Abstract

One important source of coarse particulate matter in urban atmosphere is the resuspended street dust. The aim of this study was to determine the emission potential of street dust samples, to conduct shape and mineralogical analysis of resuspendable fraction and on the bases of the findings carry out a comparison between the different sampling sites.

The dust samples were collected in February 2014 in three cities: Ostrava, Prague and Pilsen. For the purpose of this study, nine samples from the selected sites were dispersed in a resuspension chamber. The samples were collected in the center of every city in the following locations: the main square, the tram railway and the curbside.

Morphological and elemental analysis was performed using a Scanning Electron Microscope with EDS detector. The presence of mineral components such as quartz, chlorite, calcite, feldspar and kaolinite was observed. In samples from Ostrava were found spherical-shaped particles composed of iron oxides. The samples of Pilsen contained amphibole mineral fibers - actinolite. X-ray Powder Diffraction at high sensitivity showed the presence of amphibole asbestos in the samples from Ostrava and Prague.

The mass of each size fraction of resuspended samples was determined.

The mass size distribution was bimodal (2.5 µm and 8 µm), over time the second mode disappeared and distribution became monomodal.

 Resuspension fraction of particulate matter was calculated for each sample. The highest value had samples that were collected from the tram rails (9.2 to 13.5%). Samples from Ostrava had a higher aerosolized proportion (8.7 to 13.5%) than Prague (3.7 to 9.2%) and Pilsen (5.4 to 10.3%).

The emission potential has been calculated for all the resuspended samples. The highest emission potential was from the sample collected in Masaryk square in Ostrava 1.8%; the lowest was at the curbside in Pilsen – 0.03%.

Keywords: PM_{10}, street dust, resuspension, resuspension chamber, resuspended component, emission potential, aerodynamic particle sizer