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High performance biodiesel catalyst preparation by direct fluidized bed calcination of shrimp shell: process optimization and intensification

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Highlights

- CaO based catalyst was prepared from fast calcination of shrimp shell in fluidized bed at 800 °C
- Shrinking core model best describes calcination process
- The optimal preparation conditions with the largest biodiesel conversion were achieved by RSM
- Fluidized bed significantly intensify the calcination process and reduce thermal treatment duration from 4 hrs to 0.16 hrs

Abstract

Fluidized bed reactor significantly intensified the shrimp shell (SS) calcination process for the preparation of high performance CaO based catalyst. A modified Shrinking-Core Model (SCM) was employed to describe the calcination process at high temperature. The activation energy of the initial stage of the decomposition was 64 kJ/mol, which was controlled by the chemical reaction. The activation energy of the subsequent stage of the decomposition was 22 kJ/mol, which was controlled by the diffusion. The response surface methodology (RSM) and the central composite design (CCD) were used to optimize

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