Road Pavement Abrasion as the Source of Particulate Matter

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Sources of pollution with reference to particulate matter which originate from the automotive traffic can equally come from combustion processes or non-combustion processes. Non-combustion related emissions of particulate matter as of the automotive traffic may come from the tear and wear of tires, wear of the braking pads and callipers, lining of brakes [1], **abrasion of road pavement,** wear of mechanical clutches, car bodies and re-suspension of collected dust by virtue of the automotive traffic and their presence on the road, frequenting the road. It can prove rather complex and intricate to identify the road pavement abrasion directly in field as the source of particulate matter and separate it from other sources as well as quantify its share on the origination and presence of particulates. One of the possible ways is to approach the chemical analyses of particulate matter as well as multi-layer statistical analyses. But even then it is indispensable to be aware of which chemical substances are to be considered as prime suspects for a given source – to be contained and released by the road pavement, surface. The main goal of that experiment was to determine the presence, production or presence of aerosol in various samples of tarmac compounds (various in composition – hard-core aggregate and type of asphalt, tar used). Samples marked as A3 – tarmac concrete (AC), S3 – stone mastic asphalt (SMA), P3 – Single layer drainage asphalt (PA).

During the process of wearing the carriageways the ambient air was sampled inside the sampling device by means of the following apparatus - Aerodynamical Particle Sizer Spectrometer /APS/- Model 3321 and low volume flow sampler of Leckel LVS3.

Following the experimental measurements while focusing on the determination of the aerosol production originating in various road pavements and asphalt substances there were several differences uncovered among the tried samples. First of all the highest amount of the aerosol being released happened during the experimental phase, whereas it was determined to be with the sample of S3 – stone mastic asphalt (SMA). When comparing the overall mean concentrations, this was almost a twofold value. A numerous distribution of aerosol in all the three samples had a similar course. In relation to the weight distribution, a similar trend was carried over by samples of A3 and S3, the sample of P3 showed a more even weight distribution of aerosol without a significant peak values. At the same time, weight wise the most numerous aerodynamic diameter was greater than with A3 and S3 samples. In all the three cases of tested samples, the weight concentration when compared to the volumetric concentration of particulate matter, particulates were shifted towards the greater aerodynamic diameters. Each of the tested samples is a specific one, when relating to their composition – asphalt type, amount of asphalt, kind of aggregate, various lines of granularity and fraction in the composites. With regard to the materials used, there are various samples created observing similar surface structures, which can in the long run influence the abrasion of these road pavements.

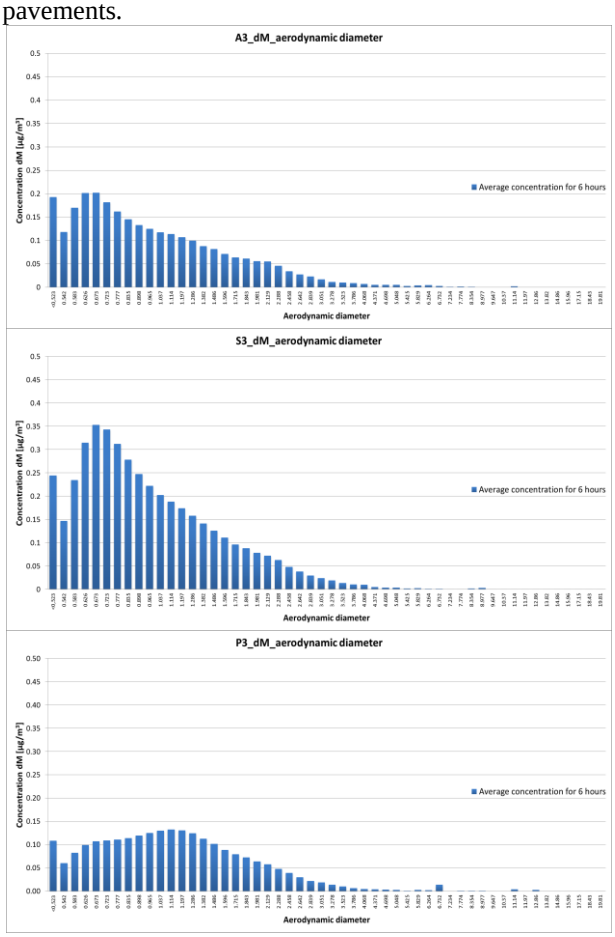

Figure 1 Mass concentration of aerosol from different asphalt mixture

References

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