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PRACA DOKTORSKA

**pt. MIGRACJA MIEDZI W ŚRODOWISKU
PRZYRODNICZYM W ZASIĘGU ODDZIAŁYWANIA IMISJI
PYŁÓW ZAKŁADU PRZETWÓRSTWA RUD OŁOWIOWO-
CYNKOWYCH MIASTECZKO ŚLĄSKIE**

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Summary

Thesis: "Copper migration in the natural environment influenced by dust immission from the Miasteczko Śląskie foundry "

Key words: heavy metals, copper, intoxication, ecotoxicological factors, dustfall

The goal of this study was to obtain material illustrating the migration of Cu in the natural environment around the Miasteczko Śląskie foundry, that is:

1. determination of copper content in soil and its speciation forms,
2. the occurrence of soluble and insoluble forms of Cu in the directional dustfall (the dust meter stationary and mobile) and total dustfall in the snow and
3. determination of copper in plants and their morphological parts (flower, stem, leaf, root) in territorial terms, in years 2002-2006.

The theoretical part presents a problem of bioavailability of copper as a trace element and how it is affected by pH of the soil. It also describes copper's natural origin and form in which it appears. Anthropogenic sources of this element, and its content in water and air, were also noted.

A significant part of the study was devoted to discuss plants mechanisms for collecting heavy metals from soil, presenting the latest theories in available literature about plant transporters of metal ions in plasmalemma. The distribution of metals in a plant was also discussed. The interaction of copper with other plant elements, its toxic effect on plants and the consequences of copper deposition in human body, were widely characterized. In addition, a properties synthesis of specific plant species, that are subject of the research, was made.

The selected administrative areas were used for research: Boruszowice, Tworóg, Zbrostawice, Strzybnica and Rybna.

Further, the methodology of research was described, including: the time and rules for sampling and preparation of soil, dust, snow, and plants samples. Soil and plants, after a pre-treatment, were mineralized in high temperature with concentrated 65% acid - HNO₃ (V), according to Ostrowska's method. In addition, a speciation analysis of the soil, according to Rudd's method, was performed to obtain bioavailable and potentially bioavailable forms. Dust was also analysed (total dustfall, from four directions and constant dustfall), from which both, soluble and insoluble in water, fractions of copper were isolated. The copper content in plants,

soil, snow and dust was determined by atomic absorption spectrometry (AAS), using hollow cathode lamps and air-acetylene flame.

Metal content in soil, dust, snow and particular parts of 23 morphological plant species were characterized by the following statistical concepts: arithmetic mean, geometric mean, standard deviation, the most likely range of metal occurrence, the content corresponding to 10 and 95 percentyl and distribution analysis of occurrence, with the determination of factors characterizing the frequency curve (factors of skewness and kurtosis).

Furthermore the coexistence of copper with other metals in soil and its speciation forms, directional (the dust meter stationary and mobile) and total dustfall (cuvette) in the snow, plants and their morphological parts (flower, stem, leaf, root) was discussed.

The degree of environmental pollution was determined by the designated ecotoxicological factors: factor of enrichment, geocummulating index, factor of specific accumulation in specific plant species, as a function of the plant's stem's segment height and its morphological part (flower, stem, leaf, root).

The evaluation of copper migration in the natural environment influenced by dust immission from the Miasteczko Śląskie foundry was based on the results of the main factors analysis results (PCA).