



Analysis of the degradability of argillaceous detrital rocks. Approach by means of artificial samples of known composition.

Joan Martinez-Bofill (1,2), Albert Soler (3), and Anna Gaya (1)

(1) GEOMAR Engineering Geology, Barcelona, Spain (martinezbofill@geomar.cat), (2) Department of Civil and Environmental Engineering, BarcelonaTECH, Barcelona, Spain, (3) Faculty of Earth Sciences. Department of Mineralogy, Petrology and Applied Geology. Universitat de Barcelona, Barcelona, Spain

Argillaceous rocks are one of the most common types of sedimentary rocks. These rocks, when recently excavated, can show features close to a hard rock, but once exposed to weathering agents, their properties may be modified, producing structural, textural and mineralogical changes that affect their behaviour and the stability of the excavated slopes, thus generating maintenance costs and compromising the safety of the infrastructures. The main components of argillaceous rocks are 1) a sandy detrital fraction, 2) a fine matrix composed of silt and clay and 3) a cement fraction, which is responsible for giving consistency to the rock. However, traditional geological classification systems do not usually consider the presence of cement, since cement is posterior to the sedimentation process and therefore has no genetic interest for petrology geologists.

The objective of this work is to study the role played by these three main components of the argillaceous rocks in the strength and durability of these rocks. The methodology has been based on preparing samples of artificial rocks by mixing different proportions of siliceous sand, clay and portland cement. A second phase was carried out by testing the durability of the obtained samples by means of the Slake Durability Test (SDT) according to the ASTM D4644 standard (1987) and ISRM (1979 and 1989). The third phase consists in carrying out tests on the mechanical properties of the samples obtained, using simple compression resistance and flexural strength tests.

The results obtained show a relationship between the mineralogical composition of the samples and their durability, as well as their resistance. It has been observed that the cement content is not the only factor that controls durability, but its effectiveness is depending on the content of sand and clay. Thus, the samples of greater strength and durability, are those that have a high content of cement mixed with sand, while the presence of clay penalizes the resistance and durability. Finally, it is concluded that the preparation of artificial samples of known composition is a useful tool to understand the influence of lithology on the durability and resistance of clay detrital rocks.

Keywords: Weak rocks, argillaceous rocks, durability, slake