

The study of aluminum loss and consequent phase transformation in heat-treated acid-leached kaolin.

ABSTRACT

This study investigates the effect of Al leaching during Fe removal from kaolin to mullite. Heat-treated kaolin was obtained by heating natural kaolin at 400, 500, 600, 700, 800 and 900 °C. The heat-treated kaolin was then leached at 100 °C with 4 M, 3 M, 2 M, 1 M, 0.2 M solution of H₂SO₄ and 0.2 M solution of oxalic acid. The dried samples were sintered to 1300 °C for 4 h at a heating rate of 10 °C min⁻¹. X-ray diffractometry and differential thermal analysis were used to study the phase transformation of kaolin to mullite. It was found that 700 °C is the optimum preheat-treatment temperature to leach out Fe and also Al for both types of the acids used. The majority of the 4 M sulfuric acid-treated kaolins formed the cristobalite phase when sintered. On the other hand, 1 M, 0.2 M sulfuric acid and 0.2 M oxalic acid leached heat-treated kaolin formed mullite and quartz phase after sintering.

Keyword: Clays; Mullite; Calcination; X-ray methods.