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Supplement of

Aging aerosol in a well-mixed continuous-flow tank reactor: an introduction of the activation time distribution

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Equation (14) shows the 2-modal Taylor dispersion model for the calculation of the RTD in the PAM and TPOT chamber taken from Lambe et al. (2011).

$$\begin{aligned}
 RTD(t) = & \frac{1}{2 \cdot \sqrt{\pi \cdot \left(\frac{D_L}{uL}\right)_1 \cdot \left(\frac{t}{t_{resid}}\right)_1}} \cdot e^{-\left(\frac{\left(1 - \left(\frac{t}{t_{resid}}\right)_1\right)^2}{4 \cdot \left(\frac{D_L}{uL}\right)_1 \cdot \left(\frac{t}{t_{resid}}\right)_1}\right)} \\
 & + \frac{1}{2 \cdot \sqrt{\pi \cdot \left(\frac{D_L}{uL}\right)_1 \cdot \left(\frac{t}{t_{resid}}\right)_1}} \cdot e^{-\left(\frac{\left(1 - \left(\frac{t}{t_{resid}}\right)_1\right)^2}{4 \cdot \left(\frac{D_L}{uL}\right)_1 \cdot \left(\frac{t}{t_{resid}}\right)_1}\right)}
 \end{aligned} \tag{1}$$

5 **Table S1: Fitting parameter for the RTD of BES-particles in a PAM chamber and TPOT chamber. The effective dispersion coefficient is a dimensionless number that consist of the axial diffusion coefficient D_L , the flow velocity u and chamber length L .**

	$\left(\frac{D_L}{uL}\right)_1$	$(t_{resid})_1$	$\left(\frac{D_L}{uL}\right)_2$	$(t_{resid})_2$
PAM-Chamber	0.04	29.4 s	0.26	66.6 s
TPOT-Chamber	0.02	43.9 s	0.11	84.6 s

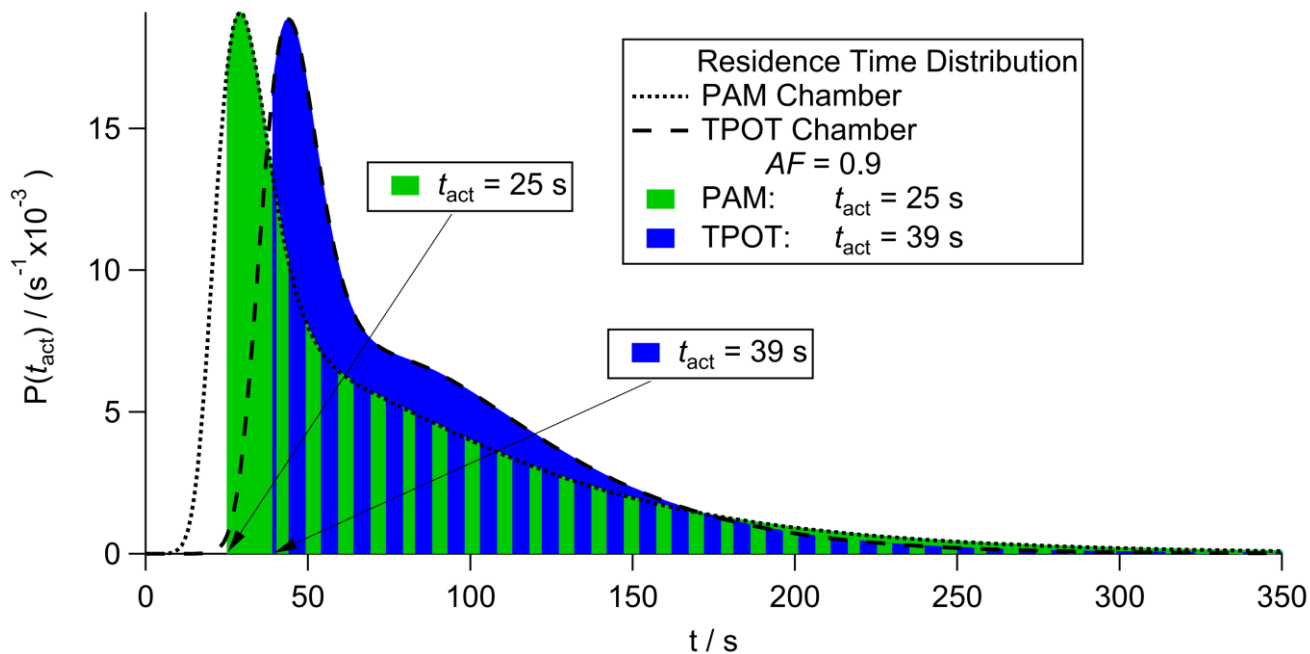


Figure S1: Calculation of t_{act} inside the PAM and TPOT chamber for a global $AF = 0.9$.

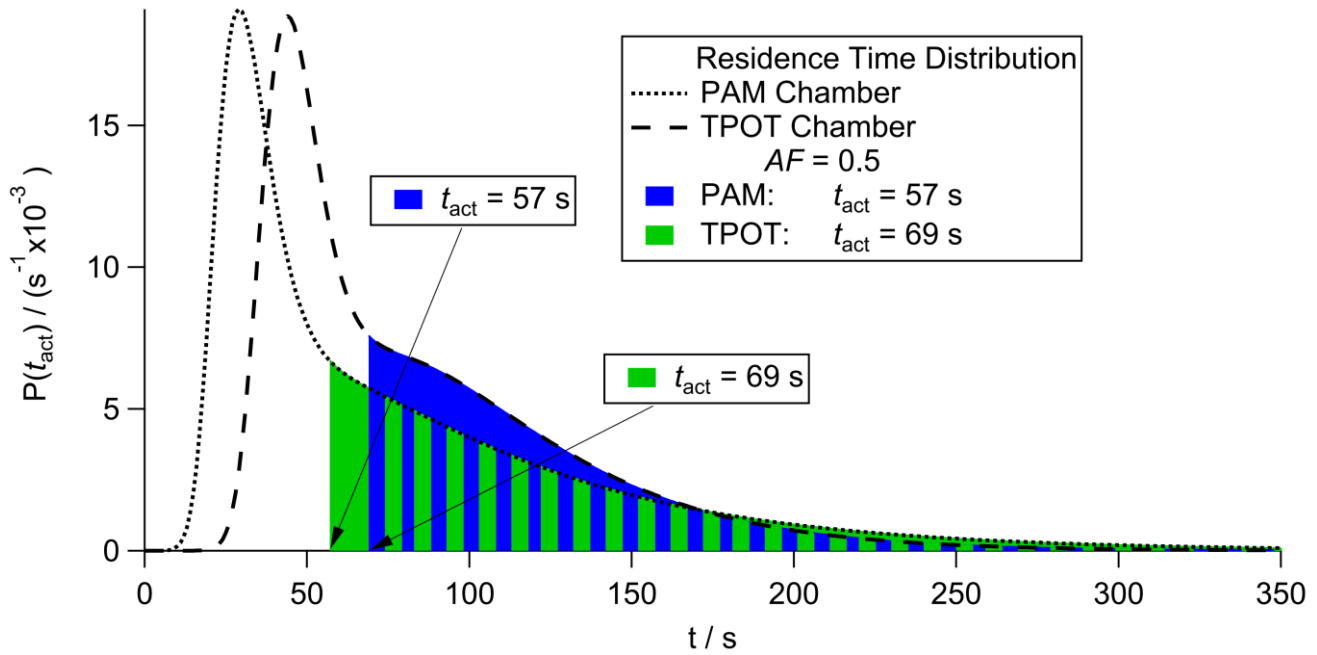


Figure S2: Calculation of t_{act} inside the PAM and TPOT chamber for a global $AF = 0.5$.

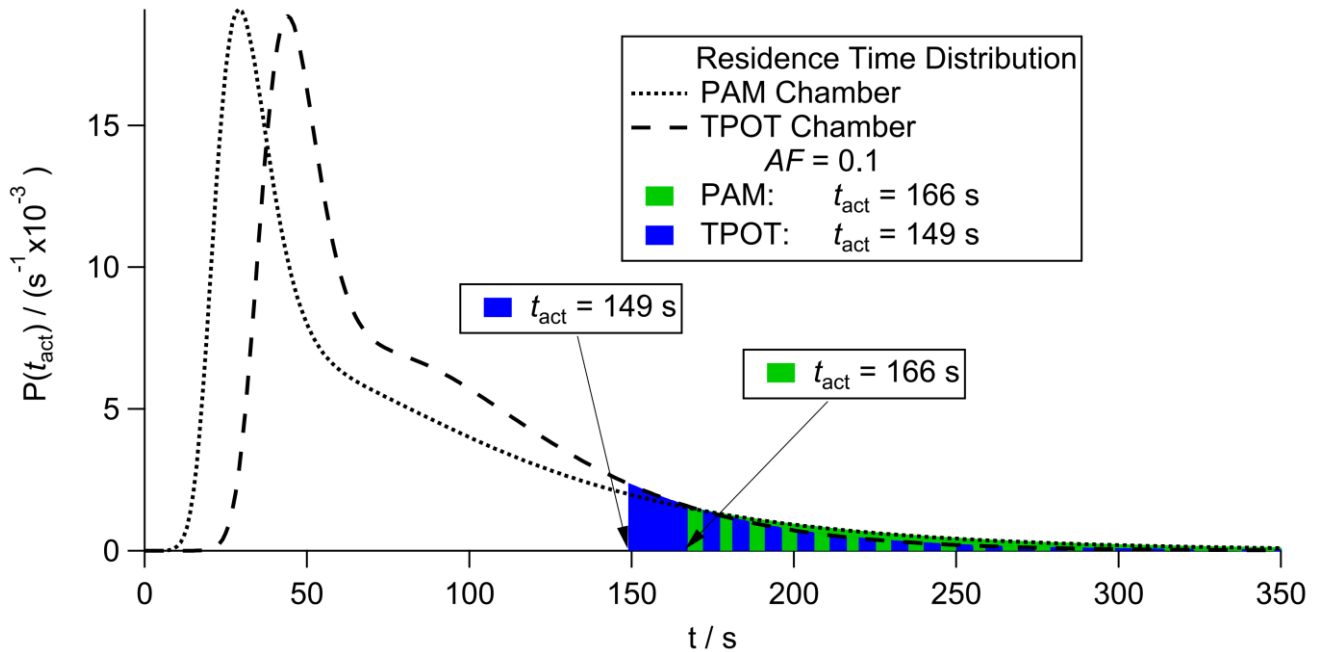


Figure S3: Calculation of t_{act} inside the PAM and TPOT chamber for a global $AF = 0.1$.

1 References

Lambe, A. T., Ahern, A. T., Williams, L. R., Slowik, J. G., Wong, J. P. S., Abbatt, J. P. D., Brune, W. H., Ng, N. L., Wright, J. P., Croasdale, D. R., Worsnop, D. R., Davidovits, P. and Onasch, T. B. B.: Characterization of aerosol photooxidation flow reactors: Heterogeneous oxidation, secondary organic aerosol formation and cloud condensation nuclei activity measurements, *Atmos. Meas. Tech.*, 4(3), 445–461, doi:10.5194/amt-4-445-2011, 2011.