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MICROSTRUCTURAL AND PHYSICAL CHARACTERIZATION OF SOLID WASTES FROM CLAY BRICKS FOR REUSE WITH CEMENT

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Abstract

This study aims to evaluate the properties of different wastes obtained from four red ceramic brick industries in the northern region of Santa Catarina, Brazil. The characterization of the clay brick waste (CBW) was performed using the XRD techniques, XRF, FTIR, DTA and SEM. Techniques to determine the pozzolanic activity, particle size, B.E.T. surface area and specific mass were used. The consumption of calcium hydroxide (CH) in the cementitious pastes with the CBWs was also measured. An application in mortar is also analysed. The results indicated that the CH consumption was a function of the large surface area of the waste particles. The CBW reactivity is favoured by firing temperature adequate (about 800 ºC), low presence of K_2O and impurities and higher kaolinite content. CBW-B showed the highest consumption of calcium hydroxide in the cement pastes tested (remaining 0.40% CH). Morphological analysis showed that microcrystals of halloysite was smaller than those of kaolinite and have more elongated profile. These differences provide the larger surface area observed for halloysite and this has an influence on the reactivity. The reference paste presented CH content of 2.37%. The compressive strength of the mortar with CBW improved comparing to reference, in 28 days (from 2.45 to 5.65 MPa), and in 90 days (from 5.72 to 10.39 MPa). The use of these wastes could reduce solid waste discards in many regions. Besides reducing CO_2 emissions and saving natural resources from the manufacture of cement.

Key words: brick waste reuse, burned clay microstructure, clay brick waste, solid waste characterization, sustainable building materials

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