

Boranate Ionic Liquids – from $[\text{BH}_4]^-$ to $[\text{B}_3\text{H}_8]^-$

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Here we open the barely developed area of hydridoborate based Ionic Liquids^[1], that might also be of interest due to the poor solubility of the alkaline metal boranates in none coordinating organic solvents, e.g. CH_2Cl_2 . To overcome this deficiency we prepared a series of well soluble and pure boranate based Ionic Liquids with BMMIM, EMMIM, PropMPip and BMP cations. In contrast to earlier reports that proved to give only mixtures of the Boranate anion with huge halide contamination (maximum $[\text{BH}_4]^-$ content: 77.5%) we developed a procedure that gives clean products with correct elemental analysis. These materials are the starting material for the (still hypothetical) hydrogen storage redox shuttling between $[\text{BH}_4]^-$ and $[\text{B}_{12}\text{H}_{12}]^{2-}$. The one step synthesis of $[\text{Cat}][\text{B}_3\text{H}_8]^-$ includes a new pathway to form $[\text{B}_3\text{H}_8]^-$ salts without using I_2 as an oxidant or BH_3 compounds as starting material. Our goal is the investigation of the reversibility of hydrogen transfer from $[\text{BH}_4]^-$ to the higher boranates.

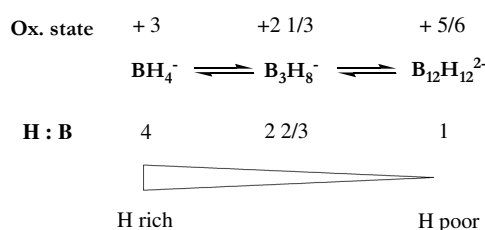


Figure 1: Scheme for the possible shuttling between $[\text{BH}_4]^-$ and $[\text{B}_{12}\text{H}_{12}]^{2-}$.

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