

ECCS  
**2025**  
Conference

# The 3rd International Electronic Conference on Catalysis Sciences

23–25 April 2025 | Online

Program and Abstract Book

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# **The 3rd International Electronic Conference on Catalysis Sciences**

**23–25 April 2025 | Online**



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# sciforum-115712: Biodiesel production by transesterification using choline hydroxide as catalyst

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Biodiesel is a mixture of fatty acid methyl esters (FAMEs) and is a biodegradable and renewable fuel, produced from fat sources mainly composed of triglycerides. The use of ionic liquids (ILs) in biodiesel catalytic production has been studied mainly in the ecological field, as it allows a high recycling efficiency. Choline (2-hydroxyethyl trimethylammonium)-based ILs have received attention due to their biocompatibility characteristics and potential for various industrial applications. Specifically, choline hydroxide (ChOH) represents a promising option. This work's objective is the optimization of the methyl transesterification reaction conditions using commercial and waste sunflower oil (WSO) as raw material and ChOH as a catalyst, assessing the possibility of recovering the catalyst between reaction cycles. Therefore, biodiesel production was carried out on heating plates with temperature control and with magnetic stirring, using methanol reflux. After phase separation, centrifugation was used to enhance biodiesel recovery. Reaction conversion was assessed by acidity drop determination, and the biodiesel FAME content was determined by GC-FID, through a procedure in accordance with EN 14103, using methyl heptadecanoate as the internal standard. IL recovery was carried out by solvent extraction with water-based binary systems, followed by an FTIR analysis of both phases for ChOH detection, and a comparison with initial IL samples. Optimal conversions, determined by acid value (AV) reduction or by biodiesel FAME mass content, were obtained using a 4%wt. catalyst load, oil/methanol molar ratio of 1:8, duration of 1 h, and temperature of 65 °C. The products' AV for WSO showed a significant reduction relating to the raw material AV (6.14 mgKOH/g). For the reactions with commercial sunflower oil (AV close to 0.20 mgKOH/g), the biodiesel phase AV remained low. ChOH recovery, performed with n-butanol/water and ethyl acetate/water systems, proved to be inefficient under the conditions tested. FTIR analysis showed the presence of ChOH in both liquid-liquid extraction phases.



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