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A TRIETHANOLAMINE:CHOLINE CHLORIDE DEEP EUTECTIC SOLVENT AS A COSOLVENT IN THE ETHANOLYSIS OF *BRASSICA NIGRA* L. SEED OIL

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Black mustard (*Brassica nigra* L.) seeds oil (BMSO), characterized by a high content of erucic acid (C22:1), belongs to inedible oils. Since BMSO has a high percentage of monounsaturated and branched fatty acids, it is a suitable raw material for biodiesel production. Also, green cosolvents, like deep eutectic solvents (DESs), can improve the biodiesel production process. This study reports the influence of the triethanolamine:choline chloride DES (2:1 mol/mol) on the BMSO ethanolysis over calcined CaO as a catalyst, under the following reaction conditions: temperature of 50, 60, and 70 ºC, ethanol-to-oil molar ratio of 12:1, as well as TEOA:ChCl DES and calcined CaO content of 20% and 10%, respectively. At 70 ºC, the ChCl:TEOA DES provided a high content of fatty acid ethyl esters (FAEE) (98.46±0.7%) after 1.5 min, compared to the control reaction (without the presence of DES), where the maximum FAEE content (98.05±0.6%) was achieved within 4 h. BMSO ethanolysis was described by the kinetic model of the pseudo-first order and the model of variable reaction order concerning TAG and the autocatalytic behavior of the ethanolysis reaction. Both kinetic models, with great accuracy, fitted the experimental data. As a result, physicochemical properties of the obtained biodiesel were within the limit values prescribed by the quality standard EN 14214. Also, the reusability of calcined CaO was proven even in four cycles with the FAEE content of over 90%.

Keywords: Brassica nigra L., Deep eutectic solvents, Ethanolysis, Kinetic modeling, Triethanolamine

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