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## BIOMONITORING OF CHEMICAL ELEMENT AIR POLLUTION IN HANOI USING *Barbula indica* MOSS

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### Abstract

Atmospheric deposition of chemical elements in the Hanoi region has been investigated in this study based on moss biomonitoring. Twenty-seven *Barbula indica* moss samples were collected from the end of 2016 to the beginning of 2017, and the concentrations of 33 chemical elements in the samples were determined by instrumental neutron activation analysis. The results show that Hanoi's air is highly polluted with Zn, Ba and Ta, and slightly polluted with Al, Cl, Sc, Ti, V, Cr, Mn, Fe, Ni, Co, As, Cd, Sb, La, Ce, Sm, Gd, Tb, Yb, Hf, Th and U. A determination of the possible pollution sources has been made for the analyzed elements; namely: coal and oil combustion are the main sources of V, Ni, Co and As; vehicle exhaust and non-exhaust sources, as well as industrial emissions, are the main sources of Mn, Co, Cd and Ba; construction dust is the source of Ca, Mg and Sb; various industries are the sources of Cr and Ni; the dust from cement kilns and ash from biomass burning is responsible for K and Cl; two-stroke motor vehicles, galvanizing factories and tire wear are the sources of Zn; and Br may be emitted from burning wastes.

**Keywords:** contamination factor, factor analysis, Hanoi air quality, moss biomonitoring, neutron activation analysis

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