



“Gheorghe Asachi” Technical University of Iasi, Romania



AN ISOTOPIC SURVEY OF SOME MINERAL WATER RESOURCES IN THE CARPATHIAN CHAIN (ROMANIA)

Roxana Elena Ionete, Raluca Popescu*, Diana Costinel

*National R&D Institute for Cryogenics and Isotopic Technologies – ICIT Rm. Valcea,
4 Uzinei Str., RO-240050, Ramnicu-Valcea, Romania*

Abstract

Popular since ancient times, the mineral waters from Carpathian Chain (Romania) have gained a well-deserved reputation due to their quality and health benefits. This study provides a description of the chemical and isotopic composition ($\delta^2\text{H}$, $\delta^{18}\text{O}$) of mineral waters (CO_2 - rich and CO_2 - free water) located in six of the most popular areas, in order to improve the overall knowledge about their genesis and recharge mechanisms. The hydro-chemical facies of groundwater vary spatially, the analysed mineral waters falling predominantly in the $\text{Ca}^{2+}\text{-HCO}_3^-$ type, except for those on Bodoc area that highlights a $\text{Na}^+\text{-HCO}_3^-$ type water, which can be related with the calc-alkaline volcanic activity that has dominated the Harghita Mountains, Bodoc springs being located nearby. The water chemistry is largely controlled by rock weathering and ion exchange processes. Monthly variation of water stable isotopes $\delta^2\text{H}$ and $\delta^{18}\text{O}$ was measured over one year in both precipitation and groundwater, in order to evaluate the possible relationship between rainfall composition and groundwater. All the water samples display values from -89 to -67‰ for $\delta^2\text{H}$ and from -11.7 to -8.1‰ for $\delta^{18}\text{O}$, most samples having values within the range from -80 to -70‰ for $\delta^2\text{H}$, and -11 to -9‰ for $\delta^{18}\text{O}$. For most of the investigated springs, $\delta^2\text{H}$ and $\delta^{18}\text{O}$ values were below GMWL (Global Meteoric Water Line), featuring O-shifts. The enrichment in ^{18}O reveals an exchange reaction between the water aquifers with the specific geological structure containing rocks (igneous rocks, carbonates, etc.) with high content of ^{18}O , on its pathway to the surface.

Key words: Carpathian, mineral water, stable isotopes, water-rock interaction

Received: February, 2013; Revised final: January, 2014; Accepted: January, 2014

* Author to whom all correspondence should be addressed: e-mail: raluca.popescu@icsi.ro; Phone: +4 0250 732744; Fax: +4 0250 732746