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Cobalt-containing mixed oxide catalysts for removal of N₂O from nitric acid plant tail gases

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Catalytic decomposition of N₂O belongs to the Best Available Technologies for N₂O abatement from nitric acid production, which has been recognized as the biggest industrial source of N₂O emission. Many efforts have been made to develop the catalyst for efficient nitrous oxide removal from nitric acid tail gases at economically appealing low temperature (below 400 °C). However, this issue still remains an unsolved problem due to the presence of inhibiting co-reactants in the feed gas (O₂, H₂O and NO_x) and the low concentration of the N₂O pollutant.

Presented contribution summarizes our research dealing with cobalt mixed oxide catalysts for low temperature N₂O catalytic decomposition. Tuning of the catalyst properties was guided by catalytic tests of N₂O decomposition including the effect of water, oxygen and NO_x inhibitors, TPR-H₂ and in-situ work function measurements. The optimal composition of the catalyst revealed in the laboratory experiments was successfully reproduced in large scale synthesis and shaping. In the pilot plant tests (130 days), high output in N₂O removal from the tail gases of the nitric plant was reached.

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