

Production of methyl ester from soybean oil by using impregnated mixed domestic-waste catalysts

Siti Norhafiza Mohd Khazaai*, Nurul Hajar Embong, Nurul Aina Nasriqah Ma'arof, Ab. Rahim Mohd Hasbi, Gaanty Pragas Maniam

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

b Faculty of Applied Sciences, Universiti Teknologi MARA Pahang, Jengka, Pahang 26400, Malaysia

c Central Laboratory, Universiti Malaysia Pahang, Lebuhraya Tun Razak, Kuantan, Gambang, Pahang 26300, Malaysia

Abstract:

Nowadays due to the depletion of non-renewable energy resources, production of green material from domestic wastes has played an important role. The waste of banana peel impregnated with calcium oxide (CaO) from eggshell had successfully been used as a low-cost catalyst to transesterify soybean oil to produce methyl ester. The catalytic actions from potassium and calcium oxide content in calcined banana peel (700 °C) and eggshell (900 °C) discover through FT-IR, XRD, and SEM. Production of methyl ester obtained at 82.29 wt. % with the optimal condition of 7 wt. % of catalyst amount, methanol/oil mass ratio, 9:1; and the reaction temperature, 65 °C within 2 h reaction time.

Keywords: Banana Peel; Calcium Oxide; Eggshell; Methyl Ester; Potassium

Acknowledgement

The authors would like to thank Ministry of Higher Education, Malaysia, Universiti Malaysia Pahang and Universiti Teknologi MARA Pahang for funding the research project under Internal Grant (RDU1803125), Flagship UMP Grant (RDU182205), UMP PGRS (170311) and the scholarship (Khazaai, S.N.M).