

Transesterification activity and characterization of natural CaO derived from waste venus clam (*Tapes belcheri* S.) material for enhancement of biodiesel production

ABSTRACT

In this study, waste venus clam (WVC) was used as a raw materials of catalyst to produce biodiesel from palm oil at atmospheric pressure. The thermogravimetric, surface functional group, morphology, structure, basicity, surface area and leaching properties of catalyst was studied by using TGA, FTIR, SEM, XRD, TPD-CO₂, BET, and AAS respectively. The result demonstrated that CS-900 catalyst gave high amount of total basicity at about 44 times than commercial CaO catalyst which is favorable for higher catalytic activity. Further, it was evident from BET that the shells calcined in temperature range 800–900 °C was exhibited enhance surface area than uncalcined shells. Under the best reaction condition (temperature 65 °C, methanol/oil molar ratio 15:1, reaction time 6 h, and catalyst 5 wt.% of oil), a high biodiesel yield of 97% was obtained. The leaching test on synthesized biodiesel revealed that the concentration of Ca in the biodiesel was 1.214 ppm which is unacceptable levels of metals as ASTM D6751 (United State) and in Europe, EN 14214 (Europe) standards. The subsequent reuse of the catalyst indicates the viability of utilizing waste shell as green catalysts for synthesis of biodiesel.

Keyword: Heterogeneous catalyst; Waste *Tapes belcheri*; Recycled calcium carbonate; Transesterification; Correlation of basic sites; Biodiesel