

Simultaneous extraction and separation of Cu(II), Zn(II), Fe(III) and Ni(II) by polystyrene microcapsules coated with Cyanex 272

Abstract

The preparation of polystyrene microcapsules coated with Cyanex 272 (MC-Xs) have been investigated and simultaneous extraction and separation behavior of Cu(II), Zn(II), Fe(III) and Ni(II) in both batch and packed column process have been carried out. It has been found from the studies that the dispersion agent plays an important role during preparation of microcapsules. Morphology studies show that higher amount of Cyanex 272 makes the MC-Xs inferior quality, whereas absence of Cyanex 272 in the microcapsules also makes the surface brittle. Mean diameter of MC-Xs are highly dependant on stirring speed and amount of polystyrene taken during preparation. The ratio of Cyanex 272 to polystyrene in the dispersed phase in preparation process for the batch extraction system shows the effect on extraction performance. Selective separation of Cu(II), Zn(II), Fe(III) and Ni(II) can be possible using MC-Xs by selecting the aqueous pH. Packed column operation studies illustrated that separation of Cu(II) from Zn(II) and Ni(II) can be obtained by performing repeated process. Almost 100% stripping from loaded MC-Xs have been obtained using 0.1 M and 0.5 M H₂SO₄ solution for Cu(II), 0.1 M H₂SO₄ solution for Zn(II) and 0.5 M H₂SO₄ solution for Fe(III). Good stability of MC-X is demonstrated from regeneration investigation. Finally selective recovery of Cu(II), Zn(II) and Ni(II) from leach liquor obtained from PCB is achieved performing the extraction-stripping process using MC-Xs.

Keywords: Microcapsules; Extraction; Separation; Cyanex 272; Packed column