Geophysical Research Abstracts
Vol. 12, EGU2010-9006, 2010
EGU General Assembly 2010

# Analysis of Glyoxal and Methylglyoxal in atmospheric particulate matter – Qualification and Quantification using a derivatisation method for HPLC-ESI-MS

Christopher Kampf and Thorsten Hoffmann

Institute for Inorganic Chemistry and Analytical Chemistry, Johannes Gutenberg-University, Mainz, Germany (kampfc@uni-mainz.de)

In recent years much effort has been put into the analysis of so called secondary organic aerosols (SOA). SOA is produced through gas phase oxidation of volatile organic compounds (VOC's) by atmospheric oxidants like OH- or $NO_3$-radicals or ozone with subsequent gas-particle partitioning of the low volatility products. VOC's are emitted by both biogenic and anthropogenic sources in large amounts into the atmosphere. However, it is found that gas to particle partitioning alone cannot explain the complete amount of SOA produced in the atmosphere. It is therefore proposed that heterogeneous reactions on the particle surface or in the particles themselves could lead to the formation of additional SOA mass from semi-volatile compounds such as the reactive dialdehydes glyoxal and methylglyoxal[1].

Global glyoxal and methylglyoxal emissions are estimated to be 45 Tg $a^{-1}$ and 140 Tg $a^{-1}$, respectively. The oxidation of biogenic isoprene contributes to about 47% of the total glyoxal mass formed and even to about 79% for methylglyoxal[2]. Due to their high solubility in water (hydration of aldehyde functions), glyoxal and methylglyoxal have a high potential to form SOA via heterogeneous reactions in the particle phase although their volatility is relatively high. Several studies propose oligomerisation or formation of imidazole derivatives as potential reaction pathways to reduce their volatility[1,3,4,5].

Here we present a method for the qualification and quantification of both glyoxal and methylglyoxal in atmospheric $PM_{2.5}$ filter samples via derivatisation with phenylhydrazine. Reproducibility, recovery and limits of detection and quantification are given. The method is found to be easily suitable for measurements at atmospheric concentration levels for both substances. First results of a measurement campaign in Mainz, Germany in August 2009 are shown for a proof of principle. Initial problems of the method development due to the chemical nature of the analytes und future enhancements of the sampling procedure are discussed.

References

1. Kalberer, M., et al. (2004). *Science*, 303(5664), 1659–1662
2. Fu, T.-M., et al. (2008). *Journal of Geophysical Research*, 113, D15303
3. Iinuma, Y., et al. (2004). *Atmospheric Environment*, 38(5), 761–773
4. Galloway, M. M., et al. (2009), *Atmos. Chem. Phys.*, 9, 3331–3345
5. Nozière, B., et al. (2009), *J. Phys. Chem. A*, 113, 231-237