601c Isotopic Labeling Study of Low Temperature Scr of No with Nh3 Using 15no, 15nh3 and 18o2 Labeled Gases over Mnox/Tio2 Catalysts

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Titania supported manganese oxide catalysts have been prepared to study the low temperature selective catalytic reduction (SCR) of NO with NH3 under power plant conditions (GHSV = 50000 h-1). The catalysts were characterized by using the surface techniques such as XPS, Raman, TPR, and in-situ FTIR techniques to understand the interaction between titania and Mn along with catalytic active surface species for low temperature SCR reaction. Based on the results obtained from in-situ FTIR study, we proposed that the reaction mechanism proceeds through the formation of nitrosamide and azoxy species. In order to get a better understanding of this mechanism, we have used isotopic labeled gases, 15NO, 15NH3 and 18O2 to investigate the reaction network of SCR of NO with NH3 over titania supported manganese oxide catalysts having preferential exposure of surface active oxygen species. Isotopic labeling studies have been performed under steady-state conditions by using the following sets of experiments: 16O2 → 18O2; NH3 + 16O2 → NH3 + 18O2; NO + 16O2 → NO + 18O2; 14NH3 + O2 → 15NH3 + O2; 14NO + O2 → 15NO + O2; NO + NH3 + 16O2 → NO + NH3 + 18O2; 14NO + NH3 + O2 → 15NO + NH3 + O2; NO + 14NH3 + O2 → NO + 15NH3 + O2. The interaction of lattice 16O active species with labeled 18O2 was investigated to find out the lability of the lattice oxygen. We have found that more number of surface oxygen species participate in the reaction over high surface anatase TiO2 than the rutile phase. The former phase gave higher conversion of NO than other support materials. It is also played an important role in the formation of reaction intermediate such as nitrosamide and azoxy species.