Abstract

In the last decades great attention has been paid to the particulate matter with respect to its effects on human health. However, only recently have studies begun to examine finer PM size fractions. Despite an increasing number of the publications very little has been known about the PM_1 size fraction, its concentration, chemical composition and the relationship to the coarse particles..

The present dissertation is aimed at characterisation of the particulate matter indoors and namely chemical composition of its fine size fraction PM_1 (particles with the aerodynamic diameter less than 1 μm) in the indoor environment.

The sampling of particulate matter was carried out in Prague as a part of an EU-project "Urban Aerosol" EVK4-CT-2000-00018 during three (2 winter and 1 summer) approx. 30 days long campaigns. 24-hour samples of the PM_1, $PM_{2,5}$ a PM_{10} size fraction indoors and $PM_{2,5}$ outdoors were collected. The average 24-hour PM_{10} outdoor concentrations from the nearest station of the Czech air quality monitoring system AIM obtained from the CHMI were used for comparison.

PM_1 concentrations were found in range from 8,1 μg m^{-3} (median for winter 2002) to 23 μg m^{-3} (median for winter 2003). PM_1 represented a majority (more than 70%) of $PM_{2,5}$ concentration and nearly 1/2 of PM_{10} concentration indoors. $PM_{2,5}$ represented a majority (approx. 60%) of PM_{10} concentration outdoors. Concentrations of the indoor fractions were positively correlated. Concentrations of the outdoor fractions were also positively correlated. It is suggested that mainly PM from the outdoor air was present in the indoor environment. Cooking was an important but seldom registered indoor PM_1 source.

Elemental carbon together with SO_4^{2-} reached the highest concentrations and the highest proportional contributions - around 1/3 to the PM_1 mass. NH_4^+ and water soluble organic carbon represented noticeably lower contributions. Na^+, Ca^{2+}, K^+, Cl^- and NO_3^- ions had, with exception of several days, very low concentrations and their contribution to the PM_1 mass was also low, in the range of tenths to the first units of per cent. Trace metals contributed in a range of pro mile to the PM_1 mass. The unidentified component accounted for the largest part of the PM_1 mass in all the three campaigns. cooking was a supplementary source of the unidentified component.