (2H, m), 5.21 (1H, t, $J = 4.3$ Hz), 6.64 (1H,

s), 6.78 (1H, d, $J = 6.92$ Hz), 6.90 (1H, d, $J = 8.0$ Hz), 7.04 (1H, d, $J = 7.4$ Hz), 7.46 (1H, t, $J = 7.4$ Hz), 7.5 (1H, d, $J = 6.80$ Hz), 8.08 (1H, d, $J = 7.0$ Hz), 8.26 (1H, d, $J = 7.3$), 10.0 (1H, s); ^{13}C NMR (DMSO, 100 MHz) $\delta = 20.8, 24.1, 29.3, 37.4, 119.6, 122.6, 125.3, 125.8, 125.9, 126.5, 127.9, 128.0, 128.04, 130.3, 131.7, 133.3, 133.4, 136.2, 149.3$; ^{13}C NMR (DMSO 100 MHz); 20.7, 23.2, 29.2, 39.3, 107.6, 123.3, 123.7, 124.7, 125.5, 126.3, 126.8, 128.0, 128.1, 130.1, 131.3, 131.9, 132.1, 133.3, 136.4, 152.4; Yield: 30%; Yield: 38%; Anal. Calcd for $\text{C}_{20}\text{H}_{18}\text{OS}$: C, 78.39; H, 5.92; S, 10.46; Found: C, 78.41; H, 5.90; O, 5.26; S, 10.42;

4-Nitro-benzenesulfonic acid 2-(6,8-dimethyl-thiochroman-4-yl)-naphthalen-1-yl ester (5o)

Mp: 82.1-83.7 °C; IR (In KBr, cm^{-1}) 3324, 2984.1, 2647.9, 1639.4, 1511.1, 1286.9, 1175.5; ^1H NMR (CDCl_3 400 MHz) $\delta = 2.12$ (3H, s), 2.23 (2H, q), 2.27 (3H, s), 2.94 (2H, q), 4.44 (1H, t, $J = 2.8$ Hz), 6.45 (1H, s), 6.86 (1H, s), 7.16 (1H, d, $J = 8.5$ Hz), 7.53 (2H, m), 7.75 (1H, d, $J = 8.4$ Hz), 7.88 (2H, q), 8.15 (2H, d, $J = 8.4$ Hz), 8.31 (2H, d, $J = 8.4$ Hz); ^{13}C NMR (CDCl_3 100 MHz) $\delta = 20.0, 20.77, 25.2, 30.0, 39.3, 122.3, 124.3, 126.6, 127.2, 127.3, 127.7, 127.8, 127.9, 128.5, 129.4, 129.5, 129.8, 133.0, 133.7, 134.6, 135.2, 135.3, 142.1, 143.0, 150.7$; Yield: 20%; Anal. Calcd for $\text{C}_{27}\text{H}_{23}\text{NO}_5\text{S}_2$: C, 64.14; H, 4.59; N, 2.77; S, 12.68; Found: C, 64.18; H, 4.55; N, 2.30; S, 12.64;

4-Nitro-benzenesulfonic acid 4-(6, 8-dimethyl-thiochroman-4-yl)-naphthalen-1-yl ester (6o)

Mp:200-202.3 °C; IR(In KBr, Cm^{-1}) 343.6, 2924.2, 2854.2, 1606.7, 1533.0, 1348.6, 1190.3, 1043.8, 886.4, 782.4; ^1H NMR (CDCl_3 400 MHz) δ = 2.15 (3H, s), 2.30 (3H, s), 2.46 (1H, m), 2.5 (1H, q), 2.74 (1H, m), 2.84 (1H, m), 4.99 (1H, s), 6.59 (1H, s), 6.83 (1H, d, J = 8.0 Hz), 6.90 (1H, s), 7.0 (1H, d, J = 8.0 Hz), 7.5 (1H, t, J = 8.0 Hz), 7.6 (1H, t, J = 7.4 Hz), 7.95 (1H, d, J = 8.4 Hz), 8.1 (1H, d, J = 8.4 Hz), 8.18 (2H, d, J = 8.4 Hz), 8.29 (1H, s), 8.3 (2H, d, J = 8.4 Hz); ^{13}C NMR (CDCl_3 100 MHz) δ = 20.0, 20.6, 23.19, 28.3, 40.24, 117.5, 122.2, 123.6, 124.4, 126.7, 127.26, 127.8, 127.38, 129.70, 129.73, 129.77, 129.8, 129.9, 131.9, 133.0, 134.3, 134.5, 140.8, 141.5, 144.2, 150.9; C, 57.46; H, 3.94; N, 3.05; S, 6.97; Yield: 50%; Anal. Calcd for $\text{C}_{27}\text{H}_{23}\text{NO}_5\text{S}_2$: C, 64.14; H, 4.59; N, 2.77; S, 12.68; Found: C, 64.16; H, 4.55; N, 2.81; S, 12.66;

4-Nitro-benzenesulfonic acid 2-chroman-4-yl-5-methyl-phenyl ester (5p)

Mp: 170.6-171.9 °C; IR(In KBr, cm^{-1}) 2925, 1530, 1488, 1346, 1190, 1941, 778; ^1H NMR (CDCl_3 , 400 MHz) δ = 2.0 (1H, m), 2.30 (1H, m), 2.32 (3H, s), 4.13 (2H, m), 6.45 (1H, d, J = 7.55 Hz), 6.72 (1H, d, J = 7.41 Hz), 6.85 (2H, m), 6.94 (1H, s), 7.02 (1H, d, J = 7.84 Hz), 7.11 (1H, t, J = 7.41 Hz), 8.15 (2H, d, J = 8.55 Hz), 8.42 (2H, d, J = 8.55 Hz); ^{13}C NMR (CDCl_3 100 MHz) δ = 20.98, 30.24, 34.47, 64.09, 116.91, 120.42, 122.18, 122.70, 126.57, 124.58, 128.0, 128.63, 130.02, 130.81, 135.21, 138.41, 141.69, 147.34, 151.08, 155.32; Yield: 32%; Anal. Calcd for $\text{C}_{22}\text{H}_{19}\text{NO}_6\text{S}$: C, 62.11; H, 4.50; N, 3.29; S, 7.54; Found: C, 62.15; H, 4.48; N, 3.33; S, 7.58;

4-Nitro-benzenesulfonic acid 4-chroman-4-yl-3-methyl-phenyl ester (6p)

Mp: 94.2-98.6 °C; IR(In KBr, cm^{-1}) 2921, 1583, 1534, 1489, 1348, 1187; ^1H NMR (CDCl_3 400 MHz) δ = 1.14 (1H, m), 1.97 (1H, m), 2.32 (3H, s), 4.13 (2H, m), 4.28 (1H, t, J = 7.41 Hz), 6.32 (1H, d, J = 8.60 Hz), 6.56 (3H, m), 6.75 (3H, m), 8.13 (2H, d, J = 8.58 Hz), 8.39 (2H, d, J = 8.56 Hz); ^{13}C NMR (CDCl_3 100 MHz) δ = 19.28, 25.24, 30.25, 64.09, 114.12, 118.20, 120.26, 122.70, 124.44, 124.65, 128.20, 128.63, 130.02, 130.81, 135.21, 138.41, 141.69, 147.34, 151.08, 155.32; Yield: 20%; Anal. Calcd for $\text{C}_{22}\text{H}_{19}\text{NO}_6\text{S}$: C, 62.11; H, 4.50; N, 3.29; S, 7.54; Found: C, 62.12; H, 4.54; N, 3.31; S, 7.50;

4-Nitro-benzenesulfonic acid 2-(6-chloro-chroman-4-yl)-5-methyl-phenyl ester (5q)

Mp: 87.5-89.5 °C; IR (In KBr, cm^{-1}) 3107, 2876, 1731, 1534, 1188, 1074, 743; ^1H NMR (CDCl_3 400 MHz) δ = 1.86 (1H, m), 1.98 (1H, m), 2.2 (3H, s), 4.12 (2H, m), 4.9 (1H, t, J = 6.9 Hz), 6.0 (1H, d, J = 2.0 Hz), 6.8 (2H, t, J = 8.1 Hz), 7.0 (3H, m), 8.2 (2H, d, J = 8.7), 8.45 (2H, d, J = 8.7 Hz); ^{13}C NMR (DMSO 100 MHz) δ = 20.7, 29.6, 33.9, 64.3, 118.7, 122.5, 123.8, 125.4, 126.2, 128.0, 128.7, 129.2, 130.3, 130.5, 134.1, 138.8, 140.1, 147.1, 151.3, 154.1; Mass for $\text{C}_{22}\text{H}_{18}\text{ClNO}_6\text{S}$: 461.0; Yield: 22%; Anal. Calcd for $\text{C}_{22}\text{H}_{18}\text{ClNO}_6\text{S}$: C, 57.46; H, 3.94; N, 3.05; S, 6.97; Found: C, 57.49; H, 3.98; N, 3.0; S, 6.92;

4-Nitro-benzenesulfonic acid 4-(6-chloro-chroman-4-yl)-3-methyl-phenyl ester (6q)

Mp: 145.7-147.0 °C; IR (In KBr, cm^{-1}) 3434.7, 1533.2, 1484, 1350, 1191, 951, 807, 742, 604; ^1H NMR (DMSO 400 MHz) δ = 1.86 (1H, m), 2.13 (1H, m), 2.3 (3H, s), 4.03 (1H, m), 4.1 (1H, m), 5.0 (1H, t, J = 6.0 Hz), 6.6 (1H, d, J = 2.2 Hz), 6.7 (1H, d, J = 1.9 Hz), 6.8 (1H, dd, J_1 = 2.16 Hz, J_2 = 8.7 Hz), 7.04 (1H, d, J = 1.9 Hz), 7.12 (1H, d, J = 2.4 Hz), 7.14 (1H, d, J = 8.7 Hz), 8.1 (2H, d, J = 8.7 Hz), 8.4 (2H, d, J = 8.7 Hz); ^{13}C NMR (DMSO 100 MHz) δ = 19.2, 28.5, 36.1, 63.7, 118.7, 119.5, 123.8, 124.0, 125.3, 126.8, 127.9, 129.5, 130.2, 30.4, 138.9, 140.1, 143.0,

147.2, 151.3, 154.1; Yield: 22%; Anal. Calcd for $C_{29}H_{24}ClNO_5S$: C, 65.22; H, 4.53; N, 2.62; S, 6.00; Found: C, 65.20; H, 4.50; N, 2.58; S, 6.05;

4-Nitro-benzenesulfonic acid 2-(7-chloro-chroman-4-yl)-5-methyl-phenyl ester (5s)

Mp:135.2-138.6 °C; IR (In KBr, Cm^{-1}) 3109, 1608, 1532, 1389, 1197, 851, 608; 1H NMR (DMSO 400 MHz) δ = 1.99 (1H, dd, J_1 = 3.58 Hz, J_2 = 4.0 Hz), 2.10 (1H, dd, J_1 = 2.65 Hz, J_2 = 2.54 Hz), 2.23 (3H, s), 4.18 (2H, m), 4.43 (1H, t, J = 7.0 Hz), 6.12 (1H, dd, J_1 = 2.46 Hz, J_2 = 2.33 Hz), 6.76 – 6.85 (3H, m), 7.0 – 7.15 (2H, m), 8.32 (2H, d, J = 8.7 Hz), 8.54 (2H, d, J = 8.7 Hz); ^{13}C NMR (DMSO 100 MHz) δ = 19.87, 29.76, 34.46, 64.09, 114.57, 115.27, 117.79, 124.82, 125.28, 128.78, 130.05, 130.70, 137.38, 137.87, 140.85, 145.46, 151.57, 155.09, 157.44; Mass for $C_{22}H_{18}ClNO_6S$: 460.0; Yield: 30%; Anal. Calcd for $C_{22}H_{18}ClNO_6S$: C, 57.46; H, 3.94; N, 3.05; S, 6.97; Found: C, 57.50; H, 3.97; N, 3.10; S, 6.92;

4-Nitro-benzenesulfonic acid 4-(7-chloro-chroman-4-yl)-3-methyl-phenyl ester (6s)

Mp:147.9-149.2 °C; IR (In KBr, Cm^{-1}) 2944, 1530, 1386, 1192; ^1H NMR (CDCl_3 400 MHz) δ = 1.95 (1H, m), 2.24 (1H, m), 2.37 (3H, s), 4.16 (2H, m), 4.31 (1H, t, J = 6.16), 6.67-6.61 (2H, m), 6.67 (2H, m), 6.86 (1H, d, J = 1.79 Hz), 6.94 (1H, d, J = 1.94 Hz), 8.08 (2H, d, J = 8.72 Hz), 8.39 (2H, d, J = 8.71 Hz); ^{13}C NMR (CDCl_3 100 MHz) δ = 19.40, 29.05, 36.38, 63.62, 116.98, 119.0, 120.75, 122.45, 123.78, 124.24, 129.69, 130.34, 130.99, 132.93, 138.04, 141.72, 147.30, 150.86, 155.80; Mass for $\text{C}_{22}\text{H}_{18}\text{ClNO}_6\text{S}$: 461.0; Yield: 22%; Anal. Calcd for $\text{C}_{22}\text{H}_{18}\text{ClNO}_6\text{S}$: C, 57.46; H, 3.94; N, 3.05; S, 6.97; Found: C, 57.42; H, 3.90; N, 3.10; S, 7.0;

4-Nitro-benzenesulfonic acid 5-methyl-2-(6-methyl-thiochroman-4-yl)-phenyl ester (5t)

Mp:123.3-124.5 °C; IR (In KBr, Cm^{-1}) 2854, 1531, 1384, 1188, 1078, 810; ^1H NMR (DMSO 400 MHz) δ = 2.08 (5H, m), 2.26 (3H, s), 2.8 (1H, m), 3.1 (1H, m), 4.0 (1H, s), 6.0 (1H, s), 6.9 (1H, d, J = 7.7 Hz), 6.8 (1H, d, J = 7.6 Hz), 6.9 (1H, d, J = 8.0 Hz), 7.1 (2H, m), 8.2 (2H, d, J = 8.4 Hz), 8.4 (2H, d, J = 8.4 Hz); ^{13}C NMR (DMSO 100 MHz) δ = 20.5, 20.7, 23.3, 29.2, 37.2, 122.2, 125.4, 126.4, 128.2, 128.8, 130.0, 130.3, 130.7, 130.8, 133.2, 134.3, 34.6, 138.5, 140.3, 146.5, 151.3; Yield: 23%; Anal. Calcd for $\text{C}_{23}\text{H}_{21}\text{NO}_5\text{S}_2$: C, 60.64; H, 4.65; N, 3.07; S, 14.08; Found: C, 60.70; H, 4.68; N, 3.10; S, 14.04;

4-Nitro-benzenesulfonic acid 2-(6,8-dimethyl-thiochroman-4-yl)-5-methyl-phenyl ester (5u)

Mp: 127-129.3 °C; IR (In KBr, cm^{-1}); 3436.0, 2925.9, 1940.4, 1536.9, 1380.9, 1190.3, 1077.0, 939.3, 813.5, 742.0, 610.3; ^1H NMR (CDCl_3 400 MHz); 2.07 (1H, s), 2.15 (2H, m), 2.23 (3H, s), 2.31 (3H, s), 2.8 (2H, m), 4.18 (1H, t, $J = 5.2$ Hz), 6.09 (1H, s), 6.79 (2H, t, $J = 8.0$ Hz), 7.03 (2H, t, $J = 8.0$ Hz), 8.12 (2H, d, $J = 8.0$ Hz), 8.38 (2H, d, $J = 8.0$ Hz); ^{13}C NMR (CDCl_3 100 MHz); 20.0, 20.5, 21.0, 23.8, 28.8, 38.1, 124.3, 124.4, 128.41, 128.42, 129.4, 129.6, 126.69, 129.9, 131.3, 132.8, 134.45, 134.55, 138.2, 141.6, 146.6, 150.8; Yield: 19%; Anal. Calcd for $\text{C}_{24}\text{H}_{23}\text{NO}_5\text{S}_2$: C, 61.39; H, 4.94; N, 2.98; S, 13.66; Found: C, 61.35; H, 5.0; N, 3.02; S, 13.60;

4-Nitro-benzenesulfonic acid 4-(6,8-dimethyl-thiochroman-4-yl)-3-methyl-phenyl ester (6u)

Mp: 136.5-139.5 °C; IR (In KBr, cm^{-1}) 3435.7, 3094.9, 2912.7, 1531.4, 386.14, 1192.6, 1140.9, 944.5, 838.4; ^1H NMR (CDCl_3 400 MHz) δ = 2.144 (3H, s), 2.22 (2H, m), 2.25 (3H, s), 2.39 (3H, s), 2.72 (2H, m), 4.36 (1H, t, $J = 4.6$ Hz), 6.43 (1H, s), 6.63 (1H, d, $J_1 = 4.0$ Hz), 6.75 (1H, d, $J = 8.4$ Hz), 6.84 (1H, s), 6.94 (1H, d, $J = 2.0$ Hz), 8.07 (2H, d, $J = 8.66$ Hz), 8.38 (2H, d, $J = 8.23$ Hz); ^{13}C NMR (CDCl_3 100 MHz) δ = 19.0, 19.5, 20.0, 20.6, 23.4, 28.0, 40.4, 118.9, 123.7,

124.3, 129.1, 129.5, 129.8, 131.0, 132.8, 134.3, 134.8, 137.5, 141.3, 147.2, 150.9; Yield: 55%;
 Anal. Calcd for $C_{23}H_{21}NO_5S_2$: C, 60.64; H, 4.65; N, 3.07; S, 14.08; Found: C, 60.69; H, 4.68;
 N, 3.04; S, 14.02;

4-Nitro-benzenesulfonic acid 2-chroman-4-yl-4-methyl-phenyl ester (5v)

Mp:150.1-153.4 °C; IR (In KBr, Cm^{-1}) 2862, 1581, 1525, 1390, 1196, 843, 742; 1H NMR (DMSO 400 MHz) δ = 1.96 (2H, m), 2.15 (3H, s), 4.13 (2Hm), 4.26 (1H, t, J = 7.22 Hz), 6.30 (1H, d, J = 7.53 Hz), 6.67 (1H, t, J = 7.37 Hz), 6.74 (1H, d, J = 7.46 Hz), 6.76 (1H, s), 7.09 (3H, m), 8.25 (2H, d, J = 8.46 Hz), 8.45 (2H, d, J = 8.45 Hz); Mass for $C_{22}H_{19}NO_6S$: 426.0; Yield: 50%; Anal. Calcd for $C_{22}H_{19}NO_6S$: C, 62.11; H, 4.50; N, 3.29; S, 7.54; Found: C, 62.09; H, 4.55; N, 3.33; S, 7.58;

4-Nitro-benzenesulfonic acid 2-(6-chloro-chroman-4-yl)-4-methyl-phenyl ester (5w)

Mp:148-150.2 °C; IR (In KBr, Cm^{-1}) 2936, 1558, 1503, 1389, 1197, 855; 1H NMR (DMSO 400 MHz) δ = 1.99 (1H, dd, J_1 = 3.58 Hz, J_2 = 4.0 Hz), 2.10 (1H, dd, J_1 = 2.65 Hz, J_2 = 2.54 Hz), 2.23 (3H, s), 4.18 (2H, m), 4.43 (1H, t, J = 7.0 Hz), 6.12 (1H, dd, J_1 = 2.46 Hz, J_2 = 2.33 Hz), 6.76 – 6.85 (3H, m), 7.0 – 7.15 (2H, m), 8.32 (2H, d, J = 8.7 Hz), 8.54 (2H, d, J = 8.7 Hz); ^{13}C NMR (DMSO 100 MHz) δ = 16.23, 28.26, 32.22, 62.01, 112.25, 115.27, 117.79, 124.82, 125.28, 128.78, 130.05, 130.70, 133.21, 136.32, 138.0, 146.20, 150.02, 152.85, 155.25; Mass for

C₂₂H₁₈ClNO₆S: 460.0; Yield: 52%; Anal. Calcd for C₂₂H₁₈ClNO₆S: C, 57.46; H, 3.94; N, 3.05; S, 6.97; Found: C, 57.50; H, 3.90; N, 3.02; S, 6.89;

4-Nitro-benzenesulfonic acid 2-(6-fluoro-chroman-4-yl)-4-methyl-phenyl ester (5x)

Mp:152.9-154.2 °C; IR (In KBr, Cm⁻¹) 3109, 1608, 1532, 1389, 1197, 851, 608; ¹H NMR (DMSO 400 MHz) δ = 1.89 (1H, dd, *J*₁ = 3.58 Hz, *J*₂ = 4.0 Hz), 2.10 (1H, dd, *J*₁ = 2.65 Hz, *J*₂ = 2.54 Hz), 2.23 (3H, s), 4.18 (2H, m), 4.43 (1H, t, *J* = 7.0 Hz), 6.12 (1H, dd, *J*₁ = 2.46 Hz, *J*₂ = 2.33 Hz), 6.76 – 6.85 (3H, m), 7.0 – 7.15 (2H, m), 8.32 (2H, d, *J* = 8.7 Hz), 8.54 (2H, d, *J* = 8.7 Hz); ¹³CNMR (DMSO 100 MHz) δ = 19.87, 29.76, 34.46, 64.09, 114.57, 115.27, 117.79, 124.82, 125.28, 128.78, 130.05, 130.70, 137.38, 137.87, 140.85, 145.46, 151.57, 155.09, 157.44; Mass for C₂₂H₁₈FNO₆S: 444.0; Yield: 55%; Anal. Calcd for C, 59.59; H, 4.09; N, 3.16; S, 7.23; Found: C, 59.59; H, 4.11; N, 3.20; S, 7.20;

4-Nitro-benzenesulfonic acid 4-methyl-2-thiochroman-4-yl-phenyl ester (5y)

Mp:139.3-140.9 °C; IR (In KBr, Cm⁻¹) 3066, 2924, 1944, 1529, 1345, 1195, 843, 745; ¹H NMR (DMSO 400 MHz) δ = 2.0 (2H, m), 2.17 (3H, s), 2.78 (1H, m), 2.97 (1H, m), 4.26 (1H, t, *J* = 5.8 Hz), 6.37 (1H, d, *J* = 8.0 Hz), 6.68 (1H, s), 6.85 (1H, m), 7.11 (4H, m), 8.2 (2H, d, *J* = 8.8 Hz), 8.43 (2H, d, *J* = 8.8 Hz); ¹³C NMR (DMSO 100 MHz) δ = 21.0, 24.13, 29.56, 37.6, 122.2, 124.4, 125.6, 126.7, 127.4, 129.3, 130.4, 131.3, 133.7, 135.1, 137.6, 137.8, 140.4, 145.0, 151.5; Yield:

50%; Anal. Calcd for $C_{22}H_{19}NO_5S_2$: C, 59.85; H, 4.34; N, 3.17; S, 14.52; Found: C, 59.80; H, 4.38; N, 3.14; S, 14.55;

4-Nitro-benzenesulfonic acid 4-methyl-2-(6-methyl-thiochroman-4-yl)-phenyl ester (5z)

Mp:139.3-140.9 °C; IR (In KBr, Cm^{-1}) 2924, 1529, 1345, 1195, 1077, 843; 1H NMR (DMSO 400 MHz) δ = 2.04 (2H, m), 2.17 (3H, s), 2.78 (1H, m), 2.97 (1H, m), 4.22 (1H, t, J = 5.6 Hz), 6.37 (1H, d, J = 7.71 Hz), 6.68 (1H, s), 6.85 (1H, t, J = 8.76 Hz), 7.11-7.01 (4H, m), 8.23 (2H, d, J = 8.76 Hz), 8.43 (2H, d, J = 8.76); ^{13}C NMR (DMSO 100 MHz) δ = 21.0, 24.13, 29.56, 37.67, 122.21, 124.45, 125.43, 125.61, 126.74, 127.42, 129.31, 130.46, 131.02, 131.37, 133.70, 135.41, 137.85, 140.40, 145.03, 151.52; Mass for $C_{23}H_{21}NO_5S_2$: 456.0; Yield: 45%; Anal. Calcd for $C_{23}H_{21}NO_5S_2$: C, 60.64; H, 4.65; N, 3.07; S, 14.08; Found: C, 60.66; H, 4.69; N, 3.10; S, 14.02;

Supporting Information
For
Syntheses of 4-Aryl Chromanes-A rearrangement Approach

Pailla Umareddy^{1,2}, Veera Reddy Arava^{1*}, Ravindranath L.K.²

¹ H and ¹³ C NMR spectra for 5a.....	S2
¹ H and ¹³ C NMR spectra for 6a.....	S3
¹ H and ¹³ C NMR spectra for 6c.....	S4
¹ H and ¹³ C NMR spectra for 5f.....	S5
¹ H and ¹³ C NMR spectra for 6f.....	S6
¹ H and ¹³ C NMR spectra for 6h.....	S7
¹ H and ¹³ C NMR spectra for 5k	S8
¹ H and ¹³ C NMR spectra for 6k.....	S9
¹ H and ¹³ C NMR spectra for 5m.....	S10
¹ H and ¹³ C NMR spectra for 5n.....	S11
¹ H and ¹³ C NMR spectra for 6n.....	S12
¹ H and ¹³ C NMR spectra for 5q.....	S13
¹ H and ¹³ C NMR spectra for 6q.....	S14
¹ H and ¹³ C NMR spectra for 5t.....	S15
¹ H and ¹³ C NMR spectra for 5v.....	S16
¹ H and ¹³ C NMR spectra for 5x.....	S17
¹ H and ¹³ C NMR spectra for 5y.....	S18
¹ H and ¹³ C NMR spectra for 5z.....	S19

F2 - Acquisition Parameters
 Date_ 20121011
 Time 12.14
 INSTRUM av400
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 16384
 SOLVENT CDCl₃
 NS 44
 DS 0
 SWH 11990.407 H
 FIDRES 0.731836 H
 AQ 0.6832628 s
 RG 64
 DW 41.700 u
 DE 6.00 u
 TE 296.0 K
 D1 1.00000000 s
 MCREST 0.00000000 s
 MCWRR 0.01500000 s

===== CHANNEL f1 =====
 NUC1 1H
 P1 8.50 u
 PL1 -2.00 d
 SFO1 400.1324708 M

F2 - Processing parameters
 SI 16384
 SF 400.1300148 M
 WDW EM
 SSB 0
 LB 1.00 H
 GB 0
 PC 1.00

F2 - Acquisition Parameters
 Date_ 20121011
 Time 12.15
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 AQ 4.6399989 s
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 TE 296.2 K
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 d11 0.03000000 s
 MCREST 0.00000000 s
 MCWRR 0.01500000 s

===== CHANNEL f1 =====
 NUC1 13C
 P1 9.70 u
 PL1 2.00 d
 SFO1 100.6218241 M

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
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 PL2 -2.00 d
 PL12 18.00 d
 PL13 17.70 d
 SFO2 400.1316005 M

F2 - Processing parameters
 SI 131072
 SF 100.6127826 M
 WDW EM
 SSB 0
 LB 0.30 H
 GB 0

F2 - Acquisition Parameter:
Date_ 20121011
Time 12.29
INSTRUM av400
PROBHD 5 mm BBO BH-1H
PULPROG zgpg30
TD 16384
SOLVENT CDCl3
NS 44
DS 0
SWH 11990.407 H:
FIDRES 0.731836 H:
AQ 0.6832628 s:
RG 64
DW 41.700 u:
DE 6.00 u:
TE 296.0 K
D1 1.00000000 s:
MCREST 0.00000000 s:
MCWRK 0.01500000 s:
===== CHANNEL f1 =====
NUC1 1H
P1 8.50 u:
PL1 -2.00 dB
SFO1 400.1324708 M
F2 - Processing parameter:
SI 16384
SF 400.1300148 M
WDW EM
SSB 0
LB 1.00 H:
GB 0
PC 1.00

F2 - Acquisition Parameter:
Date_ 20121011
Time 12.33
INSTRUM av400
PROBHD 5 mm BBO BH-1H
PULPROG zgpg30
TD 262144
SOLVENT CDCl3
NS 85
DS 0
SWH 28248.588 H:
FIDRES 0.107760 H:
AQ 4.6399989 s:
RG 9195.2
DW 17.700 u:
DE 6.00 u:
TE 296.6 K
D1 1.00000000 s:
d11 0.03000000 s:
MCREST 0.00000000 s:
MCWRK 0.01500000 s:
===== CHANNEL f1 =====
NUC1 13C
P1 9.70 u:
PL1 2.00 dB
SFO1 100.6218241 M
===== CHANNEL f2 =====
CPDPRG2 waltz16
NUC2 1H
PCPD2 80.00 u:
PL2 -2.00 dB
PL12 18.00 dB
PL13 17.70 dB
SFO2 400.1316005 M
F2 - Processing parameter:
SI 131072
SF 100.6127826 M
WDW EM
SSB 0
LB 0.30 H:
GB 0
PC 1.40

F2 - Acquisition Parameters
 Date_ 20120925
 Time 18.13
 INSTRUM av400
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 16384
 SOLVENT Acetone
 NS 38
 DS 0
 SWH 11990.407 H
 FIDRES 0.731836 H
 AQ 0.6832628 s
 RG 71.8
 DW 41.700 u
 DE 6.00 u
 TE 296.4 K
 D1 1.00000000 s
 MCREST 0.00000000 s
 MCWRK 0.01500000 s

===== CHANNEL f1 =====
 NUC1 1H
 P1 8.50 u
 PL1 -2.00 d
 SFO1 400.1324708 M

F2 - Processing parameters
 SI 16384
 SF 400.1300148 M
 WDW EM
 SSB 0
 LB 1.00 H
 GB 0
 PC 1.00

F2 - Acquisition Parameters
 Date_ 20120925
 Time 18.14
 INSTRUM av400
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 262144
 SOLVENT Acetone
 NS 91
 DS 0
 SWH 28248.588 H
 FIDRES 0.107760 H
 AQ 4.6399989 s
 RG 2298.8
 DW 17.700 u
 DE 6.00 u
 TE 296.8 K
 D1 1.00000000 s
 d11 0.03000000 s
 MCREST 0.00000000 s
 MCWRK 0.01500000 s

===== CHANNEL f1 =====
 NUC1 13C
 P1 9.70 u
 PL1 2.00 d
 SFO1 100.6218241 M

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 u
 PL2 -2.00 d
 PL12 18.00 d
 PL13 17.70 d
 SFO2 400.1316005 M

F2 - Processing parameters
 SI 131072
 SF 100.6127826 M
 WDW EM
 SSB 0
 LB 0.30 H
 GB 0
 PC 1.40

F2 - Acquisition Parameter:
 Date_ 20120605
 Time 18.09
 INSTRUM av400
 PROBHD 5 mm BBO BB-1H
 PULPROG zg30
 TD 16384
 SOLVENT DMSO
 NS 44
 DS 0
 SWH 11990.407 Hz
 FIDRES 0.731836 Hz
 AQ 0.6832628 sec
 RG 45.3
 DW 41.700 usec
 DE 6.00 usec
 TE 293.1 K
 D1 1.00000000 sec
 MCREST 0.00000000 sec
 MCWKK 0.01500000 sec

===== CHANNEL f1 =====
 NUC1 1H
 P1 8.00 usec
 PL1 -1.00 dB
 SFO1 400.1324708 MHz

F2 - Processing parameter:
 SI 16384
 SF 400.1300057 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.00

F2 - Acquisition Parameter:
 Date_ 20120605
 Time 18.15
 INSTRUM av400
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 262144
 SOLVENT DMSO
 NS 108
 DS 0
 SWH 28248.588 Hz
 FIDRES 0.107760 Hz
 AQ 4.6399989 sec
 RG 8192
 DW 17.700 usec
 DE 6.00 usec
 TE 293.6 K
 D1 1.00000000 sec
 d11 0.03000000 sec
 MCREST 0.00000000 sec
 MCWKK 0.01500000 sec

===== CHANNEL f1 =====
 NUC1 13C
 P1 9.70 usec
 PL1 2.00 dB
 SFO1 100.6218241 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 usec
 PL2 -1.00 dB
 PL12 19.00 dB
 PL13 17.70 dB
 SFO2 400.1316005 MHz

F2 - Processing parameter:
 SI 131072
 SF 100.6127690 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.40

F2 - Acquisition Parameters
 Date_ 20120726
 Time 19.01
 INSTRUM av400
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 16384
 SOLVENT DMSO
 NS 44
 DS 0
 SWH 11990.407 H
 FIDRES 0.731836 H
 AQ 0.6832628 s
 RG 90.5
 DW 41.700 u
 DE 6.00 u
 TE 296.1 K
 D1 1.00000000 s
 MCREST 0.00000000 s
 MCWRK 0.01500000 s

===== CHANNEL f1 =====
 NUC1 1H
 P1 8.50 u
 PL1 -2.00 dB
 SFO1 400.1324708 MHz

F2 - Processing parameters
 SI 16384
 SF 400.1300057 MHz
 WDW EM
 SSB 0
 LB 1.00 Hz
 GB 0
 PC 1.00

F2 - Acquisition Parameters
 Date_ 20120726
 Time 19.13
 INSTRUM av400
 PROBHD 5 mm BBO BB-1H
 PULPROG zgpg30
 TD 262144
 SOLVENT DMSO
 NS 83
 DS 0
 SWH 28248.588 Hz
 FIDRES 0.107760 Hz
 AQ 4.6399989 s
 RG 2048
 DW 17.700 us
 DE 6.00 us
 TE 296.5 K
 D1 1.00000000 s
 d11 0.03000000 s
 MCREST 0.00000000 s
 MCWRK 0.01500000 s

===== CHANNEL f1 =====
 NUC1 13C
 P1 9.70 us
 PL1 2.00 dB
 SFO1 100.6218241 MHz

===== CHANNEL f2 =====
 CPDPRG2 waltz16
 NUC2 1H
 PCPD2 80.00 us
 PL2 -2.00 dB
 PL12 18.00 dB
 PL13 17.70 dB
 SFO2 400.1316005 MHz

F2 - Processing parameters
 SI 131072
 SF 100.6127826 MHz
 WDW EM
 SSB 0
 LB 0.30 Hz
 GB 0
 PC 1.40