CHEMISTRY LETTERS, pp. 1055-1056, 1979. Published by the Chemical Society of Japan

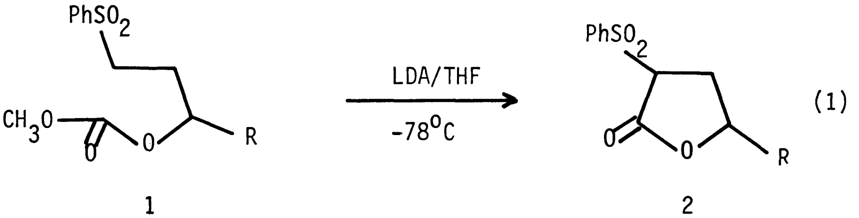
INTRAMOLECULAR ACYLATION OF *α*-SULFONYLCARBANIONS: A NOVEL SYNTHESIS OF *γ*-BUTYROLACTONES

Vichai REUTRAKUL,* Patoomratana TUCHINDA,
and Kosan KUSAMRAN

Department of Chemistry, Faculty of Science, Mahidol University,
Rama VI Road, Bangkok 4, THAILAND

A novel synthesis of *α*-phenylsulfonyl-*γ*-butyrolactones is described.

The formation of new carbon-carbon bonds utilizing *α*-sulfonylcarbanions has been a subject of extensive investigations.[1] Both intermolecular and intramolecular alkylations of the anions have been well studied.[1,2] However, there are few reports on the acylation of the carbanions.[3] Our interest in the chemistry of *γ*-butyrolactones led us to investigate the intramolecular acylation of the *α*-sulfonylcarbanions as a possible route to the synthetically versatile *α*-functionalized-*γ*-butyrolactones.[4] Our novel approach is summarized in equation (1).



(1)

1 2

The sulfone carbonates 1 were synthesized in high yields by adapting known procedures.[5] The intramolecular acylation was effected by employing lithium diisopropylamide (LDA) in tetrahydrofuran (THF) at -78^{o}C.

The following procedure is representative: the solution of sulfone carbonate 1 (1.0 equiv.) in THF was slowly added to the solutions of lithium diisopropylamide (2.0 equiv.) in THF at -78^{o}C under nitrogen. The reaction mixture was stirred at this temperature for one hour and then at 0^{o}C for two additional hours before being quenched with hydrochloric acid (1.5 N). The aqueous solution was extracted with ether and the product was purified by recrystallization from ethanol. The results are summarized in Table 1.

Table 1

1, R =	2, Yield % (Mp ^{o}C) NMR
H	81(114-115) [2.40-3.20 (2H, m), 4.20 (1H, dd, J=9 and 5.5 Hz), 4.42 (2H, app. t, J=8 Hz), 7.40-8.10 (5H, m)]
CH$_3$	67(94-96)[1.45, 1.50 (3H, two d, J=6 Hz), 2.15-3.40 (2H, m), 4.05-5.52 (2H, m), 7.35-8.20 (5H, m)]

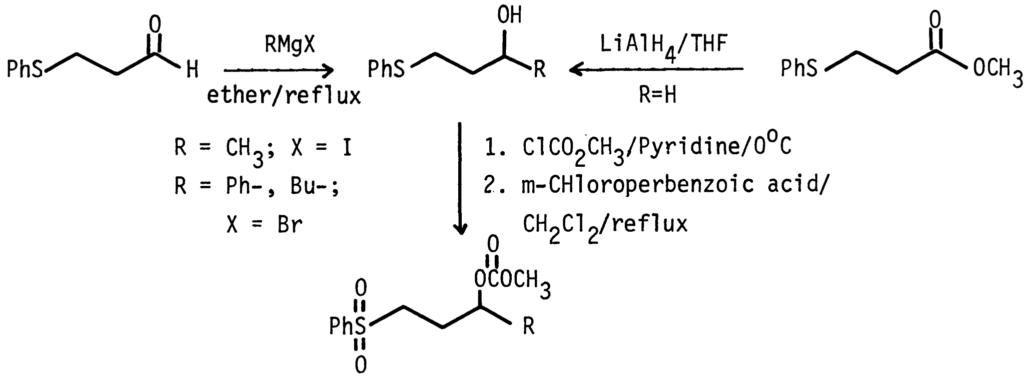
Table 1 (contd.)

1, R =	2, Yield % (Mp ^{o}C) NMR
Ph	58(143-145) [2.62, (1H, 6 lines), 3.45, (1H, 8 lines), 4.25 (1H, dd, J=9.5 and 3Hz), 5.80 (1H, dd, J=9 and 7Hz), 7.40 (5H, s) 7.60-8.20 (5H, m)]
Bu	25(70-72)[0.70-1.10 (3H, unresolved t), 1.10-1.90 (6H, m), 2.00-3.40 (2H, m), 3.95-4.95 (2H, m), 7.50-8.20 (5H, m)]

In view of the versatilities of sulfur stabilized carbanions and of the sulfonyl moiety[1,6] in organic synthesis, compounds such as 2 should be very useful for the synthesis of highly functionalized γ-butyrolactones.

REFERENCES

1. P.D. Magnus, Tetrahedron, 33, 2019 (1977) and references therein.
2. D. Savoia, C. Trombini, and A. Umani-Ronchi, J.C.S. Perkin I, 123 (1977); P.C. Conrad and P.L. Fuchs, J.Am.Chem.Soc.; 100, 346 (1978); H. Takayanagi, T. Uyehara, and T. Kato, J.C.S., Chem.Comm., 359 (1978); B. Corbel, J.M. Decesare, and T. Durst, Can.J.Chem., 56, 505 (1978).
3. K. Kondo and D. Tunemoto, Tetrahedron Lett., 1397 (1975); Y. Gaoni, Tetrahedron Lett., 503 (1976); D.A. Chass, D. Buddhasukh, and P.D. Magnus, J.Org.Chem., 43, 1750 (1978).
4. P.A. Grieco and J.J. Reap, Tetrahedron Lett., 1097 (1974); P.A. Grieco, C.S. Pogonowski, and S.D. Burke, J.Org.Chem., 40, 542 (1975); P.A. Grieco, C.J. Wang, and S.D. Burke, J.C.S., Chem.Comm., 537 (1975); P. Brownbridge and S. Warren, J.C.S., Chem.Comm., 465 (1977); M.L. Quesada and R.H. Schlessinger, J.Org.Chem., 43, 346 (1978); M. Watanabe, K. Shirai, and T. Kumamoto, Chem.Lett., 855 (1975) references therein; K. Iwai, H. Kosugi, and H. Uda, Chem.Lett.; 981 (1975); K. Tanaka, H. Uneme, and N. Yamagishi, Chem.Lett., 653 (1978).
5. 1 was prepared by the procedure as shown.



cf. C.D. Hurd and L.L. Gershbein, J.Am.Chem.Soc., 69, 2328 (1947); T. Fujisawa, T. Kobori, and H. Ohta, J.C.S., Chem.Comm., 186 (1976).
6. B.T. Grobel and D. Seebach, Synthesis, 357 (1977); B.M. Trost, Chem.Rev., 78, 363 (1978); B.M. Trost, Acc.Chem.Res., 11, 453 (1978).

(Received June 12, 1979)