

Physical Chemistry Chemical Physics

2024, 26, 12745-12752

<https://doi.org/10.1039/D4CP01632G>

## Understanding the active role of water in laboratory chamber studies of reactions of the OH radical with alcohols of atmospheric relevance

María de los A. Garavagno,<sup>a,b,c,d</sup>

Federico J. Hernández,<sup>a,b,c,e</sup>

Rafael A. Jara-Toro <sup>a,b,c, f</sup> and

Gustavo A. Pino <sup>a,b,c</sup>

<sup>a</sup> INFIQC: Instituto de Investigaciones en Físico-Química de Córdoba (CONICET – UNC), Haya de la Torre y Medina Allende, Pabellón Argentina, Ciudad Universitaria, Córdoba 5000, Argentina.

**E-mail:** [gpino@unc.edu.ar](mailto:gpino@unc.edu.ar)

<sup>b</sup> Departamento de Físicoquímica, Fac. de Ciencias Químicas, Universidad Nacional de Córdoba, Haya de la Torre y Medina Allende, Pabellón Argentina, Ciudad Universitaria, Córdoba 5000, Argentina.

<sup>c</sup> Centro Láser de Ciencias Moleculares, Universidad Nacional de Córdoba, Haya de la Torre y Medina Allende, Pabellón Argentina, Ciudad Universitaria, Córdoba 5000, Argentina.

<sup>d</sup> MAG present address: School of Chemistry, University of Bristol, Cantock's Close, Bristol BS8 1TS, UK.

<sup>e</sup> FJH present address: School of Chemistry, University of Bristol, Cantock's Close, Bristol BS8 1TS, UK.

<sup>f</sup> RAJT present address: Université de Rennes, CNRS, IPR (Institut de Physique de Rennes) - UMR 6251, F-35000 Rennes, France.

### Abstract

In this work, we studied the reactions of three cyclic aliphatic alcohols with OH at room temperature, atmospheric pressure and different humidities in a Teflon reaction chamber. It was determined that the lower the solubility of the alcohol in water, the larger the effect of the humidity on the acceleration of the reaction. This experimental evidence allows suggesting that the acceleration is due to the reaction of the co-adsorbed reactants at the air–water interface of a thin water film deposited on the Teflon walls of the reaction chamber, instead of between co-reactants dissolved in the water film or due to gas phase

catalysis as previously suggested. Therefore, formation of thin water films on different surfaces could have some implications on the tropospheric chemistry of these alcohols in the tropical regions of the planet with high humidity.

Este Artículo se encuentra embargado hasta el día 2 de abril 2025

Sin embargo, tenga en cuenta que:

This is an Accepted Manuscript, which has been through the Royal Society of Chemistry peer review process and has been accepted for publication.

Accepted Manuscripts are published online shortly after acceptance, before technical editing, formatting and proof reading. Using this free service, authors can make their results available to the community, in citable form, before we publish the edited article. We will replace this Accepted Manuscript with the edited and formatted Advance Article as soon as it is available.

You can find more information about Accepted Manuscripts in the Information for Authors. Please note that technical editing may introduce minor changes to the text and/or graphics, which may alter content. The journal's standard Terms & Conditions and the Ethical guidelines still apply. In no event shall the Royal Society of Chemistry be held responsible for any errors or omissions in this Accepted Manuscript or any consequences arising from the use of any information it contains.

El enlace a la versión antes mencionada puede ser consultada en:

[https://www.researchgate.net/profile/Maria-De-Los-Angeles-Garavagno/publication/379517439\\_Understanding\\_the\\_active\\_role\\_of\\_water\\_on\\_laboratory\\_chamber\\_studies\\_of\\_reactions\\_of\\_the\\_OH\\_radical\\_with\\_alcohols\\_of\\_atmospheric\\_relevance/links/6613e2603d96c22bc77ae8a0/Understanding-the-active-role-of-water-on-laboratory-chamber-studies-of-reactions-of-the-OH-radical-with-alcohols-of-atmospheric-relevance.pdf](https://www.researchgate.net/profile/Maria-De-Los-Angeles-Garavagno/publication/379517439_Understanding_the_active_role_of_water_on_laboratory_chamber_studies_of_reactions_of_the_OH_radical_with_alcohols_of_atmospheric_relevance/links/6613e2603d96c22bc77ae8a0/Understanding-the-active-role-of-water-on-laboratory-chamber-studies-of-reactions-of-the-OH-radical-with-alcohols-of-atmospheric-relevance.pdf)