Effective control of N_2O emissions in selective reduction of NO by NH_3 with a V_2O_5-WO_3/TiO_2 catalyst: Addition of Fe_2O_3 nanoparticles

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W have focused on effective control of the production of N_2O in selective catalytic reduction of NO by NH_3 over a sample of V_2O_5-WO_3/TiO_2 whose surface compositions were altered by adding Fe_2O_3 nanoparticles. Because of the existence of a proper amount of nanodispersed Fe_2O_3 on the bare catalyst surface, not only could the extent of NH_3 adsorption on WO_3 surfaces be controlled thereby suppressing the production of N_2O due to the oxidation of NH_3 at high temperatures, but N_2O generated from NH_3-SCR reaction on the surface of the V_2O_5 species and/or from the NH3 adsorption is also reduced by reaction with NH_3 adsorbed strongly on Fe_2O_3. XRD measurements represent that Fe_2O_3 species is in the form of nanosized particles and is able to significantly depress N_2O emissions in high-temperature NH_3-SCR reaction. According to our NH_3 TPD runs, the iron oxide species can also lower the oxidation of NH_3 into N_2, N_2O, and NO.