

The Occurrence of Beryllium in the Hot Springs of Matunoyama.

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Beryllium occurs in a great many minerals, but rarely in mineral waters.⁽¹⁾ Prof. K. Kimura found the occurrence of beryllium in the hot springs of Matunoyama, Niigata Prefecture, and in the present work the author attempted a spectroscopic estimation of the element.

Arc Spectrographic Estimation of Beryllium. Pure beryllium sulphate was dissolved in water. The beryllium content of this solution was determined gravimetrically and water was added to bring the concentration to 0.1 per cent. From this stock solution, solutions containing 0.01, 0.001, 0.0001, 0.00001, 0.000005, 0.0000025 and 0.000001 g. of beryllium per 100 c.c. were prepared. 10 mg. of sodium chloride was added to 1 c.c. of each solution, and evaporated to dryness. Then it was placed on the lower graphite electrode and subjected to arc excitation. The charges actually placed on the lower electrodes contained 1, 0.1, 0.01, 0.001, 0.0001, 0.00005, 0.000025 and 0.00001 mg. of beryllium respectively. The Hilger quartz spectrograph of E2 type was used. The spectral lines observed at different concentrations are given in Table 1. In this table,

Table 1. Spectral Lines at Different Concentrations.

λ (Å)	1 mg	0.1 mg	0.01 mg	0.001 mg	0.0001 mg	0.00005 mg	0.000025 mg	0.00001 mg
2348.6	S	S	S	S	W	W	F	
2350.8	S	W	F					
2494.7	S	S	S	W	F			
2650.8	S	S	S	W	F			
2738.1	F							
2898.2	W							
2986.1	F							
3019.3	F							
3110.8	W	F						
3130.4	S	S	W	W	W	W	F	F
3131.1	S	S	W	W				
3187.3	F							
3321.1	S	S	W	W	F			
3321.4	S	S	W	W	F			

(1) A. Béchamp, *Compt. rend.*, **62** (1866), 1088; Pomier, *J. pharm. chim.* [2], **14** (1928), 199; M. Mazade, *Compt. rend.*, **32** (1851), 685.

s signifies that the line in question is strong, w that it is weak and f that it is faintly visible.

Beryllium Content of the Hot Springs of Matunoyama. 1600 c.c. of water sample was evaporated to complete dryness. The residue was treated with hydrochloric acid and filtered. The residue which mainly consisted of silica showed no beryllium when examined spectroscopically. The chloride solution was evaporated to dryness, heated to 130° in the air bath, and weighed. Finely powdered residue in ten milligram portions was subjected to arc excitation. The beryllium lines 2348.6 (weak) and 3130.4 (faint) were always found. This would seem to indicate that a quantity higher than 0.000025 mg and lower than 0.00005 mg of beryllium was present in the zone of excitation. Expressed in percentages, the beryllium content in the total residue is estimated to be between 0.00025 and 0.0005. Expressed in terms of parts per million of the mineral water it is supposed to be between 0.04 and 0.08.

Summary

A method for the arc spectrographic detection and estimation of beryllium was described.

The beryllium content of the hot springs of Matunoyama was estimated.

In conclusion, the author wishes to express his hearty thanks to Prof. K. Kimura for his kind guidance. The expense for the experiments has been defrayed from a grant given to Prof. Kimura by The Japan Society for the Promotion of Scientific Research, to which the author's thanks are due.

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