

Biodiesel production from waste coffee grounds by one-step direct process using solid catalyst prepared with waste materials

임가희, 박수림, 염승호^{1,†}

강릉원주대학교; ¹강릉원주대학교 생명화학공학과

(shyeom@gwnu.ac.kr[†])

Coffee is one of the produces internationally traded in large volumes, and a large amount of waste coffee grounds (WCGs) are discharged in Korea. The lipid content of WCGs and FFA content of the lipids were determined to be 15.3% and 1.2%, respectively. In this study, we adopted one-step direct process where lipid extraction and transesterification occurs simultaneously in a single reactor. In addition, to avoid the disadvantages of homogeneous catalyst such as NaOH, we prepared solid catalyst using fly ash with waste scallop shells or egg shells by calcination in a furnace. We investigated the effects of catalyst type, catalyst concentration, methanol loading, hexane loading, reaction temperature and time on biodiesel production. Scallop shells supported by fly ash showed highest performance, and biodiesel conversion was proportional to catalyst concentration. Temperature and reaction time were not significant as long as they were higher than 35 °C and 6 hr, respectively. We achieved 67.5% of biodiesel conversion and 5.0% of biodiesel yield, which was comparable with that obtained from previous two-step process.