

USE OF ENZYMES TO PRODUCE SOY-BASED POLYOLS FOR POLYURETHANE

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ABSTRACT

Soy-based polyol used in polyurethane applications are sustainable and renewable materials which have been reported to require less energy to produce and to have lower market price. They also have less environmental impact, expand soybean market for soybean farmers and help to reduce consumption of petrochemical-based materials. This project proposes new soy-based polyols produced by enzymatic routes and having good reactivity in polyurethane foam production. Multiple enzymatic routes were evaluated to improve the functionality (reactivity) of soy-based materials.

All enzyme reactions proposed in this work were successfully operated at low temperature, less than 70°C. And most of the reaction did not require organic solvent which was occasionally required to preserve enzyme activity. The enzyme technology encourages the development of “green chemistry” and “sustainability” for urethane consumers. The results conclusively demonstrated that selective enzymes can synthesize improved soy-based polyols with high yield and selectivity in manners not possible with conventional chemistry.