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# BIOFUELS AND BIOENERGY

## A comparative study on biodiesel production from waste cooking oils obtained from different sources using supercritical methanol

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Biodiesel has been considered as a reasonable replacement fuel for petroleum diesel. It has many advantages over petroleum diesel including its biodegradability and non-toxicity. In addition, it provides free aromatics and sulphur combustion and it is a greener fuel with lower carbon monoxide and hydrocarbons emissions. However, biodiesel has lower heating value and it is relatively more expensive than petroleum diesel. In an attempt to reduce the cost of biodiesel, waste cooking oil (WCO) has been considered as a competitive feedstock. It also provides more sustainability for the produced biodiesel as it is a result of transformation of waste to greener source of energy. e main concern for using WCO as a feedstock for biodiesel production is the presence of high concentration of free fatty acids (FFA), which result in saponi cation reaction while using the conventional alkaline catalysed process. Saponi cation lowers the biodiesel yield by preventing the separation of biodiesel from the product. In this study, a non-catalytic method for biodiesel production from WCO using supercritical methanol has been investigated. Two di erent feedstocks with di erent FFA concentration have been examined. Response surface methodology (RSM) using Box Behnken Design (BBD) and Central Composite Design (CCD) has been employed to analyse the e ect of di erent reaction variables including methanol to oil (M:O) molar ratio, temperature, pressure and time on biodiesel yield. Numerical optimization has been applied to determine the optimum conditions for maximum production of biodiesel for each feedstock. It has been concluded that the feedstock with higher FFA concentration produce higher biodiesel yield within the same reaction conditions. is result indicates the signi cance of using supercritical methanol technique for feedstocks with high FFA concentration as it enhances both esteri cation of FFA and transesteri cation of triglycerides (TG) to fatty acids methyl esters (FAME).

### Biography

Omar Aboelazayem is a Teaching Assistant in the Chemical Engineering Department of The British University in Egypt (BUE) (2013-present). He received Bachelor of Science (Honours) (BSc) with Distinction from the BUE in Chemical Engineering (2013). He also earned a validated Bachelor of Engineering Honours degree (BEng) with Distinction in Chemical Engineering (2013) from London South Bank University (LSBU). He has enrolled in LSBU as a PhD student in February 2015. His research is focused on sustainable production of biodiesel from renewable sources. He has published more than 5 research papers from his Doctoral work.

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