Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2020-437-RC2, 2020

Atmospheric Measurement Techniques Discussions

Interactive comment on "The Improved Comparative Reactivity Method (ICRM): measurements of OH reactivity at high-NO_X conditions in ambient air" *by* Wenjie Wang et al.

Anonymous Referee #2

Received and published: 30 December 2020

The manuscript reported an improved CRM method to measure OH reactivity. The reactor of traditional CRM method was modified to suppress HO2 formation. The lab experiment results were promising that the measured and calculated kOH by trace gases have good linearity. The ambient measurements showed that the new ICRM method could be used under urban ambient air. The manuscript is well within the scope of AMT. I recommend publication after attention to the following comments.

General comments:

1. The reaction time of NO+HO2(or OH) in arm A should be clearly specified. HONO will be formed with no doubt and will it cause any interference with CRM?

Printer-friendly version

Discussion paper

2. In section 3.1, the NO addition measurement showed that Pyrrole concentration decreased to the minimum with NO around 40∼50 ppbv (Fig.2). I think the increase of Pyrrole with NO is due to NO+OH reaction which lower the produced OH concentration.

3. In section 3.2 and Fig.4, the authors gave very promising dataset of the measured and calculated kOH. The linearity were all very good but the slope were not close to 1. Since the ICRM method introduced extra NO in the reactor, the cycling of OH-HO2-OH can not be avoid due to the reaction time in the reactor. The influence of initial HO2 was suppressed and at mean time the HOx cycling was enhanced. I would guess the slopes of CO and VOCs in Fig. 4 are related to this issue. Probably more VOCs should be tested before application in ambient air.

Specific comments:

Line 58: Better to include NO in the equation.

Line 131: Please specify the brand and type of the lamp, as well as its emission line.

Line 158: "An underlying assumption of the CRM approach is that the influence of the species in ambient air on OH radicals in the reactor is ignorable." The sentence is ambiguous. It is also useful to give the theoretical OH mixing ratio in the reactor here.

Line 181: Did the author try different structure (length, ID .etc) of arm A to get an optimal setup?

Line 250: It is better to include OH+NO reaction here. Is this reaction also include in the box model?

Line 283: the rate constant of OH+NO should be given here or in Fig.3, when calculated R-true of NO.

Line 404: The rate constant were quoted from Atkinson 2004, which is a well-known reference. I would suggest the authors also check the new evaluations or recommendations on JPL-2015 or IPUAC sources.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2020-437, 2020.

Printer-friendly version

Discussion paper