We appreciate the reviewer for providing us useful comments. In the following, original reviewer comments, author's responses, and corresponding updates on the main text are shown as purple, black, and *italic*. Line numbers in the responses correspond to those in the originally submitted version.

Reviewer #3

(3.1) Vapor-wall loss plays a pivotal role in smog chambers and should be considered when assessing atmospheric processes conducted in such environments. In their study, He et al. explored the impact of temperature on vapor-wall loss for n-alkanes within a smog chamber with Teflon walls. Their findings substantiated the hypothesis that vapor-wall loss becomes more significant at lower temperatures in a Teflon-walled chamber. This research has resulted in empirical equations that enhance the practicality of data analysis for chamber experiments. The experimental protocol is carefully designed, and the procedure for determining partition, desorption, and diffusion rate coefficients seems rational. I have just two primary concerns before the paper is accepted with some minor revisions.

We thank the reviewer for the positive comments. Responses to the individual inputs are given below.

(3.2) Typically, a nebulizer is employed to produce aerosols. While the 11-D Grimm OPC detected relatively low particle levels in the chamber, it is helpful to cross-verify these results using alternative particle sizing instruments, such as a scanning mobility particle sizer. This precaution is necessary because the OPC has a higher particle size detection limit (>200 nm), and following evaporation of hexane, nanoparticles might persist, potentially distorting the measurement of vapor concentration with TAG.

We thank the reviewer for the valuable input. Unfortunately, scanning mobility particle sizer was not employed in our experiment. Nevertheless, we carefully designed the injection concentration for the alkane to be lower than 20% of its saturation concentration under the corresponding experimental temperature. The first SV-TAG measurement was conducted at least 1 h after injection in each experiment, providing sufficient time for both the solvent and alkanes to evaporate. Even if some nanoparticles might persist, it is expected to only account for a small mass fraction of alkanes in the chamber air. We revised the text to point out this issue clearly:

"*The resulting initial concentrations (C_0) of individual n-alkanes in the chamber ranged from 4 to 50 $\mu g\ m^{-3}$ assuming no wall loss, which were lower than 20% of their saturation concentrations under the corresponding experimental temperature to avoid particle formation.*" (Lines 81-82)

(3.3) My second concern is about the vapor-wall surface interaction mechanism at lower temperatures, as also pointed out by Reviewer 2. At lower temperatures, vapor molecules exhibit a tendency to remain in the condensed phase. This phenomenon was observed by the measurements of vapor-wall interactions conducted in this study. There seems to be a discrepancy between Cw and gamma specifically at these lower temperatures. It would be advantageous to establish a self-consistent vapor-wall interaction mechanism, as this would prove beneficial to both readers and the Teflon-walled chamber user community.

We thank the reviewer for the valuable input. As previously mentioned in responses to comment (2.2) and (2.3), we provided an extra comparison with pre-cooled chamber results and demonstrated that our results were not path-dependent. Consistent slopes in Fig. 5 indicated C_FEP_Surface for alkanes would be constant under different temperatures. To clarify, we revised the main text and supporting information as below:

In main text:

"*For experiments below room temperature, the cooling system of the freezer was turned on one hour after the completion of the injection. The operation procedure was employed to avoid homogeneous nucleation and subsequent condensational growth of aerosol particles. The validity of employing this post-cooled operation procedure was demonstrated by comparison with a pre-cooled chamber result at 270 K (Figure S2).*" (Lines 83-85)

Added in supporting information:

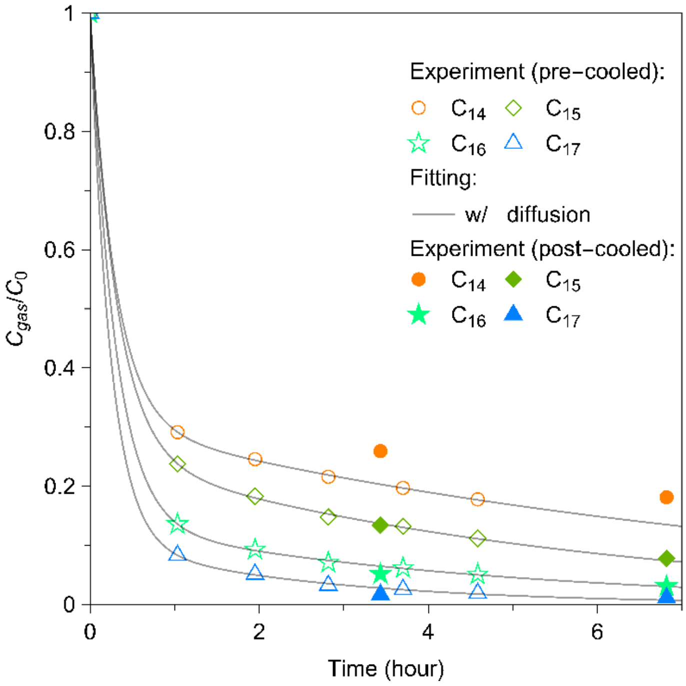

Figure S2. Comparison of C_{gas}/C_0 between pre-cooled experiment at 270 K (hollow points) and post-cooled experiment at 270.2 K (solid points). The two-layer kinetic sorption model was employed to fit the pre-cooled chamber data (black solid lines). Results in post-cooled experiments (solid points) aligns well with the two-layer kinetic model fitting results of pre-cooled experiment (black lines). The consistency between pre- and post- cooled experiment demonstrated the validity of employing post-cooled operation procedure.