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Co-Mn-Al SPINEL CATALYST FOR REMOVAL OF N₂O FROM NITRIC ACID PLANT TAIL GASES

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The K-doped Co-Mn-Al mixed oxide deN₂O catalyst was prepared by calcination of Co-Mn-Al layered double hydroxide, subsequent impregnation by KNO₃ and shaping into tablets 5x5 mm. Pilot plant catalytic measurement of N₂O decomposition was performed in a fixed bed stainless steel reactor (0.31 m i.d.), temperature range from 300 to 450 °C and inlet pressure of 0.6 MPa. Reactor was connected at the bypassed tail gas from the nitric production plant downstream the SCR NO_x/NH₃ catalyst. Feed to the reactor was varied between 300 and 600 kg h⁻¹ and contained typically 400-700 ppm N₂O together with oxygen, water vapor and low concentration of NO, NO₂ and NH₃. Various methods such as AAS, XRD, XPS, N₂ physisorption, He pycnometry, Hg porosimetry, and H₂-TPR were used for characterization of the fresh and used catalysts. The changes in the surface composition, caused by the catalyst use for 112 days in the pilot reactor, did not negatively affect catalytic performance, average value of N₂O conversion 90 ± 6% at 450 °C was kept (GHSV=8 620 m³ m_{bed}⁻³ h⁻¹) (Fig. 1). Obtained kinetic data were applied in modeling of full-scale reactor for N₂O emissions abatement.

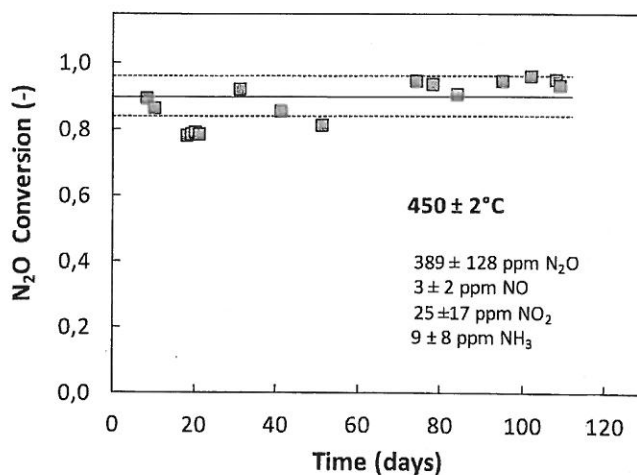


Fig. 1 Stability test over K/Co₄MnAlO_x catalyst in the pilot plant test (GHSV=8 620 m³ m_{bed}⁻³ h⁻¹, p=0.6 MPa)