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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Analysis of non-regulated vehicular emissions by extractive FTIR spectrometry: tests on a hybrid car in Mexico City" *by* F. Reyes et al.

Anonymous Referee #2

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The manuscript by Reyes et al., entitled "Analysis of non-regulated vehicular emissions by extractive FTIR spectrometry: tests on a hybrid car in Mexico City" reports on an analytical system for real-time chemical speciation of exhaust emissions from vehicles operating on a dynamometer. While the employed methods appear to be solid for the most part, there is little novelty in this report, and only one vehicle was tested, leading to the above recommendation.

Major Comments:

(1) Lack of Novelty. While the authors provide a thorough description of the employed methods and the factors affecting system performance, the paper does not present

novel concepts, ideas, tools, or data. This work focuses on an experimental system based on a commercial extractive FTIR spectrometer to characterize exhaust emissions from a vehicle tested on a dynamometer. Very similar systems are being used in a number of research labs, including CE-CERT at UC, Riverside (Durbin et al.) as correctly referenced by the authors, and have been for some time. The range of analytes measured by this system is common and no special algorithms were developed to measure new compounds. As a result, no substantial conclusions were reached. This is an important flaw that cannot easily be overcome.

(2) Insufficient Justification. On page 5766, line 10, the authors briefly mention other analytical methods for continuous monitoring of pollutants in vehicle exhaust and dismiss them as "expensive, imprecise, and require frequent and complex calibration procedures" without stating what these methods are In addition, the system described in their report certainly would be considered expensive. Without more details, the justification for the system described in this report seriously lacks authority.

(3) Potential Losses. In the described system, undiluted vehicle exhaust passes through a water trap before being analyzed by IR absorption spectroscopy. Given the low Henry's Law constants for ammonia and methanol, one could expect some losses in the trapped water. This possibility was not addressed in the manuscript. In fact, the authors report unexpectedly low ammonia and methanol emission rates; perhaps this is due to sampling losses?

(4) Response Time. On page 5778, line 27, the authors report a response time of 5 s, although the fastest theoretical response time under the given conditions is 23 s [(10 L/26 L/min)* 60 s/min]. Are the authors referring to spectrometer response time (i.e., instrument only) rather than system response time? This needs to be clarified. In addition, "response time" needs to be defined; usually as the time taken for 10-90% response.

(5) Discussion of the Data. Too much discussion on the data in Table 3 is presented.

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The data correspond to only one vehicle and no meaningful conclusions can be drawn from that small a data set. The relevant discussion should be shortened or removed entirely.

(6) Significance of the Findings. The authors report emission rates for a range of pollutants, but only from one vehicle. While this is a hybrid vehicle, these data are of limited value due to this very constrained sample.

(7) Fig. 2. The data shown in Fig. 2 correspond to standard instrument optimization and should be included under supporting information.

Minor Comments:

There are a number of spelling and grammatical errors, as well as some other minor errors in the manuscript. Corrections are not presented here due to the above major concerns.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 5773, 2006.