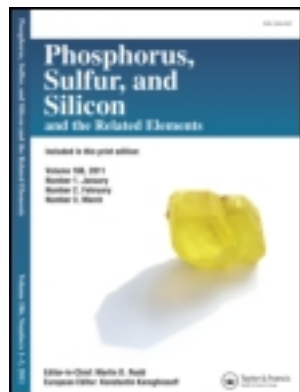


This article was downloaded by: [University of Guelph]

On: 04 October 2012, At: 12:28

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:

<http://www.tandfonline.com/loi/gpss20>

### Dimenthoxyphosphorylimino-3,3,3-trifluoropropionate as a Novel Chiral Building Block in Asymmetric Synthesis of Fluorinated $\alpha$ -Amino Acids Derivatives

Yuliya V. Rassukana<sup>a</sup>, Yaroslav Y. Khomutnyk<sup>a</sup>, Anatoly D. Synytsya<sup>a</sup> & Petro P. Onys'ko<sup>a</sup>

<sup>a</sup> Institute of Organic Chemistry, NAS of Ukraine, Kyiv, Ukraine

Version of record first published: 25 Apr 2011.

To cite this article: Yuliya V. Rassukana, Yaroslav Y. Khomutnyk, Anatoly D. Synytsya & Petro P. Onys'ko (2011): Dimenthoxyphosphorylimino-3,3,3-trifluoropropionate as a Novel Chiral Building Block in Asymmetric Synthesis of Fluorinated  $\alpha$ -Amino Acids Derivatives, *Phosphorus, Sulfur, and Silicon and the Related Elements*, 186:4, 718-720

To link to this article: <http://dx.doi.org/10.1080/10426507.2010.522634>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.tandfonline.com/page/terms-and-conditions>

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.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

## DIMENTHOXYPHOSPHORYLIMINO-3,3,3-TRIFLUOROPROPIONATE AS A NOVEL CHIRAL BUILDING BLOCK IN ASYMMETRIC SYNTHESIS OF FLUORINATED $\alpha$ -AMINO ACIDS DERIVATIVES

Yuliya V. Rassukana, Yaroslav Y. Khomutnyk,  
Anatoly D. Synytsya, and Petro P. Onys'ko

*Institute of Organic Chemistry, NAS of Ukraine, Kyiv, Ukraine*

**Abstract** A convenient method for the preparation of dimenthoxyposphoryliminotrifluoropropionate, bearing the stereodirecting dimenthoxo-phosphoryl group at the nitrogen atom, was developed. The synthetic potential of this novel chiral building block for diastereoselective synthesis of trifluoromethyl containing amino acid derivatives was demonstrated.

**Keywords** Amidophosphates; amino acids; asymmetric synthesis; chiral auxiliary; trifluoropyruvate imines

## INTRODUCTION

The occurrence of  $\alpha$ -amino acids in biological systems underlies the importance of new methods for their synthesis in enantiomerically pure forms. Fluorine is a unique tool for modifying bioactivity. Consequently, there is a growing interest in the synthesis of chiral fluorine containing building blocks.

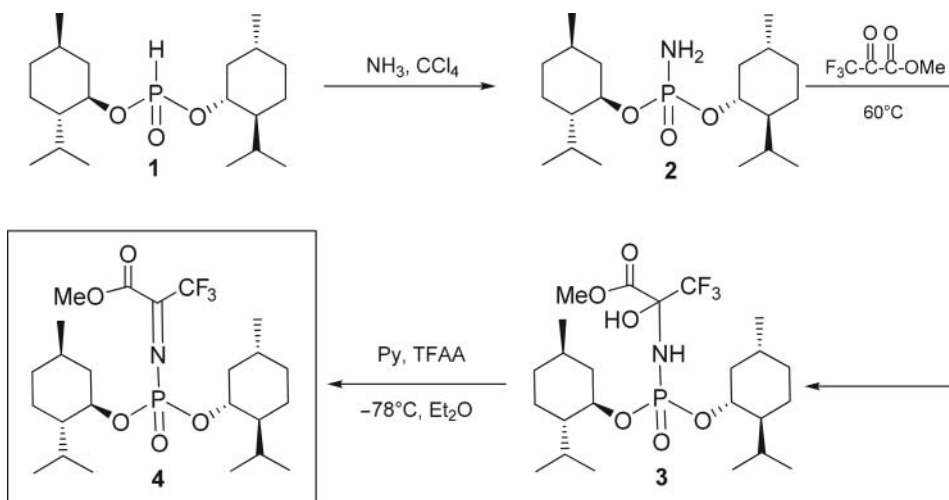
## RESULTS AND DISCUSSIONS

We have developed a convenient method for the preparation of trifluoroiminopyruvate **4** bearing the stereodirecting dimenthoxo-phosphoryl group at the nitrogen atom (Scheme 1).

Dimethyl phosphite **1** was obtained with the use of commercially available (*L*)-menthol according to the described procedure<sup>1</sup> and was transformed into amidophosphate **2** by the Atherton–Todd reaction, yield 85%,  $[\alpha]_D = -91.6^\circ$ . The reaction of amidophosphate **2** with methyl trifluoropyruvate and subsequent dehydration of intermediate addition product **3** afforded the target imine **4** bearing a stereodirecting and at the same time activating dimenthoxyposphoryl group at the nitrogen atom.

Received 26 July 2010; accepted 7 September 2010.

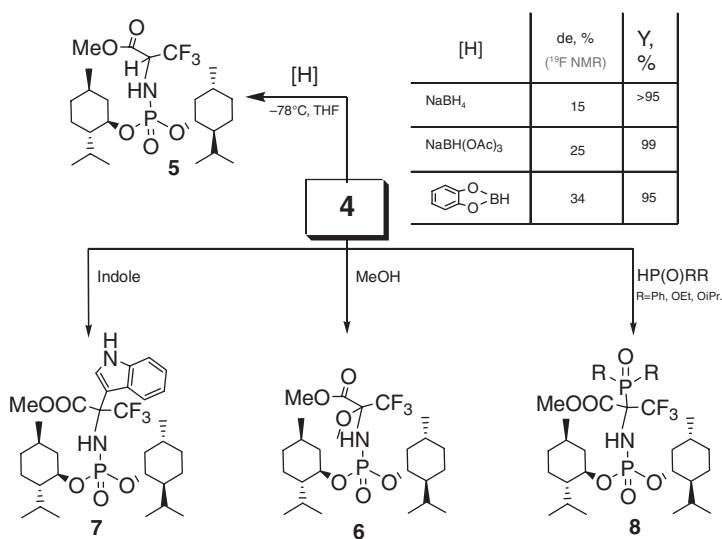
Address correspondence to Petro P. Onys'ko, Institute of Organic Chemistry, NAS of Ukraine, 5 Murmans'ka St., 02660 Kyiv, Ukraine. E-mail: onysko@rambler.ru



**Scheme 1** Preparation of trifluoroiminopyruvate **4**, bearing chiral auxiliary at the nitrogen atom.

The synthetic potential of imine **4** is demonstrated in Scheme 2. In particular, the high reactivity of the compound allows its easy functionalization even with weak C-, O-, S-, and P-centered nucleophiles to afford various chiral trifluoroalanine derivatives bearing the hydrogen (**5**), an alkoxy group (**6**), a heterocyclic moiety (**7**), or a phosphinoyl residue (**8**) at the  $\alpha$ -atom.

It should be noted that in spite of moderate *de* in the reactions studied, they can be used for preparative asymmetric synthesis; crystalline compounds **5–8** can be easily



**Scheme 2** Diastereoselective functionalization of trifluoroiminopyruvate **4**.

enriched by simple recrystallization. Thus, after only one crystallization from petroleum ether, protected trifluoroalanine **5** was obtained with *de* exceeding 99%.

## REFERENCE

1. Kolodiaznyi, O. I.; Grishkun, E. V.; Sheiko, S.; Demchuk, O.; Thoennessen, H.; Jones, P. G.; Schmutzler, R. *Tetrahedron: Asymmetry* **1998**, 9, 1645–1649.