Application of O-phenylacetyl β-CD as a carrier for selective transport of lead(II) across polymer inclusion membranes

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Received 3 December 2012; Accepted 26 April 2013

\textbf{ABSTRACT}

The o-phenylacetyl β-CD derivative 1 was obtained by substitution of β-CD and characterized by spectroscopic methods. Competitive transport of equimolar mixtures of Pb(II), Cd(II), Cu(II), and Na(I) ions from aqueous nitrate feed phase across polymer inclusion membranes (PIMs) using O-phenylacetyl β-CD 1 derivative as an ion carrier has been investigated. The influence of the phenylacetyl groups attached to β-CD rings on the selectivity and efficiency of metal ions transport across PIMs containing cellulose triacetate (CTA) as the support was studied. The efficiency of a membrane for the selective transport of Pb(II) ions has been investigated, and several parameters affecting metal transport have been evaluated, such as the carrier concentration, the plasticizer content, and the acidity of the aqueous phase. We found that facilitated transport of metal ions across the above PIMs proceeds via a carrier-mediated mechanism and is dependent on pH-driving force. PIMs including 1 selectively transported Pb(II) ions at concentration of ion carrier in membrane equal to 0.6 M and have shown the preferential selectivity order: Pb(II) >> Cd(II) > Cu(II) > Na(I). The repeated transport experiments of PIM indicated the long-term integrity of PIM.

\textbf{Keywords:} Polymer inclusion membrane; Competitive transport; O-phenylacetyl β-CD derivative; Metal ions

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