A new highly regioselective method for the synthesis of water-soluble 1,3,4-trisubstituted derivatives of tetrahydropyrimidin-2(1H)-one

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Experimental procedure

The ^{1}H and ^{13}C NMR spectra were recorded on a Bruker Avance 600 spectrometer operating frequency (600 MHz and 150 MHz, respectively) with respect to the residual proton signals of deuterated solvents (DMSO-d_6). The IR spectra were recorded on a Vector 22 Fourier spectrometer by Bruker in the range of 400-4000 cm^{-1}. Crystalline samples were studied as a suspension in vaseline oil. The melting points were determined in glass capillaries on a Stuart SMP 10 instrument. Elemental analysis of the compounds was carried out on a high-temperature 2-reactor C, H, N-analyzer of EuroVector brand EA 3000. The halogen content was determined by the Schöniger method. Sodium (1-(3,3-diethoxypropyl)ureido)methanesulfonate was obtained according to a known procedure [Taylor, H. M.; Hauser, C. R. *Org. Synth.* **1963**, *43*, 25. doi:10.15227/orgsyn.043.0025].

Quantum chemistry calculations were performed with the Gaussian 16 package [Frisch, M. J.; Trucks, G. W.; Schlegel, H. B.; Scuseria, G. E.; Robb, M. A.; Cheeseman, J. R.; Scalmani, G.; Barone, V.; Petersson, G. A.; Nakatsuji, H.; Li, X.; Caricato, M.; Marenich, A. V; Bloino, J.; Janesko, B. G.; Gomperts, R.; Mennucci, B.; Hratchian, H. P.; Ortiz, J. V; Izmaylov, A. F.; Sonnenberg, J. L.; Williams-Young, D.; Ding, F.; Lipparini, F.; Egidi, F.; Goings, J.; Peng, B.; Petrone, A.; Henderson, T.; Ranasinghe, D.; Zakrzewski, V. G.; Gao, J.; Rega, N.; Zheng, G.; Liang, W.; Hada, M.; Ehara, M.; Toyota, K.; Fukuda, R.; Hasegawa, J.; Ishida, M.; Nakajima, T.; Honda, Y.; Kitao, O.; Nakai, H.; Vreven, T.; Throssell, K.; Montgomery Jr., J. A.; Peralta, J. E.; Ogliaro, F.; Bearpark, M. J.; Heyd, J. J.; Brothers, E. N.; Kudin, K. N.; Staroverov, V. N.; Keith, T. A.; Kobayashi, R.; Normand, J.; Raghavachari, K.; Rendell, A. P.; Burant, J. C.; Iyengar, S. S.; Tomasi, J.; Cossi, M.; Millam, J. M.; Klene, M.; Adamo, C.; Cammi, R.; Ochterski, J. W.; Martin, R. L.; Morokuma, K.; Farkas, O.; Foresman, J. B.; Fox, D. J. Gaussian 16 Revision C.01. Gaussian, Inc.: Wallingford CT 2016]. Initial structures were fully optimized at the MP2/6-311+G(d,p) theory level. All optimizations were followed by frequency calculations at the same level of theory in order to check that optimized structures really correspond to true minima.

General procedures for the synthesis of tetrahydropyrimidinones 4

To a solution of acetal **3** (1.3 mmol) in 20 ml of dry chloroform was added *C*-nucleophiles (1.3 mmol) and trifluoroacetic acid (2 ml). The reaction mixture was stirring at room temperature during 24 hours. The precipitate was filtered off, washed with diethyl ether and dried in vacuum (2 hours, 0.01 torr, r.t.).

Sodium (4-(5-chloro-2,4-dihydroxyphenyl)-2-oxo-3-phenyltetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4a). White solid, yield 88%, m.p. > 250°C; IR (KBr, v/см$^{-1}$): 1047, 1615, 2874, 2945, 3430; ^{1}H-NMR (DMSO-d_6, δ ppm) 1.89-1.98 (m, 1H, CH_2), 2.26-2.34 (m, 1H, CH_2), 3.34-3.41 (m, 1H, CH_2), 3.52-3.57 (m, 1H, CH_2), 4.12 (d, 1H, CH_2, $^{2}J_{HH}$ 13.4 Hz), 4.27 (d, 1H, CH_2, $^{2}J_{HH}$ 13.4 Hz), 5.13-5.20 (m, 1H, CH), 6.47 (s, 1H, Ar-H), 7.06 (t, 1H, Ar-H, $^{3}J_{HH}$ 7.0 Hz), 7.12 (s, 1H, Ar-H), 7.17 (d, 2H, Ar-H, $^{3}J_{HH}$ 7.7 Hz), 7.23 (t, 2H, Ar-H, $^{3}J_{HH}$ 7.5 Гц), 9.69 (s, 1H, OH), 9.84 (s, 1H, OH); ^{13}C-NMR (DMSO-d_6, δ ppm): 27.69, 42.44, 56.81, 63.50, 104.20, 110.10, 120.27, 125.31, 125.36, 127.09, 128.58, 128.76, 144.61, 152.85, 153.51, 154.60. Elemental analysis: calc. for $C_{17}H_{16}ClN_2NaO_6S$; C, 46.96; H, 3.71; Cl, 8.15; N, 6.44; S, 7.37; found C, 47.12; H, 3.84; Cl, 8.24; N, 6.59; S, 7.19.

Sodium (4-(5-chloro-2,4-dihydroxyphenyl)-3-(4-chlorophenyl)-2-oxotetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4b). White solid, yield 78%, m.p. . > 250°C; IR (KBr, v/см$^{-1}$): 1044, 1619, 2942, 3436; ^{1}H-NMR (DMSO-d_6, δ ppm) 1.90-1.98 (m, 1H, CH_2), 2.25-2.38 (m, 1H, CH_2), 3.42-3.48 (m, 1H, CH_2), 3.52-3.61 (m, 1H, CH_2), 4.14 (d, 1H, CH_2, $^{2}J_{HH}$ 13.4 Hz), 4.28 (d, 1H, CH_2, $^{2}J_{HH}$ 13.4 Hz), 5.13-5.21 (m, 1H, CH), 6.49 (s, 1H, Ar-H), 7.08 (s, 1H, Ar-H), 7.20 (d, 2H, Ar-H, $^{3}J_{HH}$ 8.6 Hz), 7.28 (d, 2H, Ar-H, $^{3}J_{HH}$ 8.5 Hz), 9.76 (s, 1H, OH), 9.90 (s, 1H, OH); ^{13}C-NMR (DMSO-d_6, δ ppm): 27.67, 42.58, 56.61, 63.49, 104.21, 110.12, 119.85, 128.47, 128.55, 128.62, 129.37, 143.25, 152.94, 153.58, 154.50. Elemental analysis: calc. for $C_{17}H_{15}Cl_2N_2NaO_6S$; C, 43.51; H, 3.22; Cl, 15.11; N, 5.97; S, 6.83; found C, 43.67; H, 3.43; Cl, 15.29; N, 6.12; S, 6.95.

Sodium (4-(5-chloro-2,4-dihydroxyphenyl)-2-oxo-3-(p-tolyl)tetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4c). White solid, yield 62%, m.p. > 250°C; IR (KBr, v/см$^{-1}$): 1045, 1619, 2944, 3450; ^{1}H-NMR (DMSO-d_6, δ ppm) 1.88-1.96 (m, 1H, CH_2), 2.21 (s, 3H, CH_3), 2.25-2.35 (m, 1H, CH_2), 3.37-3.45 (m, 1H, CH_2), 3.51-3.59 (m, 1H, CH_2), 4.13 (d, 1H, CH_2, $^{2}J_{HH}$ 13.4 Hz), 4.28 (d, 1H, CH_2, $^{2}J_{HH}$ 13.4 Hz), 5.04-5.16 (m, 1H, CH), 6.46 (s, 1H, Ar-H), 7.03 (d, 2H, Ar-H, $^{3}J_{HH}$ 8.6 Hz), 7.05 (d, 2H, Ar-H, $^{3}J_{HH}$ 8.5 Hz), 7.12 (s, 1H, Ar-H), 9.67 (s, 1H, OH), 9.83 (s, 1H, OH); ^{13}C-NMR (DMSO-d_6, δ ppm): 20.89, 27.68, 42.39, 56.83, 63.52, 104.12, 109.99, 120.26, 127.13, 128.76, 129.10, 134.53, 141.95, 152.78, 153.51, 154.72. Elemental analysis: calc. for $C_{18}H_{18}ClN_2NaO_6S$; C, 48.17; H, 4.04; Cl, 7.90; N, 6.24; S, 7.14; found C, 48.25; H, 4.17; Cl, 7.87; N, 6.17; S, 7.29.

Sodium (4-(5-chloro-2,4-dihydroxyphenyl)-3-(4-methoxyphenyl)-2-oxotetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4d). White solid, yield 75%,

m.p. > 250°C; IR (KBr, ν/см$^{-1}$): 1044, 1625, 2839, 2938, 3431; ^{1}H-NMR (DMSO-d_6, δ ppm) 1.88-1.98 (m, 1H, CH_2), 2.29-2.37 (m, 1H, CH_2), 3.52-3.59 (m, 2H, CH_2), 2.68 (s, 3H, CH_3), 4.19 (d, 1H, CH_2, $^{2}J_{HH}$ 13.5 Hz), 4.32 (d, 1H, CH_2, $^{2}J_{HH}$ 13.5 Hz), 5.06-5.17 (m, 1H, CH), 6.50 (s, 1H, Ar-H), 6.79 (d, 2H, Ar-H, $^{3}J_{HH}$ 8.6 Hz), 7.09 (d, 2H, Ar-H, $^{3}J_{HH}$ 8.5 Hz), 7.15 (s, 1H, Ar-H), 9.73 (s, 1H, OH), 9.90 (s, 1H, OH); ^{13}C-NMR (DMSO-d_6, δ ppm): 27.67, 42.68, 55.59, 57.21, 63.71, 104.19, 109.97, 113.93, 120.17, 128.65, 129.35, 137.24, 152.83, 153.60, 155.12, 157.12. Elemental analysis: calc. for $C_{18}H_{18}ClN_2NaO_7S$; C, 46.51; H, 3.90; Cl, 7.63; N, 6.03; S, 6.90; found C, 46.67; H, 3.98; Cl, 7.79; N, 5.83; S, 7.07.

Sodium (4-(5-chloro-2,4-dihydroxyphenyl)-3-(4-fluorophenyl)-2-oxotetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4e). White solid, yield 85%, m.p. 185-186°C; IR (KBr, ν/см$^{-1}$): 1044, 1628, 2831, 3424; ^{1}H-NMR (DMSO-d_6, δ ppm) 1.90-1.99 (m, 1H, CH_2), 2.27-2.38 (m, 1H, CH_2), 3.39-3.47 (m, 1H, CH_2), 3.53-3.59 (m, 1H, CH_2), 4.20 (d, 1H, CH_2, $^{2}J_{HH}$ 13.6 Hz), 4.32 (d, 1H, CH_2, $^{2}J_{HH}$ 13.6 Hz), 5.10-5.20 (m, 1H, CH), 6.50 (s, 1H, Ar-H), 7.02-7.07 (m, 2H, Ar-H), 7.10 (s, 1H, Ar-H), 7.18-7.23 (m, 2H, Ar-H); ^{13}C-NMR (DMSO-d_6, δ ppm): 27.28, 42.51, 56.66, 63.33, 103.88, 109.67, 114.91 (d, $^{2}J_{CF}$ 22.3 Hz), 119.43, 128.14, 128.78 (d, $^{3}J_{CF}$ 8.6 Hz), 140.09, 152.90 (d, $^{1}J_{CF}$ 87.2 Hz), 154.62, 158.49, 160.42. Elemental analysis: calc. for $C_{17}H_{15}ClFN_2NaO_6S$; C, 45.09; H, 3.34; Cl, 7.83; N, 6.19; S, 7.08; found C, 45.23; H, 3.45; Cl, 7.96; N, 6.01; S, 7.16.

Sodium (4-(5-chloro-2,4-dihydroxyphenyl)-3-(3-chlorophenyl)-2-oxotetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4f). White solid, yield 44%, m.p. 172-174°C; IR (KBr, ν/см$^{-1}$): 1044, 1634, 3452; ^{1}H-NMR (DMSO-d_6, δ ppm) 1.92-1.99 (m, 1H, CH_2), 2.26-2.34 (m, 1H, CH_2), 3.52-3.60 (m, 2H, CH_2), 4.13 (d, 1H, CH_2, $^{2}J_{HH}$ 13.4 Hz), 4.30 (d, 1H, CH_2, $^{2}J_{HH}$ 13.4 Hz), 5.15-5.23 (m, 1H, CH), 6.49 (s, 1H, Ar-H), 7.08 (s, 1H, Ar-H), 7.10-7.14 (m, 2H, Ar-H), 7.23-7.27 (m, 1H, Ar-H), 7.29-7.31 (m, 1H, Ar-H), 9.77 (s, 1H, OH), 9.90 (s, 1H, OH); ^{13}C-NMR (DMSO-d_6, δ ppm): 27.63, 42.60, 56.60, 63.50, 104.23, 110.16, 119.75, 125.04, 125.08, 126.98, 128.54, 130.09, 132.56, 145.72, 152.95, 153.55, 154.39. Elemental analysis: calc. for $C_{17}H_{15}Cl_2N_2NaO_6S$; C, 43.51; H, 3.22; Cl, 15.11; N, 5.97; S, 6.83; found C, 43.63; H, 3.29; Cl, 15.04; N, 6.13; S, 6.95.

Sodium (4-(5-chloro-2,4-dihydroxyphenyl)-2-oxo-3-(*m*-tolyl)tetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4g). White solid, yield 31%, m.p. 216-218°C; IR (KBr, ν/см$^{-1}$): 1046, 1624, 2846, 3450; ^{1}H-NMR (DMSO-d_6, δ ppm)

1.89-1.98 (m, 1H, CH_2), 2.23 (s, 3H, CH_3), 2.29-2.34 (m, 1H, CH_2), 3.50-3.62 (m, 2H, CH_2), 4.13 (d, 1H, CH_2, $^2J_{HH}$ 13.0 Hz), 4.28 (d, 1H, CH_2, $^2J_{HH}$ 13.1 Hz), 5.09-5.20 (m, 1H, CH), 6.48 (s, 1H, Ar-H), 6.87-6.96 (m, 2H, Ar-H), 7.04 (s, 1H, Ar-H), 7.09-7.16 (m, 2H, Ar-H), 9.70 (s, 1H, OH), 9.85 (s, 1H, OH); ^{13}C-NMR (DMSO-d_6, δ ppm): 21.42, 27.62, 42.52, 56.93, 63.60, 104.22, 110.03, 120.20, 124.16, 126.22, 128.09, 128.45, 128.74, 137.78, 144.48, 152.84, 153.49, 154.71. Elemental analysis: calc. for $C_{18}H_{18}ClN_2NaO_6S$; C, 48.17; H, 4.04; Cl, 7.90; N, 6.24; S, 7.14; found C, 48.27; H, 4.15; Cl, 8.09; N, 6.30; S, 7.01.

Sodium (3-butyl-4-(5-chloro-2,4-dihydroxyphenyl)-2-oxotetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4h). White solid, yield 75%, m.p. >250°C; IR (KBr, ν/см$^{-1}$): 1046, 1617, 2849, 3443; ^{1}H-NMR (DMSO-d_6, δ ppm) 0.82 (t, 3H, CH_3, $^3J_{HH}$ 7.3 Hz), 1.13-1.25 (m, 2H, CH_2), 1.33-1.46 (m, 2H, CH_2), 1.77-1.90 (m, 1H, CH_2), 1.94-2.08 (m, 1H, CH_2), 3.15-3.29 (m, 2H, CH_2), 3.57-3.67 (m, 2H, CH_2), 4.09 (d, 1H, CH_2, $^2J_{HH}$ 13.5 Hz), 4.22 (d, 1H, CH_2, $^2J_{HH}$ 13.5 Hz), 4.64-4.72 (m, 1H, CH), 6.55 (s, 1H, Ar-H), 6.81 (s, 1H, Ar-H), 9.83 (s, 1H, OH), 9.95 (s, 1H, OH); ^{13}C-NMR (DMSO-d_6, δ ppm): 14.24, 20.04, 27.34, 30.29, 42.36, 46.63, 52.99, 63.69, 104.27, 109.95, 120.13, 128.02, 152.89, 154.05, 155.67. Elemental analysis: calc. for $C_{15}H_{20}ClN_2NaO_6S$; C, 43.43; H, 4.86; Cl, 8.55; N, 6.75; S, 7.73; found C, 43.65; H, 4.99; Cl, 8.46; N, 6.86; S, 7.57.

Sodium (4-(6-hydroxybenzo[d][1,3]dioxol-5-yl)-2-oxo-3-phenyltetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4i). White solid, yield 67%, m.p. >250°C; IR (KBr, ν/см$^{-1}$): 1031, 1636, 2894, 2970, 3242, 3391; ^{1}H-NMR (DMSO-d_6, δ ppm) 1.86-1.92 (m, 1H, CH_2), 2.26-2.38 (m, 1H, CH_2), 3.41-3.54 (m, 2H, CH_2), 3.95 (d, 1H, CH_2, $^2J_{HH}$ 13.4 Hz), 4.47 (d, 1H, CH_2, $^2J_{HH}$ 13.4 Hz), 5.19-5.27 (m, 1H, CH), 5.88 (d, 2H, CH_2, $^2J_{HH}$ 11.7 Hz), 6.39 (s, 1H, Ar-H), 6.90 (s, 1H, Ar-H), 7.06 (t, 1H, Ar-H, $^3J_{HH}$ 7.2 Hz), 7.18 (d, 2H, Ar-H, $^3J_{HH}$ 7.3 Hz), 7.22 (t, 2H, Ar-H, $^3J_{HH}$ 7.7 Hz), 9.31 (s, 1H, OH); ^{13}C-NMR (DMSO-d_6, δ ppm): 27.81, 42.71, 57.08, 63.74, 97.99, 101.00, 108.09, 120.04, 125.31, 127.17, 128.57, 140.22, 144.70, 146.69, 148.47, 154.57. Elemental analysis: calc. for $C_{18}H_{17}N_2NaO_7S$; C, 50.47; H, 4.00; N, 6.54; S, 7.48; found C, 50.65; H, 4.21; N, 6.55; S, 7.32.

Sodium (3-(4-fluorophenyl)-4-(6-hydroxybenzo[d][1,3]dioxol-5-yl)-2-oxotetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4j). White solid, yield 94%, m.p. >250°C; IR (KBr, ν/см$^{-1}$): 1044, 1631, 2894, 2937, 3437; ^{1}H-NMR (DMSO-d_6, δ ppm) 1.84-1.94 (m, 1H, CH_2), 2.28-2.38 (m, 1H, CH_2), 3.42-3.57 (m, 2H, CH_2), 3.93 (d, 1H,

CH_2, $^2J_{HH}$ 13.3 Hz), 4.47 (d, 1H, CH_2, $^2J_{HH}$ 13.3 Hz), 5.14-5.21 (m, 1H, CH), 5.89 (d, 2H, CH_2, $^2J_{HH}$ 12.4 Hz), 6.39 (s, 1H, Ar-H), 6.91 (s, 1H, Ar-H), 7.04-7.08 (m, 2H, Ar-H), 7.17-7.21 (m, 2H, Ar-H), 9.31 (s, 1H, OH); ^{13}C-NMR (DMSO-d_6, δ ppm): 27.84, 42.85, 57.23, 63.79, 98.02, 101.03, 107.98, 115.24 (d, $^2J_{CF}$ 20.5 Hz), 119.75, 129.20, 140.24, 140.82, 146.76, 148.59, 154.73, 159.80 (d, $^1J_{CF}$ 241.9 Hz). Elemental analysis: calc. for $C_{18}H_{16}FN_2NaO_7S$; C, 48.43; H, 3.61; N, 6.28; S, 7.18; found C, 48.47; H, 3.60; N, 6.41; S, 7.18.

Sodium (4-(3-carboxy-2,6-dihydroxyphenyl)-2-oxo-3-phenyltetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4k). White solid, yield 27%, m.p. >250°C; IR (KBr, ν/см$^{-1}$): 1027, 1657, 2526, 3418; ^{1}H-NMR (DMSO-d_6, δ ppm) 2.17-2.24 (m, 1H, CH_2), 2.29-2.43 (m, 1H, CH_2), 3.47-3.56 (m, 1H, CH_2), 3.71-3.90 (m, 2H, CH_2), 4.56 (d, 1H, CH_2, $^2J_{HH}$ 13.0 Hz), 5.45-5.54 (m, 1H, CH), 6.29 (d, 1H, Ar-H, $^3J_{HH}$ 8.8 Hz), 6.95-7.03 (m, 1H, Ar-H), 7.09-7.16 (m, 2H, Ar-H), 7.19-7.28 (m, 2H, Ar-H), 7.44 (d, 1H, Ar-H, $^3J_{HH}$ 8.5 Hz), 10.55 (s, 1H, OH), 12.02 (s, 1H, OH); ^{13}C-NMR (DMSO-d_6, δ ppm): 27.53, 44.86, 54.14, 63.59, 104.34, 108.03, 114.10, 125.37, 127.62, 128.01, 130.69, 143.85, 155.45, 158.71, 162.30, 172.96. Elemental analysis: calc. for $C_{18}H_{17}N_2NaO_8S$; C, 48.65; H, 3.86; N, 6.30; S, 7.22; found C, 48.79; H, 3.94; N, 6.36; S, 7.29.

Sodium (4-(4-hydroxy-6-methyl-2-oxo-2*H*-pyran-3-yl)-2-oxo-3-phenyltetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4l). White solid, yield 88%, m.p. >250°C; IR (KBr, ν/см$^{-1}$): 1048, 1629, 2945, 3067, 3466; ^{1}H-NMR (DMSO-d_6, δ ppm) 2.04 (s, 3H, CH_3), 2.14-2.28 (m, 2H, CH_2), 3.67-3.77 (m, 2H, CH_2), 3.82 (d, 1H, CH_2, $^2J_{HH}$ 13.4 Hz), 4.49 (d, 1H, CH_2, $^2J_{HH}$ 13.5 Hz), 5.10-5.16 (m, 1H, CH), 5.85 (s, 1H, Ar-H), 7.04-7.10 (m, 1H, Ar-H), 7.14-7.21 (m, 4H, Ar-H); ^{13}C-NMR (DMSO-d_6, δ ppm): 19.63, 26.90, 40.60, 44.65, 63.40, 100.27, 100.66, 125.61, 127.76, 128.09, 129.11, 133.01, 155.16, 163.44, 166.96. Elemental analysis: calc. for $C_{17}H_{17}N_2NaO_7S$; C, 49.04; H, 4.12; N, 6.73; S, 7.70; found C, 49.17; H, 4.28; N, 6.89; S, 7.86.

Sodium (3-(4-chlorophenyl)-4-(4-hydroxy-6-methyl-2-oxo-2*H*-pyran-3-yl)-2-oxotetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4m). White solid, yield 47%, m.p. >250°C; IR (KBr, ν/см$^{-1}$): 1046, 1637, 2678, 2943, 3090, 3448; ^{1}H-NMR (DMSO-d_6, δ ppm) 2.05 (s, 3H, CH_3), 2.11-2.21 (m, 1H, CH_2), 2.25-2.36 (m, 1H, CH_2), 3.64-3.79 (m, 2H, CH_2), 3.87 (d, 1H, CH_2, $^2J_{HH}$ 13.4 Hz), 4.47 (d, 1H, CH_2, $^2J_{HH}$ 13.5 Hz), 5.09-5.18 (m, 1H, CH), 5.89 (s, 1H, Ar-H), 7.17-7.29 (m, 1H, Ar-H); ^{13}C-NMR (DMSO-d_6, δ ppm): 19.67, 26.79, 44.82, 53.91, 63.48, 100.26, 128.05, 129.43, 129.68, 142.30,

155.09, 162.02, 163.36, 163.48, 167.18. Elemental analysis: calc. for $C_{17}H_{16}ClN_2NaO_7S$; C, 45.29; H, 3.58; Cl, 7.86; N, 6.21; S, 7.11; found C, 45.46; H, 3.77; Cl, 7.97; N, 6.35; S, 7.02.

Sodium (4-(4-hydroxy-6-methyl-2-oxo-2*H*-pyran-3-yl)-3-(4-methoxyphenyl)-2-oxotetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4n). White solid, yield 79%, m.p. 193-1195°C; IR (KBr, v/см$^{-1}$): 1045, 1690, 2632, 2937, 3082, 3450; ^{1}H-NMR (DMSO-d_6, δ ppm) 2.04 (s, 3H, CH_3), 2.06-2.14 (m, 1H, CH_2), 2.21-2.32 (m, 1H, CH_2), 3.47-3.51 (m, 1H, CH_2), 3.67 (s, 3H, CH_3), 3.71-3.77 (m, 1H, CH_2), 3.85 (d, 1H, CH_2, $^2J_{HH}$ 13.6 Hz), 4.49 (d, 1H, CH_2, $^2J_{HH}$ 13.6 Hz), 4.99-5.11 (m, 1H, CH), 5.89 (s, 1H, Ar-H), 6.74 (d, 2H, Ar-H, $^3J_{HH}$ 8.8 Hz), 7.07 (d, 2H, Ar-H, $^3J_{HH}$ 8.7 Hz); ^{13}C-NMR (DMSO-d_6, δ ppm): 19.64, 26.95, 44.95, 54.35, 55.52, 63.64, 100.36, 100.56, 113.47, 129.00, 136.28, 155.68, 157.21, 161.75, 163.50, 167.08. Elemental analysis: calc. for $C_{18}H_{19}N_2NaO_8S$; C, 48.43; H, 4.29; N, 6.28; S, 7.18; found C, 48.60; H, 4.37; N, 6.14; S, 7.32.

Sodium (3-(4-fluorophenyl)-4-(4-hydroxy-6-methyl-2-oxo-2*H*-pyran-3-yl)-2-oxotetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4o). White solid, yield 85%, m.p. 181-182°C; IR (KBr, v/см$^{-1}$): 1047, 1692, 2625, 2944, 3081, 3435; ^{1}H-NMR (DMSO-d_6, δ ppm) 2.02 (s, 3H, CH_3), 2.07-2.17 (m, 1H, CH_2), 2.20-2.38 (m, 1H, CH_2), 3.47-3.57 (m, 1H, CH_2), 3.68-3.79 (m, 1H, CH_2), 3.97 (d, 1H, CH_2, $^2J_{HH}$ 14.0 Hz), 4.52 (d, 1H, CH_2, $^2J_{HH}$ 13.8 Hz), 5.04-5.18 (m, 1H, CH), 5.95 (s, 1H, Ar-H), 6.95-7.09 (m, 2H, Ar-H), 7.14-7.26 (m, 2H, Ar-H); ^{13}C-NMR (DMSO-d_6, δ ppm): 19.32, 26.47, 45.06, 53.90, 63.55, 99.82, 100.03, 114.63 (d, $^2J_{CF}$ 22.2 Hz), 129.48 (d, $^3J_{CF}$ 8.3 Hz), 139.10, 155.45, 158.89, 161.75, 162.2 (d, $^1J_{CF}$ 302.5 Hz), 167.10. Elemental analysis: calc. for $C_{17}H_{16}FN_2NaO_7S$; C, 47.01; H, 3.71; N, 6.45; S, 7.38; found C, 46.79; H, 3.85; N, 6.64; S, 7.21.

Sodium (3-(3-chlorophenyl)-4-(4-hydroxy-6-methyl-2-oxo-2*H*-pyran-3-yl)-2-oxotetrahydropyrimidin-1(2*H*)-yl)methanesulfonate (4p). White solid, yield 29%, m.p. >250°C; IR (KBr, v/см$^{-1}$): 1047, 1690, 2629, 2943, 3079, 3435; ^{1}H-NMR (DMSO-d_6, δ ppm) 2.05 (s, 3H, CH_3), 2.13-2.20 (m, 1H, CH_2), 2.25-2.33 (m, 1H, CH_2), 3.46-3.54 (m, 1H, CH_2), 3.70-3.77 (m, 1H, CH_2), 3.83 (d, 1H, CH_2, $^2J_{HH}$ 13.6 Hz), 4.44 (d, 1H, CH_2, $^2J_{HH}$ 13.3 Hz), 5.12-5.19 (m, 1H, CH), 5.86 (s, 1H, Ar-H), 7.09-7.15 (m, 2H, Ar-H), 7.20-7.28 (m, 2H, Ar-H); ^{13}C-NMR (DMSO-d_6, δ ppm): 19.67, 26.82, 44.53, 53.97, 63.29, 100.22, 100.37, 125.32, 125.77, 127.89, 129.53, 132.03, 144.95, 154.81, 161.95,

163.39, 167.27. Elemental analysis: calc. for $C_{17}H_{16}ClN_2NaO_7S$; C, 45.29; H, 3.58; Cl, 7.86; N, 6.21; S, 7.11; found C, 45.54; H, 3.69; Cl, 7.98; N, 6.12; S, 7.23.

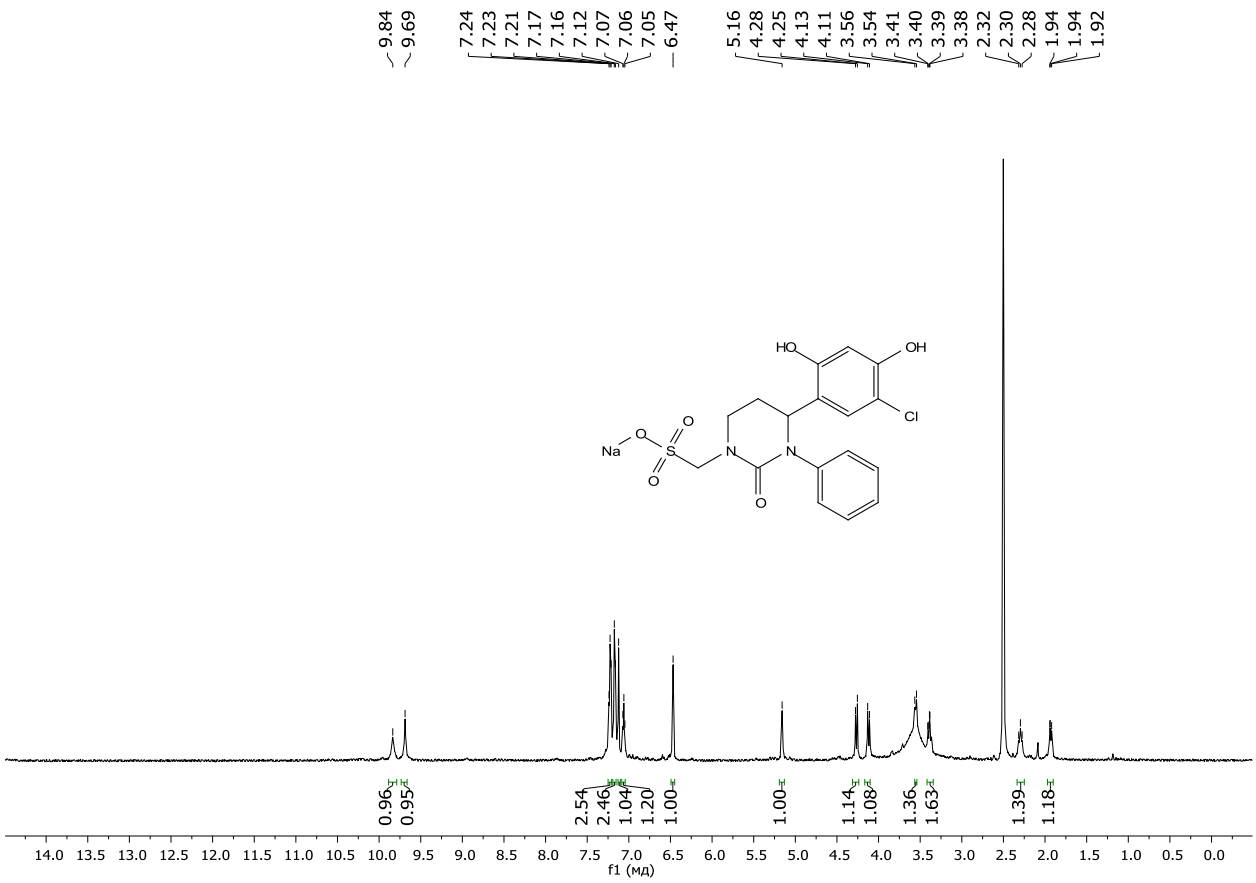

Figure S1. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4a**

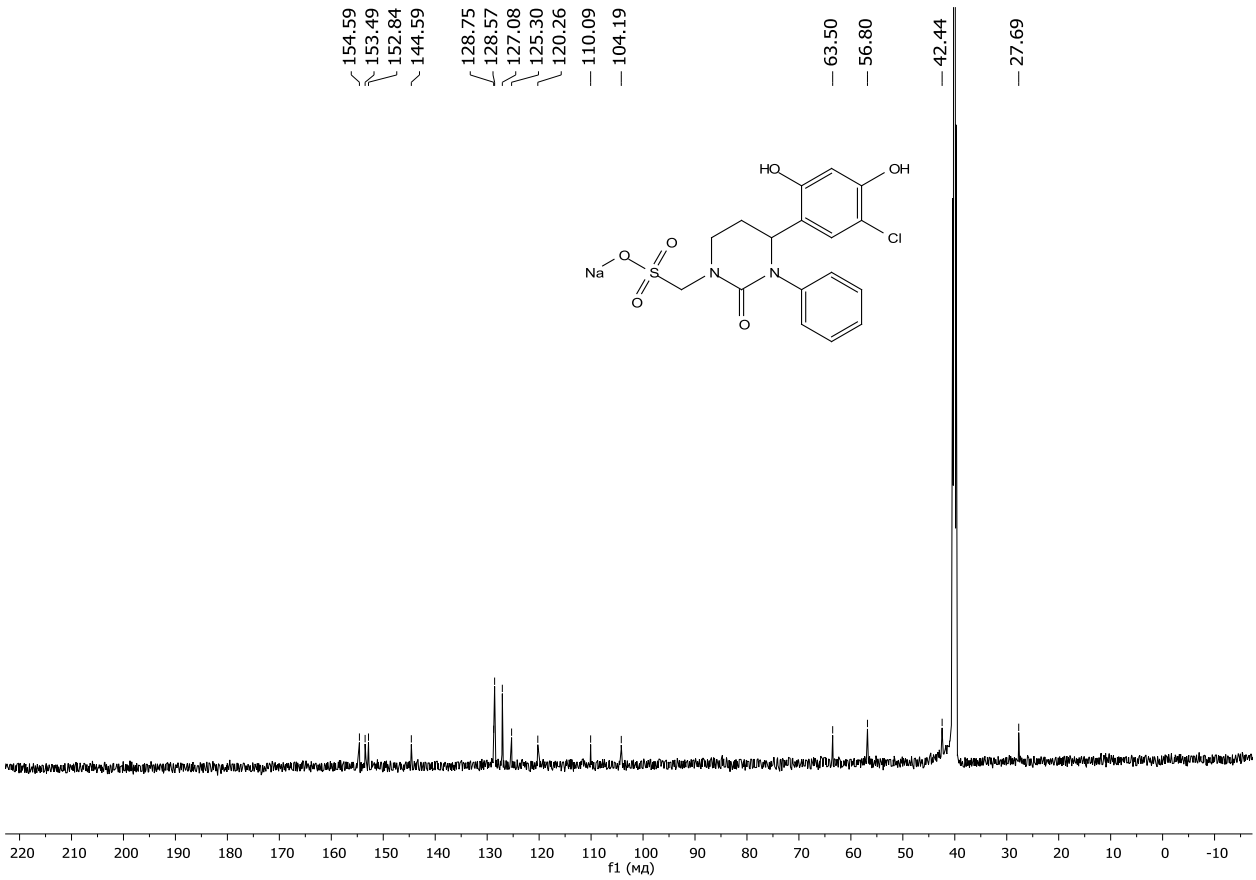

Figure S2. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4a**

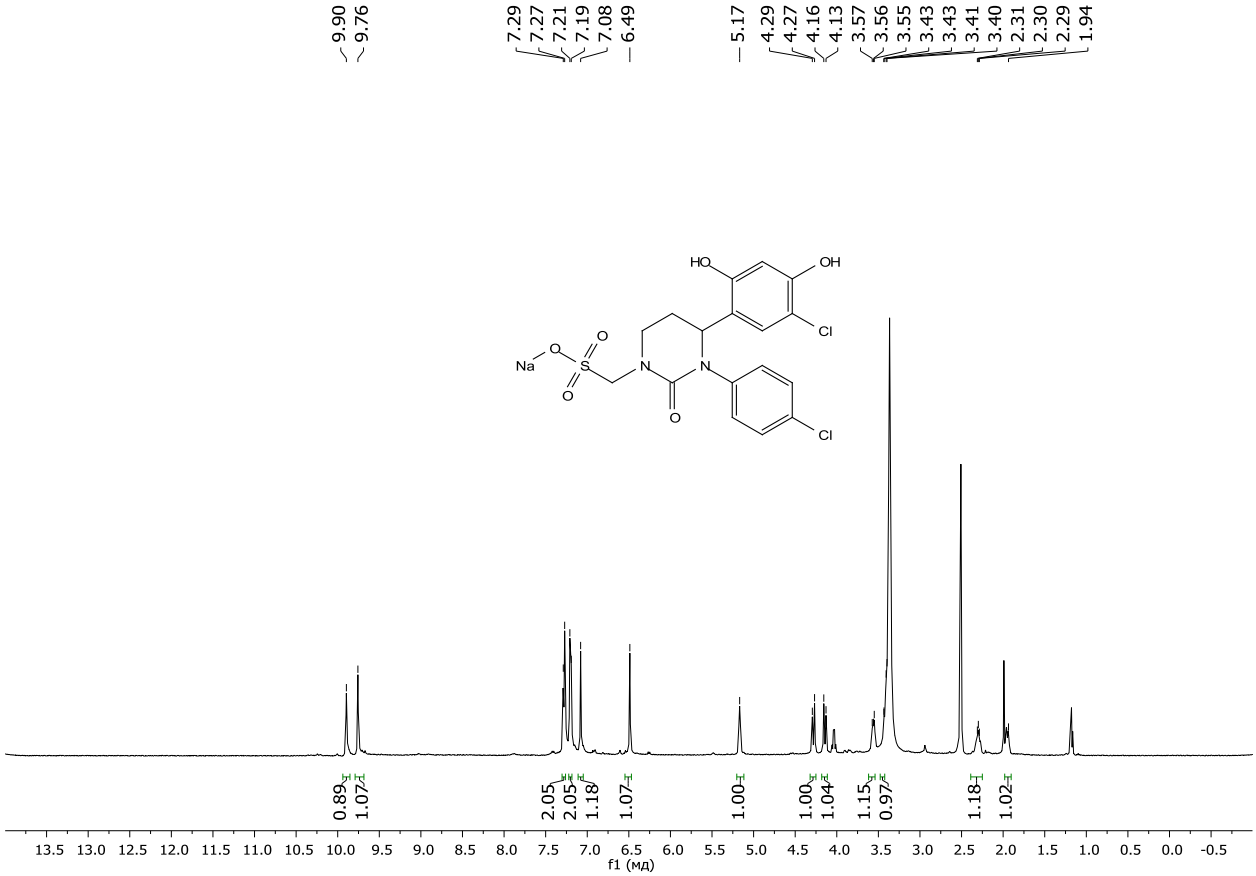

Figure S3. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4b**

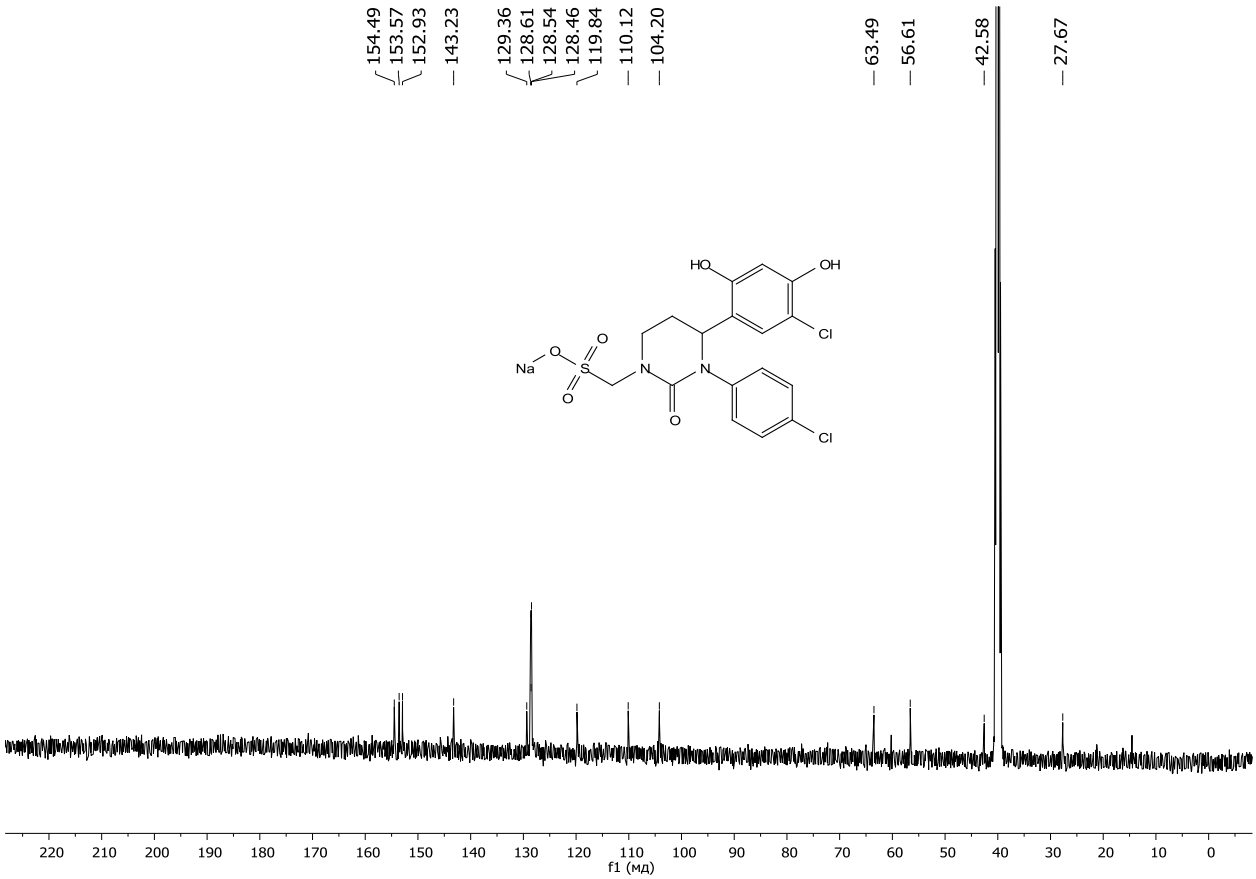

Figure S4. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4b**

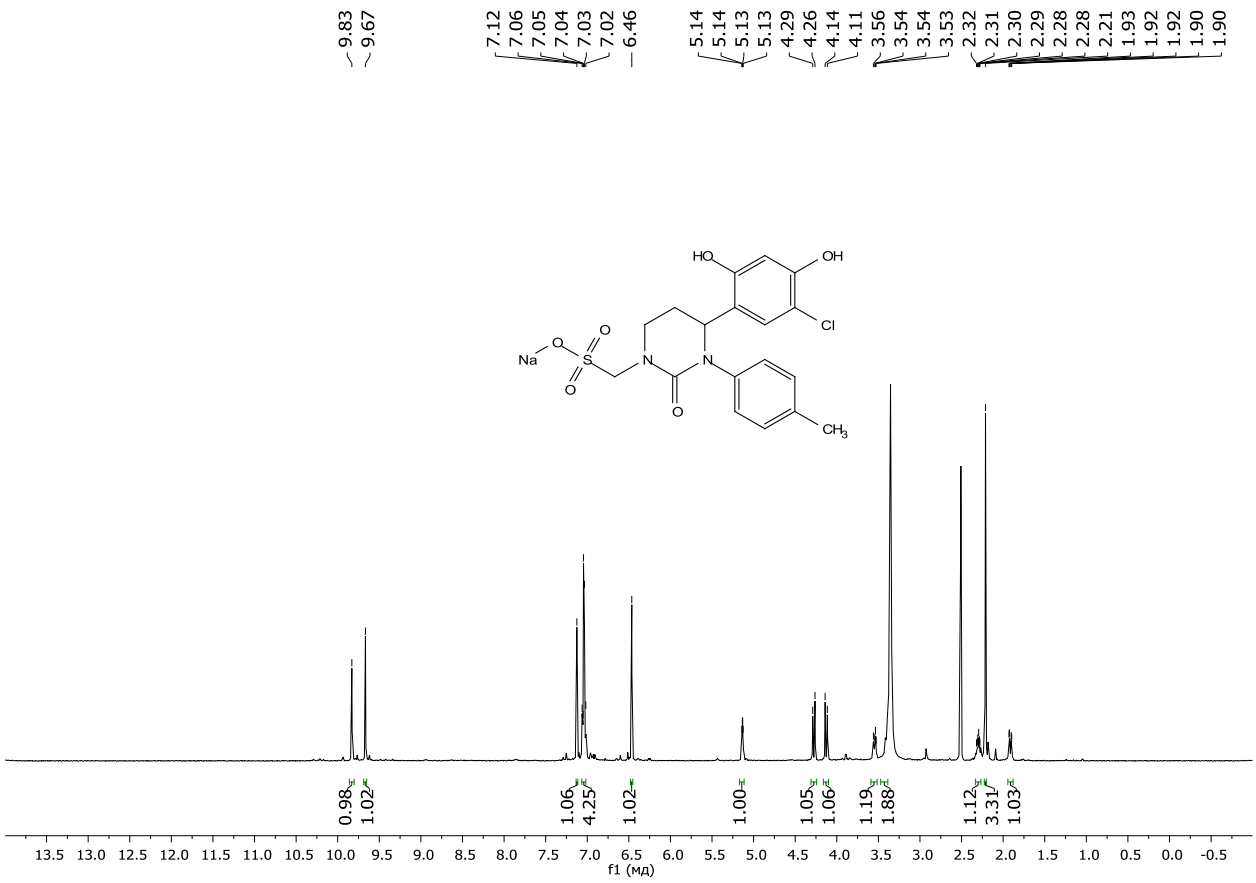

Figure S5. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4c**

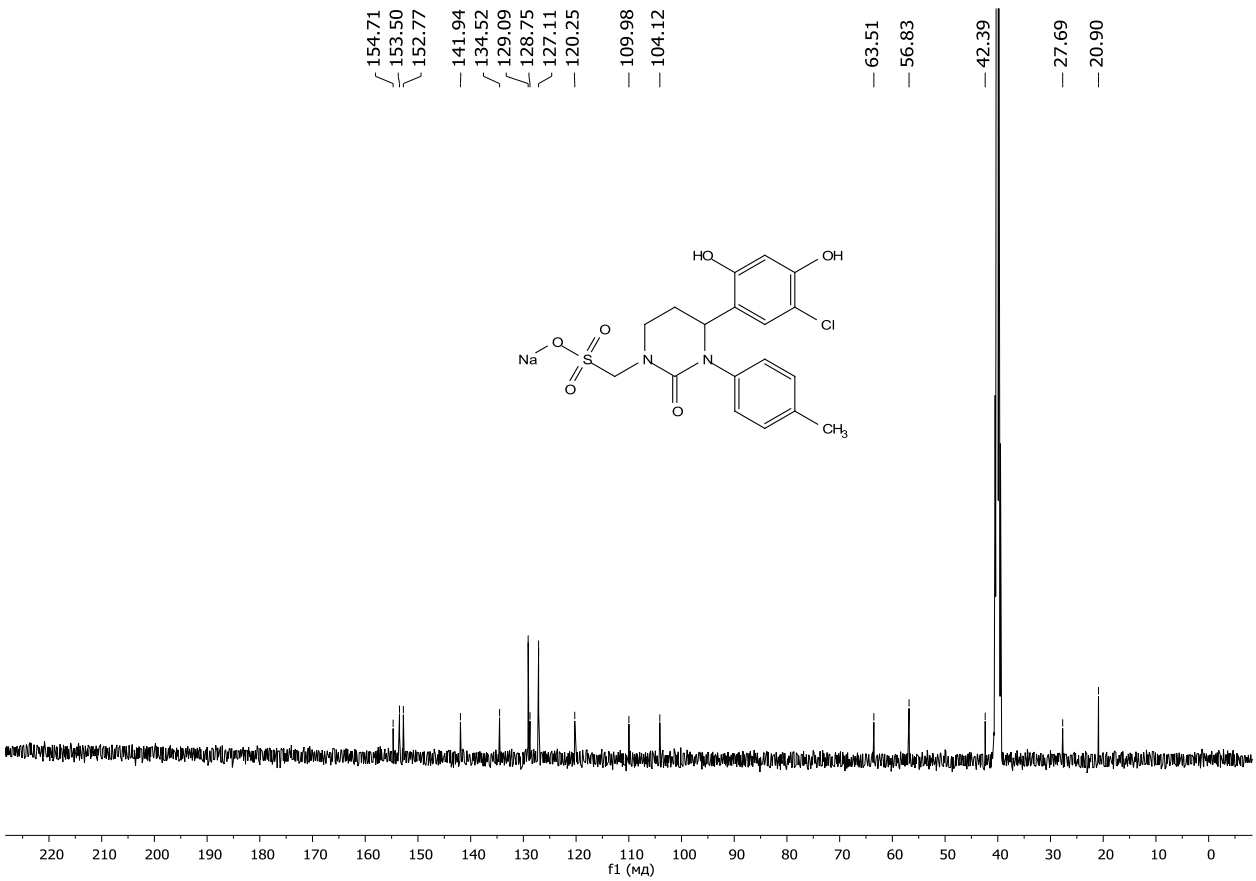

Figure S6. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4c**

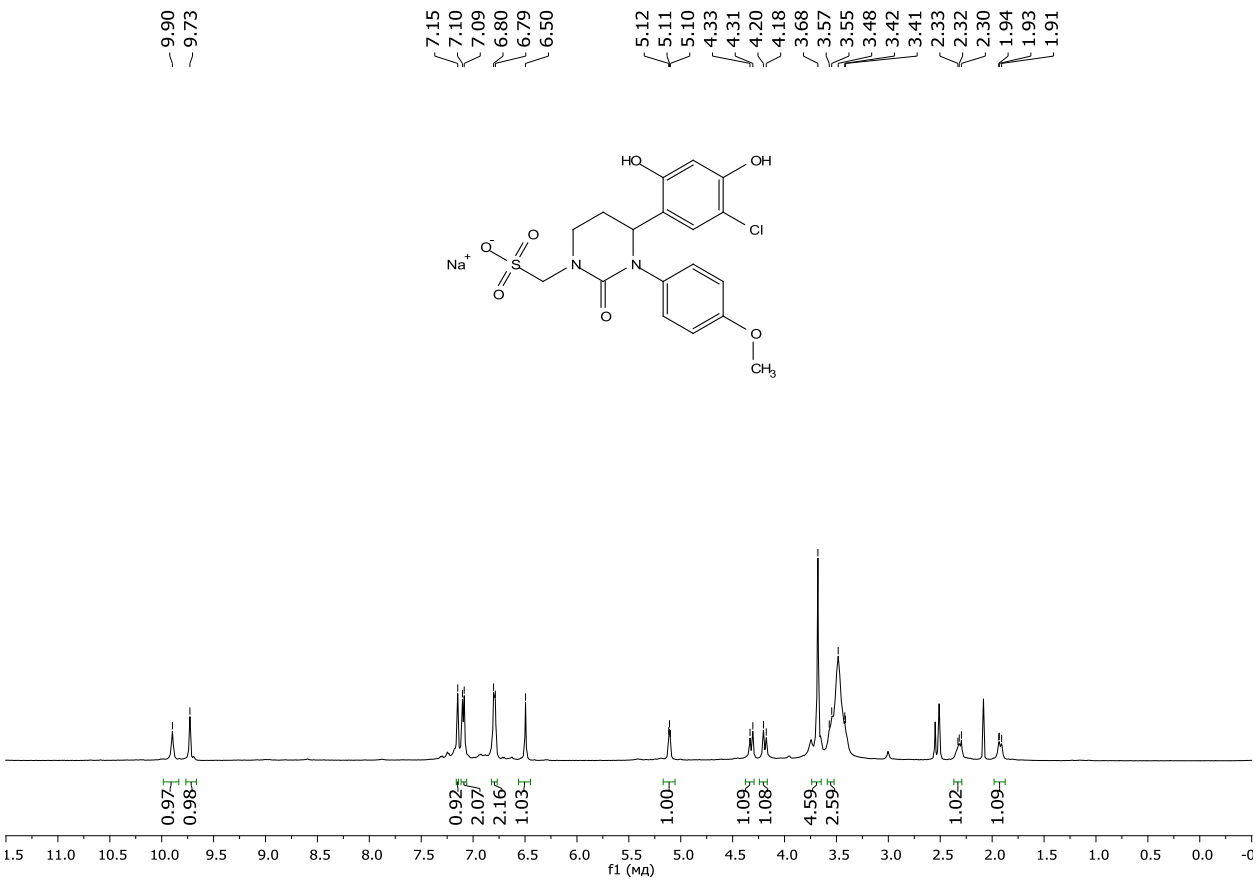

Figure S7. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4d**

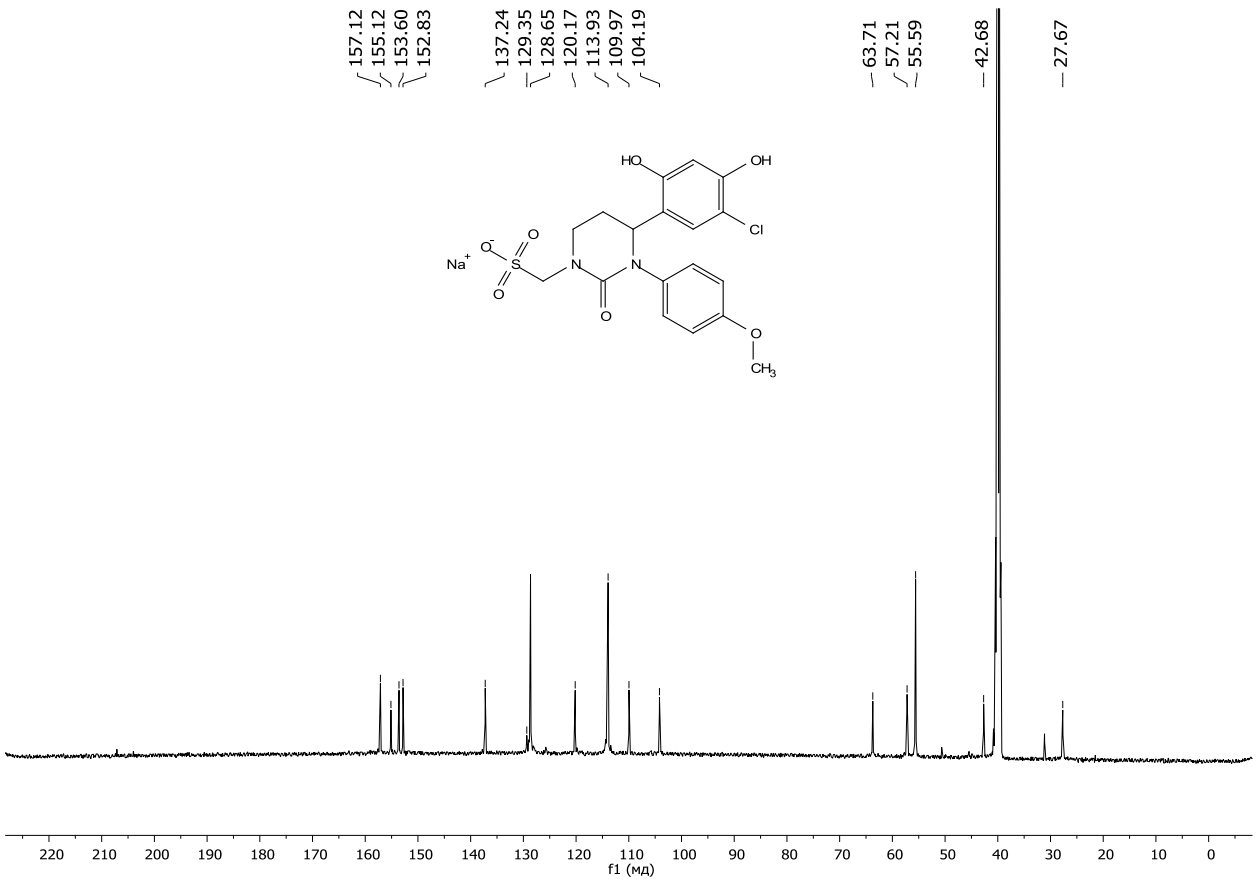

Figure S8. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4d**

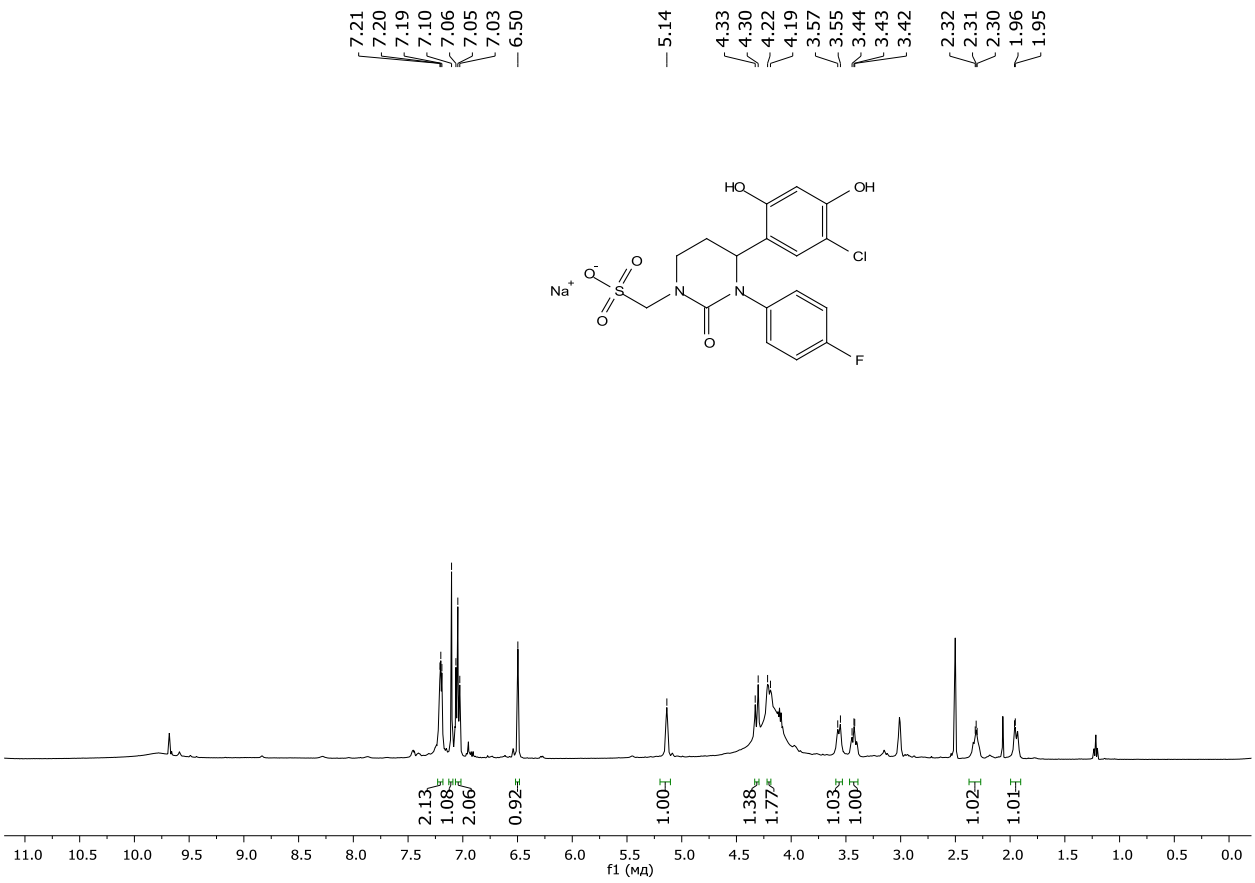

Figure S9. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4e**

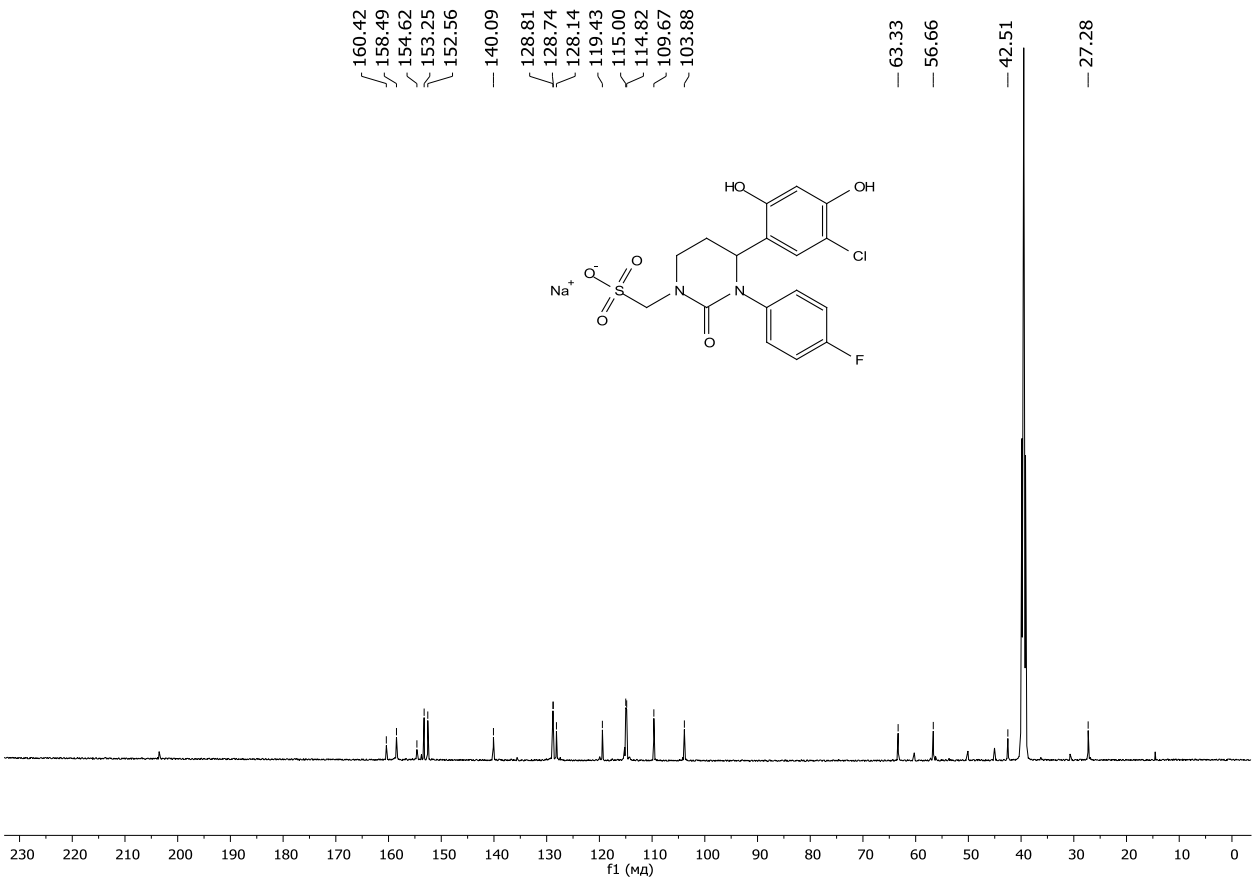

Figure S10. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4e**

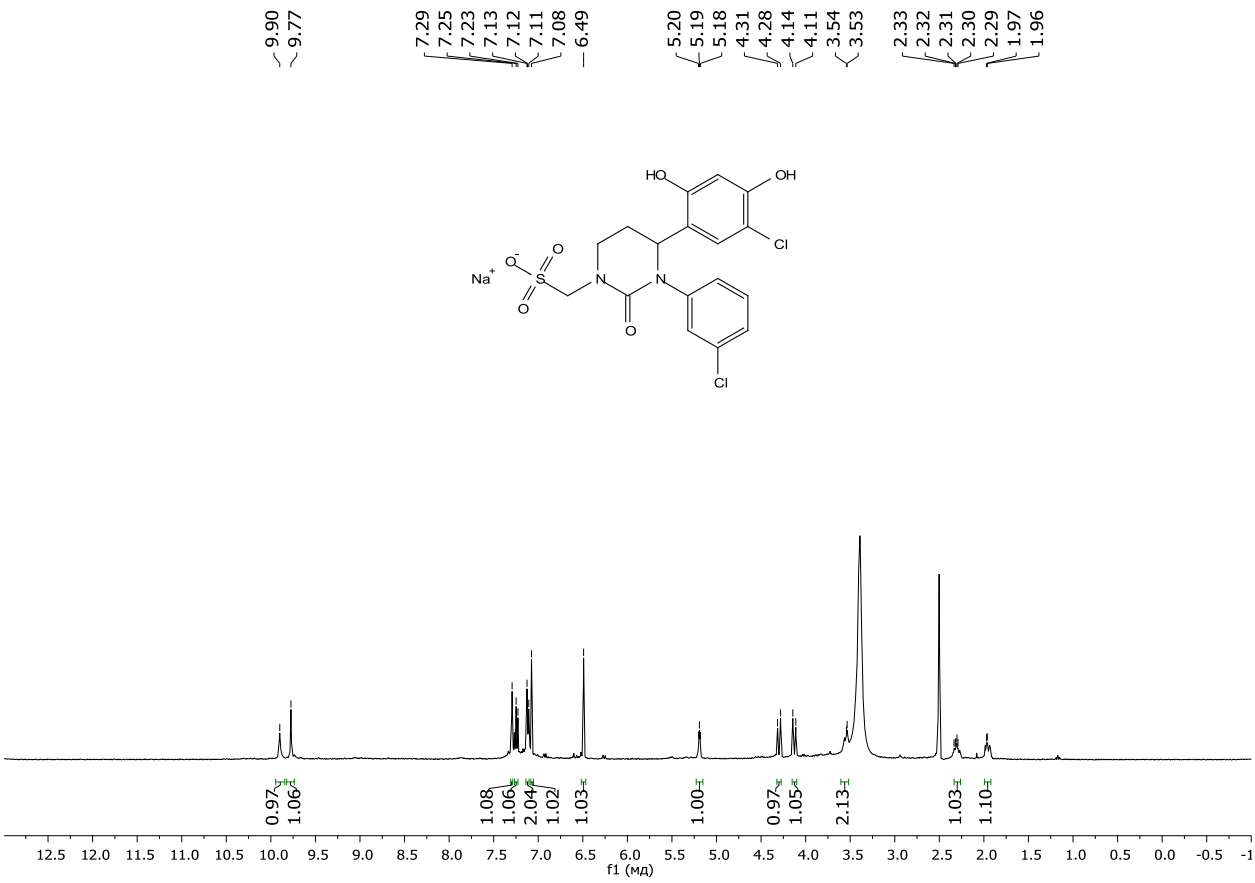

Figure S11. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4f**

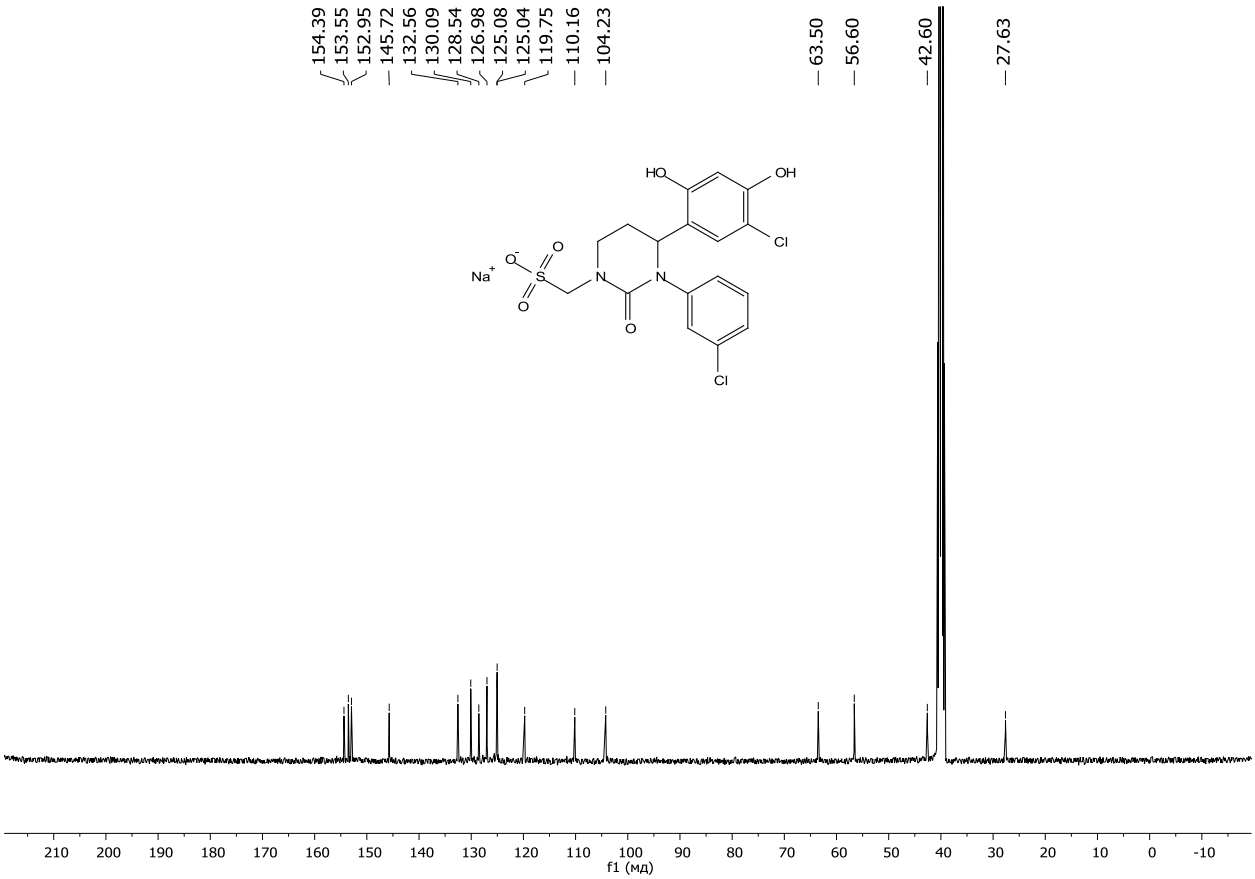

Figure S12. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4f**

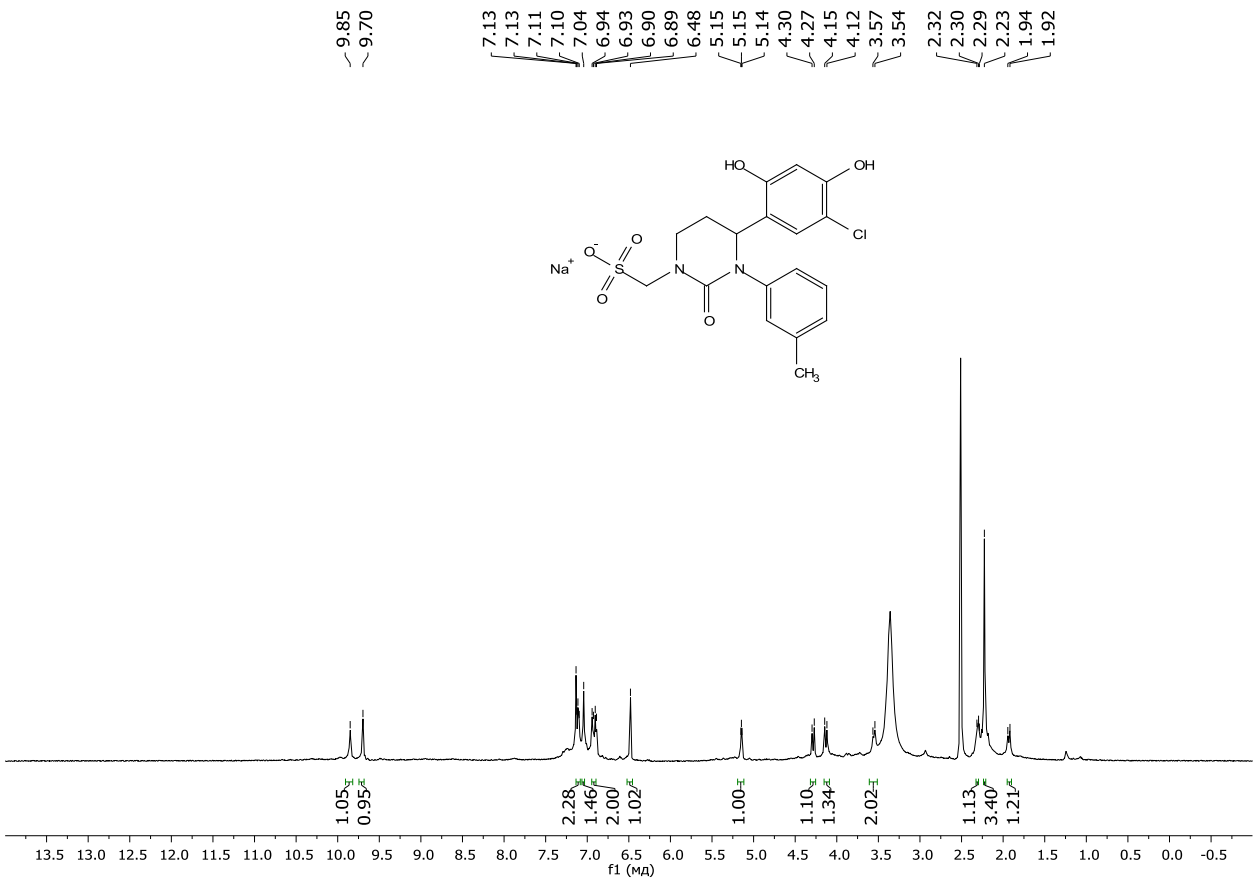

Figure S13. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4g**

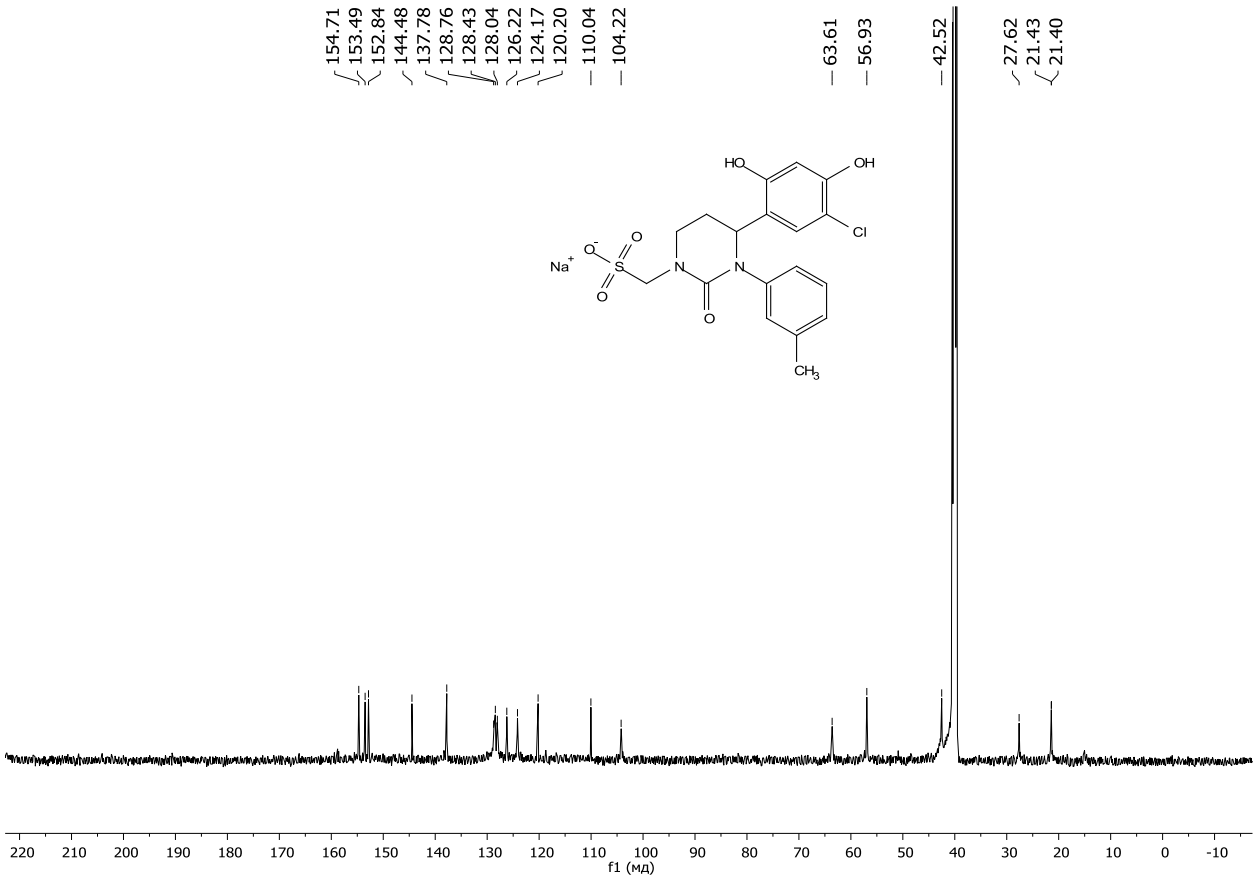

Figure S14. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4g**

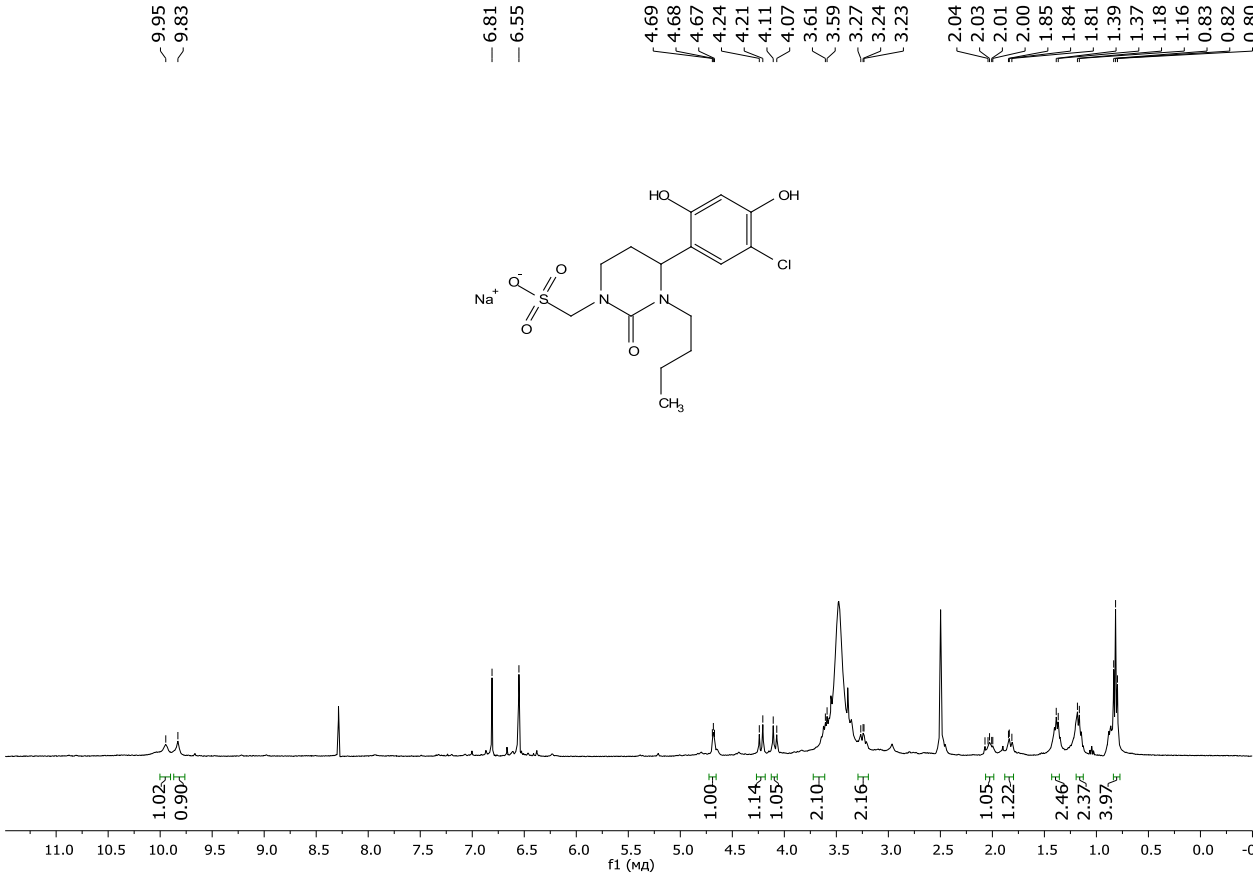

Figure S15. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4h**

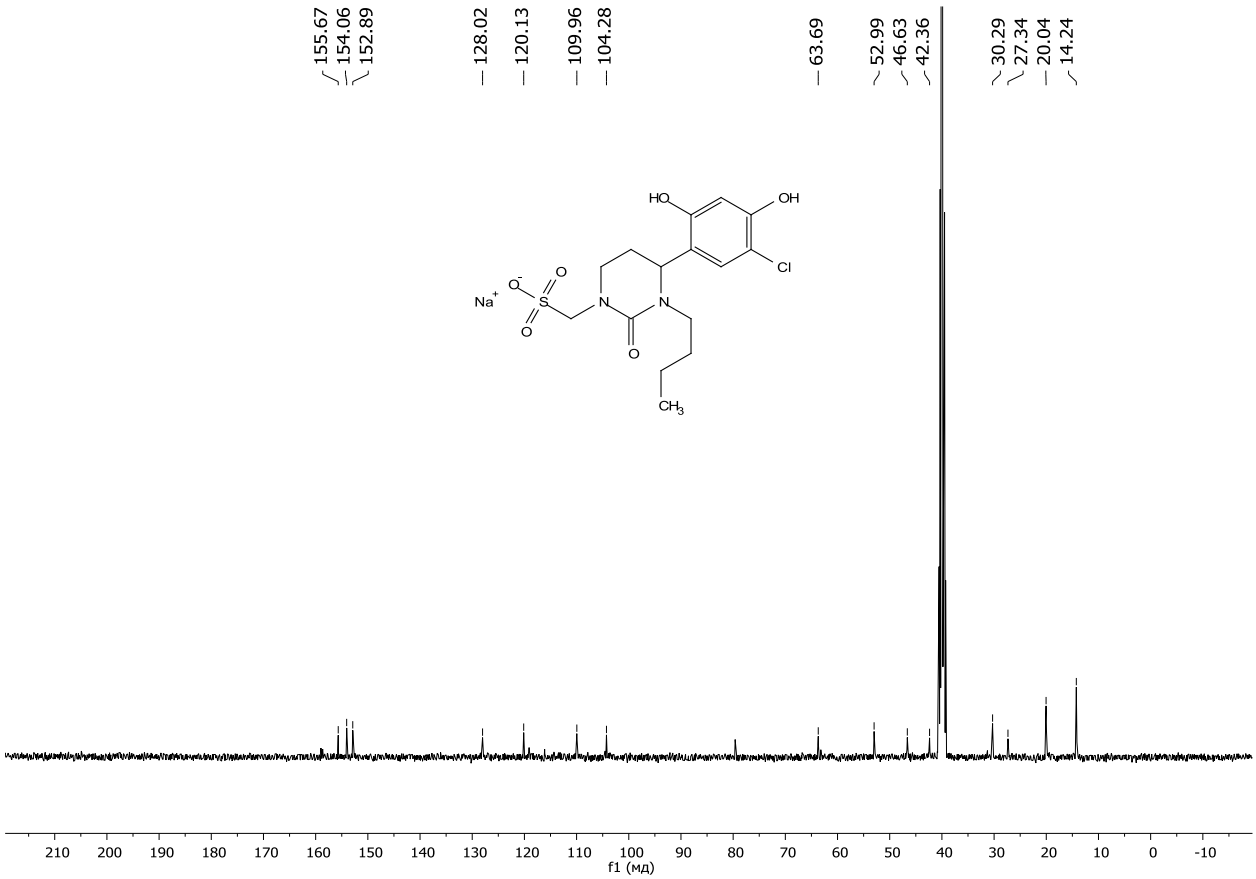

Figure S16. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4h**

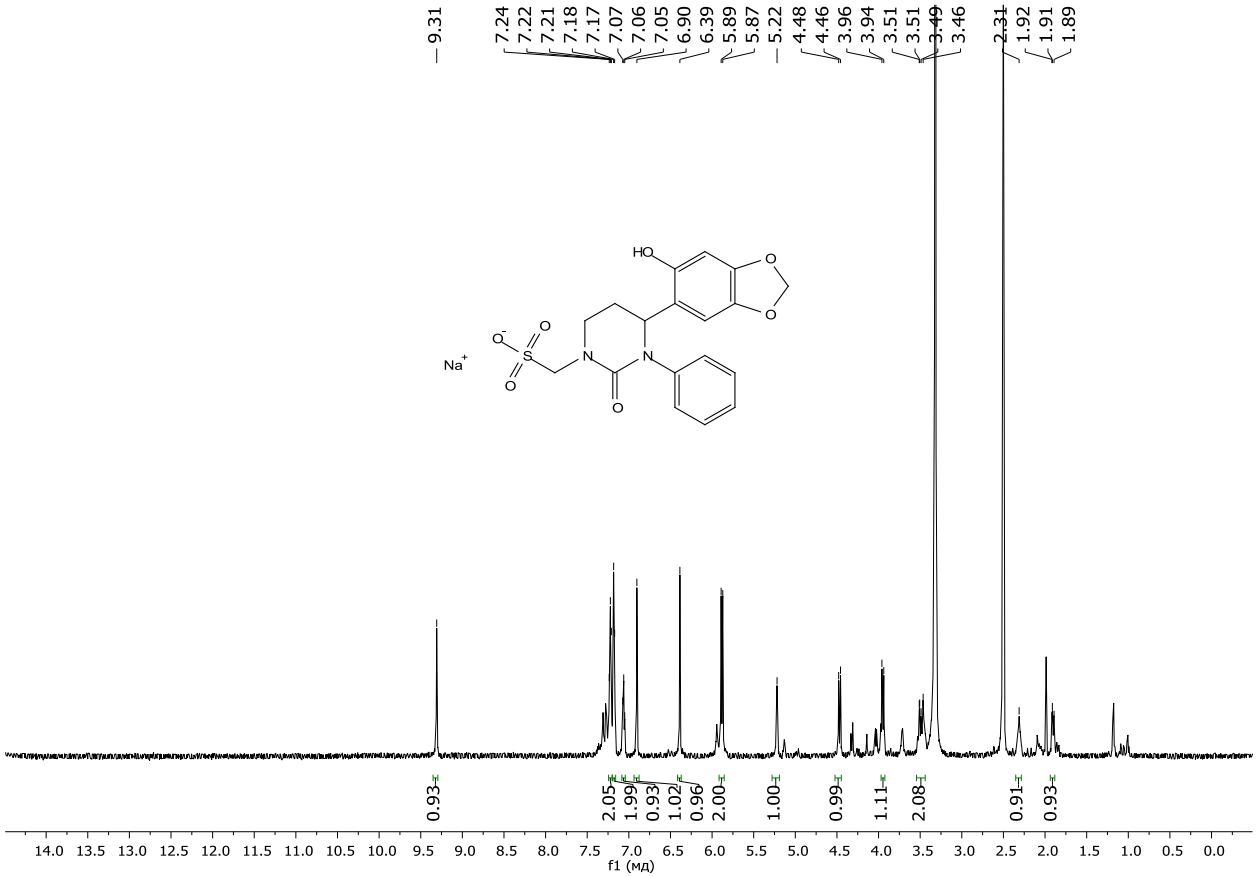

Figure S17. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4i**

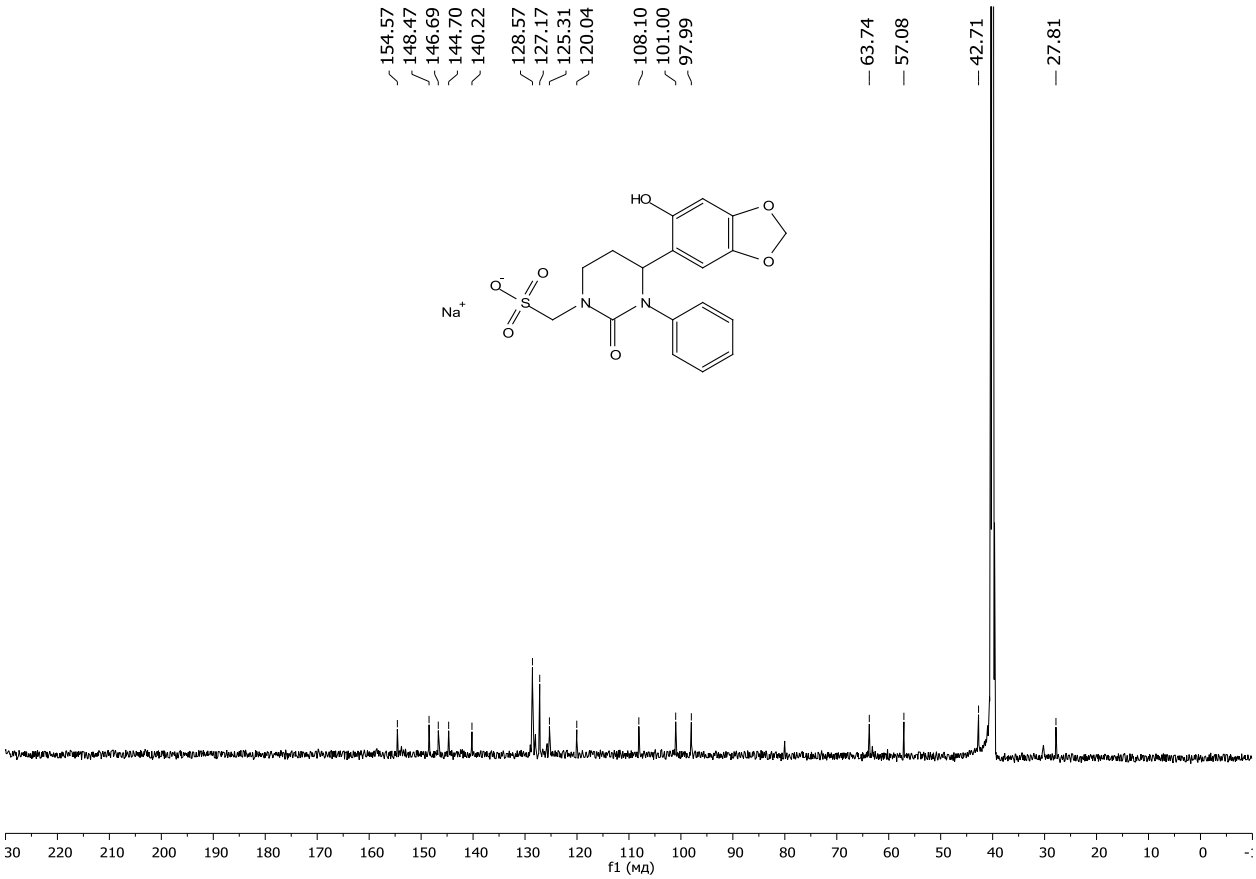

Figure S18. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4i**

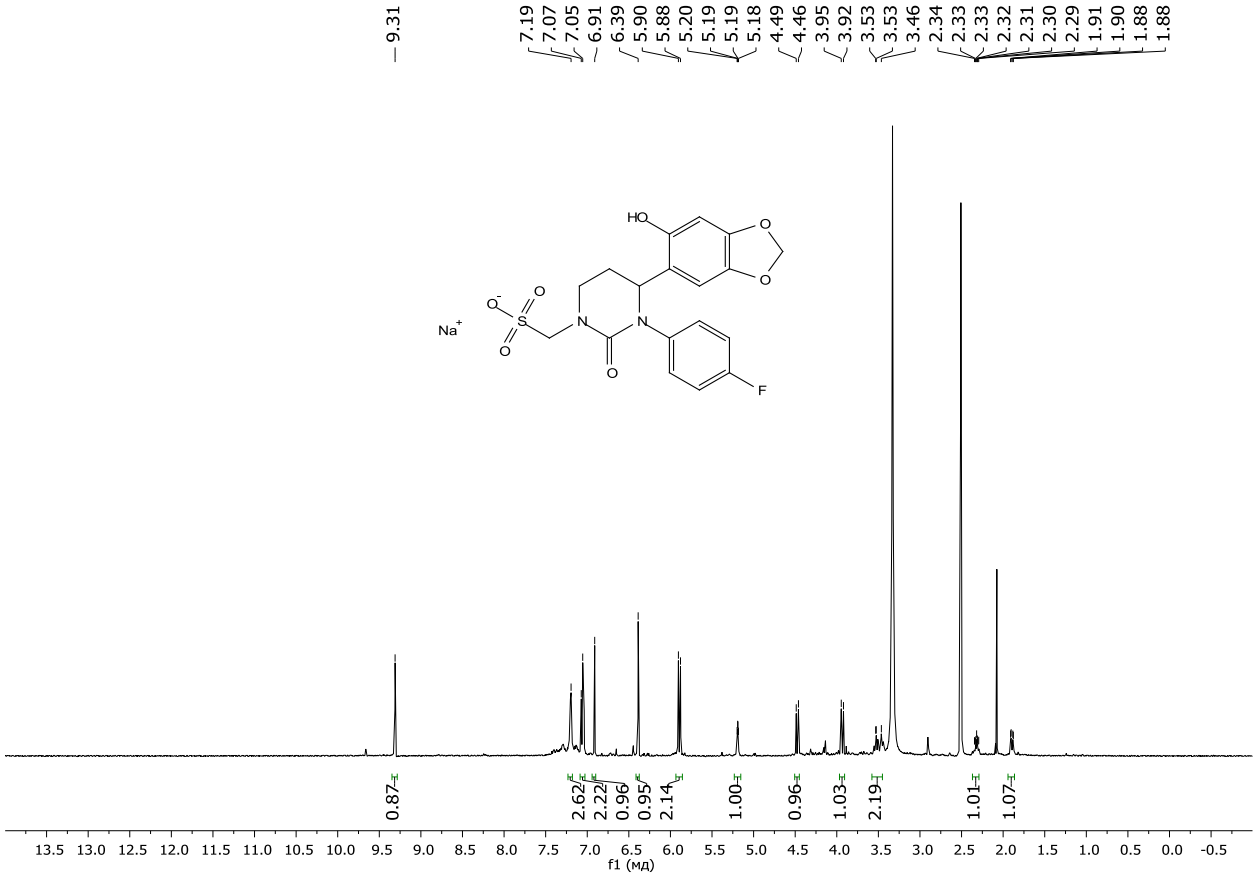

Figure S19. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4j**

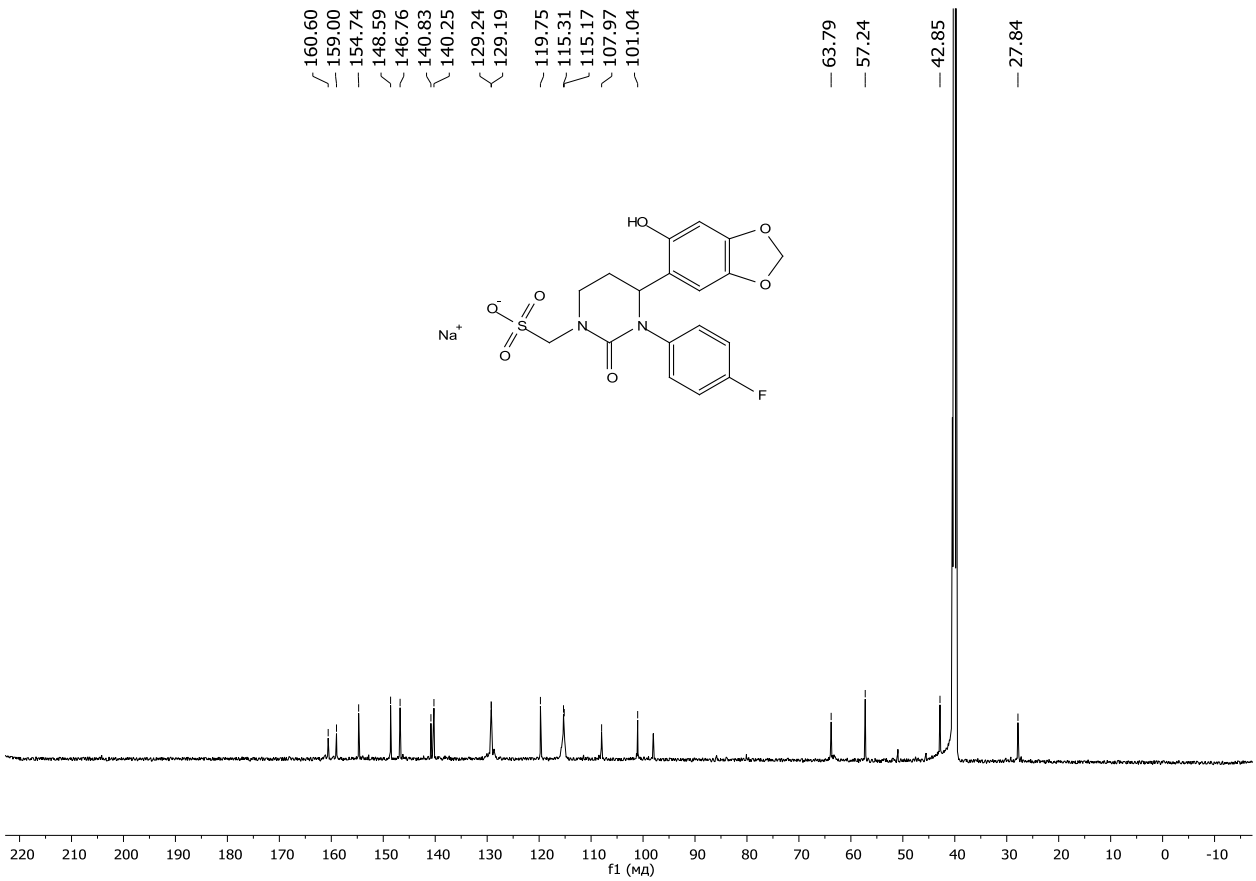

Figure S20. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4j**

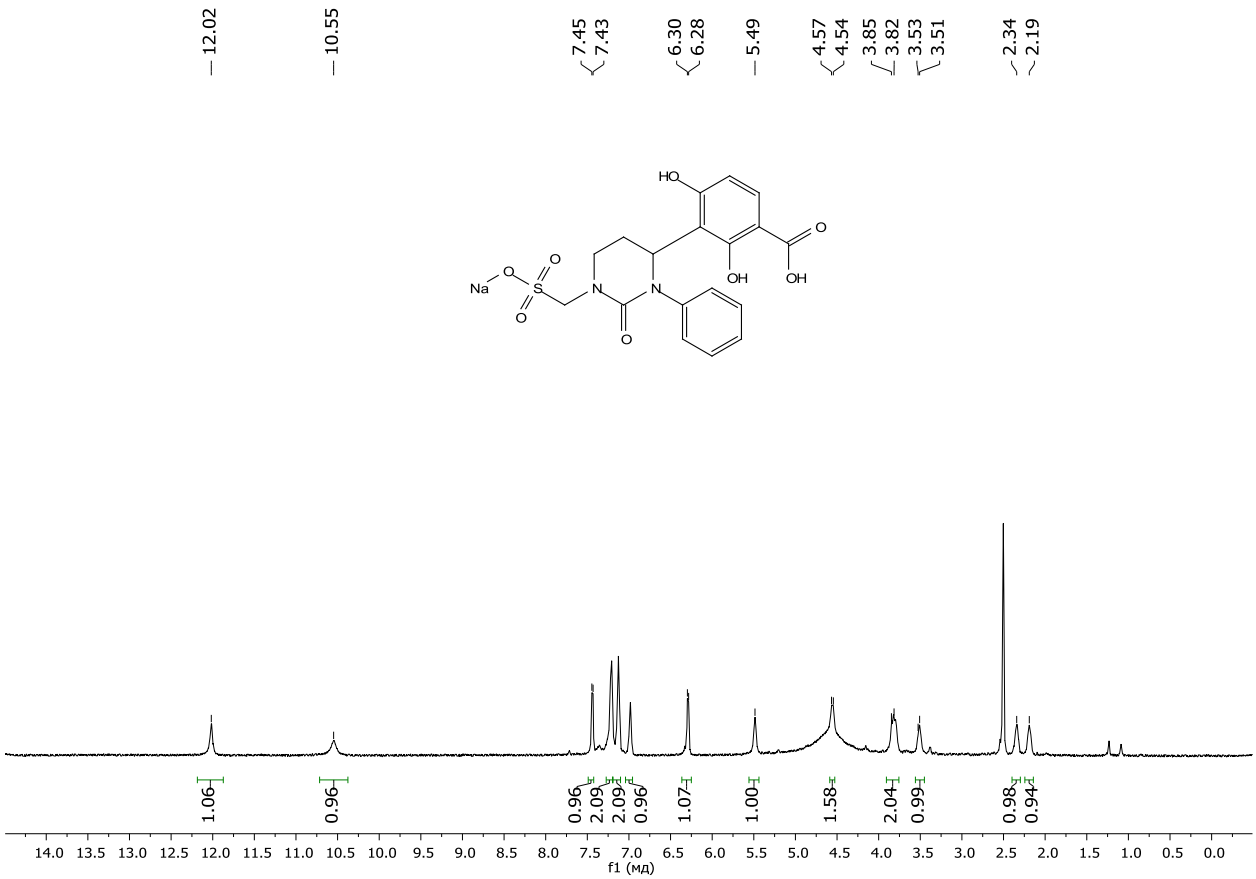

Figure S21. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4k**

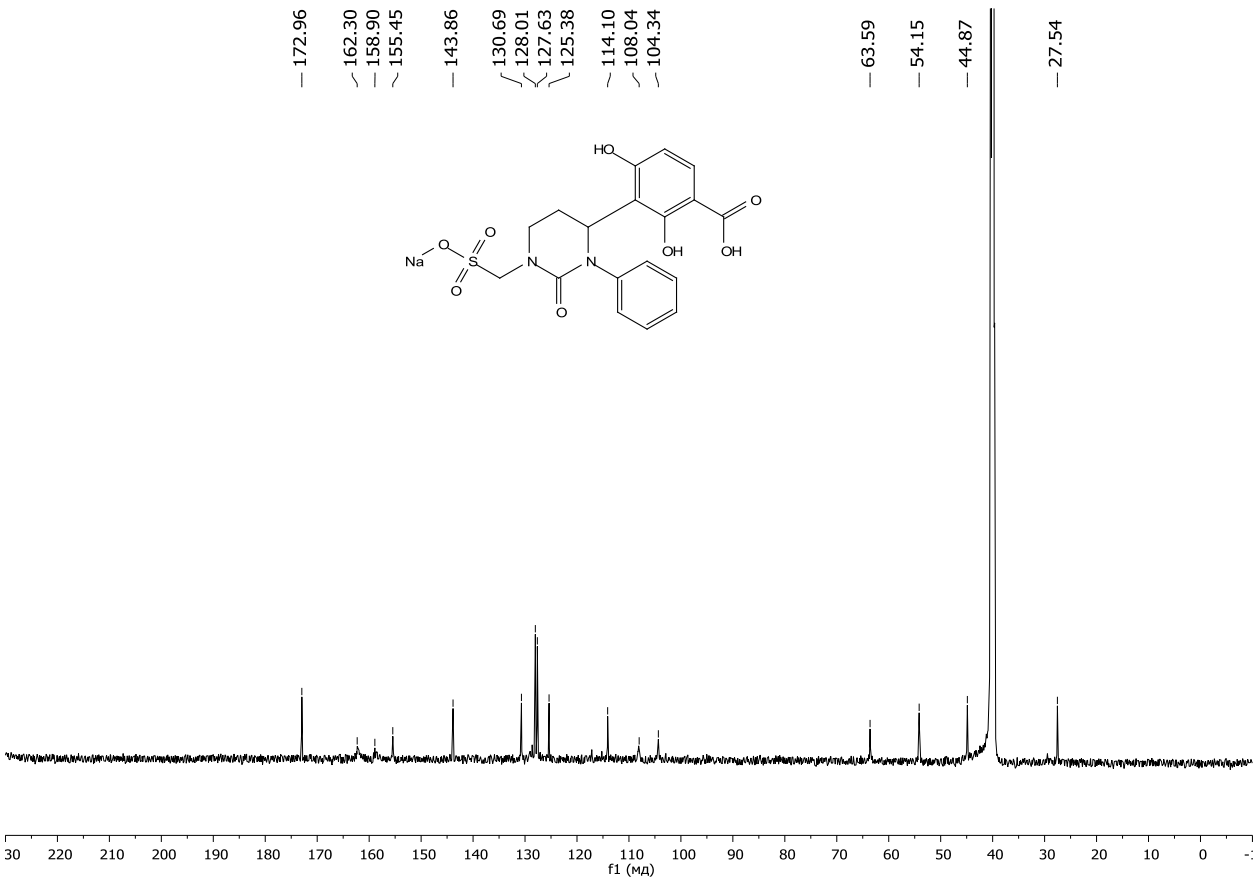

Figure S22. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4h**

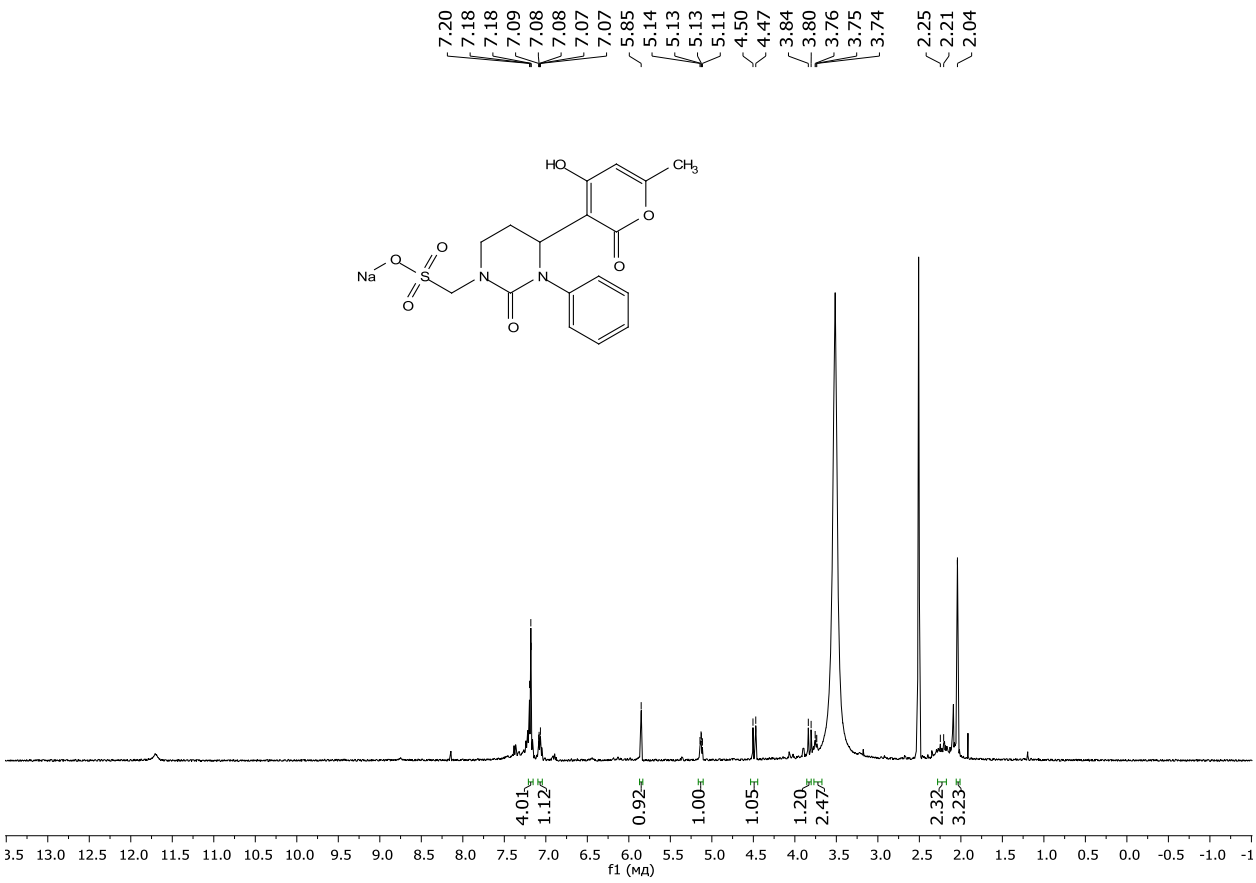

Figure S23. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4l**

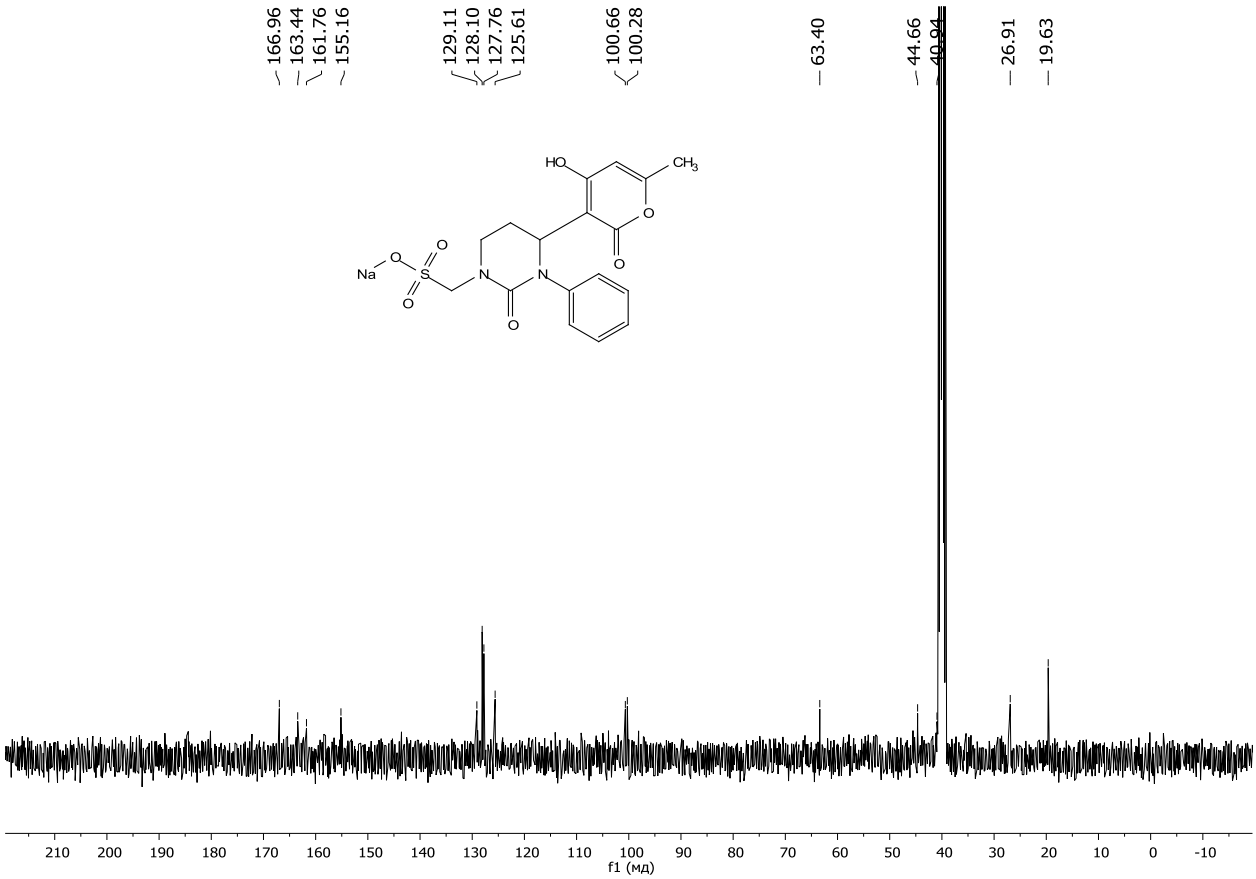

Figure S24. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4l**

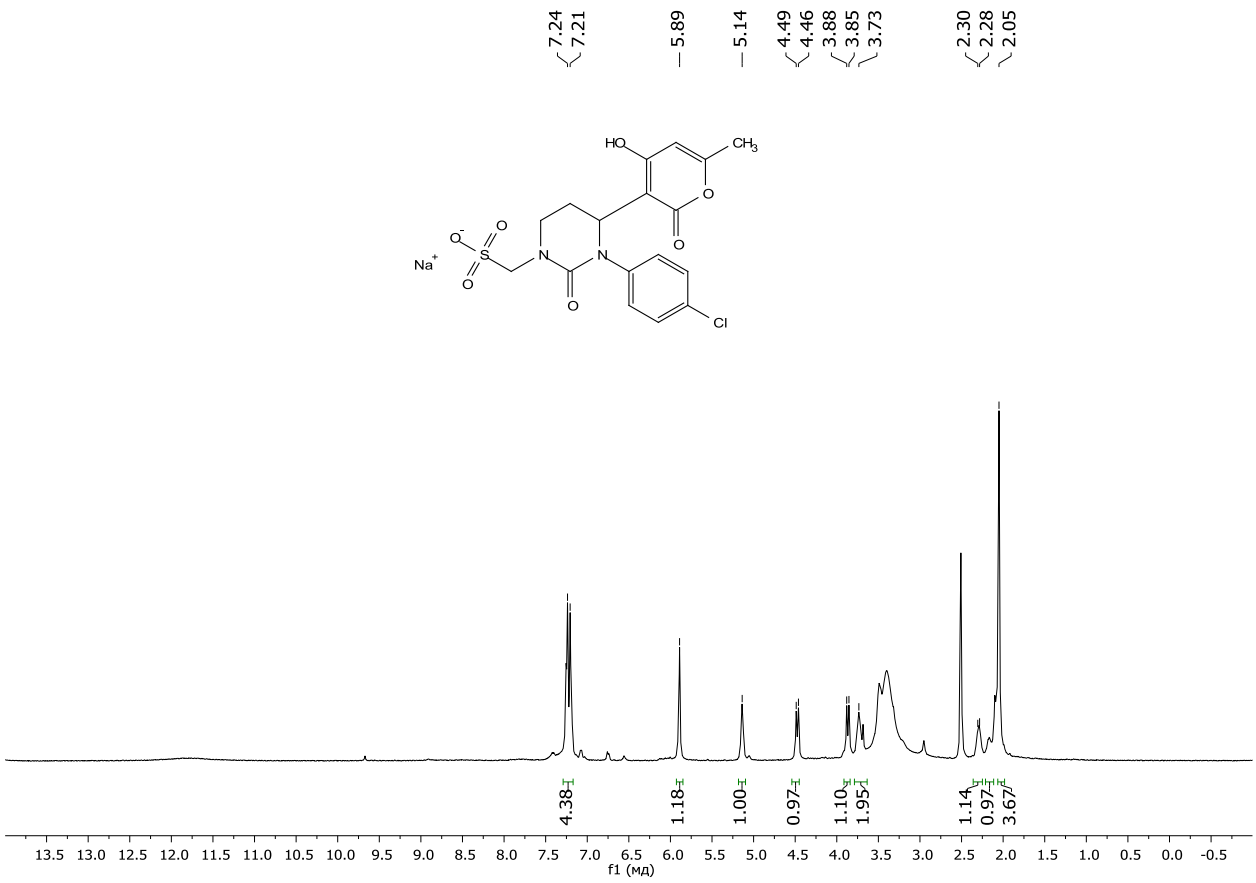

Figure S25. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4m**

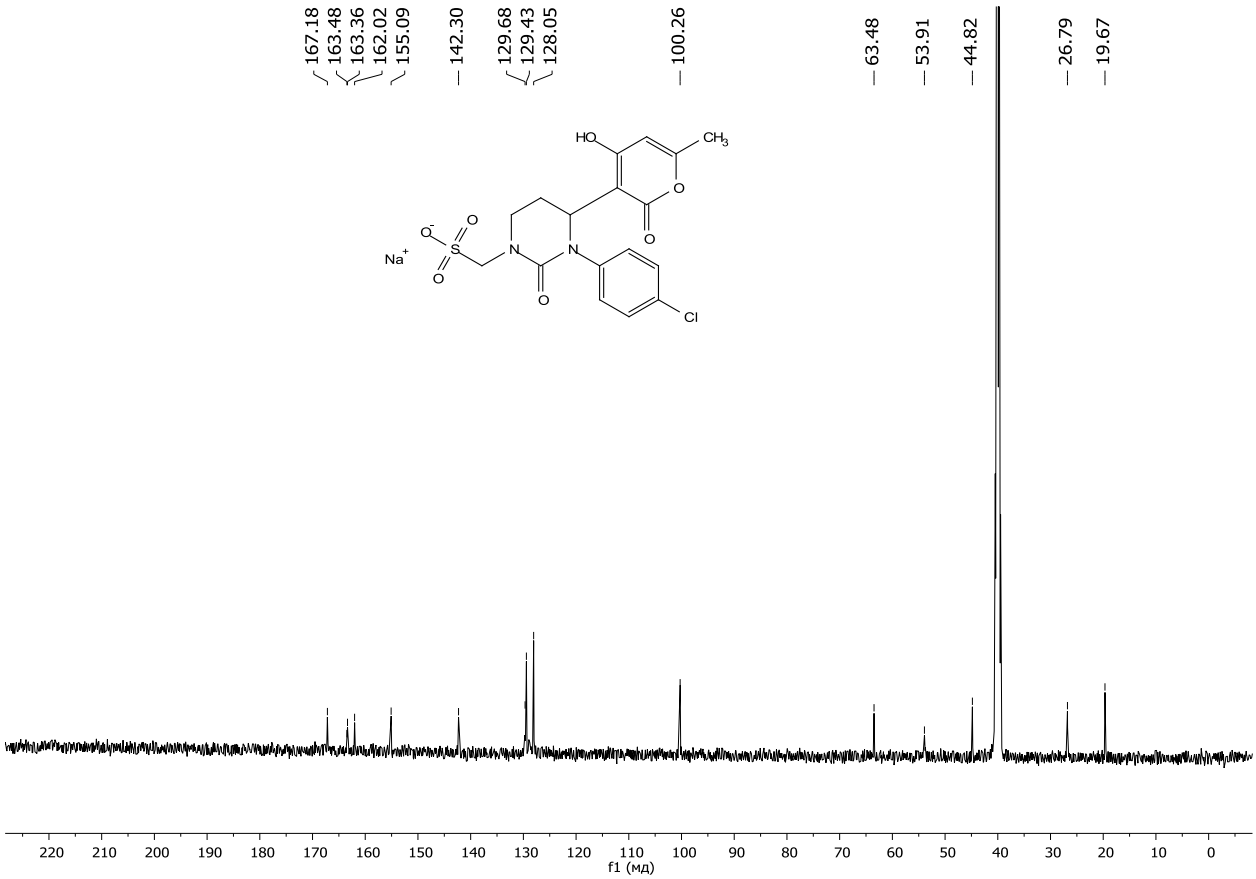

Figure S26. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4m**

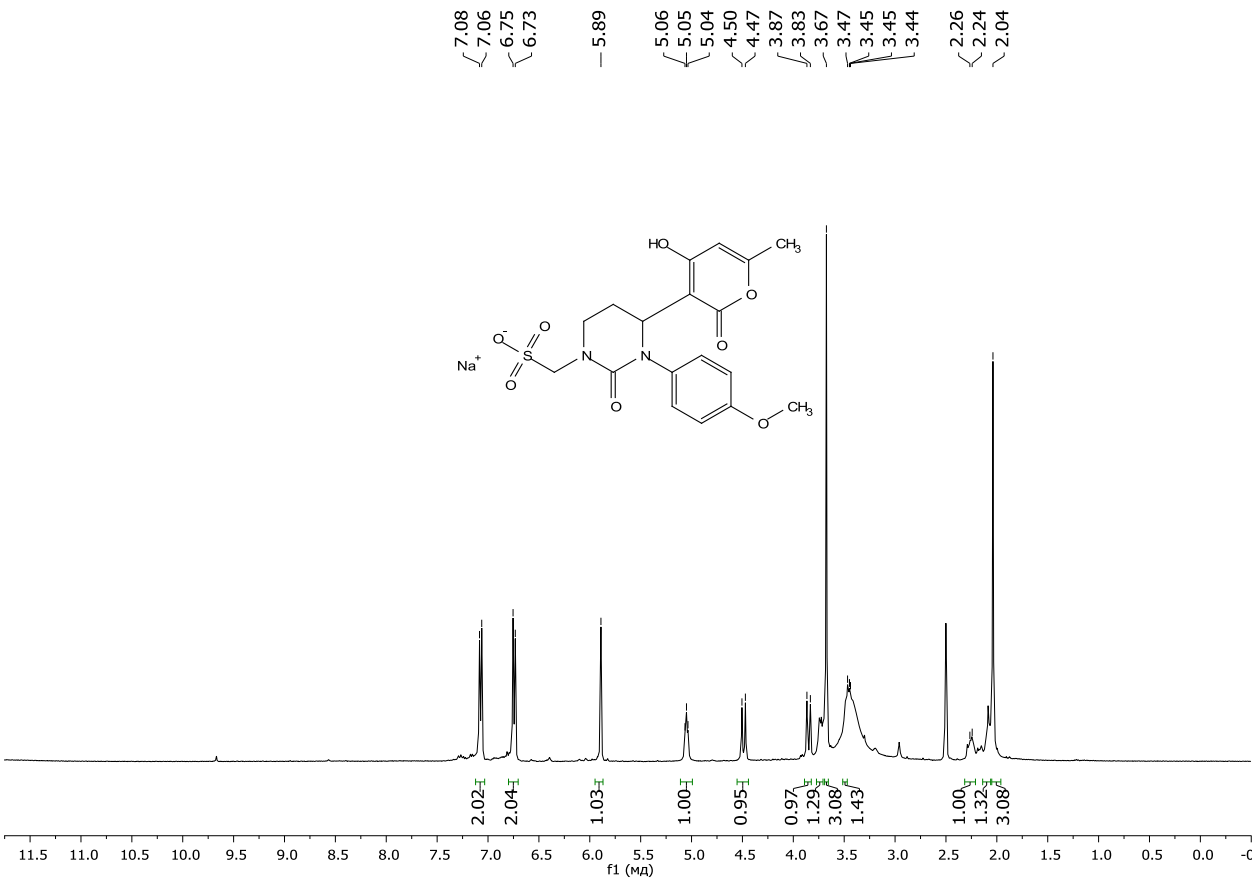

Figure S27. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4n**

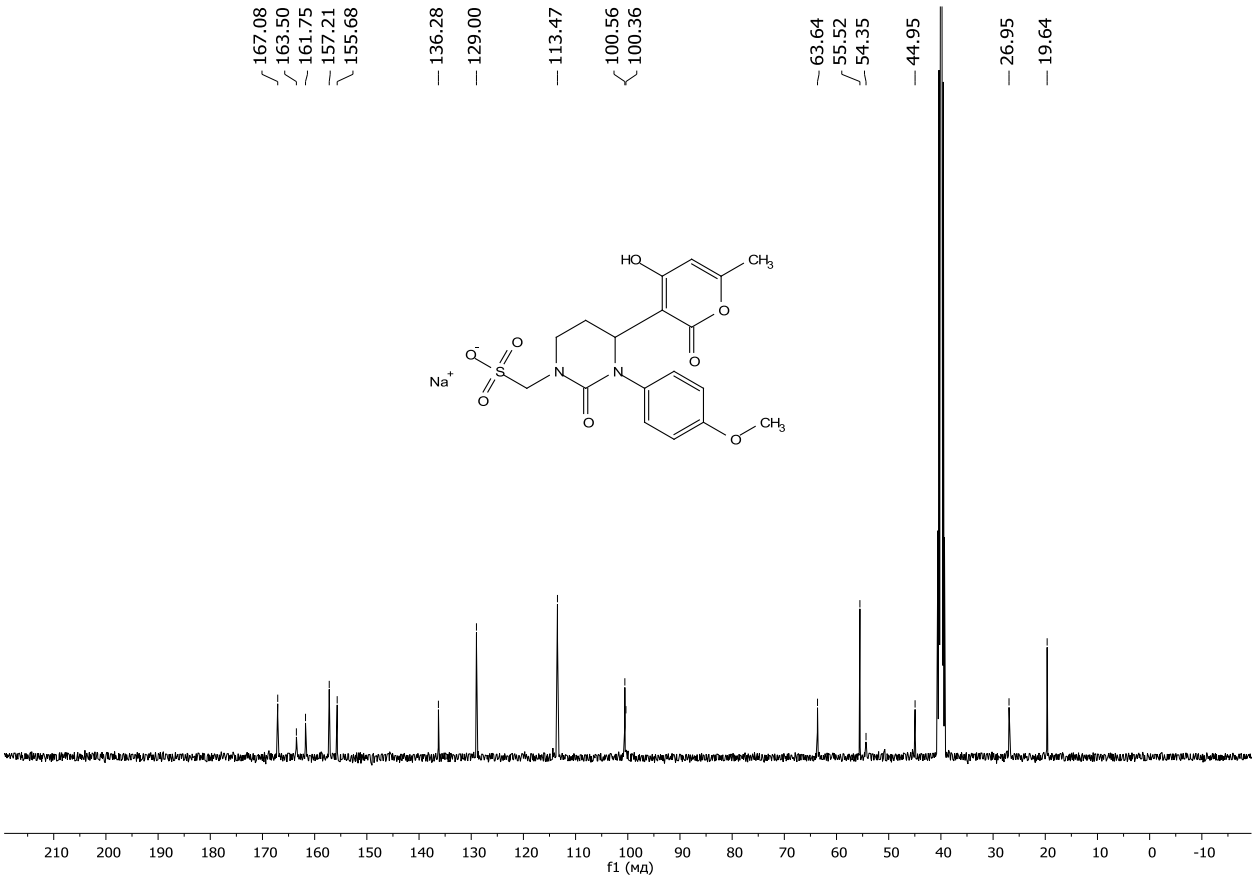

Figure S28. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4n**

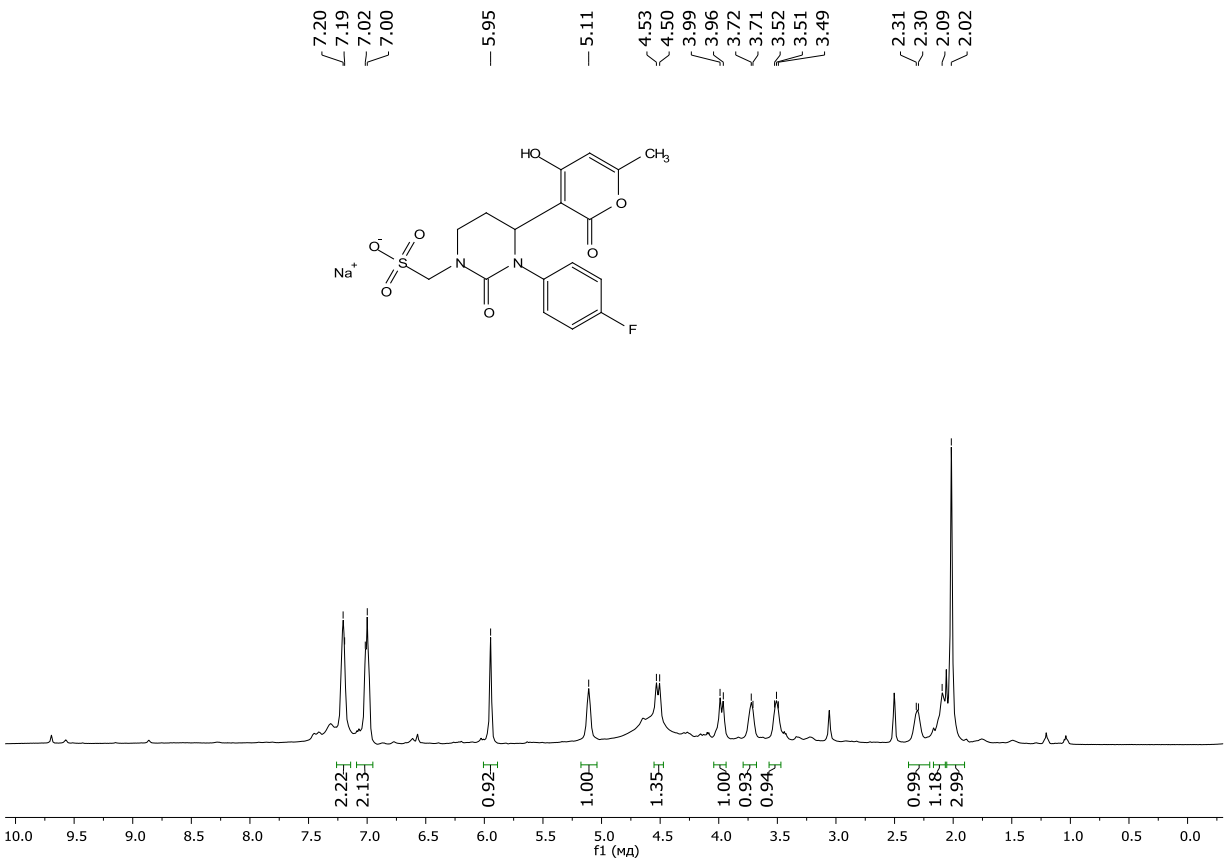

Figure S29. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4o**

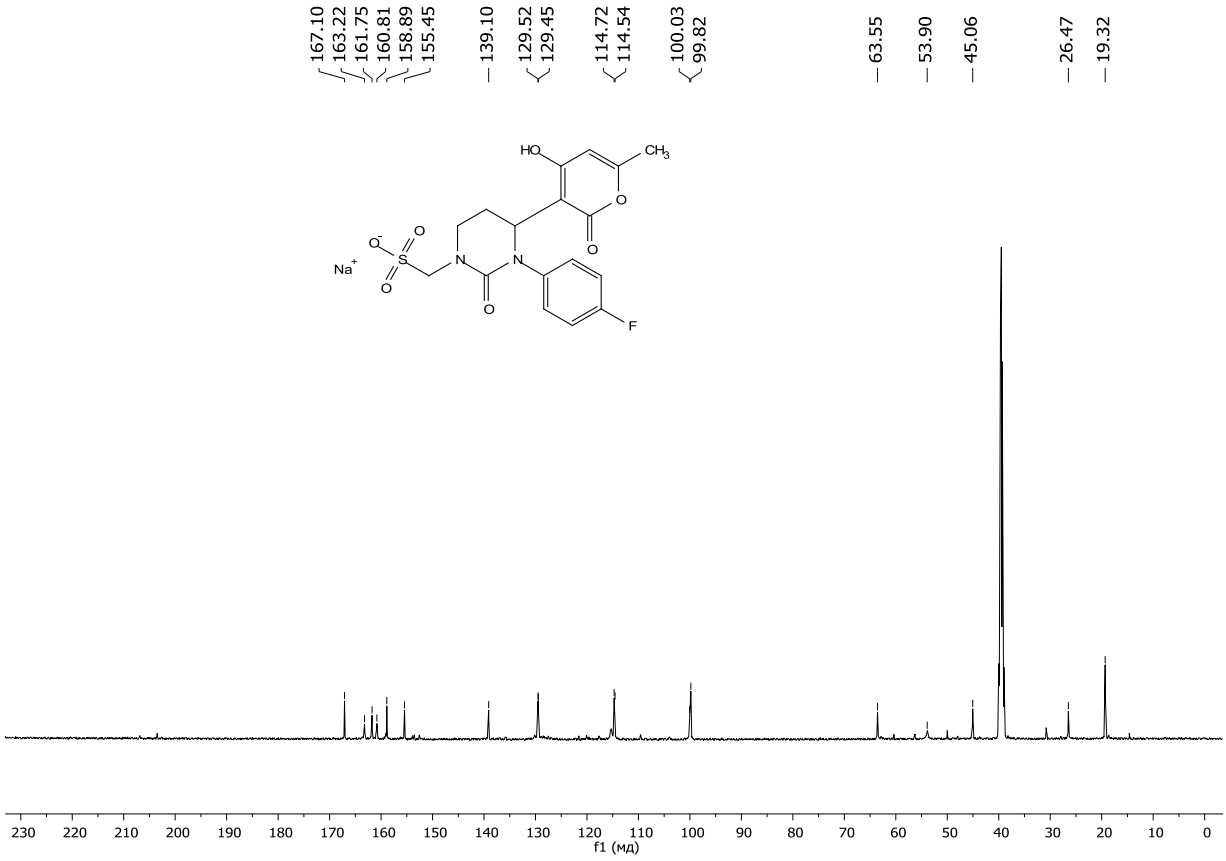

Figure S30. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4o**

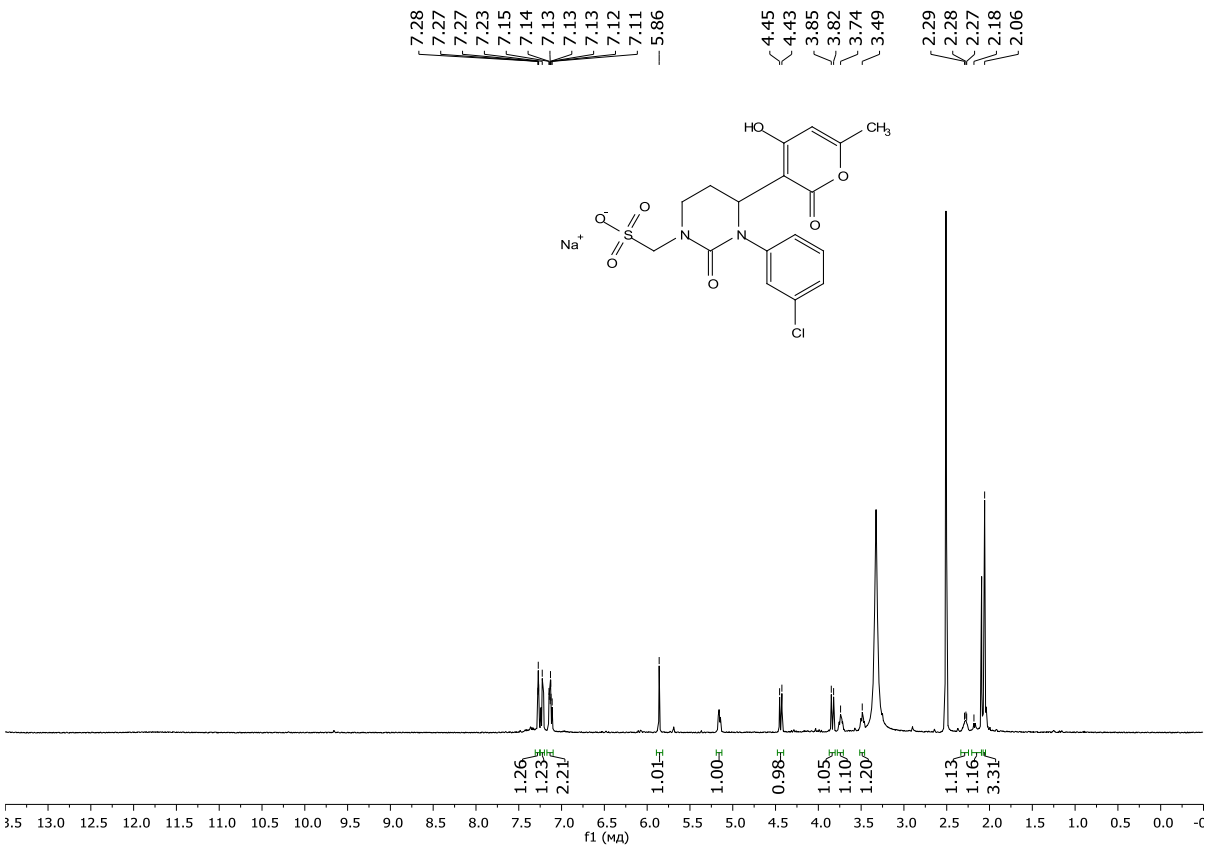

Figure S31. ^{1}H NMR spectrum (DMSO-d_6) of the compound **4p**

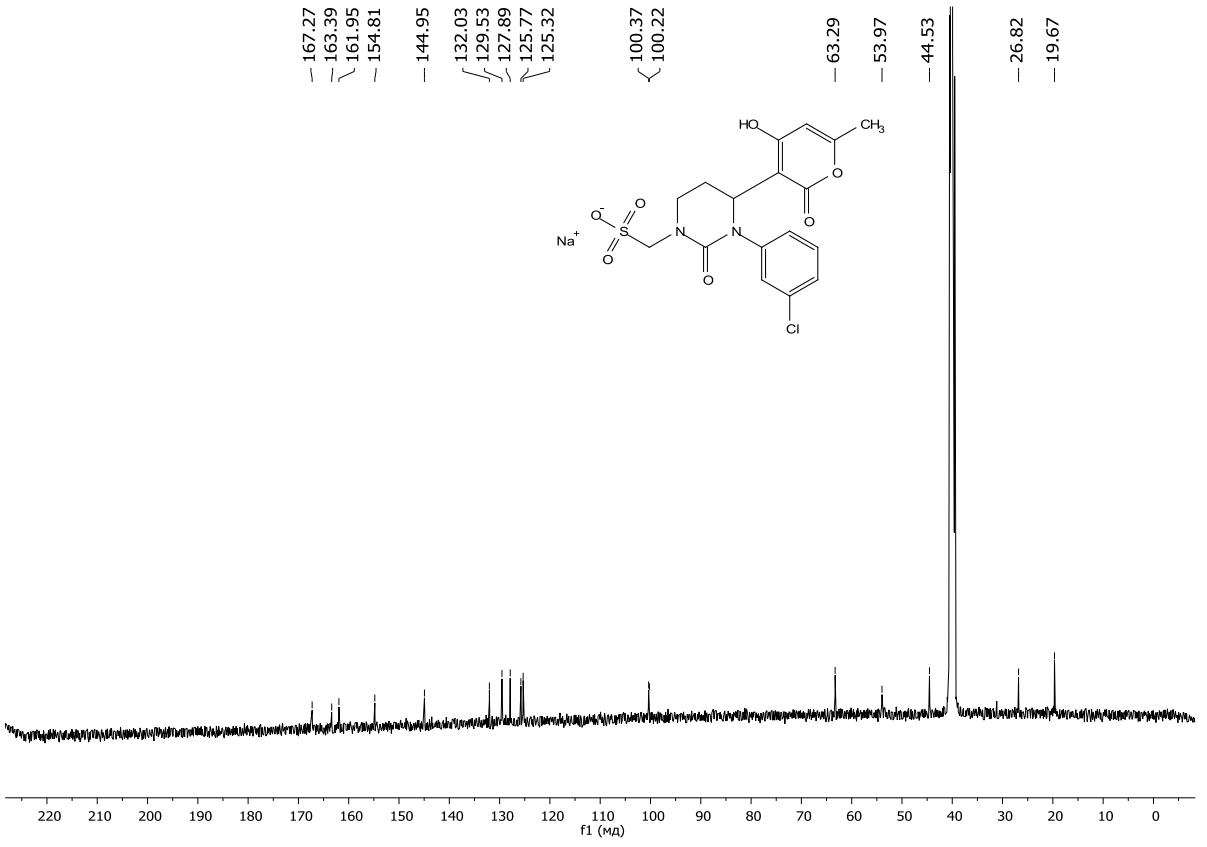

Figure S32. ^{13}C NMR spectrum (DMSO-d_6) of the compound **4p**