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GROUNDWATER QUALITY STUDIES IN TWO TRANSYLVANIAN RURAL COMMUNITIES USING PARALLEL ION CHROMATOGRAPHY

Edward Muntean*, Tania Mihăiescu

*Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine Cluj Napoca,
3-5 Calea Manastur Str., 400372 Cluj Napoca, Romania*

Abstract

Groundwater originating from two rural communities from Cluj and Bistrita Nasaud counties was analyzed using parallel ion chromatography, the focus being on major anions (chloride, nitrite, nitrate, phosphate and sulphate) and cations (potassium, sodium, ammonium, calcium and magnesium). These analytes were determined simultaneously using a Shimadzu two-channel instrument with non-suppressed conductivity detection, separations being carried out using an Allsep Anion 7u column and an Universal Cation 7u column. From the 17 investigated sampling sites (wells up to 20 m deep), four proved to have nitrate concentrations higher than the maximum allowed limit according to the Romanian Law of Water Quality (50 mg/L), ranging from 57.82 to 311.13 mg/L, while high levels of ammonium were detected in three sites (from 0.94 to 11.74 mg/L, compared with the 0.5 mg/L which is the maximum admitted level). Groundwater originating from Apahida (Cluj County) proved to be highly contaminated with inorganic ions, the major causes being the intensive agriculture applied in this area and the salifer layers. However, some highly contaminated sites were recorded also in Prundu Bargaului from Bistrita Nasaud County; the major cause here is the manure storage relatively close to the water wells. The proposed analysis method increases much the laboratory productivity by decreasing the sample preparation time and the analysis time, all analytes being determined simultaneously in one run; it is simple and rapid, having potential to be used in groundwater quality surveys in the purpose of correlating diffuse pollution inputs with changes in water quality.

Key words: groundwater, ion chromatography, potable water, principal component analysis

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* Author to whom all correspondence should be addressed: edimuntean@yahoo.com, Phone +40754074375, Fax +40264593792