JCRS

Journal of Chemical Reactivity and Synthesis 2024: 14(3) 210-219

Research Article

Efficient synthesis of novel [1,3,4]thiadiazino[6,5-b]quinoxaline derivatives

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ARTICLE INFO:

Received:
4 March 2025

Accepted:
25 April 2025

Available online:
18 May 2025

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ABSTRACT

Reaction of 2,3-dichloroquinoxaline with hydrazine and methylhydrazine gave 2-chloro-3-hydrazinyl quinoxaline and 2-chloro-3-(1-methylhydrazinyl) quinoxaline respectively in ethanol at room temperature. Condensation of 2-chloro-3-hydrazinyl quinoxaline and 2-chloro-3-(1-methylhydrazinyl) quinoxaline with carbon disulfide, trimethylamine and alkylhalides achieved a group of 3-(alkylsulfanyl) -1*H*-[1,3,4]thiadiazino[6,5-b]quinoxaline and 1-methyl-3-(alkylsulfanyl)-1*H*-[1,3,4]thiadiazino[6,5-b]quinoxaline respectively. Solvent effect of methanol and acetonitrile on this reaction and the spectral data is discussed.

***Keywords*:** 2,3- dichloroquinoxaline; [1,3,4]thiadiazino[6,5-b]quinoxaline; multicomponent reaction; hydrazine; methylhydrazine.

1. Introduction

Fused [1,3,4]thiadiazines are a well known class of heterocycles. Among this class, [1,3,4]thiadiazino[6,5-b]quinoxaline have attracted less attention. There are a few routes for the preparation of this valuable compounds including; ring expansion of 3-amino-2-iminothiazolo[4,5-b]quinoxaline [1] and the cyclization of *N*-alkylazinium cations or 2,3-dichloroquinoxaline with bifunctional nuclephiles such as thiohydrazides and dithizone [2−4], which the last route utilized expensive reagents for the preparation of few derivatives.

In an innovation, we have introduced alkyl 2- phenylhydrazinecarbodithiates as a suitable source for the preparation of [1,3,4] thiadiazino[6,5-b] quinoxaline [5] as shown in **Fig. 1**.

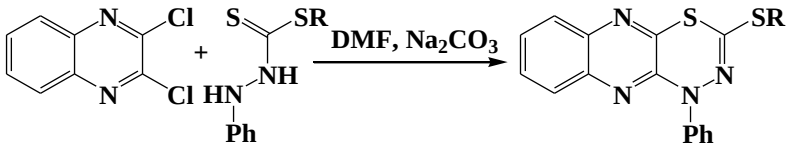


Figure 1. Condensation of alkyl 2- phenylcarbodithiates with 2,3- dichloroquinoxaline

These reagents also used for the synthesis of other fused [1,3,4]thiadiazines on the further studies [6,7]. In the present study, we report the preparation of novel [1,3,4] thiadiazino[6,5-b] quinoxaline derivatives via a multicomponent condensation.

2. Experimental

The melting points were recorded on an Electrothermal type 9100 melting point apparatus. The IR spectra were obtained on a 4300 Shimadzu Spectrometer. The ^{1}HNMR (300MHz) spectra were recorded on a Bruker AC 300 spectrometer. The mass spectra were scanned on a Varian Mat CH-7 instrument at 70 eV. Elemental analysis was obtained on a Thermo Finnigan Flash EA microanalyzer. The purity of all new compounds synthesized was tested by TLC using chloroform as mobile phase. Precursors 5a was prepared according to an earlier procedure [9] and 5b was prepared by the same procedure.

2-Chloro-3-(1-methylhydrazinyl) quinoxaline 5b:

A mixture of 2,3- dichloroquinoxaline (4 gr, 20 mmol) and methylhadrazine (1.84 gr, 40 mmol) in ethanol (100 ml) was stirred for 16 hours at room temperature. The resulting precipitate was filtered, washed with ethanol and dried in air (it was slowly decomposed at higher temperature to dark product) to obtain red powder.

Yield 3.8 g (91%), red powder, mp 195 °C to 196 °C (dec). IR spectrum, ν, cm^{-1}: 810, 2900, 2960, 3220, 3350. ^{1}H NMR spectrum, (d6-DMSO), δ, ppm (J, Hz): 3.35 (3H, s, *N*-CH_3), 4.2 (br, 2H, NH_2), 7.51 (1H, dd, J_1=J_2=7.2, C_7H), 7.62 (1H, dd, J_1=J_2=7.2, C_6H), 7.71

(1H, dd, J=7.2, C_5H), 7.82 (1H, dd, J=7.2, C_8H). ^{13}C NMR spectrum, (d6-DMSO), δ, ppm: 43.4 (*N*.CH_3), 127.5 (C_7), 128.7 (C_6), 130.9 (C_5), 131.6 (C_8), 140.1 (N_4-**C**-C_5), 141 (N_1-**C**-C_8), 144 (**C**$_3$), 145.2 (**C**$_2$).

Mass spectrum, m/z: 208 $[M]^+$ (57%), 210 $[M+2]^+$(20%). Anal. Calcd. for $C_9H_9ClN_4$: C, 51.81; H, 4.35; N, 26.85. Found: C, 52.04; H, 4.42; N, 26.62.

General Procedure for Preparation of [1,3,4]thiadiazino[6,5-b] quinoxaline 6a-j.

A mixture of 2-chloro-3-hydrazinyl quinoxaline **5a** (0.39 gr, 2 mmol) or 2-chloro-3-(1-methylhydrazinyl) quinoxaline **5b** (0.42 gr, 2mmol), carbondisulfide (0.19 gr, 2.5 mmol), appropriate alkylhalide (Iodomethane, bromoethane, 1- Bromopropane, 1- Bromobutane or Benzylbromide) (2 mmol) and triethylamine (0.2 gr, 2 mmol) in acetonitrile (20 mL) stirred for 6 hours and then heated under Nitrogen atmosphere and reflux condition for 4 hours. The resulting mixture dried by heating and recrystallized from ethanol to achieve novel [1,3,4]thiadiazino[6,5-*b*] quinoxaline derivatives **6a-j**.

3-(Methylsulfanyl)-1*H*-[1,3,4]thiadiazino[6,5-b]quinoxaline 6a:

Yield 0.35 g (70%), yellow powder, mp 125 °C, to 126 °C. IR spectrum, ν, cm^{-1}: 1570 (C=N); 2900, 2940 (CH_3); 3390 (NH). ^1H NMR spectrum, $CDCl_3$, δ, ppm (J, Hz): 2.52 (3H, s, SCH_3), 7.55 (1H, dd, J_1=J_2=7.2, C_7H), 7.68 (1H, dd, J_1=J_2=7.2, C_8H), 7.79 (1H, dd, J=7.2, C_9H), 7.91 (1H, dd, J=7.2, C_6H), 8.3 (1H, broad, NH). ^{13}C NMR spectrum, $CDCl_3$, δ, ppm: 18.2 (SCH_3), 127.9 (C_9), 128.2 (C_6), 130.9 (C_7), 131.1 (C_8), 140.1 (N_5-**C**-C_6), 141 (C_9-**C**-N_{10}), 143.9 (S_4-**C**-N_5), 144.3 (N_1-**C**-N_{10}), 154 (SCH_3-**C**-S_4). Mass spectrum, m/z: 248 [M]+. Anal. Calcd. for $C_{10}H_8N_4S_2$: C, 48.37; H, 3.25; N, 22.56; S, 25.82 Found: C, 48.45; H, 3.29; N, 22.41; S, 25.57.

1-Methyl-3-(methylsulfanyl)-1*H*- [1,3,4]thiadiazino[6,5-b]quinoxaline 6b:

Yield 0.44 g (83%), yellow powder, mp 113 °C to 114 °C. IR spectrum, ν, cm^{-1}: 1570 (C=N); 2910, 2940 (CH_3). ^{1}H NMR spectrum, $CDCl_3$, δ, ppm (J, Hz): 2.51 (3H, s, SCH_3), 3.38 (3H, s, 1-CH_3), 7.54 (1H, dd, J_1=J_2=7.2, C_7H), 7.68 (1H, dd, J_1=J_2=7.2, C_8H), 7.77 (1H, dd, J=7.2, C_9H), 7.91 (1H, dd, J=7.2, C_6H). ^{13}C NMR spectrum, $CDCl_3$, δ, ppm: 18.2 (SCH_3), 44.8 (N_1CH_3), 127.8 (C_9), 128.3 (C_6), 130.9 (C_7), 131.2 (C_8), 140.1 (N_5-**C**-C_6), 141 (C_9-**C**-N_{10}), 143.8 (S_4-**C**-N_5), 144.4 (N_1-**C**-N_{10}), 153.9 (SCH_3-**C**-S_4).

Mass spectrum, m/z: 262 [M]+. Anal. Calcd. for $C_{11}H_{10}N_4S_2$: C, 50.36; H, 3.84; N, 21.36; S, 24.44 Found: C, 50.49; H, 3.91; N, 21.25; S, 24.25.

3-(Ethylsulfanyl)-1*H*-[1,3,4]thiadiazino[6,5-b]quinoxaline 6c:

Yield 0.37 g (70%), yellow powder, mp 109 °C to 111 °C. IR spectrum, ν, cm^{-1}: 1570 (C=N); 2910, 2960 (CH_3), 3380 (NH). ^{1}H NMR spectrum, $CDCl_3$, δ, ppm (J, Hz): 1.33 (3H, t, J=19, **CH_3**CH_2S), 3.02 (2H, q, J=19, SCH_2), 7.56 (1H, dd, J_1=J_2=7.2, C_7H), 7.68 (1H, dd, J_1=J_2=7.2, C_8H), 7.78 (1H, dd, J=7.2, C_9H), 7.92 (1H, dd, J=7.2, C_6H), 8.28 (1H, broad, NH). ^{13}C NMR spectrum, $CDCl_3$, δ, ppm: 15 (SCH_2**CH_3**), 25.6 (S**CH_2**CH_3), 127.9 (C_9), 128.3 (C_6), 130.9 (C_7), 131.3 (C_8), 140.1 (N_5-**C**-C_6), 141 (C_9-**C**-N_{10}), 144 (S_4-**C**-N_5), 144.6 (N_1-**C**-N_{10}), 154.3 (SCH_3-**C**-S_4). Mass spectrum, m/z: 262 [M]+. Anal. Calcd. for $C_{11}H_{10}N_4S_2$: C, 50.36; H, 3.84; N, 21.36; S, 24.44 Found: C, 50.56; H, 3.96; N, 21.18; S, 24.19.

3-(Ethylsulfanyl) -1-methyl- 1*H*-[1,3,4]thiadiazino[6,5-b]quinoxaline 6d:

Yield 0.42 g (75%), yellow powder, mp 117 °C to 118 °C. IR spectrum, ν, cm^{-1}: 1580 (C=N); 2920, 2960 (CH_3). ^{1}H NMR spectrum, $CDCl_3$, δ, ppm (J, Hz): 1.31 (3H, t, J=19, **CH_3**CH_2S), 3.00 (2H, q, J=19, SCH_2), 3.35 (3H, s, 1-CH_3), 7.55 (1H, dd, J_1=J_2=7.2, C_7H), 7.69 (1H, dd, J_1=J_2=7.2, C_8H), 7.80 (1H, dd, J=7.2, C_9H), 7.92 (1H, dd, J=7.2, C_6H). ^{13}C NMR spectrum, $CDCl_3$, δ, ppm: 15 (SCH_2**CH_3**), 25.6 (S**CH_2**CH_3), 44.8 (N_1CH_3), 127.9 (C_9), 128.3 (C_6), 130.8 (C_7), 131.3 (C_8), 140.2 (N_5-**C**-C_6), 141 (C_9-**C**-N_{10}), 143.8 (S_4-**C**-N_5), 144.5

(N_1-**C**-N_{10}), 154.3 (SCH_3-**C**-S_4). Mass spectrum, m/z: 276 [M]+. Anal. Calcd. for $C_{12}H_{12}N_4S_2$: C, 52.15; H, 4.38; N, 20.27; S, 23.20 Found: C, 52.31; H, 4.48; N, 20.06; S, 23.03.

3-(Propylsulfanyl)-1*H*-[1,3,4]thiadiazino[6,5-b]quinoxaline 6e:

Yield 0.38 g (68%), yellow powder, mp 103 °C to 105 °C. IR spectrum, ν, cm^{-1}: 1550 (C=N); 2900, 2950 (CH_3), 3380 (NH). ^{1}H NMR spectrum, $CDCl_3$, δ, ppm (J, Hz): 1.03 (3H, t, J=19, **CH$_3$**CH_2CH_2S), 1.61 (2H, sextet, $J_1=J_2=19$, CH_3**CH$_2$**CH_2S), 3.02 (2H, t, J=19, SCH_2), 7.56 (1H, dd, $J_1=J_2=7.2$, C_7H), 7.67 (1H, dd, $J_1=J_2=7.2$, C_8H), 7.80 (1H, dd, J=7.2, C_9H), 7.90 (1H, dd, J=7.2, C_6H), 8.23 (1H, broad, NH). ^{13}C NMR spectrum, $CDCl_3$, δ, ppm: 13.6 (SCH_2CH_2**CH$_3$**), 23.2 (SCH_2**CH$_2$**CH_3), 34.4 (S **CH$_2$**CH_2CH_3), 128 (C_9), 128.4 (C_6), 130.5 (C_7), 131.3 (C_8), 140.1 (N_5-**C**-C_6), 141 (C_9-**C**-N_{10}), 143.6 (S_4-**C**-N_5), 144.4 (N_1-**C**-N_{10}), 154 (SCH_3-**C**-S_4). Mass spectrum, m/z: 276 [M]+. Anal. Calcd. for $C_{12}H_{12}N_4S_2$: C, 52.15; H, 4.38; N, 20.27; S, 23.20 Found: C, C, 52.23; H, 4.29; N, 20.14; S, 22.97.

1-Methyl-3-(propylsulfanyl)-1*H*-[1,3,4]thiadiazino[6,5-b]quinoxaline 6f:

Yield 0.46 g (79%), yellow powder, mp 121 °C to 123 °C. IR spectrum, ν, cm^{-1}: 1560 (C=N); 2910, 2950 (CH_3). ^{1}H NMR spectrum, $CDCl_3$, δ, ppm (J, Hz): 1.03 (3H, t, J=19, **CH$_3$**CH_2CH_2S), 1.60 (2H, sextet, $J_1=J_2=19$, CH_3**CH$_2$**CH_2S), 3.02 (2H, t, J=19, SCH_2), 3.34 (3H, s, 1-CH_3), 7.55 (1H, dd, $J_1=J_2=7.2$, C_7H), 7.69 (1H, dd, $J_1=J_2=7.2$, C_8H), 7.80 (1H, dd, J=7.2, C_9H), 7.92 (1H, dd, J=7.2, C_6H). ^{13}C NMR spectrum, $CDCl_3$, δ, ppm: 13.6 (SCH_2CH_2**CH$_3$**), 23.2 (SCH_2**CH$_2$**CH_3), 34.4 (S **CH$_2$**CH_2CH_3), 44.7 (N_1CH_3), 128 (C_9), 128.5 (C_6), 130.6 (C_7), 131.5 (C_8), 140 (N_5-**C**-C_6), 141 (C_9-**C**-N_{10}), 143.6 (S_4-**C**-N_5), 144.5 (N_1-**C**-N_{10}), 154.3 (SCH_3-**C**-S_4). Mass spectrum, m/z: 290 [M]+. Anal. Calcd. for $C_{13}H_{14}N_4S_2$: C, 53.77; H, 4.86; N, 19.29; S, 22.08 Found: C, 53.91; H, 4.98; N, 19.06; S, 21.85.

3-(Butylsulfanyl)-1*H*-[1,3,4]thiadiazino[6,5-b]quinoxaline 6g:

Yield 0.35 g (61%), yellow powder, mp 99 °C to 100 °C. IR spectrum, ν, cm^{-1}: 1560 (C=N); 2910, 2950 (CH_3), 3390 (NH). ^{1}H NMR spectrum, $CDCl_3$, δ, ppm (J, Hz): 0.95 (3H, t, J=19, **CH$_3$**$CH_2CH_2CH_2S$), 1.2-1.7 (4H, m, CH_3 **CH$_2$CH$_2$**CH_2S), 3.02 (2H, t, J=19, SCH_2), 7.56 (1H, dd, J_1=J_2=7.2, C_7H), 7.69 (1H, dd, J_1=J_2=7.2, C_8H), 7.80 (1H, dd, J=7.2, C_9H), 7.91 (1H, dd, J=7.2, C_6H), 8.30 (1H, broad, NH). ^{13}C NMR spectrum, $CDCl_3$, δ, ppm: 13.8 ($SCH_2CH_2CH_2$**CH$_3$**), 22.2 (S CH_2**CH$_2$CH$_2$**CH_3), 32.1 (S **CH$_2$**$CH_2CH_2CH_3$), 127.9 (C_9), 128.2 (C_6), 130.9 (C_7), 131.1 (C_8), 140.1 (N_5-**C**-C_6), 141 (C_9-**C**-N_{10}), 143.9 (S_4-**C**-N_5), 144.3 (N_1-**C**-N_{10}), 154 (SCH_3-**C**-S_4). Mass spectrum, m/z: 290 [M]+. Anal. Calcd. for $C_{13}H_{14}N_4S_2$: C, 53.77; H, 4.86; N, 19.29; S, 22.08 Found: C, 53.94; H, 5.01; N, 19.02; S, 21.93.

3-(Butylsulfanyl)-1-methyl-1*H*-[1,3,4]thiadiazino[6,5-b]quinoxaline 6h:

Yield 0.40 g (65%), yellow powder, mp 92 °C to 93 °C. IR spectrum, ν, cm^{-1}: 1560 (C=N); 2920, 2960 (CH_3). ^{1}H NMR spectrum, $CDCl_3$, δ, ppm (J, Hz): 0.94 (3H, t, J=19, **CH$_3$**$CH_2CH_2CH_2S$), 1.2-1.7 (4H, m, CH_3 **CH$_2$CH$_2$**CH_2S), 3.02 (2H, t, J=19, SCH_2), 3.31 (3H, s, 1-CH_3), 7.55 (1H, dd, J_1=J_2=7.2, C_7H), 7.69 (1H, dd, J_1=J_2=7.2, C_8H), 7.79 (1H, dd, J=7.2, C_9H), 7.92 (1H, dd, J=7.2, C_6H). ^{13}C NMR spectrum, $CDCl_3$, δ, ppm: 13.8 ($SCH_2CH_2CH_2$**CH$_3$**), 22.2 (S CH_2**CH$_2$CH$_2$**CH_3), 32.1 (S **CH$_2$**$CH_2CH_2CH_3$), 44.7 (N_1CH_3), 127.9 (C_9), 128.2 (C_6), 130.8 (C_7), 131.5 (C_8), 140.1 (N_5-**C**-C_6), 141 (C_9-**C**-N_{10}), 143.4 (S_4-**C**-N_5), 144.3 (N_1-**C**-N_{10}), 153.8 (SCH_3-**C**-S_4). Mass spectrum, m/z: 304 [M]+. Anal. Calcd. for $C_{14}H_{16}N_4S_2$: C, 55.23; H, 5.30; N, 18.40; S, 21.07 Found: C, 55.33; H, 5.45; N, 18.23; S, 20.90.

3-(Benzysulfanyl)-1*H*-[1,3,4]thiadiazino[6,5-b]quinoxaline 6i:

Yield 0.56 g (86%), orang powder, mp 161 °C to 162 °C. IR spectrum, ν, cm^{-1}: 1570 (C=N); 2900, 2960 (CH_3); 3380 (NH). ^{1}H NMR spectrum, $CDCl_3$, δ, ppm (J, Hz): 4.25 (2H, s, SCH_2), 7.4-7.7 (7H, m, aromatic), 7.79 (1H, dd, J=7.2, C_9H), 7.92 (1H, dd, J=7.2, C_6H),

8.3 (1H, broad, NH). ^{13}C NMR spectrum, $CDCl_3$, δ, ppm: 43.3 (SCH_2Ph), 127.1 (C_4 of Ph), 127.9 (C_9), 128.2 (C_6), 128.5 (C_3 of Ph), 129.4 (C_2 of Ph), 130.9 (C_7), 131.3 (C_8), 137.6 (C_1 of Ph), 140.1 (N_5-**C**-C_6), 141 (C_9-**C**-N_{10}), 143.9 (S_4-**C**-N_5), 144.3 (N_1-**C**-N_{10}), 154 (SCH_3-**C**-S_4). Mass spectrum, m/z: 324 [M]+. Anal. Calcd. for $C_{16}H_{12}N_4S_2$: C, 59.23; H, 3.73; N, 17.27; S, 19.77 Found: C, 59.41; H, 3.79; N, 17.05; S, 19.53.

3-(Benzylsulfanyl)-1-methyl-1*H*-[1,3,4]thiadiazino[6,5-b]quinoxaline 6j:

Yield 0.54 g (80%), orang powder, mp 169 °C to 170 °C. IR spectrum, ν, cm^{-1}: 1570 (C=N); 2900, 2960 (CH_3). ^{1}H NMR spectrum, $CDCl_3$, δ, ppm (J, Hz): 3.36 (3H, s, 1-CH_3), 4.25 (2H, s, SCH_2), 7.4-7.7 (7H, m, aromatic), 7.81 (1H, dd, J=7.2, C_9H), 7.92 (1H, dd, J=7.2, C_6H). ^{13}C NMR spectrum, $CDCl_3$, δ, ppm: 43 (SCH_2Ph), 45.1 (N_1CH_3), 127.1 (C_4 of Ph), 127.9 (C_9), 128.2 (C_6), 128.5 (C_3 of Ph), 129.4 (C_2 of Ph), 130.9 (C_7), 131.3 (C_8), 137.6 (C_1 of Ph), 140.1 (N_5-**C**-C_6), 141 (C_9-**C**-N_{10}), 143.9 (S_4-**C**-N_5), 144.3 (N_1-**C**-N_{10}), 154 (SCH_3-**C**-S_4). Mass spectrum, m/z: 338 [M]+. Anal. Calcd. for $C_{17}H_{14}N_4S_2$: C, 60.33; H, 4.17; N, 16.55; S, 18.95 Found: C, 60.48; H, 4.28; N, 16.39; S, 18.74.

3. Results and Discussion

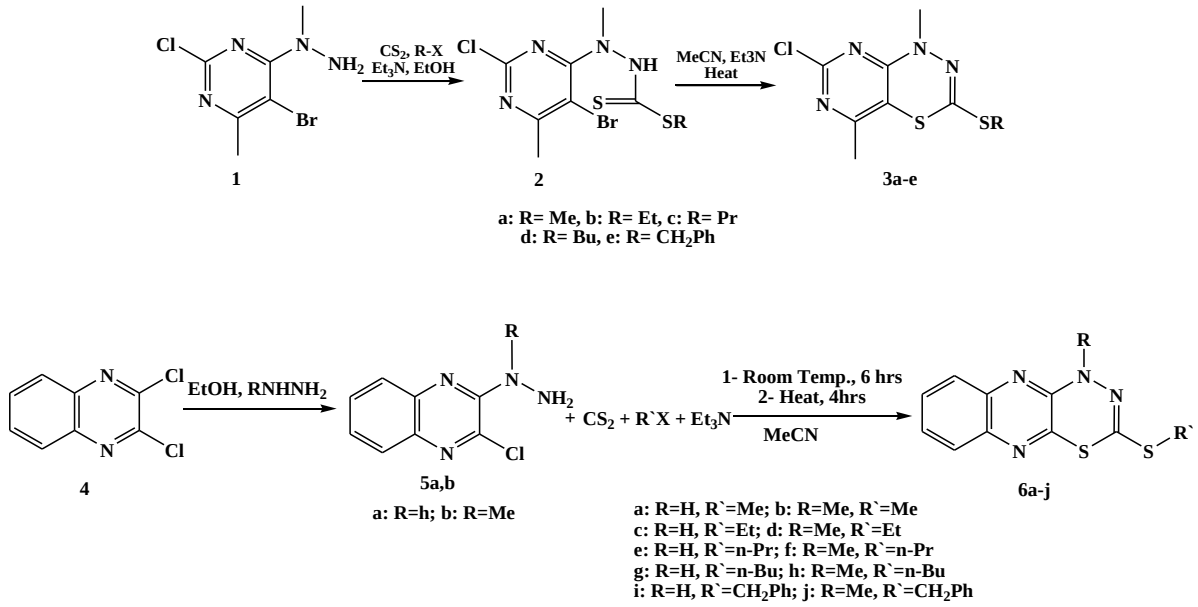
In a previous study; one pot reaction of 1-(5-bromo-2-chloro-6-methylpyrimidin-4-yl)-1-methylhydrazine **1** with carbondisulfide, alkylhalides and trimethylamine reported as an efficient rout for the synthesis of pyrimido[4,5-e][1,3,4]thiadiazine derivatives [8] as shown in **Scheme 1**.

In that route, precursors were reacted in ethanol at room temperature to produce substituted hydrazinecarbodithiates **2** and the latter compouds were heated in acetonitrile after removal of ethanol without purification to convert to final products **3a-d**. In the present study we extend that route for the synthesis of [1,3,4]thiadiazino[6,5-b] quinoxaline derivatives.

For this purpose; 2,3-dichloroquinoxaline **4** reacted with hydrazine to produce 2-chloro-3-hydrazinyl quinoxaline **5a** in ethanol at room temperature according to an earlier procedure

[9] and 2-chloro-3-(1-methylhydrazinyl) quinoxaline **5b** was prepared in the same condition. Then an equimolar mixture of **5a-b**, carbondisulfide, alkylhalides and trimethylamine stirred in acetonitrile for 6 hours and after addition of an equivalent trimethylamine, it was refluxed for 4 hours to produce novel [1,3,4]thiadiazino[6,5-*b*] quinoxaline derivatives **6a-j** in good yields as shown in **Scheme 1**.

The structure of novel derivatives **6a-j** were strongly confirmed by their spectral and microanalytical data. The IR spectra did not show the stretching vibration bands at 3450 and 3300 cm-1 (broad, NH_2) belonging to precursors **5a,b** but appeared new bands around 2900 cm^{-1} belonging to CH_2 & CH_3 groups. Products derived from **5a** showed a sharp band at 3380 cm^{-1} for the NH absorption. Mass spectra devoid the isotopic effect of chlorin atom of precursors **5a,b** in the molecular ion region and confirm its replacement by sulfur atom.



Scheme 1. Multicomponent synthesis of novel pyrimido[4,5-e][1,3,4]thiadiazine & [1,3,4]thiadiazino[6,5-b] quinoxaline derivatives

^{1}HNMR spectra also lacked of the broad NH_2 signal at δ 4.2 ppm of the precursors **5a,b** but showed expected signals assignable to aliphatic protons. For Example; IR spectra of compound **6a** showed vibration bands at 2900, 2940 and 3390 cm^{-1} due to methyl and NH groups respectively. ^{1}HNMR spectrum showed signals at δ 2.52 (s, 3H), 7.55 (dd, 1H, J_1=J_2=6Hz), 7.68 (dd, 1H, J_1=J_2=6Hz), 7.79 (dd, 1H, J=6Hz), 7.91 (dd, 1H, J=6Hz) and 8.3

(broad, 1H) ppm assignable to SCH_3, C_7H, C_8H, C_9H, C_6H and NH respectively. The molecular ions of **6a** were observed at 248 corresponding to molecular formula $C_{10}H_8N_4S_2$, which was strongly verified by microanalytical data.

These results strongly confirms the formation of [1, 3, 4]thiadiazine ring over positions 2 and 3 of the quinoxaline nucleus.

In comparison with our previous study [5]; mild condition, convenient isolation and higher yield exhibited in the present report.

4. Conclusion

In conclusion, treatment of 1-(quinoxalin-3-yl)hydrazine **5a** and 1-methyl-1-(quinoxalin-3-yl)hydrazine **5b** with carbondisulfide, alkylhalides and triethylamine in acetonitrile at room temperature and then in reflux condition is a new, convenient and general access to [1,3,4]thiadiazino[6,5-b] quinoxaline derivatives.

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