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Introducing the extended volatility range proton-transfer-reaction mass spectrometer (EVR PTR-MS)

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Table S1: Table of investigated analytes, their molecular formula, phases investigated, drift tube temperatures used, and supplier

Compound	Molecular formula	Gas	Particle	Temperatures [°C]	Manufacturer
4-Nitrocatechol	$C_6H_5NO_4$	X		120	ALDRICH
1,6-Anhydro-beta-D-glucose (Levoglucosan)	$C_6H_{10}O_5$	X	X	80, 100, 120	ALDRICH
2,6-Dimethoxyphenol	$C_8H_{10}O_3$	X		120	SIGMA-ALDRICH
2,7-Dihydroxynaphtalene	$C_{10}H_8O_2$	X	X	120	ALDRICH
2-Tridecanone	$C_{13}H_{26}O$	X		40, 60, 80, 100, 120	SIGMA-ALDRICH
4-Nitroguaiacol	$C_7H_7NO_4$	X		120	SIGMA-ALDRICH
Adipic acid	$C_6H_{10}O_4$		X	120	SIGMA
Ammonium nitrate	NH_4NO_3	X	X	60, 80, 100, 120	SIGMA-ALDRICH
Ammonium sulphate	$(NH_4)_2SO_4$		X	120	SIGMA
Arabitol	$C_5H_{12}O_5$	X		120	SIGMA
Azelaic acid	$C_9H_{16}O_4$	X	X	120	ALDRICH
Benzocaine	$C_9H_{11}NO_2$	X		120	SIGMA
Cis-pinic acid	$C_9H_{14}O_4$		X	120	
Cis-Pionic acid	$C_{10}H_{16}O_3$	X		80, 100, 120	ALDRICH
D-(+)-Glucose	$C_6H_{12}O_6$	X		120	SIGMA
Diglycolic acid	$C_4H_6O_5$	X	X	120	ALDRICH
Erythritol	$C_4H_{10}O_4$	X		120	SIGMA
Fructose	$C_6H_{12}O_6$	X		120	SIGMA
Glycolic acid	$C_2H_4O_3$	X		120	SIGMA-ALDRICH
MBTCA (3-methyl-1,2,3-butanetricarboxylic acid)	$C_8H_{12}O_6$		X	120	self-synthesized
Methyl-b-d-xylopyranoside	$C_6H_{12}O_5$		X	120	SIGMA
Norpinonic acid	$C_9H_{14}O_3$		X	120	synthesized at TROPOS
Pentadecanoic acid	$C_{15}H_{30}O_2$	X		120	SIGMA
Phenoxyacetic acid	$C_8H_8O_3$	X		120	FLUKA
Stearic acid	$C_{18}H_{36}O_2$	X	X	120	SIGMA
Tartaric acid	$C_4H_6O_6$		X	120	
Vanillic acid	$C_8H_8O_4$	X	X	120	SIGMA-ALDRICH
Vanillin	$C_8H_8O_3$	X		80, 100, 120	SIGMA-ALDRICH
Xylitol	$C_5H_{12}O_5$	X		120	SIGMA

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Table S2: Parameters of the double-exponential decay fit functions shown in Fig. 3

compound	A1	b1	A2	b2
2-tridecanone$_{(g)}$	1.08	-3.75	0.00	-1.27
cis-pinonic acid$_{(g)}$	0.78	-0.65	0.22	-0.04
4-nitrocatechol$_{(g)}$	0.72	-0.05	0.22	-0.01
nitrate$_{(p)}$	0.73	-0.38	0.28	-0.04
levoglucosan$_{(p)}$	0.70	-0.21	0.28	-0.02
2,7-dihydroxynaphthalene$_{(p)}$	0.73	-0.10	0.24	-0.01

Table S3: Parameters of the double-exponential decay fit functions shown in Fig. 5

compound	A1	b1	A2	b2
2-tridecanone$_{(g)}$ RT	0.50	-0.07	0.48	-0.03
2-tridecanone$_{(g)}$ 60°C	0.89	-0.55	0.09	-0.03
2-tridecanone$_{(g)}$ 80°C	1.07	-1.93	0.05	-0.03
2-tridecanone$_{(g)}$ 100°C	1.08	-3.75	0.00	-1.27
cis-pinonic acid$_{(g)}$ 80°C	0.75	-0.22	0.25	-0.04
cis-pinonic acid$_{(g)}$ 100°C	0.71	-0.39	0.27	-0.03
cis-pinonic acid$_{(g)}$ 120°C	0.78	-0.65	0.22	-0.04

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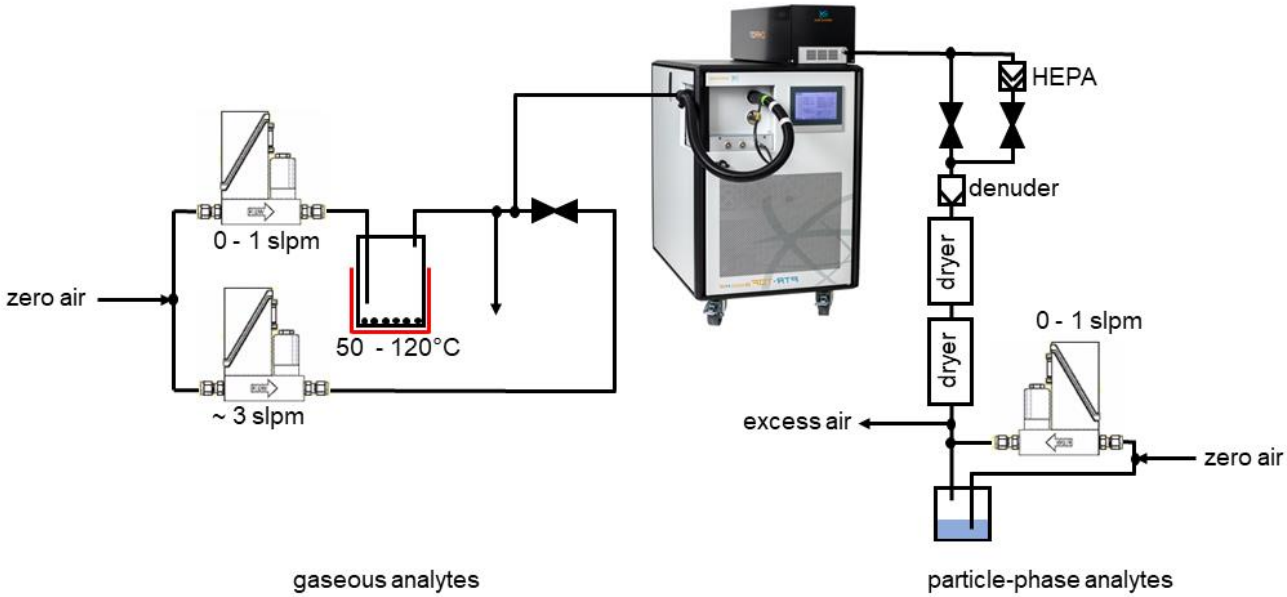

Figure S1: Scheme of the experimental set-up used for measuring $\tau_{1/e}$ of gaseous analytes (left side) and particle-phase analytes (right side)

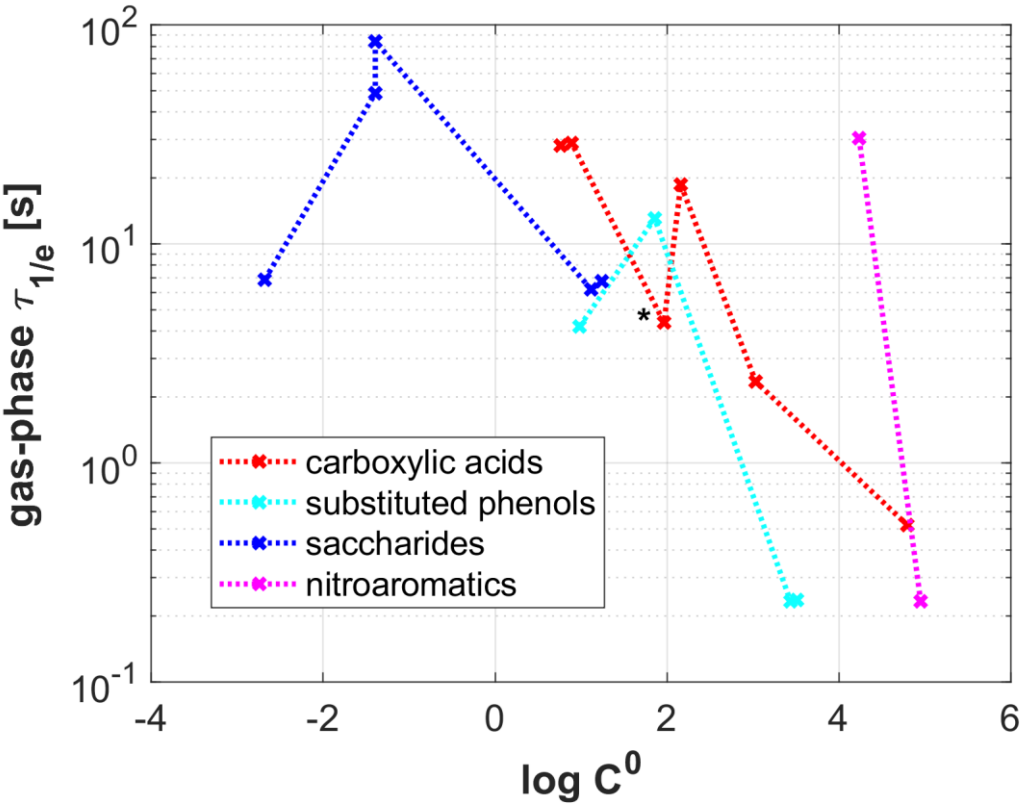

Figure S2: Graph showing the decrease of $\tau_{1/e}$ with increasing log C^0 for selected carboxylic acids (red), substituted phenols (cyan), saccharides (blue) and nitroaromatics (magenta). (*): measured at much lower concentration than for the other carboxylic acids.

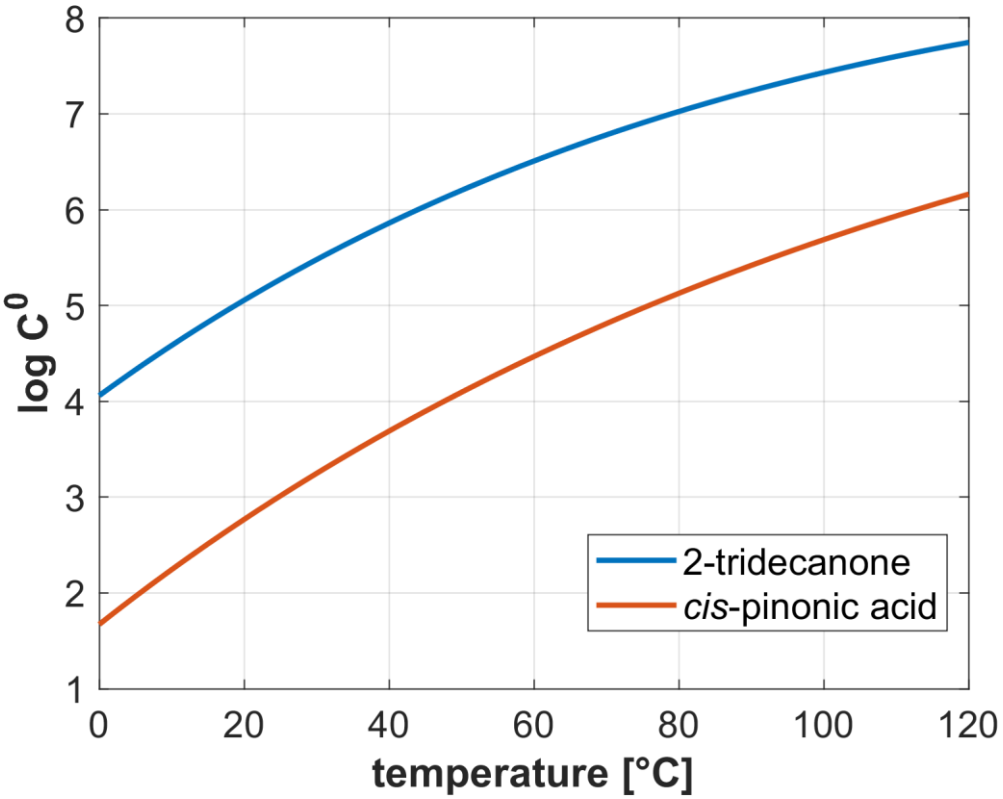

Figure S3: Graph showing the increase in log C^0 of 2-tridecanone and *cis*-pinonic acid with increasing temperature, as calculated using the SIMPOL.1 method

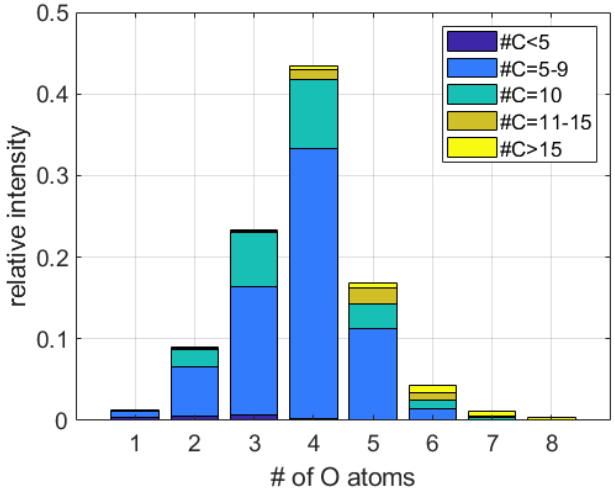

Figure S4: Normalized mass distribution as a function of the number of oxygen atoms (#O) that was observed when the CHARON EVR PTR-MS analyzer sampled SOA generated from the reaction of limonene with ozone. The color code indicates the number of carbon atoms (#C). Mass concentrations were derived from the assumption that all analytes form ammonium adducts at the collisional rate (Zaytsev et al., 2019). The collisional rate was determined as described in the Supplement of Müller et al. (2017).