Deracemization of Baylis-Hillman Adducts by Microbial Whole Cells in Ionic Liquids

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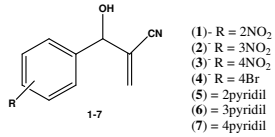
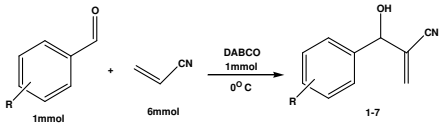
INTRODUCTION

Synthesis of chiral compounds in high enantiomeric excess is one of the targets in synthetic organic chemistry. Deracemization by chemical or biological tools is one the methods that have been known for preparation of optically active alcohols from racemates.[1] In these work, we applied microbial whole cells in the studies of deracemization of seven racemic aromatic Baylis-Hillman adducts (BHA) that show selective activity against Leishmania toxicities.[2]



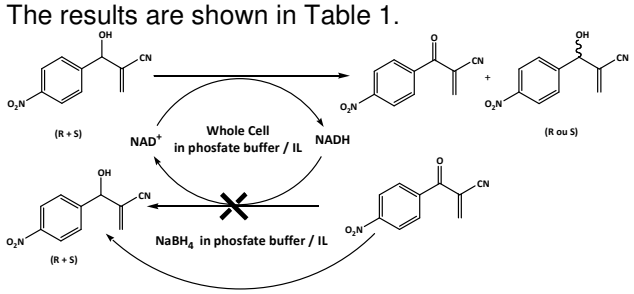
RESULTS AND DISCUSSION

BHA adducts were obtained by the method described by Vasconcellos et al.[2] in quantitative yields by reaction from adehydes and acrylonitrile using DABCO as catalyst (Scheme 1).



Scheme1. BHA prepared from acrylonitrile at low temperature.

Several microbial whole cells were used in the deracemization of BHA-**3** in a biphasic system comprised of an ionic liquid $[(BMIM)PF_6]$[3] and an aqueous phosphate buffer as solvent mixture and using $NaBH_4$ as regeneration cofactor (Scheme 2). The results are shown in Table 1.



Scheme 2. Bio-deracemization of BHA-3 in IL/buffer with $NaBH_4$

Table 1. Conversion and enantiomeric excess of BHA-3

Microbial Whole Cell	BHA-3	
	Conversion(%)[a]	e.e(%)[b]
Sac. cerevisiae	85	67
Pichia stipitis	90	100
Pichia cannadensis	100	10
Trichosporon cutaneum	100	33
Trichosporon capitatum	75	99
Candida albicans	85	99
Geotrichum Candidum	100	70
Aspergilus niger	100	85
Aspergilus terreus	99	88
Aspergilus fumegatus	100	81

Conditions: Phosfate buffer : IL (3:1), whole cell (1.0 g), glucose (0.05 g), BHA-**3** (0.06 mmol) $NaBH_4$ (0.54 mmol), reaction time 24 h, 30 °C, 300 rpm [a] Determined by GC. [b] Determined by GC using the chiral capillary column Hydrodex β-3P.

The best results for deracemization were obtained with microbial whole cell of *Picchia stipts, Trichosporon capitatum* and C*andida albicans*. The corresponding oxidation product was observed during the deracemization (Scheme 2) by GC-MS. No resolution is observed without $NaBH_4$ or biphasic mixture IL/ phosphate buffer.

CONCLUSION

The deracemization of BHA-**3** was obtained in good yield and excellent enantiomeric excess using biphasic mixture IL/ phosphate buffer and $NaBH_4$. The study of deracemization of other adduct is in progress in our laboratories.

ACKNOWLEDGEMENTS

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