

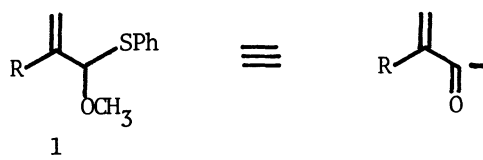
SYNTHESIS AND APPLICATION OF  $\alpha$ -METHOXYALLYL SULFIDES AS A NOVEL  
 $\alpha$ -METHYLENATED ACYL ANION EQUIVALENT

Tadakatsu MANDAI, Masahiro TAKESHITA, Mikio KAWADA, and Junzo OTERA\*  
 Okayama University of Science, Ridai-cho, Okayama 700

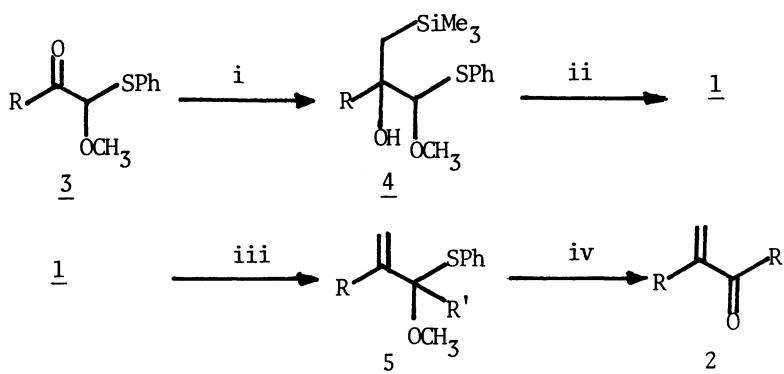
$\alpha$ -Methoxyallyl sulfides prepared from methoxy(phenylthio)methane proved to be a novel acyl anion equivalent providing a new synthetic method for  $\alpha$ -methyleneated ketones.

Allyl sulfides have received much attention as an acyl or homoenolate anion equivalent for many years.<sup>1)</sup> Feasibility of this concept is dependent on both control of the regioselectivity in the reaction of an ambident allylic anion with electrophiles and development of the effective transformation of an alkylthio group to a carbonyl moiety.

In the course of our studies on the synthetic application of methoxy(phenylthio)methane as a one carbon homologation reagent,<sup>2)</sup> we have found that  $\alpha$ -methoxyallyl sulfides 1 serve as an acyl anion equivalent. Moreover, development of a facile transformation of a hemithio acetal moiety to a carbonyl group under mild conditions led us to a novel synthesis of  $\alpha$ -methyleneated ketones 2.<sup>3)</sup>



Our strategy is depicted in Scheme 1. Treatment of 3<sup>2b)</sup> with  $\text{Me}_3\text{SiCH}_2\text{MgCl}$  at  $0^\circ\text{C}$  in  $\text{Et}_2\text{O}$  afforded 4 in ca. 90% yields, which was, then, converted into 1 in ca. 80% yields by the Peterson elimination.



i)  $\text{Me}_3\text{SiCH}_2\text{MgCl}$ ,  $\text{Et}_2\text{O}$ ,  $0^\circ\text{C}$ , ii)  $\text{NaH-HMPA}$  (each 5 equiv.), THF r.t., iii)  $n\text{-BuLi}$ , HMPA,  $\text{R}'\text{X}$ ,  $-78^\circ\text{C}$ , THF, iv) see Table 1.

Scheme 1.

Table 1. Conversion of 1 into 2

Entry	<u>1</u>	R'X	Method of oxidation <sup>a)</sup>	<u>2</u>	Yield/% <sup>b)</sup>
1		C <sub>6</sub> H <sub>13</sub> Br	A		84
2			B		64
3		CH <sub>3</sub> I	A		63
4			B		63
5			A		65
6			C		53

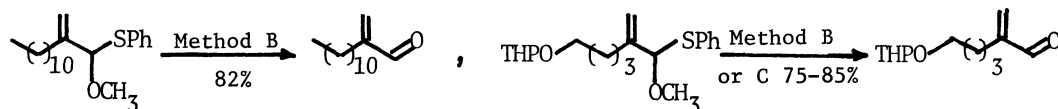
a) A: SeO<sub>2</sub> (1.1 equiv.)-H<sub>2</sub>O<sub>2</sub> (3.0 equiv.), r.t. 3 h. B: NaIO<sub>4</sub> (1.2 equiv.), dioxane, r.t. 3 h. C: *m*-CPBA (1.1 equiv.), CH<sub>2</sub>Cl<sub>2</sub>, -30 °C, 1 h. b) Overall yields after column chromatographic purification based on 1.

To a THF solution of 1 was added successively *n*-BuLi (1.1 equiv.), HMPA (1.2 equiv.), and an alkyl halide (1.2 equiv.) at -78 °C. After being stirred for 1 h at this temperature, the reaction mixture was subjected to usual workup to give 5. It should be noted that the reaction proceeds regiospecifically resulting in the exclusive  $\alpha$ -alkylation (>99% based on <sup>1</sup>H NMR spectra). Transformation of 5 to 2 was realized by oxidation of 5 with a variety of oxidizing reagents. The results are summarized in Table 1.

In conclusion, the exclusive  $\alpha$ -alkylation of 1 followed by mild oxidation of the resulting alkylation products 5 proved to give rise to a novel synthetic method for  $\alpha$ -methyleneated ketones 2. It may be further interesting from a synthetic point of view that various functionalities can be incorporated in R and R' of 2.

#### References

- 1) B.-T. Gröbel and D. Seebach, *Synthesis*, 1977, 357.
- 2) a) T. Mandai, K. Hara, T. Nakajima, M. Kawada, and J. Otera, *Tetrahedron Lett.*, 24, 4993 (1983); b) T. Mandai, M. Takeshita, K. Mori, M. Kawada, and J. Otera, *Chem. Lett.*, 1983, 1909; c) T. Mandai, H. Irei, M. Kawada, and J. Otera, *Tetrahedron Lett.*, 25, 2371 (1984).
- 3) For a synthesis of  $\alpha$ -methyleneated ketones, see N. Ono, H. Miyake, M. Fujii, and A. Kaji, *Tetrahedron Lett.*, 24, 3477 (1983), and references cited therein.
- 4) It should be added to note that  $\alpha,\beta$ -enals are obtained as expected when 1 are oxidized without alkylation.



(Received May 10, 1984)