

Promoter effect of V_2O_5/TiO_2 catalysts on selective catalytic reduction with NH_3

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During the last decade, nitrous oxide (N_2O) has more severe effect on greenhouse effect by 300 times than that of CO_2 . The formation of N_2O has been observed in the selective catalytic reduction (SCR) system as a function of side reaction. In this study, we aimed at finding the proper promoter of V_2O_5/TiO_2 catalyst which can suppress N_2O formation during SCR reaction. 5 wt% V_2O_5/TiO_2 catalyst was prepared by applying wet impregnation method using vanadium precursor with V^{3+} state. We utilized various promoters, such as W, Zr, Zn, Ga, Mo, Mn, Cr and Ce with 3 wt% loading on catalyst. Also, we changed the order of impregnation between vanadium and promoter as promoter first, vanadium first and co-impregnation. It was found that V_2O_5/TiO_2 with Mn, Zr and Zn promoter produced the least amount of N_2O at $400^\circ C$ compared with W and Mo promoter used catalysts. In addition, impregnating vanadium first then promoter later showed the least production of N_2O during SCR reaction. We utilized BET, ICP, XRD, and H_2 -TPR to investigate the physicochemical properties of V_2O_5/TiO_2 catalysts with various promoters.