



Glyceline as a Safe Purification Agent of Crude Biodiesel Produced from Inedible Oil Under Mild Conditions

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Natural deep eutectic solvent glyceline, constituted of choline chloride and glycerol in a 1:2 molar ratio, was tested for the purification of crude biodiesel. Low-acid value expired sunflower oil (0.61 mg KOH/g) was used as a feedstock for biodiesel production, prepared by the CaO-catalyzed oil methanolysis carried out at the methanol-to-oil molar ratio of 6:1, CaO amount 2.5% to oil, reaction temperature of 60 °C, stirring rate 900 min⁻¹, and reaction time of 4 h. The phases of the final reaction mixture were separated by centrifugation at 3500 rpm for 10 min. The upper layer was decanted into a flask and evaporated to constant mass under a vacuum at 40 °C using a rotary evaporator to remove unreacted methanol and other volatile impurities. Glyceline was mixed with the crude biodiesel at a 1:1 mass ratio in a two-necked glass flask equipped with a magnetic stirrer, thermometer, and reflux condenser. The purification was conducted at 25 °C and a stirring rate of 700 rpm. The samples were taken after 60, 90, and 120 min, centrifuged, and cooled in a refrigerator at 4 °C to allow separation of glyceline and biodiesel phases. The purest biodiesel was obtained after 120 min and constituted 98.9% fatty acid methyl esters, 0.1% monoacylglycerols, 0.05% diacylglycerols, and 0.15% triacylglycerols. This study suggests glyceline as a safe, natural, and efficient solvent for purifying impure crude biodiesel under moderate conditions.

Keywords: biodiesel, deep eutectic solvent, glyceline, purification

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