

Interactive comment on “Halogen activation and radical cycling initiated by imidazole-2-carboxaldehyde photochemistry” by Pablo Corral Arroyo et al.

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Below, we provide a point-by-point response to the comments raised by reviewer 1

Reviewer: This paper present for first time a new mechanism for halogens to be emitted that have not been considered up to date and that in determined conditions could be even more important that O₃ uptake in see surface. The paper is well written and structured and only require that authors address the following technical comments: - Please comment about the importance of differences between the spectra lamps and radiation in the atmosphere and possible implications for this study and atmospheric implications.

C1

Response: Thank you for this comment. We will include the following text in the conclusion of the revised version: “At 0° zenith angle the ratio of the excitation rates of IC by sunlight (spectrum given in Figure S1) and that by the lamps used in our experiments ($j_{\text{sun}}/j_{\text{lamps}}$) is about 2.83. Therefore, in terms of irradiation our results can be extrapolated to the atmosphere with confidence.”

Reviewer: Some comments should be added related the possible effect of Cl⁻ in the mechanism proposed since in sea salt aerosols Cl⁻ is going to be present.

Response: Thank you this comment. We will include the following text in the conclusion of the revised version: “Assessment of chlorine activation via IC as chromophore and sensitizer reacting with chloride, which is present in higher concentrations in sea salt aerosol particles (~5.4 M) (Herrmann et al., 2003), was beyond the scope of this study. While the ratio of chloride to bromide or iodide is higher than the inverse ratio of the corresponding rate coefficients (Tinel et al., 2014), the complex radical chemistry and kinetics requires detailed attention to understand impacts on chlorine activation and photosensitized HO₂ production.”

Reviewer: This sentence need to be finished up: "Code and data availability. The data for simulations...

Response: Yes, of course, we will deposit the data underlying each figure in the supporting material, and adapt this statement accordingly in the revised version.

References

Herrmann, H.: Kinetics of Aqueous Phase Reactions Relevant for Atmospheric Chemistry, Chem. Rev., 103, 4691-4716, 10.1021/cr020658q, 2003.

Tinel, L. D., Stéphane George, Christian: A time-resolved study of the multiphase chemistry of excited carbonyls: Imidazole-2-carboxaldehyde and halides, C. R. Chimie, 17, 801-807, 2014.

C2

