Atmos. Chem. Phys. Discuss., 4, S327–S329, 2004
www.atmos-chem-phys.org/acpd/4/S327/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measuring atmospheric naphthalene with laser-induced fluorescence" *by* M. Martinez et al.

M. Martinez et al.

Received and published: 24 March 2004

We thank both reviewers for their in-depth review of our paper and their many helpful suggestions for improvement.

As the reviewer points out, the technique we present is one of only a few possible techniques to measure naphthalene, and it has a much higher sensitivity and time resolution. Unfortunately, the reviewer is quite right when he states it is an expensive technique, unlikely to be used widely just for measuring naphthalene. However, there are a few LIF instruments operational worldwide to measure OH. The naphthalene measurements which can be made simultaneously with the OH measurements are certainly valuable even if only these few instruments are deployed, as OH measurements are of little value if measured alone and therefore often take place as a part of large campaigns.

Full Screen / Esc
Print Version
Interactive Discussion
Discussion Paper

It is in principle possible to measure other PAH with this technique. The difficulty is that, while IR spectroscopy of gas-phase PAH is used in astrophysics to study the possible existence of PAH in the interstellar medium, studies on UV spectroscopy of gas-phase PAH are sparse. However, like naphthalene, other PAH absorbing in the UV are also likely to fluoresce and should therefore be detectable with LIF. The technique therefore has the potential to detect other PAH. The same holds true for other compounds such as several monocyclic aromatic hydrocarbons, for which absorption spectra exist in the literature and which do absorb in the UV between 240 and 290 nm. As long as they donŠt photolize, they are probably detectable with LIF. We have included a sentence about this possibility in the conclusions.

Our laser has a narrow wavelength range and is therefore not well suited to do spectroscopic studies. However, it is possible to use a similar laser to produce light in a different wavelength region to try to detect a species at a known absorption wavelength. The low pressure in our instrument is necessary to measure the naphthalene fluorescence, as quenching by N2 and O2 is of comparable magnitude as for OH. The linewidth of the laser does not need to be as narrow, as the naphthalene absorption line is wider than the OH absorption line. In any case, as long as no other PAH fluorescence features are found at a wavelength sufficiently close to those of naphthalene so that they can be measured with the same instrument, the simultaneous measurement with OH is a main advantage.

As the reviewer already points out, naphthalene exists virtually 100% in the gas phase. Due to the low pressure in our instrument, other particle-bound PAH would be likely to evaporate to some degree inside the inlet. This would have to be studied for the individual PAH species and is beyond the scope of this paper.

We intend this paper to concisely present the information relevant for the new measurement technique for naphthalene. We are working on a detailed source study based on the correlations of naphthalene with NOx and other hydrocarbons for a future paper.

ACPD
4, S327–S329, 2004

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 343, 2004.

ACPD

4, S327–S329, 2004

Interactive Comment