International Symposium organised
in honour of Prof. Alain Krief

LOST II

Learning Organic Synthesis Tremendously

Namur, Belgium

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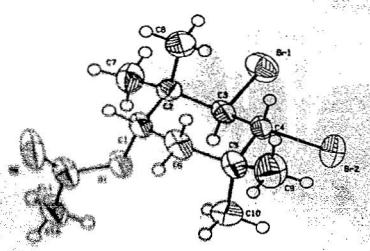

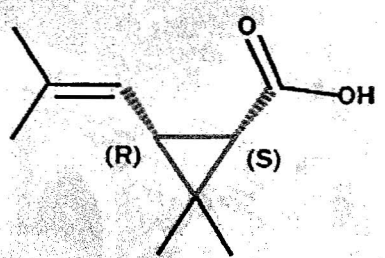

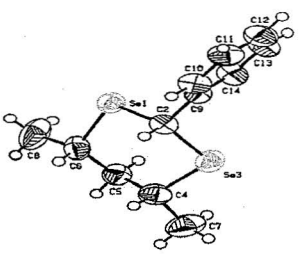

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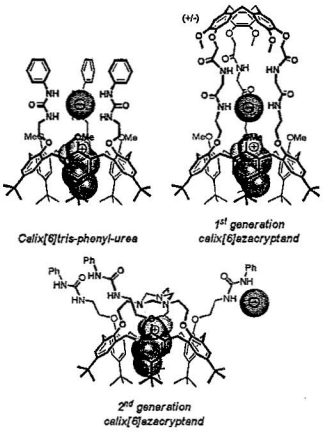
PROGRAM and ABSTRACT

rare.[3] The less studied calix[6]arenes possess a larger hydrophobic cavity that is more appropriate for the inclusion of organic guests.

On the basis of this statement, we have developed different strategies for the rigidification of the highly flexible calix[6]arene skeleton through (i) coordination of an anion using pendant urea arms,[4] (ii) covalent grafting of tripodal caps (1st generation calix[6]azacryptand)[5, 6] or (iii) a combination of these two strategies (2nd generation calix[6]azacryptand).[7, 8] All these receptors display unique recognition properties toward anions and organic ion pairs.



References

[1] J. L. Sessler, P. Gale, W.-S. Cho, *Anion Receptor Chemistry*, The Royal Society of Chemistry, Cambridge, **2006**.
[2] S. E. Matthews, P. D. Beer, in *Calixarenes 2001* (Eds.: Z. Asfari, V. Böhmer, J. Harrowfield, J. Vicens, M. Saadioui), Kluwer Academic Publishers, Dordrecht, **2001**, pp. 421.
[3] M. D. Lankshear, I. M. Dudley, K.-M. Chan, A. R. Cowley, S. M. Santos, V. Felix, P. D. Beer, *Chem. Eur. J.* **2008**, *14*, 2248.
[4] M. Hamon, M. Ménand, S. Le Gac, M. Luhmer, V. Dalla, I. Jabin, *J. Org. Chem.* **2008**, *73*, 7067.
[5] S. Le Gac, I. Jabin, *Chem. Eur. J.* **2008**, *14*, 548.
[6]M. Ménand, I. Jabin, *Org. Lett.* **2009**, *11*, 673.
[7] S. Le Gac, J. Marrot, I. Jabin, *Chem. Eur. J.* **2008**, *14*, 3316.
[8] S. Le Gac, M. Ménand, I. Jabin, *Org. Lett.* **2008**, *10*, 5195.

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Vogel's Silyl Sulfinate: Efficient Derivatization Reagent in GC Analysis

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Silylation is one of the most widely used derivatization procedure for polar and non-volatile organic compounds containing active hydrogen atoms (e.g. –OH, =NH, -NH_2, -SH, -COOH) in order to analyze them by GC techniques [1]. Silyl reagents are popular because they are easy to use and they readily form derivatives.

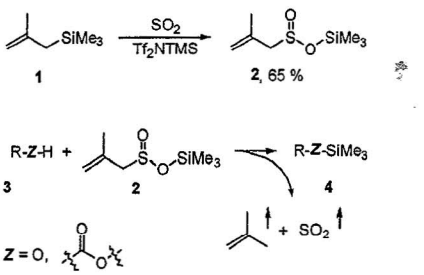
Compared to their parent compounds, silyl derivatives are more volatile, less polar and more thermally stable. As a result, GC separation is improved and detection is enhanced [2]. In 1944, trimethylsilyl chloride was introduced as the first silylating reagent [3]. Latter, a plethora of efficient silylation reagents were produced, for example TMSI, BSA, BSTFA, TMSOTf and others [4].

However, for none of the above-mentioned chemicals exists a universal silylation protocol and certain optimization process is required for quantitative GC analysis. Moreover, each of these reagents ejects its leaving group after silylation step. Very often corresponding halogenides or acetamide derivatives disturb quantitative GC analysis.

The main aim of this work is to develop a new silylation method for gas chromatographic – mass spectrometric analysis of organic compounds that are characterized by low volatility.

In 2002, trimethylsilyl prop-2-ene-1-sulfinate **2** was produced in sila–ene reaction between methallylsilane **1** and sulfur dioxide in the presence of Lewis acid [5]. Vogel's silyl sulfinate **2** is known for rapid silylation of alcohols, phenols, and carboxylic acids. The only side products of this process are volatile: sulfur dioxide and isobutene [6] (Scheme 1).

Scheme 1.



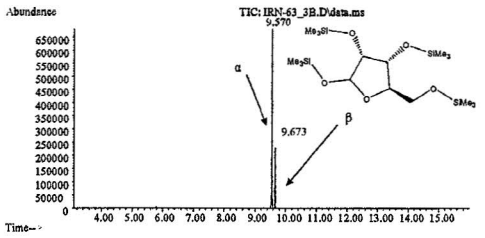
The present work deals 1) with improved preparative procedure towards silyl sulfinate **2**; 2) with use of Vogel's silyl sulfinate **2** as derivatization reagent in qualitative and quantitative GC analysis of non-volatile polyols, sugars, and carboxylic acids.

We have found that Ghosez reagent (Tf_2NTMS) [7] improves the synthesis of **2** and thus is superior to other Lewis acids used in this synthesis so far. In a typical silylation experiment, corresponding alcohols, polyols, phenols, carboxylic acids and/or their mixtures were mixed with silyl sulfinate **2** and subjected to GC–MS and/or GC–FID analysis. Reagent **5** is characterized by instant and quantitative silylation of an active –OH function.

Examples including silylation and analyses of glycerol, 2–ethyl–2–(hydroxymethyl)–1,3-propanediol, 2–dimethyl–1,3–propanediol, pentaerythritol, and other alcohols will be discussed. On the other hand, silylation and GC analyses of carboxylic acids and hydroxyl-carboxylic acids include tartaric, mandelic, malic, citric,

and other acids. One of the highlights is GC-MS analysis of sugar samples which is represented here by an example with ribose (Figure 1).

Figure 1.



References

[1] J. M. Halket, V. G. Zaikin, *Eur. J. Mass Spectrom.* **2003**, *9*, 1.
[2] a) E. Rojas-Escudero, A. L. Alacon-Jimenez, P. Elizalde-Galvan, R. Rojo-Callejas, *J. Chromtogr. A* **2007**, *1027*, 117.; b) P. M. Medeiros, B. R. T. Simoneit, *J. Chromtogr. A* **2007**, *1141*, 271.; c) T. Nadulski, F. Pragst, *J. Chromtogr. B* **2007**, *846*, 78.; d) A. Shareef, M. J. Angove, J. D. Wells, *J. Chromtogr. A* **2006**, *1108*, 121.
[3] R. O. Sauer, *J. Am. Chem. Soc.* **1944**, *66*, 1707.
[4] J. Heberle, G. Simchen, Silylating Agents. 2nd Edition, Fluka Chemie AG: Buchs, **1995**.
[5] a) L. Bouchez and P. Vogel, *Synthesis*, **2002**, 225.; b) L. C. Bouchez, S. Reddy Dubbaka, M. Turks, P. Vogel, *J. Org. Chem.* **2004**, *69*, 6413.
[6] X. Huang, C. Craita, L. Awad, P. Vogel, *Chem. Commun.* **2005**, 1297.
[7] B. Mathieu, L. Ghosez, *Tetrahedron* **2002**, *58*, 8219.

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Furan as a masked reactive entity for the generation of reactive oligonucleotides

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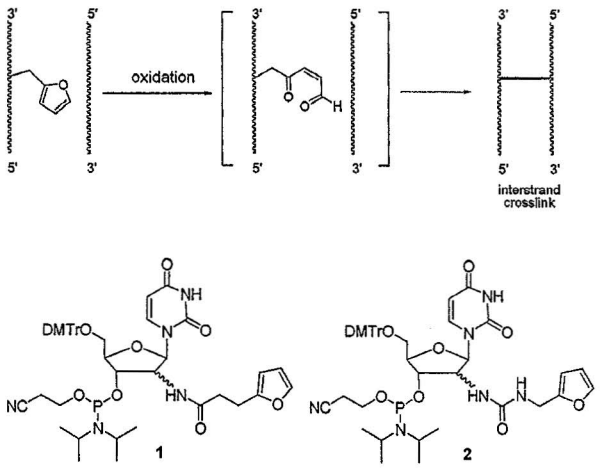
The natural toxicity of furan is due to it's metabolic oxidation to the reactive cis-2-butene-1,4-dial. This process in which a stable furanunit is converted to a reactive functionality is very convenient for the postsynthetic generation of a reactive entity in an oligonucleotide. If the reactive entity is generated after hybridization of the oligonucleotide with its complement, efficient formation of a crosslink is observed.[1]

In order to insert the furan unit in the oligonucleotides, phosphoramidites **1** and **2** are synthesized in the ribo and arabino configuration. Results about incorporation in oligonucleotides and further duplex crosslinking studies will be presented.



Reference

[1] Halila, S.; Velasco, T.; De Clercq, P.; Madder, A. *Chemical Communications* **2005**, 936-938.

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The synthesis of novel glycoamino acids

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Sugar-amino acids (SAA) are synthetic scaffolds, combining both amino acid functionality and sugar platform in one compound. This provides great versatility for using SAAs as building blocks in peptide and polysaccharide synthesis. Since sugar moiety provides great opportunities for derivatization, SAAs are excellent object for combinatorial chemistry, and were intensively studied recently [1]. Various SAAs and their derivatives show biological activity, can be used as protease and glycosidase inhibitors, as well as peptidomimetics. In carbohydrate chemistry SAAs provide great opportunity to use advanced peptide synthesis methods to obtain polysaccharides. SAA oligomers have shown self-organizing secondary structures, that can contribute to their biological activity [2].