

Supplement: 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).

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

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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

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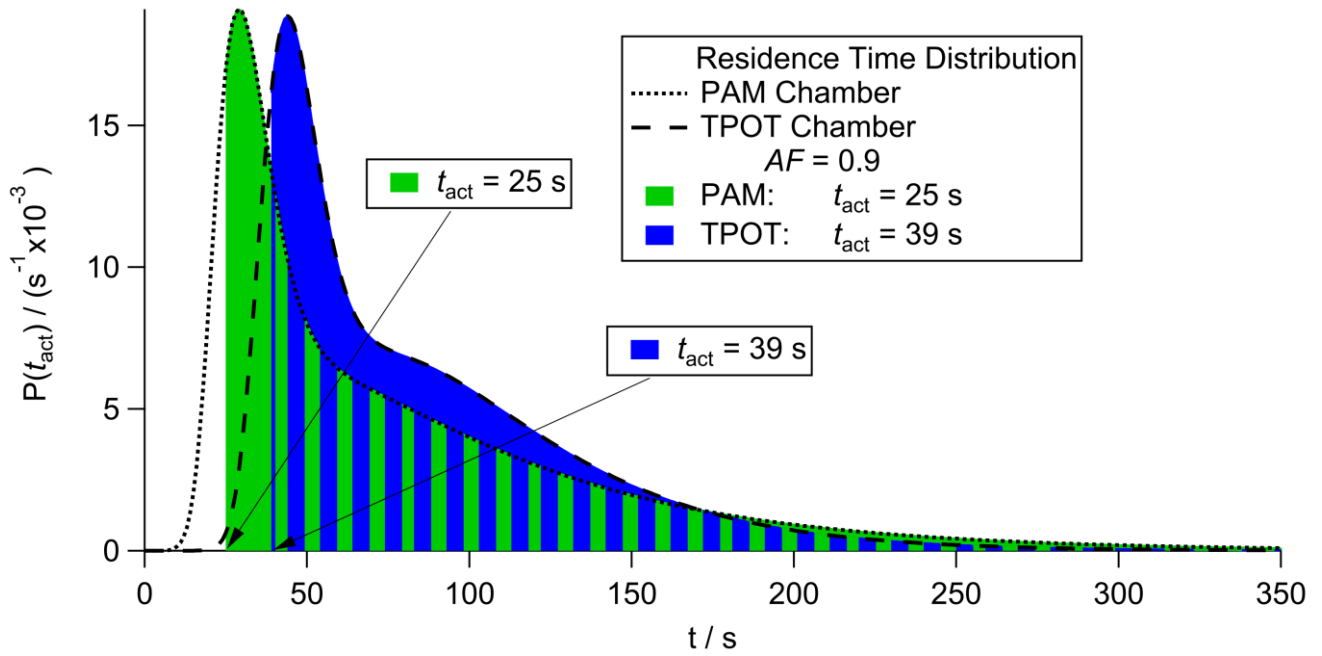


Figure S1: Calculation of t_{act} inside the PAM and TPOT chamber for a global $AF = 0.9$.

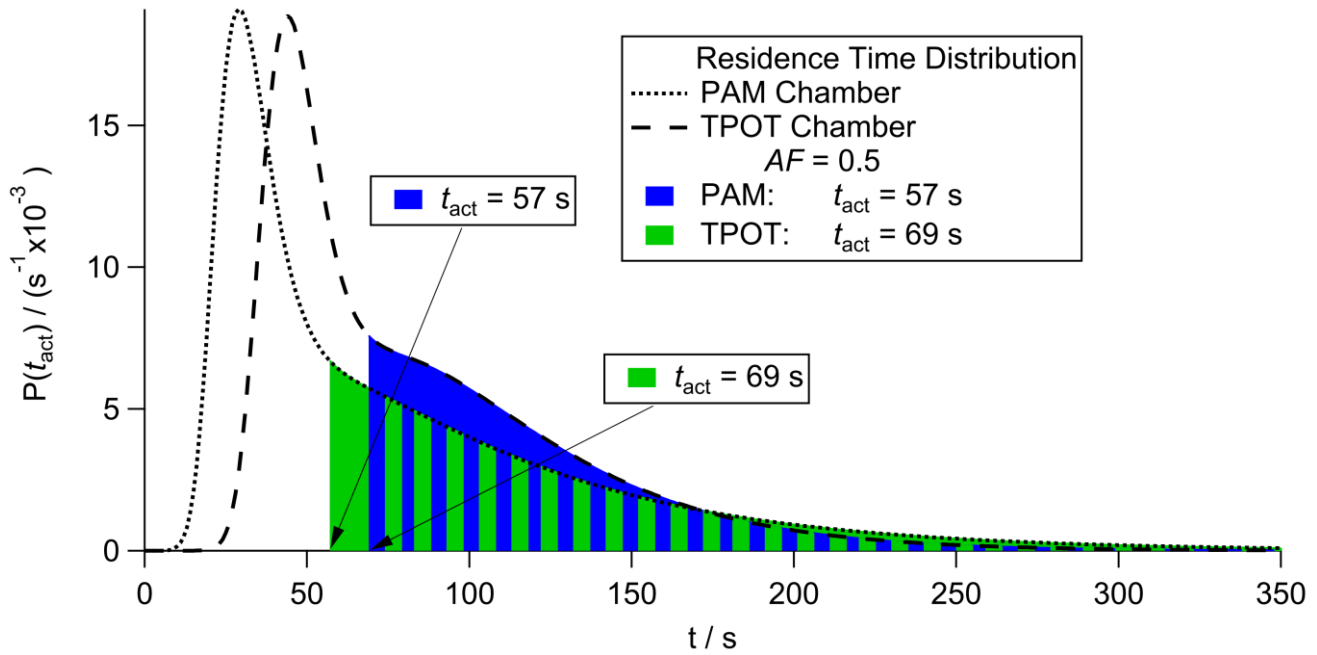


Figure S2: Calculation of t_{act} inside the PAM and TPOT chamber for a global $AF = 0.5$.

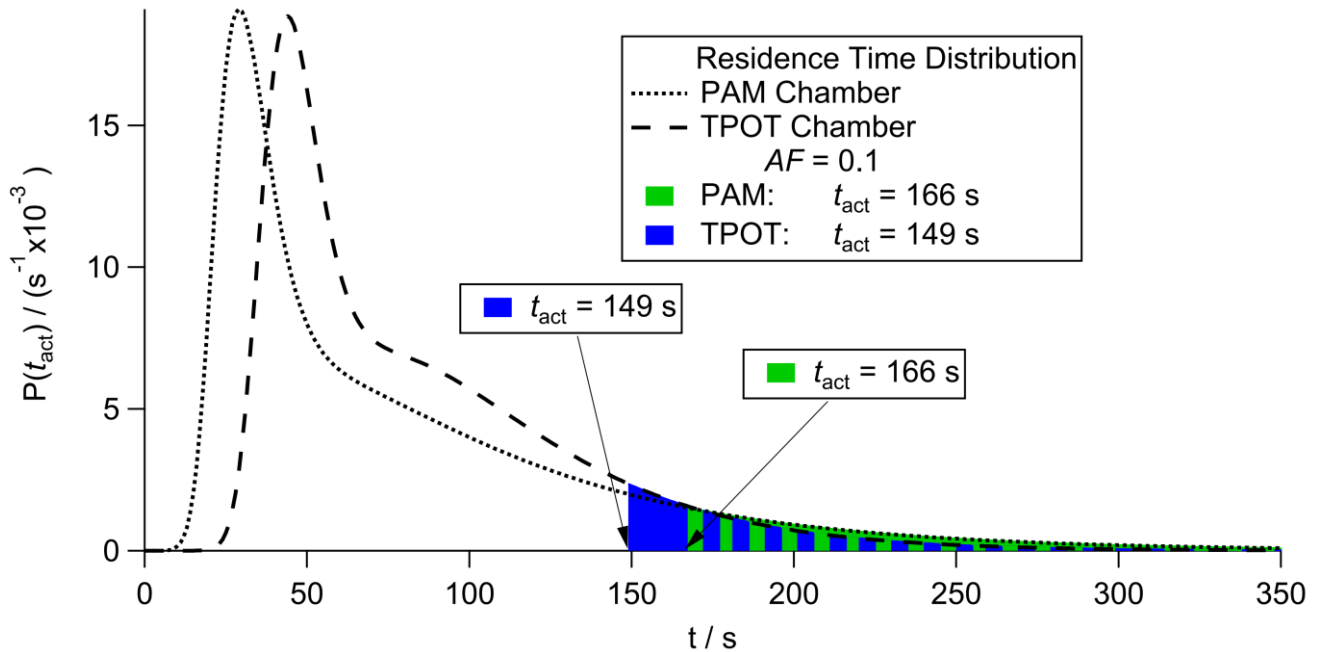


Figure S3: Calculation of t_{act} inside the PAM and TPOT chamber for a global $AF = 0.1$.

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.