Catalytic reduction of N_2O by H_2 over sillica-supported Pt-based catalysts: Effect of Cu addition

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The present study has been focused on effect of Cu addition on the activity of a sample of 1.2% Pt/SiO_2 for the selective reduction of N_2O by H_2 at very low temperatures. Sillica-supported Cu-Pt catalysts were prepared by using censecutive ion-exchange and liquid-phase reduction techniques and characterized by volumetric chemisorption, XRD and in situ TPD/TPR measurements. The addition of copper to the monometallic Pt could not only visibly give higher deN2O activity in the reduction at 110°C but also allow much better on-stream stability, depending on copper amounts to be promoted. When a single sample of Cu-Pt with 0.57% Cu was used for repeated measurements, this catalyst showed a significant loss in deN_2O catalysis performance. All copper prometed Pt catalysts consisted of alloy-like Cu-Pt species even before reaction, as confirmed by XRD measurements; thus, this was not associated with catalyst deactivation. The TPD/TPR measurements propose that generation of N-containing species during the reduction might lead to such an activity loss with time.