Peterson Olefination using Phenylsulphonyltrimethylsilylmethane. A New Preparation of Vinylic Sulphones

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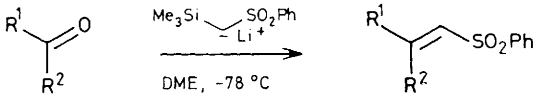
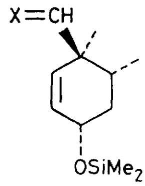
The anion from phenylsulphonyltrimethylsilylmethane reacts, in 1,2-dimethoxyethane at −78 °C, with both aldehydes and ketones to give the corresponding alkenyl phenyl sulphones in good yield.

Vinyl sulphones are now well recognised as being useful synthetic intermediates,[1] and consequently methods for their preparation are important.[2] Here we describe the use of the Peterson olefination procedure[3] for the conversion of various

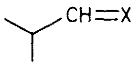


Scheme 1



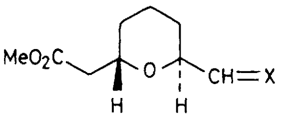
(1) $X = O$

(9) $X = CHSO_2Ph$ (*E*)



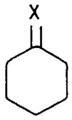
(2) $X = O$

(10) $X = CHSO_2Ph$



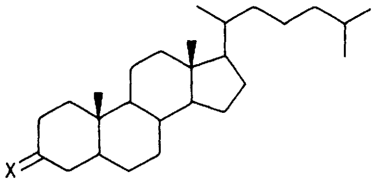
(3) $X = O$

(11) $X = CHSO_2Ph$



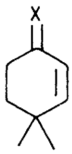
(4) $X = O$

(12) $X = CHSO_2Ph$



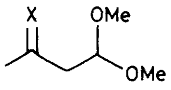
(5) $X = O$

(13) $X = CHSO_2Ph$



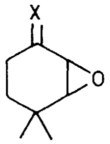
(6) $X = O$

(14) $X = CHSO_2Ph$



(7) $X = O$

(15) $X = CHSO_2Ph$



(8) $X = O$

(16) $X = CHSO_2Ph$

Table 1

Carbonyl compound	Product[a]	% Yield
(**1**)	(**9**)	92
(**2**)	(**10**)	70
(**3**)	(**11**)	50
(**4**)	(**12**)	82
(**5**)	(**13**)	85
(**6**)	(**14**)	81
(**7**)	(**15**)	57
(**8**)	(**16**)	84

[a] All new compounds were fully characterised by spectroscopic, and accurate mass and/or microanalytical methods. All unsymmetrical products were *ca.* 1:1 *E–Z* mixtures, except (**9**) which was exclusively *E*.

carbonyl compounds into vinyl sulphones (Scheme 1). Surprisingly this version of the Peterson reaction has not been reported previously.[4]

In a typical experiment, aldehydes or ketones were added to the anion generated from phenylsulphonyltrimethylsilylmethane[5] using n-butyl-lithium (1.0 equiv.) in 1,2-dimethoxyethane† (DME) at −78 °C. In this way the carbonyl compounds (**1**)—(**8**) directly afford the corresponding vinyl sulphones (**9**)—(**16**) upon work up with saturated ammonium chloride (Table 1). Crucial to the success of the reaction, especially with ketone derivatives, was the use of DME as solvent. Other solvents commonly used in these types of reaction, such as tetrahydrofuran, were much less successful.

The entries in Table 1 demonstrate that the method is mild and tolerates other functional groups, notably esters, acetals, epoxides, and silyl ethers.

In all these reactions it has so far been impossible to trap the initially formed adducts prior to elimination of the elements of Me_3SiOH. In very sterically encumbered environments aldehydes do react, but alternative sequences are necessary to generate the vinyl sulphones.

These conditions were used during an important homologation step in the synthesis of the insect antifeedant ajugarin I.[6]

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References

1 L. A. Paquette and G. D. Crouse, *J. Org. Chem.*, 1983, **48**, 141, and references therein; J. J. Eisch, J. E. Galle, and L. E. Hallenbeck, *J. Org. Chem.*, 1982, **47**, 1608; S. G. Pyne, D. C. Spellmeyer, S. Chen, and P. L. Fuchs, *J. Am. Chem. Soc.*, 1982, **104**, 5728, and previous papers in the series; J.-L. Fabre, M. Julia, and J.-N. Verpeaux, *Tetrahedron Lett.*, 1982, 2469.

2 M. Julia, M. Launay, J.-P. Stacino, and J.-N. Verpeaux, *Tetrahedron Lett.*, 1982, 2465; J. Hershberger and G. A. Russell, *Synthesis*, 1980, 475; G. Cardillo, D. Savoia, and A. Umani-Ronchi, *ibid.*, 1975, 453; M. Mikolajczyk, S. Grzejszczak, W. Midura, and A. Zatorski, *ibid.*, 1975, 278, and references therein.

3 D. J. Peterson, *J. Org. Chem.*, 1968, **43**, 780.

4 For related hetero-Peterson reactions see: K. Schank and F. Schroeder, *Liebigs Ann. Chem.*, 1977, 1676; F. A. Carey and O. Hernandez, *J. Org. Chem.*, 1973, **38**, 2670; B.-T. Gröbel and D. Seebach, *Chem. Ber.*, 1977, **110**, 852; D. H. Lucast and J. Wemple, *Tetrahedron Lett.*, 1977, 1103.

5 G. D. Cooper, *J. Am. Chem. Soc.*, 1954, **76**, 3713.

6 S. V. Ley, N. S. Simpkins, and A. J. Whittle, *J. Chem. Soc., Chem. Commun.*, 1983, 503.

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† Dry DME was obtained by distillation from benzophenone ketyl radical.