

# Biodiesel Production from Castor Oil and Its Application in Diesel Engine

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In this study, the optimum biodiesel conversion from crude castor oil to castor biodiesel (CB) through transesterification method was investigated. The base catalyzed transesterification under different reactant proportion such as the molar ratio of alcohol to oil and mass ratio of catalyst to oil was studied for optimum production of castor biodiesel. The optimum condition for base catalyzed transesterification of castor oil was determined to be 1:4.5 of oil to methanol ratio and 0.005:1 of potassium hydroxide to oil ratio. The fuel properties of the produced CB such as the calorific value, flash point and density were analyzed and compared to conventional diesel. Diesel engine performance and emission test on different CB blends proved that CB was suitable to be used as diesel blends. CB was also proved to have lower emission compared to conventional diesel.

**Key words:** biodiesel, transesterification, castor oil, diesel engine, emission; conversion

Petroleum fuels play a very important role in the development of various industries, transportations, agriculture sector and to meet many other basic human needs in modern civilization. These fuels are limited and depleting day by day as the consumption increase very rapidly. Moreover, the use of petroleum fuel has caused a lot of environmental problems by the high emission of harmful gases. A global movement towards generation of environmentally friendly yet renewable fuel is therefore under way to help meet the increased energy demands. Biofuel had become one of the most promising alternatives for petroleum fuels.

Biodiesel is the potential biofuel that can easily being produced from vegetable oil.

Biodiesel has become an interesting alternative fuel over conventional diesel for decades. Biodiesel is suitable to be used in diesel engine due to the similar properties to conventional diesel in terms of power and torque and none or very minor engine modification is required (Mushtaq *et al.* 2011). Moreover, biodiesel is biodegradable which will results in less environmental impact upon accidental release to the environment (Janaun & Ellis 2010).

Biodiesel has many important technical advantages over conventional diesel such as inherent lubricity, low toxicity, derivation from a renewable and domestic feedstock, superior flash point, negligible sulphur content and lower exhaust emissions (Moser 2009). Biodiesel had been used widely as a blend with diesel. The

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