Bioreduction of Alkynones by Fungus from Brazilian Northeast

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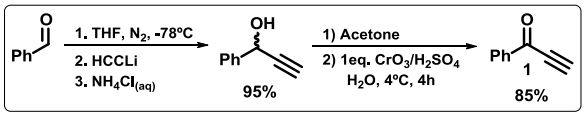
INTRODUCTION

The chiral non-racemic propargylic alcohols have been applied as important building blocks in the synthesis of biologically active products.
In addition, asymmetric bioreduction of alkynones can be a straightforward approach to obtaining this class of compounds in a high enantiomeric excess.[1]
In the last years, the number of works using enzymes of microbial strains as biocatalysts source has increased, mainly due to high catalytic and remarkable selectivity.[2] Although, the Brazilian northeast encompasses a diversity of microorganisms which have not been reported as bioreagents. Therefore, the manly objective of this work was to investigate the biocatalytic potential of the fungi *Penicillium verruculosum, Xylaria sp* and of the genus *Trichoderma* in the asymmetric reduction of alkynones.

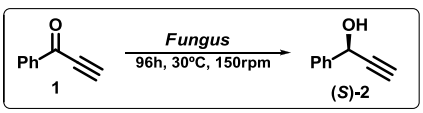
RESULTS AND DISCUSSION

The Alkynone **1** was prepared according described methods in the literature (Scheme 1).[3]



Scheme 1. Synthesis of the propargylic ketone **1**.

To verify the applicability of fungus as bioreducers agents, firstly the reaction parameters were optimized. The microorganisms were grown for 96h in an orbital shaker at 30°C and 150 rpm. After, substrate **1** (20mg; 0,15mmol) in DMSO (50µL) was added in reaction medium, the reaction course was monitored by chiral GC (Figure 1). The preliminary result showed the conversion of **1** to just one enantiomer of 1-phenyl-prop-2-yn-1-ol in a high conversion (>99%) with 96h (Scheme 2).



Scheme 2. Bioreduction of the Alkynone **1** to ***(S)*-2**

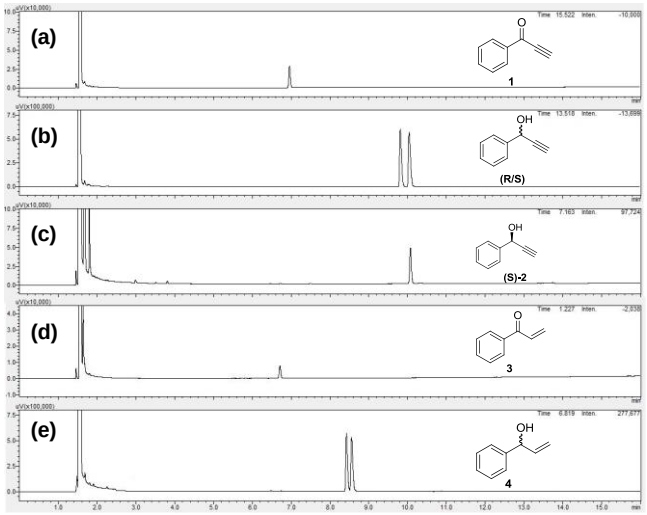


Figure 1. Chromatogram **(a)** standard alkynone **1**; **(b)** ***(R/S)*-2**; **(c)** bioreduction reaction with *Trichoderma* 220; **(d)** enone **3** and **(e)** allylic alcohol **4**

The GC analysis of these studies compared with literature[4] showed the preferential formation of (**S**)-**2** enantiomer after subjecting **1** to the bioreduction.
Actually other substrates have been prepared and submitted to the bioreduction glimpsing the synthesis of bioactive 4-HNE derivatives.[5]

CONCLUSION

The preliminary results indicated that the microorganism of the genus *Trichoderma* can be applied as potential bioreducer agent of propargylic ketones to access chiral non-racemic propargylic alcohols.

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