STUDIES ON THE FARADAIC IMPEDANCE OF THE SILVER-SILVER ION ELECTRODE SYSTEM

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Abstract

The impedance measurements of the Ag/Ag^+ system using the Schering's bridge are reported for various concentrations of Ag^+ ions at $26 \pm 1^\circ C$. The electrode system was of the guard ring type. The difficulties of obtaining the characteristic parameters from the impedance data are discussed. A new method of analysis of the impedance data has been suggested and tested on model data.

The experimental data are consistent within experimental error with the presence of a Warburg type crystallisation impedance. Slight discrepancies have had to be attributed to an additional frequency independent capacitor in series with

(a) the solution resistance

or (b) the transfer impedance. It is suggested that this is due to either oxide films or adsorption.

The purity of the materials used and the precision of the experimental method do not permit an accurate evaluation of the cell parameters. The most reliable values of the parameters are of the following order. (for $C_{Ag^+} = 1.0 \times 10^{-5}$ mol cm^{-3})

$C_0 = 10 \mu F\ cm^{-2}$; $i_0 = 20\ mA\ cm^{-2}$; $\sigma = 240\ \Omega\ cm^2\ sec^{-1}$; $\Gamma = 3 \times 10^{-12}$ mol cm^{-2}; $mV_G = 0.07$ ml cm^{-2}. The results obtained are compared with the literature values.