

New particle formation promoted by OH reactions during α -pinene ozonolysis

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Monoterpenes have been reported to rapidly convert to extremely low volatility organic compounds (ELVOCs), which can act as nucleation agents leading to new particle formation (NPF). The formation of highly oxygenated organic molecules (HOMs) via autoxidation is proposed to be a key process of the NPF in the monoterpene oxidation, but the mechanism has not yet been established. In this study, the size distribution of the number concentration of secondary organic aerosol (SOA) from α -pinene ozonolysis in the presence of seed particles was investigated. In the absence of the OH radical scavenger, this distribution was found to be bimodal. The peak arising from small particles was a result of NPF; however, when the OH radical scavenger was present in the experiment, this peak disappeared. Owing to the bimodal size distribution of SOA from limonene ozonolysis with the OH radical scavenger and seed particles, it was proposed that addition of the OH radical to the α -pinene double bond followed by isomerization, which accompanies ring opening, generating limonene-like compounds, could be one of the key steps in producing ELVOCs as nucleating agents during α -pinene ozonolysis.

Keywords: α -pinene ozonolysis, autoxidation, highly oxygenated molecules, new particle formation, nucleating agent, secondary organic aerosol

