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# Development of assessment method for acid rock drainage generation potential using handheld XRF

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Acid rock drainage (ARD) causing environmental pollution and structure corrosion occurs when the pyrite contained in the rock is exposed to air due to the excavation work in the construction sites. For the first step of solving the problem, the ARD generation potential of rock should be assessed and the acid base accounting (ABA) test and the net acid generation (NAG) test have commonly been utilized for the assessment. The common methods have been known as the time consuming and high cost methods. We developed a new cost and time effective method using a handheld X-ray fluorescence (XRF). Fifty nine rock samples were collected and the ABA test and the NAG test were conducted for the determination of the ARD generation potentials of the collected samples. The chemical compositions were determined with a handheld XRF and a desktop elemental analyzer. The total sulfur (S) content determined with the handheld XRF showed the high correlations with the S content determined with the desktop elemental analyzer (coefficient 0.94), the NAG (coefficient 0.93) and the MPA (coefficient 0.94). The concentrations of Pb and Zn of the rock samples also showed the high correlations with the eluted amount of Pb (coefficient 0.84) and Zn (coefficient 1.00) during the NAG test. The rock samples with S content > 0.1 wt. % had the high ARD generation potentials indicated by NAG pH < 4.5. According to the test results, the total S content of rocks determined with a handheld XRF can be used for the determination of ARD generation potential and the classification of rocks. If the rock contains greater than 0.1 wt. % of total S content, the rock is classified into an ARD producing rock.

Key words: Construction site, Acid rock drainage, Handheld XRF, ABA test, NAG test