

Laboratory research on aqueous reactions of isoprene with inorganic radicals

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Biogenic volatile organic compounds (bVOCs) are emitted to the atmosphere in quantities ranging up to 1150 TgC/year globally, and exceed the anthropogenic emissions by an order of magnitude. After methane, the most abundant bVOC is isoprene (500 TgC/year globally).

Recent works showed heterogeneous and aqueous-phase reactions of bVOCs, including isoprene, are an important potential route of formation of secondary organic aerosol (SOA) in the atmosphere. In aerosol chamber experiments, isoprene reacted heterogeneously on acidic aerosol particles to form a spectrum of compounds, including polyols and sulphate polyol esters [1]. On the other hand, we showed that isoprene slowed down the chain autooxidation of S^{IV} (SO_2 and sulphites) in alkaline and in acidic solution, and accelerated it in neutral solutions [2]. Thus, the aqueous-phase reaction of isoprene with sulfate radicals can be an additional source of organic sulfates in atmospheric aerosols.

The aim of our work was to evaluate influence of nitrite ions on isoprene transformation coupled with autooxidation of S^{IV} , and to evaluate the possible formation of atmospheric organonitrite or organosulfonitrite compounds.

The experiments were carried out in an isothermal, well stirred reactor, operated in batch manner. Kinetics of the autooxidation S^{IV} was determined by measuring the concentration of dissolved oxygen and evaluating the concentration of sulphite, bisulphite, nitrite ions and isoprene from high-resolution UV-spectra of reacting solutions. Post-reaction analysis of reacting solutions comprised mass spectrometry with electrospray ionization.

[1] Surratt, J.D. et al, 2006, *J. Phys. Chem.* **110**:9665–9690.

[2] Rudzinski K.J. et al, 2007, in: *Proc. 6th Int. Conf. Urban Air Quality*, R. S. Sokhi, and M. Neophytou, eds, University of Hertfordshire, Hatfield, pp. 12.3–12.6 (on CD).