

## SUITABILITY OF PORTUGUESE CLAYS FOR MEDICAL HYDROLOGY APPLICATIONS

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In Portugal, there is an old tradition in using clayey materials for therapeutic purposes. They are applied at several beaches of the Atlantic coast, in the form of clay-sea water mixtures to treat skin and rheumatic diseases. During many generations, they have been applied without scientific studies that prove their therapeutic validity. In the last decade, the Portuguese scientific community has become increasingly more interested in assessing the properties that make clayey materials suitable for therapeutic purposes. The abundance of clayey formations and the established practices of medical hydrology in our country turned this interest into a new perspective of application. A group of clayey materials which was recently considered suitable for medical hydrology applications is presented. They include different clays (in age and origin) collected from well-known formations, in some cases outcropping at beaches where empirical applications occur. To determine their suitability for therapy, compositional, physicochemical, thermal and rheological properties were assessed. To assess their composition, conventional techniques were used (XRD, XRF and Sedigraph analysis). Physicochemical properties (cation exchange and specific surface) were estimated using the ammonium acetate and BET methods. Plasticity and abrasivity indices were assessed using Atterberg limits and Einlehner abrasion tests. Thermal properties (specific heat and cooling kinetics) were determined using DSC and cooling curves analysis. Pharmacotechnical tests estimated the rheological properties (flowability and viscosity). The most relevant characteristics were: high phyllosilicates content, abundant smectite, illite and kaolinite, and safe hazardous concentrations. Samples showed moderate capacity to exchange  $\text{Ca}^{2+}$ , high plasticity and low abrasivity together with high specific heat and slow cooling kinetics. They evidenced fair flowability and were promising to formulate viscous dispersions. Because the majority of the assessed characteristics are in accordance with those presented by clay materials applied in spa (Carretero et al., 2006; Veniale et al., 2007) the studied clays were considered suitable for medical hydrology applications.

[1] Carretero, M.I., Gomes, C.S.F., and Tateo, F. (2006). Handbook of Clay Science, Chapter Clays and human health. Elsevier, Amsterdam, Nederland.

[2] Veniale, F., Bettero, A., Jobstraibizer, P.G., Setti, M. (2007). Thermal muds: Perspectives of innovations. Applied Clay Science, 36:141-147.

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