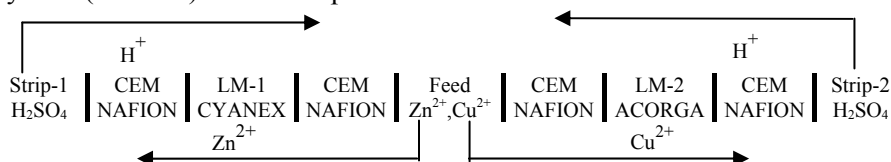


SIMULTANEOUS RECOVERY AND CONCENTRATION OF Zn(II) AND Cu(II) IN DOUBLE MULTIMEMBRANE HYBRID SYSTEM (D-MHS)

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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 Zn²⁺ and Cu²⁺ 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 Zn²⁺ and Cu²⁺, respectively, are listed in Tab.1.

Table. 1. Fluxes in the D-MHS system: feed: 0,01 M Zn(NO₃)₂ and Cu(NO₃)₂; strip 1 M H₂SO₄, 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 | 1,6×10 ⁻¹⁰ | 1,1×10 ⁻¹² | ≈0 | 6,8×10 ⁻¹⁰ |
| D2EHPA | Acorga P-50 | 6,2×10 ⁻¹⁰ | 8,8×10 ⁻¹³ | 6,8×10 ⁻¹¹ | 3,4×10 ⁻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.