V.—CHEMISTRY.

Art. LXI.—*Note on the Analysis of a Mineral Water from the Otira Gorge.*

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The sample of water referred to in the present note was collected by the writer on the 21st January, 1889, in the Otira Gorge, from a spring which is stated to have been first discovered shortly after the earthquake of the 1st September, 1888. The spring is situated about three-quarters of a mile from the Otira Hotel, up the gorge, just below the road, and flows into the river-bed from the rocks forming the bank. In addition to the one from which the sample was taken, three other smaller springs formerly existed—two warm, and one cold; these, however, were covered up at the time by the shingle of the river-bed. The main spring flowed into a pool about 4ft. in diameter, the sides of which, and the surrounding shingle, were incrusted with a white deposit of sulphur. The smell of sulphuretted hydrogen was perceptible for some distance down the gorge, and it is stated that the same was noticed previous to the earthquake.

The temperature of the water was found to be 87° Fahr., while that of the river flowing by its side was 50° Fahr., and of a stream flowing into the river a little higher up the gorge, 46° Fahr. The temperature of the air at the time (7 a.m.) was 61° Fahr. The temperature of the spring is doubtless lowered by the proximity of the river-water, which flows close to it.

The appearance of the water was of a slightly-dark colour, but clear; the taste unpleasant, but after the removal of the sulphuretted hydrogen the water became palatable. Exposed to the air, a turbidity, due to separated sulphur, was produced; but after a short time this disappeared, and the water again became clear. No change was produced in the water by boiling other than an evolution of a portion of the

sulphuretted hydrogen. The reaction of the water was distinctly alkaline to cochineal solution. Specific gravity at 62° Fahr., 1·00022.

The quantity of dissolved mineral matters present was found to be low—only little more than 12gr. per gallon. The composition of the same is shown by the following analysis:—

	Parts per Million.	Grains per Gallon.
Potassic oxide ..	2·59	0·181
Sodic oxide	63·74	4·462
Calcic oxide	11·48	0·804
Magnesic oxide ..	1·98	0·139
Ferrous oxide.. ..	Trace	Trace
Alumina	3·00	0·210
Sulphuric anhydride ..	34·33	2·403
Phosphoric anhydride..	Trace	Trace
Silicic anhydride ..	47·20	3·304
Carbonic anhydride ..	9·36	0·655
Chlorine	3·50	0·245
Sulphur, as SH_2 ..	2·82	0·197
Totals ..	180·00	12·600

These results may theoretically be arranged as follows:—

	Parts per Million.	Grains per Gallon.
Potassic sulphate ..	4·79	0·335
Sodic sulphate ..	57·03	3·992
Sodic chloride ..	5·74	0·402
Sodic sulphide ..	6·45	0·452
Sodic silicate.. ..	60·89	4·262
Calcic silicate ..	4·86	0·340
Calcic carbonate ..	16·32	1·142
Magnesic carbonate ..	4·15	0·291
Alumina	3·00	0·210
Free silicic anhydride	14·76	1·033
Totals ..	177·99	12·459

The total sulphuretted hydrogen in the water amounted to 11·8 parts per million, equal to 0·826gr. per gallon. Of this, 2·8 parts per million were in a combined form. Ammonia salts were present to the extent of 0·87 part per million, reckoned as ammonia, while albuminoid nitrogen, or that existing in an organized form, amounted to 0·18 part per million. Only a trace of nitrates existed, not sufficient for determination. No iodine or bromine was detected. The quantity of water available for testing for these elements, however, in consequence of an accident to one of the bottles in transit, was not sufficient to prove their absence with absolute certainty. A spectroscopic examination showed the absence of lithium.

From the results obtained this water might be termed siliceous and sulphurous. It is essentially different from the water from the Hanmer Springs, and pertains more to the character of the waters of the Rotorua district, reported on by

Mr. Skey in the "Trans. N.Z. Inst.," vol. x., p. 432. It differs, however, from these waters in having only a portion of its carbonic anhydride replaced by silica, and in containing less dissolved matter. The water doubtless possesses therapeutic properties, and the springs might, if means could be adopted to protect them from shingle and the influx of river-water, prove of value, situated as they are among such sublime scenery.