

2.112 Direct observation of new particle formation during ozonolysis of isoprene and ethene competing against the growth of preexisting particles.

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Abstract:

Secondary organic aerosol formation during the ozonolysis of isoprene and ethene in the presence of ammonium nitrate seed particles (surface area concentrations = $(0.8-3) \times 10^7 \text{ nm}^2 \text{ cm}^{-3}$) was investigated using a 1 nm scanning mobility particle sizer. Based on the size distribution of formed particles, particles with a diameter smaller than the minimum diameter of the seed particles (less than $\sim 6 \text{ nm}$) formed under dry conditions, but the formation of such particles was substantially suppressed during isoprene ozonolysis and was not observed during ethane ozonolysis under humid conditions. We propose that oligomeric hydroperoxides generated by stabilized Criegee intermediates (sCIs), including $\text{C}_1\text{-sCI}$ (CH_2OO), contribute to new particle formation while competing to be taken up onto preexisting particles. The OH reaction products of isoprene and ethene seem to not contribute to new particle formation; however, they are taken up onto preexisting particles and contribute to particle growth.