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Atmospheric reactivity of ketolimonene: ozone kinetics, reaction products and SOA formation

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Ketolimonene (4-acetyl-1-methylcyclohexene, $C_9H_{14}O$) is a first-generation reaction product in the gas-phase oxidation of limonene by OH radical and, to a lesser extent, O_3. Molar yields between 4.9% and 39% were measured in the gas phase from limonene + OH [1-4] and < 4% from limonene + O_3 [2]. Yet, ketolimonene reactivity in the atmosphere is poorly known, with only one determination of the OH rate constant and two determinations for the O_3 one [5,6], the latter two disagreeing by a factor of almost 2. No data on reaction products are available and only one study deals with secondary organic aerosol (SOA) formation from the ozonolysis reaction [6].

The objectives of the present study were to determine the O_3 kinetics and investigate the related gas- and particle-phase reaction products and potential SOA formation. The 760-L quartz chamber at “Al. I. Cuza” Iasi University (ESC-Q-UAIC) was used together with long-path Fourier Transform infrared spectroscopy, proton-transfer mass spectrometry (PTR-MS) coupled to a CHARON inlet, selected ion mass spectrometry (SYFT-MS) and scanning mobility particle sizer (SMPS). The results will be discussed in terms of atmospheric lifetime, ozone reaction mechanism and SOA yields.

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