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## Gas/particle partitioning of carbonyls in the photooxidation of isoprene and 1,3,5-trimethylbenzene

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**Abstract.** A new denuder-filter sampling technique has been used to investigate the gas/particle partitioning behaviour of the carbonyl products from the photooxidation of isoprene and 1,3,5-trimethylbenzene. A series of experiments was performed in two atmospheric simulation chambers at atmospheric pressure and ambient temperature in the presence of NO<sub>x</sub> and at a relative humidity of approximately 50%. The denuder and filter were both coated with the derivatizing agent *O*-(2,3,4,5,6-pentafluorobenzyl)-hydroxylamine (PFBHA) to enable the efficient collection of gas- and particle-phase carbonyls respectively. The tubes and filters were extracted and carbonyls identified as their oxime derivatives by GC-MS. The carbonyl products identified in the experiments accounted for around 5% and 10% of the mass of secondary organic aerosol formed from the photooxidation of isoprene and 1,3,5-trimethylbenzene respectively.

Experimental gas/particle partitioning coefficients were determined for a wide range of carbonyl products formed from the photooxidation of isoprene and 1,3,5-trimethylbenzene and compared with the theoretical values based on standard absorptive partitioning theory. Photooxidation products with a single carbonyl moiety were not observed in the particle phase, but dicarbonyls, and in particular, glyoxal and methylglyoxal, exhibited gas/particle partitioning coefficients several orders of magnitude higher than expected theoretically. These findings support the importance of heterogeneous and particle-phase chemical reactions for SOA formation and growth during the atmospheric degradation of anthropogenic and biogenic hydrocarbons.

[Final Revised Paper](#) (PDF, 1125 KB) [Discussion Paper](#) (ACPD)

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