

VOLCANIC GASES OF KAWAH IJEN EAST JAVA-INDONESIA

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Kawah Ijen (8°3.5'S, 114°14.5'E) is a stratovolcano with a hyperacid (pH<0.3) crater lake, which covers an area of 600x1000 m and reaches a maximum depth of about 180 m. There are no records of recent magmatic eruptions but reports of occasional phreatic activity are known since the early nineteenth century. During the last ten years there have been five events of phreatic eruptions or increased activity such as the occurrence of gas bubbles in the lake. A solfatara field on the southeastern border of the lake produces gas that may be representative of subaqueous influxes at the lake bottom. Temperatures of the on-shore gas vents show some fluctuations but are generally around 200°C. From repeated sampling since 1990, the gas composition appears to be dominated by H₂O (51.2-88.4 mole%), followed by CO₂ (9.6-25.5%), SO₂ (0.15-3.9%), H₂S (0.02-4.0%) and HCl (0.19-12.8%). Temporal variations in the relative composition of gas species show a tendency of increasing HCl and SO₂+H₂S over the years, suggesting a shift towards less magmatic and more hydrothermal contributions to the gas discharges. Sampling frequency does not allow assessing obvious correlations between gas chemistry and (phreatic) activity in the lake, although the June-July 1999 event was accompanied by an uncommonly low H₂O content in the gas. Possible implications for changes in the lake-water chemistry will be discussed.

Label	Date	N2	C	CO2	SO2	S dari SO2	S dari H2S	Total S	H2S	HCl	H2O	S/C	SO2/HCl	SO2/H2SS/HCl	CO2/SO2	CO2/HCl
M40	Jul-79	n.r		22.56	0.23				0.91	n.r.	76.4			0.25		98.09
M57	Jul-79	n.r		14.68	0.29				0.73	n.r.	84.3			0.40		50.62
ACTIVITY Mar-91																
VSI	3-May-91	0.04	4.04	14.8	3.73	1.865	0.90	2.77	0.96	0.73	79.74	0.69	5.11	3.89	3.79	20.3
VSI	Jul-91	0.75	4.61	16.89	0.15	0.075	0.58	0.66	0.62	0.76	80.77	0.14	0.20	0.24	0.87	112.60
VSI	Jul-92	0.19	2.61	9.58	0.95	0.475	0.10	0.58	0.11	0.68	88.42	0.22	1.40	8.64	0.85	10.08
ACTIVITY Jul-Aug-93																
VSI	Sep-93	0.0386	3.11	11.4	0.86	0.43	1.08	1.51	1.15	0.19	86.4	0.49	4.53	0.75	7.96	60.0
ACTIVITY Feb-94																
VSI	Jul-95	0.09	2.68	9.81	1.48	0.74	1.01	1.75	1.07	2.48	85.13	0.65	0.60	1.38	0.70	6.63
KIG-2	26-Jul-95	0.0476		9.41	0.29				1.57	0.61	88		0.48	0.18		32.45
VSI	Aug-96	1.02	6.80	24.92	3.92	1.96	0.02	1.98		3.66	66.37	0.29	1.07		0.54	6.36
ACTIVITY Jun-97																
VSI	Sep-97	0.36	3.02	11.07	1.08	0.54	1.71	2.25	1.82	1.4	84.17	0.75	0.77	0.59	1.61	10.25
VSI	Aug-98	0.89	6.95	25.47	2.28	1.14	3.76	4.90	3.99	0.73	66.45	0.70	3.12	0.57	6.71	11.17
VSI	Jun-99	16.09	4.33	15.87	3.79	1.895	0.72	2.61	0.76	4.4	57.27	0.60	0.86	4.99	0.59	4.19
ACTIVITY Jun-Jul-99																
VSI	12-Jul-99	13.78	4.45	16.31	1.83	0.915	2.74	3.65	2.91	12.78	51.16	0.82	0.14	0.63	0.29	8.91
VSI	Oct-99	0.15	2.87	10.51	0.64	0.32	1.62	1.94	1.72	4.56	82.4	0.68	0.14	0.37	0.43	16.42
VSI	Aug-00	0.87	4.32	15.84	3.01	1.505	1.51	3.01	1.6	4.83	73.7	0.70	0.62	1.88	0.62	5.26



