

## Phase Equilibria of (Water + [EMIM] Bromide) and (Water + [EMIM] Tosylate)

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Knowledge of phase equilibria of ionic liquids is essential for their application in technology. In this work, isothermal vapor-liquid equilibria (VLE) were determined for aqueous solutions of two ILs for which these data are missing: 1-ethyl-3-methylimidazolium bromide ([EMIM][Br]) and 1-ethyl-3-methylimidazolium tosylate ([EMIM][TOS]). VLE were obtained by measurements of water activity that were carried out from  $T = 288.15$  K to  $T = 318.15$  K and for water mole fractions greater than 0.45. The temperature and concentration dependences of the activity coefficients were correlated simultaneously by an extended NRTL model, by which also excess thermodynamic properties were evaluated. Their values showed that these systems are highly nonideal and that [EMIM][Br] interacts with water more strongly than [EMIM][TOS]. In addition, the NRTL model was used to predict solid-liquid equilibria (SLE) for both systems. To check these predictions, SLE was measured for (water + [EMIM][Br]) by a dynamic method over a broad range of mole fractions. The experimental and the predicted SLE data are in reasonable agreement. This is also the case of (water + [EMIM][TOS]), for which the prediction was compared with the literature SLE data. Overall, our results give insight into the molecular interactions of these two ionic liquids with water, and provide new data that can be used as a basis for applications.