THE HYDRATION OF Ca1-xSrxAl2O4 AS THE MAJOR COMPONENT OF CALCIUM ALUMINATE CEMENT

by M. Pranjoto Utomo, A.K. Prodjosantoso, Kun Sri Budiasih, Septiani, Muhammah Shobirin

ABSTRACT

Monocalciumaluminate (CA) is the major phase in the calcium aluminate cements (CAC). Solid solution of $Ca_{1-x}Sr_xAl_2O_4$ may be formed if the cement raw materialsare impure with Sr mineral. This study aims to understand the hydration reaction and the character of $Ca_{1-x}Sr_xAl_2O_4$ hydration.

Stages in this study included hydration reaction of $Ca_{1-x}Sr_xAl_2O_4$ with water and the characterization of compound by using Scanning Electron Microscopy (SEM-EDX), thermal analysis (TGA-DSC), X-Ray Diffraction (XRD) and infrared spectroscopy (FTIR).

Hydration reaction of $Ca_{1-x}Sr_xAl_2O_4$ formed *hydrogarnet*, $Ca_{3(1-x)}Sr_{3x}Al_2(OH)_{12}$ and $Al(OH)_3$. The hidrated compounds were decomposed twice at 250-281°C ($Al(OH)_3$ decomposed to Al_2O_3), and then at 680-805°C (*hydrogarnet,* $Ca_{3(1-x)}Sr_{3x}Al_2(OH)_{12}$ formed $Ca_{3(1-x)}Sr_{3x}Al_2O_6$.). Beforethe hydration, the compound contained Ca-O and Sr-O stretching, Al-O stretching bonds, and after hydration Ca-O and Sr-O stretching, Al-O stretching, Al-OH (bending & stretching), O-H bending and O-H stretching. The morphology of $Ca_{1-x}Sr_xAl_2O_4$ before the hydration with x = 0,5 was more regular than after the hydration

Kata Kunci: *Monocalcium aluminate, hydration, Ca3(1-x)Sr3xAl2(OH)12, AH3*