Supplement of

A compact, high-purity source of HONO validated by Fourier Transform Infrared and Thermal Dissociation Cavity Ring-down Spectroscopy

Nicholas J. Gingerysty[1] and Hans D. Osthoff[1]

5 [1] Department of Chemistry, University of Calgary, 2500 University Drive N.W., Calgary, Alberta, Canada T2N 1N4

Correspondence to: Hans D. Osthoff (hosthoff@ucalgary.ca)
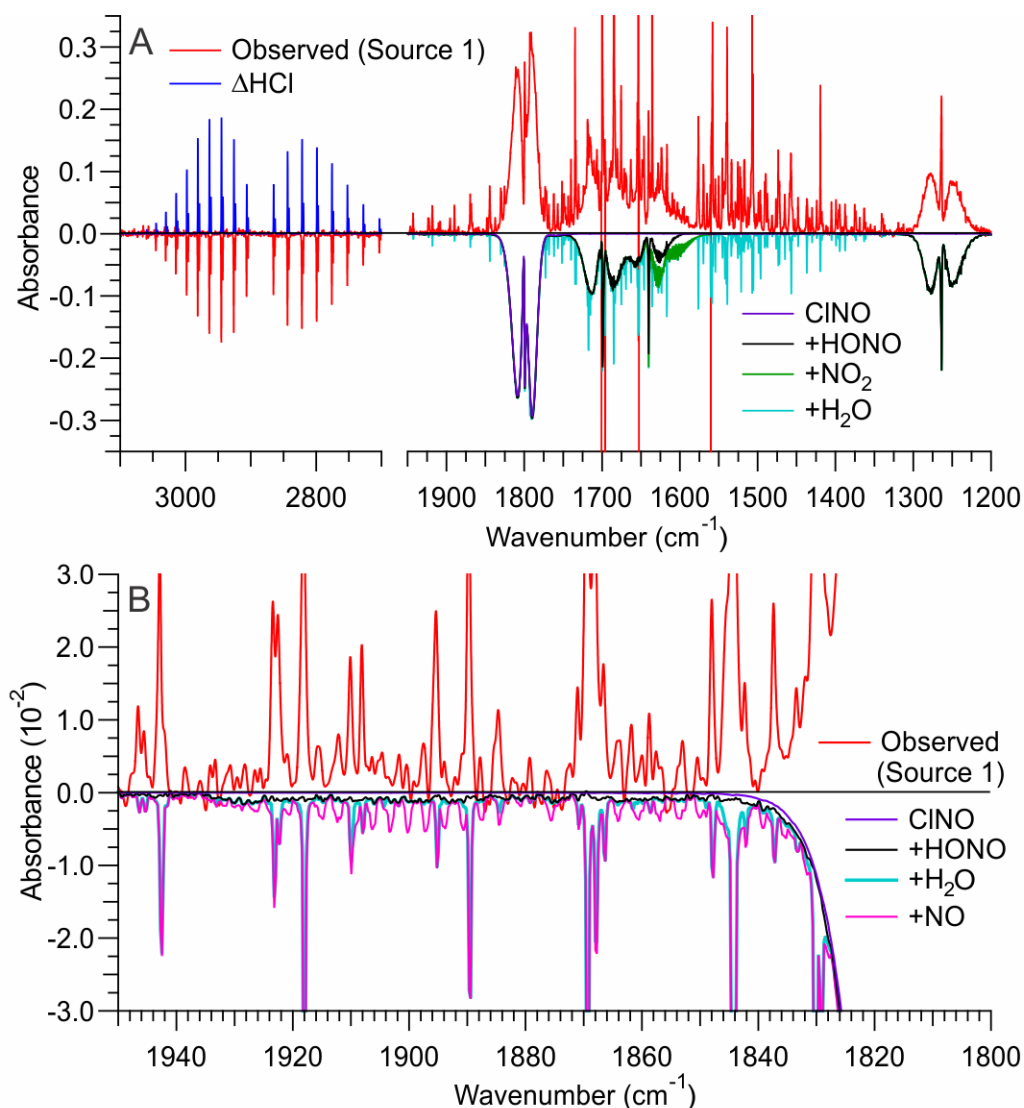
Figure S1. (A) Infrared spectrum (shown in red colour) of a gas stream generated by reaction of $HCl_{(g)}$ with $NaNO_{2(s)}$ using source 1. The reference spectrum was collected when $NaNO_2$ was bypassed, i.e., contained HCl. The transmission spectrum (not shown) was void of HCl lines, indicating quantitative conversion of HCl. Literature spectra (Sharpe et al., 2004) were multiplied by the optical path length of 6.4 m and mixing ratios of the identified trace gases to reproduce the observed spectrum; the expected spectra were multiplied by -1 (i.e., inverted) prior to presentation. In this example, source 1 emitted ~38 ppmv of HONO, ~15.5 ppmv of ClNO, ~4.0 ppmv of NO_2 and ~100 ppmv of H_2O and consumed > ~38 ppmv of HCl. (B) Expanded view of the 1950 to 1800 cm^{-1} spectral region. The spectrum expected for ~4.0 ppmv of NO is superimposed.
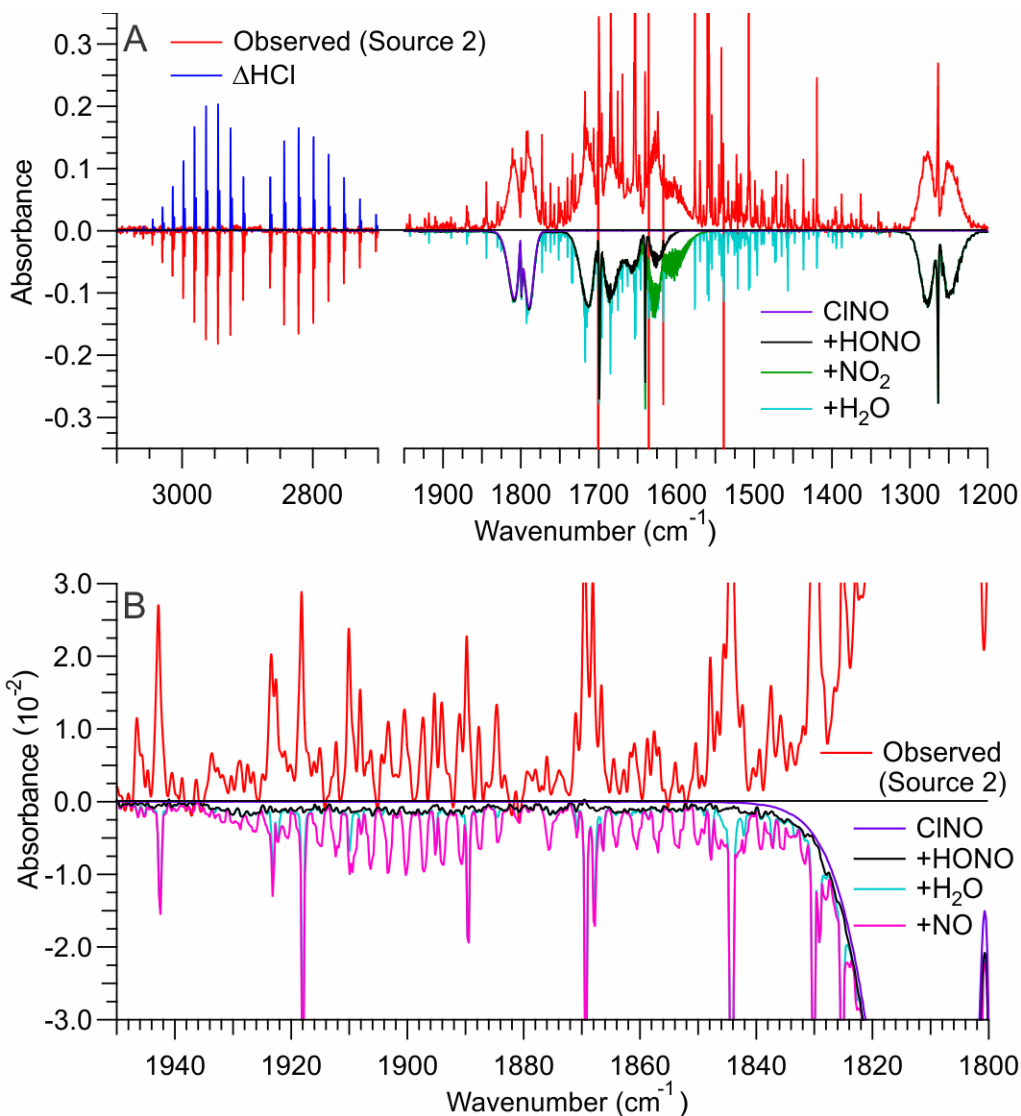
Figure S2. Infrared spectrum (shown in red colour) of a gas stream generated by reaction of $HCl_{(g)}$ with $NaNO_{2(s)}$ using source 2. In this example, source 2 emitted ~48 ppmv of HONO, ~6.5 ppmv of ClNO, ~8.0 ppmv of NO_2 and ~80 ppmv of H_2O and consumed >41.5 ppmv of HCl. (B) An expanded view of the 1950 to 1800 cm^{-1} spectral region. The spectrum expected for ~8.0 ppmv of NO is superimposed.
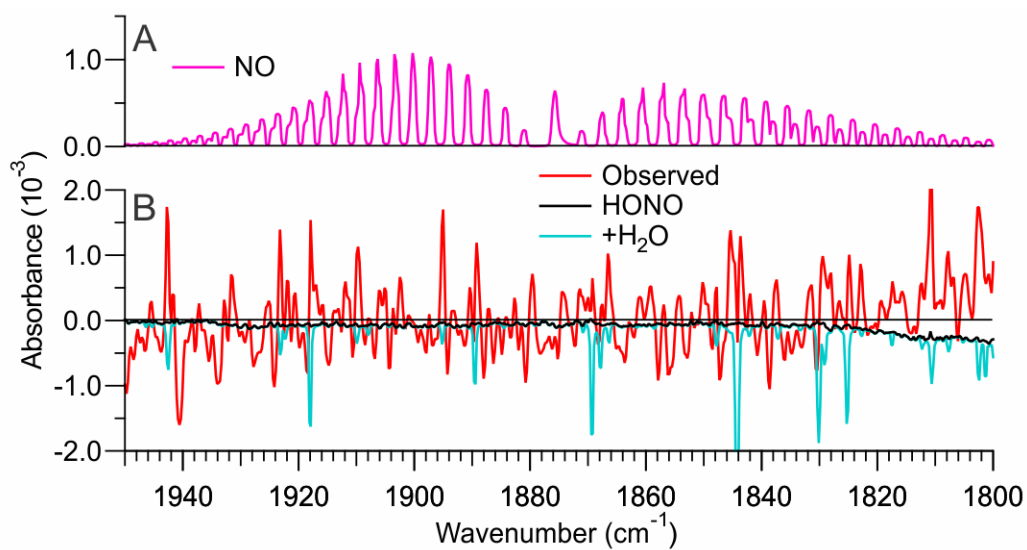
Figure S3. (A) Expected spectrum (Sharpe et al., 2004) for ~1.0 ppmv of NO. (B) Infrared spectrum (shown in red colour) of the optimized source demonstrating the absence of NO.

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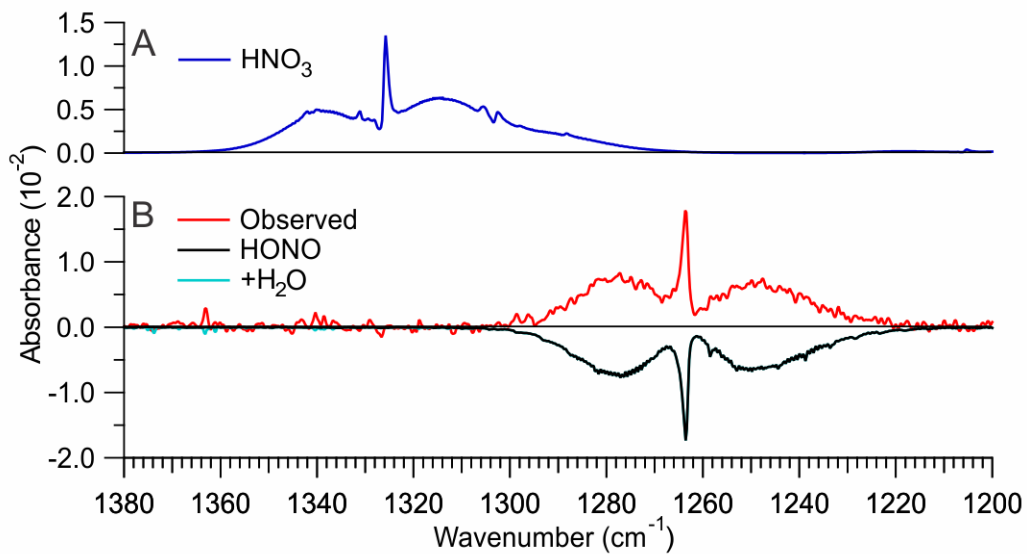
Figure S4. (A) Expected spectrum (Sharpe et al., 2004) for ~1.0 ppmv of HNO_3. (B) Infrared spectrum (shown in red colour) of the optimized source demonstrating the absence of HNO_3.

References

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Sharpe, S. W., Johnson, T. J., Sams, R. L., Chu, P. M., Rhoderick, G. C., and Johnson, P. A.: Gas-phase databases for quantitative infrared spectroscopy, Appl. Spectrosc., 58, 1452-1461, 2004.