The concentrations of HONO, $HO_2NO_2$, and RONO are predicted to be small relative to those of NO and $NO_2$. Each of these species has decomposition reactions,

$$HONO + h\nu \longrightarrow OH + NO, \quad (36)$$

$$HO_2NO_2 \longrightarrow HO_2 + NO_2, \quad (65)$$

$$RONO + h\nu \longrightarrow RO + NO, \quad (75)$$

that, at the temperatures and solar intensities prevalent in the experiment and in the summer atmosphere, are fast enough to insure that the concentrations of each of the three species are low. At lower solar intensities than those in the experiment, HONO and RONO can be expected to reach higher concentrations, and at lower temperatures, such as those in the stratosphere, $HO_2NO_2$ may accumulate.

Under daytime conditions the reactions that govern the concentration of HONO are 36 and 37. At night, however, the only apparent destruction route for HONO is reaction 33. Depending on the relative importance of reactions 37, 32, and 33, HONO may reach substantial concentrations under night-time conditions. A lower limit on the night-time concentration of HONO can be estimated from the equilibrium HONO concentration based on reactions 32 and 33.

$$[HONO] = \left[\frac{k_{13}[NO][NO_2][H_2O]}{k_{14}}\right]^{1/2} \quad (76)$$

At $[NO] = [NO_2] = 0.1$ ppm, $[H_2O] = 2.4 \times 10^4$ ppm (50% relative humidity), the equilibrium HONO concentration calculated from equation 76 is $1.9 \times 10^{-2}$ ppm. Nitrous acid has been recently observed in the atmosphere just before sunrise in Jülich, Germany, at concentrations as high as 0.8 ppb (Platt and Perner, 1979).