

Supporting Information

Heterogeneous Photochemical Conversion of NO₂ to HONO on the Humic Acid

Surface under Simulated Sunlight

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Summary

Five pages, including 4 figures and text about the trapping of HONO by a quartz tube filled with Na₂CO₃.

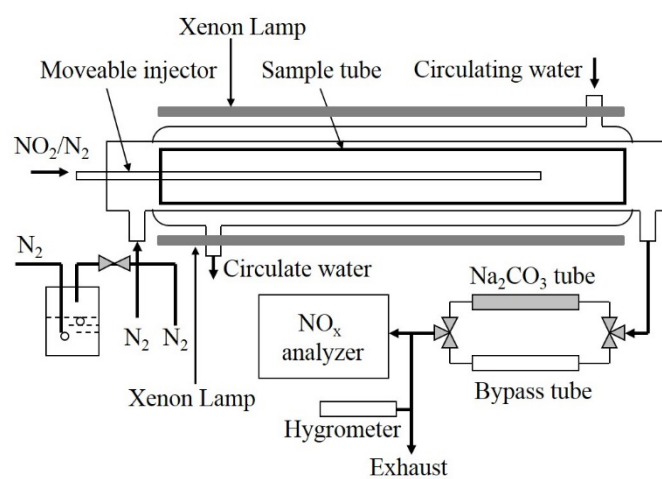


Figure S1. Diagram of the flow tube reactor

We have investigated the trapping of HONO by a quartz tube (10 cm length and 0.6 cm inner diameter) filled with 1.0 g of crystalline Na_2CO_3 . Gaseous HONO was produced by the heterogeneous reaction of HCl with NaNO_2 ($\text{HCl} + \text{NaNO}_2 \rightarrow \text{HONO} + \text{NaCl}$),^[1] where HCl diluted in N_2 passed through a column containing NaNO_2 crystals. Caused by its quantitative interference, HONO was measured from the NO_2 signal of the NO_x analyzer (Thermo 42i). As shown in Figure S2, the HONO concentration was 30 ppb by a bypass tube while only negligible HONO was observed using a quartz tube (10 cm length and 0.6 cm inner diameter) filled with 1.0 g of crystalline Na_2CO_3 . The trapping efficiency of HONO by this Na_2CO_3 tube was higher than 99% at the steady state.

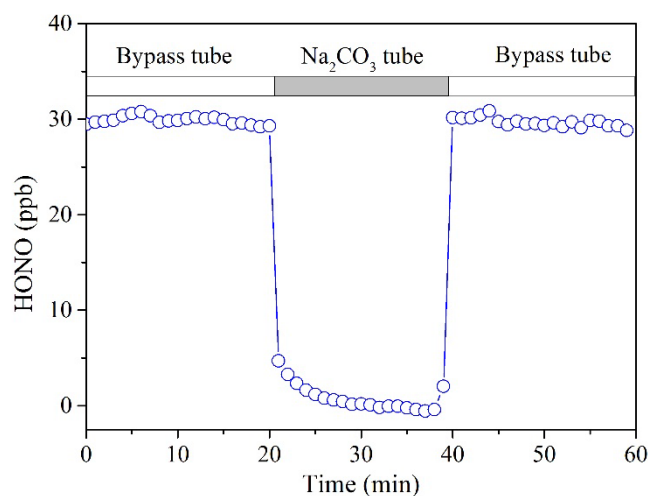


Figure S2. Trapping of HONO by a quartz tube (10 cm length and 0.6 cm inner diameter) filled with crystalline Na_2CO_3 of 1.0 g

Reference

- (1) Febo, A.; Perrino, C.; Gherardi, M; Sparapani, B., Evaluation of a High-Purity and High-Stability Continuous Generation System for Nitrous Acid. *Environ. Sci. Technol.* **1995**, 29, 2390-2395.

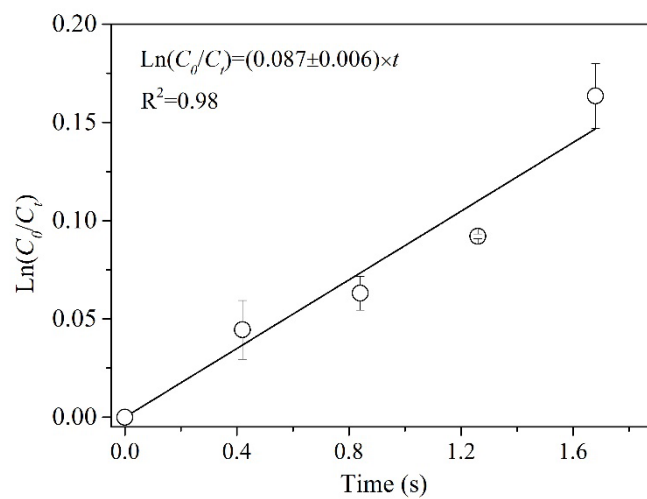


Figure S3. Determination of the linearity of $\ln(C_0/C_t)$ against t by varying the length of the HA coating in contact with NO_2 , which is equivalent to vary the reaction time.

Reaction conditions: irradiation intensity of 194.5 W/m^2 , HA mass of $15.9 \text{ }\mu\text{g/cm}^2$,

NO_2 concentration of 30 ppb, temperature of 298 K, and RH of 22%.

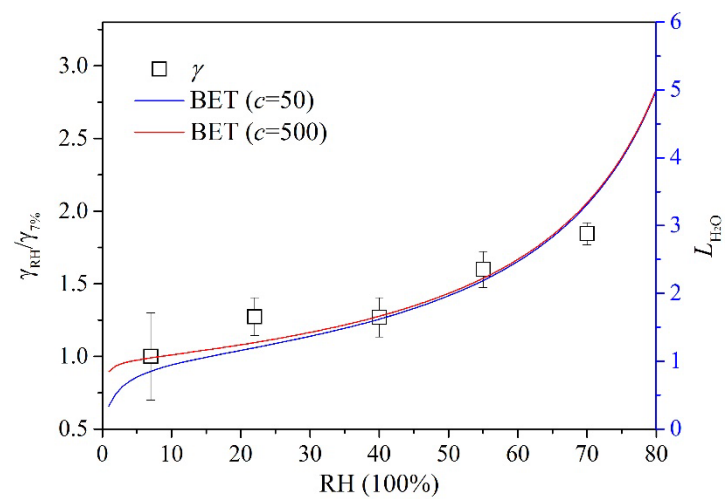


Figure S4. Relative enhancement ($\gamma_{RH}/\gamma_{7\%}$) of γ and equivalent layer numbers (L_{H_2O}) of water at different RH. Blue and red lines represent BET isotherms of water (L_{H_2O}) at $c=50$ and 500 , respectively.