

Selective Precipitation of Copper and Zinc over Iron from Acid Mine Drainage by Neutralization and Sulfidization for Recovery

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In order to selectively precipitate copper (Cu) and zinc (Zn) over iron (Fe) for recovery from an acid mine drainage (AMD) generated from an abandoned copper mine located in east Japan, the feasibility of a treatment process combining lime neutralization with sodium hydrosulfide (NaHS) sulfidization was investigated. First of all, lime neutralization was applied to the AMD to find the precipitation behaviors of Cu, Zn, and Fe. Next, NaHS sulfidization as well as the integration with lime neutralization were conducted to selectively precipitate Cu, Zn, and Fe from the AMD. The results show that by adding more than 20 mg/L NaHS into the AMD at pH 2.8 without pH adjustment, all of the Cu precipitated whereas Fe and Zn did not. Fe could be selectively precipitated over Zn afterwards by lime neutralization at pH 5; however, the addition of an oxidizing agent such as 0.02 vol.% H₂O₂ was needed. On the other hand, after Fe was fully precipitated previously by lime neutralization at pH 5, all of the Cu precipitated when 10-15 mg/L NaHS was added whereas Zn did not. After Cu and Fe were precipitated, Zn could be precipitated by lime neutralization at above pH 9.

Key Words : Acid Mine Drainage (AMD), Copper, Zinc, Neutralization, Sulfidization, Recovery