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**Kinetic Study on Microwave-Assisted Esterification of Free Fatty Acids derived from
Ceiba Pentandra Seed Oil**

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HIGHLIGHTS

- Time energy-saving of microwave technique in biodiesel pretreatment process.
- Higher conversion obtained using sulfuric acid catalyst under microwave conditions.
- Development of *pseudo*-homogeneous second-order kinetics under microwave method.

ABSTRACT

Recently, a great attention has been paid to advanced microwave technology that can be used to markedly enhance the biodiesel production process. *Ceiba Pentandra* Seed Oil containing high free fatty acids (FFA) was utilized as a non-edible feedstock for biodiesel production. Microwave-assisted esterification pretreatment was conducted to reduce the FFA content for promoting a high-quality product in the next step. At optimum condition, the conversion was achieved 94.43% using 2 wt% of sulfuric acid as catalyst where as 20.83% conversion was attained without catalyst. The kinetics of this esterification reaction was also studied to determine the influence of factors on the rate of reaction and reaction mechanisms. The results indicated that microwave-assisted esterification was of endothermic second-order reaction with the activation energy of 53.717 kJ/mol.

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