BIOTRANS
LA ROCHELLE 2023

N°1410 / PC
TOPIC(s) : (Chemo)enzymatic strategies

Crystallization-based downstream processing of ω-transaminase- and amine dehydrogenase-catalyzed reactions

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PURPOSE OF THE ABSTRACT

Biocatalytic synthesis is a powerful and frequently chosen method to produce chiral amines.[1] Unfortunately, these biocatalytic reactions often result into complex mixtures, bearing many components aside the main product amine such as residual co-substrates, co-products, cofactors and buffer salts. This issue typically requires an additional effort during downstream-processing towards the isolation of the desired chiral amine.[2],[3] For instance, transaminase- and amine dehydrogenase-catalyzed reactions, which often use high surpluses of amine or ammonia co-substrates, face complications in removing the residual amine donor or unreacted substrate and salts from the isolated amine products, thus complicating and increasing the costs of the process of product isolation and purification.[4], [5] This study explores the selective removal of chiral amines from model amine transaminase and amine dehydrogenase-catalyzed reactions via a salt-based specific crystallization step (see Figure 1). The product amine is precipitated directly in one step from the reaction mixture as a product ammonium salt, which can easily be filtered off the reaction mixture, while the other reactants remain unchanged in solution for a potential re-use.

FIGURES

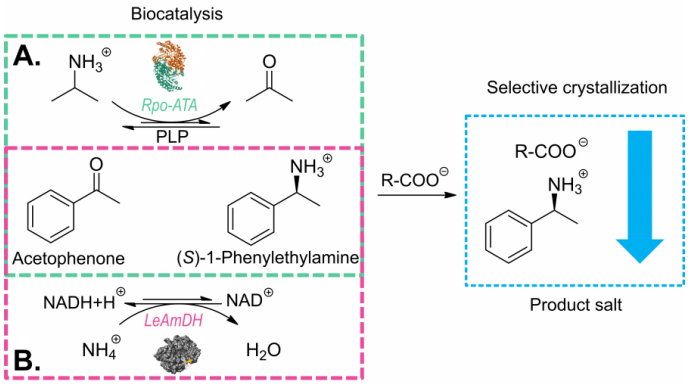

FIGURE 1

Reaction scheme of selective (S)-1-Phenylethylamine crystallization obtained from Rpo-ATA and LeAmDH catalyzed reactions.

Reaction scheme of selective (S)-1-Phenylethylamine crystallization obtained from Rpo-ATA and LeAmDH catalyzed reactions.

FIGURE 2

KEYWORDS

transaminase | amine dehydrogenase | downstream processing | crystallization

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