

Size Segregated Characterization of Main Components in Kerbside Particulates in Dresden, Germany

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High concentrations of PM₁₀ have been frequently measured at air quality monitoring stations in the agglomerations areas near road traffic. To understand the reasons for the exceedences of the EU-PM₁₀ limit values in a great number of cities in Europe it is very important to know more about the chemical composition of urban aerosols at kerbsides. The analysed size fractions of aerosols for main components (Brüggemann *et al.*, 2000) and metals (Singh *et al.*, 2002) have been used for source apportionments.

Nine 96 h (172.8 m³) measurements by Micro Orifice Uniform Deposit Impactor (MOUDI) from 0.056 to 10 µm particle diameter have been made from October 2003 until July 2004 usually from Monday to Thursday. Additionally 24h Berner Impactor samples were taken at the same time on Thursdays. The traffic site (A) with about 55,000 vehicles per day were compared to one sample from a nearby urban background site (B), at least 100 m away from streets with less than 5,000 vehicles per day (Gerwig *et al.* 2004).

Three maxima of mass concentration are in the size range from 0.32 – 0.56 µm, 1.0-1.8 µm and 3.2 – 5.6 µm (Tab. 1).

Table 1. 4 day averaged mass conc. of main components in 9 PM size ranges in kerbside particulates at Dresden, n = 9 Oct-03 – Jul-04.

Conc. in µg/m ³	Dp (µm)								
	0,056 – 0,10	0,10 – 0,18	0,18 – 0,32	0,32 – 0,56	0,56 – 1,0	1,0 – 1,8	1,8 – 3,2	3,2 – 5,6	5,6 – 10
NH4+	0,01	0,04	0,11	0,31	0,19	0,31	0,01	0,00	0,00
Na, Mg, Cl	0,004	0,01	0,01	0,03	0,02	0,05	0,10	0,15	0,14
NO3-	0,004	0,01	0,05	0,17	0,13	0,35	0,11	0,11	0,04
SO42-	0,02	0,07	0,25	0,65	0,42	0,66	0,07	0,06	0,03
EC	0,25	0,64	0,48	0,66	0,30	0,45	0,07	0,07	0,05
OM	0,14	0,38	0,50	0,88	0,24	0,50	0,13	0,18	0,13
UM	0,22	0,44	0,81	1,48	0,75	1,44	0,87	1,88	1,31
PM	0,65	1,59	2,20	4,19	2,05	3,77	1,35	2,45	1,69

The main components were uneven distributed between the size ranges (Fig. 1). In the coarse fraction (1.8 – 10 µm) was the highest percentage of Na, Cl, Mg and unknown material (crustal matter, water).

The secondary aerosol components ammonium, sulphate and nitrate were mainly found

in the accumulation mode (0.32 – 1.8 µm), nitrate also in the coarse mode.

The percentage of elemental carbon increased with decreasing particle sizes. Two thirds of ultrafine PM (0.056 – 0.100 µm) was carbonaceous.

During the winter samples more elemental carbon in the ultrafine PM and more Na, Cl, Mg was found in the coarse mode.

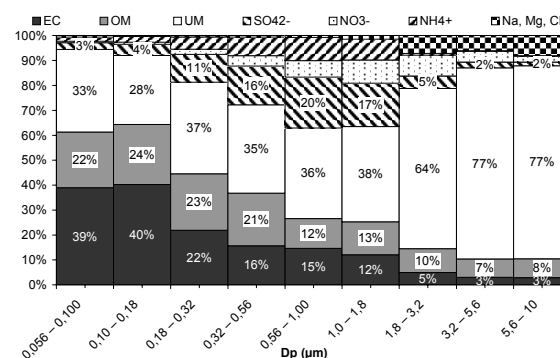


Figure 1. Percent particle size distribution in 9 size ranges of 4 day averaged mass conc. of main components in kerbside particulates at Dresden.

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