Study cis pinonic acid photodegradation by matrix isolation spectroscopy for atmospheric interest.

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Secondary Organic Aerosol (SOA) particles are formed in the atmosphere by gas-to-particle conversion processes involving volatile organic compounds from natural and anthropogenic origins. SOAs, which constitute 30 to 50 % of the global organic aerosol budget are recognized to affect both climate change and human health[1]. Oxidation of biogenic volatile organic compounds (BVOC) such as isoprene and α-pinene serves as the dominant source of SOA. To date, the formation and evolution (i.e. the atmospheric aging during air mass transport) of SOAs have been investigated by performing both field measurements and laboratory experiments, highlighting the complexity of related physico-chemical processes, due to the large diversity of their chemical makeup. Cis pinonic acid (CPA) is one of the major first generation products of α-pinene oxidation and an important tracer of α-pinene atmospheric chemistry. CPA exists in the gas phase, in particles and in aqueous droplets. The direct photolysis of CPA in aqueous media and in the gas phase has been investigated resulting in Norrish type II reaction with the conversion of CPA into its structural isomer, limononic acid[2]. In the present work, we have studied the process of direct photolysis of CPA in the absence or presence of water, using low-temperature matrix isolation experiments to gain a better understanding of the processes at the molecular level. This preliminary work shows the formation of CO in argon matrices, whatever water content, suggesting that the dominant photolysis pathway is of the Norrish I type. Although fundamental, this work helps to better understand the formation process of SOA in the atmosphere.

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[2] Lignell, H.; Epstein, S. A.; Marvin, M. R.; Shemesh, D.; Gerber, B.; Nizkorodov, S., Experimental and Theoretical Study of Aqueous cis-Pinonic Acid Photolysis. *J. Phys. Chem. A*, **2013**, *117 (48)*, 12930-12945.