Supplementary Materials

Rate coefficients for the reaction of ozone with 2- and 3-carene

H. Chen[1,2], Y. Ren[2], M. Cazaunau[2], V. Daële[2], Y. Hu[1,2], J. Chen[1,3], A. Mellouki[2,3]*

[1] Shanghai Key Laboratory of Atmospheric Particle Pollution and Prevention (LAP[3]), Department of Environmental Science & Engineering, Fudan University, Shanghai 200433, China

[2] Institut de Combustion, Aérothermique, Réactivité et Environnement/OSUC, CNRS, 45071 Orléans Cedex 02, France

[3]School of Environmental Science & Engineering, Shandong University, Shandong 250100, China

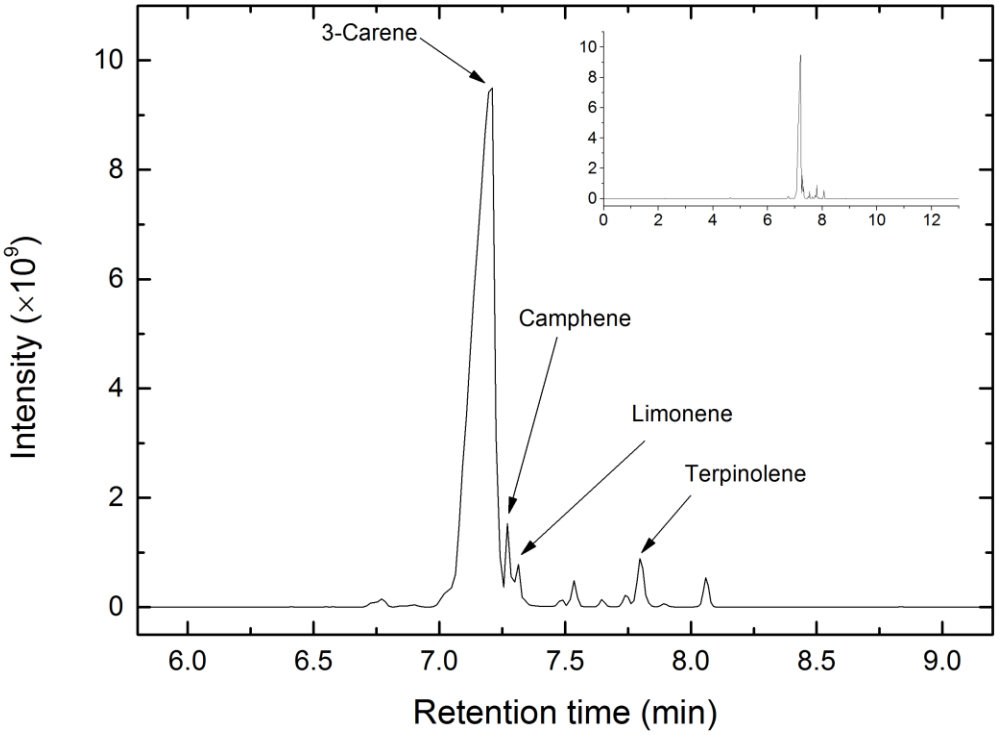
* Corresponding author:

A. Mellouki, ICARE-CNRS, 1C Avenue de la Recherche Scientifique, 45071 Orléans Cedex 02, France (Fax: (33) 238 696004, e-mail: mellouki@cnrs-orleans.fr)

1. Materials

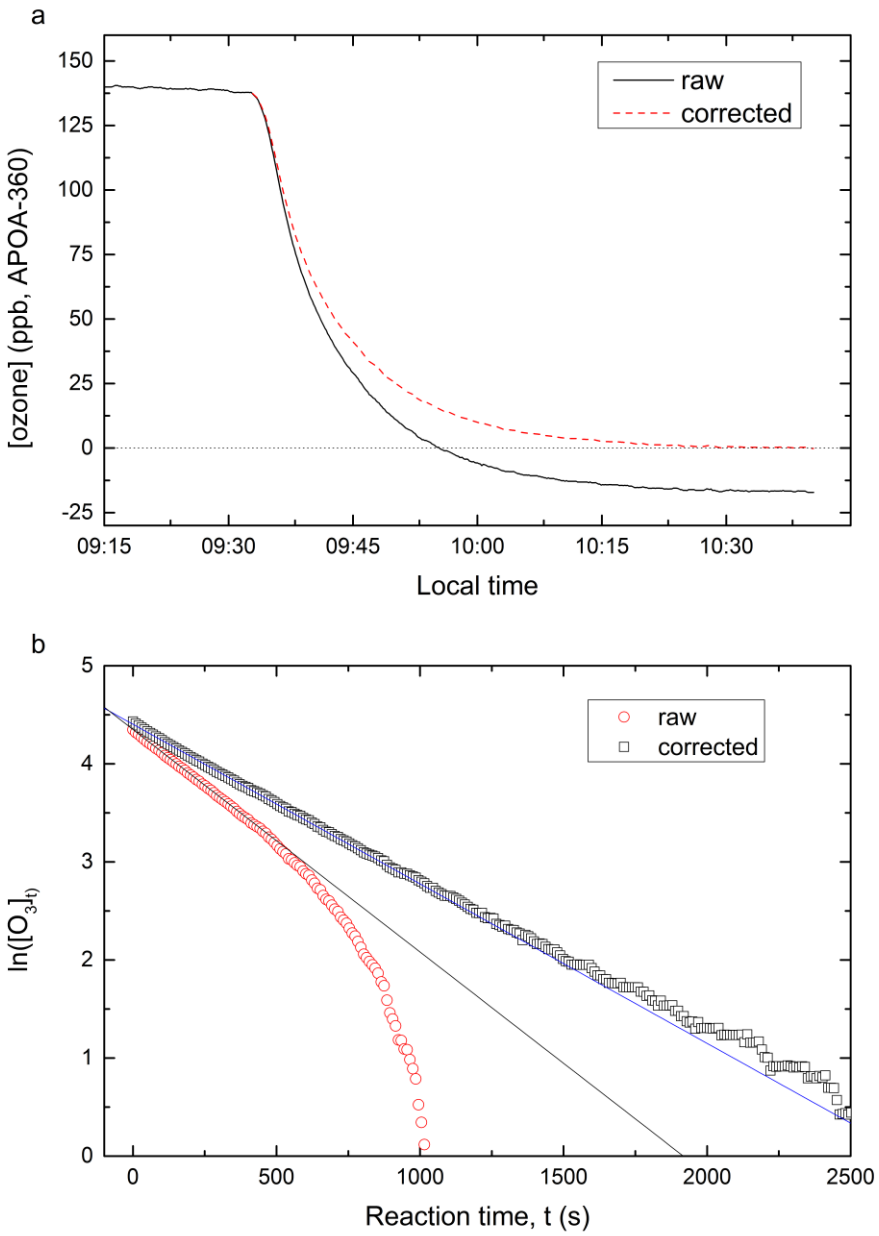
The purities of the chemicals were as follows: synthetic air, O_2 and N_2, UHP certified to >99.9995% (Alphagaz); 2-carene (Sigma-Aldrich, ≥97); 3-carene (Sigma-Aldrich, ≥98.5%); cyclohexene (Fluka, ≥99.5); 2-butanol (Fluka, ≥99.5).

The purity of 3-carene was 95% determined by GC-MS, as shown in Fig. S1. The 3-carene sample also consists of impurity of camphene (2%), limonene (1%) and terpinolene (2%).



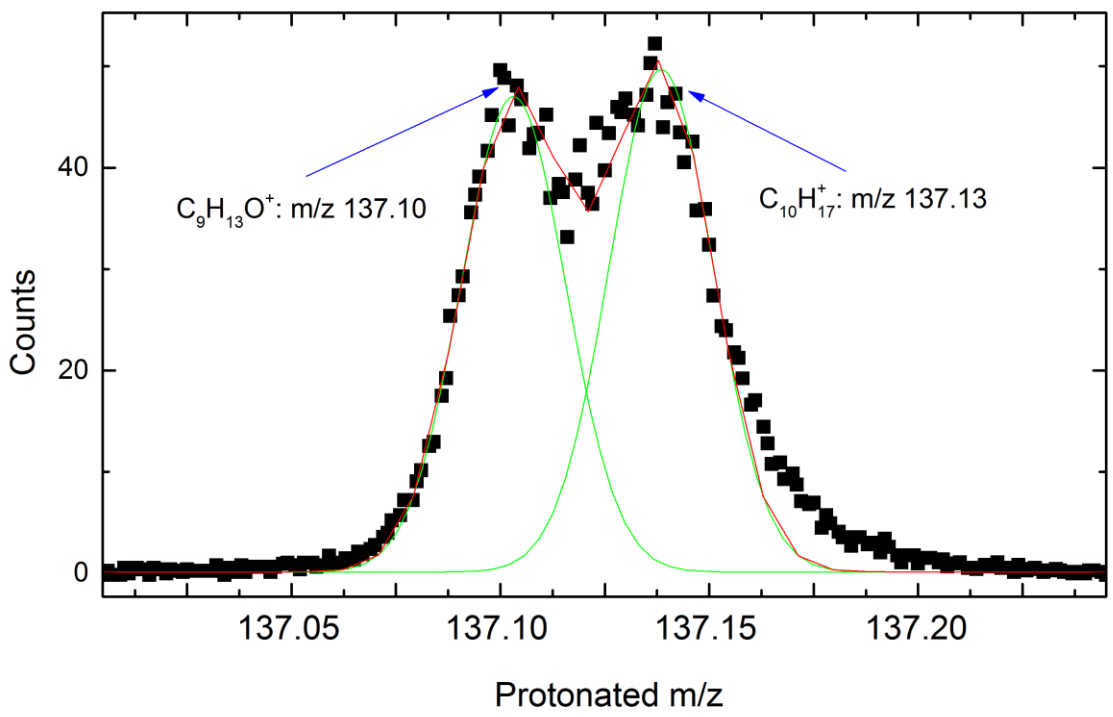
Supplementary Figure 1: Chromatogram spectrum for 3-carene sample.

2. Ozone concentration measurement by UV-absorption monitor (HORIBA APOA-360).



Supplementary Figure 2: Example for (a) concentration profile and (b) decay rate of ozone before and after correction in the presence of excess 3-carene in SC.

15 3. Identification of VOCs in PTR-TOF spectra.



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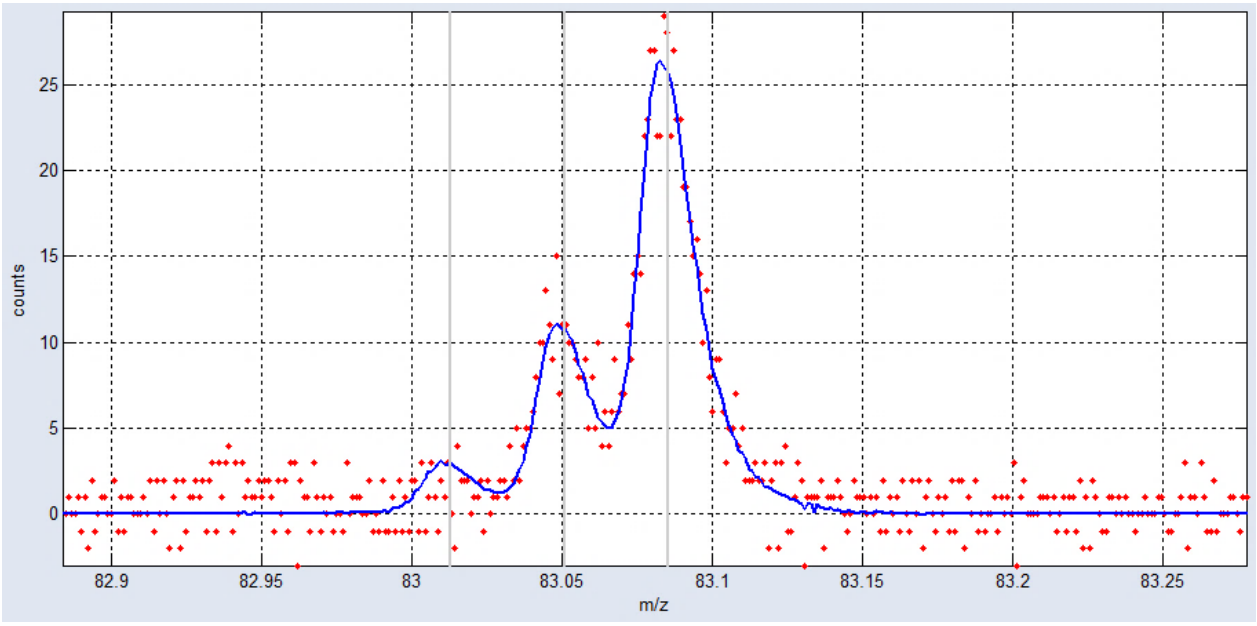
17 **Supplementary Figure 3:** Example of PTR-TOF mass spectra of Exp. 2CAR-3T using TMB as
18 an OH scavenger.



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20 **Supplementary Figure 4:** Example of PTR-TOF mass spectra for isobaric peaks: m/z 83.05
21 ($C_5H_7O^+$) and m/z 83.09 ($C_6H_{11}^+$) during measurements of relative rates.

Supplementary Table 1: Initial experimental conditions performed in HELIOS.

Experiment[a]	Temperature K	carene ppbv	ozone[b] ppbv	c-hexane[c] ppbv	TMB ppbv	2-butanol ppbv	Injection sequences
			2-carene				
2CAR-1C	298 ± 1	11.3	104	1700			2car; c-hexane; O_3[c]
2CAR-2C	300 ± 1	22.7	254	3990			2car; c-hexane; O_3[c]
2CAR-3T	305 ± 1	19.1	190		288		TMB; O_3; 2car
2CAR-4B	293 ± 1	23.9	255			2640	2-butanol; 2car; O_3
2CAR-5BR[d]	293 ± 1	6.7	410			4290	2-butanol; 2car; O_3
			3-carene				
3CAR-1C	299 ± 1	29.2	298	6820			c-hexane; O_3; 3car[c]
3CAR-2C	295 ± 1	19.1	179	4490			c-hexane; 3car; O_3[c]
3CAR-3C	295 ± 1	11.3	96	2240			c-hexane; 3car; O_3[c]
3CAR-4B	294 ± 1	9.6	347			1320	2-butanol; 3car; O_3
3CAR-5B	295 ± 1	7.7	213			1150	2-butanol; O_3; 3car
3CAR-6BR[d]	296 ± 1	9.7	347			3960	2-butanol; 3car; O_3
3CAR-7BR[d]	296 ± 1	29.1	--[e]			6630	2-butanol; 3car; O_3

[a] C = cyclohexane as a scavenger; B = 2-butanol as a scavenger; BR= cyclohexene as a reference in the presence of excess 2-butanol as a scavenger; T = 1,3,5-trimethylbezene as a scavenger.

[b] [O_3] was monitored by APOA-360 UV-absorption monitor, which is in agreement with FTIR within 5% uncertainty.

[c] c-hexane = cyclohexane.

[d] In the presence of 29.6 ppbv cyclohexene as a reference.

[e] O_3 was injected into HELIOS in several additions.

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