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Cloud forming potential of secondary organic aerosol under near atmospheric conditions

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Cloud droplets form by nucleation on atmospheric aerosol particles. Populations of such particles invariably contain organic material, a major source of which is thought to be condensation of photo-oxidation products of biogenic volatile organic compounds (VOCs). We demonstrate that smog chamber studies of the formation of such biogenic secondary organic aerosol (SOA) formed during photo-oxidation must be conducted at near atmospheric concentrations to yield atmospherically representative particle composition, hygroscopicity and cloud-forming potential. Under these conditions, the hygroscopicity measured at 95% relative humidity can be used reliably to predict the CCN activity of the SOA particles by assuming droplet surface tension of pure water. We also show that the supersaturation required to activate a given size of particle decreases with age.