



Characterisation of Criegee intermediates in the gas phase by stabilisation with a spin trap and analysis by proton transfer reaction mass spectrometry (PTR-MS)

Chiara Giorio (1), Andrea Tapparo (2), Antonio Barbon (2), Antonio Toffoletti (2), and Markus Kalberer (1)

(1) Department of Chemistry, University of Cambridge, Lensfield road, Cambridge CB2 1EW, United Kingdom
(chiara.giorio@atm.cam.ac.uk), (2) Dipartimento di Scienze Chimiche, Università degli Studi di Padova, via Marzolo 1, Padova, 35131, Italia

Biogenic and anthropogenic volatile organic compounds (VOCs) can react with oxidants present in the atmosphere to form less volatile compounds which could partition in the condensed phase and contribute to organic aerosol mass. One of the most important and efficient reaction for the formation of secondary organic aerosol (SOA) is the ozonolysis of alkenes. This process occurs with a generally accepted mechanism, proposed for the first time by Rudolf Criegee (Criegee, 1975). According to the Criegee mechanism, ozone coordinates to the double bond of alkenes forming a primary ozonide, which promptly decomposes to form biradical intermediates called Criegee intermediates (CIs). CIs further react quickly to form first generation oxidation products.

The analysis of Criegee intermediates represent an analytical challenge due to their characteristic high reactivity and low concentrations. Their role in the formation of SOA remains highly uncertain because of uncertainty in the kinetic of their reaction with different atmospheric compounds. Up to date, only a few studies have been able to detect the CIs directly (Welz et al., 2012) or indirectly (Mauldin et al., 2012).

The aim of this study is the development of a method for the on-line measurement of CIs by stabilization with a spin trap (5,5-dimethyl-pyrroline N-oxide, DMPO) and detection via proton transfer reaction mass spectrometry (PTR-MS). The novel method is used to study the ozonolysis of α -pinene in a flow tube, one of the most important precursors in the formation of SOA, often used as a proxy in global aerosol models to study the effects of biogenic organic aerosols on climate change.

Criegee R., 1975. *Angewandte Chemie* 14, 745–752.

Welz O., et al., 2012. *Science* 335, 204–207.

Mauldin R. L., et al., 2012. *Nature* 488, 193–196.