Reaction of Benzofurazan *N*-Oxide with Buta-1,3-dienylamines. Synthesis of a Novel Class of Quinoxaline *NN'*-Dioxide Enamines

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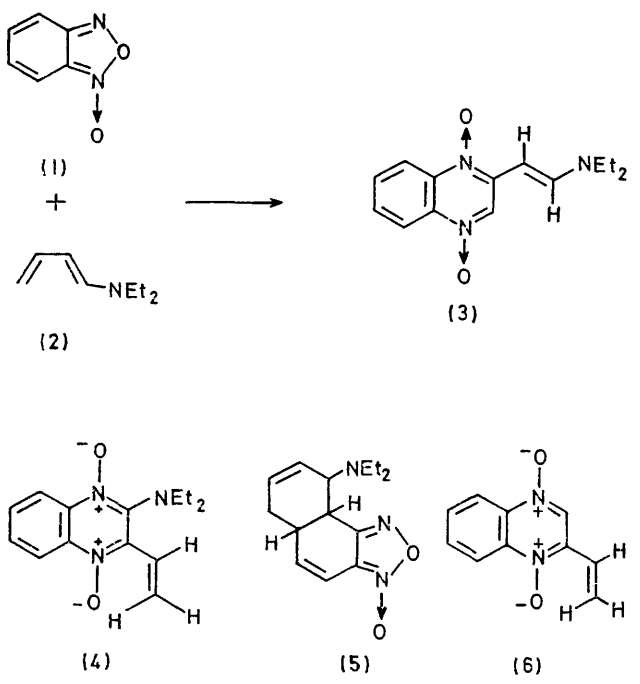
Summary Dienamines react with benzofurazan oxide to give a novel class of quinoxaline *NN'*-dioxide enamines.

NITRO-SUBSTITUTED benzofurazan oxides (BFO) are known to react as dienophiles with buta-1,3-dienes.[1] We report here that BFO (**1**) reacts with buta-1,3-dienylamines[2] yielding quinoxaline *NN'*-dioxide enamines (**3**).

Reaction of (**1**) with buta-1,3-dienyl-*NN*-diethylamine (**2**) (**1** : **1**) in anhydrous Et_2O at room temperature for 4 h gives, on removal of Et_2O, a residue which crystallised from



CCl_4–light petroleum (b.p. 40—60 °C) (1 : 1) as bright red crystals, m.p. 175 °C, in 80% yield. The same product was obtained when (**2**), prepared *in situ*, was used in the reaction.[3]

The structure (**3**) is supported by elemental and spectroscopic data: ν (KBr) 1625 and 1620 (C=C and C=N), 1355 and 1348 (N→O), and 975 cm^{-1} (*trans*-CH=CH); δ ($CDCl_3$, $SiMe_4$, 220 MHz) 1·276 (6H, t), 1·88 (H_2O), 3·38 (4H, q), 5·36 (1H, d, *J* 13·5 Hz), 7·56 (1H, m), 7·74 (1H, m), 8·23 (1H, s), 8·47 (2H, m), and 8·63 (1H, d, *J* 13·5); *m/e* 259 (37·5%) 243 (75), 242 (90), and 227 (38·9). These data clearly rule out structures (**4**) and (**5**). Further support for the structure (**3**) is obtained from the ^{13}C n.m.r. data: δ 147·5 (d), 141·6 (s), 138·2 (s), 133·2 (s), 131·7 (d), 128·5 (d), 127·4 (d), 119·6 (d), 118·6 (d), 84·65 (d), 46·1 (t), and 13·1 (q) p.p.m. The enamine (**2**) did not give any isolable product of the type (**6**) which would arise from the normal reaction of BFO with enamines.[3]

The piperidine (m.p. 186 °C, 75% yield), morpholine (m.p. 245 °C, 70% yield), and dimethylamine (m.p. 255 °C, 80% yield) analogues of (**3**) were similarly prepared.

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[1] G. Kresze and H. Bathelt, *Tetrahedron*, 1973, **73**, 1043.
[2] For recent reports on 1,4-cycloadditions of acyclic dienamines, see: S. Tanimoto, *Tetrahedron Letters*, 1977, 2903; S. Tanimoto, Y. Matsumura, T. Sugimoto, and M. Okano, *ibid.*, p. 2899.
[3] G. S. Lewis and A. F. Kluge, *Tetrahedron Letters*, 1977, 2491 and references cited therein.