High performance enzyme-catalyzed synthesis and characterization of a nonionic surfactant.

ABSTRACT

Sugar alcohol esters have a high potential for widespread application in various industries because of their surface active properties. In this work, fatty acid ester of a sugar alcohol was produced through Novozym 435-catalyzed esterification of xylitol and capric acid in nonaqueous media. Taguchi orthogonal array method based on three-level-six-variables (L27) and artificial neural network with Levenberg–Marquardt algorithm were applied to evaluate the effects of synthesis parameters and to optimize the reaction conditions. Both developed models have shown good quality predictions in terms of the conversion of xylitol caprate with a high R2 (>0.9) and a low mean square error (MSE). The maximum conversion of ester achieved was 88% requiring a small amount of enzyme and molecular sieve. Furthermore, the properties of the produced ester show that it is a suitable emulsifier for industrial application.

Keyword: Lipase; Xylitol ester; Surfactant; Optimization; Taguchi method; Artificial neural network.