Simultaneous Catalytic Reduction of NO and N_2O by H_2 and/or CO over a Pd/Rh Catalyst

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It has been reported that N_2O causes a various environmental problems such as global warming and depletion of the stratospheric ozone layer. NOx removal is usually achieved by SCR technology using reductants such as NH_3, CO and H_2. However, N_2O reduction to N_2 is much more difficult to achieve. This study deals with simultaneous catalytic reduction of NO and N_2O over a commercial Pd/Rh catalyst, where H_2 and/or CO are used as a reductant. Conversion of NO and N_2O is significantly dependent on O_2 concentration in the mixture of NO and N_2O. High conversion of NO and N_2O is shown at low O_2 concentration. In absence of O_2, higher conversion of NO and N_2O than 50 % can be obtained at the temperatures higher than 150 °C in using H_2 but 300 °C in using CO. It is worth noting that the high conversion of NO and N_2O is remained even at the temperatures over 400 °C. However, the presence of O_2 in NO and N_2O decreases the catalytic reduction of NO and N_2O at the high temperatures, which probably results from that the reductants are consumed by their oxidation rather than the reduction of NO and N_2O. The increase of NO concentration in reactants slightly lowers the conversion of NO and N_2O.