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Optimization of Cs content in Co-Mn-Al mixed oxide as catalyst for N₂O decomposition

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Abstract

The series of Co-Mn-Al mixed oxide catalysts with different amount of Cs (0.5–4.6 wt.%) was prepared by calcination of Co-Mn-Al hydrotalcite (Co:Mn:Al = 4:1:1) and followed by impregnation by cesium salt (CsNO₃, Cs₂CO₃) using pore filling method. Chemical analysis, XRD, N₂ sorption, TPR-H₂, TPD-CO₂ and TPD-NH₃ were used to characterize the catalysts. All prepared catalysts were tested for N₂O catalytic decomposition in inert gas and in the presence of oxygen, water vapor and nitric oxide. The influence of Cs salts used for catalyst preparation, cesium amount and calcination temperature on catalysts activity and stability were studied. The catalytic activity increases with increasing amount of cesium promoter. The catalysts containing ca. 3.2 wt.% Cs was the most active one under the conditions simulating the composition of the waste gas (N₂O, O₂, H₂O) upstream the SCR NO_x unit in a nitric acid plant.

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