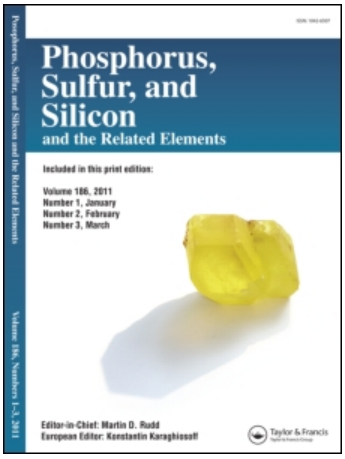

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Diastereo- and Enantioselective Syntheses of 2-Methyl-Tetrahydrofuran-3-Thiol

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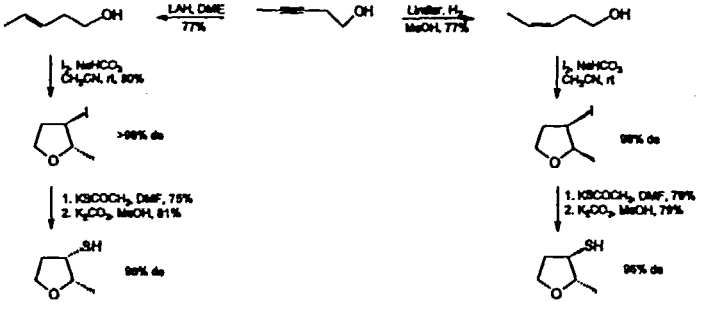
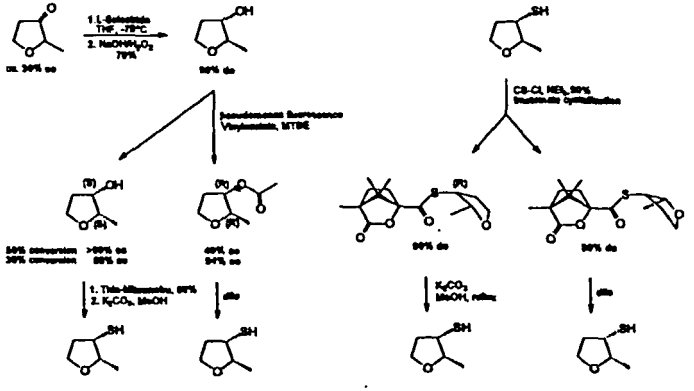
The sensory properties of diastereomeric as well as enantiomeric forms of flavor compounds frequently differ. 2-Methyl-tetrahydrofuran-3-thiol is a well-known flavor chemical possessing an intense meatlike odor and flavor enhancing properties. The compound was first described in a patent by *Unilever*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

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

Scheme 1. *Iodocyclizations 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 lipase *pseudomonas 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 taste properties were evaluated by a panel of five flavorists. Clearly, the *trans*-isomers possessed stronger meaty and roasted notes while the *cis*-thiols were weaker and had more sulfureous and musty notes. However, the *cis/trans*-mixture combines both notes to a harmonic full-body meat flavor.

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

config.	odor	odor th.	$[\alpha]_D^{25}$ ($CHCl_3$)	% ee
(2S,3R)	sulfureous, burnt, meaty, roasted, green, strong	2 pg	-45.1	96
(2R,3S)	sulfureous, musty, cabbage, onion, strong	12 pg	+42.0	94
(2R,3R)	sulfureous, rotten, meaty, weaker	13 pg	-7.3	>99
(2S,3S)	sulfureous, roasted meaty, burnt, weaker	4 pg	+6.9	97

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.