

Modeling of Mass and Heat Transfer During Dehydroxylation in a Large Kaolin-Ceramic Cylinder

Igor Medved^{C, S} and Jan Ondruska

Department of Physics, Faculty of Natural Science, Constantine the Philosopher University, Nitra, Slovakia

Kaolinite undergoes a phase transition into metakaolinite, starting at ~ 420 °C. This process is called dehydroxylation and is accompanied by a change of density and composition of the sample. As heat penetrates into a sample interior, water molecules – the product of dehydroxylation – diffuse out to the surface. We describe a theoretical model of dehydroxylation for a large kaolin-ceramic cylinder, using a suitable form of the standard mass and heat transfer equations. The equations were numerically solved by the finite element method. We obtained numerical results that are in good agreement with experimental data. The relationship between the density and the temperature as functions of a position and time is discussed.