

ABSTRACT

In the thesis were monitored 24 - hour concentrations of aerosol using cascade impactor Sioutas (PCIS) in the gym and parallel on the school yard of the primary school in Prague 1. Measurements took place from November 2005 to August 2006 in 8 periods of 7 – 10 days. Aerosol was taken in 5 size fractions of impactor stages A, B, C, D and P (A: 2.5 – 10 μm , B: 1.0 – 2.5 μm , C: 0.5 – 1.0 μm , D: 0.25 – 0.5 μm , P: < 0.25 μm). Concentrations were determined gravimetrically.

The average concentration of $\text{PM}_{2.5}$ for 70 days of monitoring, obtained as sum of B – P stages, was higher outdoors than in the gym (29.27 $\mu\text{g}/\text{m}^3$ outdoors and 23.93 $\mu\text{g}/\text{m}^3$ inside). The limit set by the WHO exceeded external concentrations in 57% (40 days) and the internal concentrations in 50 % (35 days).

The values measured on the impactor Sioutas were compared with the values of the AIM station and was found a high degree of correlation between the two methods (Pearson's correlation coefficient 0.937)

The influence of exercisers presence in the yard showed significant only for coarse aerosol fractions of A and B stages. The ratio of internal and external concentrations in both cases exceeded 1, for days without exercisers the ratio value substantially decreased (< 1). On the remaining C – P stages reflecting the fine aerosol, have been reported only minor differences between the ratios of concentrations inside and outside for days with the presence and non-presence of persons (the ratios were < 1). This indicates that coarse particles have its source inside, while a source of fine particles is mainly an outdoor environment. 40 % of the aerosol weight is contained in the finest fraction < 0.25 μm , in outdoor environment it is 36 %.

The influence of physical factors on the aerosol concentration for each size fraction was also considered, as the strongest factor is apparent wind speed. Comparing the winter and summer period has proved fall of fine fractions in the summer and the increase in the winter, coarse fractions are not affected.

Our results showed that in the gym half of days exceeded the limits of concentration. This suggests that exercising in these areas may have a negative impact on human health, because when physical activity is growing, negative ventilation and particles are moving deeper into the respiratory system. The risk is greater for children as belonging to the vulnerable population groups.