☐√ **Oral Presentation** ☐ **Poster**

Cooking oil waste transesterification over alkali metal (Li, Na, K) impregnated with rice husk silica: a potential heterogenous base catalysis

Noor Hindryawati[a,b], Gaanty Pragas Maniam[a], Chong Kwok Feng[a], Md. Rezaul Karim[a*]

[a]Faculty of Industrial Sciences and Technology, Universiti Malaysia Pahang, Lebuhraya Tun Razak 26300 Gambang, Kuantan, Pahang, Malaysia

[b]Faculty of Mathematic and Natural Sciences, Mulawarman University, Samarinda, East Borneo, Indonesia

[*]drmrkarim@yahoo.com

Abstract

Objective & Methodology: There is a very limited work on alkali metals impregnated with rice husk silica (RHS) as a heterogeneous catalyst in transesterification reaction. In this study the alkali metals (Li, Na, K) as strong base catalysts were impregnated with RHS obtained from an abundant and under-utilized biomass. The base catalysts were prepared using a simple method and their catalytic efficiency in biodiesel production was investigated. The effect of catalyst as alkali metals silicate on the reaction parameters (catalyst weight, methanol to oil ratio) and the purity of FAME were investigated. FTIR and XRD were carried out to determine the binding of alkali metals to rice husk silica. The reactivity trend of these alkali metal silicates in transesterification was also investigated. The transesterification process to produce biodiesel was carried out using cooking oil waste with methanol. *Results:* FTIR and XRD determined the successful binding of alkali metals in rice husk silica. The data showed a long lasting activity of the alkali metal silicate than the traditional base catalysts. The optimum calcination temperature and time were found to be 500 °C and 3 h, respectively. The optimum transesterification temperature and catalyst/oil ratio were 65 °C and 9:1; respectively. The process was able to transesterify oil to fatty acid methyl ester (FAME) in the purity range of 96.5–98.2% in 1 h for all series. The catalyst was easily separated from the reaction mixture by filtration and reused for several times. The final product met selected fuel properties for biodiesel according to EN 14214.

Conclusion: The alkali metals silicate showed the potential as heterogeneous base catalyst for biodiesel production from waste oil.

Keywords: Cooking oil waste; transesterification; alkali metal; rice husk silica; heterogeneous catalyst; biodiesel.