INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Biodiesel is one of the renewable and alternative to conventional diesel fuel, which attracts the attention of researchers throughout the world over last two decades. Numerous studies have been carried to produce biodiesel from different individual feedstocks and using various homogeneous and heterogeneous catalysts. The present thesis deals with the ultrasound-assisted biodiesel production using different heterogeneous (acid/base/enzyme) catalysts and mixed non-edible oils feedstocks. The studies carried out in present thesis has attempted to gain the insights into transesterification/ interesterification kinetics of heterogeneously catalyzed reaction mechanisms of using blends of non-edible oils feedstock. The reactions were analyzed through different kinetic models such as 1st order kinetic model, Eley-Rideal (E-R) model, Langmuir–Hinshelwood–Hougen–Watson (L-H-H-W) model. The kinetic modelling of heterogeneously catalyzed transesterification and interesterification reactions revealed the mechanistic features 3-phase reaction system. The output from the present research has made important and crucial contribution to understanding the basic mechanics of the heterogeneously catalyzed biodiesel production using ultrasound irradiation. Blended feedstock used in this study has vividly demonstrated feedstock flexibility of a novel biodiesel process. This feature of the process is crucial to its efficient and economic scale-up and commercialization. Present study has also attempted to utilize the waste generated during oil extraction from non-edible oil seeds and developed in active heterogeneous catalyst that can be utilized for biodiesel synthesis. Moreover, the catalyst prepared and used in this study are much cheaper than the commercial catalyst commonly used for biodiesel production and thus makes the overall process more economically feasible and sustainable.