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Enantioselective precipitation of racemic mandelic acid using chiral ionic liquids

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PURPOSE OF THE ABSTRACT

Enantiomers share the same physical and chemical properties, with the exception of their optical rotation. However, biological systems can discriminate between the two enantiomers of a molecule.[1] Conventionally, only one of the enantiomers exerts the desired effect of a drug, whilst the other may lead to a less potent or even undesired response. Challenges have been faced related to the creation of methods to produce optically active drugs. Seeing the increased difficulty in the production of pure enantiomers by asymmetric synthesis, racemic resolution appears as a propitious strategy to follow due to its simplicity, enhanced flexibility, good reliability and lower costs. This approach is commonly achieved by chromatography and crystallization.[2] Enantiomeric precipitation shows to be another route of enhanced simple execution and reasonably low cost. Thus, solid-liquid biphasic systems (SLBS) composed of chiral selectors were proposed for the resolution of mandelic acid enantiomers. Chiral ionic liquids (CILs), bearing chirality on the cations and/or anions can be used to selectively precipitate enantiomers. Given the limited number of CILs and target racemic compounds reported in SLBS, it is of great interest to explore the ILs structural versatility and expand the type of target racemic compounds covered. This technique is used to promote the enantioselective precipitation of only one enantiomer in a racemic mixture due to cooperative interactions with the CILs. The precipitation studies were performed using different CILs' aqueous solutions, where the impact of the structure and chirality were investigated. Moreover, the influence of different operational conditions was evaluated, regarding its impact on the formed precipitate (such as time, concentration of the chiral selector, the enantiomers and speed). With the IL-based SLBS proposed high enantiosselectivities (e.e.% of c.a. 49%, without further additives) were attained.

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FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Enantioseparation | Chiral ionic liquids | Solid-liquid biphasic system | Enantiomeric Excess

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