MECHANISM OF FREQUENCY-INDEPENDENT CONDUCTIVITY IN AQUEOUS SOLUTIONS OF ELECTROLYTES

L.A. Bulavin, A.N. Alekseev, Yu.F. Zabashta, S.Yu. Tkachev

Taras Shevchenko National University of Kyiv,
Faculty of Physics
(*4, Academician Glushkov Prosp., Kyiv 03680, Ukraine; e-mail: tkachevserg@gmail.com*)

S u m m a r y

It is shown that the dependence of the resistance of a cell filled with a NaCl aqueous solution on the ac frequency cannot be explained as a result of only polarization phenomena in the boundary region at the electrode–electrolyte interface. A physical mechanism is proposed, which explains the monotonous increase of the solution specific conductivity at frequencies below 10^4 Hz, and its constant value in the frequency interval of 10^4–10^5 Hz. The temperature dependences for the diffusion coefficients of Na^+ and Cl^- ions in NaCl aqueous solutions and for the dimension of an physically infinitesimal volume (a region, where the local equilibrium is established) in this electrolyte are calculated. The space-time hierarchies in the NaCl aqueous solution are analyzed, and a relationship between a connection of the ac period with certain time characteristics, on the one hand, and the frequency dependence of the specific conductivity in this electrolyte, on the other hand, is demonstrated.