

***Interactive comment on* “Technical note:
Determination of binary gas phase diffusion
coefficients of unstable and adsorbing
atmospheric trace gases at low temperature –
Arrested Flow and Twin Tube method” by Stefan
Langenberg et al.**

Anonymous Referee #1

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This manuscript describes the development and application of two techniques for the measurement of gas phase diffusion coefficients for reactive or sticky trace gases of atmospheric relevance. The two techniques had been carefully designed, the measurements have been carefully performed and thoroughly analyzed, with an eye on all conceivable pitfalls and uncertainties. The manuscript is very well organized and well written. I have only two rather minor and general comments. The effort of the authors to publish this old but very valuable material is highly appreciated; it will be an important

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contribution to the atmospheric science community.

In the experimental part, the authors shortly mention the limiting cases for each of the two methods. How many wall collisions do the diffusing molecules typically undergo? Since either reversible adsorption or chemical reaction are affecting the transport kinetics, the authors could elaborate the limiting first order loss rate coefficient and the limiting residence time on the surface to lead to a noticeable impact on the analysis of the detector signals for each method. Could the method in turn be used to measure the surface residence time of sticky but non-reactive molecules through their effective diffusivity?

line 190: no need to decide whether ozone is adsorbing or non-adsorbing. Each molecule may adsorb. I suggest to simply mention chemical decay. Whether it undergoes reversible adsorption in addition seems not obvious (cf also previous comment) from the data but cannot be excluded.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-1050>, 2019.

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