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SELENIUM HETEROCYCLE XL II [1]. SYNTHESES OF SUBSTITUTED THIAZOLO, SELENAZOLO AND 1,2,3-SELENADIAZOLOINDOLES

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Abstract

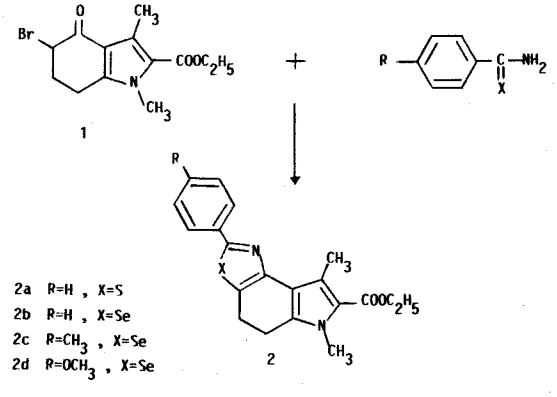
Reaction of compound **1** with thiobenzamide or substituted selenobenzamides afforded substituted pyrrolobenzothiazole or selenazoles (**2**) respectively. Selenium dioxide oxidation of the semicarbazone **4** with selenium dioxide gave 6-benzenesulfonyl-4,5-dihydro-pyrrolo [3,2-e] benzoselenadiazole (**5**).

Introduction

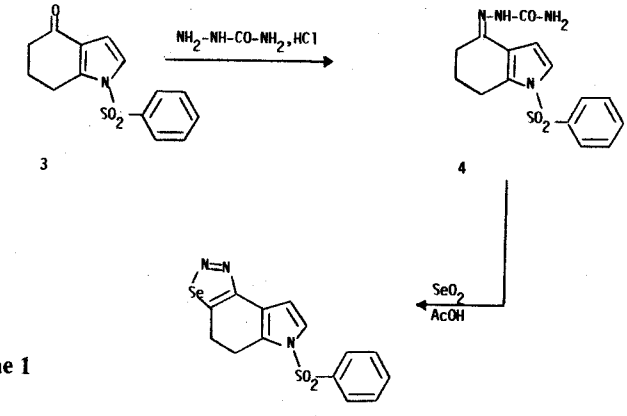
The versatile intermediate, 4-oxo-4,5,6,7-tetrahydroindole has been used for the construction of the heterocyclic ring at the 4,5-positions. The resulting tricyclic systems show good antimicrobial activities [2,3]. In view of this, we were interested in synthesizing the title compound as a possible effective drug.

Results and Discussion

The title compound could be synthesized according to Scheme 1.



Reaction of 5-bromo-2-carbethoxy-1, 3-dimethy l-4-oxo-4,5,6,7-tetrahydro-indole (**1**) [4] with thiobenzamide or substituted selenobenzamide afforded substituted pyrrolobenzothiazole or substituted pyrrolobenzoselenazole (**2**). Reaction of 1-benzenesulfonyl-4-oxo-4,5,6,7-tetrahydroindole (**3**) [5] with semicarbazide hydrochloride and sodium acetate afforded 1-benzenesulfonyl-4-oxo-4,5,6,7-tetrahydroindole semicarbazone (**4**). Selenium dioxide oxidation of compound **4** gave 6-benzenesulfonyl-4,5



Scheme 1

Keywords: Syntheses; Thiazolo; Selenazolo; 1,2,3-Selenadiazoloindoles

dihydro-pyrrolo [3,2-e] benzoselenodiazole (**5**).

The physical constants of compounds **2a-2d** are summarized in Table 1.

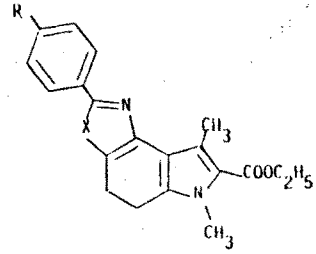


Table 1

Compound No.	R	X	Solvent for preparation	M.P.°C[a]	Yield[b]	Spectral data
2a	H	S	methanol	187-188°	80[c]	
2b	H	Se	acetone	158-160°	10	IR (KBr): ν 1680 cm^{-1} (C=0); NMR ($CDCl_3$): 7.61 (m, 5H, aromatic), 4.33 (q, 2H, CH_2), 3.83 (s, 3H, CH_3N), 3.05 (m, 4H, CH_2CH_2), 2.78 (s, 3H, CH_3) and 1.39 ppm (t, 3H, CH_3); ms: 396 (M^+)
2c	CH_3-	Se	acetone	92-93	15	IR (KBr): ν 1690 cm^{-1} (C=0); NMR ($CDCl_3$): 7.71(m, 4H, aromatic), 4.45 (q, 2H, CH_2), 3.83 (s, 3H, CH_3N), 3.10 (m, 4H, CH_2CH_2), 2.42 (s, 3H, CH_3), 2.10 (s, 3H, CH_3), and 1.47 ppm (t, 3H, CH_3); ms: 412 (M^+)
2d	CH_3O-	Se	acetone	124-125	12	IR (KBr): ν 1690 cm^{-1} (C=0); NMR ($CDCl_3$): 7.50 (m, 4H, aromatic), 4.40 (q, 2H, CH_2), 3.88 (s, 3H, CH_3N), 3.85 (s, 3H, CH_3O), 3.10 (m, 4H, CH_2CH_2), 2.60 (s, 3H, CH_3) and 1.46 ppm (s, 3H, CH_3); ms: 428 (M^+)

[a]Unless otherwise mentioned the compound was crystallized from methanol.
[b]All compounds gave satisfactory C, H, N analysis.
[c]This compound was crystallized from DMSO-Water.

The structures of all compounds were confirmed by elemental analysis, IR, NMR and mass spectroscopy.

Experimental Section

Melting points were taken on a Kofler hot stage apparatus and are uncorrected. The IR spectra were obtained using a Perkin-Elmer Model 781 spectrograph (potassium bromide disks). The ^1H NMR spectra were recorded on a Bruker FT-80 spectrometer and chemical shifts (δ) are in ppm relative to internal tetramethylsilane. The mass spectra were run on a Varian Model MAT-MS-311 spectrometer at 70 eV.

7-Carbethoxy-4,5-dihydro-6,8-dimethyl-2-phenyl-pyrrolo [3,2-e]benzothiazole (2a)

A stirring solution of compound **1** (314 mg, 1 mmole), thiobenzamide (274 mg, 3 mmoles), triethylamine (200 mg, 2 mmoles) in methanol 10 ml was refluxed for two hours. The methanol was removed, water (20 ml) was added and the precipitate was filtered. The precipitate was crystallized from DMSO-H_2O to give 210 mg (60%) of **2a**; m.p. 187-188°C; IR (KBr): ν 1680 and 1260 (C=0 of ester), 1550, 1460, 1450, 765 and 690 cm^{-1} (aromatic); ^1HNMR ($CDCl_3$): 7.93-7.35 (m, 5H, Ph), 4.32 (q, 2H, CH_2), 3.83 (s, 3H, N-CH_3), 3.13 (m, 4H, CH_2-CH_2), 2.78 (s, 3H, CH_3) and 1.39 (t, 3H, CH_3); ms: m/z (%) 352 (21), 325 (35), 318 (28), 309 (15), 298 (100), 138 (10), 105 (14) and 77 (21).
Anal. Calcd. for $C_{21}H_{20}N_2O_2S$: C, 68.18; H, 5.68; N; 7.95. Found: C, 68.02, H, 5.83; N, 8.05.
Compounds **2b-2d** were prepared similary (see Table 1).

1- Benzenesulfonyl-4-oxo-4,5,6,7-tetrahydro-indole semicarbazone (4)

To a stirring solution of compound **3** (2.75 g, 0.01 mole) in ethanol (10 ml), semicarbazide hydrochloride (1.11 g, 0.01 mole) and sodium acetate (0.82 g, 0.01 mole) in water (15 ml) were added. The mixture was heated in a steam bath for one hour. After cooling the precipitate was

filtered to give 3.16 g (95%) of **4**; m.p. 201-203°C.

6-Benzenesulfonyl-4,5-dihydro-pyrrolo [3,2-e] benzoselenadiazole (5)

To a stirring solution of compound **4** (1.3 g, 3 mmoles) in acetic acid (1 ml), powder selenium dioxide (0.33 g, 3 mmoles) was added. The heating was continued until the evolution of gas ceased. After stirring at room temperature for two hours, active charcoal (3 g) was added and filtered. The solvent was removed. The residue was purified by preparative TLC on silica gel using chloroform-ethyl acetate (50:50) as eluent. The desired fraction was crystallized from methanol to give 200 mg (14%) of **5**; m.p. 172-174°C; NMR ($CDCl_3$): 7.90-7.50 (m, 5H, C_6H_5), 7.33 (d, 1H, H_7, $J_{7,8}$= 3.26 Hz), 6.66 (d, 1H, H_8, $J_{7,8}$= 3.26 Hz) and 3.26 ppm (m, 4H, CH_2-CH_2); ms: m/z (%) 365 (M^+, 11), 363 (4), 337 (36), 335 (17), 196 (100), 194 (55), 141 (10), 116 (48), 89 (31) and 77 (50).

Anal. Calcd. for $C_{14}H_{11}N_3O_2SSe$: C, 46.15; H, 3.02; N, 11.54. Found: C, 46.02; H, 3.15; N, 11.68.

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