This article was downloaded by: [University of Cambridge] On: 20 December 2014, At: 06:31 Publisher: Taylor & Francis Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Phosphorus, Sulfur, and Silicon and the Related Elements

Publication details, including instructions for authors and subscription information: <u>http://www.tandfonline.com/loi/gpss20</u>

Diastereo- and Enantioselective Syntheses of 2-Methyl-Tetrahydrofuran-3-Thiol Andreas Goeke

^a Givaudan Roure Research Ltd. Überlandstr, 138, CH-8600 Dübendorf, Switzerland Published online: 17 Mar 2008.

To cite this article: Andreas Goeke (1999) Diastereo- and Enantioselective Syntheses of 2-Methyl-Tetrahydrofuran-3-Thiol, Phosphorus, Sulfur, and Silicon and the Related Elements, 153:1, 303-304, DOI: 10.1080/10426509908546442

To link to this article: <u>http://dx.doi.org/10.1080/10426509908546442</u>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden. Terms & Conditions of access and use can be found at <u>http://www.tandfonline.com/page/terms-and-conditions</u>

Diastereo- and Enantioselective Syntheses of 2-Methyl-Tetrahydrofuran-3-Thiol

ANDREAS GOEKE

Givaudan Roure Research Ltd. Überlandstr. 138, CH-8600 Dübendorf, Switzerland

The sensory properties of diastereometric as well as enantiometric forms of flavor compounds frequently differ. 2-Methyl-tetrahydrofuran-3-thiol is a well-known flavor chemical possessing an intense meatlike odor and flavor enhancing properties. The compound was first described in a patent by *Unilever* [1] which was followed by several others [2], all in the area of meat flavors. Generally, the compound is used as a mbdure of isomers, although recently, the trans-thiol was mentioned to be the stronger meat-like compound [3]. However, there is no information about the offactive properties of the four possible enantiomers.



To provide efficient diastereoselective and EPC-syntheses for 2,3-disubstituted tetrahydrofurana, different strategies have been applied: An iodocyclization approach leading to diastereometrically pure 2-methyl-3-mercapto-furanes is depicted in scheme 1. The diastereoselectivity depended on the isometric purities of the (E)- and (Z)-3-pentenois and on the substitution of the lodo-tetrahydrofurans by thioacetates.

Scheme 1. lociocyclizations leading to 2-methyl-tetrahydrofuran-3-thiol.





Scheme 2. Resolution of cis-configurated tetrahydrofuran-3-ol and -thiol.

The enantiomers of the trans-configurated thiol were obtained via enzymatic resolution of the corresponding cis-alcohol using the lipsse *pseudomones fluorescence* with ee's up to >99% (scheme 2). The absolute configuration was assigned based on a correlation with lactic acid. However, the enzymatic approach failed in the case of the *trans-alcohol*. Therefore, the *cis-thiol* was resolved classically via the camphanic acid thioesters (scheme 2). The relative configuration was elucidated by X-ray cristallography.

Finally, the odor and tasts properties were evaluated by a panel of five flavorists. Clearly, the trans-isomers possessed stronger meety and roasted notes while the cis-thiols were waaker and had more suffureous and musty notes. However, the cis/trans-modure combines both notes to a harmonic full-body meet flavor.

config.	odor	odor th.	$[\alpha]_0^n$ (CHCh)	% 00
(25,3R)	sulfureous, burnt, mesty, roasted, green, strong	2 pg	-45.1	96
(2R,3S)	sulfureous, musty, cabbage, onion, strong	12 pg	+42.0	94
(2R,3R)	sulfureous, rotion, meety, weeker	13 pg	-7.3	>99
(25,35)	sulfureous, roasted meaty, burnt, weaker	4 pg	+6.9	97

Table 1. Olfactive properties of the enantiomeric tetrahydrofuran-thiols.

References

- [1] G. A. M. Van den Ouweland, H. G. Peer, DE1932800 70108.
- [2] EP770686 A1 970502; CA1051441 790327; AT340748 771227; DE2458609 750619.
- [3] I. Blank, A. Staempfli, W. Eisenreich, Dev. Food Sci., 1994, 35, 271.