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Solvent effect on the enthalpy of solution and partial molar volume of the ionic liquid 1-butyl-3-methylimidazolium tetrafluoroborate

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Abstract

Enthalpies of solution and partial molar volumes of the ionic liquid 1-butyl-3- methylimidazolium tetrafluoroborate were determined in 15 solvents of different polarity. Very large differences of the enthalpies of solution (Δ ΔsolHIL = 38.9 kJ·mol -1) and partial molar volumes (ΔVIL = 43 cm 3·mol -1) are nearly the same as observed for lithium perchlorate solutions. These results clearly indicate that the low values of the macroscopic polarity parameters of [bmim]BF 4 do not correspond with the large differences of the intermolecular interactions in IL solutions. The values of the partial molar volume of the cation, V [bmim]+, were estimated for the first time. The changes of the partial molar volumes, V IL, reflect mainly the changes of anion volume, V BF4. The rate of the Diels-Alder reaction of 9,10- dimethylanthracene with maleic anhydride in the [bmim]BF 4 medium was nearly the same as in common molecular solvents.

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Keywords

1-butyl-3-methylimidazolium tetrafluoroborate, Enthalpy of solution, Partial molar volume, Solvent effect