FUEL-BORNE REDUCTANTS FOR NO_X AFTERTREATMENT

Mike Kass, John Thomas, and Bruce Bunting

Oak Ridge National Laboratory

ABSTRACT

One potential method for meeting stringent NO_x emissions standards involves blending reductants into the bulk fuel, then removing them on board, or perhaps at the pump, for use in selective catalytic reduction (SCR). One family of readily removed reductants is light alcohols.

By using ethanol as the reductant and silver-loaded alumina catalyst bricks, NO_x emissions were reduced by more than 90 percent and 80 percent for space velocities of 21,000/h and 57,000/h, respectively. These results were achieved for catalyst temperatures between 360°C and 400°C and for C1: NO_x ratios of 4-6; at lower temperatures, the NO_x conversion was less efficient.

A concept for utilizing ethanol (distilled from an ethanol-diesel micro-emulsion fuel) as the SCR reductant was included in this initial study to demonstrate fuel-borne reductant feasibility. In contrast to other catalyst technologies, NO_x conversion appeared to be enhanced by the initial catalyst aging, with the presumed mechanism being sulfate accumulation within the catalyst. We anticipate presenting follow-on efforts, which include assessing SCR performance for these catalysts using other reductant (alcohol) types.