SYNTHESIS AND REACTIONS OF FUROCONDENSED DERIVATIVES*

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This paper describes the preparation of furo[2',3':4,5]pyrrolo[1,2-*d*]-1,2,4-triazolo[3,4-*f*]-1,2,4-triazines (*V*) from 4*H*-furo[3,2-*b*]pyrrole-5-carboxhydrazide (*I*), and benzo[*b*]furo[2',3':4,5]-pyrrolo[1,2-*d*]-1,2,4-triazolo[3,4-*f*]-1,2,4-triazines (*VIII*) from 1*H*-benzo[*b*]furo[3,2-*b*]pyrrole-2-carboxhydrazide. Compound *I* reacts with triethyl orthoformate or orthoacetate to give 1,2-dihydro[2',3'-4,5]pyrrolo[1,2-*d*]-1,2,4-triazin-1-one or its methyl analogue *II*. Compounds of general formula *II* afford with phosphorus pentasulfide thiones *III*; *III* yields *IV* with hydrazine. Cyclization of *IV* with triethyl orthoformate or orthoacetate furnished compounds *V*. Similarly, *VI* gives with hydrazine *VII*, which, upon reaction with triethyl orthoformate or orthoacetate affords *VIII*.

Condensed compounds derived from triazole[1-4] and triazine[5-9] were investigated particularly because some of them are reported to be biologically active[10,11]. This paper concerns the synthesis of new furo[2',3':4,5]pyrrolo-[1,2-*d*]-1,2,4-triazolo-[3,4-*f*]-1,2,4-triazines (*V*) and benzo[*b*]furo[2',3':4,5]pyrrolo[1,2-*d*]-1,2,4-triazolo-[3,4-*f*]1,2,4-triazines (*VIII*). This paper is considered a continuation of our preceding work on arylated analogues of these substances[12]. The starting 4*H*-furo[3,2-*b*]-pyrrolo-5-carboxhydrazide and 1*H*-benzo[*b*]furo[3,2-*b*]pyrrole-2-carboxhydrazide were prepared from the corresponding esters[13,14] and hydrazine hydrate in ethanol. The above-mentioned hydrazides are compounds with two reaction centres enabling to obtain with triethyl orthoformate or orthoacetate condensed systems with an embodied 1,2,4-triazine ring. Thiones *IIIa,b* and *VIa,b* were synthesized by reacting *IIa* or benzo analogues reported in our paper[14] with phosphorus pentasulfide.

Thiones *IIIa,b*, *VIa,b* possessing two reaction centres furnished *IVa,b*, *VIIa,b* upon reaction with hydrazine hydrate. Reaction of *IVa,b*, *VIIa,b* with triethyl orthoformate or orthoacetate in dimethylformamide gave rise to furo[2',3':4,5]pyrrolo-[1,2-*d*]-1,2,4-triazolo[3,4-*d*]-1,2,4-triazines or benzo[*b*]furo[2',3'-4,5]pyrrolo-[1,2-*d*] 1,2,4-triazolo[3,4-*f*]-1,2,4-triazines and their methyl or dimethyl derivatives.

The IR spectra of compounds *Va–Vd* and *VIIIa–VIIId* revealed absorption bands of C=N bonds of the triazole and triazine rings at 1 630 and 1 580 cm^{-1}, the first of them being more intense. Absorption of ν(C—H)$_{arom}$ and ν(N—H) ap-

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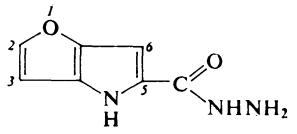
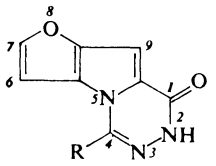
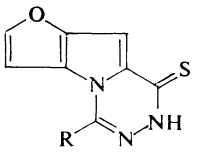
peared at 3 300–3 060 and 3 350–3 160 cm^{-1}, respectively. A strong absorption band of all compounds appeared at 290–360 nm in the electron spectrum; weaker bands were observed at 200–280 nm. These bands are associated with $\pi \rightarrow \pi^*$ electronic transitions. The relatively high λ_{max} values were found, as expected, with compounds *V* and *VIII*, consisting of four, or five condensed rings.



I



IIa, R = H
IIb, R = CH_3



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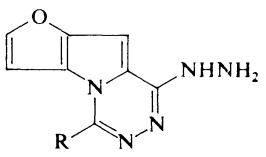
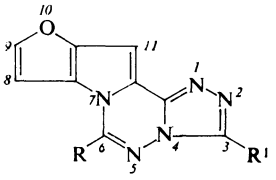


IVa, R = H
IVb, R = CH_3



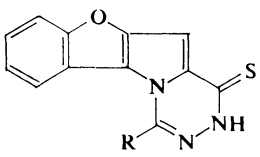
Va, R = R¹ = H
Vb, R = CH_3, R¹ = H
Vc, R = H, R¹ = CH_3
Vd, R = R¹ = CH_3

The ^{1}H NMR spectra evidenced the structure of these compounds. Proton signals of the starting carboxhydrazide *I* were attributed according to a characteristic interaction of the furopyrrole protons. Protons H_3 and H_6 displayed a long-range coupling constant $J_{3,6}$ = 0·8 Hz, the H_6 proton signal was simultaneously split by the NH proton. Formation of 1,2,4-triazine derivatives *II*, *III* and *IV* was backed by the presence of $C_{(4)}$—H or $C_{(4)}$—CH_3 proton signals. The structure of compounds *V* and *VIII* was corroborated by the presence of $C_{(6)}$—H and $C_{(3)}$—H, or $C_{(6)}$—CH_3 and $C_{(3)}$—CH_3 proton signals. A long-range coupling constant *J* = 0·8 Hz was found between protons $C_{(11)}$—H and $C_{(3)}$—H in compounds *Va*, *Vc*, and between protons $C_{(13)}$—H and $C_{(3)}$—H in compounds *VIIIa*, *VIIIc*.

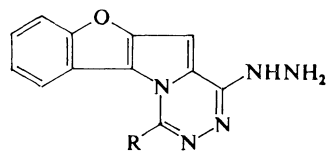
EXPERIMENTAL

4*H*-Furo[3,2-*b*]pyrrole-5-carboxhydrazide (*I*)

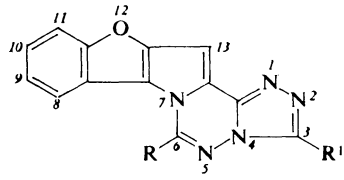
Hydrazine hydrate (80%, 3·5 g) was added to ethyl 4*H*-furo[3,2-*b*]pyrrole-5-carboxylate (1·63 g, 10 mmol) dissolved in ethanol (50 ml).The mixture was refluxed for 20 h, cooled and the precipitate was filtered off. Yield 1·34 g, 81%, m.p. 225°C (ethanol). For $C_7H_7N_3O_2$ (165·1) calculated:



VIa, R = H
VIb, R = CH_3



VIIa, R = H
VIIb, R = CH_3



VIIIa, R = R¹ = H
VIIIb, R = H, R¹ = CH_3
VIIIc, R = CH_3, R¹ = H
VIIId, R = R¹ = CH_3

50·92% C, 4·27% H, 25·45% N; found: 50·78% C, 4·12% H, 25·31% N. IR spectrum, cm^{-1}: 1 623 (C=O). UV spectrum, λ_{max}, nm (log ε): 293 (3·37). ^{1}H NMR spectrum (hexadeuteriodimethyl sulfoxide): 7·65 (1 H, d, $C_{(2)}$—H), 6·56 (1 H, dd, $C_{(3)}$—H), 6·81 (1 H, d, $C_{(6)}$—H), $J_{2,3}$ = 2·1, $J_{3,6}$ = 0·8 Hz, $J_{4,6}$ = 1·6 Hz. 1*H*-benzo[*b*]furo[3,2-*b*]pyrrole-2-carboxhydrazide[14] was prepared in the same way.

1,2-Dihydrofuro[2′,3′:4,5]pyrrolo[1,2-*d*]-1,2,4-triazin-1-one (*IIa*)

4*H*-Furo[3,2-*b*]pyrrole-5-carboxhydrazide (1·65 g, 10 mmol) and triethyl orthoformate (2 g, 10 mmol) were refluxed in dimethylformamide (10 ml) for 2·5 h. The precipitate was after cooling filtered off. Yield 1·33 g (76%), m.p. 284—285°C (dimethylformamide). For $C_8H_5N_3O_2$ (175·1) calculated: 54·87% C, 2·88% H, 23·99% N; found: 54·76% C, 2·78% H, 24·26% N. IR spectrum, cm^{-1}: 1 641 (C=O). UV spectrum, λ_{max}, nm (log ε): 290 (3·21), 244 (3·41). ^{1}H NMR spectrum (hexadeuteriodimethyl sulfoxide): 7·10 (1 H, dd, $C_{(6)}$—H), 7·14 (1 H, dd, $C_{(9)}$—H), 8·00 (1 H, d, $C_{(7)}$—H), 8·75 (1 H, d, $C_{(4)}$—H), 11·87 (1 H, bs, N—H) $J_{6,9}$ = 0·8, $J_{4,9}$ = 0·6, $J_{6,7}$ = 2·0 Hz. 1,2-Dihydrobenzo[*b*]furo[2′,3′:4,5]pyrrolo[1,2-*d*]-1,2,4-triazin-1-one was obtained in the same way[14].

4-Methyl-1,2-dihydrofuro[2′,3′:4,5]pyrrolo[1,2-*d*]-1,2,4-triazin-1-one (*IIb*)

This compound was synthesized from 4*H*-furo[3,2-*b*]pyrrole-5-carboxhydrazide and triethyl orthoacetate. Yield 75%, m.p. 258—260°C (dimethylformamide). For $C_9H_7N_3O_2$ (189·1) calculated: 57·16% C, 3·73% H, 22·22% N; found: 57·08% C, 3·52% H, 22·43% N. IR spectrum, cm^{-1}: 1 639 (C=O). UV spectrum, λ_{max}, nm (log ε): 290 (3·23), 240 (3·32). ^{1}H NMR spectrum (hexadeuteriodimethyl sulfoxide): 7·99 (1 H, d, $C_{(7)}$—H), 7·15 (1 H, d, $C_{(6)}$—H), 7·11 (1 H, d, $C_{(9)}$—H), 2·62 (3 H, s, $C_{(4)}$—CH_3), $J_{6,7}$ = 2·2, $J_{6,9}$ = 0·8 Hz. 4-Methyl-1,2-dihydrobenzo-[*b*]furo[2′,3′-4,5]pyrrolo[1,2-*d*]-1,2,4-triazin-1-one was prepared from benzo[*b*]furo[3,2-*b*:pyrrole-2-carboxhydrazide and triethyl orthoacetate[14].

1,2-Dihydrofuro[2',3'-4,5]pyrrolo[1,2-*d*]-1,2,4-triazin-1-thione (*IIIa*)

1,2-Dihydrofuro[2',3':4,5]pyrrolo[1,2-*d*]-1,2,4-triazin-1-one (*IIa*, 1·75 g, 10 mmol) and phosphorus pentasulfide (2 g, 90 mmol) were refluxed in pyridine (10 ml) with stirring for 4 h. The mixture was poured into hot water (30 ml) and the separated precipitate was filtered off. Yield 1·63 g (85%), m.p. 267—270°C (dioxane). For $C_8H_5N_3OS$ (191·2) calculated: 60·25% C, 2·63% H, 21·97% N, 16·77% S; found: 50·15% C, 2·52% H, 21·74% H, 16·64% S. IR spectrum, cm^{-1}: 1 552 (C=S). UV spectrum (methanol), λ_{max}, nm (log ε): 364 (3·21), 281 (3·13), ^{1}H NMR spectrum (hexadeuteriodimethyl sulfoxide): 7·16 (1 H, dd, $C_{(6)}$—H), 7·30 (1 H, dd, $C_{(9)}$—H), 8·08 (1 H, d, $C_{(7)}$—H), 9·15 (1 H, d, $C_{(4)}$—H), $J_{6,7} = 2·1$, $J_{6,9} = 0·8$, $J_{5,9} = 0·7$..

Likewise were prepared:

4-*Methyl*-1,2-*dihydrofuro*[2',3'-4,5]*pyrrolo*[1,2-*d*]-1,2,4-*triazine*-1-*thione* (IIIb). Yield 86%, m.p. 267—271°C (dioxane). For $C_9H_7N_3OS$ (205·2) calculated: 52·67% C, 3·47% H, 20·48% N, 15·63% S; found: 52·47% C, 3·42% H, 20·76% N, 15·57% S. IR spectrum, cm^{-1}: 1 550 (C=S). UV spectrum (methanol) λ_{max}, nm (log ε): 362 (3·17), 280 (3·10). ^{1}H NMR spectrum (hexadeuteriodimethyl sulfoxide): 7·20 (1 H, dd, $C_{(6)}$—H), 7·27 (1 H, $C_{(9)}$—H), 8·06 (1 H, d, $C_{(7)}$—H), 2·72 (3 H, s, $C_{(4)}$—CH_3), $J_{6,7} = 2·3$, $J_{6,9} = 0·8$.

1,2-*Dihydrobenzo*[b]*furo*[2',3'-4,5]*pyrrolo*[1,2-d]-1,2,4-*triazine*-1-*thione* (VIa). Yield 78%, m.p. 317—318°C (dioxane). For $C_{12}H_7N_3OS$ (241·3) calculated: 59·73% C, 2·92% H, 17·41% N, 13·29% S; found: 59·82% C, 2·98% H, 17·42% N, 13·26% S. IR spectrum. cm^{-1}: 1 550 (C=S). UV spectrum (metanol), λ_{max}, nm (log ε): 377 (3·39), 278 (3·28). ^{1}H NMR spectrum (hexadeuteriodimethyl sulfoxide): 7·37 (1 H, d, $C_{(11)}$—H), 9·50 (1 H, d, $C_{(4)}$—H), 7·38—8·37 (4 H, m, H_{arom}), $J_{4,11} = 0·8$.

4-*Methyl*-1,2-*dihydrobenzo*[b]*furo*[2',3':4,5]*pyrrolo*[1,2-d]-1,2,4-*triazine*-1-*thione* (VIb). Yield 80% m.p. 340—345°C (dioxane). For $C_{13}H_9N_3OS$ (255·3) calculated: 61·15% C, 3·55% H, 16·46% N. 12·56% S; found: 61·30% C, 3·60% H, 16·38% N, 12·32% S. IR spectrum, cm^{-1}: 1 550 (C=S). UV spectrum (dioxane) λ_{max}, nm (log ε): 380 (3·38). ^{1}H NMR spectrum (hexadeuteriodimethyl sulfoxide): 7·32 (1 H, s, $C_{(11)}$—H), 2·95 (3 H, s, $C_{(4)}$—CH_3), 7·30—8·00 (4 H, m, H_{arom}).

1-Hydrazinofuro[2',3':4,5]pyrrolo[1,2-*d*]-1,2,4-triazine (*IVa*)

1,2-Dihydrofuro[2',3':4,5]pyrrolo[1,2-*d*]-1,2,4-triazine-1-thione (*IIIa*, 1·9 g, 10 mmol) and hydrazine hydrate (94%, 15 ml) were stirred and heated at 80°C for 6 h; the precipitate was filtered off after cooling and washed with ether. Yield 1·27 g (68%), m.p. over 350°C (dioxane). For $C_8H_6N_5O$ (188·1) calculated: 51·08% C, 3·21% H, 37·23% N; found: 50·88% C, 3·07% H, 37·03% N. UV spectrum (methanol) λ_{max}, nm (log ε): 300 (3·92). ^{1}H NMR spectrum (hexadeuteriodimethyl sulfoxide): 6·61 (1 H, d, $C_{(6)}$—H), 6·93 (1 H, dd, $C_{(9)}$—H), 7·64 (1 H, d, $C_{(7)}$—H) 8·40 (1 H, s, $C_{(4)}$—H) $J_{6,7} = 2·1$, $J_{6,9} = 0·8$.

Likewise were prepared:

1-*Hydrazino*-4-*methylfuro*[2',3':4,5]*pyrrolo*[1,2-d]-1,2,4-*triazine* (IVb). Yield 72%, m.p. above 350°C (dioxane). For $C_9H_8N_5O$ (202·2) calculated: 53·45% C, 3·99% H, 34·64% N; found: 53·25% C, 3·86% H, 34·19% N. UV spectrum (methanol) λ_{max}, nm, (log ε): 302 (3·30). ^{1}H NMR spectrum (hexadeuteriodimethyl sulfoxide): 6·61 (1 H, dd, $C_{(6)}$—H), 6·93 (1 H, d, $C_{(9)}$—H), 7·61 (1 H, d, $C_{(7)}$—H), 2·37 (3 H, s, $C_{(4)}$—CH_3), $J_{6,7} = 2·3$, $J_{6,9} = 0·8$.

1-*Hydrazinobenzo*[b]*furo*[2',3':4,5]*pyrrolo*[1,2-d]-1,2,4-*triziane* (VIIa). Yield 66%, m.p. 328 to 333°C (dioxane). For $C_{12}H_8N_5$ (238·2) calculated: 60·50% C, 3·38% H, 29·40% N; found: 60·32% C, 3·24% H, 29·08% N. UV spectrum (dioxane) λ_{max}, nm (log ε): 435 (3·36), 332 (3·36). ^{1}H NMR spectrum (hexadeuteriodimethyl sulfoxide): 7·09 (1 H, s, $C_{(11)}$—H), 8·47 (1 H, s, $C_{(4)}$—H), 7·18—7·87 (4 H, m, H_{arom}).

1-*Hydrazino*-4-*methylbenzo*[b]*furo*[2',3'-4,5]*pyrrolo*[1,2-d]-1,2,4-*triazine* (VIIb). Yield 69%, m.p. 330—335°C (dioxane). For $C_{13}H_{10}N_5O$ (252·2) calculated: 61·91% C, 4·00% H, 27·77% N; found: 62·01% C, 3·98% H, 27·66% N. UV spectrum (dioxane) λ_{max}, nm, (log ε): 429 (2·77), 325 (3·27). ^{1}H NMR spectrum (hexadeuteriodimethyl sulfoxide): 7·06 (1 H, s, $C_{(11)}$—H), 7·12—7·87 (4 H, m, H_{arom}), 2·39 (3 H, s, $C_{(4)}$—CH_3).

Furo[2',3'-4,5]pyrrolo[1,2-*d*]-1,2,4-triazolo[3,4-*f*]-1,2,4-triazine (*Va*)

A mixture of *IVa* (1·88 g, 10 mmol) and triethyl orthoformate (4 g, 28 mmol) in dimethylformamide (20 ml) was refluxed for 4 h, cooled and the crystals were filtered off. Yield 1·6 g (80%) m.p. above 350°C (dimethylformamide). For $C_9H_5N_5O$ (199·2) calculated: 54·26% C, 2·53% H, 35·16% N; found: 54·18% C, 2·62% H, 34·93% N. IR spectrum, cm^{-1}: 1 630, 1 580 (C=N). UV spectrum (dioxane) λ_{max}, nm (log ε): 303 (3·13), 250 (3·46). ^{1}H NMR spectrum (trifluoroacetic acid): 7·14 (1 H, dd, $C_{(8)}$—H), 7·80 (1 H, bs, $C_{(11)}$—H), 7·96 (1 H, d, $C_{(9)}$—H), 9·10 (1 H, bs, $C_{(8)}$—H), 9·19 (1 H, s, $C_{(6)}$—H). $J_{8,9}$ = 2·3, $J_{8,11}$ = 0·8.

Following compounds were prepared in the same way:

6-*Methylfuro*[2',3'-4,5]*pyrrolo*[1,2-d]-1,2,4-*triazolo*[3,4-f]-1,2,4-*triazine* (Vb). Yield 82%, m.p. 251—253°C (dimethylformamide). For $C_{10}H_9N_5O$ (213·2) calculated: 56·33% C, 3·31% H, 32·85% N; found: 56·23% C, 3·16% H, 32·49% N. IR spectrum, cm^{-1}: 1 630, 1 580 (C=N). UV spectrum (dioxane) λ_{max}, nm (log ε): 313 (3·19), 254 (3·54). ^{1}H NMR spectrum (trifluoroacetic acid): 7·10 (1 H, dd, $C_{(8)}$—H), 7·81 (1 H, d, $C_{(11)}$—H), 8·00 (1 H, d, $C_{(9)}$—H), 9·16 (1 H, s, $C_{(6)}$—H), 3·10 (3 H, s, $C_{(3)}$—H), $J_{8,9}$ = 2·3, $J_{8,11}$ = 0·8.

3-*Methylfuro*[2',3':4,5]*pyrrolo*[1,2-d]-1,2,4-*triazolo*[3,4-d]-1,2,4-*triazine* (Vc). Yield 84%, m.p. over 350°C (dimethylformamide). For $C_{10}H_7N_5O$ (213·2) calculated: 56·33% C, 3·31% H; 32·85% N; found: 56·39% C, 3·42% H, 32·63% N. IR spectrum, cm^{-1}: 1 630, 1 584 (C=N). UV spectrum (dioxane) λ_{max}, nm (log ε): 302 (3·13), 246 (3·44). ^{1}H NMR spectrum (trifluoroacetic acid): 7·11 (1 H, dd, $C_{(8)}$—H), 7·72 (1 H, t, $C_{(11)}$—H), 7·93 (1 H, d, $C_{(9)}$—H), 9·08 (1 H, d, $C_{(3)}$—H), 2·98 (3 H, s, $C_{(6)}$—CH_3), $J_{8,9}$ = 2·3, $J_{8,11}$ = 0·8.

3,6-*Dimethylfuro*[2',3':4,5]*pyrrolo*[1,2-d]-1,2,4-*triazolo*[3,4-f]-1,2,4-*triazine* (Vd). Yield 86%. For $C_{11}H_9N_5O$ (227·2) calculated: 58·15% C, 3·99% H, 30·83% N; found: 57·95% C, 3·79% H, 31·03% N. IR spectrum, cm^{-1}: 1 630, 1 580 (C=N). UV spectrum (dioxane) λ_{max}, nm (log ε): 303 (3·16), 248 (3·37). ^{1}H NMR spectrum (trifluoroacetic acid): 7·06 (1 H, dd, $C_{(8)}$—H), 7·71 (1 H, d, $C_{(11)}$—H), 7·94 (1 H, d, $C_{(9)}$—H), 2·97 (3 H, s, $C_{(6)}$—H), 3·07 (3 H, s, $C_{(3)}$—CH_3), $J_{8,9}$ = 2·3, $J_{8,11}$ = 0·8.

Benzo[b]*furo*[2',3':4,5]*pyrrolo*[1,2-d]-1,2,4-*triazolo*[3,4-f]-1,2,4-*triazine* (VIIIa). Yield 82%, m.p. 244—245°C (dimethylformamide). For $C_{13}H_7N_5O$ (249·2) calculated: 62·65% C, 2·83% H, 28·11% N; found: 62·73% C, 2·72% H, 28·00% N. IR spectrum, cm^{-1}: 1 630, 1 580 (C=N). UV spectrum (dioxane) λ_{max}, nm (log ε): 320 (3·43), 256 (3·24). ^{1}H NMR spectrum (trifluoroacetic acid): 7·90 (1 H, d, $C_{(12)}$—H), 9·28 (1 H, s, $C_{(5)}$—H), 9·37 (1 H, d, $C_{(3)}$—H), 7·50—8·15 (4 H, m, H_{arom}), $J_{3,12}$ = 0·8.

3-*Methylbenzo*[b]*furo*[2',3':4,5]*pyrrolo*[1,2-d]-1,2,4-*triazolo*[3,4-f]-1,2,4-*triazine* (VIIIb). Yield 87%, m.p. 322–325°C (dimethylformamide). For $C_{14}H_9N_5O$ (263·2) calculated: 63·88% C, 3·45% H, 26·61% N; found: 63·95% C, 3·54% H, 26·32% N. IR spectrum, cm^{-1}: 1 630, 1 580 (C=N). UV spectrum (dioxane) λ_{max}, nm (log ε): 324 (3·36), 256 (3·39). ^{1}H NMR spectrum (trifluoroacetic acid): 7·90 (1 H, s, $C_{(12)}$—H), 9·21 (1 H, s, $C_{(5)}$—H), 7·50–8·25 (4 H, m, H_{arom}), 3·43 ($C_{(3)}$—CH_3).

5-*Methylbenzo*[b]*furo*[2',3':4,5]*pyrrolo*[1,2-d]-1,2,4-*triazolo*[3,4-f]-1,2,4-*triazine* (VIIIc). Yield 84%, m.p. 300–301°C (dimethylformamide). For $C_{14}H_9N_5O$ (263·2) calculated: 63·88% C, 3·45% H, 26·61% N; found: 63·72% C, 3·48% H, 26·38% N. IR spectrum, cm^{-1}: 1 630, 1 580 (C=N). UV spectrum (dioxane) λ_{max}, nm (log ε): 322 (3·18), 361 (3·37). ^{1}H NMR spectrum (trifluoroacetic acid): 7·80 (1 H, d, $C_{(12)}$—H), 9·30 (1 H, d, $C_{(3)}$—H), 7·50–8·15 (4 H, m, H_{arom}), 3·03 (3 H, s, $C_{(5)}$—CH_3), $J_{3,12} = 0·8$.

3,5-*Dimethylbenzo*[b]*furo*[2',3':4,5]*pyrrolo*[1,2-d]*triazolo*[3,4-f]-1,2,4-*triazine* (VIIId). Yield 88%, m.p. 343–345°C (dimethylformamide). For $C_{15}H_{11}N_5O$ (277·2) calculated: 64·99% C, 4·00% N, 25·26% N; found: 64·89% C, 4·17% H, 25·20% N. IR spectrum, cm^{-1}: 1 630, 1 580 (C=N). UV spectrum (dioxane), λ_{max}, nm (log ε): 326 (3·43), 258 (3·47). ^{1}H NMR spectrum (trifluoroacetic acid): 7·79 (1 H, s, $C_{(12)}$—H), 3·01 (3 H, s, $C_{(5)}$—CH_3), 3·41 (3 H, s, $C_{(3)}$—H).

Spectral Measurements

The IR spectra were recorded with a Specord, model 71, spectrophotometer (Zeiss, Jena) in KBr. The electron absorption spectra were taken with a Specord UV-VIS spectrophotometer (Zeiss, Jena) at a $1 . 10^{-5}$–$5 . 10^{-5}$ ml l^{-1} concentration and room temperature. The ^{1}H NMR spectra were measured with a Tesla BS 487 C apparatus operating at 80 MHz; hexadeuteriodimethyl sulfoxide solutions contained hexamethyldisiloxane, trifluoroacetic acid ones tetramethylsilane as internal references.

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