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PII: S0376-7388(18)31703-4
DOI: https://doi.org/10.1016/j.memsci.2018.08.042
Reference: MEMSCI16416

To appear in: *Journal of Membrane Science*

Received date: 21 June 2018
Revised date: 22 August 2018
Accepted date: 23 August 2018

Cite this article as: E.M. Akberova, V.I. Vasil'eva, V.I. Zabolotsky and L. Novak, EFFECT OF THE SULFOCATION-EXCHANGER DISPERSITY ON THE SURFACE MORPHOLOGY, MICRORELIEF OF HETEROGENEOUS MEMBRANES AND DEVELOPMENT OF ELECTROCONVECTION IN INTENSE CURRENT MODES, *Journal of Membrane Science,* https://doi.org/10.1016/j.memsci.2018.08.042

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ABSTRACT

Comparative analysis of the effect of electrical and geometric heterogeneity of the surface of heterogeneous sulfocation-exchanger membranes Ralex CM Pes produced by MEGA a.s. (Czech Republic) and the Russianmembranes MK-40 manufactured by JSC “Shchekinoazot” on current voltage characteristics (CVC), conditions of occurrence and intensity of electroconvective instability at the membrane/solution interface in intense current modes was carried out. Membranes MK-40 were prepared by hot-pressing technology (https://www.n-azot.ru), membranes Ralex CM Pes by hot-rolling technology (https://www.mega.cz). In the manufacture of the membranes Ralex CM Pes, the milling time for sulfocation-exchanger on a ball mill varied from 5 to 80 min, the volume ratio of cation-exchanger to polyethylene was kept the same. It was found that in the swollen state of the membranes with the increase in the milling time of the ion-exchanger, the ratio between the conducting (ion-exchanger grain) and inert (polyethylene) sections on the surface of the membranes remained constant, and the size of the conducting sections and the distances between them decreased, while the surface microrelief became smoother. Despite the decrease in roughness of the membrane surface, as the degree of dispersity of the initial sulfocation-exchanger increases, the CVC of the membranes show an increase in the limiting diffusion current, a reduction of the plateau section of the limiting current, and an increase in the size of the electroconvective instability region in the solution at the interphase boundary. These facts indicate that when the conditions of the membrane-preparing technology change, a more significant factor determining the conditions for the occurrence and intensity of the development of heteroelectroconvection is a decrease in the electrical heterogeneity of the membrane surface.