2-Halobenzenesulfonyl chlorides in the synthesis of pyrido[2,1-*c*][1,2,4]benzothiadiazine 5,5-dioxide derivatives*

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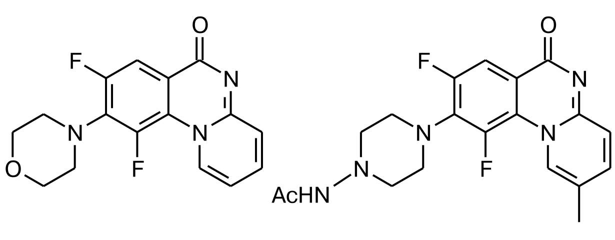
A number of new functional derivatives of pyrido[2,1-*c*][1,2,4]benzothiadiazine 5,5-dioxide was obtained based on the reactions of 2-halobenzenesulfonyl chlorides with 2-aminopyridine derivatives. A quantitative criterion for the evaluation of a possibility for the reaction to proceed under noncatalytic conditions depending on the type of halogen and substituents in the starting compounds was suggested.

Key words: 2-halobenzenesulfonyl chlorides, 2-aminopyridine, sulfoacylation, cyclocondensation, pyrido[2,1-*c*][1,2,4]benzothiadiazine 5,5-dioxide derivatives.

In the last several years, the interest to the synthesis of fused compounds derived from quinoline and 4(3*H*)-quinazoline annulated with different 5- and 6-membered heterocyclic fragments[1—3] and possessing various practically useful properties noticeably increased. Particular attention was paid to high tuberculostatic activity of some pyrido[1,2-*a*]quinazoline-6-one derivatives.[4]

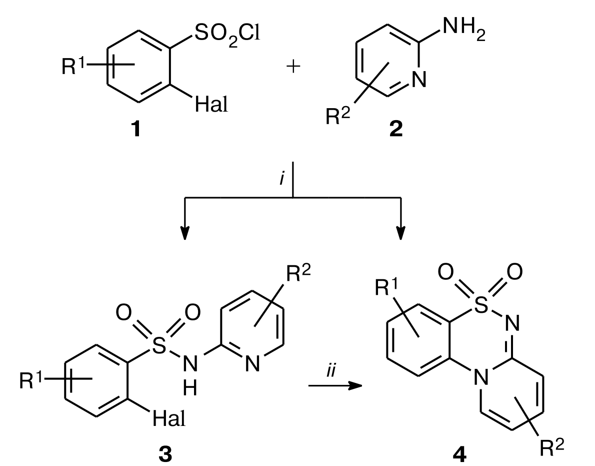


Pyrido[1,2-*a*]quinazolin-6-one derivatives

Pyrido[2,1-*c*][1,2,4]benzothiadiazine 5,5-dioxides are close structural analogs of these compounds. Like abovementioned quinazolines, they can be synthesized from the corresponding benzenesulfonyl chlorides **1** containing activated halogen at position 2 and 2-aminopyridine derivatives **2** (Scheme 1). Earlier,[5] this method was used to synthesize a small series of pyrido[2,1-*c*][1,2,4]benzothiadiazine 5,5-dioxides (**4**).

Depending on the structure of the starting compounds, the reactions can proceed either in one step (without catalysts), or in two steps, using potassium or copper salts in the cyclocondensation step of the intermediate sulfonamides **3** (see Scheme 1, *ii*). It was also shown[5] that the key factors influencing a possibility of the formation and the yields of cyclic compounds in the reactions under consideration are the type of the halogen; electron effects of substituents which activate the halogen; steric hindrance of the intramolecular nucleophilic attack in compounds **3**.

Scheme 1



Reaction conditions: *i*. without catalyst; *ii*. potassium or copper salts as catalysts.

The purpose of the present work is the experimental determination of this method scope in the synthesis of derivatives **4** under noncatalytic conditions.

* Based on the materials of the International Congress on the Heterocyclic Chemistry "KOST-2015" (October 18—23, 2015, Moscow, Russia).

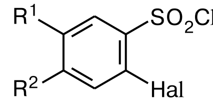
Published in Russian in *Izvestiya Akademii Nauk. Seriya Khimicheskaya,* No. 7, pp. 1839—1845, July, 2016.
1066-5285/16/6507-1839

Results and Discussion

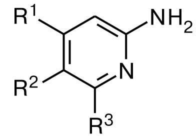
The analysis of the relationship between the structure of the starting compounds and a possibility of cyclic compounds **4** formation in several model syntheses (Table 1) allowed us to reveal a quantitative criterion, which was sufficient for the formulation of requirements to the type of substituent R^1 in compounds **1** depending on the type of halogen. The influence of steric factors in the chosen set of reagents was minimized. In the case of sulfonyl chlorides **1** (or sulfonamides **3**) containing one type of halogen, which is activated due to different substituents at *para*- and *meta*-positions, the possibility of cyclocondensation to proceed is mainly determined by their electron effects, with the σ_p or σ_m values from the Hammett equation indirectly serving as the measure of quantitative account for them.[6–8]

Sulfonyl chlorides **1** (see Table 1) containing electron-withdrawing groups and having the σ_p values in the range from 0.78 to 0.23 were used for model reactions.[8] The sulfoacylation step of aminopyridines **2** (see Scheme 1, *i*) was carried out in refluxing pyridine over 3 h. In the case when cyclic compound **4** was not isolated in the first step, the intermediate compounds were additionally refluxed in DMF for 3 h (see Scheme 1, *ii*).

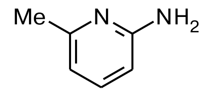
The results showed that the target pyrido[2,1-*c*]-[1,2,4]benzothiadiazine 5,5-dioxides **4** were not obtained



1a—l, I—IV



2a—c



2d

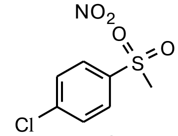
Compound **1**	R^1	R^2	Hal
a	NO_2	H	Cl
b		H	Cl
c	N≡C	H	Cl
d	ClO_2S	H	Br
e	ClO_2S	H	Cl
f	MeOC(O)	H	Cl
g	MeOC(O)	Cl	Cl
h	$NH_2C(O)$	H	Br
i	$NH_2C(O)$	H	Cl
k	$NH_2C(O)$	H	F
l	Cl	Cl	Cl
Compound	R^1	R^2	Hal
I	NO_2	H	Br
I	NO_2	H	F
III	MeOC(O)	H	Br
IV	MeOC(O)	H	F
Compound **2**	R^1	R^2	R^3
a	H	H	H
b	H	Cl	H
c	Me	H	H

Table 1. Model reactions of benzenesulfonyl chlorides with 2-aminopyridine derivatives

Entry	Sulfonyl chlorides	Amino-pyridines	σ_p/σ_m [a]	Cyclic product[b]		Yield (%)
				I	II	
1	**I**[c]	**2c**	0.78/—	**4**	—	—
2	**1a**	**2a**	0.78/—	**4a**	—	65
3	**1a**	**2b**	0.78/—	**4b**	—	81
4	**1a**	**2c**	0.78/—	**4c**	—	75
5	**1a**	**2d**	0.78/—	—	— (**3a**)	66
6	**II**[c]	**2c**	0.78/—	**4**	—	94
7	**1b**	**2c**	0.68/—	—	**4d**	34
8	**1c**	**2b**	0.66/—	—	**4e**	12
9	**1d**[d]	**2c**	0.65[e]/—	—	— (**3b**)	48
10	**1e**	**2c**	0.65[e]/—	—	— (**3c**)	53
11	**III**[c]	**2c**	0.45/—	**3**	—	—
12	**1f**	**2c**	0.45/—	—	— (**3d**)	41
13	**1g**	**2c**	0.45/0.37	—	**4f**	19
14	**IV**[c]	**2c**	0.45/0.37	**4**	—	91
15	**1h**	**2c**	0.36/—	—	— (**3e**)	52
16	**1i**	**2b**	0.36/—	—	— (**3f**)	46
17	**1k**	**2c**	0.36/—	—	**4g**	63
18	**1l**	**2c**	0.23/0.37	—	— (**3g**)	60

[a] The ratio for substituent in sulfonamide **3**.
[b] Cyclic product was isolated selectively in the step: I in the reaction *i* (Py, Δ, 3 h); II in the reaction *ii* (DMF, Δ, 3 h).
[c] According to the data in the work.[5]
[d] A two-fold molar excess of **2** was used.
[e] The value for the SO_2NHPh group was used.[8]

in all the cases. The presence in the molecule of the starting sulfonyl chloride **1** of the most strong accepting substituent, the nitro group (σ_p = 0.78), allowed us to selectively obtain cyclic compounds **4a—c** in one step in the reactions *1—4* and *6* (see Table 1) independent of the type of halogen. An exception was only sulfonamide **3a**, in which, probably, the steric hindrance created by the methyl group of the pyridine fragment blocked proceeding the cyclocondensation even upon prolonged reflux in DMF (in the case of reaction *5*).

The steric structure of formed compounds, in addition to the information obtained earlier,[5] was for the first time confirmed by ^{1}H—^{1}H and ^{1}H—^{13}C correlation NMR spectroscopy on a model compound **4a** (Fig. 1). The key signals confirming its angular structure are the cross-peaks between the protons H(1) and H(10) in the 2D NOESY spectrum and between the proton H(10) and the carbon nucleus C(11a) in the 2D HMBC spectrum.

A decrease in the σ_p value to 0.68 for the substituent in compound **1b** led to the fact that its reaction with derivative **2** (see Table 1, entry *7*) in pyridine resulted in the formation of a mixture predominantly containing the corresponding sulfonamide with insignificant amount of the target cyclic compound **4d**. However, further heating of this mixture in DMF allowed us to selectively obtain the target benzothiadiazine **4d**.

Similar results were obtained in the reaction *8* with involvement of sulfonyl chloride **1c** containing a carbonitrile group (σ_p = 0.66), however, the yield of compound **4f** was considerably lower as compared to that of **4d**.

A further decrease in the reactivity of halogen was observed when the substituent σ_p value decreased to 0.65. The results showed that the reactions of disulfonyl chlorides **1d** and **1e** with derivatives **2** (reactions *9* and *10*) led to the selective formation of disulfonamides **3b** and **3c**, which upon further prolonged heating in DMF did not form cyclic compounds. Thus, this value of σ_p is on the borderline, after which the activity of chlorine and bromine atoms is already insufficient for the intramolecular nucleophilic substitution reactions to proceed.

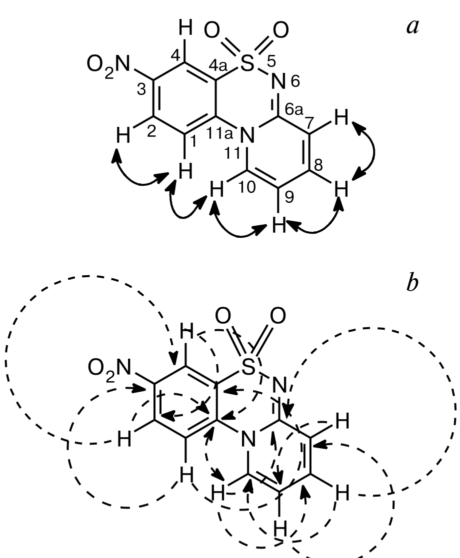


Fig. 1. (*a*) The ^{1}H—^{1}H-correlation scheme in the NOESY spectrum of compound **4a**. (*b*) Remote ^{1}H—^{13}C-interactions in the 2D HMBC spectrum of compound **4a**.

As it was expected, the reactions *11* and *12* involving sulfonyl chlorides **1** bearing an ester group (σ_p = 0.45) led to the selective formation of the corresponding sulfonamides. However, the presence of an additional activating substituent at *meta*-position to chlorine (σ_m = 0.37) in compound **1g** allowed us to obtain (reaction *13*) benzothiadiazine **4f** in two steps. Replacement of chlorine with fluorine in the starting sulfonyl chloride considerably facilitated proceeding of the cyclocondensation reaction, as it was shown in the case of entry *14*.

A decrease in the σ_p value of substituent to 0.36 in compounds **1h—k** containing a carboxamide group led to the fact that the formation of benzothiadiazine **4g** (reaction *17*) takes place only in the case of sulfonyl chloride **1k** and only in two steps. In other cases, the corresponding sulfonamides **3e** and **3f** were isolated (reactions *15* and *16*).

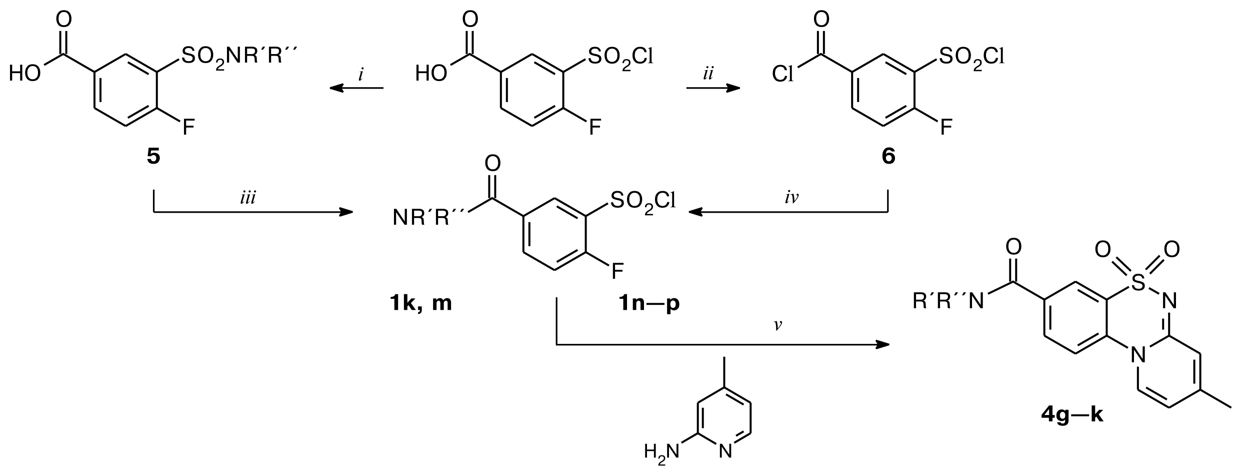
The fluorine atom undergoes intramolecular nucleophilic substitution the most readily in the reactions of this type. Among electron-withdrawing substituents, which are of interest for subsequent functionalization or which possess pharmacophoric activity, the σ_p values in most cases are within the range 0.78—0.36. Thus, 2-fluorine-containing derivatives **1** are the most promising starting objects for the preparation of the target pyrido[2,1-*c*][1,2,4]benzothiadiazine 5,5-dioxides **4** under noncatalytic conditions.

In particular, successful synthesis of compound **4g** opens wide possibilities for the preparation of its analogs containing both the aliphatic and aromatic component in the composition of the carboxamide fragment. The synthesis of the starting sulfonyl chlorides in this case is possible by two methods (Scheme 2).

The first of them (see Scheme 2, *i*) is based on the reaction of intramolecular transamidation[9] of sulfonamides **5** in chlorosulfonic acid. In this case, sulfonyl chlorides **1k**,**m** were obtained in 30 and 44% yields, respectively. Another method (see Scheme 2, *ii*) is based on usage of a significantly higher reactivity of COCl group (in 100—900 times) compared to SO_2Cl group in the reactions of 3-sulfobenzoyl dichlorides **6** with aromatic amines.[10] This specific feature allows one to remain intact the free chlorosulfonyl group in compounds **1n—p**.

Based on sulfonyl chlorides **1k**,**n—p** in all the cases we have obtained the corresponding benzothiadiazines **4g—k**. The ^{1}H NMR spectra showed the presence of the signals for the protons corresponding to the carboxamide fragments and the absence of the signals for the protons of the sulfonamide groups, which also agreed with the IR spectroscopy and mass spectrometry data.

Scheme 2



1: NR′R′′ = NH_2 (**k**), NHMe (**m**), NHPh (**n**), NH(4-CN)Ph (**o**), NH(2-CF_3)Ph (**p**)
4: NR′R′′ = NH_2 (**g**), NHMe (**h**), NHPh (**i**), NH(4-CN)Ph (**j**), NH(2-CF_3)Ph (**k**)

Reagents and conditions: *i.* NHR′R′′, MeCN; *ii.* $SOCl_2$, DMF, Δ; *iii.* HSO_3Cl, 1—1.5 h, 90—100 °C; *iv.* NHR′R′′, Py, MeCN, 1 h, 20 °C; *v.* 1) Py, Δ, 3 h; 2) DMF, Δ, 3 h.

Experimental

^{1}H and ^{13}C NMR spectra were recorded on Bruker DRX400 and Bruker DRX500 spectrometers (solvent DMSO-d_6, an internal standard TMS). IR spectra were recorded on a RX-1 Perkin Elmer Fourier-transform spectrometer with the wavelength of 700—4000 cm^{-1}. The analyzed sample was placed in the instrument as a suspension in Nujol between KBr plates. Mass spectra for compounds **4a—c** were recorded on a Finnigan MAT Incos 50 spectrometer with the ionization potential of electrons 70 eV and the ionization chamber temperature 100—220 °C. For other compounds mass spectra were recorded on a Shimadzu Prominence LCMS-2020 HPLC/MS spectrometer equipped with a chromatography column (40 °C, eluent acetonitrile) and a mass spectrometer (LCMS-2020, the *m/z* range of 0—2000, ESI/ACPI ionization modes).

5-(4-Chlorobenzene-1-sulfonyl)-2-chlorobenzene-1-sulfonyl chloride (1b) was synthesized according to the known procedure.[11] The yield was 0.971 g (55%), white crystals, m.p. 173—176 °C. IR, ν/cm^{-1}: 3088 (C_{arom}—H); 1572 (C_{arom}—C_{arom}); 1381, 1334, 1186, 1164 (SO_2); 1283; 1111; 1089; 1034; 1012; 839; 814; 758; 706; 680; 641.

2-Chloro-5-cyanobenzene-1-sulfonyl chloride (1c). Commercially available agent (Atomax Chemicals Co. Ltd., CAS 942199-56-6). M.p. 102—106 °C.

4-Bromobenzene-1,3-disulfonyl dichloride (1d). Chlorosulfonic acid (7.5 mL, 0,114 mol) was added to bromobenzene (3 g, 0.019 mol). The reaction mixture was heated for 3 h at 140 °C. The reaction product was isolated pouring on ice (100 g) with subsequent recrystallization of the precipitate from toluene. The yield was 4.45 g (66%), white crystals, m.p. 98—102 °C. IR, ν/cm^{-1}: 3093 (C_{arom}—H); 1569 (C_{arom}—C_{arom}); 1377, 1181, 1168 (SO_2); 1282; 1256; 1101; 1094; 1023; 810; 722; 694; 678; 624.

4-Chlorobenzene-1,3-disulfonyl dichloride (1e) was obtained similarly to compound **1d**. The yield was 2.90 g (35%), white crystals, m.p. 85—86.5 °C. IR, ν/cm^{-1}: 3105 (C_{arom}—H); 1576 (C_{arom}—C_{arom}); 1383, 1368, 1182, 1168 (SO_2); 1286; 1256; 1116; 1038; 821; 699; 682; 644; 634; 604.

Methyl 4-chloro-3-chlorosulfonylbenzoate (1f). Methanol (0.148 mL, 3.656 mmol) was added to a solution of 3-chlorosulfonyl-4-chlorobenzoyl chloride (1 g, 3.656 mmol) in acetonitrile (10 mL), followed by a gradual addition of triethylamine to the mixture to pH 7—8. The reaction product was isolated by the addition of some cold water with subsequent recrystallization of formed precipitate from toluene. The yield was 0.879 g (89%), white crystals, m.p. 153—157 °C.

Methyl 2,4-dichloro-5-chlorosulfonylbenzoate (1g) was obtained similarly to compound **1f.** The yield was 0.927 g (94%), white crystals, m.p. 109—112 °C. IR, ν/cm^{-1}: 3094 (C_{arom}—H); 1720 (C=O); 1583, 1458, 1434 (C_{arom}—C_{arom}); 1381, 1351, 1184 (SO_2); 1267 (C—O); 1141; 1073; 965; 920; 887; 802; 780; 680; 623.

2-Bromo-5-carbamoylbenzene-1-sulfonyl chloride (1h). Chlorosulfonic acid (2.2 mL, 0.032 mol) was added to 3-sulfamoyl-4-bromobenzoic acid (3 g, 0.011 mol). After thorough stirring, the reaction mixture was heated for 2.5 h at 90 °C. The reaction product was isolated by pouring on ice (10 g) with subsequent recrystallization of formed precipitate from toluene. The yield was 2.172 g (68%), white crystals, m.p. 176—178 °C. IR, ν/cm^{-1}: 3466, 3361, 3300, 1617 (NH_2); 1685 (C=O); 1588 (C_{arom}—C_{arom}); 1378, 1351, 1184, 1165 (SO_2); 1284; 1249; 1104; 1025; 927; 847; 799; 688; 655.

Compounds **1i—m** were obtained similarly to compound **1h**.

5-Carbamoyl-2-chlorobenzene-1-sulfonyl chloride (1i). The reaction time was 2 h, the temperature 90 °C. The yield was 1.833 g (57%), white crystals, m.p. 145—148 °C. IR, ν/cm^{-1}: 3464, 3361, 3300, 1618 (NH_2); 3094 (C_{arom}—H); 1684 (C=O), 1592 (C_{arom}—C_{arom}); 1379, 1353, 1180, 1167 (SO_2); 1287; 1250; 1114; 1104; 1038; 928; 853; 799; 693; 675.

5-Carbamoyl-2-fluorobenzene-1-sulfonyl chloride (1k). The reaction time was 2 h, the temperature 90 °C. The yield was 0.979 g (30%), white crystals, m.p. 134—135.5 °C. IR, ν/cm^{-1}:

3471, 3360, 3147 (NH_2); 3077 (C_{arom}—H); 1686 (C=O); 1600, 1495 (C_{arom}—C_{arom}); 1387, 1370, 1188 (SO_2); 1303; 1280; 1232; 1061; 936; 879; 851; 795; 704; 692.

2,4,5-Trichlorobenzene-1-sulfonyl chloride (1l). The reaction time was 3 h, the temperature 145 °C. The yield was 2.00 g (43%), white crystals, m.p. 65—67 °C. IR, ν/cm^{-1}: 3097 (C_{arom}—H); 1565, 1534 (C_{arom}—C_{arom}); 1379, 1179, 1156 (SO_2); 1320; 1118; 1066; 909; 880; 688; 657; 623.

5-(*N*-Methyl)carbamoyl-2-fluorobenzene-1-sulfonyl chloride (1m). The reaction time was 1.5 h, the temperature 100 °C. The yield was 1.418 g (44%), needle-like white crystals, m.p. 124—126 °C. IR, ν/cm^{-1}: 3303, 3107 (CON—H); 3086, 3043 (C_{arom}—H); 1639 (C=O); 1604, 1492 (C_{arom}—C_{arom}); 1558 (N—H); 1397, 1377, 1187 (SO_2); 1326; 1275; 1242; 1156; 1066; 906; 891; 868; 811; 768; 726; 714; 626.

5-(*N*-Phenyl)carbamoyl-2-fluorobenzene-1-sulfonyl chloride (1n). A mixture of aniline (0.35 mL, 3.890 mmol), pyridine (0.31 mL, 3.890 mmol), and acetonitrile (10 mL) was added to a solution of compound **6** (1 g, 3.890 mmol) in acetonitrile (10 mL) at 20 °C with vigorous stirring over 15 min. Then, the mixture was allowed to stand for 1 h under the same conditions. The reaction product was isolated by pouring in water (100 mL) with subsequent recrystallization of formed precipitate from toluene. The yield was 1.118 g (92%), white crystals, m.p. 191—193 °C. IR, ν/cm^{-1}: 3292, 3195, 3140 (CON—H); 3080 (C_{arom}—H); 1655 (C=O); 1600, 1490 (C_{arom}—C_{arom}); 1556, 1544 (N—H); 1381, 1186 (SO_2); 1331; 1262; 921; 842; 763; 711; 695.

Compounds **1o** and **1p** were obtained similarly to compound **1n**.

5-[(*N*-4-Cyanophenyl)carbamoyl]-2-fluorobenzene-1-sulfonyl chloride (1o). The yield was 1.247 g (95%), light beige crystals, m.p. 190—193 °C. IR, ν/cm^{-1}: 3358 (N—H); 3066 (C_{arom}—H); 2230 (C≡N); 1690 (C=O); 1602, 1507, 1492 (C_{arom}—C_{arom}); 1528 (N—H); 1380, 1323, 1181 (SO_2); 1279; 1260; 1244; 1099; 1066; 918; 847; 754; 719; 650; 627.

5-([*N*-(2-Trifluoromethyl)phenyl]carbamoyl)-2-fluorobenzene-1-sulfonyl chloride (1p). The yield was 1.221 g (82%), white crystals, m.p. 130—133 °C. IR, ν/cm^{-1}: 3203 (N—H); 3044 (C_{arom}—H); 1669, 1651 (C=O); 1603, 1591, 1496, 1483 (C_{arom}—C_{arom}); 1541 (N—H); 1379, 1318, 1188 (SO_2); 1265; 1125; 1058; 1036; 929; 882; 844; 823; 766; 760; 740; 710; 652; 634; 608; 564.

One-step synthesis of pyrido[2,1-*c*][1,2,4]benzothiadiazine 5,5-dioxide derivatives (4a—c) (general procedure). An equimolar amount of the corresponding 2-aminopyridine derivative **2** and pyridine (3 mL) were added to the starting sulfonyl chloride **1** (0.5 g). The reaction mixture was refluxed for 3 h. On completion, the pyridine was evaporated at normal pressure and water (40 mL) was added. A precipitate of compound **4** was collected by filtration and purified by recrystallization from a mixture of DMF—acetonitrile—water (3 : 1 : 1, v/v).

3-Nitro-5*H*-pyrido[2,1-*c*][1,2,4]benzothiadiazine 5,5-dioxide (4a). Yellow crystals, m.p. 333—335 °C. Found (%): C, 47.54; H, 2.53; N, 15.22. $C_{11}H_7N_3O_4S$. Calculated (%): C, 47.65; H, 2.54; N, 15.16. M 277.26. IR, ν/cm^{-1}: 1648 (C=N, C=C); 1609, 1596, 1508 (C_{arom}—C_{arom}); 1536, 1353 (NO_2); 1328, 1299, 1176, 1155, 1127 (SO_2); 1224; 1072; 1002; 960; 930; 894; 858; 834; 797; 766; 750; 656; 565. ^{1}H NMR (500 MHz), δ: 7.11 (m, 1 H, H(9), ^3J = 6.7 Hz, ^4J = 2.1 Hz); 7.19 (dd, 1 H, H(7), ^3J = 6.7 Hz, ^4J = 2.1 Hz); 7.92 (m, 1 H, H(8), ^3J = 6.7 Hz, ^4J = 2.1 Hz); 8.44 (d, 1 H, H(1), ^3J = 9.5 Hz); 8.58 (d, 1 H, H(4), ^4J = 3.3 Hz); 8.66 (dd, 1 H, H(2), ^3J = 9.5 Hz, ^4J = 3.3 Hz); 8.92 (dd, 1 H, H(10), ^3J = 6.7 Hz, ^4J = 2.1 Hz). ^{13}C NMR (125 MHz), δ: 113.71 (C(9)), 119.05 (C(4)), 122.88 (C(1)), 123.79 (C(7)), 127.11 (C(4a)), 127.33 (C(2)), 133.15 (C(10)), 139.43 (C(11a)), 141.35 (C(8)), 146.95 (C(3)), 152.59 (C(6a)). MS (EI, 70 eV), m/z (I_{rel} (%)): 277 $[M]^+$ (14), 213 (59), 168 (8), 167 (91), 166 (17), 155 (23), 140 (35), 113 (8), 78 (23), 75 (21), 74 (9), 63 (32), 62 (14), 52 (11), 51 (27), 50 (16), 46 (34), 44 (19), 39 (10), 30 (100), 29 (7), 28 (14).

9-Chloro-3-nitro-5*H*-pyrido[2,1-*c*][1,2,4]benzothiadiazine 5,5-dioxide (4b). Dark yellow plate crystals, m.p. 290—292 °C. Found (%): C, 42.48; H, 1.93; N, 13.53. $C_{11}H_6ClN_3O_4S$. Calculated (%): C, 42.39; H, 1.94; N, 13.48. M 311.70. IR, ν/cm^{-1}: 1643 (C=N, C=C); 1605, 1590, 1501 (C_{arom}—C_{arom}); 1523, 1356 (NO_2); 1306, 1176, 1150, 1129 (SO_2); 1220; 1065; 958; 929; 894; 839; 818; 752; 726; 697; 597. ^{1}H NMR (500 MHz), δ: 7.23 (d, 1 H, H(7), ^3J = 9.7 Hz); 7.98 (dd, 1 H, H(8), ^3J = 9.7 Hz, ^4J = 2.2 Hz); 8.56 (d, 1 H, H(1), ^3J = 9.5 Hz); 8.60 (d, 1 H, H(4), ^4J = 2.6 Hz); 8.65 (dd, 1 H, H(2), ^3J = 9.5 Hz, ^4J = 2.6 Hz); 9.13 (d, 1 H, H(10), ^4J = 2.2 Hz). MS (EI, 70 eV), m/z (I_{rel} (%)): 313 $[M]^+$ (10), 311 $[M]^+$ (27), 249 (22), 248 (9), 247 (71), 203 (30), 202 (14), 201 (100), 191 (7), 189 (26), 176 (6), 174 (22), 167 (10), 166 (72), 165 (19), 139 (11), 138 (6), 114 (8), 112 (18), 88 (11), 77 (7), 76 (42), 75 (27), 74 (23), 73 (10), 64 (14), 63 (31), 62 (17), 51 (6), 50 (8), 46 (11), 44 (8), 30 (27).

8-Methyl-3-nitro-5*H*-pyrido[2,1-*c*][1,2,4]benzothiadiazine 5,5-dioxide (4c). Brown needle-like crystals, m.p. 312—315 °C. Found (%): C, 49.33; H, 3.12; N, 14.36. $C_{12}H_9N_3O_4S$. Calculated (%): C, 49.48; H, 3.11; N, 14.43. M 291.28. IR, ν/cm^{-1}: 1659 (C=N, C=C); 1609, 1595, 1507 (C_{arom}—C_{arom}); 1538, 1354 (NO_2); 1302, 1175, 1154, 1131 (SO_2); 1226; 1070; 976; 938; 893; 883; 870; 831; 793; 748; 700; 658. ^{1}H NMR (500 MHz), δ: 2.43 (d, 3 H, Me, J = 1.5 Hz); 7.01 (dd, 1 H, H(9), ^3J = 7.3 Hz, ^4J = 2.1 Hz); 7.04 (d, 1 H, H(7), ^4J = 2.1 Hz); 8.41 (d, 1 H, H(1), ^3J = 9.5 Hz); 8.57 (d, 1 H, H(4), ^4J = 2.6 Hz); 8.65 (dd, 1 H, H(2), ^3J = 9.5 Hz, ^4J = 2.6 Hz); 8.84 (d, 1 H, H(10), ^3J = 7.3 Hz). MS (EI, 70 eV), m/z (I_{rel} (%)): 291 $[M]^+$ (13), 228 (9), 227 (73), 182 (15), 181 (100), 180 (9), 179 (12), 169 (22), 166 (19), 154 (10), 153 (7), 127 (13), 78 (6), 77 (9), 76 (11), 75 (17), 74 (12), 65 (20), 64 (10), 63 (22), 62 (8), 52 (10), 51 (9), 50 (8), 46 (24), 44 (6), 39 (22), 38 (6), 30 (65), 28 (11), 27 (6).

Two-step synthesis of pyrido[2,1-*c*][1,2,4]benzothiadiazine 5,5-dioxide derivatives (4d—g) (general procedure). The first step was similar to that given above for compounds **4a**—**c**. Dimethylformamide (3 mL) was added to the intermediate sulfonamide **3** (or a mixture of **3** and **4**) (0.5 g). The reaction mixture was refluxed for 3 h. The reaction product was isolated by the addition of acetonitrile (1 mL) and water (1 mL).

3-(4-Chlorobenzene-1-sulfonyl)-8-methyl-5*H*-pyrido[2,1-*c*]-[1,2,4]benzothiadiazine 5,5-dioxide (4d). Light yellow crystals, m.p. 292—294 °C. Found (%): C, 51.24; H, 3.13; N, 6.63. $C_{18}H_{13}ClN_2O_4S_2$. Calculated (%): C, 51.37; H, 3.11; N, 6.66. M 420.89. IR, ν/cm^{-1}: 3060 (C_{arom}—H); 1656 (C=N); 1585, 1522 (C_{arom}—C_{arom}); 1335, 1320, 1178, 1155 (SO_2); 1292; 1225; 1123; 1092; 1080; 1040; 1015; 978; 861; 830; 821; 774; 758; 728; 707; 700; 649; 614; 590; 562; 548. ^{1}H NMR (400 MHz), δ: 2.37 (s, 3 H, CH_3); 6.97 (dd, 1 H, H(9), ^3J = 7.3 Hz, ^4J = 1.8 Hz); 7.00 (d, 1 H, H(7), ^4J = 1.8 Hz); 7.74 (d, 2 H, $H(3)_{Ph}$, $H(5)_{Ph}$, ^3J = 8.6 Hz); 8.14 (d, 2 H, $H(2)_{Ph}$, $H(6)_{Ph}$, ^3J = 8.6 Hz); 8.34—8.39 (m, 2 H, H(1), H(4)); 8.44 (dd, 1 H, H(2), ^3J = 9.1 Hz, ^4J = 2.2 Hz); 8.76 (d, 1 H, H(10), ^3J = 7.3 Hz). MS (ESI), m/z (I_{rel} (%)): 421 $[M]^+$ (42), 420 $[M]^+$ (25), 419 $[M]^+$ (100), 275 (3), 173 (6).

9-Chloro-5*H*-pyrido[2,1-*c*][1,2,4]benzothiadiazine-3-carbonitrile 5,5-dioxide (4e). Light brown crystals, m.p. 242—244 °C. Found (%): C, 49.57; H, 2.07; N, 14.36. $C_{12}H_6ClN_3O_2S$. Calculated (%): C, 49.41; H, 2.07; N, 14.40. M 291.71. IR, ν/cm^{-1}: 2238 (C≡N); 1641 (C=N, C=C); 1606, 1513 (C_{arom}—C_{arom}); 1304, 1154, 1136 (SO_2); 1262; 1102; 953; 834; 821; 806; 740; 707; 658. ^{1}H NMR (500 MHz), δ: 7.23 (d, 1 H, H(7), ^3J = 9.6 Hz); 7.94 (dd, 1 H, H(8), ^3J = 9.6 Hz, ^4J = 2.1 Hz); 8.37 (dd, 1 H, H(2), ^3J = 9.0 Hz, ^4J = 1.8 Hz); 8.48 (d, 1 H, H(1), ^3J = 9.0 Hz); 8.55 (d, 1 H, H(4), ^4J = 1.8 Hz); 9.07 (d, 1 H, H(10), ^4J = 2.1 Hz).

Methyl 2-Chloro-8-methyl-5*H*-pyrido[2,1-*c*][1,2,4]benzothiadiazine-3-carboxylate 5,5-dioxide (4f). Light yellow crystals, m.p. 281—283 °C. Found (%): C, 49.46; H, 3.29; N, 8.24. $C_{14}H_{11}ClN_2O_4S$. Calculated (%): C, 49.64; H, 3.27; N, 8.27. M 338.77. IR, ν/cm^{-1}: 3076 (C_{arom}—H); 1741 (C=O); 1659 (C=N); 1601, 1574, 1499 (C_{arom}—C_{arom}); 1351, 1163, 1134 (SO_2); 1294 (C—O); 1186; 1102; 1034; 973; 891; 867; 849; 805; 775; 758; 722; 712; 665. ^{1}H NMR (400 MHz), δ: 2.38 (s, 3 H, Me); 3.86—3.94 (m, 3 H, CO_2Me); 6.94 (dd, 1 H, H(9), ^3J = 7.3 Hz, ^4J = 2.0 Hz); 6.98 (d, 1 H, H(7), ^4J = 2.0 Hz); 8.33 (s, 1 H, H(1)); 8.47 (s, 1 H, H(4)); 8.81 (d, 1 H, H(10), ^3J = 7.3 Hz). MS (ESI), *m/z* (I_{rel} (%)): 339 [M]$^+$ (39), 338 [M]$^+$ (18), 337 [M]$^+$ (100), 173 (4).

8-Methyl-5*H*-pyrido[2,1-*c*][1,2,4]benzothiadiazine-3-carboxamide 5,5-dioxide (4g). Beige crystals, m.p. 329—331 °C. Found (%): C, 53.83; H, 3.85; N, 14.48. $C_{13}H_{11}N_3O_3S$. Calculated (%): C, 53.97; H, 3.83; N, 14.52. M 289.31. IR, ν/cm^{-1}: 3386, 3305 (NH_2); 1678 (C=N); 1658 (C=O); 1625 (NH_2); 1612, 1580, 1514, 1486 (C_{arom}—C_{arom}); 1536 (N—H); 1356, 1181, 1150 (SO_2); 1284; 1225; 1123; 1079; 1039; 994; 977; 910; 870; 843; 793; 755; 718; 708; 690; 658; 601; 565. ^{1}H NMR (400 MHz), δ: 2.38 (s, 3 H, Me); 6.95 (dd, 1 H, H(9), ^3J = 7.3 Hz, ^4J = 1.9 Hz); 6.98 (d, 1 H, H(7), ^4J = 1.9 Hz); 7.71 (s, 1 H, $CONH_2$); 8.24 (d, 1 H, H(1), ^3J = 9.2 Hz); 8.32 (dd, 1 H, H(2), ^3J = 9.2 Hz, ^4J = 2.0 Hz); 8.41 (s, 1 H, $CONH_2$); 8.46 (d, 1 H, H(4), ^4J = 2.0 Hz); 8.80 (d, 1 H, H(10), ^3J = 7.3 Hz). MS (ESI), *m/z* (I_{rel} (%)): 288 [M]$^+$ (100), 275 (8), 250 (5), 191 (10), 173 (26), 113 (9), 77 (6), 59 (14).

8-Methyl-5*H*-pyrido[2,1-*c*][1,2,4]benzothiadiazine-3-(*N*-methyl)carboxamide 5,5-dioxide (4h). The yield was 0.274 g, brown plate crystals, m.p. 333—335 °C. Found (%): C, 55.62; H, 4.30; N, 13.92. $C_{14}H_{13}N_3O_3S$. Calculated (%): C, 55.43; H, 4.32; N, 13.85. M 303.34. IR, ν/cm^{-1}: 3353 (N—H); 1655 (C=O, C=N); 1612, 1581, 1510 (C_{arom}—C_{arom}); 1540 (N—H); 1355, 1303, 1179, 1150 (SO_2); 1304; 1273; 1226; 1120; 1079; 1041; 994; 980; 904; 866; 843; 792; 763; 713; 706; 659; 602; 564. ^{1}H NMR (400 MHz), δ: 2.37 (s, 3 H, Me); 2.83 (d, 3 H, NH<u>CH</u>$_3$, ^3J = 4.4 Hz); 6.94 (dd, 1 H, H(9), ^3J = 7.3 Hz, ^4J = 1.8 Hz); 6.98 (d, 1 H, H(7), ^4J = 1.8 Hz); 8.24 (d, 1 H, H(1), ^3J = 9.0 Hz); 8.29 (dd, 1 H, H(2), ^3J = 9.0 Hz, ^4J = 1.8 Hz); 8.42 (d, 1 H, H(4), ^4J = 1.8 Hz); 8.79 (d, 1 H, H(10), ^3J = 7.3 Hz); 8.90 (d, 1 H, CONH, ^3J = 4.4 Hz). MS (ESI), *m/z* (I_{rel} (%)): 303 [M]$^+$ (20), 302 [M]$^+$ (100), 275 (7), 225 (5), 191 (4), 173 (25), 113 (5), 77 (3), 59 (9).

8-Methyl-5*H*-pyrido[2,1-*c*][1,2,4]benzothiadiazine-3-(*N*-phenyl)carboxamide 5,5-dioxide (4i). The yield was 0.195 g, beige crystals, m.p. >350 °C. Found (%): C, 62.62; H, 4.12; N, 11.45. $C_{19}H_{15}N_3O_3S$. Calculated (%): C, 62.45; H, 4.14; N, 11.50. M 365.41. IR, ν/cm^{-1}: 3300 (N—H), 3078 (C_{arom}—H); 1669 (C=N); 1655 (C=O); 1598, 1500 (C_{arom}—C_{arom}); 1534 (N—H); 1326, 1178, 1156 (SO_2); 1286; 1273; 1254; 1224; 1119; 1079; 1034; 984; 956; 926; 905; 880; 870; 824; 776; 748; 714; 698; 956; 616; 592; 564. ^{1}H NMR (400 MHz), δ: 2.39 (s, 3 H, Me); 6.97 (dd, 1 H, H(9), ^3J = 7.3 Hz, ^4J = 1.9 Hz); 7.00 (d, 1 H, H(7), ^4J = 1.9 Hz); 7.14 (t, 1 H, $H(4)_{Ph}$, ^3J = 7.7 Hz); 7.39 (t, 2 H, $H(3)_{Ph}$, $H(5)_{Ph}$, ^3J = 7.7 Hz); 7.81 (d, 2 H, $H(2)_{Ph}$, $H(6)_{Ph}$, ^3J = 7.7 Hz); 8.30 (d, 1 H, H(1), ^3J = 9.0 Hz); 8.42 (dd, 1 H, H(2), ^3J = 9.0 Hz, ^4J = 2.1 Hz); 8.60 (d, 1 H, H(4), ^4J = 2.1 Hz); 8.82 (d, 1 H, H(10), ^3J = 7.3 Hz); 10.65 (br.s, 1 H, CONH). MS (ESI), *m/z* (I_{rel} (%)): 365 [M]$^+$ (24), 364 [M]$^+$ (100), 285 (3), 275 (4), 239 (5), 222 (3), 173 (15), 113 (4), 59 (4).

8-Methyl-5*H*-pyrido[2,1-*c*][1,2,4]benzothiadiazine-3-(*N*-4-cyanophenyl)carboxamide 5,5-dioxide (4j). The yield was 0.123 g, beige crystals, m.p. >350 °C. Found (%): C, 61.34; H, 3.60; N, 14.38. $C_{20}H_{14}N_4O_3S$. Calculated (%): C, 61.53; H, 3.61; N, 14.35. M 390.42. IR, ν/cm^{-1}: 3377 (N—H); 3072 (C_{arom}—H); 2225 (C≡N); 1670 (C=N); 1653 (C=O); 1598, 1512 (C_{arom}—C_{arom}); 1538 (N—H); 1352, 1336, 1183, 1152 (SO_2); 1312; 1287; 1272; 1252; 1228; 1120; 1109; 1075; 1038; 868; 851; 784; 755; 713; 659; 625; 595; 566; 554. ^{1}H NMR (400 MHz), δ: 2.39 (s, 3 H, CH_3); 6.98 (dd, 1 H, H(9), ^3J = 7.3 Hz, ^4J = 1.8 Hz); 7.00 (d, 1 H, H(7), ^4J = 1.8 Hz); 7.85 (d, 2 H, $H(3)_{Ph}$, $H(5)_{Ph}$, ^3J = 8.8 Hz); 8.02 (d, 2 H, $H(2)_{Ph}$, $H(6)_{Ph}$, ^3J = 8.8 Hz); 8.32 (d, 1 H, H(1), ^3J = 9.1 Hz); 8.42 (dd, 1 H, H(2), ^3J = 9.1 Hz, ^4J = 2.0 Hz); 8.60 (d, 1 H, H(4), ^4J = 2.0 Hz); 8.82 (d, 1 H, H(10), ^3J = 7.3 Hz); 10.99 (s, 1 H, CONH). MS (ESI), *m/z* (I_{rel} (%)): 390 [M]$^+$ (24), 389 [M]$^+$ (100), 235 (3), 191 (3), 174 (3), 173 (24).

8-Methyl-5*H*-pyrido[2,1-*c*][1,2,4]benzothiadiazine-3-[*N*-(2-trifluoromethyl)phenyl]carboxamide 5,5-dioxide (4k). The yield was 0.163 g, dark beige crystals, m.p. 228—230 °C. Found (%): C, 55.59; H, 3.27; N, 9.66. $C_{20}H_{14}F_3N_3O_3S$. Calculated (%): C, 55.43; H, 3.26; N, 9.70. M 433.40. IR, ν/cm^{-1}: 3412 (N—H); 3068 (C_{arom}—H); 1686 (C=N); 1656 (C=O); 1609, 1585, 1507 (C_{arom}—C_{arom}); 1348, 1323, 1159, 1127 (SO_2); 1294; 1247; 1228; 1104; 1076; 1054; 1033; 896; 868; 813; 774; 762; 660; 652; 566. ^{1}H NMR (400 MHz), δ: 2.40 (s, 3 H, Me); 6.98 (dd, 1 H, H(9), ^3J = 7.3 Hz, ^4J = 1.8 Hz); 7.01 (d, 1 H, H(7), ^4J = 1.8 Hz); 7.54—7.62 (m, 2 H, $H(3)_{Ph}$, $H(4)_{Ph}$); 7.77 (t, 1 H, $H(5)_{Ph}$, ^3J = 7.7 Hz); 7.83 (d, 1 H, $H(6)_{Ph}$, ^3J = 7.7 Hz); 8.32 (d, 1 H, H(1), ^3J = 9.1 Hz); 8.38 (dd, 1 H, H(2), ^3J = 9.1 Hz, ^4J = 1.8 Hz); 8.57 (d, 1 H, H(4), ^4J = 1.8 Hz); 8.83 (d, 1 H, H(10), ^3J = 7.3 Hz); 10.65 (s, 1 H, CONH). MS (ESI), *m/z* (I_{rel} (%)): 433 [M]$^+$ (25), 432 [M]$^+$ (100).

***N*-(6-Methylpyridin-2-yl)-2-chlorobenzene-1-sulfonamide (3a).** Yellow crystals, m.p. 192—194 °C. Found (%): C, 43.83; H, 3.07; N, 12.78. $C_{12}H_{10}ClN_3O_4S$. Calculated (%): C, 43.98; H, 3.08; N, 12.82. M 327.74. IR, ν/cm^{-1}: 3238 (N—H); 1616 (C=N); 1603 (C_{arom}—C_{arom}); 1528, 1355 (NO_2); 1355, 1147, 1124 (SO_2); 1283; 1246; 1064; 1037; 892; 858; 841; 807; 738; 706; 676; 632; 588. ^{1}H NMR (400 MHz), δ: 2.35 (s, 3 H, Me); 6.70 (d, 1 H, $H(5)_{Py}$, ^3J = 7.6 Hz); 7.11 (d, 1 H, $H(3)_{Py}$, ^3J = 7.6 Hz); 7.73 (t, 1 H, $H(4)_{Py}$, ^3J = 7.6 Hz); 7.86 (d, 1 H, H(3), ^3J = 8.8 Hz); 8.33 (dd, 1 H, H(4), ^3J = 8.8 Hz, ^4J = 2.1 Hz); 8.76 (d, 1 H, H(6), ^4J = 2.1 Hz); 13.54 (s, 1 H, SO_2NH). MS (ESI), *m/z* (I_{rel} (%)): 328 [M]$^+$ (39), 327 [M]$^+$ (16), 326 [M]$^+$ (100), 321 (16).

4-Bromo-N^1,N^3-bis(4-methylpyridin-2-yl)benzene-1,3-disulfonamide (3b). Brown crystals, m.p. 264—266 °C. Found (%): C, 43.31; H, 3.47; N, 11.31. $C_{18}H_{17}BrN_4O_4S_2$. Calculated (%): C, 43.47; H, 3.45; N, 11.26. M 497.39. IR, ν/cm^{-1}: 3227 (N—H); 1633 (C=N); 1612, 1514 (C_{arom}—C_{arom}); 1341, 1304, 1158, 1143 (SO_2); 1275; 1244; 1185; 1093; 1044; 1024; 995; 976; 943; 893; 834; 804; 739; 712; 676; 648; 618; 598, 582; 567. ^{1}H NMR (400 MHz), δ: 2.19 (s, 3 H, Me); 2.26 (s, 3 H, CH_3); 6.64—6.72 (m, 2 H, $H(5)_{Py}$); 6.97 (d, 1 H, $H(3)_{Py}$, ^4J = 1.7 Hz); 7.05 (d, 1 H,

$H(3)_{Py}$, ^4J = 1.7 Hz); 7.74 (d, 1 H, $H(6)_{Py}$, ^3J = 6.2 Hz); 7.79 (d, 1 H, $H(6)_{Py}$, ^3J = 6.2 Hz); 7.83—7.91 (m, 2 H, H(3), H(4)); 8.49 (d, 1 H, H(6), ^4J = 1.7 Hz); 12.5—13.5 (br.s, 2 H, SO_2NH). MS (ESI), *m/z* (I_{rel} (%)): 498 $[M]^+$ (21), 497 $[M]^+$ (100), 495 $[M]^+$ (89), 415 (6), 190 (5), 113 (3).

4-Chloro-*N*^{1},*N*^{3}-bis(4-methylpyridin-2-yl)benzene-1,3-disulfonamide (3c). Light brown crystals, m.p. 276—278 °C. Found (%): C, 47.60; H, 3.77; N, 12.42. $C_{18}H_{17}ClN_4O_4S_2$. Calculated (%): C, 47.73; H, 3.78; N, 12.37. M 452.93. IR, ν/cm^{-1}: 3229 (N—H); 1631 (C=N); 1612, 1517 (C_{arom}—C_{arom}); 1340, 1306, 1159, 1144 (SO_2); 1275; 1244; 1184; 1097; 1038; 996; 977; 945; 896; 836; 803; 740; 718; 680; 649; 626; 598, 583; 568. ^{1}H NMR (400 MHz), δ: 2.19 (s, 3 H, Me); 2.26 (s, 3 H, CH_3); 6.64—6.72 (m, 2 H, $H(5)_{Py}$); 6.99 (d, 1 H, $H(3)_{Py}$, ^4J = 1.7 Hz); 7.05 (d, 1 H, $H(3)_{Py}$, ^4J = 1.7 Hz); 7.69 (d, 1 H, H(3), ^3J = 8.2 Hz); 7.74 (d, 1 H, $H(6)_{Py}$, ^3J = 6.2 Hz); 7.79 (d, 1 H, $H(6)_{Py}$, ^3J = 6.2 Hz); 7.96 (dd, 1 H, H(4), ^3J = 6.2 Hz, ^3J = 1.7 Hz); 8.48 (d, 1 H, H(6), ^4J = 1.7 Hz); 12.8—13.4 (br.s, 2 H, SO_2NH). MS (ESI), *m/z* (I_{rel} (%)): 454 $[M]^+$ (9), 453 $[M]^+$ (43), 451 $[M]^+$ (100), 416 (4), 190 (5), 113 (3).

Methyl 4-chloro-3-[(4-methylpyridin-2-yl)sulfamoyl]benzoate (3d). Light beige crystals, m.p. 236—238 °C. Found (%): C, 49.52; H, 3.83; N, 8.18. $C_{14}H_{13}ClN_2O_4S$. Calculated (%): C, 49.34; H, 3.85; N, 8.22. M 340.78. IR, ν/cm^{-1}: 3065 (C_{arom}—H); 1732 (C=O); 1609, 1592, 1516 (C_{arom}—C_{arom}); 1303, 1152 (SO_2); 1241 (C–O); 1037; 894; 803; 757; 738; 708; 678; 650; 601. ^{1}H NMR (400 MHz), δ: 2.26 (s, 1 H, Me); 3.90 (s, 3 H, CO_2CH_3); 6.68 (dd, 1 H, $H(5)_{Py}$, ^3J = 6.2 Hz, ^4J = 1.8 Hz); 7.06 (d, 1 H, $H(3)_{Py}$, ^4J = 1.8 Hz); 7.72 (d, 1 H, H(1), ^3J = 8.3 Hz); 7.77 (d, 1 H, $H(6)_{Py}$, ^3J = 6.2 Hz); 8.05 (dd, 1 H, H(4), ^3J = 8.3 Hz, ^4J = 2.1 Hz); 8.60 (d, 1 H, H(4), ^4J = 2.1 Hz); 12.8—13.3 (br.s, 1 H, SO_2NH). MS (ESI), *m/z* (I_{rel} (%)): 341 $[M]^+$ (39), 340 $[M]^+$ (19), 339 $[M]^+$ (100), 173 (5).

4-Bromo-3-[(4-methylpyridin-2-yl)sulfamoyl]benzamide (3e). Light beige crystals, m.p. 297—299 °C. Found (%): C, 42.33; H, 3.28; N, 11.39. $C_{13}H_{12}BrN_3O_3S$. Calculated (%): C, 42.17; H, 3.27; N, 11.35. M 370.22. IR, ν/cm^{-1}: 3402, 3313, 3244 ($CONH_2$, SO_2NH), 3086 (C_{arom}—H); 1690 (C=O); 1625, 1553 (NH_2); 1585, 1516 (C_{arom}—C_{arom}); 1379, 1158, 1143, 1122 (SO_2); 1346; 1292; 1253; 1186; 1095; 1002; 978; 946; 894; 827; 742; 708; 700; 653; 594; 576. ^{1}H NMR (400 MHz), δ: 2.25 (s, 3 H, CH_3); 6.66 (dd, 1 H, $H(5)_{Py}$, ^3J = 6.2 Hz, ^4J = 0.5 Hz); 7.05 (d, 1 H, $H(3)_{Py}$, ^4J = 0.5 Hz); 7.56 (s, 1 H, $CONH_2$); 7.75 (d, 1 H, $H(6)_{Py}$, ^3J = 6.2 Hz); 7.83 (d, 1 H, H(3), ^3J = 8.1 Hz); 7.87 (dd, 1 H, H(4), ^3J = 8.1 Hz, ^4J = 1.7 Hz); 8.25 (s, 1 H, $CONH_2$); 8.59 (d, 1 H, H(6), ^4J = 1.7 Hz); 12.95 (br.s, 1 H, SO_2NH). MS (ESI), *m/z* (I_{rel} (%)): 371 $[M]^+$ (14), 370 $[M]^+$ (100), 369 $[M]^+$ (13).

4-Chloro-3-[(5-chloropyridin-2-yl)sulfamoyl]benzamide (3f). Light beige crystals, m.p. 242—244 °C. Found (%): C, 41.75; H, 2.63; N, 12.08. $C_{12}H_9Cl_2N_3O_4S$. Calculated (%): C, 41.63; H, 2.62; N, 12.14. M 346.19. IR, ν/cm^{-1}: 3470, 3374, 3199 ($CONH_2$, SO_2NH); 1678 (C=O); 1630 (NH_2); 1599 (C_{arom}—C_{arom}); 1527 (N—H); 1377, 1152, 1141 (SO_2); 1294; 1278; 1248; 1237; 1124; 1105; 1039; 979; 930; 904; 847; 795; 756; 712; 699; 679; 628; 587. ^{1}H NMR (400 MHz), δ: 7.05 (d, 1 H, $H(3)_{Py}$, ^3J = 8.8 Hz); 7.66 (s, 1 H, $CONH_2$); 7.72 (d, 1 H, H(3), ^3J = 8.3 Hz); 7.81 (dd, 1 H, $H(4)_{Py}$, ^3J = 8.8 Hz, ^4J = 2.6 Hz); 8.08 (dd, 1 H, H(4), ^3J = 8.3 Hz, ^4J = 2.1 Hz); 8.11 (d, 1 H, $H(6)_{Py}$, ^4J = 2.6 Hz); 8.30 (s, 1 H, $CONH_2$); 8.60 (d, 1 H, H(6), ^4J = 2.1 Hz); 11.89 (br.s, 1 H, SO_2NH). MS (ESI), *m/z* (I_{rel} (%)): 346 $[M]^+$ (16), 347 $[M]^+$ (71), 345 $[M]^+$ (100), 235 (10), 218 (5), 113 (5).

***N*-(4-Methylpyridin-2-yl)-2,4,5-trichlorobenzene-1-sulfonamide (3g).** White crystals, m.p. 287—290 °C. Found (%): C, 40.90; H, 2.59; N, 7.99. $C_{12}H_9Cl_3N_2O_2S$. Calculated (%): C, 40.99; H, 2.58; N, 7.97. M 351.64. IR, ν/cm^{-1}: 3238 (N—H); 1634 (C=N); 1614, 1515 (C_{arom}—C_{arom}); 1326, 1150 (SO_2); 1274; 1253; 1183; 1110; 1067; 1046; 1002; 978; 946; 896; 867; 822; 798; 744; 732; 695; 686; 649; 614; 588; 561. ^{1}H NMR (400 MHz), δ: 6.72 (d, 1 H, $H(5)_{Py}$, ^3J = 5.9 Hz); 7.09 (s, 1 H, $H(3)_{Py}$); 7.79 (d, 1 H, $H(6)_{Py}$, ^3J = 5.9 Hz); 7.97 (s, 1 H, H(4)); 8.21 (s, 1 H, H(6)). MS (ESI), *m/z* (I_{rel} (%)): 351 $[M]^+$ (99), 349 $[M]^+$ (100).

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Received January 21, 2016;
in revised form March 28, 2016