

Response surface modelling of 1-stearoyl-3(2)-oleoyl glycerol production in a pilot packed bed immobilized *Rhizomucor miehei* lipase reactor.

ABSTRACT

A dual response approach using diacylglycerol (DAG) and triacylglycerol (TAG) as responses for optimization of 1-stearoyl-3(2)-oleoyl glycerol-enriched DAG synthesis using response surface methodology (RSM) was investigated. Four variables from a lipase-catalyzed esterification reaction were optimized using a central composite rotatable design. The following optimized conditions yielded 51 wt.% DAG and 22 wt.% TAG: reaction temperature of 55 °C, enzyme dosage of 9.5 wt.%, fatty acid/glycerol molar ratio of 2.1 and reaction time of 3 h. Results were repeatable at 10 kg production scale in a pilot packed-bed enzyme reactor. No significant losses in enzyme activity or changes in fatty acid selectivity on DAG synthesis were observed during the five pilot productions. Lipozyme RM IM showed selectivity towards the production of stearic acid enriched DAG. The purity of DAG oil after purification was 90 wt.%.

Keyword: Diacylglycerol; Esterification; Lipozyme RM IM; Reactor; Response surface.