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VIII INTERNATIONAL CONGRESS VIII

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BOOK OF ABSTRACTS

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MARCH 20-23, 2023

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THE USE OF CHOLINE BUTYRATE FOR THE EXTRACTION OF 5-HYDROXHYMETHYLFURFURALE (HMF) FROM HONEY

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Abstract

Choline (2-hydroxyethyltrimethyl ammonium chloride) belongs to the class of quaternary ammonium salts and is always associated with an anion of the opposite charge (chloride, hydroxide, tartrate, butyrate). It is one of the most important biodegradable, inexpensive and water-soluble organic salt. Also, is a component present in the body and is considered a good biocompatible component of ionic liquids. Choline serves as a precursor molecule for the neurotransmitter acetylcholine, which plays a role in many functions, including memory and muscle control. It appears in the composition of the main groups of phosphatidylcholine and sphingomyelin, two classes of phospholipids that are present in cell membranes. Compared to ionic liquids containing imidazole or pyridine cations, ionic liquids with choline cations have lower toxicity and higher biodegradability. Choline-based ionic liquids are widely used today in the field of green, sustainable chemistry and in many chemical processes.

Honey is the only natural food product consumed in unprocessed form. Application of ionic liquids for the extraction and detection of some honey safety parameters (hydroxymethylfurfural and pesticides) can lead to greater efficiency of targeted analytes due to the possibility of designing the structure of ionic liquids. At the same time, applied systems do not affect the honey matrix. Also, designed systems can achieve greater selectivity of the extraction process, without the use of toxic solvents and with a reduction in the duration of the process.

The aim of this work was to develop and implement extraction procedures for isolating HMF from honey, in order to ensure its health safety and to enable the further application of isolated HMF in various branches of industry. Bio-ionic liquids are seen as an ideal extractant for both purposes, and additionally, they can be reused (recycled), which lowers the cost of the analysis/process, as well as environmental pollution. Using a two-phase system based on choline butyrate and potassium phosphate for the extraction of HMF from honey, maximum extraction efficiency was achieved (EE_{HMF} > 98%). Also, the mechanisms of HMF extraction using ionic liquids are explained based on the optimized structures of the ionic liquid system with HMF, together with the visualization of non-covalent interactions and on the basis of calculated binding energies ΔGbin, which can serve as a good predictor of the extraction potential of choline butyrate.

***Key words**: honey, HMF, ionic liquid*

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