

Significance in N₂O Emissions from NH₃-SCR Reaction over V₂O₅/TiO₂-Based Catalysts

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Nitrous oxide (N₂O) is a strong greenhouse gas and has been known to be produced from catalytic processes that are widely used for selectively reducing NO_x by NH₃. Thus, the extent of the formation of N₂O upon SCR reaction with commercial V₂O₅/TiO₂-based catalysts is of particular interest. Direct measurements for N₂O formation during NH₃-SCR reaction over commercial V₂O₅/TiO₂-based systems were conducted using an on-line infrared (IR) analysis system with a gas cell having an optical path of 10 meters. A “standard” 1.41% V₂O₅-7.98% WO₃/TiO₂ catalyst was employed for this study with reference SCR catalysts. When directly measuring N₂O concentrations during the course of SCR reaction, the extent of N₂O formation depended significantly on reaction temperatures. The “standard” catalyst gave a decrease in NO_x conversions at temperatures greater than 350°C from which N₂O formation occurs. Other V₂O₅/TiO₂-based catalysts with higher V₂O₅ amounts facilitated N₂O production even at the same temperatures. Consequently, it presents significant N₂O formation for SCR reaction with commercial V₂O₅-WO₃/TiO₂ catalysts and the need to develop a new catalyst having lower N₂O production even at high temperatures.