Direct observation of first oxidation products from the OH + isoprene reaction for pristine environmental conditions

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Isoprene, C_5H_8, inserts about half of the non-methane carbon flux of biogenic origin into the atmosphere. Its degradation is mainly initiated by the reaction with OH radicals.
The formation of reactive intermediates and corresponding closed-shell products from the OH + isoprene reaction for low NO/HO_2 conditions is experimentally shown. Detailed product analysis has been achieved by mass spectrometric techniques using 6 different ionization schemes. Quantum chemical calculations support the usefulness of applied ionization schemes. Observed RO_2 radicals are the isomeric HO-$C_5H_8O_2$ radicals and their isomerization products HO-$C_5H_8(O_2)O_2$ and HO-$C_5H_8(O_2)_2O_2$ in traces. Main closed-shell products from unimolecular RO_2 reactions are hydroperoxy aldehydes, “HPALDs”, and smaller yield products with the composition $C_5H_8O_4$ and $C_4H_8O_5$.