



Portuguese low grade kaolin based geopolymers

Fernando Rocha, Cristiana Costa, and Sara Fernandes

University of Aveiro, GeoBioTec, Geosciences Department, Aveiro, Portugal (tavares.rocha@ua.pt)

Rapid technological development, coupled with increasing worldwide evolution, leads to the large production of Portland cements, the most commonly used binder in construction, and its production equals 8% of global CO₂ emissions by 2015. To find substitutes for these binders the geopolymers have been widely studied, since they present a smaller environmental footprint, as well as better properties.

The present dissertation aims to verify if the geopolymerization process benefits from the use of low grade kaolin as a precursor, since this material does not present the characteristics desirable by the market, has a lower price, even being rejected. And since this type of material presents characteristics that can be beneficial in the geopolymerization, these can find in the geopolymers a possible application.

For the present study, we selected low grade kaolins from exploitation located on NW Portugal (Mibal enterprise, Barqueiros), being sedimentary formations of Pliocene age, very rich in kaolinite but presenting iron contents too high for paper and white ceramic applications.

Two low grade kaolin, with and without heat treatment, were then used in the formulation of different geopolymers. The different specimens were then subjected to compression and water absorption tests at 7, 14 and 28 days of cure.

Obtained results show that the use of this type of kaolin as geopolymer precursor evidences gains of resistance (up to 5.7MPa on no heated samples and 9.6MPa on heated samples), considering similar formulations existing in the published literature. Therefore, we can conclude that a greater structural disorganization of the kaolin precursor benefits the process of dissolution and production of the polymeric gel.