Supporting Information

SnCl₂/EtOH Mediated Synthesis of Novel 4-Ethoxy- and 4-Chloroindazoles Bearing Sulfonamide Moiety

Hakima Chicha¹, Latifa Bouissane¹, Lahcen El Ammari², Mohamed Saadi², Michel Baltas³,
El Mostapha Rakib¹

¹Laboratoire de Chimie Organique et Analytiques, Faculté des Sciences et Techniques,
Université Sultan Moulay Slimane, B.P. 523, Béni-Mellal, Morocco

²Laboratoire de Chimie du Solide Appliquée, Faculté des Sciences, Université Mohammed V-
Agdal, Avenue Ibn Battouta, B.P. 1014, Rabat, Morocco

³Université Paul Sabatier, Laboratoire de Synthèse et Physico-Chimie de Molécules d'Intérêt
Biologique, UMR-CNRS 5068, 118 route de Narbonne, 31062 Toulouse cedex 9, France

Corresponding author. El Mostapha Rakib, Email: elmostapha1@ymail.com

EXPERIMENTAL

Melting points were determined using a Büchi-Tottoli apparatus. ¹H and ¹³C NMR spectra were recorded in CDCl₃, DMSO-d₆ and solution (unless otherwise specified) with TMS as an internal reference using a Bruker AC 300 (¹H) or 75MHz (¹³C) instruments. Chemical shifts are given in d parts per million (ppm) downfield from TMS. Multiplicities of ¹³C NMR resources were assigned by distortionless enhancement by polarization transfer (DEPT) experiments. Low-resolution mass spectra (MS) were recorded on a Perkin-Elmer Sciex API 3000 spectrometer. Column chromatography was carried out on SiO₂ (silica gel 60 Merck 0.063–0.200 mm). Thin-layer chromatography (TLC) was carried out on SiO₂ (silica gel 60, F 254 Merck 0.063–0.200 mm), and the spots were located with UV light. Commercial reagents were used without further purification unless stated

General procedure for the synthesis of *N*-alkyl-5-nitroindazoles 2a,b and 3a,b

To a solution of 5-nitroindazole **1** (6.13 mmol) in THF (25 mL) cooled at 0 °C was added cesium carbonate (12.26 mmol). After 15 mn at 0°C, alkyl halide (6.13 mmol) was added dropwise. Upon disappearance of the starting material as indicated by TLC, the resulting mixture was evaporated. The crude material was dissolved with EtOAc (50 mL), washed with

water and brine, dried over MgSO₄ and the solvent was removed in vacuo. The resulting residue was purified by column chromatography on silica gel using EtOAc/hexane (3:7) to afford the desired products, 1-alkyl-5-nitroindazole followed by 2-alkyl-5-nitroindazole.

1-Methyl-5-nitro-1H-indazole (2a). Yield: 58%; yellow solid; mp 156-158°C (lit.^[26] mp: 162-164°C); ¹H NMR (CDCl₃): δ 4.13 (s, 3H, NCH₃), 7.44 (d, 1H, J = 9.3 Hz), 8.17 (s, 1H, H-3), 8.25 (dd, 1H, J = 9.3 Hz, 1.8 Hz), 8.69 (d, 1H, J = 1.8 Hz); ¹³C NMR (CDCl₃): δ 36.0 (NCH₃), 109.2 (CH), 118.9 (CH), 121.4 (CH), 123.0 (C), 135.6 (CH-3, =CH), 141.5 (C), 142.3 (C).

2-Methyl-5-nitro-2H-indazole (3a). Yield: 40%; dark yellow solid; mp 124-126°C (lit.^[26] mp: 128-130°C); ¹H NMR (CDCl₃): δ 4.27 (s, 3H, NCH₃), 7.72 (d, 1H, J = 9.2 Hz), 8.06 (dd, 1H, J = 9.2 Hz, 2.4 Hz), 8.19 (s, 1H, H-3), 8.68 (d, 1H, J = 2.1 Hz); ¹³C NMR (CDCl₃): δ 40.9 (NCH₃), 118.1 (CH), 119.2 (CH), 120.2 (CH), 121.0 (C), 127.7 (CH-3, =CH), 143.1 (C), 149.9 (C).

1-Allyl-5-nitro-1H-indazole (2b). Yield: 54%; yellow solid; mp 59-61 °C; ¹H NMR (CDCl₃): δ 5.05-5.13 (m, 2H, NCH₂), 5.18-5.31 (m, 2H, =CH₂), 5.97-6.01 (m, 1H, =CH), 7.45 (d, 1H, J = 9.0 Hz), 8.21 (s, 1H, H-3), 8.25 (dd, 1H, J = 9.3, 2.4 Hz), 8.72 (d, 1H, J = 1.8 Hz); ¹³C NMR (CDCl₃): δ 52.2 (NCH₂), 109.6 (CH), 118.6 (=CH₂), 119.0 (CH), 121.5 (CH), 123.4 (C), 131.8 (CH), 135.9 (CH-3, =CH), 141.2 (C), 142.4 (C).

2-Allyl-5-nitro-2H-indazole (3b). Yield: 39%; Yellow solid; mp 46-48 °C; ¹H NMR (CDCl₃): δ 5.07-5.11 (m, 2H, NCH₂), 5.34-5.43 (m, 2H, =CH₂), 6.07-6.12 (m, 1H, =CH), 7.73 (d, 1H, J = 9.2 Hz), 8.07 (dd, 1H, J = 9.2 Hz, 1.8 Hz), 8.24 (s, 1H, H-3), 8.70 (d, 1H, J = 1.8 Hz); ¹³C NMR (CDCl₃): δ 56.7 (NCH₂), 118.4 (CH), 119.4 (CH), 120.4 (CH), 120.8 (=CH₂), 121.2 (C), 126.8 (CH-3, =CH), 131.1 (CH), 143.2 (C), 149.7 (C).

General procedure for the synthesis of compounds 4a-d, 5a-d and 6a-d

A mixture of 1-alkyl-5-nitroindazoles **2a,b** (0.66 mmol) and anhydrous SnCl₂ (3.3 mmol) in 25 mL of absolute alcohol was heated at 60 °C. After reduction the solution was allowed to cool down. The pH was made slightly basic (pH 7–8) by addition of 5% aqueous potassium bicarbonate before being extracted with ethyl acetate. The organic phase was washed with brine and dried over magnesium sulfate. The solvent was removed to afford the amine, which was immediately dissolved in pyridine (5 mL) and then reacted with arylsulfonyl chloride (0.72 mmol) at room temperature overnight. After the reaction mixture was concentrated in vacuo, the resulting residue was purified by flash chromatography (eluted with EtOAc/hexane).

***N*-(4-Chloro-1-methyl-1*H*-indazol-5-yl)-4-methylbenzene sulfonamide (4a).** White solid; mp 159-161 °C; ¹H NMR (CDCl₃): δ 2.34 (s, 3H, CH₃), 4.05 (s, 3H, NCH₃), 6.85 (s, 1H, NH), 7.14 (d, 2H, *J* = 8.1 Hz), 7.29 (d, 1H, *J* = 9.0 Hz), 7.54 (d, 2H, *J* = 8.1 Hz), 7.74 (d, 1H, *J* = 8.1 Hz), 7.87 (s, 1H, H-3); ¹³C NMR (CDCl₃): δ 21.6 (CH₃), 35.9 (NCH₃), 108.4 (CH), 118.6 (C), 122.9 (C), 124.5 (CH), 126.4 (C), 127.2 (2CH), 129.6 (2CH), 130.8 (C), 131.4 (CH), 135.7 (C), 138.7 (C), 144.1 (C); EI-MS (*m/z*) = 336 (³⁵Cl) [M+1]⁺, 338 (³⁷Cl) [M+3]⁺; Anal. Calcd for C₁₅H₁₄ClN₃O₂S; C, 53.65; H, 4.20; N, 12.51. Found: C, 53.77; H, 4.09; N, 12.64.

***N*-(4-Ethoxy-1-methyl-1*H*-indazol-5-yl)-4-methylbenzene sulfonamide (5a).** White solid; mp 125-127 °C; ¹H NMR (CDCl₃): δ 1.20 (t, 3H, CH₃, *J* = 7.2 Hz), 2.31 (s, 3H, CH₃), 4.01 (s, 3H, NCH₃), 4.20 (q, 2H, CH₂O, *J* = 7.2 Hz), 6.81 (s, 1H, NH), 6.97 (d, 1H, *J* = 9.0 Hz), 7.14 (d, 2H, *J* = 8.4 Hz), 7.51 (d, 2H, *J* = 8.4 Hz), 7.67 (d, 1H, *J* = 9.0 Hz), 7.92 (s, 1H, H-3); ¹³C NMR (CDCl₃): δ 15.3 (CH₃), 21.5 (CH₃), 35.7 (NCH₃), 67.8 (CH₂O), 102.2 (CH), 113.0 (CH), 118.1 (C), 122.9 (C), 124.6 (CH), 126.4 (C), 127.2 (2CH), 129.2 (2CH), 130.2 (CH), 136.1 (C), 140.4 (C), 143.5 (C); EI-MS (*m/z*) = 346 [M+1]⁺; Anal. Calcd for C₁₇H₁₉N₃O₃S; C, 59.11; H, 5.54; N, 12.16. Found: C, 59.27; H, 5.41; N, 12.08.

4-Methyl-*N*-(1-methyl-1*H*-indazol-5-yl)-benzene sulfonamide (6a). White solid; mp 182-184 °C; ¹H NMR (DMSO-*d*₆): δ 2.27 (s, 3H, CH₃), 3.94 (s, 3H, NCH₃), 7.09 (dd, 1H, *J* = 9.0, 2.1 Hz), 7.25 (d, 2H, *J* = 8.1 Hz), 7.38 (d, 1H, *J* = 1.8 Hz), 7.46 (d, 1H, *J* = 9.0 Hz), 7.55 (d, 2H, *J* = 8.1 Hz), 7.92 (s, 1H, H-3), 10.01 (s, 1H, NH); ¹³C NMR (DMSO-*d*₆): δ 21.4 (CH₃), 35.8 (NCH₃), 110.6 (CH), 113.2 (CH), 122.5 (CH), 123.8 (C), 127.2 (2CH), 130.0 (2CH), 130.9 (C), 132.6 (CH), 136.1 (C), 136.9 (C), 137.8 (C), 143.5 (C); EI-MS (*m/z*) = 302 [M+1]⁺; Anal. Calcd for C₁₅H₁₅N₃O₂S; C, 59.78; H, 5.02; N, 13.94. Found: C, 59.64; H, 5.13; N, 13.78.

***N*-(4-Chloro-1-methyl-1*H*-indazol-5-yl)-4-methoxybenzene sulfonamide (4b).** Yellow solid; mp 134-136 °C; ¹H NMR (CDCl₃): δ 3.79 (s, 3H, CH₃O), 4.06 (s, 3H, NCH₃), 6.81 (m, 3H, NH and 2H), 7.29 (d, 1H, *J* = 9.0 Hz), 7.58 (d, 2H, *J* = 8.4 Hz), 7.73 (d, 1H, *J* = 9.0 Hz), 7.87 (s, 1H, H-3); ¹³C NMR (CDCl₃): δ 35.9 (NCH₃), 55.5 (CH₃O), 108.4 (CH), 114.1 (2CH), 118.7 (C), 124.7 (CH), 126.6 (C), 129.4 (2CH), 130.2 (C), 131.4 (CH), 138.8 (C), 163.3 (C); EI-MS (*m/z*) = 352 (³⁵Cl) [M+1]⁺, 354 (³⁷Cl) [M+3]⁺; Anal. Calcd for C₁₅H₁₄ClN₃O₃S; C, 51.21; H, 4.01; N, 11.94. Found: C, 51.34; H, 4.12; N, 11.86.

***N*-(4-Ethoxy-1-methyl-1*H*-indazol-5-yl)-4-methoxybenzene sulfonamide (5b).** Dark brown solid; mp 157-159 °C; ¹H NMR (CDCl₃): δ 1.24 (t, 3H, CH₃, *J* = 7.2 Hz), 3.78 (s, 3H, CH₃O), 4.04 (s, 3H, NCH₃), 4.12 (q, 2H, CH₂O, *J* = 7.2 Hz), 6.79 (d, 2H, *J* = 9.0 Hz), 6.98 (d, 1H, *J* = 9.0 Hz), 7.55 (d, 2H, *J* = 9.0 Hz), 7.69 (d, 1H, *J* = 9.0 Hz), 7.95 (s, 1H, H-3); ¹³C NMR

(CDCl₃): δ 15.4 (CH₃), 35.6 (NCH₃), 55.5 (CH₃O), 67.8 (CH₂O), 102.3(CH), 114.0 (2CH), 118.7 (C), 124.8 (CH), 129.3 (2CH), 131.3 (CH), 132.9 (C), 140.3 (C), 143.4 (C), 162.9 (C), 164.0 (C); EI-MS (m/z) = 362 [$M+1$]⁺; Anal. Calcd for C₁₇H₁₉N₃O₄S; C, 56.50; H, 5.30; N, 11.63. Found: C, 56.67; H, 5.18; N, 11.74.

4-Methoxy-*N*-(1-methyl-1*H*-indazol-5-yl)benzene sulfonamide (6b). White solid; mp 148-150 °C; ¹H NMR (DMSO-*d*₆): δ 3.75 (s, 3H, CH₃O), 3.98 (s, 3H, NCH₃), 6.98 (d, 2H, J = 9.0 Hz), 7.06 (dd, 1H, J = 1.8, 9.0 Hz), 7.37-7.40 (m, 2H), 7.59 (d, 2H, J = 9.0 Hz), 7.97 (s, 1H, H-3), 9.90 (s, 1H, NH); ¹³C NMR (DMSO-*d*₆): δ 35.8 (NCH₃), 56.0 (CH₃O), 110.6 (CH), 114.2 (2CH), 122.5 (CH), 123.8 (C), 129.7 (2CH), 130.9 (C), 132.6 (CH), 136.1 (C), 137.8 (C), 162.5 (C); EI-MS (m/z) = 318 [$M+1$]⁺; Anal. Calcd for C₁₅H₁₅N₃O₃S; C, 56.77; H, 4.76; N, 13.24. Found: C, 56.63; H, 4.67; N, 13.35.

***N*-(1-Allyl-4-chloro-1*H*-indazol-5-yl)-4-methylbenzene sulfonamide (4c).** White solid; mp 105-107 °C; ¹H NMR (CDCl₃): δ 2.35 (s, 3H, CH₃), 4.98 (m, 2H, NCH₂), 5.12-5.28 (m, 2H, =CH₂), 5.94-6.05 (m, 1H, =CH), 6.83 (s, 1H, NH), 7.15 (d, 2H, J = 8.1 Hz), 7.29 (d, 1H, J = 9.0 Hz), 7.55 (d, 2H, J = 8.1 Hz), 7.72 (d, 1H, J = 8.1 Hz), 7.91 (s, 1H, H-3); ¹³C NMR (CDCl₃): δ 21.5 (CH₃), 52.2 (NCH₂), 108.8 (CH), 118.4 (=CH₂), 118.6 (C), 123.1 (C), 124.4 (CH), 126.6 (C), 127.2 (2CH), 129.6 (2CH), 131.8 (CH), 132.1 (CH), 135.8 (C), 138.3 (C), 144.1 (C); EI-MS (m/z) = 362 (³⁵Cl) [$M+1$]⁺, 364 (³⁷Cl) [$M+3$]⁺; Anal. Calcd for C₁₇H₁₆ClN₃O₂S; C, 56.43; H, 4.46; N, 11.61. Found: C, 56.54; H, 4.36; N, 11.72.

***N*-(1-Allyl-4-ethoxy-1*H*-indazol-5-yl)-4-methylbenzene sulfonamide (5c).** Off white solid; mp 109-111 °C; ¹H NMR (CDCl₃): δ 1.21 (t, 3H, CH₃, J = 7.2 Hz), 2.34 (s, 3H, CH₃), 4.06 (q, 2H, CH₂O, J = 7.2 Hz), 4.96 (m, 2H, NCH₂), 5.11-5.26 (m, 2H, =CH₂), 5.93-6.01 (m, 1H, =CH), 6.80 (s, 1H, NH), 6.98 (d, 1H, J = 9.0 Hz), 7.13 (d, 2H, J = 8.1 Hz), 7.53 (d, 2H, J = 8.1 Hz), 7.65 (d, 1H, J = 9.0 Hz), 7.95 (s, 1H, H-3); ¹³C NMR (CDCl₃): δ 15.4 (CH₃), 21.5 (CH₃), 51.8 (NCH₂), 67.8 (CH₂O), 102.6 (CH), 118.3 (=CH₂), 117.3 (C), 124.6 (CH), 127.2 (2CH), 129.4 (2CH), 130.7 (CH), 131.3 (C), 132.1 (CH), 136.2 (C), 139.9 (C), 143.3 (C), 143.5 (C); EI-MS (m/z) = 372 [$M+1$]⁺; Anal. Calcd for C₁₉H₂₁N₃O₃S; C, 61.44; H, 5.70; N, 11.31. Found: C, 61.57; H, 5.61; N, 11.44.

***N*-(1-Allyl-1*H*-indazol-5-yl)-4-methyl-benzenesulfonamide (6c).** White solid; mp 100-102 °C; ¹H NMR (DMSO-*d*₆): δ 2.27 (s, 3H, CH₃), 4.95 (m, 2H, NCH₂), 5.02-5.12 (m, 2H, =CH₂), 5.87-5.98 (m, 1H, =CH), 7.09 (dd, 1H, J = 9.0, 1.8 Hz), 7.26 (d, 2H, J = 8.1 Hz), 7.40 (d, 1H, J = 1.8 Hz), 7.47 (d, 1H, J = 9.0 Hz), 7.56 (d, 2H, J = 8.1 Hz), 7.97 (s, 1H, H-3), 10.03 (s, 1H, NH); ¹³C NMR (DMSO-*d*₆): δ 21.4 (CH₃), 51.3 (NCH₂), 110.8 (CH), 113.2 (CH), 117.8 (=CH₂), 122.5 (CH), 124.1 (C), 127.2 (2CH), 130.0 (2CH), 131.1 (C), 133.1 (CH),

134.0 (CH), 137.0 (C), 137.4 (C), 143.5 (C); EI-MS (m/z) = 328 $[M+1]^+$; Anal. Calcd for $C_{17}H_{17}N_3O_2S$; C, 62.37; H, 5.23; N, 12.83. Found: C, 62.48; H, 5.34; N, 12.70.

***N*-(1-Allyl-4-chloro-1*H*-indazol-5-yl)-4-methoxybenzene sulfonamide (4d).** Yellow solid; mp 106-108 °C; 1H NMR ($CDCl_3$): δ 3.80 (s, 3H, CH_3O), 4.98 (m, 2H, NCH_2), 5.12-5.27 (m, 2H, $=CH_2$), 5.94-6.01 (m, 1H, $=CH$), 6.82 (m, 3H, NH and 2H), 7.29 (d, 1H, $J = 9.0$ Hz), 7.59 (d, 2H, $J = 8.4$ Hz), 7.71 (d, 1H, $J = 9.0$ Hz), 7.91 (s, 1H, H-3); ^{13}C NMR ($CDCl_3$): δ 52.2 (NCH_2), 55.5 (CH_3O), 108.8 (CH), 114.1 (2CH), 118.4 ($=CH_2$), 118.6 (C), 123.1 (C), 124.6 (CH), 126.7 (C), 129.4 (2CH), 130.3 (C), 131.8 (CH), 132.1 (CH), 138.3 (C), 163.3 (C); EI-MS (m/z) = 378 (^{35}Cl) $[M+1]^+$, 380 (^{37}Cl) $[M+3]^+$; Anal. Calcd for $C_{17}H_{16}ClN_3O_3S$; C, 54.04; H, 4.27; N, 11.12. Found: C, 54.20; H, 4.14; N, 11.24.

***N*-(1-Allyl-4-ethoxy-1*H*-indazol-5-yl)-4-methoxybenzene sulfonamide (5d).** White solid; mp 130-132 °C; 1H NMR ($CDCl_3$): δ 1.24 (t, 3H, CH_3 , $J = 7.2$ Hz), 3.79 (s, 3H, CH_3O), 4.13 (q, 2H, CH_2O , $J = 7.2$ Hz), 4.95 (m, 2H, NCH_2), 5.12-5.28 (m, 2H, $=CH_2$), 5.94-6.07 (m, 1H, $=CH$), 6.81 (m, 3H, NH and 2H), 6.98 (d, 1H, $J = 9.0$ Hz), 7.58 (d, 2H, $J = 8.8$ Hz), 7.65 (d, 1H, $J = 9.0$ Hz), 7.96 (s, 1H, H-3); ^{13}C NMR ($CDCl_3$): δ 15.4 (CH_3), 51.8 (NCH_2), 55.5 (CH_3O), 67.7 (CH_2O), 102.6 (CH), 113.7 (2CH), 117.3 (C), 118.3 ($=CH_2$), 124.0 (C), 124.5 (CH), 129.3 (2CH), 130.8 (CH), 131.3 (C), 132.1 (CH), 133.7 (C), 161.4 (C), 162.9 (C); EI-MS (m/z) = 388 $[M+1]^+$; Anal. Calcd for $C_{19}H_{21}N_3O_4S$; C, 58.90; H, 5.46; N, 10.84. Found: C, 59.05; H, 5.38; N, 10.77.

***N*-(1-Allyl-1*H*-indazol-5-yl)-4-methoxy-benzene sulfonamide (6d).** White solid; mp 96-98 °C; 1H NMR ($DMSO-d_6$): δ 3.73 (s, 3H, CH_3O), 4.96 (m, 2H, NCH_2), 5.02-5.12 (m, 2H, $=CH_2$), 5.87-5.97 (m, 1H, $=CH$), 6.98 (d, 2H, $J = 9.0$ Hz), 7.09 (dd, 1H, $J = 9.0, 2.1$ Hz), 7.40 (d, 1H, $J = 2.1$ Hz), 7.47 (d, 1H, $J = 9.0$ Hz), 7.61 (d, 2H, $J = 9.0$ Hz), 7.97 (s, 1H, H-3), 9.95 (s, 1H, NH); ^{13}C NMR ($DMSO-d_6$): δ 51.3 (NCH_2), 56.0 (CH_3O), 110.8 (CH), 112.8 (CH), 113.2 (2CH), 117.5 ($=CH_2$), 122.5 (CH), 124.1 (C), 129.3 (2CH), 131.2 (C), 131.5 (CH), 133.1 (CH), 134.0 (C), 137.4 (C), 162.7 (C); EI-MS (m/z) = 344 $[M+1]^+$; Anal. Calcd for $C_{17}H_{17}N_3O_3S$; C, 59.46; H, 4.99; N, 12.24. Found: C, 59.58; H, 5.08; N, 12.11.

Synthesis of compounds 7a-d and 8a-d

These compounds were prepared from 2-alkyl-5-nitroindazoles **3a,b** using the same procedure applied to 5-nitroindazole **1**.

***N*-(4-Chloro-2-methyl-2*H*-indazol-5-yl)-4-methyl-benzene sulfonamide (7a).** Brown solid; mp 113-115 °C; 1H NMR ($CDCl_3$): δ 2.33 (s, 3H, CH_3), 4.23 (s, 3H, NCH_3), 6.92 (s, 1H, NH), 7.16 (d, 2H, $J = 8.1$ Hz), 7.30 (d, 1H, $J = 8.4$ Hz), 7.56 (d, 2H, $J = 8.1$ Hz), 7.68 (d, 1H, $J = 8.4$ Hz), 7.88 (s, 1H, H-3); ^{13}C NMR ($CDCl_3$): δ 21.7 (CH_3), 40.5 (NCH_3), 116.1 (CH),

122.6 (C), 124.6 (CH), 125.2 (CH), 126.0 (C), 127.2 (2CH), 129.3 (C), 129.5 (2CH), 135.8 (C), 144.2 (C), 145.2 (C); EI-MS (m/z) = 336 (^{35}Cl) $[\text{M}+1]^+$, 338 (^{37}Cl) $[\text{M}+3]^+$; Anal. Calcd for $\text{C}_{15}\text{H}_{14}\text{ClN}_3\text{O}_2\text{S}$; C, 53.65; H, 4.20; N, 12.51. Found: C, 53.73; H, 4.12; N, 12.59.

***N*-(4-Ethoxy-2-methyl-2*H*-indazol-5-yl)-4-methyl-benzene sulfonamide (8a).** Off white solid; mp 103-105 °C; ^1H NMR (CDCl_3): δ 2.33 (s, 3H, CH_3), 4.23 (s, 3H, NCH_3), 6.92 (s, 1H, NH), 7.16 (d, 2H, $J = 8.1$ Hz), 7.30 (d, 1H, $J = 8.4$ Hz), 7.56 (d, 2H, $J = 8.1$ Hz), 7.68 (d, 1H, $J = 8.4$ Hz), 7.88 (s, 1H, H-3); ^{13}C NMR (CDCl_3): δ 21.7 (CH_3), 40.5 (NCH_3), 116.1 (CH), 122.6 (C), 124.6 (CH), 125.2 (CH), 126.0 (C), 127.2 (2CH), 129.3 (C), 129.5 (2CH), 135.8 (C), 144.2 (C), 145.2 (C); EI-MS (m/z) = 346 $[\text{M}+1]^+$; Anal. Calcd for $\text{C}_{17}\text{H}_{19}\text{N}_3\text{O}_3\text{S}$; C, 59.11; H, 5.54; N, 12.16. Found: C, 59.20; H, 5.50; N, 12.24.

***N*-(4-Chloro-2-methyl-2*H*-indazol-5-yl)-4-methoxy-benzene sulfonamide (7b).** Green solid; mp 104-106 °C; ^1H NMR (CDCl_3): δ 3.80 (s, 3H, CH_3O), 4.22 (s, 3H, NCH_3), 6.80-6.85 (m, 3H), 7.58-7.69 (m, 4H), 7.85 (s, 1H, H-3); ^{13}C NMR (CDCl_3): δ 40.5 (NCH_3), 55.6 (CH_3O), 114.1 (2CH), 116.4 (CH), 117.5 (C), 121.4 (C), 124.0 (C), 124.2 (CH), 124.8 (CH), 127.8 (C), 129.3 (C), 129.5 (2CH), 130.2 (C), 144.2 (C), 163.3 (C); EI-MS (m/z) = 352 (^{35}Cl) $[\text{M}+1]^+$, 354 (^{37}Cl) $[\text{M}+3]^+$; Anal. Calcd for $\text{C}_{15}\text{H}_{14}\text{ClN}_3\text{O}_3\text{S}$; C, 51.21; H, 4.01; N, 11.94. Found: C, 51.28; H, 4.10; N, 11.88.

***N*-(4-Ethoxy-2-methyl-2*H*-indazol-5-yl)-4-methoxy-benzenesulfonamide (8b).** Off white solid; mp 108-110 °C; ^1H NMR ($\text{DMSO}-d_6$): δ 1.12 (t, 3H, CH_3 , $J = 7.2$ Hz), 3.75 (s, 3H, CH_3O), 3.92 (q, 2H, CH_2O , $J = 7.2$ Hz), 4.07 (s, 3H, NCH_3), 6.98 (d, 2H, $J = 8.4$ Hz), 7.11 (d, 1H, $J = 9.0$ Hz), 7.45 (d, 1H, $J = 9.0$ Hz), 7.76 (d, 2H, $J = 8.4$ Hz), 8.30 (s, 1H, H-3), 9.07 (s, 1H, NH); ^{13}C NMR ($\text{DMSO}-d_6$): δ 15.6 (CH_3), 40.4 (NCH_3), 56.0 (CH_3O), 67.3 (CH_2O), 110.7 (CH), 114.3 (2CH), 118.5 (C), 122.6 (C), 124.3 (CH), 126.9 (CH), 129.3 (2CH), 132.8 (C), 149.2 (C), 162.6 (C), 162.8 (C); EI-MS (m/z) = 362 $[\text{M}+1]^+$; Anal. Calcd for $\text{C}_{17}\text{H}_{19}\text{N}_3\text{O}_4\text{S}$; C, 56.50; H, 5.30; N, 11.63. Found: C, 56.61; H, 5.27; N, 11.69.

***N*-(2-Allyl-4-chloro-2*H*-indazol-5-yl)-4-methyl-benzene sulfonamide (7c).** Brown solid; mp 147-149 °C; ^1H NMR (CDCl_3): δ 2.34 (s, 3H, CH_3), 5.02 (m, 2H, NCH_2), 5.33-5.40 (m, 2H, $=\text{CH}_2$), 6.03-6.16 (m, 1H, $=\text{CH}$), 6.90 (s, 1H, NH), 7.15 (d, 2H, $J = 8.1$ Hz), 7.58-7.67 (m, 4H), 7.87 (s, 1H, H-3); ^{13}C NMR (CDCl_3): δ 21.6 (CH_3), 56.3 (NCH_2), 116.9 (CH), 119.6 (C), 120.8 ($=\text{CH}_2$), 122.9 (CH), 124.5 (CH), 127.3 (2CH), 127.7 (C), 129.0 (C), 129.6 (2CH), 131.2 (CH), 135.9 (C), 144.1 (C), 146.3 (C); EI-MS (m/z) = 362 (^{35}Cl) $[\text{M}+1]^+$, 364 (^{37}Cl) $[\text{M}+3]^+$; Anal. Calcd for $\text{C}_{17}\text{H}_{16}\text{ClN}_3\text{O}_2\text{S}$; C, 56.43; H, 4.46; N, 11.61. Found: C, 56.48; H, 4.40; N, 11.68.

***N*-(2-Allyl-4-ethoxy-2*H*-indazol-5-yl)-4-methyl-benzene sulfonamide (8c).** Off white solid; mp 115-117°C; ¹H NMR (DMSO-*d*₆): δ 1.10 (t, 3H, CH₃, *J* = 7.2 Hz), 2.30 (s, 3H, CH₃), 3.92 (q, 2H, CH₂O, *J* = 7.2 Hz), 4.98 (m, 2H, NCH₂), 5.15-5.23 (m, 2H, =CH₂), 5.98-6.06 (m, 1H, =CH), 7.05 (d, 1H, *J* = 9.0 Hz), 7.27 (d, 2H, *J* = 7.8 Hz), 7.44 (d, 1H, *J* = 9.0 Hz), 7.56 (d, 2H, *J* = 7.8 Hz), 8.21 (s, 1H, H-3), 9.96 (s, 1H, NH); ¹³C NMR (DMSO-*d*₆): δ 15.6 (CH₃), 21.4 (CH₃), 55.6 (NCH₂), 67.4 (CH₂O), 111.0 (CH), 118.3 (CH), 119.0 (=CH₂), 117.3 (C), 124.0 (CH), 127.0 (2CH), 129.6 (2CH), 130.0 (CH), 131.4 (C), 133.8 (C), 137.1 (C), 143.0 (C), 146.4 (C); EI-MS (*m/z*) = 372 [M+1]⁺; Anal. Calcd for C₁₉H₂₁N₃O₃S; C, 61.44; H, 5.70; N, 11.31. Found: C, 61.52; H, 5.65; N, 11.38.

***N*-(2-Allyl-4-chloro-2*H*-indazol-5-yl)-4-methoxy-benzene sulfonamide (7d).** Yellow solid; mp 98-100 °C; ¹H NMR (DMSO-*d*₆): δ 3.78 (s, 3H, CH₃O), 5.03 (m, 2H, NCH₂), 5.18-5.25 (m, 2H, =CH₂), 6.02-6.11 (m, 1H, =CH), 7.02 (d, 2H, *J* = 9.0 Hz), 7.06 (d, 1H, *J* = 9.0 Hz), 7.51 (d, 1H, *J* = 9.0 Hz), 7.56 (d, 2H, *J* = 9.0 Hz), 7.37 (s, 1H, H-3), 9.73 (s, 1H, NH); ¹³C NMR (DMSO-*d*₆): δ 55.8 (CH₃O), 56.1 (NCH₂), 114.7 (2CH), 116.9 (CH), 119.3 (=CH₂), 121.0 (C), 121.9 (C), 124.5 (CH), 126.9 (C), 127.4 (CH), 129.4 (2CH), 132.5 (C), 133.6 (CH), 147.1 (C), 162.8 (C); EI-MS (*m/z*) = 378 (³⁵Cl) [M+1]⁺, 380 (³⁷Cl) [M+3]⁺; Anal. Calcd for C₁₇H₁₆ClN₃O₃S; C, 54.04; H, 4.27; N, 11.12. Found: C, 54.12; H, 4.21; N, 11.18.

***N*-(2-Allyl-4-ethoxy-2*H*-indazol-5-yl)-4-methoxy-benzene sulfonamide (8d).** White solid; mp 103-105 °C; ¹H NMR (CDCl₃): δ 1.13 (t, 3H, CH₃, *J* = 7.2 Hz), 3.73 (s, 3H, CH₃O), 3.95 (q, 2H, CH₂O, *J* = 7.2 Hz), 4.97 (m, 2H, NCH₂), 5.14-5.22 (m, 2H, =CH₂), 6.00-6.10 (m, 1H, =CH), 6.86 (d, 2H, *J* = 9.0 Hz), 7.06 (d, 1H, *J* = 9.0 Hz), 7.45 (d, 1H, *J* = 9.0 Hz), 7.61 (d, 2H, *J* = 9.0 Hz), 8.21 (s, 1H, H-3); ¹³C NMR (CDCl₃): δ 16.7 (CH₃), 55.6 (CH₃O), 56.1 (NCH₂), 67.4 (CH₂O), 111.1 (CH), 114.3 (2CH), 118.3 (C), 119.1 (=CH₂), 122.8 (C), 123.4 (CH), 127.1 (CH), 129.3 (2CH), 133.7 (CH), 132.8 (C), 145.7 (C), 149.2 (C), 162.7 (C); EI-MS (*m/z*) = 388 [M+1]⁺; Anal. Calcd for C₁₉H₂₁N₃O₄S; C, 58.90; H, 5.46; N, 10.84. Found: C, 58.84; H, 5.40; N, 10.75.

Figure S1. ^1H NMR, ^{13}C NMR and DEPT spectra of compound 4b	S9-S10
Figure S2: ^1H NMR, ^{13}C NMR and DEPT spectra of compound 4c	S10-S11
Figure S3: ^1H NMR, ^{13}C NMR and DEPT spectra of compound 5a	S12-S13
Figure S4: ^1H NMR, ^{13}C NMR and DEPT spectra of compound 5c	S13-S14
Figure S5: ^1H NMR, ^{13}C NMR and DEPT spectra of compound 5d	S15-S16
Figure S6: ^1H NMR, ^{13}C NMR and DEPT spectra of compound 6a	S16-S17
Figure S7: ^1H NMR, ^{13}C NMR and DEPT spectra of compound 6c	S18-S19
Figure S8: ^1H NMR, ^{13}C NMR and DEPT spectra of compound 7b	S19-S20
Figure S9: ^1H NMR, ^{13}C NMR and DEPT spectra of compound 7c	S21-S22
Figure S10: ^1H NMR, ^{13}C NMR and DEPT spectra of compound 7d	S22-S23
Figure S11: ^1H NMR, ^{13}C NMR and DEPT spectra of compound 8c	S24-S25
Figures S12, S13, S14, S15. ORTEPS diagram of compounds 6a-d	S25-S26
Figures S16, S17. ORTEPS diagram of compounds 7a and 8a	S27

Figure S1. ^1H NMR (300 MHz, CDCl_3) spectra of compound **4b**

Figure S1. ^{13}C NMR (75 MHz, CDCl_3) spectra of compound **4b**

201RMN11
UATRS CNRST
DEPT

Figure S1. ¹³C NMR (75 MHz, CDCl₃, DEPT) spectra of compound 4b

Figure S2. ¹H NMR (300 MHz, CDCl₃) spectra of compound 4c

Figure S2. ^{13}C NMR (75 MHz, CDCl_3) spectra of compound **4c**

Figure S2. ^{13}C NMR (75 MHz, CDCl_3 , DEPT) spectra of compound **4c**

Figure S3. ^1H NMR (300 MHz, CDCl_3) spectra of compound **5a**

Figure S3. ^{13}C NMR (75 MHz, CDCl_3) spectra of compound **5a**

Figure S3. ^{13}C NMR (75 MHz, CDCl_3 , DEPT) spectra of compound **5a**

Figure S4. ^1H NMR (300 MHz, CDCl_3) spectra of compound **5c**

Figure S4. ^{13}C NMR (75 MHz, CDCl_3) spectra of compound **5c**

Figure S4. ^{13}C NMR (75 MHz, CDCl_3 , DEPT) spectra of compound **5c**

Figure S5. ^1H NMR (300 MHz, CDCl_3) spectra of compound **5d**

Figure S5. ^{13}C NMR (75 MHz, CDCl_3) spectra of compound **5d**

Figure S5. ^{13}C NMR (75 MHz, CDCl_3 , DEPT) spectra of compound **5d**

Figure S6. ^1H NMR (300 MHz, $\text{DMSO}-d_6$) spectra of compound **6a**

Figure S6. ¹³C NMR (75 MHz, DMSO-d₆) spectra of compound 6a

Figure S6. ¹³C NMR (75 MHz, DMSO-d₆, DEPT) spectra of compound 6a

Figure S7. ^1H NMR (300 MHz, DMSO- d_6) spectra of compound 6c

Figure S7. ^{13}C NMR (75 MHz, DMSO- d_6) spectra of compound 6c

Figure S7. ^{13}C NMR (75 MHz, DMSO- d_6 , DEPT) spectra of compound **6c**

Figure S8. ^1H NMR (300 MHz, CDCl_3) spectra of compound **7b**

Figure S8. ^{13}C NMR (75 MHz, CDCl_3) spectra of compound 7b

Figure S8. ^{13}C NMR (75 MHz, CDCl_3 , DEPT) spectra of compound 7b

Figure S9. ¹H NMR (300 MHz, CDCl₃) spectra of compound **7c**

Figure S9. ¹³C NMR (75 MHz, CDCl₃) spectra of compound **7c**

201RMN07
UATRS CNRST
DEPT

Figure S9. ^{13}C NMR (75 MHz, CDCl_3 , DEPT) spectra of compound 7c

201RMN09
UATRS CNRST
1H

Figure S10. ^1H NMR (300 MHz, DMSO-d_6) spectra of compound 7d

Figure S10. ^{13}C NMR (75 MHz, DMSO- d_6) spectra of compound **7d**

Figure S10. ^{13}C NMR (75 MHz, DMSO- d_6 , DEPT) spectra of compound **7d**

Figure S11. ¹H NMR (300 MHz, DMSO-d₆) spectra of compound **8c**

Figure S11. ¹³C NMR (75 MHz, DMSO-d₆) spectra of compound **8c**

201RMN10
UATRS CNRST
DEPT

Figure S11. ¹³C NMR (75 MHz, DMSO-d₆, DEPT) spectra of compound **8c**

Figure S12. ORTEP diagram of 4-Methyl-N-(1-methyl-1H-indazol-5-yl)-benzene sulfonamide **6a**^{S2}.

Figure S13. ORTEP diagram of 4-Methoxy-*N*-(1-methyl-1*H*-indazol-5-yl)benzene sulfonamide **6b**^{S3}.

Figure S14. ORTEP diagram of *N*-(1-Allyl-1*H*-indazol-5-yl)-4-methylbenzenesulfonamide **6c**^{S4}

Figure S15. ORTEP diagram of *N*-(1-Allyl-1*H*-indazol-5-yl)-4-methoxy-benzenesulfonamide **6d**^{S5}

Figure 16: ORTEP diagram of *N*-(4-chloro-2-methyl-2*H*-indazol-5-yl)-4-methyl-benzene sulfonamide **7a**

Crystal structure data for compound **7a**: The title compound was recrystallized from ethanol. Crystals of $C_{15}H_{14}ClN_3O_2S$ belong to the $P2(1)2(1)2(1)$ space group [$a = 4.9585$ (1), $b = 12.2442$ (3), $c = 25.8587$ (8) Å; $Z = 4$; $V = 1569.96$ (7) Å³]. The 16328 room temperature diffraction data were measured on a Bruker X8 diffractometer using Mo K α radiation up to a 2θ max of 59.14 °. The crystal structure was refined to a final R-index of 0.0424 for 3579 unique reflections and 200 least squares parameters. The crystallographic information file has been deposited with the Cambridge Crystallographic Data Centre, CCDC 1031265.

Figure 17: ORTEP diagram of *N*-(4-ethoxy-2-methyl-2*H*-indazol-5-yl)-4-methyl-benzene sulfonamide **8a**

Crystal structure data for compound **8a**: The title compound was recrystallized from ethanol. Crystals of $C_{17}H_{19}N_3O_3S$ belong to the $P2(1)/c$ space group [$a = 13.5102$ (5), $b = 9.0587$ (3), $c = 14.1624$ (5) Å, $\beta = 92.089$ (2)°; $Z = 4$; $V = 1732.11$ (7) Å³]. The 26283 room temperature diffraction data were measured on a Bruker X8 diffractometer using Mo K α radiation up to a 2θ max of 54.20°. The crystal structure was refined to a final R-index of 0.0439 for 2912 unique reflections and 217 least squares parameters. The crystallographic information file has been deposited with the Cambridge Crystallographic Data Centre, [CCDC 1031266](#).

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