

CHEMICAL COMPOSITION OF METAL(LOID)S IN ANTHROPOGENIC SPHERICAL MAGNETIC PARTICLES FROM ATTIC DUST COLLECTED FROM TWO FORMER INDUSTRIAL CITIES, HUNGARY

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Industrial activity in Hungary, particularly in cities of Ózd and Salgótarján, started in the middle of the 18th century when iron and steel industry had an intensive development. This development is connected to the emission of heavy metal(loid)s into the atmosphere, which was accumulated in houses with attic areas for decades. The analysis of deposited atmospheric dust can provide information on environmental pollution, based on the assumption that there are enough anthropogenic spherical magnetic particles, as a result of industrial processes such as metal smelting or combustion of solid fuels (i.e., coal). The chemical composition of metal(loid)s (Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Mo, Ag, Sn, Sb, Pb and W) in magnetic spherical particles can contribute data for a picture about pollution in formerly industrial cities.

Laser ablation ICP-MS (LA-ICP-MS) analysis was carried out on 48 magnetic spherical particles from Ózd and 47 from Salgótarján to determine the concentration of the 15 above-listed metal(loid)s. Scanning electron microscope (SEM) was used to determine the concentrations of iron to complement the calculations of LA-ICP-MS data set. The dust was collected from attic areas of 6 houses in Ózd and 7 ones in Salgótarján. The selected sampling sites have attics intact for at least 30 years.

Results from SEM analysis showed that both cities have major Fe-O-(Si, Al, Ca) and trace elements (K, S, Ti, Mg, Mn, P, Na, Ni, Cu, Zn, V, Cr, Mo, Ba).

The median concentration (in mg kg⁻¹) of LA-ICP-MS analysis for Salgótarján: Ti(7265), Mn(3343), Cr(2063), Zn(848), Cu(569), V(333), Ni(273), Pb(264), Co(97), Mo(62), W(54.3), Sb(8.83), Sn(5.91), Ag(3.01), and for Ózd = Mn(5586), Zn(1290), Cu(812), Cr(645), Pb(579), Ti(500), Ni(231), V(34.5), Co(34.1), Mo(29.5), W(19.6), Sn(12.3), Sb(8.78), Ag(4.06).

The median concentration of anthropogenic spherical magnetic particles revealed the following order: Salgótarján = (Ti>Mn>Cr>Zn>Cu>V>Ni>Pb>Co>Mo>W>Sb>Sn>Ag) and Ózd = (Mn>Zn>Cu>Cr>Pb>Ti>Ni>V>Co>Mo>W>Sn>Sb>Ag),