Steam reforming of methane over porosity controlled spherical nickel catalyst

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Recently, as interest in hydrogen energy increases, various methods for producing hydrogen are being studied. Among the various methods of producing hydrogen, hydrogen production through steam reforming is known to be the most economical. In particular, methane has the highest H/C ratio among several hydrocarbons, so hydrogen production reaction through steam reforming of methane is ideal. In the industrial scale catalytic process, the catalyst is pelletized into a shape of several mm in size to solve the pressure drop problem. However, in the steam reforming reaction, the reaction rate is faster than the intraparticle diffusion rate, so that the active sites of the catalyst are not sufficiently utilized. Therefore, in this study, the pore characteristics of the catalyst support formed into a spherical shape of several mm in size were adjusted through acid treatment. After that, a catalyst was prepared by impregnating nickel, which is inexpensive and excellent in reaction activity in steam reforming. The physicochemical characteristics of the catalyst prepared through XRD, BET, H_2-TPR, and TGA analysis were performed, and applied to the steam reforming of methane reaction.