

Geochemical characteristics of mine drainage water and spring water around the Hata mine, Kyowa township, Akita prefecture

Daizo Ishiyama*¹, Shinya Suzuki*², Hinako Sato*¹
Toshio Mizuta*¹, Koichiro Sera *³

*¹ Faculty of Engineering and Resource Science, Akita University
1-1 Gakuen-Machi, Tegata, Akita 010-8502, Japan

*² Graduate School of Life and Environmental Sciences, University of Tsukuba
1-1-1 Tennohdai, Tsukuba, Ibaraki 305-8577, Japan

*³ Cyclotron Research Center, Iwate Medical University
348-58 Tomegamori Takizawa, Iwate 020-0173, Japan

Abstract

Chemical analyses of drainage water and spring water around the Hata deposit were performed using PIXE analyses and ion chromatography to determine characteristic features of the flow system of ground water in the Hata mining area. The Hata deposit is a Zn-Pb-Cu vein-type deposit in a dacitic lava dome that was emplaced in Miocene time. The deposit is composed of three orebodies. Drainage water flows out from the orebodies submerged through adits. Drainage water and spring water in the mining area are divided into three types: acidic drainage water having high Ca, Mg and SO_4^{2-} concentrations, acidic spring water having relatively high Ca, Mg and SO_4^{2-} concentrations, and neutral spring water containing Na and HCO_3^- components. Acidic drainage water flows out from the orebodies submerged through adits and contains high concentrations of heavy metals such as Fe and Zn. The area in which the acidic spring water exudes rings the orebodies of the Hata deposit and is encompassed by an area in which the neutral spring water exudes. The chemical characteristics of the acidic spring water show characteristics intermediate between those of drainage water and neutral spring water. This fact suggests that the acidic spring water is formed by an interaction such as mixing of the neutral ground water (i.e., neutral spring water) with acidic mine drainage water in the orebodies.