

Optimization of Ba loading on BaCo/CeO₂ catalyst for high temperature water-gas shift reaction using waste derived synthesis gas

김경진, 이열립, 장원준, 심재오, 전경원, 나현석, 김학민, 유성연, 안선용, 김범준, 조재완, 노현석†
연세대학교
(hsroh@yonsei.ac.kr†)

In our previous research, we compared the performance of alkali (Na, K) and alkaline earth metal (Ba, Ca) promoted Co/CeO₂ catalysts in high temperature water-gas shift (HTS) reaction. Among the prepared catalysts, BaCo/CeO₂ catalyst showed the best performance. To enhance the performance of BaCo/CeO₂ catalyst, we varied the loading of Ba (1 to 3 wt.%). 1%BaCo/CeO₂ and 2%BaCo/CeO₂ showed stable activity (50 h, 450 °C) without any side reaction even at extremely severe reaction conditions (GHSV = 142,663 h⁻¹, CO conc. = 38% in the feed gas). Co/CeO₂ catalyst and 3%BaCo/CeO₂ catalyst were rapidly deactivated within the first 20 h during the stability test. The stability test result shows that the incorporation of Ba enhances the catalytic performance of Co/CeO₂ catalyst, while the further increase of Ba loading (over 3 wt.%) decreases the stability of the catalyst.