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## Heterogeneous OH oxidation of palmitic acid in single component and internally mixed aerosol particles: vaporization and the role of particle phase

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**Abstract.** We studied the OH oxidation of submicron aerosol particles consisting of pure palmitic acid (PA) or thin (near monolayer) coatings of PA on aqueous and effloresced inorganic salt particles. Experiments were performed as a function of particle size and OH exposure using a continuous-flow photochemical reaction chamber coupled to a chemical ionization mass spectrometer (CIMS) system, for detection of gas and particle-bound organics, and a DMA/CPC for monitoring particle size distributions. The loss rate of PA observed for pure PA aerosols and PA on crystalline NaCl aerosols indicates that the OH oxidation of PA at the gas-aerosol interface is efficient. The pure PA oxidation data are well represented by a model consisting of four main processes: 1) surface-only reactions between OH and palmitic acid, 2) secondary reactions between palmitic acid and OH oxidation products, 3) volatilization of condensed-phase mass, and 4) a surface renewal process. Using this model we infer a value of  $\gamma^{\text{OH}}$  between 0.8 and 1. The oxidation of palmitic acid in thin film coatings of salt particles is also efficient, though the inferred  $\gamma^{\text{OH}}$  is lower, ranging from  $-0.3+0.1/-0.05$  for coatings on solid NaCl and  $-0.05 (\pm 0.01)$  on aqueous NaCl particles. These results, together with simultaneous data on particle size change and volatilized oxidation products, provide support for the ideas that oxidative aging of aliphatic organic aerosol is a source of small oxidized volatile organic compounds (OVOCs), and that OH oxidation may initiate secondary condensed-phase reactions.

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