

TITLE: DEVELOPMENT OF IMPROVED CATALYSTS FOR THE SELECTIVE CATALYTIC REDUCTION OF NITROGEN OXIDES WITH HYDROCARBONS

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INDUSTRY

COLLABORATOR: TDA Research

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PERIOD OF

PERFORMANCE: September 1, 2000– March 31, 2001

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ABSTRACT

OBJECTIVES

- To gain insight into the adsorption-reaction mechanism of the reduction of NO_x by methane using temperature programmed desorption and temperature programmed reaction studies.
- To improve the activity and selectivity of alumina supported cerium oxide-copper oxide-based sorbent catalysts for the reduction of NO_x by methane by the addition of promoters to enhance NO chemisorption, NO oxidation, intermediate stabilization, or methane activation. Alternative catalyst preparation methods will also be tried to enhance metal aluminate formation over the formation of oxide crystals.
- To investigate the possibility of using inexpensive and widely available residual fuel oils as an alternate reductant to replace ammonia in the SCR reaction.

ACCOMPLISHMENTS TO DATE

In this period of performance we concentrated on

- The preparation of the modified catalysts
- The temperature Programmed Desorption (TPD), Temperature Programmed Reaction (TPR), and Temperature Programmed Reduction (TPRed) studies of the modified and unmodified catalysts with NO, O₂, CH₄, and various combinations of these gases.
- The evaluation of the effects of various pretreatments on the catalyst performance using TPD and TPR.

Data has been collected, but data analysis is ongoing.

SIGNIFICANT RESULTS

The results of the TPD, TPR, and TPRed with modified and unmodified catalysts will be presented at the HBCU/OMI Meeting to be held in Pittsburgh, PA, June 5, 6, 2001.

PLANS FOR THE COMING YEAR

- Complete the TPD, TPR, and TPRed runs.
- Complete the evaluation of pretreatment effects.
- Complete the evaluation of the data.
- Select the catalysts for further testing
- Test selected catalysts in our laboratory scale packed bed reactor setup.
- Select the catalyst for long-term testing
- Send data on selected catalysts to TDA Research for bulk production and long-term testing

ARTICLES, PRESENTATIONS, AND STUDENT SUPPORT

Journal Articles (peer reviewed)

None

Conference Presentations

To be presented at the HBCU/OMI Meeting, Pittsburgh, PA, June 5-6, 2001.

Students Supported Under This Grant

The following undergraduate chemical engineering students were supported under this grant:

- Vaughnery Ammons
- Randolph Ashton
- Lashonda Martin