

## The feasibility and optimization of biodiesel production from *Celtis australis* L. oil using chicken bone catalyst and ultrasonic waves

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### ABSTRACT

Biodiesel is a green renewable energy source and an alternative for diesel fuel. The objective of this research was to study the feasibility of biodiesel production from *Celtis australis* L. oil using an ultrasonic system and CaO derived from chicken bone as a biowaste renewable resource. In this research, the effects of some parameters such as the alcohol-to-oil molar ratio (6:1, 9:1, 12:1), the CaO catalyst concentration (3%, 5% and 7% w/w), and the reaction time using ultrasonication (10, 25, 40 min) on the rate of conversion of fatty acids to methyl ester (biodiesel) were studied. The results showed that by increasing the molar ratio into the range between 6:1 and 9:1, the conversion percentage first increased and then its value followed a fixed trend. By increasing the catalyst concentration to about 5%, the conversion percentage increased significantly, and then remained constant. By increasing the time from 10 to 25 min, the conversion percentage increased by 20.19%, but from 25 to 40 min, no significant difference was observed. Moreover, all of the properties of *C. australis* methyl ester were found to meet the requirements of EN 14214 (European Committee for Standardization) biodiesel standards.

### KEYWORDS

Biodiesel production; *C. australis*; CaO catalyst; Green fuel; Ultrasonic assisted

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