Zeitschrift: Schweizerische mineralogische und petrographische Mitteilungen = Bulletin suisse de minéralogie et pétrographie

Band: 43 (1963)

Heft: 1: Festschrift Robert L. Parker : zu seinem 70. Geburtstag : 1. Mai 1963

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DOI: https://doi.org/10.5169/seals-33444

A Note on Parawollastonite from Oldoinyo Lengai, Tanganyika

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In 1960 the first author carried out geological mapping of the active carbonatite volcano Oldoinyo Lengai in the Eastern Rift in northern Tanganyika (DAWSON, 1962). The work was done as a part of the mapping program of the Geological Survey of Tanganyika. During this study a number of loose blocks of wollastonite and wollastonite-ijolite were found embedded in the black nephelinitic agglomerates which, with associated tuffs, form the second main eruptive phase of the volcano. It is worthy of note that wollastonite-bearing rocks have not been found in the yellow ijolitic tuffs and agglomerates that form the first phase of activity. In thin section the following constituents have been identified in the wollastonite-rich rocks: wollastonite, nepheline, apatite, magnetite and a dark-brown glass. It seems probable that the wollastonite-rich rocks are result of calcium metasomatism of earlier ijolitic rocks, belonging to the phase of carbonatite activity which gave rise to the yellow pyroclastics. This view is supported by the fact that a wollastonite-free ijolite can be seen to grade into a wollastonitite-rich ijolite in a hand specimen over a matter of 2—3 cm and that wollastonite often forms overgrowths on the aegirine-augite.

Because wollastonite of such a mode of occurrence seemed worth a closer study, a specimen (numbered BD 90) of wollastonite-ijolite was handed over to the second author. This specimen is an oval-shaped ejected block approximately 12×17 cm in size. The composition of the rock is given in Table 1. The composition of the nepheline contained in the rock was determined by powder pattern with the result 22 mol.%

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$KAlSiO_4$. The wollastonite was separated using Clerici solution and isodynamic separator. The composition of this wollastonite material is also given in Table 1.

Table 1. *Wollastonite-ijolite from Oldoinyo Lengai, Tanganyika.* Specimen BD 90.

	Bulk rock *)	Wollastonite **)		
	%	%	Unit cell content	
SiO_2	44.35	50.78	Si	11.90
TiO_2	0.44	0.07	Al	0.15
Al_2O_3	3.34	0.54	Fe^{3+}	0.02
Fe_2O_3	2.56	0.13	Fe^{2+}	0.14
FeO	1.48	0.72	Mg	0.04
MnO	0.45	0.53	Ti	0.01
MgO	0.41	0.11	Mn	0.11
CaO	37.45	46.62	Ca	11.71
Na_2O	3.10	0.18	Na	0.08
K_2O	1.41	0.04	K	0.01
BaO	—	0.00	Sr	0.01
SrO	—	0.10	O	36.13
P_2O_5	2.46	n. d.		
H_2O^+	n. d.	0.05		
H_2O^-	0.62	0.02		
Loss on ignition above 110° C	2.60	—		
Total	100.67	99.89		

*) Chemical analysis by Mr. A. P. Muley and Mr. G. Luena, both of the Geological Survey of Tanganyika.

**) Chemical analysis by Dr. H. B. Wiik, of the Geological Survey of Finland.

The following optical properties were measured for wollastonite: $\alpha = 1.619$, $\beta = 1.632$, $\gamma = 1.634$; $2V_\alpha = 41°$ for sodium light, inclined dispersion of the optic axial angle with $r > v$; $\beta // b$, $c \wedge \alpha = 32° \pm 2°$ in the acute angle β. Specific gravity $d = 2.922$ which probably is accurate within ± 0.004.

For determining the unit cell, rotation and Weissenberg photographs were taken about all three axes of the same crystal. The following dimensions were obtained: $a_0 = 15.44 \pm 0.05$ Å; $b_0 = 7.32 \pm 0.02$ Å with a very strongly pronounced sub-cell with $b_0/2$; $c_0 = 7.10 \pm 0.02$ Å with a slight indication to a sub-cell of $c_0/2$; $\beta = 95° 40' \pm 20'$; α and $\gamma = 90°$. If only the reflections corresponding to the monoclinic sub-cell (a_0,

$b_0/2$, c_0) are taken into account, the cell will be C-centered. The true monoclinic cell (a_0, b_0, c_0) is primitive with the same systematic extinctions as given by BARNICK (1936). Space group $P2_1/c$. The first-layer Weissenberg photograph about b shows streaks connecting the reflections in the a* direction in a way described by JEFFERY (1953), but less strongly pronounced. In addition, some other cleavage fibres do not show a symmetry plane perpendicular to b in a b-axis oscillation photograph. Accordingly, it is concluded that the wollastonite of Oldoinyo Lengai represents an intergrowth of triclinic wollastonite and monoclinic parawollastonite.

The Commissioner for the Geological Survey of Tanganyika is acknowledged for the use of the rock analysis of Table 1 and Dr. H. B. Wiik for the analysis of wollastonite.

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Manuscript received December 20, 1962.