

BIOACCESSIBILITY BY PERSPIRATION UPTAKE OF MINERALS FROM TWO DIFFERENT SULFUROUS PELOIDS

Carla Marina Bastos^{1,2}, Fernando Rocha¹, Carla Patinha¹, Paula Marinho-Reis³

¹ *Department of Geosciences, GeoBioTec Research Centre, University of Aveiro, 3810-193 Aveiro, Portugal.*

² *Exatronic, Lda, 3800-373 Aveiro, Portugal.*

³ *Institute of Earth Sciences (ICT) – Pole of the University of Minho, University of Minho, 4710-057 Braga, Portugal.*

Abstract: Testing the risks of peloid usage in thermal centers, spas, or at home is essential for establishing safety guidelines regarding peloid formulations and releasing concerning substances. Additionally, evaluating the beneficial effects of specific elements on human health helps understand the therapeutic action and effectiveness of pelotherapy for dermatological or musculoskeletal disorders. A methodology was developed to study the biogeochemical behavior of elements in formulated peloids. With periodic stirring, two peloids were created with the same clay and two different sulfurous mineral-medicinal glasses of water for 90 days. Bentonite clay, rich in smectite and primary exchangeable cations Ca and Mg, with high heat capacity, was used. The mineral-medicinal waters were collected from recognized Portuguese thermal centers for their efficacy in treating rheumatic, respiratory, and dermatological pathologies. The peloids were used directly from the maturation tank without drying, and a reference sample of bentonite mixed with demineralized water was prepared. An artificial perspiration test simulated the peloids' interaction with the skin. Thirty-one elements extracted from the two prepared peloids were analyzed using ICP-MS. The data were analyzed and compared to the original clay's mineralogical composition and the maturation tanks' supernatant composition. The solubility of potentially toxic elements and the bioaccessibility of metals through perspiration were low, with undetectable amounts extracted from the samples. This analytical method provided reliable information on dermal exposure and identifying elements that may enter the bloodstream, requiring the implementation of surveillance and control measures.

Keywords; Clays, mineral-medicinal water, peloids, artificial perspiration; transdermal delivery.

Acknowledgement. FCT funded this research—Fundação para a Ciência e a Tecnologia and Exatronic, Lda, Grant Number SFRH/BDE/11062/2015 and also supported by GeoBioTec Research Centre (UIDB/04035/2020), funded by FCT, FEDER funds through the Operational Program Competitiveness Factors COMPETE.