

Effects of Carbonation on the Leaching Behavior of Coal Fly Ash for Mine Reclamation Potential:
A Preliminary Study

Triwigati Purnaning Tuwuh, 박영준^{1,†}

Gwangju Institute of Science and Technology (GIST); ¹광주과학기술원
(young@gist.ac.kr[†])

Using industrial wastes for carbon mineralization is beneficial, however, not all of them contain sufficient calcium and heavy metals contained also need serious attention. This preliminary study aims to investigate the effect of carbonation on heavy metals' leaching. Direct gas-solid carbonation was performed under atmospheric conditions using Coal Fly Ash (CaO = 6.51wt%, Ca-poor), Concrete Waste (CaO = 66.09wt%, Ca-rich), and the mixture of both with a 1:1 ratio. ATR FT-IR data showed no CaCO₃ peak in the carbonated CFA, however, 712 and 874 cm⁻¹ peaks were seen in the carbonated mixture. PSD data confirmed the phenomenon. TG-DSC data showed a mass decrement in carbonated CFA is due to oxidation of the unburned carbon and in the carbonated mixture is due to CaCO₃ dissociation (carbonation efficiency = 24.99%). To compare heavy metals leaching in fresh CFA and carbonated mixture, Synthetic Precipitation Leaching Procedure (SPLP) was conducted using pH 4.2 mimicking Acid Mine Drainage (AMD). ICP-MS data showed a leaching decrement of heavy metals regulated in the Korean soil standards (except Cu) after carbonation. Finally, efforts are needed to improve carbonation efficiency.