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Synthesis of imprinted styrene-maleic acid functionalized resin for enantio-selective extraction of R-amphetamine

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Abstract

This article presents the development of an enantio-selective polymeric resin based on cross-linked styrene-maleic acid copolymer for chiral recognition of R-amphetamine and efficient optical resolution of (±)-amphetamine racemate. In the beginning, a polymerizable R-amphetamine-maleimide derivative was synthesized and investigated using elemental analysis, FTIR, and NMR spectroscopy to affirm the chemical structure. The chiral maleimide derivative was then copolymerized with styrene and divinylbenzene via free radical polymerization and the obtained polymeric resin was agitated with sodium hydroxide followed by HCl to expel the R-amphetamine template molecules out of the polymer texture. The obtained molecularly imprinted polymer was characterized using SEM, FTIR and EDX spectra then evaluated for selective removal of R-amphetamine under various conditions. The results indicated that the maximum uptake was achieved at pH 7 and the adsorption was performed in accordance with the Langmuir model with a maximum capacity of 210±1 mg/g. In addition, the optical separation was carried out using a column and the results indicated approximate enantiomeric excess values of 76.5% and 56.5% within both supernatant and eluant solution referring to S- and R-amphetamine approximately, respectively.

Keywords:
Molecular-imprinting
Amphetamine
Styrene-maleic acid polymer
Chiral resolution

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