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Application of continuous flow packed bed milireactor for the simultaneous production of mono- and diacylglycerol using enzymatic catalysis

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PURPOSE OF THE ABSTRACT

Monoacylglycerols (MAG) and diacylglycerol (DAG) are non-ionic surfactants that have been widely used in food, medicine, cosmetic and pharmaceutical industries due to their outstanding properties as emulsifiers. Unfortunately, establishing a sustainable synthesis technique for these emulsifiers presents a concern. Process intensification is proposed in this study using an enzymatic continuous flow packed bed milireactor. This work examined the synthesis of glycerol monooleates (GMO) and glycerol dioleates (GDO) through esterification of glycerol with oleic acid by lipase enzyme under a continuous flow system. At 2.5 molar ratio of oleic acid/glycerol, high oleic acid conversion were attained (76%) with comparable selectivity values of GMO and GDO calculated at 48% and 52% which corresponding to 0.35 M and 0.33 M, respectively. The performance of oleic acid conversion and selectivities of GMO and GDO at 4×10^{-3} L min⁻¹ in the circulated opened-loop system are comparable to the closed-loop system. Both circulated systems results exhibited similar values with the continuous flow system at a flow rate of 5×10^{-5} L min⁻¹. This work successfully determined the performance of lipase in the synthesis of MAG and DAG in packed bed milireactor achieved at a relatively short time.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

BIBLIOGRAPHY