

## **Synthesis of *Jatropha curcas* oil-based in a pulsed loop reactor.**

### **Abstract**

*Jatropha curcas* oil (JCO) has a high content of free fatty acids and has been used extensively as a feedstock in biodiesel production. In the present study, the transesterification reaction of JCO to *Jatropha curcas* methyl ester (biodiesel) was performed in a continuous pulsed loop reactor under atmospheric conditions. The JCO was pre-treated prior to the reaction to reduce the free fatty acid content to below 1% (w/w). The operating parameters of the loop reactor were optimised based on the conversion of the JCO to *Jatropha curcas* biodiesel and included reaction temperature, molar ratio of oil to MeOH, reaction time and oscillation frequency. The findings show that the highest reaction conversion of 99.7% (w/w) was achieved using KOH catalyst and 98.8% conversion was obtained using NaOCH<sub>3</sub> catalyst. The optimal operating conditions were a molar ratio of 6:1, an oscillation frequency of 6 Hz, temperature of 60 °C, feedstock FFA content of 0.5% (w/w) and only 10 min of reaction time. As a commercial commodity, the physical properties of biodiesel were analysed, and they compared well with the characteristics of fossil-based diesel fuel.

**Keyword:** Biodiesel; *Jatropha curcas* oil; Pulsed loop reactor; Methyl ester