

Interactive comment on “Combustion characteristics of water-insoluble elemental and organic carbon in size selected ambient aerosol particles” by K. Wittmaack

Anonymous Referee #2

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General Comments

The manuscript presents results from a scanning electron microscopy study on the combustion characteristics of carbonaceous material which is collected on a filter. The author reports on the changes of particle morphology and particle chemical composition of filter-deposited aerosols after several steps of thermal pre-treatment. It is concluded in the paper, that Diesel soot particles were observed to vanish at oxidation temperatures of as low as 500 deg C. Residuals in the size range of 10 nm which are detected on the filter are attributed to ash. On the other hand, organic compo-

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nents were observed to oxidise over a wide range of temperatures up to 500 deg C. In particular biogenic matter was still found at even higher pre-treatment temperatures.

The paper makes a significant contribution to the important area of measuring organic and black or elemental carbon in aerosol samples. The presented material deserves publication in ACP after few minor changes are considered. The presentation is of high quality.

However, beyond the minor modifications discussed below, the reviewer requests a more detailed discussion of the consequences for an OC/EC determination that arise from the presented results. In the current version, the paper limits itself to a presentation of experimental observations. The lack of an extensive discussion section reduces the use of the paper considerably.

As the author states in the introduction, a detailed peak analysis of evolved gas analysis thermograms is difficult for the current techniques. The main reason is a lack of precision in the definition of the carbonaceous species which are assigned to single peaks in the thermograms, and a lack of information on the combustion behaviour of collected particles. The manuscript reports on observations of biogenic material even at a thermal pre-treatment at temperatures above 500 deg C. In common analysis protocols, this biogenic matter is attributed to elemental carbon, which results in an overestimation of EC. Since these are important observations, the reviewer requests a discussion of the consequences for the interpretation of thermograms following from the presented results. Furthermore, a discussion of the observed oxidation temperatures with results reported for diesel particles, various OC including water-insoluble OC in the literature is needed. There are several references available in the literature from the groups working with evolved gas analysis with or without optical correction of pyrolysis (see e.g., Novakov et al., Chow et al., Puxbaum et al.).

Specific Comments

Section 2 Methods The author treated the samples prior to the thermal pre-treatment

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by water extraction. This procedure removes water-soluble matter. The author furthermore states that water extraction removes or at least reduces combustion artefacts due to inorganic matter. This statement should be softened, because metallic components which cause a large part of the artefacts are not necessarily removed by water extraction.

Figure 1: Please present the data as mass distribution, which is more common than the mass per stage. The information on the deposited mass per stage is already contained in the coverage plot below.

Figure 4: A better resolution of the presentation of the SEM images is preferable, although the images are referred to as low-resolution images.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 2247, 2005.

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