Enzyme catalyzed esterification of sugar by thermostable t1 lipase from geobacillus zalihae in ionic liquid

ABSTRACT

Thermostable T1 lipase from Geobacillus zalihae strain was utilized in esterification of various sugars with fatty acids to form fatty acid sugar esters. Fatty acid sugar esters (FASE) are an important class of non-ionic surfactant which possesses good emulsifying, stabilizing and conditioning properties. In this work the esterification reaction was done in [Bmim][BF4] ionic liquid with dimethylsulfoxide (DMSO) as co-solvent. Esterification of galactose with oleic acid was initially screened by varying the conditions (temperature, time, enzyme loading and the fatty acid chain length). It was found that the reaction was optimum at the following conditions: temperature (65 °C), time (120 minutes) and enzyme loading (2% (w/w)) when carried out in mixture of DMSO: [Bmim][BF4] (1:20). Interestingly, the percentage of conversion was not affected by the chain length of the acyl donor (C8 – C18) or the unsaturation degree. When the reaction was repeated with linoleic acid as acyl donor and different acyl acceptor (galactose, glucose, fructose, sucrose, maltose, trehalose and xylitol), sucrose gave the best conversion at 65%. In conclusion, TI lipase showed broad substrate specificity either for the acyl donor or acyl acceptor during the esterification of sugars in ionic liquid.

Keyword: T1 lipase; Fatty acid sugar ester; Ionic liquid; Esterification; [Bmim][BF4]