Selective deoxygenation of sludge palm oil into diesel range fuel over Mn-Mo supported on activated carbon catalyst

ABSTRACT

Originating from deoxygenation (DO) technology, green diesel was innovated in order to act as a substitute for biodiesel, which contains unstable fatty acid alkyl ester owing to the existence of oxygenated species. Green diesel was manufactured following a process of catalytic DO of sludge palm oil (SPO). An engineered $Mn_{(0.5\%)}$-$Mo_{(0.5\%)}$/AC catalyst was employed in a hydrogen-free atmosphere. The influence of Manganese (Mn) species (0.1–1 wt.%) on DO reactivity and the dissemination of the product were examined. The $Mn_{(0.5\%)}$-$Mo_{(0.5\%)}$/AC formulation gave rise to a superior harvest of approximately 89% liquid hydrocarbons; a higher proportion of diesel fraction selectivity n-(C_{15} +C_{17}) was obtained in the region of 93%. Where acid and basic active sites were present on the $Mn_{(0.5\%)}$-$Mo_{(0.5\%)}$/AC catalyst, decarboxylation and decarbonylation reaction mechanisms of SPO to DO were enhanced. Evidence of the high degree of stability of the $Mn_{(0.5\%)}$-$Mo_{(0.5\%)}$/AC catalyst during five continuous runs was presented, which, in mild reaction conditions, gave rise to a consistent hydrocarbon harvest of >72% and >94% selectivity for n-(C_{15} +C_{17}).