

# METHYL ESTERS PRODUCED FROM WASTE COOKING OILS BY USING MICROWAVE IRRADIATION METHOD: An experimental and modeling study

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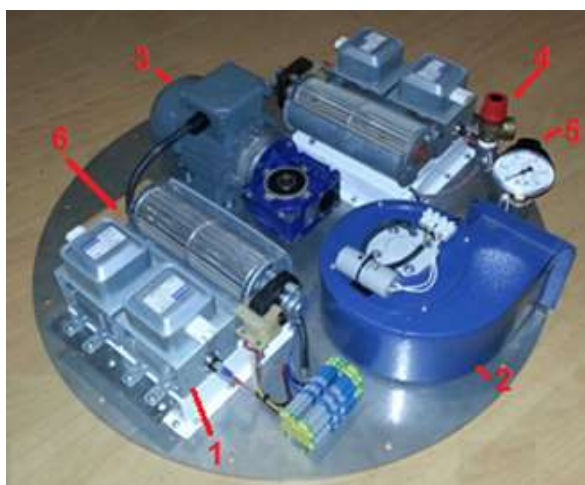
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## Abstract

Recently, there has been widespread interest in microwave heating technology to produce biodiesel. Compared with conventional heating methods, it has several advantages such as more effective heating, faster energy transfer, selective heating, reaction time, equipment size and energy consumption, faster response to process heating control, faster start-up, simplified manipulation and higher purity in the final product [1-3]. In this study, methyl esters are produced by transesterification of waste cooking oils at 60°C with methanol to oil molar ratio of 6:1, in the presence of 1.0% KOH as catalyst in the microwave assisted batch (Fig.1 ) biodiesel reactor as seen in Fig. 2. The reactor seen in Fig. 3 has 60 L capacity. Density, viscosity, flash point measurements and Fourier Transform Infrared Spectroscopy (FTIR) analyses are used to determine the product's quality. We are developing a detailed chemical kinetic mechanism to obtain the necessary information about the combustion process of the produced biodiesel. The detailed chemical kinetics mechanism will be reduced by using the "Necessity Analysis" method [4] for CFD simulations.

Keywords: Methyl Ester, Microwave Irradiation, Necessity Analysis.



1-System equipped with magnetron, waveguide and cooling fan

2-Intake fan

3- Electric motor and reduction gearbox

4- Relief valve

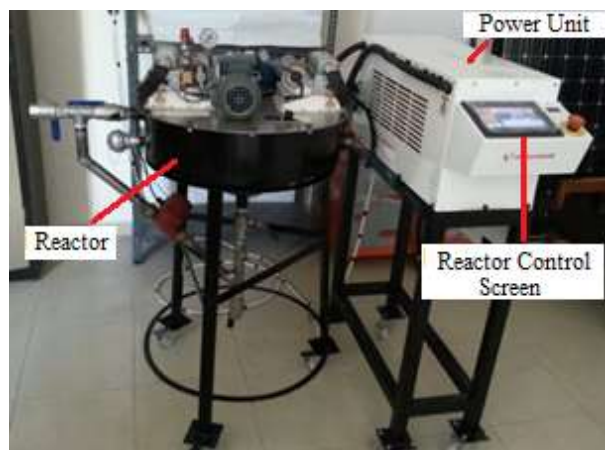
5- Manometer

6- Oil entry

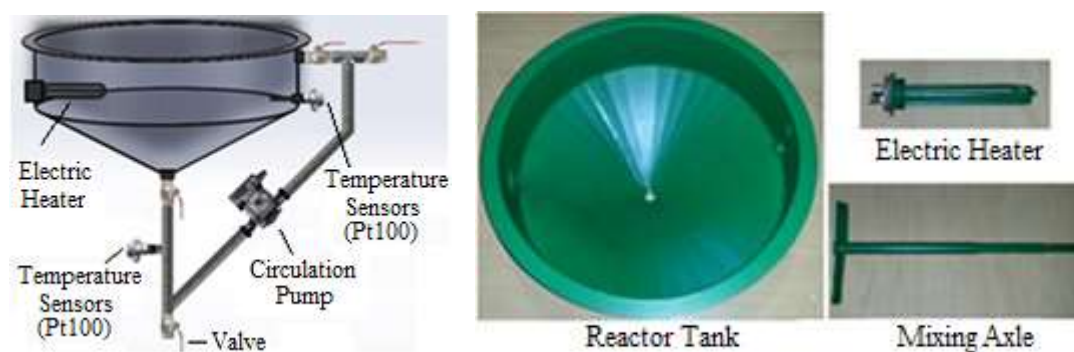
**Figure 1.** Microwave units

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**Figure 2.** Front view of biodiesel reactor.



**Figure 3.** Design of 60 L capacity reactor and its components coated with **PTFE**.

## References

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