COMPREHENSIVE STUDY OF EVAPORATION OF $BMImBF_4$ IONIC LIQUID

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It is known that ionic liquids based on imidazolium with tetrafluoroborate anion have a complex composition of vapor. To determine the nature of the saturated vapor components and find their thermodynamic characteristics a comprehensive study of the ionic liquid 1-butyl-3-methylimidazolium tetrafluoroborate, comprising Knudsen mass spectrometry, IR spectroscopy, thermal analysis and NMR, gas chromatography and quantum chemical calculations is performed.

It is established that the composition of the condensed phase does not undergo appreciable changes in the process of heating and evaporation of the liquid. In the temperature range 424-514 K in the mass spectra of the object under study the ions of both the ionic liquid itself and its conversion products are detected. First of all it is necessary to note products of interaction of a cation with an anion - ylidenes, concentration of which reaches 70% from an ionic liquid. Another characteristic feature is the possible cyclization of the starting compound. Products of this conversion in electron ionization mass spectrum are dominating and their fraction (as the fraction ylidenes) increases with time and temperature.

The revealed features of evaporation indicate the impossibility of using integral methods for determining the pressure of saturated vapor to find thermodynamic characteristics. However, the slope of the temperature dependence of the ion current of the parent $BMIm^+$ cation the enthalpy of vaporization of the ionic liquid was determined.