Enantiospecific Synthesis of α,β-Diamino Acids via Rhodium-catalyzed Intramolecular Formation of *N*-Sulfamoyl 2,3-Aziridino-γ-lactones

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INTRODUCTION

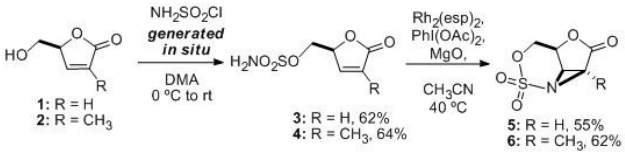
Many examples of α,β-diamino acids are found in nature or as components of natural products and their core structure is part of a wide variety of therapeutically useful drugs.[1]

2,3-Aziridino-γ-lactones have been shown to be valuable starting materials for the preparation of α- and β-amino acids.[2]

In this work, we wish to report the intramolecular aziridination of sulfamates derived from butenolide **1** as well as its 2-methyl derivative **2** to obtain 2,3-aziridino-γ-lactones. The reactivity of the latter toward nucleophiles and application of the procedure to the synthesis of α,β-diamino acids were subsequently studied.

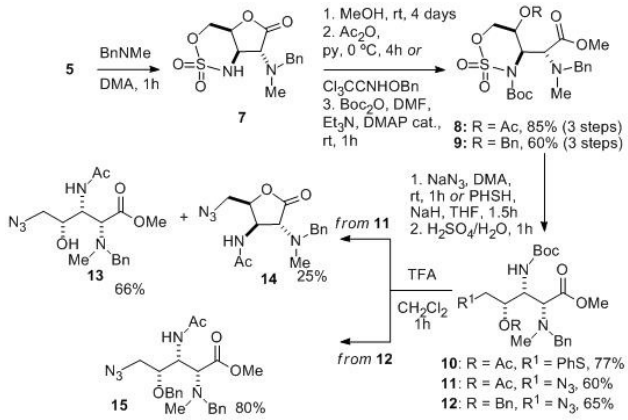
RESULTS AND DISCUSSION

The optically pure aziridino-γ-lactones **5** and **6** can be obtained by direct rhodium-catalyzed intramolecular aziridination of the butenolide sulfamates **3** or **4** prepared from the known butenolides **1** and **2** (Scheme 1).



Scheme 1. Preparation of the aziridino-γ-lactones **5** and **6**.

Regioselective opening of the aziridine ring of **5** with *N*-methyl-*N*-benzylamine gave derivative **7** (Scheme 2). Transformation of the latter into its *N*-protected and activated *N*-Boc derivative **8** was then accomplished in 3 steps with an overall yield of 85%. The analogous *O*-acetyl derivative **9** was obtained in 60% yield. The cyclic sulfamates were subjected to attack by azide or thiophenolate to give the corresponding α,β-diamino esters (**10**-**12**) in good yields. Removal of the Boc group of **11** led to the products of *trans*-acetylation **13** and lactonization **14**. Starting from the OBn derivative **12**, lactonization was avoided, affording the α,β-amino acid **15** in 80% yield (Scheme 2).



Scheme 2. Protected α,β-diamino acids **12** and **14** from aziridino-γ-lactone **5**.

CONCLUSION

In conclusion, we describe herein an efficient intramolecular rhodium-catalyzed, iminoiodane-mediated aziridination of 4-sulfamoylmethylbutenolides, furnishing the corresponding aziridino-δ-lactones. This methodology allows access to α,β-diamino acids.

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