

## Polyoxygenated Cyclohexenes from Aromatic Compounds: Selective Reactions of Bis(endoperoxides)

Howard A. J. Carless,\* Robert Atkins, and G. K. Fekarurhobo

*Department of Chemistry, Birkbeck College, Malet Street, London WC1E 7HX, U.K.*

Selective rearrangements of the styrene bis(endoperoxide) (**1**) at a single endoperoxide ring have been observed on thermolysis, photolysis, or treatment with triethylamine; reduction by phosphorus(III) reagents gives reaction at the bicyclic endoperoxide ring of the bis(endoperoxides) (**1**) and (**8**).

---

The reaction of singlet oxygen ( $^1\text{O}_2$ ) with styrenes is unusual, in that the aromatic ring is attacked along with the exocyclic double bond, to give bis(1,4-endoperoxides) [*e.g.* (**1**) and (**2**), formed from  $\beta$ -methylstyrene as shown in Scheme 1].<sup>1,2</sup> Although 1,4-endoperoxides have been much used as a convenient functional group for subsequent synthetic trans-

formations,<sup>3,4</sup> very little is known about the chemistry of bis(endoperoxides). We now show that compounds such as (**1**) are capable of being transformed selectively at either endoperoxide ring, by stereospecific reactions. Sensitised photo-oxidation of  $\beta$ -methylstyrene gives the bis(endoperoxide) (**1**) as the major product,<sup>1</sup> separable by column chromatography

