Physico-mechanical characterization of ceramics obtained from diatomite earth

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Abstract

Diatomaceous earth (DE) mined from geological depostisis, that may contain impurities like metal oxide and organic matter, make it an interesting candidate for use as a material for the production of ceramics. These impurities can be altered or removed by different treatment processes like sitnering time and temperature. The samples under consideration were sintered at 1000°C temperature, for a period of 1h, 2h and 3h and at 900°C and 1100°C for a period of 3h, in order to remove the impurities that DE may contain. Different analytical tools for the determination of bulk density, water absorption of ceramic samples, characterization of mechanical properties by Vickers hardness test (non-destructive method) and compression test (destructive method) where used in dependence of sintering time and temeprature. The results from calculating bulk density of samples are showing that increasing sintering temperature and time, increases the bulk density of the analyzed samples. From the results which have been obtained from the analysis of water absorption, it has been concluded that the percentage of water absorption at the same temperature decreases over time, and also decreases with increasing temperature. The use of the Vickers hardness test is performed to determine the material's resistance to a localized plastic deformation. From the analysis of the sample under scrutiny using a 5kg load for a period of 10 seconds on each sample, the results have shown that with increasing temperature and sintering time period, the hardness of the ceramic samples increases. As a result of the compression test method, it turns out that the examined sample is very dense and homogeneous. For the homogeneity of the majority can be judged from the sufficient linear part of the graph acquired from the compress test, the linearity which continues until the moment of destruction of the sample.

Keywords: Diatomaceous earth; Characterization; Sintering, temperature, bulk density

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