

Supporting Information

Development and Characterisation of Biphenylsulfonamides as Novel Inhibitors of Bone Resorption

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1. Synthesis of compounds

4'-Fluorobiphenyl-4-sulfonic acid (1): 4-Fluorobiphenyl (5 g) was dissolved in chloroform (100 ml) at room temperature. Chlorosulfonic acid (5 g) was added dropwise and stirring was continued for a further 4 h, after which the solvent was allowed to slowly evaporate until precipitation was seen. The mixture was left to recrystallise overnight and the solid was collected by filtration. Further crops of crystals were collected from the filtrate. 51 %: mp 125-128 °C

4'-Bromobiphenyl-4-sulfonic acid (2): 4-Bromobiphenyl (14 g) was dissolved in chloroform (140 ml) at room temperature. Chlorosulfonic acid (8.4 g) was added dropwise and a precipitate appeared soon after addition was complete. Stirring was continued for a further 4 h, after which the solid was collected by filtration. Further crops of crystals were collected from the filtrate. The solid was washed with cold chloroform and the washings also allowed to crystallise. 84 %: mp 119-120 °C

4'-Bromo, 2'-fluorobiphenyl-4-sulfonic acid (3): 4-Bromo, 2-fluorobiphenyl (14 g) was dissolved in chloroform (140 ml) at room temperature. Chlorosulfonic acid (8.4 g) was added dropwise and a precipitate appeared soon after addition was complete. Stirring was continued for a further 4 h, after which the solid was collected by filtration. Further crops of crystals were collected from the filtrate. The solid was washed with cold chloroform and the washings also allowed to crystallise. 60 %: mp 101-104 °C

2'-Nitrobiphenyl-4-sulfonic acid (4): 2-Nitrobiphenyl (5 g) was added slowly to chlorosulfonic acid (25 ml) at room temperature and stirring was continued for 2 h. The mixture was carefully dripped into ice water and extracted with DCM. The solvent was evaporated and the residue purified by column chromatography (petrol / ethyl acetate) to give a white solid. 54 %: mp 117-118 °C

3'-Nitrobiphenyl-4-sulfonic acid (5): 3-Nitrobiphenyl (5 g) was added slowly to chlorosulfonic acid (25 ml) at room temperature and stirring was continued for 2 h.

The mixture was carefully dripped into ice water and extracted with DCM. The solvent was evaporated to give a white powder. 70 %: mp 118-119 °C

2'-Iodobiphenyl-4-sulfonic acid (6): 2-Iodobiphenyl (2 g) was dissolved in chloroform (30 ml) at room temperature. Chlorosulfonic acid (2 g) was added dropwise and a precipitate appeared soon after addition was complete. Stirring was continued for a further 1 h, after which the solid was collected by filtration. Further crops of crystals were collected from the filtrate. The solid was washed with cold chloroform and the washings also allowed to crystallise. 77 %: mp 79-82 °C

2', 4' Difluoro, 3-methoxybiphenyl-4-sulfonic acid (7): 2',4'-Difluoro, 3-methoxybiphenyl was prepared by as a clear oil from 2,4-difluorophenyl boronic acid and 3-bromoanisole using method A. 2',4'-Difluoro, 3-methoxybiphenyl (2 g) was dissolved in chloroform (30 ml) at room temperature. Chlorosulfonic acid (2 g) was added dropwise and an oil separated soon after addition was complete. Stirring was continued for a further 1 h, after which the solvent was decanted and the oil repeatedly washed with chloroform to give an oil. 56 %: bp >250 °C (20 mmHg) dec

4'-Fluorobiphenyl-4-sulfonyl chloride (8): 4'-Fluorobiphenyl-4-sulfonic acid **1** (3 g) was refluxed in thionyl chloride (30 ml) with a catalytic quantity of DMF (0.5 ml) for 4 h. Toluene was added and the solvents evaporated under vacuum to give an amorphous solid. 95 %: mp 119-121 °C

4'-Bromobiphenyl-4-sulfonyl chloride (9): 4'-Bromobiphenyl-4-sulfonic acid **2** (5 g) was refluxed in thionyl chloride (30 ml) with a catalytic quantity of DMF (0.5 ml) for 4 h. Toluene was added and the solvents evaporated under vacuum. The residue collected was recrystallised from petrol / ethyl acetate to give white crystals. 92 %: mp 116-118 °C

4'-Bromo, 2'-fluorobiphenyl-4-sulfonyl chloride (10): 4'-Bromo, 2'-fluorobiphenyl-4-sulfonic acid **3** (5 g) was refluxed in thionyl chloride (30 ml) with a catalytic quantity of DMF (0.5 ml) for 4 h. Toluene was added and the solvents evaporated under vacuum. The residue collected was recrystallised from petrol / ethyl acetate to give white crystals. 88 %: mp 69-70 °C

2'-Nitrobiphenyl-4-sulfonyl chloride (11): 2'-Nitrobiphenyl-4-sulfonic acid **4** (2 g) was refluxed in thionyl chloride (30 ml) with a catalytic quantity of DMF (0.5 ml) for 4 h. Toluene was added and the solvents evaporated under vacuum to give a yellow oil. 87 %: bp 130 °C (20 mmHg) dec

3'-Nitrobiphenyl-4-sulfonyl chloride (12): 3'-Nitrobiphenyl-4-sulfonic acid **5** (2 g) was refluxed in thionyl chloride (30 ml) with a catalytic quantity of DMF (0.5 ml) for 4 h. Toluene was added and the solvents evaporated under vacuum. The residue was recrystallised from ethyl acetate / petrol to give white crystals. 82 %: mp 110-111 °C

2'-Iodobiphenyl-4-sulfonyl chloride (13): 2'-Iodobiphenyl-4-sulfonic acid **6** (1 g) was refluxed in thionyl chloride (10 ml) with a catalytic quantity of DMF (0.5 ml) for 4 h. Toluene was added and the solvents evaporated under vacuum. The residue collected was recrystallised from petrol / ethyl acetate to give white crystals. 80 %: mp 64-66 °C

2', 4' Difluoro, 3-methoxybiphenyl-4-sulfonyl chloride (14): 2', 4'-Difluoro, 3-methoxybiphenyl-4-sulfonic acid **7** (3 g) was refluxed in thionyl chloride (30 ml) with a catalytic quantity of DMF (0.5 ml) for 4 h. Toluene was added and the solvents evaporated under vacuum to give a pale brown oil. 76 %: bp 125 °C (20 mmHg) dec

Biphenyl-4-sulfonic acid-(3-hydroxypropyl)-amide (15) was prepared as a white powder from biphenyl-4-sulfonyl chloride and 3-aminopropanol using method B. 85 %: mp 120-123 °C; Anal. (C₁₅H₁₇NO₃S): C, H, N; MS, *m/z*: Calcd, 291.09; Found, 292.15 (MH)

Biphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (16) was prepared as a white powder from biphenyl-4-sulfonyl chloride and 4-aminobutanol using method B. 89 %: mp 122-123 °C; Anal. (C₁₆H₁₉NO₃S): C, H, N; MS, *m/z*: Calcd, 305.11; Found, 306.11 (MH)

Biphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (17) was prepared as a white powder from biphenyl-4-sulfonyl chloride and 5-aminopentanol using method B. 91 %: mp 109-110 °C; Anal. (C₁₇H₂₁NO₃S): C, H, N; MS, *m/z*: Calcd, 319.12; Found, 320.18 (MH)

Biphenyl-4-sulfonic acid-(6-hydroxyhexyl)-amide (18) was prepared as a white powder from biphenyl-4-sulfonyl chloride and 6-aminohexanol using method B. 86 %; mp 116-117 °C; Anal. (C₁₈H₂₃NO₃S) Calcd: C, 64.84; H, 6.95; N, 4.20; Found C, 64.94; H, 7.38; N, 4.18; MS, *m/z*: Calcd, 333.14; Found, 334.13 (MH)

4'-Fluorobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (19) was prepared as a white powder from 4'-fluorobiphenyl-4-sulfonyl chloride **8** and 4-aminobutanol using method B. 82 %: mp 156-158 °C; Anal. (C₁₆H₁₈FNO₃S): C, H, N; MS, *m/z*: Calcd, 323.10; Found, 346.28 (M+Na)

4'-Bromobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (20) was prepared as a white powder from 4'-bromobiphenyl-4-sulfonyl chloride **9** and 4-aminobutanol using method B. 84 %: mp 142-143 °C; Anal. (C₁₆H₁₈BrNO₃S): Calcd. C 50.01, H 4.72, N 3.64; Found C 50.36, H, 4.16, N 3.53. MS, *m/z*: Calcd, 383.00; Found, 383.98, 385.90 (MH, MH+2)

4'-Bromobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (21) was prepared as a white powder from 4'-bromobiphenyl-4-sulfonyl chloride **9** and 5-aminopentanol using method B. 83 %: mp 138-140 °C; Anal. (C₁₇H₂₀BrNO₃S): Calcd. C 51.26, H 5.06, N 3.52; Found C 50.60, H, 4.77, N 3.16; MS, *m/z*: Calcd, 397.03; Found, 398.00 (MH)

4'-Bromo, 2'-fluorobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (22) was prepared as a white powder from 4'-bromo, 2'-fluorobiphenyl-4-sulfonyl chloride **10** and 4-aminobutanol using method B. 90 %: mp 100-102 °C; Anal. (C₁₆H₁₈BrFNO₃S): C, H, N; MS, *m/z*: Calcd, 401.01; Found, 402.01, 403.95 (MH, MH+2)

2'-Nitrobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (23) was prepared as a white powder from 2'-nitrobiphenyl-4-sulfonyl chloride **11** and 4-aminobutanol using method B. 88 %: mp 109-111 °C; Anal. (C₁₆H₁₈N₂O₅S): C, H, N; MS, *m/z*: Calcd, 350.09; Found, 351.21 (MH)

3'-Nitrobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (24) was prepared as a white powder from 3'-nitrobiphenyl-4-sulfonyl chloride **12** and 4-aminobutanol using method B. 80 %: mp 90-91 °C; Anal. (C₁₆H₁₈N₂O₅S): C, H, N; MS, *m/z*: Calcd, 350.09; Found, 351.14 (MH)

2'-Iodobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (25) was prepared as a white powder from 2'-iodobiphenyl-4-sulfonyl chloride **13** and 4-aminobutanol using method B. 56 %: mp 106-108 °C; Anal. (C₁₆H₁₈INO₃S): Calcd. C 44.56, H 4.21, N 3.25; Found C 45.00, H 3.43, N 3.06; MS, *m/z*: Calcd, 431.01; Found, 432.26 (MH)

2',4'-Difluoro, 3-methoxybiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (26) was prepared as a clear oil from 2', 4' difluoro, 3-methoxybiphenyl-4-sulfonyl chloride **14** and 5-aminopentanol, using method B. 42 %: bp >250 °C (20 mmHg) dec; Anal. (C₁₈H₂₁F₂NO₄S): C, H, N; MS, *m/z*: Calcd, 385.12; Found, 386.03 (MH)

4-Bromophenyl sulfonic acid-(4-hydroxybutyl)-amide (27) was prepared as a white powder from 4-bromophenyl sulfonyl chloride **22** and 4-aminobutanol using method B. 78 %: mp 79-80 °C

4-Bromophenyl sulfonic acid-(5-hydroxypentyl)-amide (28) was prepared as a white powder from 4-bromophenyl sulfonyl chloride and 5-aminopentanol using method B. 75 %: mp 58-60 °C

4-Bromo-2-chlororophenyl sulfonic acid-(4-hydroxybutyl)-amide (29) was prepared as a white powder from 4-bromo, 2-chlorophenyl sulfonyl chloride and 4-aminobutanol using method B. 82 %: mp 69-70 °C

4-Bromo-2-trifluoromethoxyphenyl sulfonic acid-(4-hydroxybutyl)-amide (30) was prepared as a white powder from 4-bromo, 2-trifluoromethoxyphenyl sulfonyl chloride and 4-aminobutanol using method B. 76 %: mp 80-90 °C dec.

4-Bromo-3-methylphenyl sulfonic acid-(4-hydroxybutyl)-amide (31) was prepared as a white powder from 4-bromo, 3-methylphenyl sulfonyl chloride and 4-aminobutanol using method B. 69 %: mp 60-61 °C

4-Bromo-2-ethylphenyl-sulfonic acid-(4-hydroxybutyl)-amide (32) was prepared as an impure clear oil from 4-bromo, 2-ethylphenyl sulfonyl chloride and 4-aminobutanol using method B. 52 %.

4-Bromo-2-trifluoromethylphenyl sulfonic acid-(4-hydroxybutyl)-amide (33) was prepared as a white powder from 4-bromo, 2-trifluoromethylphenyl sulfonyl chloride and 4-aminobutanol using method B. 32 %: mp 70-75 °C dec.

4-Bromo-2-fluorophenyl sulfonic acid-(4-hydroxybutyl)-amide (34) was prepared as a white powder from 4-bromo, 2-fluorophenyl sulfonyl chloride and 4-aminobutanol using method B. 89 %: mp 67-68 °C

4-Bromo-3-fluorophenyl sulfonic acid-(4-hydroxybutyl)-amide (35) was prepared as a white powder from 4-bromo, 3-fluorophenyl sulfonyl chloride using method B. 85 %: mp 71-73 °C

4'-Methylbiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (36) was prepared as a white solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and 4-methylphenyl boronic acid, using method A. 78 %: mp 137-138 °C; Anal. (C₁₇H₂₁NO₃S): Calcd. C 63.92, H 6.63, N 4.39; Found C 64.66, H 7.45, N 4.15; MS, *m/z*: Calcd, 333.14; Found, 334.13 (MH)

4'-Acetylbiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (37) was prepared as a white solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and 4-acetylphenyl boronic acid, using method A. 70 %: mp 136-138 °C; Anal. (C₁₉H₂₃NO₄S): C, H, N; MS, *m/z*: Calcd, 361.13; Found, 362.42 (MH)

4'-Methylthiobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (38) was prepared as a pale yellow solid from 4-bromophenyl sulfonic acid-(4-hydroxybutyl)-amide **27** and 4-methylthiophenyl boronic acid, using method A. 28 %: mp 145-146 °C; Anal. (C₁₇H₂₁NO₃S₂): Calcd. C 58.09, H 6.02, N 3.99; Found C 59.07, H 5.78, N 3.63; MS, *m/z*: Calcd, 351.10; Found, 351.04 (M⁺)

4'-Cyanobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (39) was prepared as a white solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and 4-cyanophenyl boronic acid, using method A. 45 %: mp 140-142 °C; Anal. (C₁₈H₂₀N₂O₃S): C, H, N; MS, *m/z*: Calcd, 344.12; Found, 344.33 (M⁺)

2'-Methoxybiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (40) was prepared as a white solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and 2-methoxyphenyl boronic acid, using method A. 52 %: mp 65-67 °C Anal. (C₁₈H₂₃NO₄S): C, H, N; MS, *m/z*: Calcd, 349.13; Found, 350.16 (MH)

4'-Carboxybiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (41) was prepared as a white solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and 4-carboxyphenyl boronic acid, using method A. 68 %: mp 215-216 °C; Anal. (C₁₈H₂₁NO₅S): C, H, N; MS, *m/z*: Calcd, 363.11; Found, 386.21 (M+Na)

4'-Dimethylaminobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (42) was prepared as a white solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and 4-dimethylaminophenyl boronic acid, using method A. 65 %: mp 176-178 °C; Anal. (C₁₉H₂₆N₂O₃S): Calcd. C 62.96, H 7.23, N 7.73; Found C 62.22, H 7.32, N 7.61; MS, *m/z*: Calcd, 362.17; Found, 363.31 (MH)

4'-Hydroxybiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (43) was prepared as a slightly impure pale brown solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and 4-hydroxyphenyl boronic acid, using method A. 28 %: mp 168-172 °C; Anal. (C₁₇H₂₁NO₄S): Calcd. C 60.87, H 6.31, N 4.18; Found C 62.13, H 6.50, N 3.92; MS, *m/z*: Calcd, 335.12; Found, 336.20 (MH)

2',4'-Dichlorobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (44) was prepared as a white solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and 2,4-dichlorophenyl boronic acid, using method A. 34 %: mp 87-89 °C; Anal. (C₁₇H₁₉Cl₂NO₃S): C, H, N; MS, *m/z*: Calcd, 387.05; Found, 387.04, 389.22 (MH MH+2)

2',4'-Bis(trifluoromethyl)biphenyl-4-sulfonic acid-(4-hydroxypentyl)-amide (45) was prepared as a white powder from 4-bromophenyl sulfonic acid-(4-hydroxybutyl)-amide **27** and 2,4-bis(trifluoromethyl)phenylboronic acid using method A. 38 %: mp 115-116 °C; Anal. (C₁₈H₁₇F₆NO₃S): C, H, N; MS, *m/z*: Calcd, 441.08; Found, 464.35 (M+Na)

4-Trifluoromethoxybiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (46) was prepared as a white solid from 4-bromophenyl sulfonic acid-(4-hydroxybutyl)-amide **27** and 4-trifluoromethylphenyl boronic acid, using method A. 67 %: mp 135-136 °C; Anal. (C₁₇H₁₈F₃NO₄S): Calcd. C 52.44, H, 4.66, N 3.60; Found C 52.75, H 3.95, N 3.50; MS, *m/z*: Calcd, 389.09; Found, 390.11 (MH)

***p*-Terphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (47)** was prepared as a white solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and phenylboronic acid, using method A. 72 %: mp 195-196 °C; Anal. (C₂₃H₂₅NO₃S): C, H, N; MS, *m/z*: Calcd, 395.16; Found, 396.42 (MH)

3'-Methylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (48) was prepared as a white solid from 4-bromophenyl sulfonic acid-(4-hydroxybutyl)-amide **27** and 3-methylphenyl boronic acid, using method A. 75 %: mp 100-101 °C; Anal. (C₁₇H₂₁NO₃S): C, H, N; MS, *m/z*: Calcd, 319.12; Found, 320.15 (MH)

2'-Trifluoromethylbiphenyl-4-sulfonic acid (5-hydroxy-pentyl)-amide (49) was prepared as a white solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and 2-trifluoromethylphenyl boronic acid, using method A. 53 %: mp 55-57 °C; Anal. (C₁₈H₂₀F₃NO₃S): C, H, N; MS, *m/z*: Calcd, 387.11; Found, 387.98 (MH)

4'-Trifluoromethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (50) was prepared as a white solid from 4-bromophenyl sulfonic acid-(4-hydroxybutyl)-amide **27** and 4-trifluoromethylphenyl boronic acid, using method A. 48 %: mp 140-141 °C; Anal. (C₁₇H₁₈F₃NO₃S): Calcd. C 54.68, H 4.86, N 3.75; Found C 55.26, H 4.18, N 3.57; MS, *m/z*: Calcd, 373.10; Found, 374.05 (MH)

3',4'-Difluorobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (51) was prepared as a white solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and 3,4-difluorophenyl boronic acid, using method A. 69 %: mp 85-87 °C; Anal. (C₁₇H₁₉F₂NO₃S): C, H, N; MS, *m/z*: Calcd, 355.11; Found, 354.22 (M-H)

2',4'-Difluorobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (52) was prepared as a white solid from 4-bromophenyl sulfonic acid-(5-hydroxypentyl)-amide **28** and 2,4-difluorophenyl boronic acid, using method A. 62 %: mp 110-112 °C; Anal. (C₁₇H₁₉F₂NO₃S): Calcd. C 57.45, H 5.39, N 3.94; Found C 56.94, H 5.38, N 3.85; MS, *m/z*: Calcd, 355.11; Found, 378.18 (M+Na)

2',4'-Difluoro, 3-chlorobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (53) was prepared as a white solid from 4-bromo, 2-chlorophenyl sulfonic acid-(4-hydroxybutyl)-amide **29** and 2,4-difluorophenyl boronic acid, using method A. 94 %: mp 87-88 °C; Anal. (C₁₆H₁₆ClF₂NO₃S): C, H, N; MS, *m/z*: Calcd, 375.05; Found, 374.18 (M-H)

2',4'-Difluoro-3-trifluoromethoxybiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (54) was prepared as a white solid from 4-bromo, 2-trifluoromethoxyphenyl sulfonic acid-(4-hydroxybutyl)-amide **30** and 2,4-difluorophenyl boronic acid, using method A. 81 %: mp 86-88 °C; Anal. (C₁₇H₁₆F₅NO₄S): C, H, N; MS, *m/z*: Calcd, 425.07; Found, 427.30 (MH+1)

2',4'-Difluoro, 2-methylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (55) (ABD295) was prepared as a white solid from 4-bromo, 3-methylphenyl sulfonic acid-(4-hydroxybutyl)-amide **31** and 2, 4-difluorophenyl boronic acid, using method

A. 46 %: mp 59-61 °C; Anal. (C₁₇H₁₉F₂NO₃S): C, H, N; MS, *m/z*: Calcd, 355.11; Found, 378.53 (M+Na)

4'-Fluoro, 2-methylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (56) was prepared as a white solid from 4-Bromo, 3-methylphenyl sulfonic acid-(4-hydroxybutyl)-amide **31** and 4-fluorophenyl boronic acid, using method A. 54 %: mp 55-57 °C; Anal. (C₁₇H₂₀FNO₃S): Calcd. C 60.51, H 5.97, N 4.15; Found C 60.71, H 5.36, N 4.00; MS, *m/z*: Calcd, 337.11; Found, 359.62 (M+Na)

2',4'-Difluoro, 3-ethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (57) was prepared as a white solid from 4-bromo, 2-ethylphenyl sulfonic acid-(4-hydroxybutyl)-amide **32** and 2,4-difluorophenyl boronic acid, using method A. 55 %: mp 92-95 °C; Anal. (C₁₈H₂₁F₂NO₃S): Calcd. C 58.52, H 5.73, N 3.79; Found C 59.40, H 5.76, N 4.45; MS, *m/z*: Calcd, 369.12; Found, 392.70 (M+Na)

3-Trifluoromethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (58) was prepared as a white solid from 4-bromo, 2-trifluoromethylphenyl sulfonic acid-(4-hydroxybutyl)-amide **33** and phenyl boronic acid, using method A. 29 %: mp 89-91 °C; Anal. (C₁₇H₁₈F₃NO₃S): Calcd. C 54.68, H 4.86, N 3.75; Found C 55.45, H 4.95, N 3.42; MS, *m/z*: Calcd, 373.10; Found, 374.05 (MH)

2',4'-Difluoro, 3-trifluoromethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (59) was prepared as a pale brown oil from 4-bromo, 2-trifluoromethylphenyl sulfonic acid-(4-hydroxybutyl)-amide **33** and 2, 4-difluorophenyl boronic acid, using method A. 63 %: bp >250 °C (20 mmHg) dec; Anal. (C₁₇H₁₆F₅NO₃S): Calcd. C 49.88, H 3.94, N 3.42; Found C 50.55, H 3.52, N, 2.96; MS, *m/z*: Calcd, 409.08; Found, 409.00 (M⁺)

3-Fluoro, 4'-trifluoromethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (60) was prepared as a white solid from 4-bromo 2-fluorophenyl sulfonic acid-(4-hydroxybutyl)-amide **34** and 4-trifluoromethylphenyl boronic acid, using method A. 66 %: mp 90-91 °C; Anal. (C₁₇H₁₇F₄NO₃S): C, H, N; MS, *m/z*: Calcd, 391.09; Found, 413.82 (M+Na)

2-Fluoro, 4'-trifluoromethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (61) was prepared as a white solid from 4-bromo 3-fluorophenyl sulfonic acid-(4-hydroxybutyl)-amide **35** and 4-trifluoromethylphenyl boronic acid, using method A. 43 %: mp 108-110 °C; Anal. (C₁₇H₁₇F₄NO₃S): Calcd. C 52.17, H 4.38, N 3.58; Found C 53.02, H 3.60, N 3.35; MS, *m/z*: Calcd, 391.09; Found, 390.21 (M-H)

2'-Aminobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (62): 2'-Nitrobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (0.5 g) was dissolved in methanol (50 ml). 10% Pd/C (0.5 g) was added and the mixture stirred under nitrogen for 4 h. The mixture was filtered through celite and evaporated to a brown oil. Column chromatography gave a clear oil, crystallised from ether / petrol to give a white powder. 91 %: mp 155-156 °C. Anal. (C₁₆H₂₀N₂O₃S): C, H, N; MS, *m/z*: Calcd, 320.12; Found, 321.15 (MH)

4'-Fluorobiphenyl-2-sulfonic acid (4-hydroxybutyl)-amide (63) was prepared as a clear oil from 2-bromophenyl sulfonic acid-(4-hydroxybutyl)-amide and 4-fluorophenyl boronic acid, using method A. 32 %: bp >250 °C (20 mmHg) dec. Anal. (C₁₆H₁₈FNO₃S): Calcd. C 59.43, H 5.61, N 4.33; Found C 59.40, H 6.02, N 4.45; MS, *m/z*: Calcd, 323.10; Found, 324.21 (MH)

4'-Trifluoromethylbiphenyl-3-sulfonic acid (4-hydroxybutyl)-amide (64) was prepared as a white solid from 3-bromophenyl sulfonic acid-(4-hydroxybutyl)-amide and 4-trifluoromethylphenyl boronic acid, using method A. 49 %: mp 83-84 °C; Anal. (C₁₇H₁₈F₃NO₃S): C, H, N; MS, *m/z*: Calcd, 373.10; Found, 374.04 (MH)

Biphenyl-4-sulfonic acid-(4-hydroxybutyl)-methyl-amide (65) was prepared as a white solid from biphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (0.4 g) and methyl iodide (0.2 ml) and K₂CO₂ (0.5 g) in DMF (20 ml). The mixture was stirred at room temperature 4 h, poured into water and extracted with diethyl ether. The organic phase was repeatedly washed with water and evaporated to give a white solid. 82 %: mp 89-90 °C. Anal. (C₁₇H₂₁NO₃S): Calcd. C 63.92, H 6.63, N 4.39; Found C 63.12, H 6.62, N 4.35; MS, *m/z*: Calcd, 319.12; Found, 319.14 (M⁺)

Biphenyl-4-sulfonic acid-(4-hydroxybutyl)-pentyl-amide (66) was prepared as a white solid from biphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (0.4 g), bromopentane (0.2 ml) and K_2CO_2 (0.5 g) in DMF (20 ml). The mixture was stirred at 60 °C 4 h, poured into water and extracted with diethyl ether. The organic phase was repeatedly washed with water and evaporated to give a white solid. 47 %: mp 66-68 °C. Anal. ($C_{21}H_{29}NO_3S$): Calcd. C 67.17, H 7.78, N 3.73; Found C 66.64, H 7.40, N 3.35; MS, m/z : Calcd, 375.19; Found, 375.22 (M^+)

Biphenyl-4-carboxylic acid 4-hydroxy-butyl ester (67) was prepared as a white solid from biphenylcarbonyl chloride (2 g), 1,4-butanediol (5 ml) and pyridine (1 ml) in DCM (20 ml). The mixture was stirred at room temperature overnight, poured into water and extracted DCM. The organic phase was repeatedly washed with water and evaporated to give a white solid. 66 %: mp 68-70 °C; Anal. ($C_{17}H_{18}O_3$): C, H, N; MS, m/z : Calcd, 270.13; Found, 293.59 ($M+Na$)

2. Spectroscopic Analysis of compounds

4'-Fluorobiphenyl-4-sulfonic acid (1): ^1H NMR (CDCl_3): δ 7.16 (2H, t, $J = 8.5$ Hz), 7.50 (2H, m), 7.61 (2H, d, $J = 8.5$ Hz) and 7.94 (2H, d, $J = 8.2$ Hz)

4'-Bromobiphenyl-4-sulfonic acid (2): ^1H NMR ($\text{DMSO}-d_6$): δ 7.60 (6H, m), 7.72 (2H, m).

4'-Bromo, 2'-fluorobiphenyl-4-sulfonic acid (3): ^1H NMR (CDCl_3): δ 7.28 – 7.42 (3H, m), 7.66 (2H, d, $J = 8.2$ Hz), and 7.90 (2H, d, $J = 8.2$ Hz)

2'-Nitrobiphenyl-4-sulfonic acid (4): ^1H NMR ($\text{DMSO}-d_6$): δ 7.73 (5H, m), 8.12 (1H, d, $J = 8.2$ Hz), 8.18 (1H, d, $J = 8.2$ Hz) and 8.40 (1H, m)

3'-Nitrobiphenyl-4-sulfonic acid (5): ^1H NMR ($\text{DMSO}-d_6$): δ 7.79 (1H, t, $J = 8.2$ Hz), 7.89 (1H, t, $J = 8.2$ Hz), 7.98 (2H, d, $J = 8.2$ Hz), 8.11 (2H, d, $J = 8.2$ Hz), 8.20 (1H, d, $J = 8.2$ Hz) and 8.56 (1H, s)

2'-Iodobiphenyl-4-sulfonic acid (6): ^1H NMR (CDCl_3): δ 7.07 (1H, t, $J = 7.9$ Hz), 7.27 (1H, m), 7.41 (1H, t, $J = 7.9$ Hz), 7.45 (2H, d, $J = 8.5$ Hz), 7.88 (2H, d, $J = 8.5$ Hz) and 7.97 (1H, d, $J = 7.9$ Hz)

2', 4' Difluoro, 3-methoxybiphenyl-4-sulfonic acid (7): Used without further purification

4'-Fluorobiphenyl-4-sulfonyl chloride (8): Used without further purification

4'-Bromobiphenyl-4-sulfonyl chloride (9): ^{13}C NMR ($\text{DMSO}-d_6$): δ 121.2, 126.2, 126.3, 128.9, 131.9, 138.6, 139.4 and 146.6;

^1H NMR ($\text{DMSO}-d_6$): δ 7.58 (4H, m), 7.62 (2H, m), 7.68 (2H, m).

4'-Bromo, 2'-fluorobiphenyl-4-sulfonyl chloride (10): ^1H NMR (CDCl_3): δ 7.27 – 7.43 (3H, m), 7.62 (2H, d, $J = 8.2$ Hz), and 7.94 (2H, d, $J = 8.2$ Hz)

2'-Nitrobiphenyl-4-sulfonyl chloride (11): ^1H NMR (DMSO- d_6): δ 7.74 (5H, m), 8.13 (1H, d, $J = 8.2$ Hz), 8.18 (1H, d, $J = 8.2$ Hz) and 8.41 (1H, m)

3'-Nitrobiphenyl-4-sulfonyl chloride (12): ^1H NMR (DMSO- d_6): δ 7.74 (3H, m) 8.15 (2H, m), 8.17 (1H, d, $J = 8.2$ Hz), 8.21 (1H, d, $J = 8.2$ Hz) and 8.56 (1H, s)

2'-Iodobiphenyl-4-sulfonyl chloride (13): ^1H NMR (CDCl_3): δ 7.07 (1H, t, $J = 7.9$ Hz), 7.27 (1H, m), 7.41 (1H, t, $J = 7.9$ Hz), 7.40 (2H, d, $J = 8.5$ Hz), 7.92 (2H, d, $J = 8.5$ Hz) and 7.97 (1H, d, $J = 7.9$ Hz)

2', 4' Difluoro, 3-methoxybiphenyl-4-sulfonyl chloride (14): Used without further purification

Biphenyl-4-sulfonic acid-(3-hydroxypropyl)-amide (15): ^{13}C NMR (DMSO): δ 32.4, 40.0, 58.1, 127.1, 127.2, 127.6, 128.6, 129.2, 138.6, 139.3 and 143.8;

^1H NMR (CDCl_3): δ 1.73 (2H, quintet, $J = 6.0$ Hz), 3.15 (2H, t, $J = 6.0$ Hz), 3.76 (2H, t, $J = 6.0$ Hz), 7.42 (2H, d, $J = 7.0$ Hz), 7.47 (1H, t, $J = 7.2$ Hz), 7.59 (2H, d, $J = 7.0$ Hz), 7.71 (2H, d, $J = 8.2$ Hz) and 7.94 (2H, d, $J = 8.2$ Hz)

Biphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (16): ^{13}C NMR (DMSO- d_6): δ 25.9, 29.6, 42.6, 60.2, 127.1, 127.2, 127.6, 128.6, 129.2, 138.6, 139.4 and 143.8;

^1H NMR (CDCl_3) δ 1.58 (4H, m), 3.07 (2H, m), 3.62 (2H, t, $J = 6.0$ Hz), 7.41 – 7.49 (3H, m), 7.60 (2H, d, $J = 8.5$ Hz), 7.71 (2H, d, $J = 8.5$ Hz) and 7.92 (2H, $J = 8.2$ Hz)

Biphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (17): ^{13}C NMR (DMSO- d_6): δ 22.6, 28.9, 32.0, 42.6, 60.5, 127.1, 127.2, 127.6, 128.6, 129.2, 138.6, 139.3 and 143.8;

^1H NMR (CDCl_3) δ 1.36 (2H, m), 1.51 (4H, m), 3.01 (2H, t, $J = 6.0$ Hz), 3.61 (2H, t, $J = 6.0$ Hz), 7.41 – 7.49 (3H, m), 7.60 (2H, d, $J = 8.5$ Hz), 7.71 (2H, d, $J = 8.5$ Hz) and 7.92 (2H, $J = 8.2$ Hz)

Biphenyl-4-sulfonic acid-(6-hydroxyhexyl)-amide (18): ^{13}C NMR (DMSO- d_6): δ 25.1, 26.0, 29.1, 32.4, 42.5, 60.6, 127.1, 127.2, 127.6, 128.6, 129.2, 138.6, 139.3 and 143.8;

^1H NMR (CDCl_3) δ 1.31 (2H, m), 1.48 (6H, m), 3.00 (2H, m), 3.60 (2H, t, $J = 6.2$ Hz), 7.41 – 7.50 (3H, m), 7.60 (2H, d, $J = 8.5$ Hz), 7.71 (2H, d, $J = 8.5$ Hz) and 7.91 (2H, $J = 8.2$ Hz)

4'-Fluorobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (19): ^{13}C NMR (DMSO- d_6): δ 25.9, 29.6, 42.6, 60.2, 115.9 (d, $J = 22.5$ Hz), 127.1, 128.9 (d, $J = 8.8$ Hz), 129.1, 135.0 (d, $J = 2.9$ Hz), 139.3, 142.7 and 162.5 (d, $J = 245.1$ Hz);

^1H NMR (CDCl_3): δ 1.60 (4H, m), 3.01 (2H, m), 3.62 (2H, m), 7.16 (2H, t, $J = 8.5$ Hz), 7.53 (2H, m), 7.66 (2H, d, $J = 8.2$ Hz) and 7.91 (2H, d, $J = 7.7$ Hz);

4'-Bromobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (20): ^{13}C NMR (DMSO- d_6): δ 25.9, 29.6, 42.6, 60.3, 122.1, 127.2, 127.3, 129.2, 132.0, 137.8, 139.7 and 142.5;

^1H NMR (DMSO- d_6): δ 1.35 (4H, m), 2.70 (2H, m), 3.35 (2H, m), 7.70 (4H, m) and 7.85 (4H, m)

4'-Bromo, 2'-fluorobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (21): ^{13}C NMR (DMSO- d_6): δ 22.6, 28.9, 32.0, 42.6, 60.5, 122.1, 127.2, 127.3, 129.2, 132.0, 137.8, 139.7 and 142.5;

^1H NMR (DMSO- d_6): δ 1.37 (6H, m), 2.72 (2H, m), 3.36 (2H, m), 7.70 (4H, m) and 7.82 (4H, m)

4'-Bromo, 2'-fluorobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (22): ^{13}C NMR (DMSO- d_6): δ 25.9, 29.6, 42.6, 60.2, 119.3, 122.1 (d, $J = 9.8$ Hz), 126.3 (d, $J = 12.7$ Hz), 126.7 (d, $J = 13.7$ Hz), 128.2, 129.4, 132.2, 137.8, 140.2 and 158.9 (d, $J = 252.0$ Hz);

^1H NMR (CDCl_3): δ 1.57 (4H, m), 3.02 (2H, m), 3.61 (2H, m), 7.27 – 7.41 (3H, m), 7.64 (2H, d, $J = 7.9$ Hz), and 7.92 (2H, d, $J = 8.2$ Hz)

2'-Nitrobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (23): ^{13}C NMR (DMSO- d_6): δ 25.9, 29.6, 42.6, 60.2, 124.6, 126.7, 128.9, 129.3, 131.9, 133.4, 134.1, 140.3, 141.1 and 148.5;

^1H NMR (CDCl_3): δ 1.56 (4H, m), 3.06 (2H, m), 3.61 (2H, m), 7.42 (1H, m), 7.43 (2H, d, $J = 8.2$ Hz), 7.56 (1H, t, $J = 7.6$ Hz), 7.66 (1H, d, $J = 7.6$ Hz), 7.91 (2H, d, $J = 8.2$ Hz) and 7.95 (1H, m)

3'-Nitrobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (24): ^{13}C NMR (DMSO- d_6): δ 25.9, 29.6, 42.6, 60.2, 121.6, 123.1, 127.4, 127.9, 130.6, 133.5, 140.5, 141.4 and 148.5;

^1H NMR (CDCl_3): δ 1.60 (4H, m), 3.01 (2H, m), 3.63 (2H, t, $J = 6.0$ Hz), 7.75 (1H, t, $J = 8.2$ Hz), 7.89 (1H, t, $J = 8.2$ Hz), 7.93 (2H, d, $J = 8.2$ Hz), 8.08 (2H, d, $J = 8.2$ Hz), 8.20 (1H, d, $J = 8.2$ Hz) and 8.56 (1H, s)

2'-Iodobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (25): ^{13}C NMR (DMSO- d_6): δ 25.9, 29.6, 42.6, 60.2, 98.2, 126.2, 126.3, 128.4, 129.7, 130.0, 139.8, 144.6 and 147.2;

^1H NMR (CDCl_3): δ 1.60 (4H, m), 3.06 (2H, t, $J = 6.4$ Hz), 3.63 (2H, t, $J = 5.5$ Hz), 7.07 (1H, t, $J = 7.9$ Hz), 7.27 (1H, m), 7.41 (1H, t, $J = 7.3$ Hz), 7.47 (2H, d, $J = 8.5$ Hz), 7.90 (2H, d, $J = 8.5$ Hz) and 7.96 (1H, d, $J = 7.9$ Hz)

2',4'-Difluoro, 3-methoxybiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (26): ^{13}C NMR (CDCl_3): δ 22.8, 29.3, 32.0, 43.0, 55.7, 62.5, 103.9 (t, $J = 25.4$ Hz), 111.2 (dd, $J = 21.5, 2.9$ Hz), 113.2, 118.6, 122.5 (dd, $J = 5.9, 2.9$ Hz), 130.6, 132.2, 132.8 (dd, $J = 5.9, 2.9$ Hz), 135.2, 159.7 (dd, $J = 250.0, 12.7$ Hz), 162.2 and 162.3 (dd, $J = 252.0, 12.7$ Hz);

^1H NMR (CDCl_3): δ 1.28 – 1.33 (6H, m), 3.58 (2H, m), 3.86 (3H, s), 6.79 (1H, d, $J = 2.4$ Hz), 6.89 (1H, m), 6.94 (1H, s), 6.99 (1H, dd, $J = 8.8, 2.4$ Hz), 7.37 (1H, q, $J = 8.2$ Hz) and 8.05 (1H, d, $J = 8.8$ Hz)

4-Bromophenyl sulfonic acid-(4-hydroxybutyl)-amide (27): ^{13}C NMR (CDCl_3): δ 26.4, 29.5, 43.1, 62.2, 127.5, 128.6, 132.4 and 139.0;

^1H NMR (CDCl_3): δ 1.56 (4H, m), 2.96 (2H, m), 3.63 (2H, m), 7.63 (2H, d, $J = 8.8$ Hz) and 7.71 (2H, d, $J = 8.5$ Hz)

4-Bromophenyl sulfonic acid-(5-hydroxypentyl)-amide (28): ^{13}C NMR (CDCl_3): δ 22.7, 29.1, 31.8, 43.0, 62.3, 127.5, 128.6, 132.4 and 139.0;

^1H NMR (CDCl_3): δ 1.36 (2H, m), 1.50 (4H, m), 3.00 (2H, m), 3.60 (2H, t, $J = 6.0$ Hz), 7.61 (2H, d, $J = 8.5$ Hz) and 7.72 (2H, d, $J = 8.5$ Hz)

4-Bromo-2-chlororophenyl sulfonic acid-(4-hydroxybutyl)-amide (29): ^{13}C NMR (CDCl_3): δ 26.4, 29.4, 43.1, 62.1, 127.6, 130.6, 132.4, 134.4 and 136.4;

^1H NMR (CDCl_3): δ 1.58 (4H, m), 2.95 (2H, m), 3.63 (2H, t, $J = 5.6$ Hz), 7.55 (1H, d, $J = 8.5$ Hz), 7.68 (1H, s) and 7.93 (1H, d, $J = 8.5$ Hz)

4-Bromo-2-trifluoromethoxyphenyl sulfonic acid-(4-hydroxybutyl)-amide (30): ^{13}C NMR (CDCl_3): δ 26.2, 29.4, 43.2, 62.0, 118.7, 123.5, 127.9, 132.0, and 146.1;

^1H NMR (CDCl_3): δ 1.58 (4H, m), 2.98 (2H, t, $J = 6.1$ Hz), 3.63 (2H, t, $J = 6.0$ Hz), 7.54 (3H, m) and 7.87 (1H, d, $J = 8.8$ Hz)

4-Bromo-3-methylphenyl sulfonic acid-(4-hydroxybutyl)-amide (31): ^{13}C NMR (CDCl_3): δ 23.1, 26.4, 29.5, 43.1, 62.2, 125.7, 129.0, 130.0, 133.2, 139.0 and 139.4; ^1H NMR (CDCl_3): δ 1.60 (4H, m), 2.29 (3H, s), 3.01 (2H, m), 3.64 (2H, m), 7.60 (3H, m)

4-Bromo-2-ethylphenyl-sulfonic acid-(4-hydroxybutyl)-amide (32): used crude without further purification

4-Bromo-2-trifluoromethylphenyl sulfonic acid-(4-hydroxybutyl)-amide (33): ^{13}C NMR (CDCl_3): δ 26.5, 29.4, 43.3, 62.1, 127.3, 131.7, 131.7, 133.1, 135.4 and 137.9;

^1H NMR (CDCl_3): δ 1.60 (4H, m), 3.04 (2H, m), 3.64 (2H, t, $J = 5.8$ Hz), 7.81 (1H, d, $J = 8.2$ Hz), 7.91 (1H, s) and 8.24 (1H, d, $J = 8.2$ Hz)

4-Bromo-2-fluorophenyl sulfonic acid-(4-hydroxybutyl)-amide (34): ^{13}C NMR (CDCl_3): δ 26.5, 29.4, 43.1, 62.2, 120.6 (d, $J = 13.4$ Hz), 127.5, 128.0 (d, $J = 3.9$ Hz), 128.2, 131.4 and 159.5 (d, $J = 250.2$ Hz);

^1H NMR (CDCl_3): δ 1.59 (4H, m), 3.02 (2H, m), 3.65 (2H, t, $J = 5.6$ Hz), 7.40 (2H, m) and 7.75 (1H, t, $J = 8.2$ Hz)

4-Bromo-3-fluorophenyl sulfonic acid-(4-hydroxybutyl)-amide (35): ^{13}C NMR (CDCl_3): δ 26.5, 29.4, 43.2, 62.2, 114.5 (d, $J = 20.5$ Hz), 115.3 (d, $J = 25.4$ Hz), 123.7 (d, $J = 3.9$ Hz), 134.5, 141.2 (d, $J = 5.9$ Hz) and 158.9 (d, $J = 252.0$ Hz);

^1H NMR (CDCl_3): δ 1.59 (4H, m), 2.99 (2H, t, $J = 6.1$ Hz), 3.63 (2H, t, $J = 6.0$ Hz), 7.52 (1H, d, $J = 8.2$ Hz), 7.59 (1H, dd, $J = 7.6, 1.5$ Hz) and 7.72 (1H, t, $J = 8.2$ Hz)

4'-Methylbiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (36): ^{13}C NMR ($\text{DMSO}-d_6$): δ 20.8, 22.6, 28.9, 32.0, 42.6, 60.5, 126.9, 127.0, 127.3, 129.7, 135.7, 138.0, 139.0 and 143.7;

^1H NMR (CDCl_3): δ 1.36 – 1.51 (6H, m), 2.40 (3H, s), 3.00 (2H, q, $J = 6.0$ Hz), 3.60 (2H, $J = 6.0$ Hz), 7.27 (2H, d, $J = 8.6$ Hz), 7.50 (2H, d, $J = 7.3$ Hz), 7.69 (2H, d, $J = 7.9$ Hz) and 7.99 (2H, d, $J = 7.6$ Hz)

4'-Acetylbiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (37): ^{13}C NMR ($\text{DMSO}-d_6$): δ 22.6, 26.9, 28.9, 32.0, 42.6, 60.5, 127.0, 127.3, 127.9, 128.9, 136.4, 140.2, 142.5, 142.9 and 197.6;

^1H NMR (CDCl_3): δ 1.37 – 1.50 (6H, m), 2.65 (3H, s), 3.01 (2H, m), 3.60 (2H, $J = 6.1$ Hz), 7.69 (2H, d, $J = 7.9$ Hz), 7.75 (2H, d, $J = 8.2$ Hz), 7.95 (2H, d, $J = 7.9$ Hz) and 8.06 (2H, d, $J = 7.9$ Hz)

4'-Methylthiobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (38): ^{13}C NMR ($\text{DMSO}-d_6$): δ 14.5, 25.9, 29.6, 42.6, 60.2, 125.9, 126.2, 127.1, 127.3, 127.5, 134.8, 139.1 and 143.1;

^1H NMR (CDCl_3): δ 1.52 (4H, m), 2.52 (3H, s), 3.00 (2H, m), 3.60 (2H, t, $J = 6.1$ Hz), 7.33 (2H, d, $J = 8.2$ Hz), 7.53 (2H, d, $J = 8.2$ Hz), 7.68 (2H, d, $J = 8.2$ Hz) and 7.89 (2H, d, $J = 8.5$ Hz)

4'-Cyanobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (39): ^{13}C NMR (DMSO- d_6): δ 22.6, 28.9, 32.0, 42.6, 60.5, 111.0, 118.7, 127.3, 127.0, 127.9, 128.1, 133.0, 140.6, 141.9 and 143.1;

^1H NMR (DMSO- d_6): δ 1.35 (6H, m), 2.74 (2H, m), 3.35 (2H, m), 7.68 (2H, d, $J = 8.5$ Hz), 7.88 (2H, d, $J = 8.2$ Hz) and 7.96 (4H, m)

2'-Methoxybiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (40): ^{13}C NMR (DMSO- d_6): δ 22.7, 29.0, 32.0, 42.7, 55.6, 60.6, 115.5, 121.4, 125.3, 126.1, 128.2, 129.8, 130.2, 138.8, 142.1 and 156.1;

^1H NMR (CDCl_3): δ 1.36 (2H, m), 1.51 (4H, m), 3.02 (2H, t, $J = 6.0$ Hz), 3.59 (2H, t, $J = 6.0$ Hz), 3.82 (3H, s), 7.01 (1H, t, $J = 8.5$ Hz), 7.04 (1H, d, $J = 7.3$ Hz), 7.32 (1H, m), 7.66 (2H, d, $J = 8.2$ Hz) and 7.86 (2H, d, $J = 8.5$ Hz)

4'-Carboxybiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (41): ^{13}C NMR (DMSO- d_6): δ 22.6, 28.9, 32.0, 42.6, 60.5, 127.2, 127.4, 127.7, 130.2, 130.5, 140.1, 142.7, 142.7 and 167.0;

^1H NMR (DMSO- d_6): δ 1.35 (6H, m), 2.75 (2H, m), 3.35 (2H, m), 7.65 (2H, d, $J = 8.2$ Hz), 7.87 (2H, d, $J = 8.5$ Hz), 7.97 (2H, d, $J = 8.2$ Hz) and 8.03 (2H, d, $J = 8.5$ Hz)

4'-Dimethylaminobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (42): ^{13}C NMR (DMSO- d_6): δ 22.7, 28.9, 32.0, 39.9, 42.6, 60.5, 112.6, 125.5, 125.8, 127.1, 127.8, 137.5, 143.9 and 150.5;

^1H NMR (DMSO- d_6): δ 1.35 (6H, m), 2.73 (2H, m), 2.96 (6H, s), 3.35 (2H, m), 6.80 (2H, d, $J = 8.8$ Hz), 7.61 (2H, d, $J = 8.5$ Hz) and 7.77 (4H, m)

4'-Hydroxybiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (43): ^{13}C NMR (DMSO- d_6): δ 22.6, 28.9, 32.0, 42.6, 60.5, 116.0, 126.4, 127.2, 128.2, 129.2, 138.1, 143.8 and 158.1;

^1H NMR (DMSO- d_6): δ 1.32 (6H, m), 2.70 (2H, m), 3.31 (2H, m), 6.88 (2H, d, $J = 8.2$ Hz), 7.58 (2H, d, $J = 8.2$ Hz) and 7.78 (4H, m)

2',4'-Dichlorobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (44): ^{13}C NMR (DMSO- d_6): δ 22.6, 29.0, 32.0, 42.7, 60.5, 126.5, 127.8, 129.5, 130.0, 132.3, 132.7, 133.7, 137.4, 140.3 and 141.3;

^1H NMR (CDCl_3): δ 1.50 (6H, m), 3.02 (2H, m), 3.59 (2H, t, $J = 6.0$ Hz), 7.24 (1H, d, $J = 8.5$ Hz), 7.34 (1H, d, $J = 8.5$ Hz), 7.50 (1H, s), 7.54 (2H, d, $J = 8.2$ Hz) and 7.91 (2H, d, $J = 8.2$ Hz)

2',4'-Bis(trifluoromethyl)biphenyl-4-sulfonic acid-(4-hydroxypentyl)-amide (45): ^{13}C NMR (CDCl_3): δ 26.4, 29.5, 43.2, 62.3, 123.6, 126.8, 128.5, 129.6, 132.5, 140.2 and 142.6;

^1H NMR (CDCl_3): δ 1.58 (4H, m), 3.07 (2H, m), 3.63 (2H, m), 7.45 (1H, m), 7.46 (2H, d, $J = 8.2$ Hz), 7.87 (1H, d, $J = 7.9$ Hz), 7.93 (2H, d, $J = 7.9$ Hz) and 8.03 (1H, s)

4-Trifluoromethoxybiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (46): ^{13}C NMR ($\text{DMSO-}d_6$): δ 25.9, 29.6, 42.6, 60.2, 121.7, 127.1, 127.4, 129.0, 137.9, 139.8, 142.3 and 148.5;

^1H NMR (CDCl_3): δ 1.61 (4H, m), 3.03 (2H, m), 3.63 (2H, m), 7.32 (2H, d, $J = 8.5$ Hz), 7.61 (2H, d, $J = 8.5$ Hz), 7.67 (2H, d, $J = 8.5$ Hz) and 7.92 (2H, d, $J = 8.2$ Hz)

***p*-Terphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (47):** ^{13}C NMR ($\text{DMSO-}d_6$): δ 22.7, 29.0, 32.0, 42.7, 60.5, 126.7, 127.4, 129.1, 137.5, 139.4, 139.4, 140.1 and 143.2;

^1H NMR ($\text{DMSO-}d_6$): δ 1.37 (6H, m), 2.75 (2H, m), 3.35 (2H, m), 7.40 (2H, t, $J = 7.9$ Hz), 7.49 (2H, t, $J = 7.9$ Hz), 7.75 (2H, d, $J = 8.2$ Hz), 7.82 – 7.88 (5H, m) and 7.91 (2H, d, $J = 8.2$ Hz)

3'-Methylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (48): ^{13}C NMR ($\text{DMSO-}d_6$): δ 21.1, 25.8, 29.5, 42.6, 60.2, 124.1, 127.1, 127.3, 129.0, 138.4, 138.6, 139.2 and 143.9;

^1H NMR (CDCl_3): δ 1.58 (4H, m), 2.42 (3H, s), 3.01 (2H, m), 3.62 (2H, m), 7.23 (2H, m), 7.37 (2H, m), 7.69 (2H, d, $J = 7.9$ Hz) and 7.90 (2H, d, $J = 7.3$ Hz)

2'-Trifluoromethylbiphenyl-4-sulfonic acid (5-hydroxy-pentyl)-amide (49): ^{13}C NMR ($\text{DMSO-}d_6$): δ 22.6, 28.9, 32.0, 42.7, 60.5, 121.9, 126.2, 126.5, 127.1, 128.8, 129.8, 132.0, 132.6, 139.2, 140.2 and 143.1;

^1H NMR (CDCl_3): δ 1.52 (4H, m), 3.02 (2H, t, $J = 6.1$ Hz), 3.61 (2H, t, $J = 6.1$ Hz), 7.30 (1H, d, $J = 6.4$ Hz), 7.47 (2H, d, $J = 7.9$ Hz), 7.54 (1H, m), 7.56 (1H, t, $J = 7.3$ Hz), 7.77 (1H, d, $J = 7.3$ Hz) and 7.89 (2H, d, $J = 8.2$ Hz)

4'-Trifluoromethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (50): ^{13}C NMR ($\text{DMSO}-d_6$): δ 25.9, 29.6, 42.6, 60.2, 127 – 129 indistinct m, 140.4, 142.2 and 142.6;

^1H NMR (CDCl_3): δ 1.59 (4H, m), 3.03 (2H, m), 3.65 (2H, t, $J = 6.0$ Hz), 7.20 (2H, m), 7.39 (2H, m), 7.71 (2H, m) and 7.95 (2H, m)

3',4'-Difluorobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (51): ^{13}C NMR (CDCl_3): δ 22.7, 29.3, 31.9, 43.1, 62.5, 116.4 (d, $J = 17.6$ Hz), 118.0 (d, $J = 17.6$ Hz), 123.5 (d, $J = 4.9$ Hz), 127.6, 127.8, 136.4 (m), 139.2, 143.3, 150.5 (d, $J = 250.0$ Hz) and 150.7 (d, $J = 250.0$ Hz);

^1H NMR (CDCl_3): δ 1.37 (2H, m), 1.50 (4H, m), 2.99 (2H, t, $J = 6.0$ Hz), 3.60 (2H, t, $J = 6.0$ Hz), 7.27 (1H, m), 7.30 (1H, m), 7.38 (1H, m), 7.64 (2H, d, $J = 8.2$ Hz) and 7.92 (2H, d, $J = 8.2$ Hz)

2',4'-Difluorobiphenyl-4-sulfonic acid-(5-hydroxypentyl)-amide (52): ^{13}C NMR (CDCl_3): δ 12.1, 22.7, 29.3, 31.9, 43.1, 62.5, 104.7 (t, $J = 25.8$ Hz), 112.0 (dd, $J = 22.9$ and 3.5 Hz), 127.3, 129.6, 131.5 (d, $J = 8.8$ Hz), 131.5 (d, $J = 9.8$ Hz), 139.1, 139.4, 163.3 (d, $J = 250.2$ Hz) and 163.0 (d, $J = 250.2$ Hz);

^1H NMR (DMSO): δ 1.35 (6H, m), 2.74 (2H, m), 3.35 (2H, m), 7.25 (1H, t, $J = 8.2$ Hz), 7.43 (1H, d, $J = 8.2$ Hz), 7.68 (1H, m), 7.76 (2H, d, $J = 8.2$ Hz) and 7.86 (2H, d, $J = 8.5$ Hz)

2',4'-Difluoro, 3-chlorobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (53): ^{13}C NMR (CDCl_3): δ 26.4, 29.5, 41.2, 62.1, 104.9 (t, $J = 26.0$ Hz), 112.3 (dd, $J = 21.3$, 2.9 Hz), 122.3 (dd, $J = 12.7$, 3.9 Hz), 127.5, 131.3, 131.5, 131.5, 131.7 (d, $J = 2.0$ Hz), 136.2, 140.6, 159.9 (dd, $J = 252.0$, 11.7 Hz) and 163.3 (dd, $J = 252.0$, 11.7 Hz);

^1H NMR (CDCl_3): δ 1.54 (2H, m), 1.60 (2H, m), 2.99 (2H, m), 3.60 (2H, m), 6.95 (2H, m), 7.40 (1H, m), 7.53 (1H, d, $J = 7.7$ Hz), 7.66 (1H, s) and 8.14 (1H, d, $J = 8.2$ Hz)

2',4'-Difluoro-3-trifluoromethoxybiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (54): ^{13}C NMR (CDCl_3): δ 26.6, 29.5, 43.2, 62.2, 105.0 (t, $J = 25.4$ Hz), 112.3 (dd, $J = 21.5, 2.9$ Hz), 118.3, 120.5, 122.5 (dd, $J = 6.4, 3.9$ Hz), 126.9, 131.0, 131.4 (dd, $J = 9.8, 3.9$ Hz), 141.4, 145.9, 159.7 (dd, $J = 250.0, 12.7$ Hz) and 162.3 (dd, $J = 252.0, 12.7$ Hz);

^1H NMR (CDCl_3): δ 1.61 (4H, m), 3.04 (2H, m), 3.65 (2H, m), 6.96 (2H, m), 7.41 (1H, m), 7.52 (1H, d, $J = 8.5$ Hz), 7.53 (1H, s) and 8.08 (1H, d, $J = 8.5$ Hz)

2',4'-Difluoro, 2-methylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (55) (ABD295): ^{13}C NMR ($\text{DMSO}-d_6$): δ 20.0, 26.4, 29.5, 43.1, 62.2, 104.2 (t, $J = 25.4$ Hz), 111.6 (d, $J = 21.5$ Hz), 123.8 (d, $J = 11.7$ Hz), 124.4, 128.4, 131.7, 131.8 (m), 138.4, 139.4 (d, $J = 3.9$ Hz), 159.4 (d, $J = 250.0, 11.7$ Hz) and 162.8 (dd, $J = 250.0, 11.7$ Hz);

^1H NMR (CDCl_3): δ 1.60 (4H, m), 2.28 (3H, s), 3.00 (2H, t, $J = 6.0$ Hz), 3.64 (2H, $J = 6.1$ Hz), 6.94 (1H, dd, $J = 8.5, 2.4$ Hz), 6.97 (1H, dd, $J = 8.5, 2.4$ Hz), 7.35 (1H, d, $J = 8.2$ Hz), 7.44 (1H, q, $J = 8.2$), 7.71 (1H, d, $J = 8.2$ Hz) and 7.75 (1H, s)

4'-Fluoro, 2-methylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (56): ^{13}C NMR (CDCl_3): δ 20.6, 26.4, 29.6, 43.1, 62.2, 115.4 (d, $J = 21.5$), 124.5, 128.8, 130.5, 130.6, 136.1 (d, $J = 2.9$ Hz), 136.9, 138.6, 145.3 and 162.4 (d, $J = 247.1$ Hz);

^1H NMR (CDCl_3): δ 1.61 (4H, m), 2.28 (3H, s), 3.01 (2H, t, $J = 6.0$ Hz), 3.63 (2H, $J = 6.0$ Hz), 7.11 (2H, t, $J = 8.5$ Hz), 7.24 (2H, t, $J = 8.5$ Hz), 7.30 (1H, d, $J = 7.9$ Hz), 7.70 (1H, d, $J = 8.2$ Hz) and 7.75 (1H, s)

2',4'-Difluoro, 3-ethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (57): ^{13}C NMR (CDCl_3): δ 15.3, 25.9, 26.6, 29.5, 43.0, 62.2, 104.7 (t, $J = 25.4$ Hz), 111.9 (dd, $J = 21.5, 2.9$ Hz), 123.8 (dd, $J = 23.7, 3.9$ Hz), 126.3, 129.7, 131.2, 131.5 (dd, $J = 8.8, 3.9$ Hz), 136.9, 143.5, 159.8 (dd, $J = 252.0, 11.7$ Hz) and 162.8 (dd, $J = 250.0, 11.7$ Hz);

^1H NMR (CDCl_3): δ 1.33 (3H, t, $J = 7.3$ Hz), 1.60 (4H, m), 3.02 (2H, m), 3.07 (3H, q, $J = 7.3$ Hz), 3.64 (2H, m), 6.95 (2H, m), 7.40 (1H, m), 7.42 (1H, d, $J = 7.9$ Hz), 7.49 (1H, s) and 8.00 (1H, d, $J = 8.2$ Hz);

3-Trifluoromethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (58): ^{13}C NMR ($\text{DMSO-}d_6$): δ 26.1, 29.5, 42.8, 60.2, 125.1, 126.6, 127.2, 127.4, 129.2, 130.8, 132.5, 137.1, 138.3 and 144.0;

^1H NMR (CDCl_3): δ 1.60 (4H, m), 3.01 (2H, t, $J = 5.2$ Hz), 3.64 (2H, t, $J = 5.2$ Hz), 7.33 (1H, m), 7.49 (2H, m), 7.61 (2H, d, $J = 8.5$ Hz), 7.87 (1H, d, $J = 8.5$ Hz), 8.05 (1H, s) and 8.26 (1H, d, $J = 8.2$ Hz)

2',4'-Difluoro, 3-trifluoromethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (59): ^{13}C NMR ($\text{DMSO-}d_6$): δ 26.6, 29.4, 43.3, 62.2, 104.6 (t, $J = 25.4$ Hz), 112.4 (dd, $J = 21.5, 2.9$ Hz), 120.7, 159.8 (dd, $J = 222.7, 12.7$) and 163.4 (dd, $J = 252.0, 11.7$ Hz);

^1H NMR (CDCl_3): δ 1.59 (2H, m), 1.61 (2H, m), 3.04 (2H, m), 3.63 (2H, t, $J = 5.8$ Hz), 6.94 (1H, dd, $J = 8.5, 2.4$ Hz), 6.97 (1H, dd, $J = 8.5, 2.4$ Hz), 7.44 (1H, q, $J = 8.2$), 7.81 (1H, d, $J = 8.2$ Hz), 7.97 (1H, s) and 8.26 (1H, d, $J = 8.2$ Hz)

3-Fluoro, 4'-trifluoromethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (60): ^{13}C NMR (CDCl_3): δ 26.5, 29.4, 43.2, 62.2, 115.7 (d, $J = 24.5$ Hz), 123.2, 126.1, 127.4 (d, $J = 14.6$ Hz), 127.6, 128.6 (d, $J = 9.8$ Hz), 131.1, 132.1 (d, $J = 9.8$ Hz), 141.6, 146.6 (d, $J = 8.8$ Hz) and 159.0 (d, $J = 255.0$ Hz);

^1H NMR (CDCl_3): δ 1.63 (4H, m), 3.05 (2H, m), 3.66 (2H, t, $J = 5.6$ Hz), 7.56 (2H, d, $J = 7.6$ Hz), 7.61 (1H, m), 7.65 (2H, d, $J = 7.6$ Hz), 7.71 (1H, s) and 7.74 (1H, d, $J = 8.2$ Hz)

2-Fluoro, 4'-trifluoromethylbiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (61): ^{13}C NMR ($\text{DMSO-}d_6$): δ 26.4, 29.5, 43.2, 62.2, 115.4 (d, $J = 25.4$ Hz), 123.2, 125.7, 129.4, 130.8 (d, $J = 22.2$ Hz), 131.6, 137.6, 141.5 (d, $J = 6.8$ Hz) and 159.3 (d, $J = 253.9$ Hz);

^1H NMR (CDCl_3): δ 1.58 (2H, m), 1.62 (2H, m), 3.08 (2H, m), 3.65 (2H, m), 7.44 (1H, m), 7.49 (1H, d, $J = 8.2$ Hz), 7.68 (2H, d, $J = 8.5$ Hz), 7.74 (2H, d, $J = 7.9$ Hz) and 7.98 (1H, t, $J = 7.9$ Hz)

2'-Aminobiphenyl-4-sulfonic acid-(4-hydroxybutyl)-amide (62): ^{13}C NMR ($\text{DMSO-}d_6$): δ 25.9, 29.6, 42.6, 60.3, 115.6, 116.8, 124.1, 126.8, 128.8, 129.3, 129.9, 138.6, 143.8 and 145.2;

^1H NMR (CDCl_3): δ 1.60 (4H, m), 3.02 (2H, m), 3.62 (2H, m), 6.82 (2H, m), 7.15 (2H, m) and 7.70 (4H, m)

4'-Fluorobiphenyl-2-sulfonic acid (4-hydroxybutyl)-amide (63): ^{13}C NMR (CDCl_3): δ 26.2, 29.4, 42.8, 62.1, 115.2 (d, $J = 21.5$ Hz), 128.1, 129.5, 131.1 (d, $J = 8.8$ Hz), 132.4, 133.7, 135.1, 138.1, 139.3 and 162.7 (d, $J = 249.0$ Hz);

^1H NMR (CDCl_3): δ 1.55 (4H, m), 3.00 (2H, m), 3.55 (2H, m), 7.13 (2H, t, $J = 8.2$ Hz), 7.29 (1H, d, $J = 7.0$ Hz), 7.44 (2H, m, $J = 8.2$ Hz), 7.52 (1H, d, $J = 7.6$ Hz), 7.57 (1H, d, $J = 7.3$ Hz) and 8.11 (1H, d, $J = 7.0$ Hz)

4'-Trifluoromethylbiphenyl-3-sulfonic acid (4-hydroxybutyl)-amide (64): ^{13}C NMR (CDCl_3): δ 26.5, 29.5, 43.2, 62.3, 125.7, 125.8, 126.0, 126.1, 126.5, 127.6, 129.9, 131.3, 140.9 and 141.0;

^1H NMR (CDCl_3): δ 1.58 (4H, m), 3.01 (2H, m), 3.61 (2H, m), 7.61 (1H, t, $J = 8.2$ Hz), 7.71 (4H, m), 7.78 (1H, d, $J = 7.0$ Hz), 7.88 (1H, d, $J = 7.6$ Hz) and 8.09 (1H, s)

Biphenyl-4-sulfonic acid-(4-hydroxybutyl)-methyl-amide (65): ^{13}C NMR ($\text{DMSO-}d_6$): δ 23.7, 29.5, 34.5, 49.6, 60.2, 127.1, 127.2, 127.6, 128.6, 129.2, 135.8, 138.4 and 144.3.

^1H NMR (CDCl_3): δ 1.45 (4H, m), 2.68 (3H, s), 2.97 (2H, t, $J = 7.0$ Hz), 3.40 (2H, m), 7.49 (3H, m), 7.75 (2H, d, $J = 7.0$ Hz), 7.83 (2H, d, $J = 8.5$ Hz) and 7.91 (2H, d, $J = 8.2$ Hz)

Biphenyl-4-sulfonic acid-(4-hydroxybutyl)-pentyl-amide (66): ^{13}C NMR (CDCl_3): δ 14.0, 22.3, 25.3, 28.4, 29.6, 48.1, 48.4, 62.2, 127.3, 127.6, 128.4, 129.0, 138.5, 139.4 and 145.2.

^1H NMR (CDCl_3): δ 0.84 (3H, t, $J = 7.0$ Hz), 1.24 (4H, m), 1.50 (6H, m), 2.06 (1H, s), 3.14 (4H, m), 3.62 (2H, t, $J = 5.9$ Hz), 7.41 (3H, m), 7.56 (2H, d, $J = 7.9$ Hz), 7.67 (2H, d, $J = 8.5$ Hz) and 7.83 (2H, d, $J = 8.2$ Hz)

Biphenyl-4-carboxylic acid 4-hydroxy-butyl ester (67): ^{13}C NMR (CDCl_3): δ 25.3, 29.3, 62.4, 64.8, 127.1, 127.3, 128.2, 129.0, 129.1, 130.1, 130.7, 140.0, 145.7 and 166.6.

^1H NMR (CDCl_3): δ 1.74 – 1.77 (2H, m), 1.86 – 1.89 (2H, m), 2.63 (1H, s, OH), 3.74 (2H, t, $J = 6.3$ Hz), 4.38 (2H, t, $J = 6.3$ Hz), 7.45 (3H, m), 7.63 (4H, m) and 8.10 (2H, d, $J = 8.5$ Hz)

3. Elemental analysis data.

Compound	Formula	CHN %	
		Calculated	Found
15	C ₁₅ H ₁₇ NO ₃ S	C, 61.83; H, 5.88; N, 4.81	C, 61.93; H, 5.87; N, 4.85
16	C ₁₆ H ₁₉ NO ₃ S	C, 62.93; H, 6.27; N, 4.59	C, 62.66; H, 5.97; N, 4.68
17	C ₁₇ H ₂₁ NO ₃ S	C, 63.92; H, 6.63; N, 4.39	C, 63.68; H, 6.49; N, 4.50
18	C ₁₈ H ₂₃ NO ₃ S	C, 64.84; H, 6.95; N, 4.20	C, 64.94; H, 7.38; N, 4.18
19	C ₁₆ H ₁₈ FNO ₃ S	C, 59.43; H, 5.61; N, 4.33	C, 59.55; H, 5.65; N, 4.32
20	C ₁₆ H ₁₈ BrNO ₃ S	C, 50.01; H, 4.72; N, 3.64	C, 50.36; H, 4.16; N, 3.53
21	C ₁₇ H ₂₀ BrNO ₃ S	C, 51.26; H, 5.06; N, 3.52	C, 50.60; H, 4.77; N, 3.16
22	C ₁₆ H ₁₈ BrFNO ₃ S	C, 47.77; H, 4.26; N, 3.48	C, 47.96; H, 4.15; N, 3.64
23	C ₁₆ H ₁₈ N ₂ O ₅ S	C, 54.85; H, 5.18; N, 7.99	C, 55.10; H, 5.21; N, 8.22
24	C ₁₆ H ₁₈ N ₂ O ₅ S	C, 54.85; H, 5.18; N, 7.99	C, 54.94; H, 5.11; N, 7.94
25	C ₁₆ H ₁₈ INO ₃ S	C, 44.56; H, 4.21; N, 3.25	C, 45.00; H, 3.43; N, 3.06
26	C ₁₈ H ₂₁ F ₂ NO ₄ S	C, 56.09; H, 5.49; N, 3.63	C, 56.36; H, 5.40; N, 3.34
36	C ₁₇ H ₂₁ NO ₃ S	C, 63.92; H, 6.63; N, 4.39	C, 64.66; H, 7.45; N, 4.15
37	C ₁₉ H ₂₃ NO ₄ S	C, 63.13; H, 6.41; N, 3.88	C, 62.73; H, 6.45; N, 3.76
38	C ₁₇ H ₂₁ NO ₃ S ₂	C, 58.09; H, 6.02; N, 3.99	C, 59.07; H, 5.78; N, 3.63
39	C ₁₈ H ₂₀ N ₂ O ₃ S	C, 62.77; H, 5.85; N, 8.13	C, 62.97; H, 5.32; N, 7.53
40	C ₁₈ H ₂₃ NO ₄ S	C, 61.87; H, 6.63; N, 4.01	C, 62.24; H, 6.59; N, 4.21
41	C ₁₈ H ₂₁ NO ₅ S	C, 59.49; H, 5.82; N, 3.85	C, 59.43; H, 5.36; N, 3.74
42	C ₁₉ H ₂₆ N ₂ O ₃ S	C, 62.96; H, 7.23; N, 7.73	C, 62.22; H, 7.32; N, 7.61
43	C ₁₇ H ₂₁ NO ₄ S	C, 60.87; H, 6.31; N, 4.18	C, 62.13; H, 6.50; N, 3.92
44	C ₁₇ H ₁₉ Cl ₂ NO ₃ S	C, 52.58; H, 4.93; N, 3.61	C, 52.90; H, 4.77; N, 3.53
45	C ₁₈ H ₁₇ F ₆ NO ₃ S	C, 48.98; H, 3.88; N, 3.17	C, 48.87; H, 3.45; N, 3.20
46	C ₁₇ H ₁₈ F ₃ NO ₄ S	C, 52.44; H, 4.66; N, 3.60	C, 52.75; H, 3.95; N, 3.50
47	C ₂₃ H ₂₅ NO ₃ S	C, 69.84; H, 6.37; N, 3.54	C, 69.73; H, 6.47; N, 3.49
48	C ₁₇ H ₂₁ NO ₃ S	C, 63.92; H, 6.63; N, 4.39	C, 64.04; H, 6.70; N, 4.32
49	C ₁₈ H ₂₀ F ₃ NO ₃ S	C, 55.80; H, 5.20; N, 3.62	C, 55.99; H, 5.08; N, 3.56
50	C ₁₇ H ₁₈ F ₃ NO ₃ S	C, 54.68; H, 4.86; N, 3.75	C, 55.26; H, 3.18; N, 3.57
51	C ₁₇ H ₁₉ F ₂ NO ₃ S	C, 57.45; H, 5.39; N, 3.94	C, 57.50; H, 5.37; N, 4.39
52	C ₁₇ H ₁₉ F ₂ NO ₃ S	C, 57.45; H, 5.39; N, 3.94	C, 56.94; H, 5.38; N, 3.85
53	C ₁₆ H ₁₆ ClF ₂ NO ₃ S	C, 51.13; H, 4.29; N, 3.73	C, 51.07; H, 3.93; N, 3.65
54	C ₁₇ H ₁₆ F ₅ NO ₄ S	C, 48.00; H, 3.79; N, 3.29	C, 48.13; H, 3.54; N, 3.37
55	C ₁₇ H ₁₉ F ₂ NO ₃ S	C, 57.45; H, 5.39; N, 3.94	C, 57.30; H, 5.06; N, 3.87
56	C ₁₇ H ₂₀ FNO ₃ S	C, 60.51; H, 5.97; N, 4.15	C, 60.71; H, 5.36; N, 4.00
57	C ₁₈ H ₂₁ F ₂ NO ₃ S	C, 58.52; H, 5.73; N, 3.79	C, 59.40; H, 5.76; N, 4.45
58	C ₁₇ H ₁₈ F ₃ NO ₃ S	C, 54.68; H, 4.86; N, 3.75	C, 55.45; H, 4.95; N, 3.42
59	C ₁₇ H ₁₆ F ₅ NO ₃ S	C, 49.88; H, 3.94; N, 3.42	C, 50.55; H, 3.52; N, 2.96
60	C ₁₇ H ₁₇ F ₄ NO ₃ S	C, 52.17; H, 4.38; N, 3.58	C, 52.29; H, 4.12; N, 3.57
61	C ₁₇ H ₁₇ F ₄ NO ₃ S	C, 52.17; H, 4.38; N, 3.58	C, 53.02; H, 3.60; N, 3.35
62	C ₁₆ H ₁₈ FNO ₃ S	C, 59.98; H, 6.29; N, 8.74	C, 59.88; H, 6.20; N, 8.51
63	C ₁₆ H ₂₀ FNO ₃ S	C, 59.43; H, 5.61; N, 4.33	C, 59.40; H, 6.02; N, 4.45
64	C ₁₇ H ₁₈ N ₂ O ₃ S	C, 54.68; H, 4.86; N, 3.75	C, 54.75; H, 4.57; N, 3.77
65	C ₁₇ H ₂₁ NO ₃ S	C, 63.92; H, 6.63; N, 4.39	C, 63.12; H, 6.62; N, 4.35
66	C ₂₁ H ₂₉ NO ₃ S	C, 67.17; H, 7.78; N, 3.73	C, 66.64; H, 7.40; N, 3.35
67	C ₁₇ H ₁₈ O ₃	C, 75.53; H, 6.71; N, 17.67	C, 75.51; H, 6.42; N, 17.38