Viscosity Determination in Mixtures of Water with Organic Solvents Using Electroanalytical Limiting Currents

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Values of relative viscosity can be determined from ratios of limiting diffusion controlled currents recorded in pure aqueous solutions to those obtained in mixture with water-soluble organic co-solvents. These values can be used for evaluation of electrochemical experiments in such media and for distinguishing currents affected solely by a change in viscosity from those caused by other solvent-solute interactions, e.g. covalent additions. Limiting currents of Cd2+ ions and of 2-hydroxy-1,4- naphthoquinone proved to yield most reliable result, values of relative viscosity obtained with Tl+ ions showed somewhat poorer correlation. The average values of relative viscosity obtained from comparison of limiting currents for mixtures of water with ethanol and acetonitrile are in very good agreement with average values of relative viscosity reported in the literature and in acceptable agreement for mixtures of water with 2- propanol. Nevertheless, the electrochemical data show much smaller standard deviations, than the data reported in the literature, which have shown inconsistencies when data from different sources are compared. The data obtained for mixtures of water with DMF have not been previously reported.

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