

A NOVEL SYNTHESIS OF α -SULFENYLATED ALDEHYDES

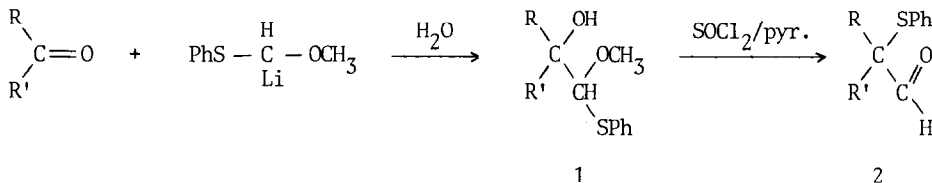
Ae. de Groot* and B.J.M.Jansen

Department of Organic Chemistry, Agricultural University, De Dreijen 5,
 6703 BC Wageningen, The Netherlands

Summary: Ketones are converted into α -sulfenylated aldehydes with addition of one carbon atom via reaction with methoxyphenylthiomethyl lithium followed by rearrangement of the adducts.

The synthesis of α -sulfenylated carbonyl compounds is often accomplished by treatment of enolates with sulfenylating agents. In the case of aldehydes the enolates are prepared by direct generation with potassium hydride¹ or by reaction of the corresponding silyl enol ethers with methyl lithium². Metallated enamines³ and vinylthio ethers⁴ are also used as starting materials for α -sulfenylated aldehydes.

A novel approach to α -sulfenylated aldehydes, starting from ketones, was developed via the reactions outlined below.

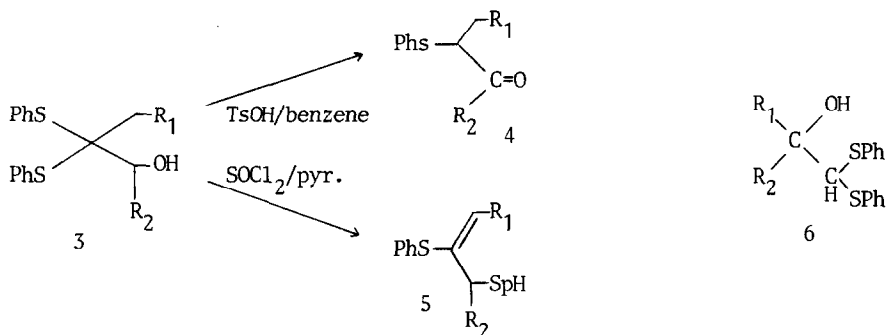


Addition of methoxyphenylthiomethyl lithium⁵ to ketones gives the adduct 1. Rearrangement of these adducts, using SOCl_2 in pyridine at 0°C , afford the corresponding α -phenylthio-aldehydes.

ketone	adduct % yield	aldehyde % yield	DNPH ⁶ , mp. $^\circ\text{C}$
$\text{R}=\text{R}'=\text{CH}_3$	92	93	153-154
$\text{R}=\text{R}'=\text{C}_2\text{H}_5$	88	95	144-145
$\text{R}=\text{CH}_3, \text{R}'=\text{C}_6\text{H}_5$	96 ⁷	90	202-203
$\text{R}=\text{R}'=(\text{CH}_2)_5$	93	83	194-195

Adducts of methoxyphenylthiomethyl lithium with aldehydes could be obtained simply and in high yields as well but rearrangement of these adducts did not give satisfactory results.

Our work complements that described by Warren *et al.*^{8,9} who use bis(phenylthio)alkyllithium compounds as acyl anion equivalents. The intermediate hydroxy compounds 3 can be rearranged to ketones⁹, α -phenylthio-ketones 4 or phenylthio-enolethers under similar reaction conditions as used by us. In our case the methoxy group modifies the results of the rearrangements insofar



that high yields of α -phenylthio-aldehydes 2 are obtained with $\text{SOCl}_2/\text{pyridine}$ and low yields (20-30%) of hydroxy compounds 6 with TsOH in acetic acid.

A general procedure for the synthesis of the adducts and the rearrangement can be described as follows:

A solution of 25 mmoles of methoxymethylphenylsulfide in 50 ml of dry tetrahydrofuran was treated with a solution of 25 mmoles of butyllithium in hexane at -30°C . After 30 minutes the resulting yellow solution was treated with 20 mmoles of the appropriate ketone. The solution was stirred for another 30 minutes at -30°C and then poured into an aqueous NH_4Cl solution. The mixture was extracted with ether; the ethereal solution was dried and evaporated and the residue was purified by column chromatography. The adducts (10 mmoles) were dissolved in 20 ml of pyridine and treated with 1.5 ml of SOCl_2 at 0°C . After 30 minutes the resulting mixture was poured into an ice cold hydrochloric acid solution and extracted with ether. The ethereal solution was dried and evaporated and the residue was purified by column chromatography over silicagel.

References and Notes

1. P.Groenewegen, H.Kallenberg and A.van der Gen, *Tetrahedron Letters*, **1979**, 2817.
2. D.Seebach and M.Teschner, *Chem. Ber.*, **109**, 1601 (1976).
3. R.M.Coates, H.D.Pigott and J.Ollinger, *Tetrahedron Letters*, **1974**, 3955.
4. H.J.Bestmann and J.Angerer, *Liebigs Ann. Chem.*, **1974**, 2085.
5. B.M.Trost and C.H.Miller, *J. Am. Chem. Soc.*, **97**, 7182 (1975).
6. Correct elemental analysis were obtained for all DNPH's.
7. Obtained as a mixture of diastereoisomers.
8. P.Blatcher, J.J.Grayson and S.Warren, *J. Chem. Soc. Chem. Comm.*, **1976**, 547.
9. P.Blatcher and S.Warren, *J. Chem. Soc. Chem. Comm.*, **1976**, 1055.