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[P1.131] Noise spectra of K⁺ and NH₄⁺ ion transport at a cation exchange membrane interface
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ABSTRACT

The present work investigates the effect of the counter ion nature on the noise of the over-limiting current (lov.). Moreover the electrochemical methods ; current voltage curve (I-V) and the chronopotentiometry (V-t) measurements are examined. The over limiting current is always accompanied by a neat electrical noise. It is a well accepted experimental phenomenon. The study of this noise may contribute to a better understanding of the lov. and the feasibility of electrodialysis operation at this current in terms of energy consumption. The electrical noise depends directly on the counter ion nature. Its intensity decreases according to the Hoffmeister serie : Li -> Na+ -> K+). This is explained based on the Hydration number of the counter-ion. The power spectral density of the membrane’s potential fluctuation was obtained via the Fourier analysis of the time series recorded during the transport of counter ions (Li+, Na+, K+ and NH4+ ). The spectra are evaluated above the limiting current indicating the differences between the K+ and the NH4+. It is found that the cation NH4+ presents a singular behaviour and the noise is minimal.

Figure 1: The instantaneous differential ddp tranmembranaire/Δl at a given current. (Four electrodes cell, membrane CMX, Free convection, AutolabPGSTAT30). Sulfates at 0.05N

For the countre ion: a) K+ b)NH4+
Figure 2: Chronopotentiometric curves of CMX membrane in 0.05N K₂SO₄ and (NH₄)₂SO₄ under a constant current density of 10mA cm⁻² as a function of counter ion solutions at 23°C.

Figure 3: Spectral density of membrane potential fluctuation measured for a membrane in 0.05N solution K₂SO₄ and (NH₄)₂SO₄ at 10mA cm⁻².

REFERENCES.

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