

We thank the reviewer for the helpful additional suggestions. In the following, the reviewer comments are copied in black font, and the response is in blue font.

Minor comments:

Please remove references to THE mass accommodation coefficient. Call your chosen quantity something else: it is not the microscopic mass accommodation coefficient. Please see mathematical treatments in Brown, 1978 and Murphy and Fahey, 1987 and many others on high-pressure flow tube kinetics. Mozurkewich et al. (HO<sub>2</sub> mass accommodation) JGR 1987 has a nice sentence on p4165: " At high pressure ... the wall loss rate become independent of the reaction probability at the wall " i.e. mass accommodation coef., continuing: " and will approach the diffusion limit. "

1. Brown, R. L., Tubular Flow Reactors with First-Order Kinetics. Journal of Research of the National Bureau of Standards and Technology 1978, 83 (1).
2. Howard, C. J., Kinetic measurements using flow tubes. Journal of Physical Chemistry 1979, 83 (1), 3-9.
3. Murphy, D. M.; Fahey, D. W., Mathematical treatment of the wall loss of a trace species in denuder and catalytic converter tubes. Analytical Chemistry 1987, 59 (23), 2753-2759
4. Keyser, L. High-pressure flow kinetics.... J. Phys. Chem. 1984, 88, 20, 4750–4758  
<https://doi.org/10.1021/j150664a061>

Done. In the revised paper, we now refer to the wall's "sticking coefficient" to separate it from the mass accommodation coefficient. The references have also been included. At the end of Section 3.5, the following paragraph was added:

"At high pressure, the wall loss rate is ideally expected to become independent of the reaction probability at the wall (i.e. the mass accommodation coefficient), and the wall loss is expected to approach the diffusion limit (Brown, 1978; Howard, 1979, Murphy and Fahey, 1987; Keyser, 1984). Here, however, we see that at ground-level, the sticking coefficient influences gas loss suggesting that the impact of the wall's sticking coefficient on wall loss does not exactly match that of the mass accommodation coefficient. It is possible that some of this dependence of gas loss on the sticking coefficient is a result of numerical errors in resolving flow features close to the wall, including the laminar sub-layer for turbulent flow."

We further added the following sentences to draw better distinction and clarify the differences between the sticking coefficient and a mass accommodation coefficient:

- a) Page 8, behind the equation that defines the sticking coefficient: “where the mass fraction in the flow is the initial mass fraction of the studied species, and serves as the initial condition for the simulation. If the sticking coefficient was calculated using  $w_{flow}$  in one grid cell away from the wall, for an infinitely small grid cell the sticking coefficient would be equivalent to the mass accommodation coefficient at the wall.”
- b) Page 12, literature discussion: “The sticking coefficient ( $\alpha_i$ ) we defined to set up the boundary conditions on the wall for our simulations is comparable to the mass accommodation coefficients measured at lower pressures in those previous studies.”
- c) Page 16, discussion of Figure 7: “This decrease in sensitivity of gas loss to laminar diffusivity with decreasing sticking coefficients makes the sticking coefficient qualitatively similar in principle to mass accommodation coefficient.”

Finally, on page 18, summary: We have added the following sentence for perspective about better gas transmission in the turbulent flow regime: “The transmission increases initially due to a shorter residence time in the inlet, and then decreases as turbulent mixing increases and the laminar sub-layer thickness decreases in highly turbulent flow.”