Life-water-mineral interactions in AMD -Examination of novel processing method learnt to natural attenuation mechanism-

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Acid mine drainage was formerly generated in mining operation. However all of them have already stopped, the acid drainage still comes out from the gallery at the present. So, many abandoned mine must conduct the treatment and management of the mine drainage. The drainage treatment has two problems, the enormous expenditure and the finite tailings dams for the sludge formed by neutralization. And the continual processing method is desired less the sludge and the cost. We suggest the idea that the natural attenuation mechanism reported by Fukushi et al. (2001) etc. which the poorly crystalline iron mineral schwertmannite generated by iron oxidizing bacteria adsorbs arsenic is applied. In this research, Horobetsu mine as the case study of the neutralizing process about sulfuric acidity mine drainage containing high-concentrated arsenic, and the novel processing method applied the natural attenuation mechanism about the adsorption of arsenic from acid mine drainage by schwertmannite.

The drainage and neutralization sludge in Horobetsu mine is examined. pH, ORP and EC is measured about the drainage, and the water was corrected. The water sample was analyzed by ICP-MS and on chromatograph in laboratory. In addition, the neutralization sludge was collected, and identified minerals by XRD. And, the solution extracted by MgCl2, Morgan, TAO , CDB and 6 M-HCl extraction was analyzed by ICP-MS. Moreover, the synthesis schwertmannite and removal arsenic from the drainage water was examined in laboratory. And, the removal arsenic and iron from the drainage water was examined by the flow-through test using iron oxidization bacteria In addition, the waste concrete powder which is construction scrap as neutralizer was examined using the drainage removed in iron and arsenic by flow-through examination.

The dangerousness that the arsenic with carbonate included in the neutralization sludge is dissolved by rainwater is suggested. Besides, schwertmannite was synthesized from Horobetsu mine drainage by pH adjustment, and the arsenic in the drainage was removed by the adsorption of arsenic by synthesized schwertmannite. Novel processing method is proposed based on these results. The method is shown by the following procedure. Process 1: The drainage is adjusted to pH 3.0-3.5. Process 2: The arsenic in the drainage is removed by the adsorption of arsenic by schwertmannite. Process 3: Schwertmannite is synthesized from the drainage by pH adjustment and iron oxidizing bacteria, and the synthesized schwertmnnite is supplied to process 2. Process 4: the drainage removed arsenic and iron is neutralized by the waste concrete powder.