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A VERSATILE METHOD FOR OBTAINING NEW OXYGENATED FUEL ADDITIVES BY REACTIVE DISTILLATION

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Abstract

Glycerol acetals/ketals and their esters, produced from renewable raw materials, are highly valuable compounds, being used as oxygenated fuel additives and ecological solvents. A new method for obtaining glycerol acetal/ketal esters, difficult to synthesize using classical techniques, was developed. The method is based on the reversible reaction of 1,2-O-isopropylidene-glycerol esters (IPGEs) with low volatility aldehydes/ketones, in the presence of a heterogeneous acid catalyst. To circumvent reaching equilibrium, the continuous removal of acetone (Ac) from the reaction mixture was done, the former being reused in the synthesis of IPGEs. The method viability was assessed by synthesis and characterization of eight new compounds from two classes: furfurylidene-glycerol esters (FGEs) and ethyl levulinate glycerol ketal esters (ELGKEs). A detailed kinetic study was done throughout an experimental program, first developed in Asia 330, a modular range flow chemistry system, and then in a continuous-flow process at micropilot scale.