TITLE: **OXIDATION OF MERCURY IN PRODUCTS OF COAL COMBUSTION**

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ABSTRACT

Objectives

The objectives of the work are: (1) to develop new catalysts having high activity for both NOx reduction and mercury oxidation and (2) to provide fundamental chemical kinetic data on mercury reactions in flue gas that are needed to design and optimize the performance of SCR for NOx, SOx, particulate matter, and mercury control in plants equipped with electrostatic precipitators downstream from an air preheater (cold side ESP), followed by a wet flue gas desulfurization system (wet FGD).

Accomplishments to Date

The experimental and theoretical work is on-going. The work plan has three components: catalyst formulation, catalyst performance, and development of a chemical kinetic mechanism. New catalysts are being developed and characterized in the Center for Surface Chemistry and Catalysis and the Combustion and Emission Laboratory at Clark Atlanta University. The most promising candidates for efficient NO_X reduction and mercury oxidation will be subjected to performance tests at the Catalyst Reactivity Test Facility at the Southern Research Institute.

Currently, three catalysts supplied by Gas Technology Institute are being studied at the Catalyst Reactivity Test Facility at the Southern Research Institute. The current experiments include iron, vanadium and cerium based catalysts. The variables include temperature, flue gas composition, including simulated Powder River Basin Coal flue gas, and mercury and HCl concentrations.

In parallel with the experimental evaluation of performance, the chemical reactions of mercury in the presence of HCl, NH_3, SO_2, SO_3, NO, NO_2, CO, CO_2, O_2, unburned carbon, fly ash, and catalyst are being studied by a theoretical modeling effort. A chemical kinetic mechanism and rate coefficients are being developed that are consistent with the results of the laboratory experimental and field data.

Future Work

(1) Continue the catalyst development effort to provide new catalysts for the laboratory evaluation of NOx reduction and mercury oxidation.

(2) Continue the experimental study at the Catalyst Reactivity Test Facility to determine the effect of various factors such as flue gas composition and fly ash composition.

(3) Continue the development of a chemical kinetic mechanism consistent with the results obtained in laboratory, data available in the literature, and data from field tests.

List of Papers Published

None

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