

Carbon Dioxide Loss from a Cyclic Imide—an Example of Oxygen Transfer in the Mass Spectrometer

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MUCH attention has been paid recently to unusual processes in mass spectrometry, such as loss of non-terminal portions of open-chain ions,¹ and migration of aryl and methyl groups.² We report an example of an unusual process which does not appear to have been recorded previously in the literature.

While studying the behaviour of a cyclic imide, namely *N*-methylphthalimide, in the mass spectrometer, a strong peak at 44 mass units less than the parent ion was observed. Accurate mass measurement showed this to be due to the loss of a molecule

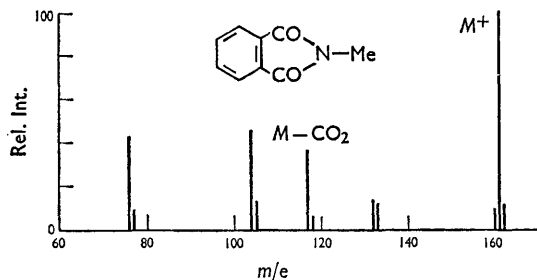
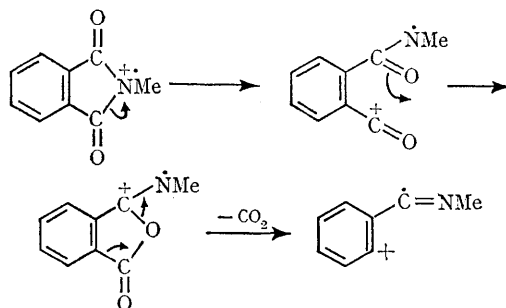


FIGURE. Mass spectrum of *N*-methylphthalimide.

of carbon dioxide. The mass spectrum of the imide is shown in the Figure.

The mechanism by which CO₂ is lost from *N*-methylphthalimide must involve the transfer of an oxygen atom, and we suggest the following mechanism:



Further details of the mass spectrum of this and other cyclic imides will be published shortly, including studies of the energy involved in the removal of carbon dioxide from these imides.

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¹ R. A. W. Johnstone and B. J. Millard, *Z. Naturforsch.*, 1966, **21a**, 604; A. Bhati, R. A. W. Johnstone, and B. J. Millard, *J. Chem. Soc. (C)*, 1966, 358; J. Ø. Madsen, C. Nolde, S.-O. Lawesson and G. Schroll; J. H. Bowie, and D. H. Williams, *Tetrahedron Letters*, 1965, 4377.

² B. R. Webster, *Chem. Comm.*, 1966, 124; C. Djerassi, A. M. Duffield, F. Komitsky, Jr., and L. Tokes, *J. Amer. Chem. Soc.*, 1966, **88**, 860.