

Thermal behavior of aluminate refractory mixtures

Ioanna D. Katsavou, Magdalini K. Krokida, Ioannis C. Ziomas

Department of Chemical Engineering, National Technical University of Athens,
Zografou Campus, Athens, Greece.

Bauxite and aluminate chamotte, binded with aluminate cement, were selected, and their thermal behavior was studied using differential scanning calorimetry and thermogravimetry, as well as their loss on ignition, after firing at 1000°C, was determined. The main changes in mass observed were attributed to moisture removal up to temperatures of 140°C and to the dehydration of calcium aluminate cement at 200-300°C. Boehmite (500°C) and bayerite transformations (650-700°C) were found for bauxite samples, while chamotte samples exhibited changes due to goethite conversion to hematite (400°C) and spinel formation at 900°C. Water removal was then examined in detail through differential scanning calorimetry tests. Experiments concerning loss on ignition showed that particle size of refractory bauxite does not cause mass changes during firing, while chamotte samples were found to appear greater loss at particle sizes 200-315 µm, due to impurities and low melting point compounds.

Keywords: Bauxite, Chamotte, DSC, Loss on Ignition, TG/DTG.