The Impedance of the Water - 1,2-Dichloroethane Interface

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The study of electrochemical properties of the interphase between two immiscible solutions of lithium chloride in water and tetrabutylamonium tetraphenylborate (TBATPB) in 1,2-dichloroethane were extended [1] using cyclic voltammetry and ac impedance in the frequency range of 5 Hz to 50 KHz. Attention was focussed in the concentration dependence of impedance spectra as well as on the effect of concentration on the potential interval of ideal polarization.

The impedance spectra displays, at low concentrations, a semicircle, fig. 1, and linear portions from which values of the differential capacity were obtained [2]. Typical results illustrating the effect of varying the concentration in the aqueous phase and in the organic phase are shown, respectively in figs. 2 and 3. It appears that there is no shift in the potential range of capacitive behaviour when both phases contain equal concentrations of the electrolytes [3]. Maintaining the concentration of one of the electrolytes constant the differential capacity minimum shifts upon varying the concentration of the other, even accounting for the degree of association in the organic phase. The results will be discussed in view of the current models to describe such interfaces in order to understand the role played by each part of the interface in the overall properties [4].

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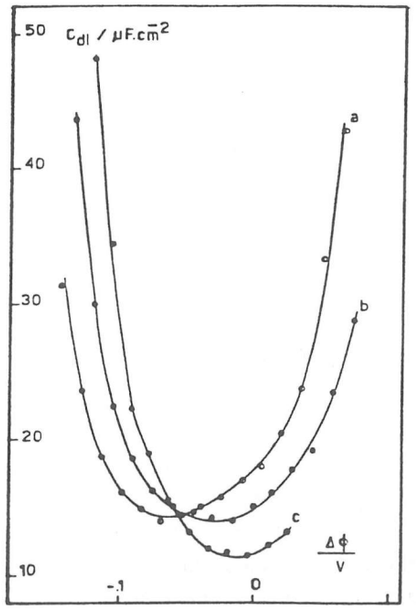

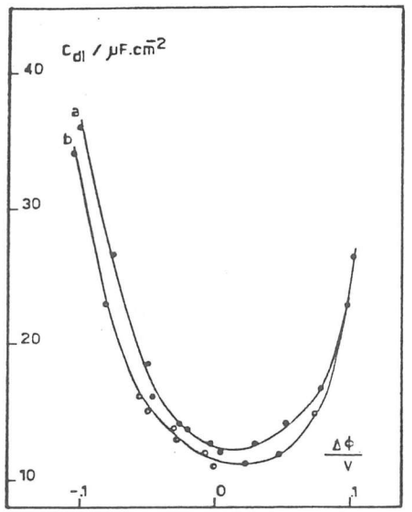

Fig.2- Effect of concentration of TBATPB on the differential capacity of the 1,2-Dichloroethane -Water interface; a) 0.060 M b) 0.034 M, c) 0.017 M LiCl-0.035 M

Fig.3- Effect of concentration of LiCl on the differential capacity of 1,2-Dichloroethane-Water interface; a) 0.036 M b) 0.049 M TBATPB-0.029 M

References:

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2- P. Hádjková, D. Homolka, V. Marecek and Z. Samec, J. Electroanal. Chem., 151 (1983) 277.
3- J. R. Reid, P. Vanicek and R. P. Buck, J. Electroanal. Chem., 161 (1984)1
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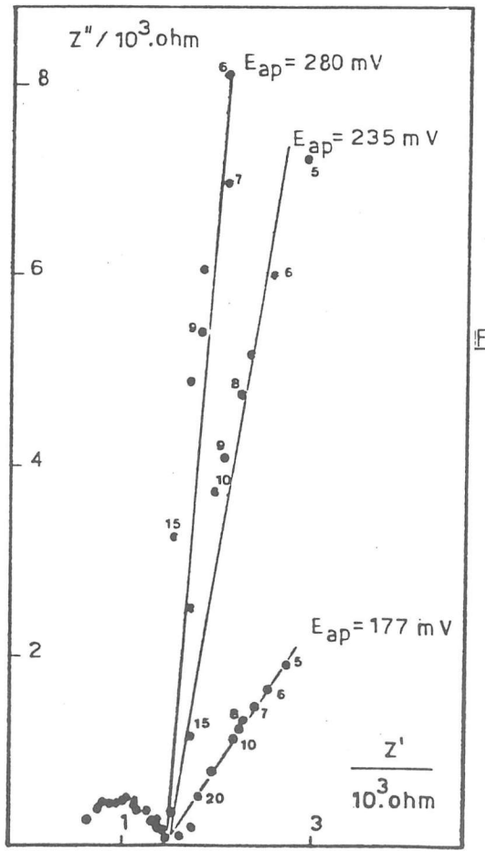

Fig.1- Impedance spectra for the 1,2-Dichloroethane(TBATPB) - -Water (LiCl) interface; frequencies in Hz.