

Comparative study of the mobility of Pd species in SSZ-13 and ZSM-5, and its implication for catalytic activity after hydro-thermal aging as Passive NO_x Adsorbers (PNAs)

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The comparative behavior of Pd species in ZSM-5 and SSZ-13 zeolite supports was studied. The addition of water in the feed during thermal treatment resulted in the Pd sintering in Pd/ZSM-5, although Pd dispersion and agglomeration were concurrently observed in Pd/SSZ-13. The prepared catalysts were vacuum-treated to induce the auto-reduction of atomic Pd species. The isolated Pd species in ZSM-5 were completely reduced to form large Pd clusters after vacuum treatment, while most of the Pd species in SSZ-13 remained atomically dispersed. Therefore, the different behavior of Pd/ZSM-5 and Pd/SSZ-13 against the hydrothermal treatments could be explained by the intrinsic difference in the Pd mobility. The smaller pore size of SSZ-13 than ZSM-5 seems to contribute to the lesser Pd mobility. The hydrothermal treatment deactivated the NO adsorption ability of Pd/zeolite catalysts with larger pore openings which supports the present proposal.