

Effective catalytic deoxygenation of waste cooking oil over nanorods activated carbon supported CaO

ABSTRACT

Under nitrogen atmosphere, waste cooking oil (WCO) was deoxygenated in semi-batch experiments by using the nanorods of phosphate-activated carbon, which is derived from walnut shell and promoted by CaO as catalyst at 350 °C. The deoxygenation reaction showed high activity (> 48% hydrocarbon yield) and high selectivity towards decarboxylation/decarbonylation (deCO_x) reactions via exclusive formation of green diesel C₁₅ fraction (> 60%). The high activity and high selectivity were attributed to the good physicochemical characteristics of the catalyst, including improved metal dispersion, high surface area and high basic properties. Overall, this study demonstrates CaO/AC catalytic deoxygenation as a promising approach to produce liquid green diesel C₁₅ from WCO under hydrogen-free atmosphere.

Keyword: Activated carbon; Biofuel; Deoxygenation; Waste cooking oil