

**PROMISING MENTHOL-BASED (DEEP) EUTECTIC SOLVENTS FOR REMOVAL OF INORGANIC SPECIES**Cherniakova M. Yu.<sup>1</sup>, Belikov K. N.<sup>1,2</sup><sup>1</sup>Institute of Functional Materials Chemistry, State Scientific Institution

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Despite the development of instrumental methods in analytical chemistry, the problem of matrix effects still remains. In the case of the analysis of elemental impurities [1], which is necessary for quality control of pharmaceuticals, food products, miscellaneous materials, and environmental control, to overcome this problem, it is often essential to separate and preconcentrate analytes at the sample preparation stage.

Deep eutectic solvents (DES) have attracted a significant academic and practical interest, in particular because of their potential for use in separation technologies and extraction processes. DES are mixtures of different substances for which the melting point is notably depressed due to strong intermolecular interactions. However, only a small set of combinations of substances can demonstrate this property, so DES are defined as a subclass of eutectic solvents (ES) [2].

The binary mixtures of *L*-menthol with oleic acid (M : OA), thioctic acid (M : TA), antipyrine (M : A), ortho-vanillin (M : o-V), and resorcinol (M : R) were obtained. The solid-liquid phase equilibrium was studied using differential scanning calorimetry and the lowest melting points of these systems were determined, resulting in -7.8, 30.4, 36.3, 34.4, and -34.8 °C for M : OA, M : TA, M : A, M : o-V, and M : R, respectively [3].

The developed hydrophobic ES at their eutectic composition were tested for their ability to extract ions of 24 elements from aqueous solutions with an initial concentration of about 1 mg/L. The distribution coefficient ( $K_D$ ) for each element was calculated based on the results of the analysis of the aqueous phase before and after extraction using an inductively coupled plasma atomic emission spectrometer.

The M : o-V system demonstrated the capability of quantitative extraction of Au(III) in a neutral medium. High  $K_D$  values corresponding to quantitative recovery were obtained for trivalent metals with the M : A system, namely for Au(III) in an acidic medium and for Bi(III) and Fe(III) in a neutral medium. The M : OA system has shown the ability to efficiently extract Bi(III), Fe(III), Pb(II) in neutral medium, as well as Bi(III) in acidic medium. It can be assumed that in this case, the extraction process is dictated by the protonation-deprotonation processes of oleic acid, as well as the stability of the solvate shell of ions in aqueous medium. The M : R system did not show a high extraction capacity, although partial removal was observed only for trivalent metals Al(III), Bi(III), Fe(III), Au(III).

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