

Asymmetric reduction of 4-Bromo-Acetophenone using whole cells

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INTRODUCTION

Biocatalysis has become an increasingly valuable tool for synthetic chemists. Chiral alcohols with additional functional groups are very important intermediates in the synthesis of enantiomerically pure pharmaceuticals and other important chemicals.¹ Chiral phenylethanols (*R* or *S*) are an interesting compounds with a number of potential applications, particularly in the drug industry. These alcohols are used as building blocks for the synthesis of bioactive compounds such as pharmaceuticals, agrochemicals and natural products².

In this work, we report the use of 14 microorganisms for the asymmetric reduction of 4-Br-acetophenone.

RESULTS AND DISCUSSION

In this work, we used 14 microorganisms for the asymmetric reduction of 4-Br-acetophenone (10 yeast strains and 4 filamentous fungi strains) Figure 1. The best results are showed in table 1, some microorganisms such as *K.marxianus*, *Hansenula* sp., 3 strains of *S.cerevisiae* and *Phaenerochete* sp. showed low conversions (between 3 and 13%). All the reactions were conducted during 24 hours.

Figure 1. Reduction of 4-Br-Acetophenone

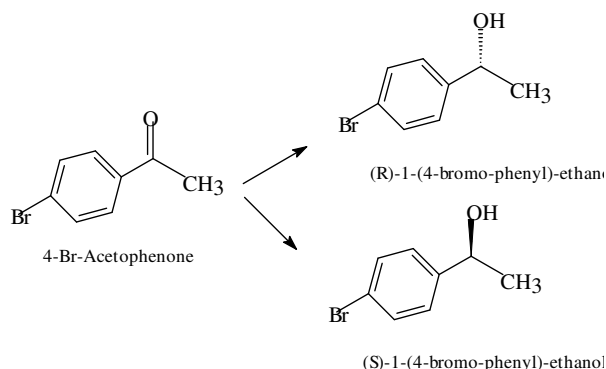


Table 1. Bioreduction of 4-Br-acetophenone

Microorganism	Conversion (%) [*]	e.e. (%) [*]
<i>Pichia</i> sp.	64,5	89,8 (<i>S</i>)
<i>G. candidum</i>	91,9	97,4 (<i>R</i>)
<i>A. niger</i>	98,4	100 (<i>R</i>)
<i>M. ramannianus</i>	100	20 (<i>S</i>)
<i>T. harzianum</i>	98,5	98(<i>R</i>)
<i>R. rubra</i>	96,13	98,8 (<i>S</i>)
<i>R. minuta</i>	99,36	98,2 (<i>S</i>)
<i>Candida</i> sp.	59,15	53,8 (<i>R</i>)

^{*}Determined using GC analysis

G.candidum, *A.niger* and *T.harzianum* were able to produce the *R*-enantiomer with excellent conversions and e.e. while *R.rubra* and *R.minuta* gave the *S*-enantiomer.

We chose 5 microorganisms to monitor the reaction's time, *G.candidum*, *R.rubra*, *R.minuta*, *A.niger* and *T.harzianum*. Using *G.candidum* we found that with 5 hours of reaction the conversion is 95%. Using *R.rubra* and *R.minuta* this conversion is achieved with 10 hours. The filamentous fungi, *A.niger* and *T.harzianum* need 24 hours to complete the reaction.

CONCLUSION

Using microorganisms we are able to produce both enantiomers of 1-(4-Br-phenyl)-ethanol, in excellent conversions and high enantiomeric excess.

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