

Physical-chemical characterization of the particulate matter inside two road tunnels in the São Paulo Metropolitan Area

by Brito et al.

Tasking into account the expansion of flexible fuel vehicles in Brazil and their representativeness in megacities as São Paulo, the characterization of emissions from this source is of utmost importance. Brito et al. present a comprehensive description of the particulate matter in two road tunnel with distinct features. The manuscript is generically well written and appropriate references are cited. However, the work suffers from some drawbacks, which have to be properly explained before the article can be accepted for publication. The authors state several times that tunnel measurements are a tool for characterizing vehicular emissions. In fact it is true! An enormous weakness of this work has to do with the experimental design. Since CO/CO₂ concentrations, ventilations in the tunnels and background measurements have not been performed, it is impossible to estimate emission factors. Indeed, the lack of background measurements is a critical point. Although it is supposed that concentrations in the tunnels are considerably higher than those observed outside, depending on the ventilation systems, the effect may not be negligible, principally in the JQ tunnel, where PM concentrations are lower. A discussion on the influence of background air concentrations should be provided.

A description of the ventilation systems and how ventilation can affect concentrations (mechanical, natural, ...) in section 2.1 is needed.

Section 2.2. Three particulate matter samplers were simultaneously used. How do they compare? How the Angstrom exponent was calculated for particles deposited on a glass fibrous filter? The estimation of optical properties from particles collected onto filters has been criticized in the literature.

Section 3.1.1. How OC and EC correlate each other? Which are the minimum OC/EC ratios in the OC vs. EC plots (lower line)?

Page 20850. The conclusions drawn from the application of EFs should be regarded as rough, because there may be large differences between the composition of UCC and the local soil.

Section 3.1.2. The first paragraph is strange, concerning the formation processes of PAHs. It should be noted that PAH concentrations reported in this study are lower limits of the "real" concentrations, since most PAHs are in the gaseous phase. Only PAHs with 5 or more benzenic rings are predominantly in the particulate phase. Also, it should be emphasized that Rogge et al. presented PAH ratios for vehicles representing the American fleet at that time (more than 20 years ago), whereas the present study refer to vehicles powered by different fuels and expressing another reality. PAH were determined in filters from a high-volume sampler with a PM₁₀ inlet, but mass percentages are reported to PM_{2.5}!

Page 20853. It is not clear why ratios of 1.6 and 1.5 have been used to convert OC to organic matter.

Section 3.2. The interpretation of volatility classes must be made with caution because the thermogram profiles are highly dependent on the thermal protocol. In addition, artifacts (quartz fiber filters are highly adsorptive) may interfere.

Table 2. Why different numbers (N) of samples have been analyzed for different elements?

Figure 10. Try to apply a statistical rejection test to the point (80,18).

Conclusions. This section should present a compilation of the major findings and not a discussion or comparison of results with those of the literature.

Minor changes/comments:

Abstract, line 24. Delete “in the JQ tunnel”

Introduction, line 19. considerable amount.

Page 20849, lines 6-7. Review the construction of this sentence.

Section 3.4.2, line 23. Change “particulated” to “particles “

A mixture of American and British styles is used. Examples: sulphur (UK), characterization (USA)