

SOLIDIFICATION OF COPPER IN CaO-CuOx-SiO₄ COMPOSITES

by Anti Kolonial Prodjosantoso, Kun Sri Budiasih, Isti Yunita, dan Maximus Pranjoto Utomo, Rio Bagus Samudra, Ulfa Fitri Rohmatin, Walfajri Putra, Jossephine Daniella Iki, and Winda Fatmasari Ayu Styaningsih

ABSTRACT

Domestics wastes are main problem to almost all countries. Methods are applied to reduce the wastes, but the problem still exists. Some domestics wastes may leave inorganic materials after docomposition. Burning eggshells may produce calcium oxide, and cogon grass (*Imperata cylindrica*) may produce silica. These oxides are promising materials for cement component synthesis, such as calcium silicates. Calcium silicates indicate the high power to stabilize toxic metals. The copper may be stabilized by the calcium silicates, forming copper-doped calcium silicates.

This research was conducted to prepare and characterize copper-doped calcium silicates, synthesized using calcium oxide and silica from chicken eggshells and *Imperata cylindrica*, respectively, and to determine the leaching ability of copper from copper-doped calcium silicates.

The copper-doped calcium silicates were synthesised by using the solid-state reaction method. The reactions were conducted at the temperature of 1050°C for 4 hours to produce copper-doped calcium silicates. The samples were characterized using the X-Ray Diffraction (XRD), Fourier Transform Infrared (FTIR), Scanning Electron Microscopy-Electron Dispersive X-Ray Analyzer (SEM/EDX) methods, and to determine the leaching ability of copper the Atomic Absorption Spectrophotometry (AAS) method was deployed.

The results indicate that the copper-doped calcium silicates were successfully synthesized using the solid-state reaction method. The XRD, FTIR and SEM-EDX methods indicate the presence of typical peaks of Ca₂SiO₄, Ca₃SiO₅, Ca(OH)₂ and SiO₂ compounds in the samples. The AAS method confirms the leaching of <0.266 mg/L copper from the copper-doped calcium silicates.

Kata Kunci: *calcium silicate, solid state reaction, chicken eggshell, Imperata cylindrica.*