

CONTINUOUS CATALYST-FREE PRODUCTION OF FATTY ACID ETHYL ESTERS FROM WASTE FRIED OIL: EFFECTS OF WATER AND CO-SOLVENT ADDITION

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The supercritical method requires high molar ratios of alcohol to oil and the use of high temperatures and pressures to afford satisfactory conversion levels, leading to high processing costs and causing in many cases degradation of the fatty acid esters formed and secondary reactions with glycerol formed as a by-product, decreases the reaction conversion. In this context, alternatives to reduce the expected high operating costs and product degradation are studied. The main objective of this work is to investigate the production of fatty acid ethyl esters (FAEE) from waste fried oil under supercritical conditions in a continuous mode. For this purpose it was assessed the effects of temperature (573 and 598 K), water concentration of 0 wt% to 10 wt% (added to anhydrous ethanol) and co-solvent to oil mass ratio (0 wt% to 20 wt%) at 20 MPa, ethanol to oil mass ratio of 1:1 for different residence time. Results demonstrated that temperature had a positive effect on FAEE production. The addition of water and co-solvent in the reaction medium favors the FAEE yield and decreases the decomposition of fatty acids. In the experimental range investigated appreciable FAEE yields achieved at 598 K, 20 MPa, oil to ethanol mass ratio of 1:1 for two situation: 5 wt% of water concentration and 20 wt% of co-so-solvent addition, both with low fatty acid decomposition.

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