

New Pathways for the Utilization of Glycerol

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Glycerol is a highly versatile molecule obtained as a “green” by-product from the biodiesel manufacturing process. Due to the fact that biodiesel production has increased enormously over the last years alternative uses have to be developed. Within our project glycerol should be converted into valuable products. Several oxidation routes enable the formation of value added products for the chemical industry while another route is the derivatization of glycerol. On the one hand the formation of lactic acid as a promising oxidation product for processing of crude glycerol was investigated. Whereas direct conversion of glycerol to lactic acid demands extreme reaction conditions, conversion under moderate conditions can be achieved by a combination of two single oxidation steps. Partial electrochemical oxidation of glycerol is an efficient route for converting glycerol to dihydroxyacetone as a first step. The isolation of dihydroxyacetone is difficult but subsequent processing is advantageous. In a second step dihydroxyacetone can be catalytically transformed to lactic acid. Reactive extraction with phosphoryl compounds is proposed as an alternative method for the isolation of lactic acid from dilute aqueous solution.

On the other hand glycerine was derivatized amongst others with other renewable products to yield novel compounds that e.g. can be used as fuel components. Those additives can be mixed to biodiesel directly at the manufacturing plant for resource efficiency. These compounds have been evaluated as fuel components by measurement of different chemical and physical properties. Our tests indicated that some of those novel fuel additives can improve the physical qualities of the biodiesel, for example its viscosity or boiling point distribution.