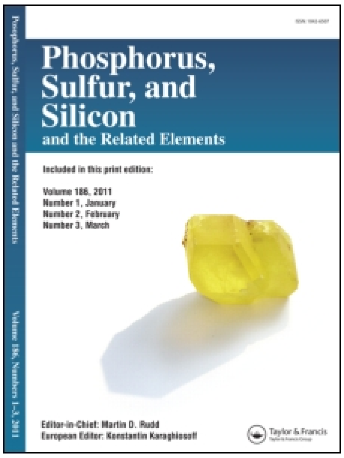


Phosphorus, Sulfur, and Silicon and the Related Elements
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713618290

The Use of α-Heteroatom Substituted C-Nucleophiles and Heterocumulenes in Enantio- and Diastereoselective Syntheses

Wolfgang Dölling[a]; Bernhard Hellrung[a]; Hans-Martin Siebel[a]
[a] Martin-Luther-University Halle-Wittenberg, Institute of Organic Chemistry, Halle/Saale, Germany

To cite this Article Dölling, Wolfgang , Hellrung, Bernhard and Siebel, Hans-Martin(1994) 'The Use of α-Heteroatom Substituted C-Nucleophiles and Heterocumulenes in Enantio- and Diastereoselective Syntheses', Phosphorus, Sulfur, and Silicon and the Related Elements, 95: 1, 409 — 411

To link to this Article: DOI: 10.1080/10426509408034255

URL: http://dx.doi.org/10.1080/10426509408034255

Phosphorus, Sulfur, and Silicon, 1994, Vol. 95–96, pp. 409–411
Reprints available directly from the publisher
Photocopying permitted by license only

THE USE OF α-HETEROATOM SUBSTITUTED C-NUCLEOPHILES AND HETEROCUMULENES IN ENANTIO- AND DIASTEREOSELECTIVE SYNTHESES

WOLFGANG DÖLLING, BERNHARD HELLRUNG
AND HANS-MARTIN SIEBEL
Martin-Luther-University Halle-Wittenberg, Institute of Organic Chemistry,
Weinbergweg 16, D-06120 Halle / Saale, Germany

Abstract C-Nucleophiles derived by deprotonation from tropinone **1**, cis-bicyclo[3.3.0]octane-3,7-dione **3**, and its 1,5-dimethyl derivative **4**, react with carbon disulfide and alkylating agents to the corresponding racemates of their 2-[bis(alkylthio)-methylene] derivatives **2**, **5**, and **6**, respectively. Diastereoselective alkylations of alkyl (R)- 2-methoxymethyl-pyrrolidine-1-dithiocarboxylates **7** and its (S) isomers **8** were studied. The enantiomeric dithiocarbamates **7** and **8** react in a diastereoselective manner with alkyl halides after deprotonation with LiTMP/LiBr at -78 °C in THF to **9**.

INTRODUCTION

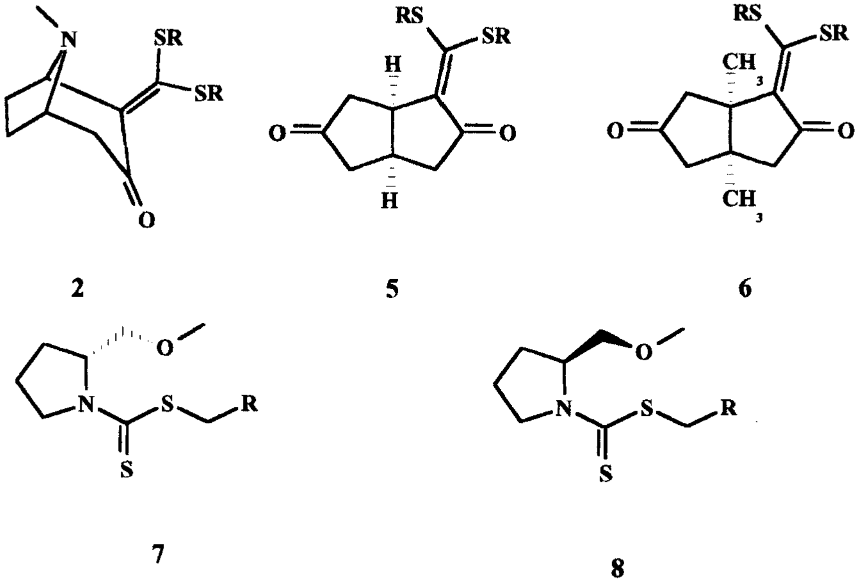
Carbon nucleophiles are among the most important intermediates in synthetic organic chemistry. We are interested in developing methods for reactions of such intermediates derived from bicyclic systems with heterocumulenes and for synthesis of diastereomers via alkylation of α-heteroatom substituted C-nucleophiles having a chiral center.

The dithiocarboxylation reaction of α-heteroatom substituted C-nucleophiles have been under investigation in our laboratory for a number of years[1, 2]. The reactions of carbon disulfide with carbon nucleophiles have been reviewed[3].

RESULTS

The racemic tropinone lithium enolate reacts with electrophiles[4]. The tropinone sodium enolate obtained by treatment of tropinone **1** with sodium-tert-butoxide in dry THF reacts with carbon disulfide to the corresponding enedithiolate which can be alkylated with 1,2-dibromo-ethane to 2-(1,3-dithiolane-2-ylidene)-8-methyl-8-aza-bicyclo[3.2.1]octane-3-one **2** (R, R = $-CH_2CH_2-$, Scheme. I).

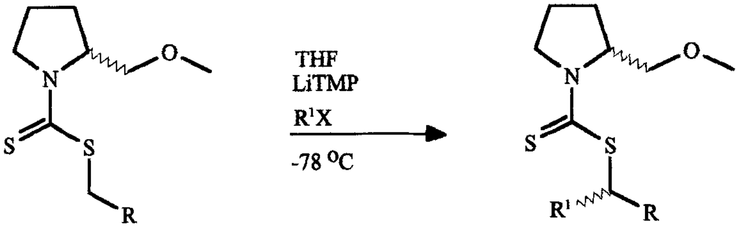
cis-Bicyclo[3.3.0]octane-3,7-dione **3** and its 1,5-dimethyl derivative **4** can conveniently be dithiocarboxylated in dry DMF in the presence of two equivalents of sodium hydride yielding after alkylation 2-[bis(alkylthio)-methylene]-bicyclo-[3.3.0]octane-3,7-diones **5** or **6** in good yields. HPLC studies on a chiral phase showed that the resulting products **5** and **6** are racemic mixtures due to the asymmetric substituted carbon atom 1 after attack of carbon disulfide.



Scheme. I

Enantioselective α-alkylations of ketones and aldehydes using metalated chiral hydrazones of (S)- or (R)-1-amino-2-methoxymethyl-pyrrolidine ("SAMP / RAMP-hydrazones") have been developed as an efficient and highly selective general method for asymmetric C-C bond formation[5]. Since the transition states after deprotonation of these hydrazones are compareable to those of dithiocarbamates **7** or **8** we decided to study the behavior of the latter carbon nucleophiles.

Diastereoselective alkylations of alkyl (R)- 2-methoxymethyl-pyrrolidine-1-dithiocarboxylates **7** and its (S) isomers **8** were found. The enantiomerically pure dithiocarbamates **7** and **8** react in a diastereoselective manner with alkyl halides after deprotonation with LiTMP/LiBr at -78 °C in THF to **9**.



7, 8 **9**

7a, 8a $R = C_6H_5$
7b, 8b $R = CH{=}C(CH_3)_2$

Scheme. II

Studies are in progress in order to better define scope and limitations of the described processes and reactions.

ACKNOWLEDGEMENT

The support by the Deutsche Forschungsgemeinschaft is gratefully acknowledged.

REFERENCES

1. W. Dölling, K. Frost, F. Heinemann and H. Hartung, Z. Naturforsch., 48b, 493-504 (1993).
2. W. Dölling, Phosphorus, Sulfur, and Silicon, in the press (1994).
3. W.-D. Rudorf, Sulfur Reports, 11, 51 (1991).
4. M. Majewski and G.-Z. Zheng, Synlett, 173-175 (1991).
5. D. Enders, in Current Trends in Organic Synthesis, edited by H. Nozaki (Pergamon Press, Oxford, 1983), pp. 151-168.