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NMR STUDY OF BIOACTIVE IONIC LIQUIDS

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Bioactive Room Temperature Ionic Liquid (b-RTIL) is a class of RTIL that is made of biomolecules and thus b-RTIL is compatible with living organisms. Due to composition b-RTILs are widely applied in the medical field in drug delivery systems and can increase non-soluble drug solubility in water.

In this study high-resolution Nuclear Magnetic Resonance (NMR) was used to investigate choline lysinate [Ch][Lys] and choline tryptophanate [Ch][Try] in a water mixture. [Ch] is involved in the metabolism process while [Try] and [Lys] are involved in protein biosynthesis. Diluted [Ch][Try] water solution was investigated by ^{1}H, ^{13}C, ^{15}N 1D and 2D NMR. The solutions were measured in b-RTIL concentration from 10^{-6} to 1 molar fraction. Additionally, glibenclamide (Gli) solubility was examined in [Ch][Lys] and [Ch][Try] water mixtures. Glibenclamide is used to treat type II diabetes.

It was found that the [Ch]$^{+}$ ^{1}H chemical shifts reach the plateau at around $\chi_{\text{RTIL}} = 2.5 \times 10^{-4}$ molar freq. in [Ch][Try] water mixture and at $\chi_{\text{RTIL}} = 1.4 \times 10^{-4}$ molar freq. in [Ch][Lys] water mixture. [Try]$^{-}$ protons' chemical shift stabilizes at $\chi_{\text{RTIL}} = 5 \times 10^{-5}$ molar freq. [Lys]$^{-}$ ^{1}H chemical shift never reaches the plateau. Chemical shift minima were registered at $\chi_{\text{RTIL}} = 0.1$ molar freq. for almost all protons in the cation and both anions.

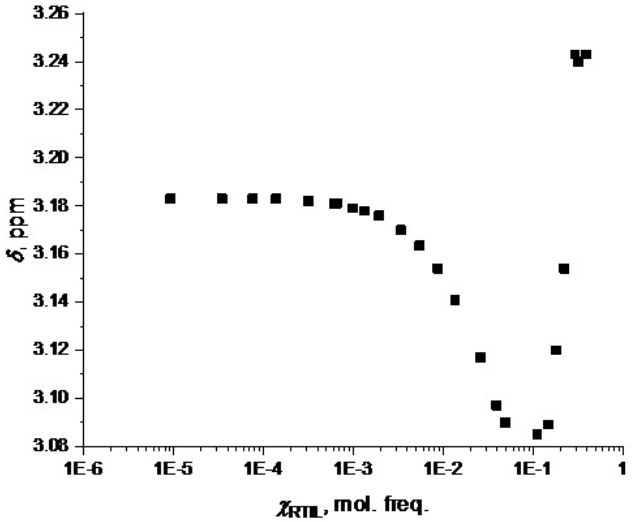

Fig. 1. [Ch]$^{+}$ ^{1}H of $(CH_3)_3$–X chemical shift dependency of b-RTIL concentration in [Ch][Lys] and water solution.

Finally, both [Ch][Lys] and [Ch][Try] increase glibenclamide's solubility in water.