

Effect of stirring time on synthesis of ultra fine α -Al₂O₃ powder by a simple sol-gel method.

ABSTRACT

The present paper tends to explore the effect of stirring time on the synthesis of nano α -Al₂O₃ particles. In this study, alumina nanoparticles were synthesized through an alkoxide route implementing sol-gel method in which aqueous solutions of aluminum isopropoxide and 0.5M aluminum nitrate nanohydrate were used to prepare an alumina sol. Sodium dodecylbenzen sulfonate was used as the surfactant stabilizing agent. The prepared solution was stirred for different times (24, 36, 48 and 60 hours) at 60 oC. The samples were, then, characterized by Brunauer-Emmet-Teller method, X-ray diffraction, thermogravimetry analysis, differential scanning calorimetry, Fourier transform infrared spectrometry, scanning electron microscopy and transmission electron microscopy. The introduction of different stirring times affected the particle size and shape and the degree of aggregation. By increasing the stirring time (starting from 24 to 48 hours), the particle size decreased, but there was a harder agglomeration for the samples with 60 hours stirring time. The finest particle size (20-30 nm) was obtained at 48 hours stirring time.

Keyword: Nano particle; Ceramic alumina; Sol-gel methods.