Institute of Chemical Engineering

Kinetics of esterification of the levulinic acid with n -hexanol, n -octanol, and 2-ethylhexanol in the presence of methanesulfonic acid as a catalyst under nonisothermal conditions

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The levulinic acid was esterified with alcohol at an alcohol to acid molar ratio of 3:1, 5:1, and 10:1 in the presence of a 0.1 wt% methanesulfonic acid catalyst. During esterification, the temperature was changed linearly from 373 to 428 K and its average change was 4.5 K/min. The authors stated that reactions were of second order and that the activation energy (E) decreased from 61 to 46 kJ/mol in the following alcohol sequence: n-hexanol > n-octanol > 2-ethylhexanol. The fitting errors varied between 3.8% and 6.4%. The time of experiment carried out under nonisothermal condition is five to 15 times shorter than that conducted under isothermal conditions. A smaller number of experimental series also determines a significantly lower cost of such research. The results of such study are the precise form of the kinetic equation, which is indispensable in design and optimization of industrial-scale chemical reactors.

Metryczka

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