

## **Selective sequential precipitation of dissolved metals in mine drainage from coal mine**

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In abandoned mines in Korea, a large amount of mine drainage continues to flow out and spread pollution. In purification of the mine drainage a massive amount of sludge is generated as waste. Since this metal sludge contains high Fe, Al and Mn oxides, developing the treatment method to recover homogeneous individual metal with high purity may be beneficial to recycle waste metals as useful resources and reduce the amount of sludge production. In this regard, we established a dissolved metals selective precipitation process to treat Waryong Industry's mine drainage. The process that selectively precipitates metals dissolved in mine drainage is a continuous Fe-buffer-Al process, and each process consists of the neutralization tank, the coagulation tank, and the settling tank. Based on this process, this study verified the operational applicability of the Fe and Al selective precipitation.

Our previous study revealed that high-purity Fe and Al precipitates could be recovered at a flow rate of 1.5 ton/day, while the lower purity was achieved when the rate was increased to about 3 ton/day due to the difficulty in reagent dosage control. In the current study was conducted to increase the capacity of the system to recover Fe and Al as high-purity precipitates at a flow rate of 10 ton/day with the ensured continuous operations by introducing an automatic reagent injection system. The previous study had a difficulty in controlling the pH and operating system continuously due to the manually controlled reagent injection system. To upgrade this and ensure the optimal pH in a stable way, a continuous reagent injection system was installed. The result of operation of the 10 ton/day system confirmed that the scaled-up process could maintain the stable recovery rates and purities of precipitates on site.