Área: ANA

Synthesis and characterization of natural deep eutectic solvents aiming at the extraction of metals from lubricating oils

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Highlights

Obtaining NADES from renewable and low-cost precursors. Characterized by FTIR, TGA, density, pH, and rheometry analyses. Promising in metal extraction stages.

Resumo/Abstract

The growing demand for environmentally responsible analytical methodologies has driven the use of natural deep eutectic solvents (NADES), composed of biodegradable, low-toxicity compounds. [1] These solvents have gained notoriety for their extractive efficiency, versatility, and compliance with Green Chemistry principles, and are considered promising alternatives for separation and analysis processes in various matrices.[2]

In this work, five NADES were synthesized by combining choline chloride with different organic compounds (malic acid, lactic acid, glycerol, citric acid, and oxalic acid) and ultrapure water in a molar ratio of 1:1:10. The syntheses were performed using conventional heating (heating plate for 1 h at 60 °C) and microwave heating (8 cycles of 15 s). The resulting solvents were characterized by Fourier transform infrared spectroscopy (FTIR), in addition to analyses of density, pH, and rheological properties, to evaluate their physicochemical characteristics and stability. Based on the results, it was observed that the different heating methods presented similar characteristics, highlighting the potential of using microwaves to obtain NADES, since this method provides reduced preparation time compared to conventional heating.

The next step of the study will be the application of these NADES in the extraction of metals present in lubricating oil samples, with a specific focus on the determination of Cu, Zn, and Fe. The quantification of the extracted metals will be performed using flame atomization atomic absorption spectrometry (FAAS), aiming to validate the efficiency of the synthesized solvents and contribute to the development of more sustainable analytical methodologies.

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