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Ionic liquid based solvent micro-extraction of Ag and Cd from saline and hyper-saline waters

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Abstract

Cadmium (Cd) and silver (Ag) are naturally occurring metals in saline natural waters, which may present toxic effects even at trace level. Membrane technology has been widely applied for their extraction, including hollow fiber supported liquid membranes. However, their application to saline waters is limited. In this work, a hollow fiber liquid micro-extraction system, with a configuration of 2 phase solvent bar micro-extraction (2SBME), using the ionic liquid N-methyl-N,N,N-trioctylammonium chloride (Aliquat® 336), dissolved in kerosene as extractant is proposed to overcome the limitations of existing HFLPME of Ag and Cd in saline waters.

The use of an ionic liquid solution in the 2SBME leaded to higher stability of the organic solution in the fiber. The effect of chemical variables on the extraction was evaluated. Extraction of Cd and Ag with Aliquat® 336 was enhanced by Cl^- in the sample, but it was independent of the concentration of organic matter. Extraction yield varied in the range 65-80% for Ag, and 45%-95% for Cd, depending on the salinity of samples. The highest extraction was obtained in seawater samples for 75% Aliquat® 336 dissolved in kerosene with 10% dodecan-1-ol, after 45 minutes, and 800 rpm stirring rate in the sample. Efficacy of the proposed system when applied to real