Atmos. Chem. Phys. Discuss., 3, S2080–S2082, 2003
www.atmos-chem-phys.org/acpd/3/S2080/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Validation of the calibration of a laser-induced fluorescence instrument for the measurement of OH radicals in the atmosphere" *by* W. J. Bloss et al.

Anonymous Referee #2

Received and published: 2 December 2003

Review of Atmos. Chem. Phys. Manuscript (# acp2003-128) "Validation of the calibration of a laser-induced fluorescence instrument for the measurement of OH radicals in the atmosphere" by Bloss et al.

General comments

This manuscript presents an assessment of LIF calibration of OH measurements by applying it in a smog chamber study. Because this LIF instrument for OH measurement has its relatively large uncertainty due to its calibration, validation of its calibration is important for accurate OH measurements. On the whole the paper is clearly written, reports important results, and draws a clear conclusion. I recommend publication in ACP with minor changes and ask the authors to consider the following comments, for

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correctness and clarity.

Special Comments

1) Page 6055, in Table 1, it would be better to include the overall 1-sigma uncertainty (+/-26%) in a bottom line.

2) Page 6057, in Table 2 or Page 6058 in Table 3, it would be nice to also include the initial hydrocarbon and NO/NO2 concentrations in each experiment.

3) Page 6033, line 11-14, "Scattered solar radiation is measured during a second photon counting window, several microseconds after each excitation laser pulse, at which time all OH LIF has decayed away.", please give the purpose of this measurement.

4) Page 6034, line 5, strictly speaking the flow under the given conditions is not exactly laminar. The Reynolds number is about 1600 according to the dimension of the tube and the flow rate. According to "Bird, R.B., W.E. Stewart and E.N. Lightfoot, Transport Phenomena, Wiley, New York (1960)", the minimum length (=1.12 m under the given conditions, which is longer than the length used in this experiment) of tube, can be calculated from 0.035xDxRe (where, D is the internal diameter of the tube and Re is the Reynolds number) to develop a stable laminar flow.

5) Page 6034, line 6, "slm" needs to be defined at its first appearance.

6) Page 6035, line 7, "phi(OH) =1 and phi(O3) =2", please give proper references for them.

7) Page 6043, how much is the uncertainty in the measurement of HC with FTIR or HPLC? The uncertainty in the inferred OH from HC decay also includes the uncertainty in the measurement of HC with FTIR/HPLC. The authors need to mention this somewhere in the manuscript (maybe in 4. Experimental or in 7. Discussion) and quantify the contribution of this part to the total uncertainty.

8) Page 6044, 1,3,5-TMB needs to be defined at its first appearance.

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9) Page 6047, line 23-25, please quantify the agreement between FTIR and GC-FID measurements for 1,3,5-TMB (to within ??%).

10) Page 6048, line 15, under the given conditions,the OH concentration in the FAGE cell is about 14,000 cmˆ-3, not 17,000 cmˆ-3. 17,000 cmˆ-3 could be true if the detection cell pressure in Page 6033 line 2, is 1.6 Torr, not 1.6 mbar. Please verify these numbers.

11) Page 6048, 1st paragraph, it is necessary to consider and discuss other possibilities of LIF artifacts and the combination of all possibilities, e.g. some Criegee intermediates which are formed during the experiment and may decompose in the low pressure cell or be photolyzed by the laser and produce OH.

Technical corrections

Please see the above special comments for some technical corrections.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 6029, 2003.