A study on coating technology for preventing acid drainage

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Acid rock drainage is generated in mining areas or construction sites when sulfide mineral containing rocks are exposed to oxygen in air or surface water, consequently causing serious damage to its surrounding environment. Particularly, pyrite is most abundant among sulfide minerals, is the main cause of acid rock drainage. As one of the preventing ways of this problem, a pyrite surface coating is expected to control long-term natural pyrite oxidation and acid drainage production.

In this study, coating of sulfide minerals on a mine dump and a roadside rock mass was studied to reduce pollution by acid drainage that occurs during mine development or construction.

A roadside rock mass was treated with hydrogen peroxide and then coated with distilled water, 0.1, 0.5 and 1M (mol) of calcium silicate reagent. The results from a measurement of the water quality drained from the roadside rock mass in the field for 9 times during 5 months indicated that the pH level of 4 was maintained from the non-treatment surface. On the other hand, the pH level was maintained to approximately 7 for five months from the treated roadside rock mass with 1M of liquid coating reagent, thereby verifying treatment effects. The results of the chemical analysis indicates that elution of Ca, which was included in the initial reagent, was minimized before and after Day 50 and that an insignificant amount of ferrous iron (Fe^{2+}) was observed except in the test using calcium silicate reagent of 0.1 M.

The liquid coting reagent was derived through the test on applying calcium silicate, and a process including hydrogen peroxide treatment was established to apply this reagent to roadside rock mass and mine dumps. Further studies on long-term data collection are needed to ensure its long-term performance.