

ELABORATION OF THE NEW METHOD OF SYNTHESIS OF $M_xB(CF_3)_4$ SALTS, $M=Li, Na, Mg$ – POTENTIAL SOLID ELECTROLYTES

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Solid state ionic conductors are interesting alternatives to the solutions of metal salts in organic solvents, which are typically used as electrolytes in electrochemical batteries. One of the groups of potential ionic conductors are the salts of weakly coordinating anions – characterized by very weak cation-anion interactions and high redox and thermal stability. Tetrakis(trifluoromethyl) borate, $[B(CF_3)_4]^-$, is an example of such anion. Although a few of its salts were mentioned in the literature, only the crystal structure of $K[B(CF_3)_4]$ and $Cs[B(CF_3)_4]$ were reported, and no electrochemical characterization of such salts has been conducted. The currently known methods of synthesis of the $M[B(CF_3)_4]_x$ salts are either inefficient or hazardous, involving such precursors as fluorine or chlorine monofluoride[1]. Here we present our effort to develop a more convenient synthetic approach, which could be carried out in a typical laboratory. We report a series of the methods tested and present the obtained chemical compounds, characterized by their crystal structures and spectroscopically.

[1] Eduard Bernhardt, Gerald Henkel et al., Synthesis and Properties of the Tetrakis(trifluoromethyl)borate Anion, $[B(CF_3)_4]^-$: Structure Determination of $Cs[B(CF_3)_4]$ by Single-Crystal X-ray Diffraction, Chem. Eur. J. 2001, 7, No. 21