

Characteristics of NH_3 and N_2O formation over Pt substituted commercial three-way catalysts (TWCs)

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An acute shortage of Pd has pushed its price to the highest level compared to Pt. From a standpoint of commercial application in the aftertreatment system, it is highly desired to identify the TWC performance by the partial substitution of Pt in Pd/Rh TWC while maintaining a constant total loading of PGM. This study characterized formations of byproducts, N_2O and NH_3 along with the TWC reaction converting CO, HCs and NO. We compared six aged commercial TWCs consisting of the Pd/Rh catalysts and partially substituted Pt TWCs with respect to the location of the catalytic converter (WCC front, WCC rear and UCC). All six TWCs showed nearly 100% conversion of NO to N_2 at high temperature (500 °C), regardless of the presence of Pt. However, in the lower temperature range (200 ~ 400 °C), formations of N_2O and NH_3 were strongly affected by the presence of Pt. Pt-substituted Pt/Rh/Pd catalysts showed a superior NO conversion and N_2 selectivity compared to the Pd/Rh TWC, regardless of the converter location. This study provides possible application of the Pt substituted TWC with comparable performances in a catalytic converter with reduced cost replacing conventional Pd/Rh based TWC.