

## COMPARATIVE STUDY OF ACIDIC HETEROGENEOUS CATALYSTS USED FOR ESTERIFICATION OF FREE FATTY ACIDS TO FAME/FAEE

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The local production of 2<sup>nd</sup> generation biodiesel from biomethanol or bioethanol and nonedible waste oils and fats could serve as a diesel oil competitive renewable liquid fuel to drive agricultural machinery for a long time. Classical base catalysed transesterification of waste oils and fats is unfortunately accompanied by the occurrence of soaps generated from higher levels of free fatty acids. In this work we have tried to find the best acidic porous solid catalysts and a suitable technology process for cheaper and easier initial esterification of higher amounts of fatty acids before the subsequent transesterification of triacylglycerols. We collected and tested a series of 18 porous solid inorganic and organic acids for their esterification efficacy. Four of the most abundant fatty acids mixed with an excess of alcohol were used as a model mixture for their catalytical conversion to fatty acids methyl- (FAME) or ethylesters (FAEE). The original HPLC MS method allowed us to quantify the weight % ratio of acids and esters present in the reaction mixture. The breakthrough success in the best time/yield parameter was achieved mainly by the continuous dehydration of the reaction mixture. Titanium oxosulfate and Amberlyst-36 have been identified as the best, cheapest, and most easily removable stable acidic heterogeneous catalysts.

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