

Effect of blast furnace waste addition on sintering kaolinitic clay

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Abstract – In this study, the addition of blast furnace slag and clay has been investigated. The characterizations of the raw materials were carried out. Wastes in the range of 0–50 wt. % have been added into the Clay. Specimens 7 x 2 cm² were shaped by uniaxial pressing at 25 MPa for sintering at temperatures ranging from 850 to 1150 °C for 1 h. The technological properties were carried out. The SEM revealed quartz crystals embedded in the glassy matrix. The results showed that structural ceramic could be made up to 30% weight of blast furnace slag and clay mixture.

Keywords: Blast furnace slag, kaolinitic clay, structural ceramic.

The industrial and urban wastes have become one of the most serious problems faced by the modern society. These wastes cause environmental degradation, with pollution and contamination of water and soil. On the other hand, the ceramic industry faces scarcity of good quality raw materials in locations close to the industries. Blast furnace slag (BFS) is the residue of pig iron production and based on world steel annual manufacturing, approximately 150 million metric tones of slag are prepared every year [01]. BFS is mainly used for the production of cement where slag is primarily utilized as one of the raw materials replacing clay. Many alternative products of ceramics structural are being explored with the incorporation of sub product of the steel industry.

The main disadvantage of BFS is the presence of a large amount of lime in its chemical composition. Clay used in the red ceramic industry contains a low amount of lime but it contains a large amount of silica and lesser than silica iron oxide and alkaline making it a low melting body. An optimum mixing of clay with BFS can produce a balanced composition where desired improved properties of the products may be attained.

The sintering formed phases that influence the properties of products, such as higher mechanical strength, apparent density, water absorption. In the present investigation, blast furnace slag was used for the fabrication of red ceramic block. The BFS was added to Clay in the range of 0–50 wt. % and sintered products were characterized to obtain optimum conditions such as composition, sintering temperature and some properties of sintered products.

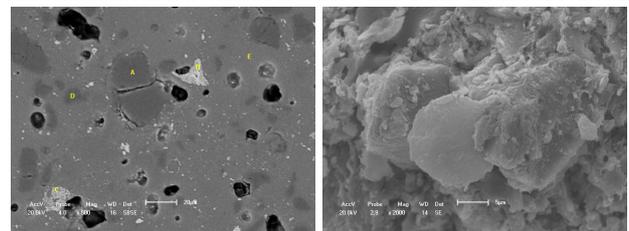
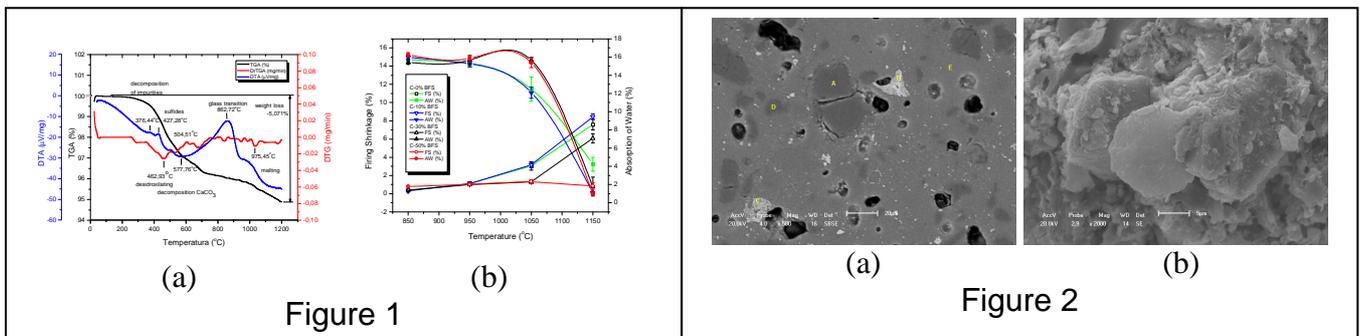


Figure 1: the results of the thermal behavior of the slag of blast furnace is shown in a) and curve of firing is shown in b) and shows that the composition 30 %wt SBF has the best

Figure 2: The images obtained by SEM shows in a) microstructure of the composition with 30 %wt SBF up to 4 distinct phases and b) shows the quartz crystals embedded by a