

Diastereoselective addition of arylzinc reagents to a sugar aldehyde. Formal synthesis of (+)-7-*epi*-goniofufurone

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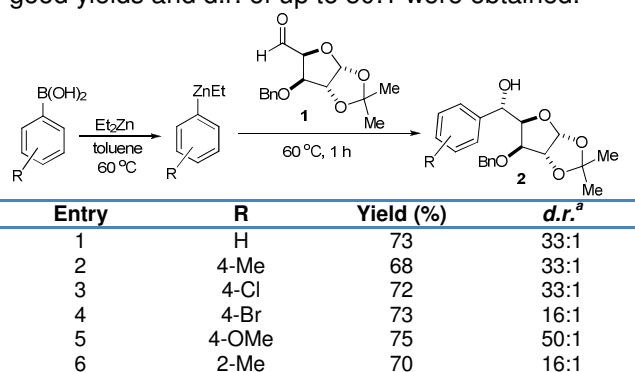
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INTRODUCTION

The addition of organozinc reagents to carbonyl compounds has been a subject of intense research over the past few years. However, while dialkylzinc reagents have been the most studied compounds, the synthetic potential of arylalkylzinc reagents have been less explored, despite their interesting reactivity. In this context, we described herein our studies regarding the diastereoselective addition of arylethylzinc reagents to chiral sugar aldehydes. In addition, this methodology was applied to a formal synthesis of the styryllactone 7-*epi*-goniofufurone.

RESULTS AND DISCUSSION

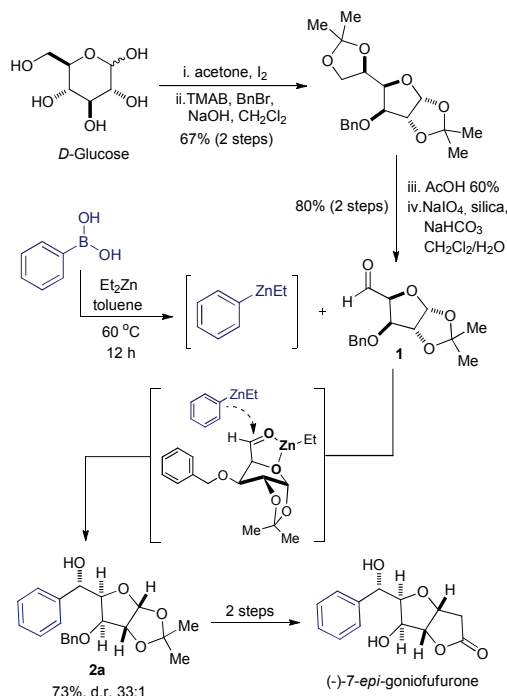
The method of choice for the generation of the arylzinc reagent was the boron-to-zinc exchange reaction, using arylboronic acids as the source of the transferable aryl group.¹ After optimization of the reaction conditions in order to achieve high yields and diastereoselectivity, we found that conducting the reaction in toluene, at 60 °C furnished the best results. Next, the scope of the arylation of the chiral furanoside aldehyde **1** with different arylzinc reagents was examined and in all cases studied, good yields and d.r. of up to 50:1 were obtained.



^a Determined by ¹H NMR.

The utility of this reaction was demonstrated in a formal synthesis of (+)-7-*epi*-goniofufurone, a natural styryllactone, isolated from *Goniiothalamus giganteus*.² The key step involved the phenylzinc addition to the sugar aldehyde **1**, which was prepared in 4 steps (1 chromatographic purification) from D-glucose. The phenyl addition occurred

smoothly in 73% yield and with excellent diastereoselectivity (33:1 d.r.). The resulting alcohol **2a** can be converted to the target compound in 2 additional steps,³ thus completing the a formal synthesis of the natural product.



CONCLUSION

In summary, we have developed an efficient, diastereoselective arylation of sugar aldehyde with arylzinc reagents. This methodology was successfully applied in a short and efficient formal synthesis of the (+)-7-*epi*-goniofufurone. Studies towards the expansion of the scope to several chiral aldehydes and their application to the synthesis of natural products and analogues are now underway.

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FAPESP, CNPq, CAPES

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