Review of "Chemical investigation of 8 different types of carbonaceous particles using thermoanalytical techniques" by Matushchek, Karg, et al.

Synopsis: Relatively sophisticated chemical techniques are used to evaluate aerosol composition for bulk samples collected on filters. The sophistication of the analysis is synthesized as a few relatively simple parameters, and is evaluated with a wide range of aerosol samples.

Broad Analysis of this paper: It is not clear if the authors are proposing a new regulatory quantity, proxy for organic carbon mass concentration, or are doing something simpler, evaluating their data and synthesizing it around unifying principles. This needs to be clarified. Since the method does not deal with the inorganic content of aerosol, and in fact appears to be greatly impacted by this content, the use in analyzing general samples seems questionable.

Comment in the context of the field: My feel is that we need more specific, tangible definition and analysis, and less definition of proxy parameters, or operationally defined parameters.

Readability: Overall, the paper starts well, and is easy to follow. Later, the use of so many acronyms left me wandering around. For example, take the sentence on page 14, lines 9-11, and read it to a man or woman on the street. I would recommend trying to restate this sentence in a form >>> more <<<< understandable by the man on the street, of course realizing also that some specialization in the literature is to be endured.

Recommendation: Upon supplying major revisions I would like to read this manuscript again before making a specific judgment about publication.

Specific Review:

Pg 2. line 15. 'printex' should be spelled out as descriptive rather than as a trade name.

Pg 3. line 7. The size/volume/area issue seems murky because of the depth of penetration into the lungs, solubility of particles, and chronic versus immediate health effect considerations.

Pg 3. Line 14. The OC determination always seems to also need an assumption of average molecular weight.

Pg 3. Line 19. The AMS manufacturer now claims to get EC as a mass residual. Comment?

Pg 4. Table 1. What is printex powder used for? How was is prepared? What was the particle size? After resuspension, maybe it adsorbs chemicals from the air?

Pg 4. Table 1. DEP – how would these results differ for a vehicle under load? More importantly, what sorts of treatments are done on the exhaust between the engine and the tailpipe?

Pg 4. Table 1, comment c. ceramic parts are better than plastic parts? Is this so that you don't get the plastic evaporation coming into the chemical analyzers?

Pg 5. Lines 4 and 7. It would be best to move the definition of ptfe up.

Pg 5. General. In all thermal methods the prospect of chemical transformation with increasing temperature is present. This is composition dependent. How is this dealt with?

Pg 6. General. During analysis, are the filters aspirated? Suppose you have layers of particles and the lower ones cant' desorb because they are covered up.

Pg 6, line 19. Are you stating that 1% to 40% of the mass on the filter desorbs by the time the temperature is raised to 800 C? What is the remaining mass?

Pg 7. Line 17. Why should the CP show ANY OIC signal?

Pg 7. Line 24. Why is this an expected result? Better to use your space to explain it than to 'expect it'.

Pg 8. Lines 17-20. Would the results be different if the desorption was done in an inert atmosphere?

Pg 8. Lines 23 and 24. The discussion of time is unclear. What is the time axis?

Pg 9. Where does the silicon come from? How do you know it is an artifact?

Pg 10. Line 13. How close do you get to mass closure with the 800 components?

Pg 10. Lines 17 and 18. Unclear. I would remove this sentence.

Pg 10. Lines 25. 'as expected' by whom?

Pg 11. From here, acronym use gets thick. On line 22 it would be good to use an equation to define your primary quantity.

Pg 11 line 18. Is this true? If more skill were available for the ms analysis deconvolution would it be possible, or is it fundamentally impossible for sound reasons?

Pg 11. Line 24. The use of Atic is hard to understand relative to Aoic. You're a bit to specialized in this discussion – readership will suffer.

Pg 12. line 14. Why plot Aoic rather than your proxy parameter?

Pg 12 line 16. Why is the total aerosol amount an issue? It seems arbitrary. Comparison seems unnecessary. How was the TDP processed? By resuspension?

Pg 13. Line 4. What is OIR?

Pg 14. Lines 9-11. See the readability comment at the beginning of the review.

Pg 15. What about inorganics? It seems this method could be grossly in error if used in areas with high concentrations of inorganics.

Pg 15 line 17. The conventional methods use inert atmospheres for the oc determination. This is different from the author' analysis, so it makes comparison a bit questionable.

Pg 15. Something catalyzes the EC oxidation in the CP sample. The method proposed here would not work for such pure EC samples, for they would appear as OC (blind study for example, where you do not know before hand what the sample is.) It seems the OC blocks to EC oxidation.