



The relations between the origin and some basic physical and chemical properties of bentonite rocks illustrating on the example of Sarmatian bentonite site at Sajóbábony (HU)

Noémi M. Nagy*, József Kónya

Isotope Laboratory, University of Debrecen, P.O. Box 8, H-4010 Debrecen, Hungary

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Abstract

Five bentonite samples (35–47% montmorillonite) from a Sarmatian sediment series with bentonite sites around Sajóbábony (Hungary) were studied. Some of these samples were tuffogenic bentonite (sedimentary), the others were bentonitized tuff with volcano sedimentary origin. The mineral composition, particle size distribution, specific surface area, cation exchange capacity, acid–base properties of the edge sites, swelling, adsorption and migration rate of different substances were studied. We found that some characteristic properties of bentonites are mainly determined by montmorillonite content but others depend on the origin. The montmorillonite content determines the cation exchange capacity and caesium ion sorption properties. These properties depend on the layer charges of montmorillonite.

The origin of bentonite determines the particle size distribution, consequently the specific surface area determined by BET method and acid–base properties of the edge sites. The quantity of the edge sites mainly depends on the specific surface area.

The swelling and migration of a non-adsorbing ion in bentonite shows no direct relations to the montmorillonite content or the origin. These processes are influenced by several factors.

As a consequence, the properties and the application possibilities of bentonites are not determined alone by the montmorillonite content, the origin has also an important role.

The paper studies a special Hungarian bentonite site so in this respect it has local significance. However, the consequences, that is the effort about the search of relation between the bentonites and their properties, are general and valid for other bentonites, too.

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1. Introduction

Bentonite rocks are frequently used for different purposes in chemical and oil industry and environmental protection. For these applications, different

* Corresponding author. Fax: +36 52310122.

E-mail address: noemi@tigris.klte.hu (N.M. Nagy).

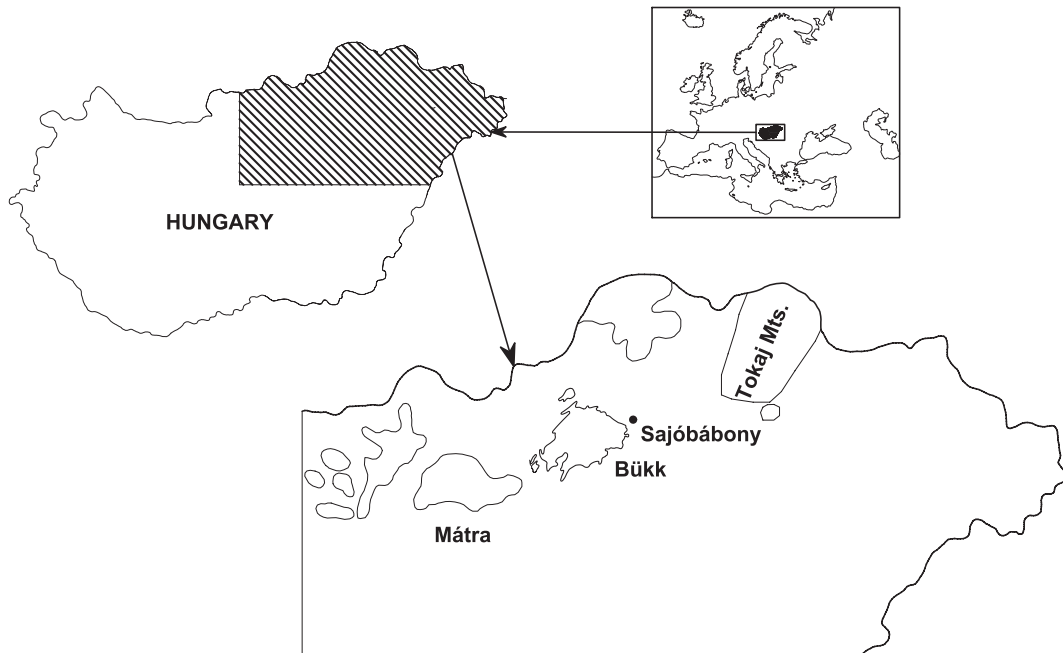


Fig. 1. General map of bentonite sites in the Kő valley around Sajóabony (Hungary).

properties of bentonite rocks are relevant and the bentonites are qualified from different points of view. The most important properties are the way of geological formation, the chemical and mineral composition, especially montmorillonite content, particle size distribution, specific surface area, cation exchange capacity, acid–base properties of the edge sites, swelling, adsorption and migration rate of different substances.

The industrial users and the scientists are usually interested only in some properties, e.g. geologists deal with the way of formation and mineral composition,

chemists study the surface properties and catalytic effects, swelling and viscosity are important for oil industry and environmental protection, etc. However, the relation of geological, chemical and mechanical properties is very interesting and important from scientific and industrial points of view as well.

In this study, the relations between the geological formation, mineral composition, chemical and physical properties are shown. The role of montmorillonite is discussed, the properties depending or not depending on the montmorillonite content are shown.

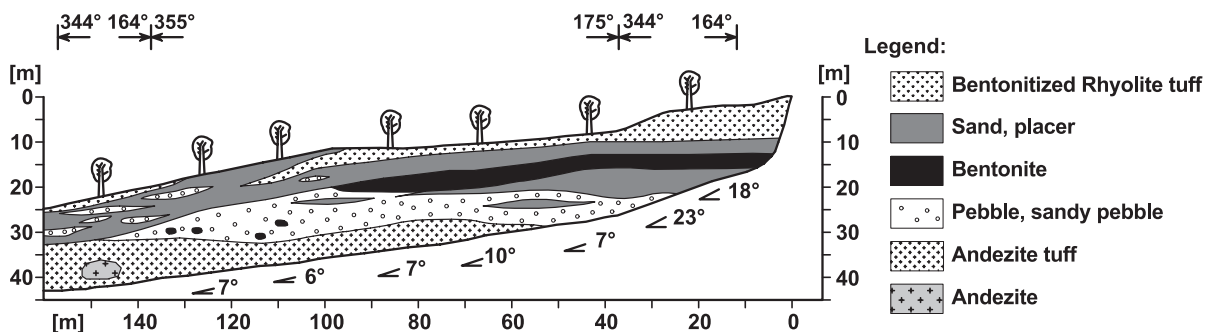


Fig. 2. Sarmatian sediment series with bentonite sites in the Kő valley around Sajóabony (Hungary) (Püspöki et al., 2003a,b).

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