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REACTIVE COUPLING OF GLYCEROL TRANSFORMATION TO SOLKETAL INTO BIODIESEL PRODUCTION PROCESS USING ORGANIC ACID CATALYST

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Reactive coupling of triglyceride transesterification and in situ acetalisation of the glycerol by-product was investigated by both experimental and kinetic modelling approach. This study was designed to minimise or prevent co-production of crude glycerol in a biodiesel process. This reduces the biodiesel cost, as the solketal produced could be left in the biodiesel as fuel additive. Kinetics of glycerol acetalisation was studied to obtain the data for numerical modelling of the reactively-coupled transesterification and acetalisation. The kinetic model was established using MATLAB software to solve the rate equations by Runge-Kutta "ode45" solver. Parametric study of the reactive coupling process carried out by the use of Design of Experiments (DoE) statistics to evaluate the effects of the reaction conditions, such as acetone to glycerol (oil) molar ratio, residence time, and the silica gel loading, on a one-stage process. The reaction conditions were also investigated for a two-stage reactive coupling process to obtain optimal variables required for high fatty acid methyl esters (FAMEs) and solketal yields. The kinetic model for the reactive coupling of rapeseed oil transesterification and glycerol conversions to solketal showed that excellent match between the experimental and predicted values. The DoE results showed that the one-stage reactive coupling did not achieve high solketal conversions (< 50%) at the reaction conditions studied, however, FAME conversion of up to 99% was achievable. It was found that the two-stage process was more effective, achieving up to 99 % of FAME conversion and 82% for solketal.

Biography

Luma Al-saadi is a PhD Student with a good research background. Confident, reliable, hardworking and organized, able to work under pressure, highly motivated. After her graduation from university of technology in Iraq with honor degree she got a scholarship from Iraqi government as a reward to complete her PhD in the UK. She has got her experience in biodiesel area after working in Newcastle University since 2015. She got 4th papers from her hardworking in this field so far

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