# X КОНГРЕС
ПО ЧИСТА И ПРИМЕНЕТА ХЕМИЈА
НА СТУДЕНТИТЕ ОД МАКЕДОНИЈА
(со меѓународно учество)

# 10th CONGRESS
OF PURE AND APPLIED CHEMISTRY
OF STUDENTS FROM MACEDONIA
(with international participation)

# КНИГА НА АПСТРАКТИ
# BOOK OF ABSTRACTS

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# ASSESSMENTS OF THE CONTENT OF 21 ELEMENTS IN BRYOPHYTE SPECIES (*Hypnum cupressiforme*, *Scleropodium purum* AND *Camptotecium lutescens*) FOR ENVIRONMENTAL POLLUTION IMPACT OF LEAD-ZINC FLOTATION PLANT

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In order to assess the contribution of emission sources to the pollution of areas remote from industrial facilities, a combined approach of factor analysis and multivariate statistics was used for detecting the origin of heavy metal pollution in the vicinity of lead and zinc mine and flotation plant. Three moss species (*Hypnum cupressiforme*, *Scleropodium purum* and *Camptotecium lutescens*) were used as biomonitors for determination the air-distribution of total 21 elements. The values for the metals contents were determined in moss samples by atomic emission spectrometry with inductively coupled plasma (ICP-AES). Data processing was applied with combinations of multivariate statistical methods: factor analysis, principal component analysis and cluster analysis, enabled discrimination of the lithologic and anthropogenic sources of heavy metals in the mosses. Higher contents of Pb and Zn were assumed (average values 60 and 75 mg $kg^{-1}$, respectively). The contents of Cd, Cu and Mn were also assumed as anthropogenically influenced from the emission sources, in order of their range values: 0.08-1.73; 4.11-21.4; and 55.5-376 mg $kg^{-1}$, respectively. Multivariate factor analysis produced two factors (F1 and F2), expressed as statistically significant elements associations. The first factor associates Ag, Ba, Cd, Cu, Fe, K, Mg, Mn, Mo, Na, Pb and Zn, while the second factor associates Al, Cr, Li, and V. Principle component analysis was used for visualizing the correlations between factor components extracted from the elements contents (as variable) and the expressiveness of three moss species (as cases). No characteristic correlation was found to the element contents vs. individual moss species; higher contents of the anthropogenically introduced elements (Cd, Cu, Mn, Pb and Zn) positively correlate with the distance from the pollution source (lead and zinc flotation tailings).

**Key words:** Air pollution, heavy metals, biomonitoring, moss species, multivariate analysis