Enhancement of biodiesel properties via hydrogenation process: a pilot plant study

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Abstract: The utilization aspect of non-food feedstock still important and necessary to the society of endlessly-growing population with highly demand in energy. Regarding this awareness, our recently study was focused on an alternative non-food oil crop as jatropha for a pilot scale biodiesel production. This pilot comprises of two major sectors, i.e. a 1000 liters/day production unit and 100 liters/batch of an upgrading unit. Jatropha biodiesel produced via this production unit, exhibited the reaction completeness with fatty acid methyl ester (FAME) conversion more than 97wt% and yielded higher than 80%. However, the crude oil containing high amount of unsaturated structures could not corporate and made this jatropha biodiesel met the regulation as oxidation stability property. Hence, the upgrading unit with the partial hydrogenation process was needed. The oxidation stability could increase from 0.11-1.39 hours to 15-23 hours after passed through the hydrogenation process. As a result, the high quality jatropha biodiesel obtained from this pilot plant was in accordance with national and international specifications. Furthermore, this jatropha and others oil crop contained high level of unsaturated compounds can be used with this pilot plant and consider as potential feedstocks for biodiesel production.

Keywords: Jatropha biodiesel; Hydrogenation; Oxidation stability; Pilot plant