

***Interactive comment on* “Technical Note:  
Determination of formaldehyde mixing ratios in  
polluted air with PTR-MS: laboratory experiments  
and field measurements” by S. Inomata et al.**

**S. Inomata et al.**

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We thank valuable comments and suggestions from the referee. Responses to the comments and suggestions are given below. We reflected these responses in a revision of the manuscript.

**Specific comments**

1. We deleted "polluted" in the title.
2. We mentioned that formaldehyde is probably carcinogenic in Introduction and we added a reference of a book of Seinfeld and Pandis.
3. The high purity N<sub>2</sub> gas was used when we took background mass spectra for Fig.

2(a)-(c). We mentioned this in the caption of Fig 2.

4. Dimethyl sulfate, hydrogen peroxide, potassium hydroxide, sulphuric acid, diethyl ether, and sodium sulfate were used for synthesis of methyl peroxide. For methanol, ethanol, 2-propanol, *n*-butanol, and *iso*-butanol, reference mass spectra were obtained from vapors prepared by injecting liquid chemicals into a 5-liter Pyrex glass vessel to check whether these alcohols produce a fragment ion at  $m/z$  31. We mentioned these in the text.

5. Length = approximately 15 m, i.d. = 4.0 mm, flow rate = 2 L min<sup>-1</sup>. Residence time in the sampling tube is approximately 6 s. We added this information in the text.

6. We removed "MH<sup>+</sup>" in the sentence and the sentence proofread by two native English speakers.

The mass spectra shown in Fig 2 were obtained by subtracting background mass spectra without HCHO from sample mass spectra. (We mentioned this in the caption of Fig 2.) Therefore, signals at some mass number became negative.

7. We mentioned in the text that the concentration of 1.02 ppmv used in the direct introduction method is close to the upper limit of the linear dynamic range of the PTR-MS.

8. We measured the humidity dependence only in the dynamic dilution method because we prevent HCHO from passing through the water in the humidity controller. However, we believe that the detection sensitivities obtained in the direct introduction method are better suited to accurate field measurement than those obtained in the dynamic dilution method. Therefore, we multiplied the ion counts with the humidity dependence obtained in the dynamic dilution method by "m/n". Since the humidity dependence as shown in Fig 4 was measured at 23.3 ppbv of HCHO in the dilution method, the ion counts were divided by 23.3 to obtain the detection sensitivity in a unit of ncps/ppbv. We added sentences in the text.

9. Since the errors originating from the fitting to Eq. (4) can not be shown in the figure, we mentioned how to estimate the errors only in the text (Sec. 3-1-2).

10. We removed Table 2.

11. Slashes (/) were missing at  $\delta\alpha_{49}/\alpha_{49}$ ,  $\delta\alpha_{33}/\alpha_{33}$ , and  $\delta\alpha_{47}/\alpha_{47}$ .

12. We added the values of the intercept of the regression lines in Sec. 3-2.

### Technical comments

1. We revised the sentence according to the comment.

2. We replaced "photooxidation studies" with "oxidation studies" and also referred "Lee et al.: Gas-phase products and secondary aerosol yields from the photooxidation of 16 different terpenes, Journal of Geophysical Research, 111, D17305, doi:10.1029/2006JD007050, 2006."

3. We revised properly.

4. We revised it according to the comment.

5. We replaced "H<sub>2</sub>CO" with "HCHO" at four places.

6. We deleted this sentence.

7. We revised them according to the comment.

8. We corrected the reference "Irie et al. (2007)".

9. We revised it according to the comment.

10. We mentioned the concentration of HCHO in the caption of Fig 4.

As mentioned above, since the errors originating from the fitting to Eq. (4) can not be shown in the figure, we mentioned how to estimate the errors only in the text (Sec. 3-1-2).

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11. We revised Fig 6 properly and we moved a sentence "Error limits of the slope and intercept represent 95% confidence levels." to the text.

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