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STUDIES OF PLANT MATERIALS FROM MINING, INDUSTRIAL AND GREEN SITES BY SPECTROSCOPIC METHODS

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Abstract

Various plants were investigated here as bioindicators for control of the environment. Grass, moss and leaves of maple, birch and oak from different locations, i.e., mining, chemical industrial sites and open green area in a small industrial town in the south-western Poland (Złoty Stok) were examined. Concentrations of As, Ba, Ca, Cd, Co, Cr, Cu, Fe, Hg, Mg, Mn, Ni, Pb, Se, Sr, Ti, V and Zn were measured by the ICP-OES and CVG-ICP-OES techniques. Infrared spectroscopy (FT-IR) was used to investigate organic matter in plants and the main vibrational bands (referred to functional groups of organic molecules) were identified. The element accumulations were analysed taking into account seasonal changes in element concentrations, the sampling location and the kind of plant species. The highest differences in As, Fe, Mn, Ni, Pb, Sr and Zn concentrations for investigated sites were observed. Relationships between the element concentrations and sampling sites were very strong for Ni and Pb and were noticeable for As, Ba, Mn, Sr and Zn. Generally, moss demonstrated the highest accumulation of metals, except for the alkali earth metals and Mn or Zn, which were the most strongly accumulated in birch (Ba, Zn, Mn) or maple leaves (Mg, Ca, Sr, Mn). Element correlations were also investigated, and the Ca-Sr and Fe-Ti positive relationships were prominent and observed in all plants. The intensities of vibrational bands found in moss varied greatly depending on the sample location. Considerable decrease of the bands in moss samples from mining site was observed.

Key words: bioindicators, environmental pollution, plants, spectrometry

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