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**OH oxidation of organic aerosols.** JARED SMITH, ERIN MYSAK, MUSA AHMED, LBNL, CHRISTOPHER CAPPA, UC, Davis, STEPHEN LEONE, UC, Berkeley and LBNL, KEVIN WILSON, LBNL — Ambient aerosols play a significant role in a variety of atmospheric processes such as direct and indirect effects on radiative forcing. Chemical composition can be an important factor in determining the magnitude of these effects. However, a major fraction of organic aerosols (OA) can not be resolved on a molecular level. Recent identification of high mass oligomeric species as a major component in laboratory and ambient OA has received much attention due to the possibility that these species may account for much of the unknown organic mass in ambient aerosols. Although, a few mechanisms have been proposed, the origin and formation processes of these compounds remain largely unknown. Here we provide strong evidence for a previously unidentified mechanism of extremely rapid oligomer formation, via OH radical initiated oxidation of OA. This process appears capable of converting a sizable fraction of an organic particle to higher mass oligomers within a day of exposure to OH radicals at typical atmospheric concentrations. Furthermore, we have found that rapid volatilization is also important for specific reaction systems, and can lead to the loss of a large fraction of the particle mass. We propose that such a rapid processing is possible due to a radical chain reaction which quickly propagates throughout the entire particle and is only initiated by the surface OH reaction.

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