

## Synthesis of Olefins by Desulphuration of $\alpha\beta$ -Unsaturated Phenyl Sulphones

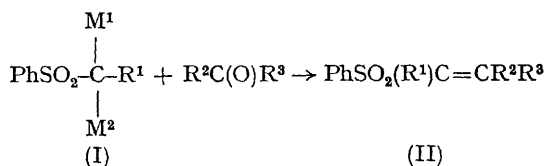
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**Summary** Reductive cleavage of  $\alpha\beta$ -unsaturated phenyl sulphones with aluminium amalgam or  $\text{LiAlH}_4\text{-CuCl}_2$  provides an attractive synthetic route to a variety of olefins in high yields.

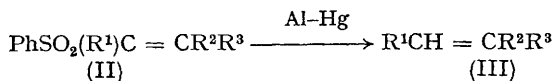
phenyl-1-phenylvinyl phenyl sulphone gave exclusively the corresponding *E*-isomers.

RECENTLY we reported that 1,1-dimetal derivatives of alkyl and benzyl phenyl sulphones (I) obtained *via* Li-Mg exchange give good yields of  $\alpha\beta$ -unsaturated phenyl sulphones (II) on treatment with aldehydes or ketones.<sup>1</sup>



$\text{M}^1 = \text{Li}$ ,  $\text{M}^2 = \text{MgI}$ , or  $\text{M}^1 = \text{M}^2 = \text{Li}$  or  $\text{MgI}$ ;  $\text{R}^1 = \text{H}$ , or  $\text{h}$

We now report that  $\alpha\beta$ -unsaturated phenyl sulphones (I) can be converted easily into the corresponding olefins (II) by reductive cleavage of the carbon-sulphur bond with aluminium amalgam. As shown in the Table olefins (II)



produced in yields of *ca.* 85%. Products were identified either by direct comparison with authentic material or by n.m.r., i.r., and mass spectra and elemental analysis.

The reaction seems to be completely stereoselective; *Z*-1,2-diphenylvinyl phenyl sulphone and *Z*-2-*p*-chloro-

TABLE

$\text{PhSO}_2(\text{R}^1)\text{C}=\text{CR}^2\text{R}^3$	$\text{R}^1$	$\text{R}^2$	$\text{R}^3$	Yield (%) <sup>a</sup> of $\text{R}^1\text{CH}=\text{CR}^2\text{R}^3$
	H	Ph	Ph	90 <sup>b</sup> 60 <sup>c</sup>
	Ph	Ph	H	90 <sup>b,d</sup>
	"	<i>p</i> -ClC <sub>6</sub> H <sub>4</sub>	H	90 <sup>b,d</sup>
	"	Ph	Ph	85 <sup>b</sup> 65 <sup>c</sup> 40 <sup>e</sup>
	"	Cholest-4-en-3-ylidene <sup>f</sup>		80 <sup>b,d</sup> 60 <sup>e</sup>

<sup>a</sup> Yield of isolated, purified compounds. <sup>b</sup> From Al-Hg. <sup>c</sup> From  $\text{LiAlH}_4\text{-CuCl}_2$ . <sup>d</sup> *E*-isomer from *Z*-isomer. <sup>e</sup> From  $\text{LiAlH}_4$ . <sup>f</sup> Mixture of isomers.

The conversion of the former into (*E*)-1,2-diphenylethylene illustrates a typical procedure. Aluminium amalgam<sup>2</sup> (0.02 g. atom Al in 2% aqueous  $\text{HgCl}_2$ ) was added to a solution of *Z*-1,2-diphenylvinyl phenyl sulphone (1 mmol) 10% aqueous tetrahydrofuran (50 ml) under argon. The mixture was refluxed for 3 h, and worked up, and the residue was chromatographed on silica gel.

Other reduction procedures give the same products but with smaller yields. Refluxing of 1,2,2-triphenylvinyl phenyl sulphone for 3 h with  $\text{LiAlH}_4$  gives the expected 1,2,2-triphenylethylene in 40% yield. The use of a  $\text{LiAlH}_4\text{-CuCl}_2$  (4:8) mixture<sup>3</sup> under the same conditions increases the yield to *ca.* 65%.

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<sup>1</sup> V. Pascali, N. Tangari, and A. Umami-Ronchi, *J.C.S. Perkin I*, in the press.; A. Bongini, V. Pascali, R. Pescara, and A. Umami-Ronchi, unpublished results.

<sup>2</sup> E. J. Corey and M. Chaykovsky, *J. Amer. Chem. Soc.*, 1965, **87**, 1345.

<sup>3</sup> T. Mukaiyama, K. Narasaka, K. Maekawa, and M. Furusato, *Bull. Chem. Soc. Japan*, 1971, **44**, 2285.