Activity Coefficients of Binary Mixtures Through the Whole Concentration Range from Surface Tension Measurements

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Knowledge of activity coefficients values, γ, is of primary importance in physicochemical problems involving mixtures of different substances. They include, among others, applications to biological systems, environmental engineering and industry of separation processes. For instance the behavior of enzymes in solvents of different thermodynamic activity has proved to be very interesting from both, the basic understanding of such molecules and the new potential applications they can have. A number of experimental techniques and theoretical models have been developed to provide numerical values of activity coefficients but there is not any universal method suitable for every kind of systems. It is relatively simple to determine γ values when at least one of the solutes has a significant volatility but alternative methods for other kind of system are demanded. The surface tension is a physicochemical property which could be employed with this aim because of its very high sensitivity to any change in the concentration, and so in the thermodynamic activity, of the different compounds in a mixture. A few papers dealing with the topic of evaluating limiting activity coefficients from surface tension data have been published in the past but there are no proposals to determine γ values through the whole concentration range from liquid-vapor surface tension measurements. In this work a method of such characteristics is proposed proving to work well for several binary mixtures for which both, surface tension and activity coefficients determined from independent sources, are available.