# Séminaires @ ICARE

# Does the Reaction of $HO_2$ with NO Produce $HONO_2$ and HOONO?


**by**

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***Salle de conférences, ICARE***

$HO_x$($HO_2$ and OH) and $NO_x$($NO_2$ and NO) radicals are key intermediates in chemistry throughout the atmosphere; the $HO_x$ and $NO_x$ cycles catalyze ozone depletion in the stratosphere and ozone and photochemical smog production in the troposphere. Interconversion within the $HO_x$family and within the $NO_x$ family happens continuously, partially through the reaction of $HO_2$ and NO to form OH and $NO_2$. Since these radicals are continually recycled, even a small branching yield of nitric acid ($HONO_2$) from the reaction of $HO_2$ with NO would impact radical concentrations predicted in the troposphere and stratosphere, by cumulatively sequestering radicals in a stable reservoir species.

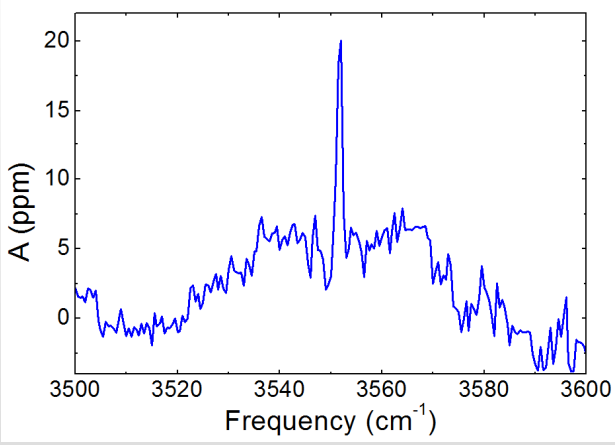


*Fig. 1:* Spectrum of pure $HONO_2$ ($4.0 \times 10^{12}$ $cm^{-3}$) at room temperature. $HONO_2$ was purified by vacuum distilling a mixture of $HONO_2$ (70% in water) and concentrated $H_2SO_4$ and added to the cell with (87 ± 2) torr of $N_2$.

Butkovskaya *et al*. observed a small yield of $HONO_2$ from the reaction of $HO_2$ with NO (0.5% at 1 atm and 298K) in a turbulent flow reactor using Chemical-Ionization Mass Spectrometry. We investigated this reaction by an alternative method: directly detecting the $HONO_2$ – as well as its weakly bound isomer HOONO – with Pulsed-Cavity Ringdown spectroscopy. $HO_2$ radicals were produced by Pulsed Laser Photolysis of $Cl_2$ in a slow flow cell, in the presence of methanol. Addition of 700 Torr of CO prevented unwanted $HONO_2$ formation from the reaction of OH and $NO_2$and recycled $HO_2$. Our experiments provide a complementary approach, allowing detection of products spectroscopically on short time-scales (2.5 ms) in the absence of any wall reactions.

*Pour tout renseignement complémentaire, ou proposition de séminaire par un thésard ou un chercheur invité, contacter Sedina Tsikata (sedina.tsikata@cnrs-orleans.fr)*