

Effect of $\text{TiO}_2\text{-ZrO}_2$ Composition on Catalytic Activity of Supported NiSO_4 for Ethylene Dimerization

손종락*, 이시훈¹, 이성규
경북대학교; ¹포항산업과학연구원
(jrsohn@knu.ac.kr*)

A series of catalysts, $\text{NiSO}_4/\text{TiO}_2\text{-ZrO}_2$ having different $\text{TiO}_2\text{-ZrO}_2$ composition, for ethylene dimerization was prepared by the impregnation method using an aqueous solution of nickel sulfate. No diffraction line of nickel sulfate was observed up to 30 wt%, indicating good dispersion of nickel sulfate on the surface of supported NiSO_4 catalysts. The surface area and acidity of $\text{TiO}_2\text{-ZrO}_2$ binary metal oxide increased remarkably compared with single metal oxide, TiO_2 or ZrO_2 . The binary oxide, $\text{TiO}_2\text{-ZrO}_2$ calcined above 600 °C resulted in the formation of crystalline orthorhombic phase of ZrTiO_4 . Therefore, $\text{NiSO}_4/\text{TiO}_2\text{-ZrO}_2$ calcined at 500 °C exhibited a maximum catalytic activity, and then the catalytic activity decreased with the calcination temperature. NiSO_4 supported on 50 $\text{TiO}_2\text{-50ZrO}_2$ ($\text{TiO}_2/\text{ZrO}_2$ ratio = 1) among $\text{TiO}_2\text{-ZrO}_2$ binary oxides exhibited the highest catalytic activity for ethylene dimerization. The catalytic activities of supported NiSO_4 catalysts were correlated with the acidity of catalysts measured by the ammonia chemisorption method, regardless of the kind of support (TiO_2 , ZrO_2 , or $\text{TiO}_2\text{-ZrO}_2$).