

Activity report: 4-16 January 2002.
Institute for Study of the Earth's Interior, Okayama University, Misasa,
Japan.

The analyses done under the direction of the professor M. Kusakabe take part in a PhD project whose aim is to understand the interactions between high temperature volcanic gases and volcanic lakes superficial waters. The two major sites studied are the Kaba and the Dempo volcanoes located in Sumatra (Indonesia). Both present at their summit one or several active crater lakes with extremely acidic and mineralized waters. Another feature of those lakes is their high contents in dissolved bisulfate but also the presence of elemental sulfur in their waters that could be explained by the disproportionation reaction of magmatic SO₂.

Additional analyses were also made on Kelut crater lake waters and on Papandayan hot springs and mud pools waters, those two sites being also located in Indonesia (Java).

The work carried out consisted to apply the analytical techniques used for sulfur and oxygen isotopes determination, this in order to be able later to understand the processes that could influence the crater lakes chemistry.

Sulfur isotopic analysis were made on SO₂ gas coming from the thermal decomposition of BaSO₄ precipitates mixed with V₂O₅ and SiO₂, following the method described by Yanigisawa and Sakai (1983)¹. As for the oxygen isotopic analysis they were made on CO₂ resulting from the decomposition of BaSO₄ previously mixed with graphite, following the procedure described by Rafter (1967)².

All the data collected are listed in table 1 (page 2).

¹ Yanagisawa, F. and Sakai, H., 1983. Thermal decomposition of barium sulfate-vanadium pentoxide-silica glass mixtures for preparation of sulfur dioxide in sulfur isotope ratio measurements. *Anal. Chem.*, **55**: 985-987.

² Rafter, T.A., 1967. Oxygen isotopic composition of sulphates-Part 1. A method for the extraction of oxygen and its quantitative conversion to carbon dioxide for isotope ratio measurements. *N.Z.J.Sci.*, **10**: 493-510.

Table 1. Sulfur and oxygen isotopic compositions expressed in per mil.

Sample	Location	Comment	$\delta^{34}\text{S}$	$\delta^{18}\text{O}_{\text{HSO}_4}$
DL01	Dempo	Lake water	18.0	12.7
DL02	Dempo	Lake water	17.5	13.3
DL03	Dempo	Lake water	17.4	13.4
DL04	Dempo	Lake water	17.4	13.0
DL05	Dempo	Lake water	17.6	12.9
K001	Kaba	Hot spring water	17.6	15.6
K002	Kaba	Hot spring water	17.7	16.3
K003	Kaba	Hot spring water	18.5	15.8
K004	Kaba	Mud pool water	16.6	-
6	Dempo	Native sulfur	6.4	-
7	Dempo	Native sulfur	-6.6	-
8	Dempo	Native sulfur	-7.1	-
35	Kelut	Lake water	15.5	6.7
36	Kelut	Lake water	15.9	7.4
37	Kelut	Lake water	14.0	4.8
39	Papandayan	Hot spring water	9.5	0.2
40	Papandayan	Hot spring water	10.3	-
41	Papandayan	Hot spring water	8.7	-
42	Papandayan	Hot spring water	8.6	-
43	Papandayan	Hot spring water	-1.0	-
44	Papandayan	Hot spring water	2.2	-
46	Papandayan	Mud pool water	5.4	-
47	Papandayan	Hot spring water	14.5	5.5
48	Papandayan	Hot spring water	-	4.4
49	Papandayan	Hot spring water	9.5	3.5
50	Papandayan	Hot spring water	4.4	12.2
51	Papandayan	Mud pool water	5.1	14.7
52	Papandayan	Hot spring water	3.3	-