Kinetics of the esterification of crotonic acid with n-octyl alcohol, n-decyl alcohol or n-dodecyl alcohol

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Keywords: Kinetics, crotonic acid, esterification, octanol, n-decyl alcohol, n-dodecyl alcohol

Esters of crotonic acid and fatty alcohols have many applications in perfume and textile industries. However, kinetic data concerning crotonates have not been found in available literature.

The kinetics of the esterification of crotonic acid with n-octyl alcohol, n-decyl alcohol or n-dodecyl alcohol has been investigated in an experimental isothermal semi batch reactor. The chemical equilibrium state was shifted towards desired product – crotonate - by efficient removal of water. The study was conducted using classical catalyst sulfuric acid at constant concentration of 0.075 wt%, in the range of temperature 390 ÷ 430 K, with initial mole ratios of crotonic acid to respective alcohol of 1:3, 1:5, 1:10.

The kinetic parameters have been determined. It was found that, when using sulfuric acid catalyst, the reaction appears to be the first order with respect to crotonic acid and the first order with respect to alcohol. The activation energy decreases as molecular weight of aliphatic alcohol rises, $6.49 \cdot 10^4$; $6.20 \cdot 10^4$; $5.99 \cdot 10^4$ [J/mol], respectively.