

High vacuum fractional distillation (HVFD) approach for quality and performance improvement of *Azadirachta indica* biodiesel

ABSTRACT

Biodiesel offers an advantage only if it can be used as a direct replacement for ordinary diesel. There are many reasons to promote biodiesel. However, biodiesel cannot get wide acceptance until its drawbacks have been overcome including poor low temperature flow properties, variation in the quality of biodiesel produced from different feedstocks and fuel filter blocking. In the present study, a much cheaper and simpler method called high vacuum fractional distillation (HVFD) has been used as an alternative to produce high-quality refined biodiesel and to improve on the abovementioned drawbacks of biodiesel. The results of the present study showed that none of biodiesel sample produced from crude *Azadirachta indica* (neem) oil met standard biodiesel cetane number requirements. The high vacuum fractional distillation (HVFD) process improved the cetane number of produced biodiesels which ranged from 44–87.3. Similarly, biodiesel produced from fractionated *Azadirachta indica* oil has shown lower iodine values (91.2) and much better cloud (-2.6 °C) and pour point (-4.9 °C) than pure *Azadirachta indica* oil. In conclusion, the crude oil needs to be vacuum fractionated for superior biodiesel production for direct utilization in engine and consistent quality production.

Keyword: Biodiesel; Vacuum fractionation; Transesterification; Fuel; Fatty acids composition