

Halogen concentrations in hydrothermal system, Kusatsu-Shirane Volcano, Gunma prefecture, Japan

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<http://www-cc.gakushuin.ac.jp/%7e19881147/HP-Yasuyuki/Top2.html>

Mt. Kusatsu-Shirane is an active volcano located along the volcanic front on Honshu Island, Japan. Crater lake water in Yugama, located at the top of Kusatsu-Shirane volcano, contains high concentration of chloride. It was observed that variation of chloride concentration in Yugama water reflected the volcanic activity (Ohba et al., 2000). However, there are limited data on other halogens, especially iodine. In this study, we measured halogen concentrations and $^{129}\text{I}/\text{I}$ ratios in Yugama water and hot spring water surrounding Yugama in order to know their levels, their relationships and determine the origin of iodine.

Fifty four water samples, which were collected from Yugama lake during 1988-2006 and stored at Volcanic Fluid Research Center, Tokyo Institute of Technology, were used in this study. Some other samples collected surrounding Yugama were also used. After samples were filtered and diluted with de-ionized water, iodine and bromine concentrations were measured by inductively coupled plasma mass spectrometry (ICP/MS). Chloride concentration was measured by ion chromatography (IC). $^{129}\text{I}/\text{I}$ were analyzed at the accelerator mass spectrometry (AMS).

Concentration ranges of iodine, bromine and chlorine in Yugama water were 0.3-6ppm, 2-9ppm and 1500-3500ppm, respectively (data for chlorine; Ohba et al., 2000). These concentrations are much higher than those in ground water in Kusatsu-Shirane area. It is interesting to note that concentration of iodine is 100 times higher than that of sea water in Yugama water. A pattern of secular variations of iodine and bromine is similar to that of chloride in Yugama, Bandaiko and Manza-Karabuki water. Good correlations between Cl and Br are observed in all samples. However, there is no correlation between Cl and I in samples obtained from Yugama, Kagusa and Jyohu.

From these results, it is considered that Br has an origin from magma same as Cl. From the view of the secular variations of halogen elements, iodine seems to have the same origin as Cl and Br. However, iodine did not correlate with Cl and Br in same series of samples in Yugama and surroundings. This suggests that there is another source of iodine under Mt. Kusatsu-Shirane. We considered Green tuff is one of the possibilities of the source. The layer was formed during the early Miocene period associated with the main stage of the opening Japan sea and it is known that the Green tuff layer contains fluid that has high concentration of iodine. An investigation of estimating iodine age using $^{129}\text{I}/\text{I}$ is on going now.