

Accepted Manuscript

Effect of ampholyte nature on current-voltage characteristic of anion-exchange membrane

E.D. Melnikova, N.D. Pismenskaya, L. Bazinet, S. Mikhaylin, V.V. Nikonenko



PII: S0013-4686(18)31704-3

DOI: [10.1016/j.electacta.2018.07.186](https://doi.org/10.1016/j.electacta.2018.07.186)

Reference: EA 32383

To appear in: *Electrochimica Acta*

Received Date: 17 June 2018

Revised Date: 22 July 2018

Accepted Date: 24 July 2018

Please cite this article as: E.D. Melnikova, N.D. Pismenskaya, L. Bazinet, S. Mikhaylin, V.V. Nikonenko, Effect of ampholyte nature on current-voltage characteristic of anion-exchange membrane, *Electrochimica Acta* (2018), doi: 10.1016/j.electacta.2018.07.186.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

EFFECT OF AMPHOLYTE NATURE ON CURRENT-VOLTAGE CHARACTERISTIC OF ANION-EXCHANGE MEMBRANE

E.D. Melnikova¹, N.D. Pismenskaya¹, L. Bazinet^{2,3}, S. Mikhaylin^{2,3}, V.V. Nikonenko¹

¹Physical Chemistry Department, Kuban State University, 149 Stavropolskaya Str., 350040 Krasnodar, Russia

²Institute of Nutrition and Functional Foods (INAF) and Department of Food Sciences, Université Laval, Québec, QC, Canada

³Laboratory of Food Processing and ElectroMembrane Processes (LTAPEM), Université Laval, Québec, QC, Canada

HIGHLIGHTS

I-V curves of an AMX membrane in phosphate and tartrate solutions are compared

There are two limiting currents in the case of monosodium hydrophosphate solution

The first limiting current is absent in the case of potassium hydrotartrate solution

Difference is due to the ratio of the ampholyte dissociation constants

ABSTRACT

Current-voltage characteristics (CVCs) of a Neosepta AMX membrane are studied in NaH_2PO_4 (pH=4.7, $C=0.02$ mol/L) and $\text{KC}_4\text{H}_5\text{O}_6$ (pH= 3.6, $C=0.02$ mol/L) solutions. It is shown that in the case of NaH_2PO_4 there are two plateaus in the CVC, which correspond to achievement of the first, i_{lim}^I , and second, i_{lim}^{II} , limiting currents. i_{lim}^I occurs when the NaH_2PO_4 salt diffusion to the membrane surface is saturated, i_{lim}^{II} refers to the saturation of the proton flux when the membrane is almost completely converted into the HPO_4^{2-} form. In the case of potassium hydrotartrate, there is no state corresponding to i_{lim}^I . The difference in CVC for two ampholytes is due to the difference in the ratio between the dissociation constants related to the first (K_{a1}) and second (K_{a2}) steps of ampholyte dissociation. In the case of NaH_2PO_4 , where $\text{p}K_{a1}$ and $\text{p}K_{a2}$ differ greatly, a solution of this salt contains nearly exclusively the singly charged phosphate form. However, a $\text{KC}_4\text{H}_5\text{O}_6$ solution contains, together with the $\text{C}_4\text{H}_5\text{O}_6^-$ anion, about 15% of the doubly charged tartrates, which take part in charge transfer. Approximate analytical expressions are obtained for i_{lim}^I and i_{lim}^{II} in the case of monosodium hydrophosphate solution. Their

Download English Version:

<https://daneshyari.com/en/article/6601803>

Download Persian Version:

<https://daneshyari.com/article/6601803>

[Daneshyari.com](https://daneshyari.com)