

# Development and Application of a Denuder-Filter Sampling Technique for Gas and Particle Phase Carbonyls

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A denuder-filter sampling technique for the simultaneous collection of gas and particle phase carbonyl compounds has been developed and tested. The denuder was coated with XAD-4 resin and the derivatizing agent *O*-(2,3,4,5,6-pentafluorobenzyl)-hydroxylamine (PFBHA) to enable on-tube conversion of gas-phase carbonyls to their oxime derivatives which were extracted and identified by GC-MS. The performance of the PFBHA coated denuder was tested on a range of carbonyls, dicarbonyls, aromatic aldehydes, carbonyl-containing furans and benzoquinones. The method was used to determine experimental gas/particle partitioning coefficients for a wide range of carbonyl products formed from the photooxidation of isoprene, 1,3,5-trimethylbenzene, benzene and *p*-xylene and compared with the theoretical values based on standard absorptive partitioning theory. 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 chemistry as a pathway for SOA formation and growth during the atmospheric degradation of anthropogenic and biogenic hydrocarbons.