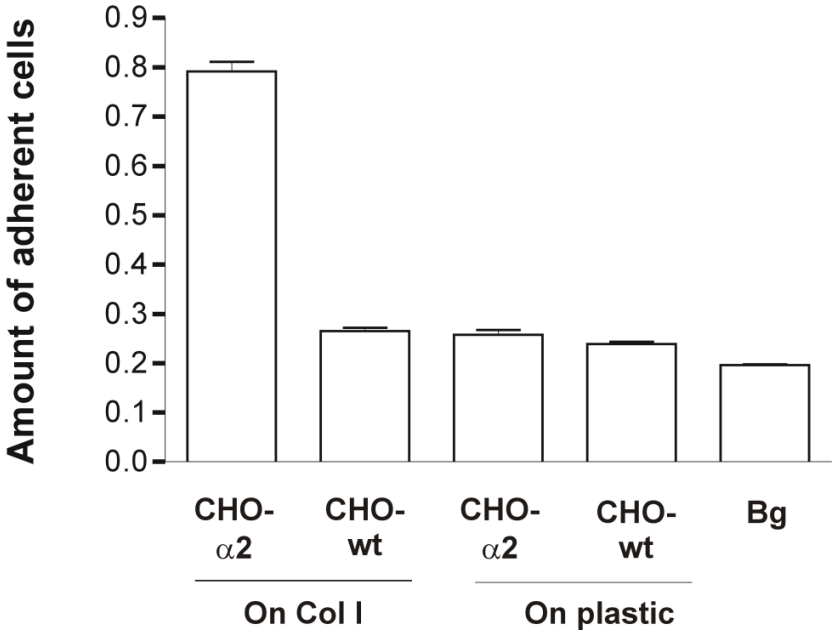



Figure S1. The wild type CHO cells do not adhere to collagen I, and neither do CHO-α2 or CHO-wt cells adhere to plastic.

# Materials and Methods

## Molecular modeling

All molecules during the development process were sketched by using Sybyl 7 (Tripos Inc., St. Louis, MO, USA), and energy minimized using the Merck molecular force field (MMFF94)[1] and conjugate gradient method until the energy gradient was less than 0.05 kcal/mol. Energy minimized molecules were docked to the closed conformation of α2I domain with Gold3.1.1.[2] using search area of a 15 Å radius sphere centered at the $Mg^{2+}$ ion. Gold was selected for this study, because the scoring function has been developed by using the small molecule crystal structure data, and the metal coordination geometries are properly described. Protein structures were acquired from the PDB [3]. Hydrogen atoms were added to the protein structure with Sybyl. Protonation of histidines was selected on the basis of hydrogen bonding with nearby atoms. All docking results were visually inspected by using Bodil Modeling Environment[4].

## Structural characterization

NMR measurements were done with Bruker Avance DRX 500 ($^1$H-NMR 500 MHz and $^{13}$C-NMR 126 MHz) using dimethylsulfoxide-d6 (DMSO-$d_6$) as the solvent. The mass spectrometry was done with Micromass ESI TOF spectrometer using methanol as solvent. Melting points were measured using Stuart Scientific melting point apparatus and are uncorrected. All compounds have purities >95% determined by elemental analyses (using Bruker Quantax400 EDS).

## Cell adhesion assay

CHO (Chinese hamster ovarian cells), were obtained from the American type Culture Collection (ATCC). CHO cells were transfected to express either wild-type (wt) human α2 or α1 integrin[56]. Shortly, integrin α2 cDNA was linked to pAWneo2 expression vector (Ohashi et al, 1985) Integrin α1 cDNA was linked to pcDNA3.1. Cells chosen to adhesion tests are controlled to have similar integrin overexpression. In adhesion assays CHO-α2 or -α1 cells (150 000/well) were allowed to attach on rat tail collagen I or on collagen IV (respectively, Becton Dickinson Labware) for 2 h at 37°C. Number of adherent cells was measured with WST-1 (Roche Applied Science) according to the manufacturer's protocol. WST-1 measures the amount of live cells. The stable tetrazolium salt WST-1 is cleaved to a soluble formazan that occurs primarily at the cell surface. This is dependent on the production of NAD(P)H in viable cells. Therefore, the amount of formazan dye formed directly correlates to the number of metabolically active cells in the culture. The $EC_{50}$ (concentration required for half maximal effect) and $I_{max}$ (maximal inhibitory effect) values were determined using Graph Pad Prism (Graph Pad Software Inc). Based on our previous study, sulfonamides do not inhibit CHO wild type adhesion to collagen I[7]. In addition, CHO wt cells do not adhere to collagen I, and neither do CHO-α2 or CHO-wt cells adhere to plastic (supplementary Fig. S2). The α2 vs α1 selectivity was determined by comparing $EC_{50}$ values of CHO-α2 and -α1 adhesion assays.

## Cytotoxicity assay

Cytotoxicity of compounds were measured with CytoTox-ONE™ (Promega, Madison, WI, USA) by following the manufacturer's protocol. The protocol is based on determining the release of lactate dehydrogenase from cells with a damaged membrane. An enzymatic assay that converts resazurin into a fluorescent resorufin is measured after 10 minutes. The amount of fluorescent resorufin is proportional to the number of dead cells. As mentioned in Table 1, **5-20** were not toxic at ≤200μM, **4** was not toxic at ≤20μM, and **21** was not toxic at ≤100μM.

## Figures

Figs. 2A, 3, and 4 were prepared by using Bodil[4], Molscript v2.1.2[8] and Raster3D[9].

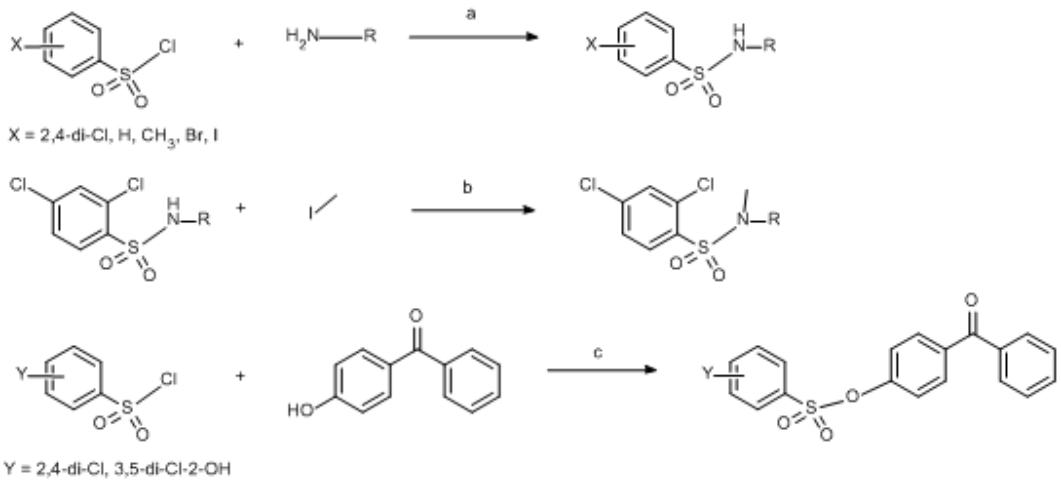
## Synthesis.

**General procedures.** Sulfonamides were synthesized with one step synthesis from commercially available starting materials. General procedure **a** (compounds **4-7** and **12-20**; Scheme S1:a): Corresponding amine (2 mmol) and sulfonyl chloride (2.2 mmol.) were dissolved in 30 mL of acetone with 1 mL of pyridine and stirred at room temperature for 10-16 hours. 10 mL of 2 M HCl was added to the reaction mixture to precipitate crude product. Recrystallization was done from ethanol/water mixture using following procedure: Crude product was dissolved to hot 2:1 Ethanol/water mixture. Water was added to the hot mixture until short precipitation happened. The reaction mixture was cooled slowly to 4-6 ºC, precipitated product was filtered of and washed several time with water to give the pure product.

Methylation of sulfonamides was done using following process (general procedure **b**; compounds **8-10;** Scheme S1: b) 1 eqv. of corresponding sulphonamide (compounds **4-6**), 2 eqv of iodomethane and 3 eqv of potassium carbonate in dimethylformamide (10 mL) were stirred under nitrogen atmosphere for 72 hours. The mixture was diluted in dichloromethane and hydrolized with 10% hydrochloric acid. Water phase was extracted with dichloromethane, organic layers were combined, dried over magnesium

sulfate and solvent was evaporated. Recrystallization was done from ethanol/water mixture as described above.

Preparation of sulfonates (general procedure **c**; compounds **11** and **21**; Scheme S1:c): Corresponding phenol (2 mmol) and triethylamine (3 mmol) in 30mL of acetone. Corresponding sulfonylchloride (2 mmol) in 10mL of acetone was added drop wise to the reaction mixture. The reaction mixture was stirred with a magnetic stir bar under nitrogen gas for 5 hours. Recrystallization was done from ethanol/water mixture as described above.




**Scheme 1.** a) pyridine, acetone, RT 12-16h b) $K_2CO_3$, DMF, RT 70h c) triethylamine, acetone, RT 12-14h

**LogP Screening**

The LogP value (octanol/water partition coefficient) of a drug compound reflects the lipophilicity of the compound.

RP-LC technique (Reverse-Phase Liquid Chromatography) was used for the determination. An Agilent 1100-series HPLC-system (Agilent Technologies, Waldbronn, Germany) with UV- and mass-selective detection was used for the measurement. The used column was a double-encapped C18-column (Zorbax XDB-C18, 3.0 mm x 100 mm, 3.5 µM, Agilent Technologies) and the mobile phase was a mixture of water and acetonitrile.

Compounds with known LogP values were used as the reference compounds. The retention times of the compounds were measured. Capacity factors ( k') were calculated to generate the calibration curve (LogP versus logk'). Log P value of the compound JYV-149 was then was then extrapolated from the calibration curve.

Capacity factor: k'= (tr -t0)/t0
tr= retention time of the analyte
t0 = retention time of unretained solvent

**Compound characterization data**

*General procedure a:*

***N*-4-benzoylphenyl-2,4-dichlorobenzenesulfonamide 4**: Yield 54 %; mp: 123-125 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 11.32(s, 1H), 8.14(d, 1H, $J$ = 8.6 Hz), 7.87(d, 2H, $J$ = 1.9 Hz), 7.67-7.61(m, 6H), 7.52(t, 2H, $J$ = 7.8 Hz), 7.24(d, 2H, $J$ = 8.8 Hz); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.3, 141.0, 138.9, 137.2, 135.3, 132.9, 132.2, 131.9, 131.8, 131.5, 131.4, 129.3, 128.4, 128.1, 117.5; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{15}Cl_2NO_3S$-H, 403.99; found 403.95; elemental analysis (calcd., found for

$C_{19}H_{13}Cl_2NO_3S$: C(56.17, 56.12), H(3.23, 3.26) , N (3.45, 3.36).

***N*-3-benzoylphenyl-2,4-dichlorobenzenesulfonamide, 5**: Yield 48 %; mp: 136-137 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 10.97(s, 1H), 8.00(d, 1H, *J* = 8.6 Hz), 7.88(d, 1H, *J* = 1.9 Hz), 7.69(tt, 1H, *J* = 7.3 Hz), 7.63-7.60(m, 3H), 7.55(t, 2H, *J* = 7.8 Hz), 7.45-7.44(m, 2H), 7.40-7.37(m, 2H); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.9, 138.8, 137.8, 137.0, 136.6, 135.3, 132.7, 131.9, 131.4, 129.6, 129.4, 128.5, 128.0, 125.2, 123.3, 120.1; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{15}Cl_2NO_3S$-H, 403.99; found 403.95; elemental analysis (calcd., found for $C_{19}H_{15}Cl_2NO_3S$: C(56.17, 56.17), H( 3.23, 3.16) , N (3.45, 3.46).

***N*-(9-okso-9*H*-fluoren-2-yl)-2,4dichlorobenzenesulfonamide, 6:** Yield 57 % mp: 186-187 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 11.05(s, 1H), 8.07(d, 1H, *J* = 8.6 Hz), 7.87(d, 1H, *J* = 2.0 Hz), 7.66-7.62(m, 3H), 7.57-7.54(m, 2H), 7.24-7.27(m, 3H); $^{13}$C NMR (126MHz, DMSO- $d_6$): 192.3, 143.5, 139.3, 138.9, 137.9, 135.5, 135.2, 134.4, 133.2, 132.8, 131.9, 128.9, 128.0, 124.9, 124.0, 122.1, 120.8, 114.6; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{11}Cl_2NO_3S$-H, 401.98; found 401.95; elemental analysis (calcd. , found for $C_{19}H_{11}Cl_2NO_3S$: C(56.45, 56.29), H( 2.74, 2.78) , N (3.46, 3.55).

***N*-(4-acetylphenyl)-2,4-dichlorobenzenesulfonamide, 7:** Yield 47 %; mp: 204-206 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 11.27 (s, 1H), 8.12 (d, 1H, *J* = 8.6 Hz), 7.85-7.82 (m, 3H), 7.65 (dd, 1H *J* = 8.6 Hz, *J* = 2.1 Hz), 7.18 (d, 2H, *J* = 8.8 Hz), 2.46 (s, 3H); 13C NMR (126MHz, DMSO- $d_6$): 196.32, 141.19, 138.96, 135.16, 132.98, 132.08, 131.93, 131.47, 129.78 (2C), 128.03, 117.50 (2C), 26.30; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{14}H_{11}Cl_2NO_3S$-H, 341.99; found 342.10; elemental analysis (calcd., found for $C_{14}H_{11}Cl_2NO_3S \cdot ½C_3H_6O$: C(49.87, 49.50), H(3.78, 3.27) , N (3.75, 3.87).

***N*-(9H-fluoren-2-yl)-2,4-dichlorobenzenesulfonamide**, **12** Yield 48 %, mp: 177-178 ºC $^1$H NMR (500MHz, DMSO- $d_6$): 10.72 (s, 1H), 8.03 (d, 1H, *J* = 8.6Hz), 7.83 (d, 1H, *J* = 2.0Hz), 7.76-7.72 (m, 2H), 7.58 (dd, 1H, *J* = 8.6Hz, *J* = 2.0Hz), 7.51 (d, 1H, *J* = 7.4 Hz), 7.34-7.32 (m, 2H), 7.25 (td, 1H, *J* = 7.5Hz, *J* = 1.2Hz) 7.12 (dd, 1H, *J* = 8.5Hz, *J* = 2.0Hz); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.3, 141.0, 138.9, 137.2, 135.3, 132.9, 132.2, 131.9, 131.8, 131.5, 131.4, 129.3, 128.4, 128.1, 117.5; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{13}Cl_2NO_2S$-H 388.00; found 387.97; elemental analysis (calcd. , found for $C_{19}H_{13}Cl_2NO_2S$: C(58.47, 58.54), H(3.36, 3.38) , N (3.59, 3.61)

***N*-(3-benzoylphenyl)-benzenesulfonamide 13:** Yield 70 %; mp: 101-103 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 10.52(s, 1H), 7.76(m, 2H), 7.70-7.62(m, 1H), 7.60-7.54(m, 6H), 7.43-7.41(m, 4H); $^{13}$C NMR (126MHz, DMSO- $d_6$): 195.0, 139.2, 137.8, 137.7, 136.6, 133.0, 132.7, 129.5, 129.4, 129.3, 128.5, 126.6, 125.2, 124.1, 120.8; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{15}NO_3S$-H, 336.07; found 336.09; elemental analysis (calcd., found for $C_{19}H_{15}NO_3S$: C(67.64, 67.65), H(4.48, 4.42) , N (4.15, 4.04).

***N*-(4-benzoylphenyl)-benzenesulfonamide 14:** Yield 35 %; mp: 102-104 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 10.89(s, 1H), 7.86(d, 2H, *J* = 8.9 Hz), 7.66-7.57(m, 8H), 7.52(t, 2H, *J* = 7.0 Hz), 7.26 (d, 2H, *J* = 8.6 Hz); $^{13}$C NMR (126MHz, DMSO- $d_6$):194.3, 142.0, 139.4, 137.2, 133.2, 132.2, 131.6, 131.3, 129.4, 129.2, 128.4, 126.6, 117.9; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{15}NO_3S$-H, 336.07; found 336.09; elemental analysis (calcd., found for $C_{19}H_{15}NO_3S \cdot ½C_2H_6O$: C(66.65, 66.54), H(5.03, 4.62) , N (3.89, 3.72).

***N*-(4-benzoylphenyl)-4-methylbenzenesulfonamide 15:** Yield 28 %; mp: 180-181 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 10.83(s, 1H), 7.74(d, 2H, *J* = 8.0 Hz), 7.66-7.62(m, 5H), 7.52(t, 2H, *J* = 7.3Hz), 7.38(d, 2H, *J* = 8.0 Hz), 7.25 (d, 2H, *J* = 7.3Hz), 2.34 (s, 1H); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.3, 143.6, 137.3, 136.5, 132.2, 131.5, 131.3, 129.8, 129.22, 128.4, 126.6, 117.8, 20.8; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{20}H_{17}NO_3S$-H, 350.09; found 350.11; elemental analysis (calcd., found for $C_{20}H_{17}NO_3S$: C(68.36, 67.80), H(4.88, 4.68) , N (3.99, 3.95)

***N*-(3-benzoylphenyl)-4-methylbenzenesulfonamide 16:** Yield 21 %; mp: 118-119 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 10.44(s, 1H), 7.68(m, 1H), 7.64(d, 2H, *J* = 8.5 Hz), 7.62-7.58(m, 2H), 7.56-7.53(m, 2H), 7.43-7.42(m, 2H), 7.40-7.36(m, 4H), 2.35(s, 3H); $^{13}$C NMR (126MHz, DMSO- $d_6$): 195.0, 143.4, 138.0, 137.7, 136.6, 136.4, 132.7, 129.7, 129.5, 129.4, 128.5, 126.6, 125.0, 123.8, 120.6, 20.9; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{20}H_{17}NO_3S$-H, 350.01; found 350.01; elemental analysis (calcd., found for $C_{20}H_{17}NO_3S$: C(68.36, 68.26), H(4.88, 4.74) , N (3.99, 3.86).

***N*-(3-benzoylphenyl)-4-bromobenzenesulfonamide 17:** Yield 47 %; mp: 127-130; $^1$H NMR (500MHz, DMSO- $d_6$): 10,59(s,1H), 7.80(dt, 2H, *J* = 8.7 Hz, *J* = 2.5Hz), 7.68(m, 3H), 7.60(m, 2H), 7.54(m,2H), 7,44(m,4H); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.9, 138.4, 137.8, 137.5, 136.6, 132.7, 132.4, 129.7, 129.4, 128.6, 128.5, 126.9, 125.5, 124.4, 121.1; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{14}BrNO_3S$-H, 416,29; found 415.94; elemental analysis (calcd. , found for $C_{19}H_{14}BrNO_3S$: C(54.73, 54.82), H(3.39, 3.43) , N (3.36, 3.25)

***N*-(4-benzoylphenyl)-4-bromobenzenesulfonamide, 18:** Yield 39 %; mp: 173-175 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 10.96(s, 1H), 7.82-7.76(m, 4H), 7.68-7.64(m, 5H), 7.53(t, 2H, *J* = 7.8 Hz), 7.26(d, 2H, *J* = 8.6 Hz); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.3, 141.6, 138.6, 137.2, 132.5, 132.2, 131.9, 131.4, 129.2, 128.6, 128.4, 127.1, 118.2; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{14}BrNO_3S$-H, 415.98; found 416.01; elemental analysis (calcd., found for $C_{19}H_{14}BrNO_3S$: C(54.82, 54.82), H(3.39, 3.27) , N (3.36, 3.38)

***N*-(4-benzoylphenyl)-4-iodobenzenesulfonamide, 19:** Yield 33.1 %; mp: 167-168 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 10.94(s, 1H), 7.98(dt, 2H, *J* = 8.6 Hz, *J* = 2.0 Hz), 7.68-7.62(m, 5H), 7.60(dt, 2H, *J* = 8.6 Hz, *J* = 2.0 Hz), 7.53(t, 2H, *J* = 7.6Hz), 7.25(d, 2H, *J* = 8.7 Hz); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.3, 141.7, 139.0, 138.3.0, 137.2, 132.2, 131.9, 131.4, 129.2, 128.4, 128.2, 118.1; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{15}INO_3S$-H, 461.96; found 461.96; elemental analysis (calcd., found for

$C_{19}H_{14}INO_3S$: C(49.26, 49.06), H(3.05, 2.96) , N (3.02, 2.91).

***N*-(3-benzoylphenyl)-4-iodobenzenesulfonamide 20:** Yield 55 %; mp: 134-135 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 10.56(s, 1H), 7.97(dt, 2H, 8.6Hz), 7.70-7.66(t, 1H, 7.3Hz), 7.61-7.52(m, 4H) 7.55(dt, 2H, 8.6Hz), 7.48-7.40(m, 4H); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.9, 138.8, 138.2, 137.8, 137.5, 136.6, 132.7, 129.6, 129.4, 128.5, 128.2, 125.4, 124.3, 121.0, 101.3; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{14}INO_3S$-H, 461.97; found 461.96; elemental analysis (calcd., found for $C_{19}H_{14}INO_3S$: C(49.26, 49.58), H(3.05, 3.05) , N (3.02, 2.91).

General procedure b:

***N*-methyl-*N*-4-benzoylphenyl-2,4-dichlorobenzenesulfonamide 8:** Yield 84 %; mp: 108-109 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 7.95(d, 1H, *J* = 8.6 Hz), 7.92(d, 1H, *J* = 1.9Hz), 7.72(d, 2H, *J* = 8.5 Hz), 7.70-7.66 (m, 3H,) 7.64 (dd, 1H, *J* = 8.6Hz, *J* = 1.9Hz), 7.56 (t, 2H, 7.8Hz) 7.45 (d 2H, *J* = 8.5 Hz) 3.39(s, 3H); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.7, 144.1, 139.0, 136.8, 134.6, 134.2, 133.3, 132.6, 132.3, 131.8, 130.5, 129.4, 128.5, 128.0, 124.5, 37.4; ESI-TOF-MS (m/z): $[M]^+$ calcd. for $C_{20}H_{15}Cl_2NO_3SNa$, 442.00; found 441.93; elemental analysis (calcd., found for $C_{20}H_{15}Cl_2NO_3S$ : C(57.15, 57.19), H(3.60, 3.61) , N (3.33, 3.25).

***N*-methyl-*N*-3-benzoylphenyl-2,4-dichlorobenzenesulfonamide 9:** Yield 73 %; mp: 76-77 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 7.91(d, 1H, *J* = 1,9 Hz), 7.86(d, 1H, *J* = 8,6 Hz), 7.69(t, 1H, *J* = 7.8Hz), 7.66-7.64(m, 3H), 7.61(dd, 1H, *J* = 8,6 Hz, *J* = 1,9 Hz), 7.59-7.53(m 4H), 7.51(s, 1H), 3.35(s, 3H); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.7, 140.4, 138.9, 137.8, 136.4, 134.2, 133.3, 132.9, 132.3, 131.7, 130.2, 129.6, 129.5, 128.5, 128.2, 128.0, 126.9, 38.3; ESI-TOF-MS (m/z): $[M]^+$ calcd. for $C_{20}H_{15}Cl_2NO_3SNa$, 442,00; found 441,93; elemental analysis (calcd., found for $C_{20}H_{15}Cl_2NO_3S$ : C(57.15, 57.07), H(3.60, 3.53) , N (3.33, 3.23).

***N*-methyl-*N*-(9-okso-9*H*-fluoren-2-yl)-2,4dichlorobenzenesulfonamide, 10:** Yield 74 %; mp: 132-133 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 7.91(d, 1H, *J* = 1.9 Hz), 7.87(d, 1H, *J* = 8.6 Hz), 7.78-7.76(m, 2H), 7.63-7.60(m, 3H), 7.47(d, 1H, *J* = 2.0 Hz), 7.45(s, 1H), 7.38(d, 1H *J* = 7.3 Hz), 3.34(s, 3H); $^{13}$C NMR (126MHz, DMSO- $d_6$): 192.1, 143.1, 142.2, 141.4, 138.9, 135.5, 134.0, 133.5, 133.3, 132.5, 132.4, 131.8, 129.5, 128.0, 124.0, 121.7, 121.5, 121.4, 38.2; ESI-TOF-MS (m/z): $[M]^+$ calcd. for $C_{20}H_{13}Cl_2NO_3SNa$, 439,99; found 440,05; elemental analysis (calcd., found for $C_{20}H_{15}Cl_2NO_3S$ : C(57.43, 57.27), H(3.13, 3.13) , N (3.35, 3.30).

*General procedure c:*

**4-benzoylphenyl-2,4-dichlorobenzenesulfonate, 11:** Yield 86 %; mp: 97-98 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 8.09(d, 1H, *J* = 1.9 Hz), 7.97(d, 1H, *J* = 8.6 Hz), 7.78(dt, 2H, *J* = 8.8 Hz), 7.77-7.64(m, 4H), 7.54(dt, 2H, *J* = 7.7 Hz), 7.33(dt, 2H, *J* = 8.8 Hz); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.3, 151.3, 140.9, 136.4, 136.2, 133.4, 133.1, 132.8, 132.2, 131.8, 131.1, 129.5, 128.5, 128.4, 121.8; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{12}Cl_2O_4SNaCH_3OH$, 461,00; found 461.07; elemental analysis (calcd. , found for $C_{19}H_{12}Cl_2O_4S$: C(56.03, 56.10), H(2.97, 2.89) , N (0.00, 0.00).

**4-benzoylphenyl-3,5-dichloro-2-hydroxybenzenesulfonate 21**: Yield 17 %; mp: 150 - 151 ºC; $^1$H NMR (500MHz, DMSO- $d_6$): 11.86 (br, 1H), 8.03 (d, 1H, *J* = 2.6 Hz), 7.80 (dt, 2H, *J* = 9.0 Hz, *J* = 2.7 Hz, *J* = 2.0 Hz), 7.73-7.66 (m, 3H), 7.62 (d, 1H, *J* = 2.6 Hz), 7.56(t, 2H, *J* = 7.6 Hz), 7.34 (dt, 2H, *J* = 9.0 Hz, *J* = 2.7 Hz, *J* = 2.0 Hz); $^{13}$C NMR (126MHz, DMSO- $d_6$): 194.4, 151.7, 136.5, 136.0, 135.9, 132.8, 131.7, 129.5, 128.6, 128.4, 125.3, 124.7, 124.5, 122.9, 121.9; ESI-TOF-MS (m/z): $[M]^-$ calcd. for $C_{19}H_{12}Cl_2O_5S$, 420,98; found 420.95; elemental analysis (calcd. , found for $C_{19}H_{12}Cl_2O_5S$: C (53.91, 54.19), H (2.86, 2.79) , N (0.00, 0.00).

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