

## Photochemistry of 1-Methoxyphthalazine 3-Oxide

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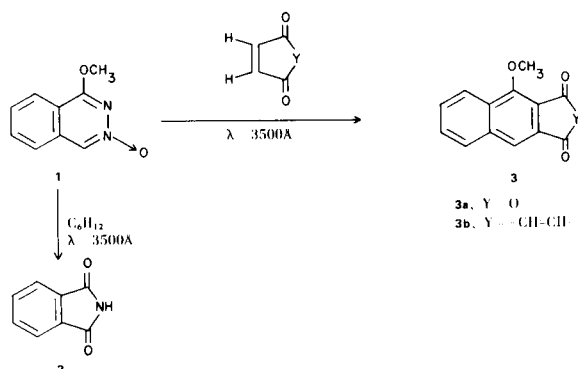
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Irradiation of 1-methoxyphthalazine 3-oxide in cyclohexane at 3500 Å resulted in the formation of phthalimide. On the other hand, irradiation in the presence of maleic anhydride resulted in the formation of 1-methoxynaphthalene-2,3-dicarboxylic acid anhydride. The similar cycloadduct was also observed by irradiation in the presence of benzoquinone. The formation of the cycloaddition products was also observed in acetic anhydride at 60°.

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Sir:

The photochemistry of a variety of heteroaromatic *N*-oxides, in particular pyridine and quinoline *N*-oxides, has been extensively examined (1). It is generally accepted that photoinduced rearrangements of these compounds proceed *via* oxaziridines (1,2). On the other hand, only a few reports on the light-induced reactions of 1,2-diazine *N*-oxides have been published. Irradiation of 1,4-diphenylphthalazine *N*-oxide resulted in the formation of 1,3-diphenylisobenzofurane (3). The intermediate formed in the photorearrangement was identified as a diazoketone, and Buchardt, *et al* (3) suggested that the formation of products is generated from a singlet excited state, or directly from the excited state, without the formation of a transient oxaziridine.



We now report the results of a study of the light-induced reactions of 1-methoxyphthalazine 3-oxide (1). A 15 hour

irradiation of 1 in cyclohexane at 3500 Å resulted in the formation of phthalimide (2) (yield 55%), which was identified by ir, nmr and mass spectral data. Furthermore, irradiation of 1 at 3500 Å in the presence of maleic anhydride resulted in the formation of a single crystalline product. 1-Methoxynaphthalene-2,3-dicarboxylic acid anhydride (3) (4) (m.p. 197-199°, yield 45%), while in the presence of benzoquinone the irradiation also resulted in the formation of the cycloadduct 3b (yield 35%, m.p. 189-190°). However, irradiation in the presence of tetracyanoethylene or dichloromaleic anhydride resulted in the formation of phthalimide (2).

We have observed a similar cycloaddition reaction between 1-methoxyphthalazine 3-oxide and maleic anhydride or benzoquinone which on heating at 60° in the presence of acetic anhydride resulted in the formation of product 3. On the other hand, formation of phthalimide (2) was observed by heating the *N*-oxide (1) at 60° in a solution of potassium *t*-butoxide in *t*-butyl alcohol.

Further study of the mechanism of this photochemical rearrangement and cycloaddition reaction is in progress.

## REFERENCES AND NOTES

- (1) G. G. Spence, E. C. Taylor and O. Buchardt, *Chem. Rev.*, **70**, 231 (1970).
- (2) F. Bellamy, P. Martz, and J. Streith, *Tetrahedron Letters*, 3189 (1974).
- (3) K. B. Tomer, N. Harrit, I. Rosenthal, O. Buchardt, P. L. Kumler and D. Creed, *J. Am. Chem. Soc.*, **95**, 7402 (1973).
- (4) Elemental microanalysis, mass spectra and nmr data of all products are in agreement with their molecular formulas.