

## **Biodiesel production via simultaneous esterification and transesterification of chicken fat oil by mesoporous sulfated Ce supported activated carbon**

### **ABSTRACT**

Biodiesel, as an alternative fuel for petroleum-derived fuel, has gained significant attention from society. In this research work, biodiesel is produced via simultaneous esterification and transesterification of chicken fat and skin oil (CFSO) over Ce supported sulfated activated carbon derived from coconut shell (ACcs-S). Details of a study on the effect of Ce concentrations in the range of 5–15 wt% were also investigated. The results showed that 5 wt% Ce was an optimum concentration for the esterification and transesterification of CFSO with approximately 93% free fatty acid (FFA) conversion. High FFA conversion by 5Ce/ACcs-S is attributed to it having a sufficient amount of acid-base and noticeable pore structures. The effect of four variables (i.e., methanol to chicken fat oil, catalyst loading, reaction time, and temperature) on the FFA conversion was studied via the one-variable-at-a-time method. Optimum FFA conversion (93%) was achieved at a temperature of 90 °C, 12:1 MeOH to oil ratio, 3 wt % catalyst loading, and 1 h reaction time. 5Ce/ACcs-S shows high chemical stability by maintaining the FFA conversion at up to 90% within five consecutive reaction cycles.

**Keyword:** Biodiesel; Esterification; Transesterification; Chicken fat oil; Cerium