

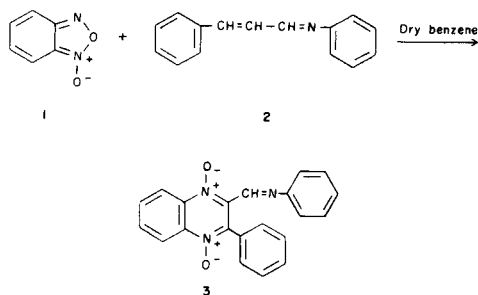
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1-Aza-1,3-butadienes react with benzofurazan *N*-oxide (BFO) to give a new class of *N,N'*-dioxide imines.*J. Heterocyclic Chem.*, **21**, 1247 (1984).

Benzofuran oxide **1** reacts with a variety of nucleophiles, enamines and enolates, and this chemistry has recently been reviewed [2]. Our earlier investigations on 1-aza-1,3-butadienes **2** had revealed that the carbon-carbon double bond does not participate in reactions and several dipoles [3], as well as nucleophiles [4], react with the carbon-nitrogen double bond only. In contrast, here we report reaction of BFO with azadienes **2** in which the carbon-carbon double bond has reacted, giving a novel class of quinoxaline *N,N'*-dioxide imines **3**.



Equimolar quantities of **1**, 1.36 g (0.01 mole) and **2** 2.07 g (0.01 mole), on refluxing in dry benzene for one hour and then kept stirring for another 72 hours, on removal of benzene gives a dark brown residue. This mass was washed with dry ether (100 × 5 ml). The ether was removed under vacuum and the residue was crystallised from benzene-light petroleum ether to obtain yellow crystals, mp 189-190° in 60% yield [5]. The structural assignment of adduct **3a** is supported by spectroscopic, as well as elemental data; ir (potassium bromide): 1625 and 1600 (C=N bonds) and 1350 (N—O); nmr (deuteriochloroform, tetramethylsilane): δ 360 MHz 6.87 (2H, m), 7.27 (3H, m), 7.52 (5H, m), 7.93 (2H, m), 8.72 (2H, m), 8.86 (1H, s); ms: *m/e* 341 (3.2%), *m/e* 325 (12.1%), *m/e* 308 (100%).

Anal. Calcd. for C₂₁H₁₅N₃O: C, 73.90; H, 4.40; N, 12.32. Found: C, 73.88; H, 4.44; N, 12.30.

The two consecutive losses of 16 and 17 units are typical of di-*N,N'*-oxides. The absence of CH=CH *trans* and the presence of an azomethine proton at 8.86 (1H, s) proves beyond doubt that only the C=C site of **2** is involved in the reaction.

We have also observed similar products **3b** and **3c** when

we used *N*-(*p*-toluidine) (mp 189-191°, 65% yield) and *N*-(*p*-anisidine) (mp 193-194°, 68% yield) analogues of **2**.

Compound **3b** had the following analytical data:

Anal. Calcd. for C₂₂H₁₇N₃O₂: C, 74.37; H, 4.79; N, 11.83. Found: C, 74.29; H, 4.82; N, 11.88.

Compound **3c** had the following analytical data:

Anal. Calcd. for C₂₂H₁₇N₃O₃: C, 71.16; H, 4.58; N, 11.32. Found: C, 71.04; H, 4.60; N, 11.42.

The *N*-methyl analogue of **2** had **3d**, mp 172-173°, 70% yield. In the nmr (360 MHz, deuteriochloroform), the methyl group showed at δ 3.53 (3H, d) and the azomethine proton at δ 8.53 (1H, q). The mutual coupling was confirmed by spin-spin decoupling. The magnitude of this coupling (*J* = 1.6 Hz) clearly indicates a *trans* arrangement at the azomethine site [6].

Compound **3d** had the following analytical data:

Anal. Calcd. for C₁₆H₁₃N₃O₂: C, 68.81; H, 4.66; N, 15.05. Found: C, 68.79; H, 4.60; N, 15.13.

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- [5a] There was considerable brown polymeric material which did not give any identifiable product. [b] For complete conformational analyses of **2**, see M. Anteunis, A. DeBruyn and J. S. Sandhu, *J. Magn. Reson.*, **8**, 7 (1972).
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