Pyrolytic–deoxygenation of triglyceride via natural waste shell derived Ca(OH)2 nanocatalyst

ABSTRACT

Crackingï Deoxygenation process is one of the important reaction pathways for the production of biofuel with desirable n-C17 hydrocarbon chain via removal of oxygen compounds. Calcium-based catalyst has attracted much attention in deoxygenation process due its relatively high capacity in removing oxygenated compounds in the form of CO2 and CO under decarboxylation and decarbonylation reaction, respectively. In the present study, deoxygenation of triolein was investigated using Ca(OH)2 nanocatalyst derived from low cost natural waste shells. The Ca(OH)2 nanocatalyst was prepared via integration techniques between surfactant treatment (anionic and non-ionic) and wet sonochemical effect. Results showed that sonochemically assisted surfactant treatment has successfully enhanced the physicochemical properties of Ca(OH)2 nanocatalyst in terms of nano-particle sizes (~50 nm), high surface area (~130 m2 gī 1), large porosity (~18.6 nm) and strong basic strength. The presence of superior properties from surfactant treated Ca(OH)2 nanocatalysts rendered high deoxygenation degree, which are capable of producing high alkane and alkene selectivity in chain length of n-C17 (high value of C17/(n-C17 + n-C18) ratio = 0.88). Furthermore, both Ca(OH)2ï EG and Ca(OH)2ï CTAB nanocatalysts showed high reactivity with 47.37% and 44.50%, respectively in total liquid hydrocarbon content of triolein conversion with high H/C and low O/C ratio.

Keyword: Cracking; Decarboxylationï decarbonylation; Calcium oxide; Clamshell; Hydrocarbon