Ni(II) extraction by 5-phenyl-azo-8-hydroxyquinoline (5PH8HQ) grafted on Aerosil silica particles in colloidal suspension

Maureen ROSE-HELENE, Alain WALCARIUS, Marc HEBRANT

Nancy University - Institut Jean Barriol - LCPME UMR 7564 CNRS - ELAN
405 rue de Vandoeuvre- 54600 VILLERS-LES-NANCY, France
*e-mail: marc.hebrant@lcpme.cnrs-nancy.fr

There is a growing interest for solvent free processes. Metal ion extraction by ultrafiltration of micelles solubilizing a selective extractant instead of classical solvent extraction has been proven to allow to drastically decrease the quantities of organic matter involved in the process. Nevertheless, the loss of small amounts of surfactant through the ultrafilter is a significant drawback.

In this work we are studying the interest of replacing the micellar pseudophase by a dispersed complexing solid phase in colloidal state. The interest is twice: one may not only imagine no organic leaking through the membrane but also higher concentration factors of the metal ion initially in the treated effluent in contrast to micellar ultrafiltration.

We describe here the extraction of copper and nickel by preformed silica particles (Aerosil 200 and 300) functionalized by grafting 5-phenyl-azo-8-hydroxyquinoline.

At the laboratory scale frontal ultrafiltration is carried out using Millipore 8010 (10mL) stirred cells. The ultrafiltration experiments carried out using varying ligand-to-metal ratio (L/M). Retentate and permeate have been analyzed by ICP-AES.

The experimental curves (yield as a function of L/M ratio) are fitted by a non linear least squares procedure. The complex stoechiometry allowing the best fit is 1:1. The thermodynamic constants are compared to those found in the literature in homogeneous, micellar medium or grafted on other solids.