

Interactive comment on “Measuring long chain alkanes in diesel engine exhaust by thermal desorption PTR-MS” by M. H. Erickson et al.

Anonymous Referee #2

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General comments:

This paper describes a method to use thermal desorption sampling and analysis by PTR-MS to measure long chain alkanes (C_{12} – C_{18}) and other larger organics associated with diesel engine exhaust emissions. To discriminate the long chain alkanes from light alkenes, the Tenax trap was purged at 150 °C before desorption. I think that the data obtained in this paper were fully analyzed and discussed. However, I wonder whether PTR-MS is a good choice for the detection of the long chain alkanes. Since the long chain alkanes were detected by a series of fragment ions with formula C_nH_{2n+1} , I feel that the method described in this paper is worse from the point of view of speciation and quantification than GC/MS (Schauer et al., 1999, 2002). I believe

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the authors should clarify the strong points of the method described in this paper compared with other techniques such as GC/MS even though the long chain alkanes were not individually detected but as an ensemble. Although some parts of this paper have to be clarified or revised, I think that the paper includes a technical advance in atmospheric chemistry. I recommend this paper to be published in Atmospheric Measurement Techniques after the authors' consideration of my specific and technical comments detailed below.

Specific comments:

(1) Page 6008, Lines 19-20: The authors mention here that the quantification of the abundance of IVOC species is improved by the method described in this paper. But I cannot find the discussion as to what degree the detection of the IVOC was improved, for example, in comparison with the previous methods, in the paper.

(2) Page 6010, Lines 6-8: I guess that the temperatures of the inlet tube, the ion source, and the drift tube were 50 °C, according to Jobson and McCoskey (2010). Was it okay that the desorption temperature was 230 °C? I am afraid that sticky compounds may be adsorbed on the line, resulting in the interference for the next desorption.

(3) Page 6014, Lines 20-28: As mentioned in the abstract, the authors defined the long chain alkanes as C_{12} – C_{18} . However, the detection sensitivity was determined up to C_{16} at 120 Td and C_{13} at 80 Td in Fig. 3. Is there any difficulty in determining the sensitivity for C_{17} – C_{18} alkanes at 120 Td and C_{14} – C_{18} alkanes at 80 Td? In particular, the data for C_{14} – C_{16} alkanes at 80 Td should be shown because there were data for C_{14} – C_{16} alkanes at 120 Td. If the sensitivities for C_{14} – C_{16} alkanes at 80 Td were not close to 1.5 Hz ppbv⁻¹ per MHz H_3O^+ , I am afraid that the long chain alkanes

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(C₁₂-C₁₈) were not quantified correctly by the method described in this paper.

(4) Page 6024, Lines 10-16: I cannot follow the derivation of the numbers of 18 %, 2 %, 1 %, and 26 %. Were these numbers determined from the data in Fig. 6 or from the data in the previous papers?

Technical corrections:

- (1) Page 6032, Line 7: ...sources, 2. → ...sources, 5.
- (2) Page 6032, Line 13: The paper of Schulz et al. (1999) is not referred in text.

References

Jobson, B. T. and McCoskey, J. K.: Sample drying to improve HCHO measurements by PTRMS instruments: laboratory and field measurements, *Atmos. Chem. Phys.*, 10, 1821–1835, 2010.

Schauer, J. J., Kleeman, M. J., Cass, G. R., and Simoneit, B. R. T.: Measurement of emissions from air pollution sources, 2. C1 through C30 organic compounds from medium duty diesel trucks, *Environ. Sci. Technol.*, 33, 1578–1587, 1999.

Schauer, J. J., Kleeman, M. J., Cass, G. R., and Simoneit, B. R. T.: Measurement of emissions from air pollution sources, 5. C1–C32 organic compounds from gasoline-powered motor vehicles, *Environ. Sci. Technol.*, 36, 1169–1180, 2002.

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