

Accretion product formation from self- and cross-reactions of RO₂ radicals in the atmosphere

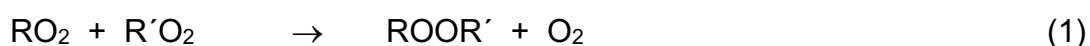
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The global emission rate of non-methane hydrocarbons from vegetation and human activities into the atmosphere is estimated to be about 1.3×10^9 metric tons of carbon per year. Their gas-phase degradation process is mainly initiated by the reaction with hydroxyl (OH) or nitrate (NO₃) radicals, chlorine atoms or ozone (O₃). After initial attack of the oxidant, RO₂ radicals are almost exclusively formed as intermediates, which rapidly react further with NO, HO₂ or other RO₂ radicals or via RO₂ radical self-reaction. Here we show that self- and cross-reactions of two RO₂ radicals produce accretion products composed of the carbon backbone of both reactants.¹



RO₂ radicals bearing functional groups show fast accretion product formation rates competing with those of the corresponding reactions with NO and HO₂. This pathway, not considered yet in the modelling of atmospheric processes, can be important, or even dominant for the fate of RO₂ radicals in all areas of the atmosphere. Moreover, the formed accretion products can be featured by remarkably low vapour pressure characterizing them as effective source for secondary organic aerosol.

¹ Berndt et al., *Angew. Chem. Int. Ed. Engl.* (2018) doi:10.1002/anie.201710989.