Semi-Industrial Production of Biodiesel with immobilized Lipases

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Biodiesel is produced by transesterification reaction between oil and fat triglycerides with methanol. The reaction is catalyzed by either an alkali metal hydroxide or an alkali metal methoxide. Transesterification of oils and fats with methanol is also catalyzed by strong acids, typically sulfuric acid, to form biodiesel and glycerol. These processes are characterized by numerous disadvantages, resulting in the formation of environmental hazards and cost-ineffectiveness.

During the last two decades the lipase-catalyzed transesterification of plant oils and animal fats with short-chain alcohols for the production of biodiesel has been extensively studied. It has been reported that the major drawback of lipases results from their low tolerance towards hydrophilic substrates, particularly short-chain alcohols, present in the transesterification reaction medium. Another disadvantage of the process is that most commercially available lipases in either their free or immobilized forms are incapable of reaching near to complete conversions at reasonable reaction time. As a result of both constraints the production of biodiesel at industrial scales with a cost-effective lipase remains unresolved issue.

TransBiodiesel has developed new modified-immobilized lipase preparations capable of tolerating high concentrations of short-chain alcohols for the transesterification reaction of oils and fats particularly with methanol. This presentation will cover the use of newly developed lipase preparations for the production of biodiesel in a lab-scale system as well as in a semi-pilot demonstration system of 50 litters in volume.