

One-pot conversion of alginic acid into furfural using Amberlyst-15 as a solid acid catalyst in γ -butyrolactone/water co-solvent system

김형주, 양승도, 김도희[†]

서울대학교

(dohkim@snu.ac.kr[†])

One-pot conversion of alginic acid, which was derived from brown algae, to furfural was investigated using various solid acid catalysts. Among the solid acid catalysts tested, Amberlyst-15 showed the highest activity in furfural production in aqueous media. When the effect of reaction media was examined by applying various organic solvent mixtures, it was found that γ -butyrolactone/water co-solvent system was selected as the most appropriate system for the reaction. Maximum furfural yield of 32.2% was obtained using Amberlyst-15 in the γ -butyrolactone/H₂O at 210 °C for 20 min. Catalyst showed gradual deactivation behavior as the reaction proceeded, although the catalyst recovered its activity upon the simple treatment with sulfuric acid. N₂ adsorption-desorption experiments, Fourier-transform infrared spectroscopy (FT-IR), back titration, and CHNS analysis were applied to investigate the physicochemical property of post-reaction samples, confirming that the leaching of the active sulfonic acid group and decrease in acid density was the major cause of deactivation.