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# A new series of seven-membered cyclic sulfamides containing thiophene or pyridine units

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**ABSTRACT**

*A new series of 1,4,3,5-oxathiadiazepanes 4, 4-dioxydes containing thiophene or pyridine ring have been synthesized by the reactions of N'-benzyl-N-(2-hydroxyethyl)-sarcosine or proline sulfamide with thiophencarboxaldehyde or pyridinecarboxaldehyde in a cycolodehydration reaction through two methods.*

**Key words:** Cyclic sulfamide; Oxathiadiazepane; Thiophene; Pyridine.

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## INTRODUCTION

Heterocycles are important structural units found in a wide range of biologically active compounds [1-3]. There have been many calls for the synthesis of novel heterocyclic systems to be used as building blocks for the next generation of pharmaceuticals [4-7]. Recently, a variety of aromatic sulfides [8, 9] and sulfones [10-13] have been shown to possess anti-HIV activity. In addition, Sulfonamide derivatives have been also reported to show substantial antitumor and anti-HIV activities [14-17]. We reported in previous work the synthesis of certain sultams [18-21] and substituted 1,4,3,5-oxathiadiazepanes-4,4-dioxides [22], so we aimed to continue the previous syntheses in this work. Substituted aminoalcohol derivative of sarcosine or proline was refluxed with pyridinecarboxaldehyde in toluene at reflux, or condensed with thiophencarboxaldehyde in dichloromethane in a reaction of cycolodehydratation.

## MATERIALS AND METHODS

*General*

All commercial chemicals and solvents were used as received. Melting points were determined in open tubes on a Büchi apparatus and are uncorrected. Microanalyses were performed in the Microanalysis Laboratory of ENSCM (Montpellier). $^{1}H$ and $^{13}C$-Nuclear Magnetic Resonance spectra were determined on a Brüker AC 250 spectrometre. Chemical shifts are recorded in ppm (δ) and coupling constants in Hertz, relative to tetramethylsilane used as internal standard. Multiplicity is indicated as s (singlet), d (doublet), q (quadruplet), m (multiplet) and combinations of these signals. Fast-atom bombardment mass spectra (FAB) were recorded in positive or negative mode with glycerol (G), thioglycerol (GT), or 3-nitrobenzylalcohol (NOBA) as matrix. Optical rotations for solutions in $CHCl_3$ were measured with a POLAX model 2L digital polarimeter. All reactions were monitored by thin Layer Chromatography (TLC) on silica gel Merck 60 F254 precoated aluminium plates, developed by spraying with ninhydrin solution. Column chromatography was performed using silica gel 60 (203-400 mesh).

*General procedure for the preparation of 1,4,3,5-oxathiadiazepanes 4,4-dioxydes* ***1b-6b***
Amino alcohol **1a** or **2a** (0.01 mol) was refluxed separately with an equimolar amount of pyridinecarboxaldehyde (0.01 mol ) in dry toluene (30 ml). When no more starting material could be detected on TLC (4h-6h), the solvent was evaporated off and the residual oil crystallized on treatment with $Et_2O$. The crystalline product was filtred off and recrystallized from hexane.

*2-(4-pyridyl), $N^3$-benzyl, $N^5$-methyl 1,4,3,5-oxathiadiazepane 4,4-dioxyde (**1b**)*: Green powder; Yield = 48%; TLC: Rf = 0.60 (hexane/$CH_2Cl_2$ 1:1); mp = 93°C; $^1$H-NMR ($CDCl_3$) δ ppm: 8.70 (d, 2H, J = 4.60 Hz, pyr); 7.44 (d, 2H, J = 4.62 Hz, pyr); 7.27 (m, 5H, Ar-ph); 6.35(s, 1H, CH*); 4.33 (t, 2H, $CH_2O$); 4.20 and 4.25 (2d, 1H, J = 15.75 Hz and 1H, J = 15.80 Hz, $CH_2$-ph); 3.33 (t, 2H, $CH_2$-N); 2.93 (s, 3H, $CH_3$-N); $^{13}$C-NMR($CDCl_3$) δ ppm: 37.77; 49.70; 52.75; 68.01; 86.89; 125; 128; 148; M.S: (ESI$^+$): 356 $[M+Na]^+$; M = 333; Anal.Calcd for $C_{16}H_{19}O_3N_3S$: C, 57.63; H, 5.74; N, 12.60; S, 9.61; found: C, 57.70; H, 5.80; N, 12.58; S, 9.59.

*2-(3-pyridyl), $N^3$-benzyl, $N^5$-methyl 1,4,3,5-oxathiadiazepane 4,4-dioxyde (**2b**)*: Green powder; Yield = 40%; TLC: Rf = 0.60 (hexane/$CH_2Cl_2$ 1:1); mp = 96°C; $^1$H-NMR ($CDCl_3$) δ ppm: 8.72 (s, 1H, pyr); 8.52 (d, 1H, pyr); 7.83 (d, 1H, pyr); 7.34 (t, 1H, pyr); 7.25 (m, 5H, Ar-ph); 6.33 (s, 1H, CH*); 4.32 (t, 2H, $CH_2O$); 4.15 and 4.25 (2d, 1H, J = 15.70 Hz and 1H, J = 17.75 Hz, $CH_2$-ph); 3.32 (t, 2H, $CH_2$-N); 2.93 (s, 3H, $CH_3$-N); $^{13}$C-NMR($CDCl_3$) δ ppm: 37.78; 49.70; 52.77; 68; 86.90; 125; 128; 135; 147; 150; M.S: (ESI$^+$): 356 $[M+Na]^+$; M = 333; Anal.Calcd for $C_{16}H_{19}O_3N_3S$: C, 57.63; H, 5.74; N, 12.60; S, 9.61; found: C, 57.72; H, 5.75; N, 12.33; S, 9.20.

*2-(2-pyridyl), $N^3$-benzyl, $N^5$-methyl 1,4,3,5-oxathiadiazepane 4,4-dioxyde (**3b**)*: Green powder; Yield = 37%; TLC: Rf = 0.60 (hexane/$CH_2Cl_2$ 1:1); mp = 147°C; $^1$H-NMR ($CDCl_3$) δ ppm: 8.69 (d, 1H, J = 4.60 Hz, pyr); 7.84 (t, 1H, J = 7.80 Hz, pyr); 7.52 (d, 1H, J = 7.80 Hz, pyr); 7.27 (t, 1H, J = 5.95 Hz, pyr); 7.23 (m, 5H, Ar); 6.30 (s, 1H, CH*); 4.35 (t, 2H, $CH_2O$); 4.0 and 4.2 (2d, 1H, J = 15.65 Hz and 1H, J = 15,70 Hz, $CH_2$-ph); 3.31 (t, 2H, $CH_2$-N); 2.93 (s, 3H, $CH_3$-N). $^{13}$C-NMR($CDCl_3$) δ ppm: 37.79; 49.72; 52.79; 68.01; 86.90; 123; 127; 128; 136; 148; M.S: (ESI$^+$): 356 $[M+Na]^+$; M = 333; Anal.Calcd for $C_{16}H_{19}O_3N_3S$: C, 57.63; H, 5.74; N, 12.60; S, 9.61; found: C, 57.75; H, 5.84; N, 12.28; S, 9.27.

*2-(4-pyridyl), $N^3$-benzyl, ($N^{5,6}$)-trimethylene 1,4,3,5-oxathiadiazepane 4,4-dioxide (**4b**)*: Green powder; Yield = 50%; TLC: Rf = 0.66 (hexane/$CH_2Cl_2$ 1:1); mp = 98°C; $^1$H-NMR ($CDCl_3$) δ ppm: 1.92 (m, 4H, $CH_{2\beta}$ et $CH_2\gamma$); 3.62 (m, 2H, $CH_2$-N); 3.84 (m, 2H, $CH_2O$); 4.00 (m, 1H, $C_2H$*); 4.43 (s, 2H, $CH_2$-ph); 6.40 (s, 1H, $C_1H$*); 8.50 (d, 2H, J = 4.56 Hz, pyr); 7.36 (d, 2H, J = 4.58 Hz, pyr); 7.25 (m, 5H, Ar-ph); $^{13}$C-NMR($CDCl_3$) δ ppm: 24.75; 28.90; 41; 48.20; 59; 72.81; 98.97; 125; 128; 148; M.S: (NOBA, FAB>0): 360 $[M+H]^+$, M = 359; Anal.Calcd for $C_{18}H_{21}O_3N_3S$: C, 60.14; H, 5.88; N, 11.69; S, 8.92; found: C, 60.18; H, 5.90; N, 11.66; S, 8.89.

*2-(3-pyridyl), $N^3$-benzyl, ($N^{5,6}$)-trimethylene 1,4,3,5-oxathiadiazepane 4,4-dioxide (**5b**)*: Green powder; Yield = 41%; TLC: Rf = 0.66 (hexane/$CH_2Cl_2$ 1:1); mp = 104°C; $^1$H-NMR ($CDCl_3$) δ ppm: 1.92 (m, 4H, $CH_{2\beta}$ et $CH_2\gamma$); 3.61 (m, 2H, $CH_2$-N); 3.83 (m, 2H, $CH_2O$); 4.00 (m, 1H, $C_2H$*); 4.41 (s, 2H, $CH_2$-ph); 6.41 (s, 1H, $C_1H$*); 6.68 (s, 1H, pyr); 8,47 (d, 1H, pyr); 7.78 (d, 1H, pyr); 7.31 (t, 1H, pyr); 7.24 (m, 5H, Ar-ph); $^{13}$C-NMR($CDCl_3$) δ ppm: 24.76; 28.90; 41.01; 48.18; 59; 72.80; 98.95; 125; 128; 135; 147; 150; M.S: (NOBA, FAB>0): 360 $[M+H]^+$, M = 359; Anal.Calcd for $C_{18}H_{21}O_3N_3S$: C, 60.14; H, 5.88; N, 11.69; S, 8.92; found: C, 60.30; H, 6.12; N, 10.56; S, 8.24.

*2-(2-pyridyl), $N^3$-benzyl, ($N^{5,6}$)-trimethylene 1,4,3,5-oxathiadiazepane 4,4-dioxide (**6b**)*: Green powder; Yield = 35%; TLC: Rf = 0.66 (hexane/$CH_2Cl_2$ 1:1); mp = 152°C; $^1$H-NMR ($CDCl_3$) δ ppm: 1.93 (m, 4H, $CH_{2\beta}$ et $CH_2\gamma$); 3.64 (m, 2H, $CH_2$-N); 3.85 (m, 2H, $CH_2O$); 4.02 (m, 1H, $C_2H$*); 4.45 (s, 2H, $CH_2$-ph); 6.45 (s, 1H, $C_1H$*); 8.65 (d, 1H, J = 4.58 Hz, pyr); 7.78 (t, 1H, J = 7.78 Hz, pyr); 7.49 (d, 1H, J = 7.78 Hz, pyr); 7.25 (t, 1H, J = 5.95 Hz, pyr); 7.20 (m, 5H, Ar-ph); $^{13}$C-NMR($CDCl_3$) δ ppm: 24.75; 28.91; 41.01; 48.20; 59; 72.81; 98.95; 123; 127; 128; 136; 148; M.S: (NOBA, FAB>0): 360 $[M+H]^+$, M = 359; Anal.Calcd for $C_{18}H_{21}O_3N_3S$: C, 60.14; H, 5.88; N, 11.69; S, 8.92; found: C, 60.33; H, 6.18; N, 10.43; S, 8.19.

*General procedure for the preparation of 1,4,3,5-oxathiadiazepanes 4,4-dioxydes* ***7b-12b***
Compounds **1a** and **2a** (0.01 mol) were dissolved separately in 25ml of dichloromethane, and the thiophenecaboxaldehyde (0.01 mol) was added. A drop of concentrated sulfuric acid was also added, and stirred the reaction mixture for 3h at room temperature. The reaction mixture was washed with a 5% solution of sodium bicarbonate, water and then with brine. The organic layer was dried over anhydrous sodium sulfate, and evaporated under reduced pressure on a rotary evaporator. The residue was purified by column chromatography eluting with hexane/dichloromethane (2:1) to give the 1,4,3,5-oxathiadiazepanes 4,4-dioxydes.

*2-(2-thiophenyl), $N^3$-benzyl, $N^5$-methyl 1,4,3,5-oxathiadiazepane 4,4-dioxyde (**7b**)*: Red powder; Yield = 64%; TLC: Rf = 0.40 (hexane/$CH_2Cl_2$ 2:1); mp = 79°C; $^1$H-NMR ($CDCl_3$) δ ppm: 7.27 (m, 5H, ph); 7.14 (d, 1H, J = 4.47 Hz,

thio); 6.87 (t, 1H, J = 4.45 Hz, thio); 6.82 (d, 1H, J = 3.6 Hz, thio); 6.50 (s, 1H, CH*); 4.40 (t, 2H, $CH_2$-O); 4.10 and 4.25 (2d, 1H, J = 15.80 Hz and 1H, J = 15.83 Hz, $CH_2$-ph); 3.35 (t, 2H, $CH_2$-N); 2.95 (s, 3H, $CH_3$-N); $^{13}$C-NMR($CDCl_3$) δ ppm: 37.75; 49.66; 52.73; 67.95; 87.47; 126; 128; M.S: ($ESI^+$): 361 $[M+Na]^+$; M = 338; Anal.Calcd for $C_{15}H_{18}O_3N_2S_2$: C, 53.23; H, 5.36; N, 8.27; S, 18.97; found: C, 53.25; H, 5.50; N, 8.10; S, 19.00.

*2-(5-ethyl, 2-thiophenyl), $N^3$-benzyl, $N^5$-methyl 1,4,3,5-oxathiadiazepane 4,4-dioxyde (**8b**)*: light-brown oil; Yield = 72%; TLC: Rf = 0.43 (hexane/$CH_2Cl_2$ 5:1); mp = oil; $^1$H-NMR ($CDCl_3$) δ ppm: 7.25 (m, 5H, ph); 6.68 (d, 1H, J = 3.85 Hz, thio); 6.70 (d, 1H, J = 3.85 Hz, thio); 6.48 (s, 1H, CH*); 4.99 (t, 2H, $CH_2$-O); 4.0 and 4.15 (2d, 1H, J = 15.80Hz and 1H, J = 15.82 Hz, $CH_2$-ph); 3.33 (t, 2H, $CH_2$-N); 3.0 (q, 2H, $CH_2$-thio); 2.93 (s, 3H, $CH_3$-N); 2.65 (t, 3H, C**H$_3$**-$CH_2$-thio); $^{13}$C-NMR($CDCl_3$) δ ppm: 20.3; 29.5; 37.76; M.S: ($ESI^+$): 389 $[M+Na]^+$; M = 366; Anal.Calcd for $C_{17}H_{22}O_3N_2S_2$: C, 55.71; H, 6.05; N, 7.64; S, 17.49; found: C, 55.68; H, 5.98; N, 7.68; S, 17.54.

*2-(3-thiophenyl), $N^3$-benzyl, $N^5$-methyl 1,4,3,5-oxathiadiazepane 4,4-dioxyde (**9b**)*: Brown-red powder; Yield = 63%; TLC: Rf = 0.40 (hexane/$CH_2Cl_2$ 2:1); mp = 118°C; $^1$H-NMR ($CDCl_3$) δ ppm: 7.28 (m, 5H, ph); 7.18 (d, 1H, J = 6.00 Hz, thio); 6.89 (d, 1H, J = 6.00 Hz, thio); 6.84 (s, 1H, thio); 6.60 (s, 1H, CH*); 4.45 (t, 2H, $CH_2O$); 4.15 and 4.30 (2d, 1H, J = 15.90 Hz and 1H, J = 16.00 Hz, $CH_2$-ph); 3.38 (t, 2H, $CH_2$-N); 2.96 (s, 3H, $CH_3$-N); $^{13}$C-NMR($CDCl_3$) δ ppm: 37.80; 49.68; 52.75; 68; 87.53; 124; 128; 129; 130; M.S: ($ESI^+$): 361 $[M+Na]^+$; M = 338; Anal.Calcd for $C_{15}H_{18}O_3N_2S_2$: C, 53.23; H, 5.36; N, 8.27; S, 18.97; found: C, 53.20; H, 5.60; N, 7.80; S, 18.70.

*2-(2-thiophenyl), $N^3$-benzyl, ($N^{5,6}$)-trimethylene 1,4,3,5-oxathiadiazepane 4,4-dioxide (**10b**)*: Red powder; Yield = 65%; TLC: Rf = 0.42 (hexane/$CH_2Cl_2$ 2:1); mp = 105°C; $^1$H-NMR ($CDCl_3$) δ ppm: 1.85 (m, 4H, $CH_{2\beta}$ and $CH_2\gamma$); 3.54 (m, 2H, $CH_2$-N); 3.75 (m, 2H, $CH_2O$); 3.93 (m, 1H, $C_2H$*); 4.30 (s, 2H, $CH_2$ph); 6.48 (s, 1H, $C_1H$*); 6.80 (d, 1H, J = 3.7 Hz, thio); 6.85 (t, 1H, J = 4.40 Hz, thio); 7.10 (d, 1H, J = 4.42 Hz, thio); 7.25 (m, 5H, Ar-ph); $^{13}$C-NMR($CDCl_3$) δ ppm: 24.78; 28.90; 41; 48.15; 59; 72.80; 89.95; 126; 128; M.S: (NOBA, FAB>0): 365 $[M+H]^+$, M = 364; Anal.Calcd for $C_{17}H_{20}O_3N_2S_2$: C, 56.02; H, 5.53; N, 7.68; S, 17.59; found: C, 56.06; H, 5.56; N, 7.70; S, 17.51.

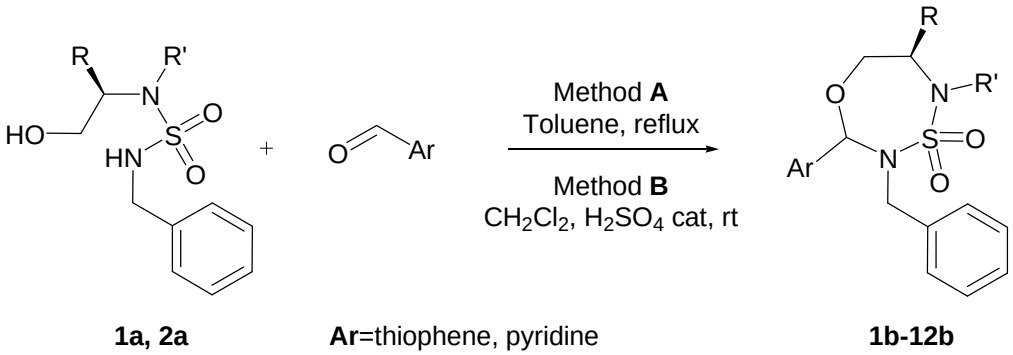
*2-(5-ethyl, 2-thiophenyl), $N^3$-benzyl, ($N^{5,6}$)-trimethylene 1,4,3,5-oxathiadiazepane 4,4-dioxide (**11b**)*: light-brown oil; Yield = 75%; TLC: Rf = 0.45 (hexane/$CH_2Cl_2$ 5:1); mp = oil; $^1$H-NMR ($CDCl_3$) δ ppm: 1.87 (m, 4H, $CH_{2\beta}$ and $CH_2\gamma$); 3.75 (m, 2H, $CH_2$-N) ; 3.78 (m, 2H, $CH_2O$) ; 3.95 (m, 1H, $C_2H$*) ; 2.62 (t, 3H, $CH_3$-$CH_2$-thio) ; 3.15 (q, 2H, $CH_2$-thio) ; 4.20 (s, 2H, $CH_2$-ph) ; 6.50 (s, 1H, $C_1H$*); 6.68 (d, 1H, J = 4.30 Hz, thio); 6.65 (d, 1H, J = 4.30 Hz, thio); 7.25 (m, 5H, Ar-ph); $^{13}$C-NMR($CDCl_3$) δ ppm: 20.5; 24.79; 28.92; 29.60; 41.01; 48.17; 57.02; 72.85; 89.93; 126; 128; M.S: (NOBA, FAB>0): 393 $[M+H]^+$, M = 392; Anal.Calcd for $C_{19}H_{24}O_3N_2S_2$: C, 58.13; H, 6.16; N, 7.13; S, 16.33; found: C, 58.10; H, 6.12; N, 7.10; S, 16.35.

*2-(3-thiophenyl), $N^3$-benzyl, ($N^{5,6}$)-trimethylene 1,4,3,5-oxathiadiazepane 4,4-dioxide (**12b**)*: Brown-red powder; Yield = 66%; TLC: Rf = 0.42 (hexane/$CH_2Cl_2$ 2:1); mp = 135°C; $^1$H-NMR ($CDCl_3$) δ ppm: 1.86 (m, 4H, $CH_{2\beta}$ and $CH_2\gamma$); 3.55 (m, 2H, $CH_2$-N); 3.77 (m, 2H, $CH_2O$); 3.94 (m, 1H, $C_2H$*); 4.10 (s, 2H, $CH_2$-ph): 6.48 (s, 1H, CH*); 6.82 (s, 1H, thio); 6.86 (d, 1H, J = 6.00 Hz, thio); 7.15 (d, 1H, J = 6.00 Hz, thio); 7.25 (m, 5H, ph); $^{13}$C-NMR($CDCl_3$) δ ppm: 24.73; 28.88; 41.01; 48.20; 59; 72.82; 90; 124; 128; 129; 130; M.S: (NOBA, FAB>0): 365 $[M+H]^+$, M = 364; Anal.Calcd for $C_{17}H_{20}O_3N_2S_2$: C, 56.02; H, 5.53; N, 7.68; S, 17.59; found: C, 55.82; H, 5.48; N, 7.45; S, 17.16.

## RESULTS AND DISCUSSION

Twelve new oxathiadiazepanes 4,4-dioxides containing thiophene or pyridine unit were prepared in moderate to good yields starting from the same precursors **1a** or **2a** through two methods **A** and **B** (Scheme **1**). Compounds **1a-2a** were synthesized from tert-butyloxycarbonylsulfamides in three steps alkylation under Mitsunobu conditions [23-26] using benzylic alcohol, selective cleavage of the *t*-butyloxycarbonyl protective group and reduction with $NaBH_4$ as previously described [22].

The reaction of substituted aminoalcohols (*N'*-benzyl-*N*-(2-chloroethyl)-proline or sarcosine sulfamides **1a** or **2a** with pyridinecarboxaldehydes have been carried out in molar ratio 1:1 in refluxing toluene for 4h-6h (Method **A**, Table **1**), whereby it afforded oxathiadiazepanes 4,4-dioxides containing pyridine unit **1b-6b** in moderate yield. Compounds **7b-12b** were synthesized via cycolodehydration reaction of thiophencarboxaldehydes with compounds **1a** or **2a** in dichloromethane at room temperature (Method **B**, Table **1**), The yields of compounds **1b-12b** are listed in (Table **1**).




**1a, 2a** **Ar**=thiophene, pyridine **1b-12b**

**Scheme 1: Synthesis of substituted oxathiadiazepanes 4,4-dioxides.**

**Table 1: The reaction of (*N'*-benzyl-*N*-(2-chloroethyl)-proline or sarcosine sulfamides (1a, 2a) with pyridinecarboxaldehydes or thiophencarboxaldehydes.**

| Entry | Substrate | Ar | Method[a] | Product | Yield (%) |
|---|---|---|---|---|---|
| 1 | **1a**, R=H, R'=$CH_3$ | 4-pyridyl | A | **1b** | 48 |
| 2 | **1a**, R=H, R'=$CH_3$ | 3-pyridyl | A | **2b** | 40 |
| 3 | **1a**, R=H, R'=$CH_3$ | 2-pyridyl | A | **3b** | 37 |
| 4 | **2a**, R,R'=$(CH_2)_3$ | 4-pyridyl | A | **4b** | 50 |
| 5 | **2a**, R,R'=$(CH_2)_3$ | 3-pyridyl | A | **5b** | 41 |
| 6 | **2a**, R,R'=$(CH_2)_3$ | 2-pyridyl | A | **6b** | 35 |
| 7 | **1a**, R=H, R'=$CH_3$ | 2-thiophenyl | B | **7b** | 64 |
| 8 | **1a**, R=H, R'=$CH_3$ | 5-ethyl-2-thiophenyl | B | **8b** | 72 |
| 9 | **1a**, R=H, R'=$CH_3$ | 3-thiophenyl | B | **9b** | 63 |
| 10 | **2a**, R,R'=$(CH_2)_3$ | 2-thiophenyl | B | **10b** | 65 |
| 11 | **2a**, R,R'=$(CH_2)_3$ | 5-ethyl-2-thiophenyl | B | **11b** | 75 |
| 12 | **2a**, R,R'=$(CH_2)_3$ | 3-thiophenyl | B | **12b** | 66 |

[a]*Method A: Toluene, reflux. Method B: $CH_2Cl_2$, $H_2SO_4$ cat, rt.*

In the $^1$H-NMR ($CDCl_3$) spectra the asymmetric carbon proton of oxathiadiazepanes 4,4-dioxides derivatives showed for pyridine derivatives **1b-6b** and thiophene derivatives **7b-12b** a singlet peak around 6.30-6.45 ppm and 6.48-6.60 ppm, respectively. The $^1$H-NMR spectrum of **7b** as an example for thiophene derivatives, **C2**, **C4**, and **C5** protons of thiophene heterocycle, appear at 7.14 ppm as doublet with coupling constants of 4.47 Hz, at 6.87 ppm as triplet with coupling constants of 4.45 Hz and at 6.82 ppm as doublet with coupling constants of 3.60 Hz, respectively. While compound **(1b)** as an example for pyridine derivatives, **C2**, **C6** and **C3**, **C5** protons of pyridine heterocycle appear at 8.70 ppm as doublet with coupling constants of 4.60 Hz and at 7.44 ppm as doublet with coupling constants of 4.62 Hz, respectively.

## CONCLUSION

In summary, we have successfully prepared via a simple strategy some new derivatives of 1,4,3,5-oxathiadiazepanes 4,4-dioxides containing thiophene or pyridine rings. The simplicity of the reaction conditions with short reaction times to obtain the pure products in high yields should make this method attractive for organic chemists. This strategy is suitable for preparing seven-membered cyclic sulfamides on a large scale and analogues for extensive biological evaluation, and structure-activity relationship study. Related work in this field is currently in progress and will be reported in due course.

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