Estimating infiltration of quasi-ultrafine black carbon particles by an absorbance method: air quality in

Pavla Stehlíková

Abstract

This diploma thesis focused on the estimating quasi-ultrafine particles amount in school gyms continue previous study researched air quality in schools.

The size-segregated mass concentration of particulate matter was measured in three elementary school gyms in central part of Prague, on periphery of Prague and in a small settlement Černošice during twenty campaigns, from 2005 to 2009. The mass concentration of particulate matter were measured by 5-staged Sioutas impactor. For this thesis we have selected samples on filters with particle size <0,25μm. To evaluate carbonaceous particles amount we used reflectance. Reflectance was transformed into an absorption coefficient ($m^{-1}.10^{-5}$).

The average levels of absorptions coeficients were higher outdoors (14,66 ± 8,93 $m^{-1}.10^{-5}$) than indoors (13,64 ± 8,08 $m^{-1}.10^{-5}$). The correlations between absorption coeffitients outdoors and indoors were significant for all schools (Spearman's correlation coefficient at intervals 0,834-0,957, regression slope 0,759-1,007), suggesting a high outdoor-to-indoor penetration rate. The weak correlation between absorption coefficients and number of exercising pupils (correlation coefficient 0,059) indicates that main source of these carbonaceous particles is outdoors. Evaluating influences of physical factors we obtained a dominant influence of wind speed. The seasonal differences were found non-significant for absorption coefficients. This finding supports hypothesis that traffic is the main source of these particles throughout the year.

Considering the fact that, absorption coeffitients indoors and levels outdoors are relative similar, the physical exercise performed in gyms in urban areas with high traffic intensity may represent a considerable health risk especially for children because of their higher sensitivity to air pollution.

Keywords: indoor air pollution, ultrafine particles, absorbance, schools