

DOI: 10.5593/SGEM2014/B42/S19.050

HOW PROTECTED ARE WE INDOOR? INDOOR AIR POLLUTION WITH PARTICULATE MATTER IN AN OFFICE BUILDING FROM BUCHAREST

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Wednesday 1 October 2014 by [Libadmin2014](#)

References: 14th International Multidisciplinary Scientific GeoConference SGEM 2014, www.sgem.org, SGEM2014 Conference Proceedings, ISBN 978-619-7105-16-2 / ISSN 1314-2704, June 19-25, 2014, Book 4, Vol. 2, 383-390 pp

ABSTRACT

This paper presents the results of an indoor air quality monitoring study conducted in an office building located on the outskirts of Bucharest, in an area characterized by low traffic and no major industrial pollution sources, during the summer of 2013, from

14th of June to 3rd of July. The aim was to determine the concentration of particulate matter dimensional fractions PM_{2.5} (particulate nominal diameter less than 2.5 μm), PM₁₀ (particulate nominal diameter less than 10 μm), Total Suspended Particles (TSP), the PM_{2.5} and PM₁₀ percent from TSP, metals and also the water-soluble anions present in the particulate matter in indoor air. The concentration of particulate matter varies widely from a minimum of 11.93 μg/m³ for PM_{2.5} in weekend up to a maximum of 86.75 μg/m³ in a working day with intense activity. The PM_{2.5} average concentration for the period was 42.64 ± 28.28 μg/m³; for PM₁₀ it was determined a period average of 44.09 ± 28.29 μg/m³ and 46.44 ± 30.41 μg/m³ for TSP. The particulate matter are composed mostly of fine particles; fo PM₁₀ contains a 96% of PM_{2.5} and total suspended particulates are form from 91% of PM_{2.5}. Analysis by ICP- EOS technique for the acid mineralization of the particulate matter retained on the filters lead to the identification of 15 metals: K, Ca, Fe, Al, Na, Mg, Pb, Zn, Ni, Ba, Cu, Ti, Mn, As, Cr. The metal content in the three dimensional fractions is different, indicating the probability existence of an indoor source for particulate matter with metals. Regarding the content of water-soluble anion in the three dimensional fractions, were identified following ions:

NO₃

► > SO₄

2-> Cl -> F -> PO₄

3-> NO₂

► . Pearson Correlation Analysis indicated a high correlation between all the dimensional particulate fractions and also between metals and anions present in particulate matter. As so, the correlation coefficients for metals have values of R=0.96 for PM_{2.5}/PM₁₀; R=0.93 and R=0.88 for TSP/PM₁₀ for PM_{2.5}/TSP. The high correlations were maybe obtained due to the composition of the PM₁₀ and the TSP, both consisting in PM_{2.5} particulates in percentage of over 90%.

Keywords: indoor air, PM_{2.5}, PM₁₀, metals, anions soluble in water.

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