The transport of hydrogen chloride (HCl) gas in air was studied in a simulated heating, ventilating and air conditioning (HVAC) system. The test system was a tube of square cross section, 0.305 m (1 ft) on each side, with a total length of ca 120 m. The sides of the apparatus were built of painted and unpainted gypsum wallboard, and poly(methyl methacrylate) (PMMA), arranged in two different configurations.

All four tests were run at normal room temperature. Hydrogen chloride gas was injected into the air at the entrance to yield initial HCl concentrations of ca. 3,000-4,000 ppm (vol). The experiments were typically conducted for 30 min. Gaseous HCl concentrations were measured at 9 locations along the conduit, and the results were compared with predictions from an existing model for HCl transport and decay from fire atmospheres.

The model was used in a purely predictive mode, i.e, unchanged, since the flow dynamics are well defined in this scenario and since HCl decay parameters for each type of surface used had been developed for the model in previous studies.

The data indicated rapid HCl decay along the system. In every case less than 10% of the HCl introduced at the beginning of the HVAC system was still present at its exit. In fact, in the cases where no PMMA surfaces were involved, less than 1% of the original HCl exited the HVAC system. This decline in HCl concentration results strictly from surface effects since there was no opportunity for dilution with ambient air along the flow path. Excellent agreement was obtained between model predictions and experimental measurements. The model did, in fact, accurately simulate the greatly varying capacity of the various surfaces to retain HCl.