

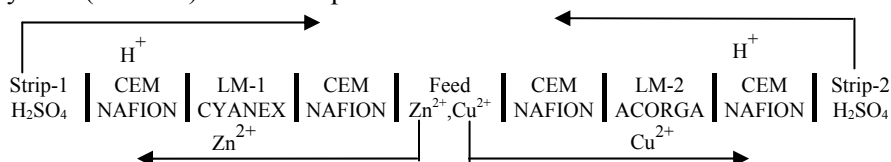
XVII-th ARS SEPARATORIA – Borówno, Poland 2002

SIMULTANEOUS RECOVERY AND CONCENTRATION OF Zn(II) AND Cu(II) IN DOUBLE MULTIMEMBRANE HYBRID SYSTEM (D-MHS)

Piotr SZCZEPAŃSKI, Grażyna SZCZEPAŃSKA
and Romuald WÓDZKI

Nicholas Copernicus University, Faculty of Chemistry
87-100 Toruń, 7 Gagarina St., Poland
e-mail: wodzki@chem.uni.torun.pl

This work deals with functioning of a double multimembrane hybrid system (D-MHS) of the composition:



where CEM denotes a cation exchange membrane, a f – feed solution, s – stripping solution and LM – liquid membrane.

The main aim of this study was to design an experimental D-MHS system sufficient for the simultaneous recovery and separation of Zn^{2+} and Cu^{2+} from dilute aqueous solutions. According to the above-presented scheme, the D-MHS operation involves a series of ion-exchange-diffusion processes (in CEMs) coupled to the LM transports mediated by two different carriers. It was found experimentally that the D-MHS separation ability depends mainly on the composition of an organic phase and, specifically, on the carrier properties. Some representative results corresponding with D-MHS with Acorga P-50 and Cyanex 302 (or D2EHPA) as the selective carriers of Zn^{2+} and Cu^{2+} , respectively, are listed in Tab.1.

Table. 1. Fluxes in the D-MHS system: feed: 0,01 M $Zn(NO_3)_2$ and $Cu(NO_3)_2$; strip 1 M H_2SO_4 , LM 0,1 M carrier in kerosene

LM-1	LM-2	Fluxes [mol/cm ² s]			
		Zn^{2+}		Cu^{2+}	
		S-1	S-2	S-1	S-2
Cyanex 302	Acorga P-50	$1,6 \times 10^{-10}$	$1,1 \times 10^{-12}$	≈ 0	$6,8 \times 10^{-10}$
D2EHPA	Acorga P-50	$6,2 \times 10^{-10}$	$8,8 \times 10^{-13}$	$6,8 \times 10^{-11}$	$3,4 \times 10^{-10}$

The results of this study prove that two simultaneously operating MHS systems allow the efficient separation and recovery of two cations. The optimization of the carrier concentration in a given liquid membrane and the concentration of the stripping agent in external stripping solutions could enhance the system performances.