Continuous and easily operated glycerolysis was studied in different lipase-packed columns to evaluate the most potential process set-ups for industrial monoacylglycerol (MAG) production. Practical design-related issues such as enzyme-filling degree, required reaction time, mass transfer investigations, and capacity and stability of the enzyme were evaluated. A commercially available immobilized Candida antarctica lipase B was used to catalyze the glycerolysis reaction between glycerol and sunflower oil dissolved in a binary tert-butanol:tert-pentanol medium. Considering easy handling of the enzyme and measured expansion when wetted with a reaction mixture, a filling degree of 52 vol % dry enzymes particles per column volume seemed appropriate. Twenty minutes was required to reach equilibrium conditions with a MAG content of 50-55 wt %. Only insignificant indications of mass transfer limitations were observed. Hence, the commercial lipase seemed adequate to use in its available particle size distribution ranging from 300 to 900 μm. A column length-to-diameter ratio of less than 25 did not interfere with the transfer of the fluid mixture through the column. Under the tested conditions, the enzyme could be active for approximately 92 days before enzyme renewal was needed. This corresponds to a very high enzyme capacity with approximately 2000 L pure MAG produced per kg enzyme.
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