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Intergrowth of Ba-rich and Ba-poor phases in barium feldspars from Otjosondu, South-West Africa

BARIUM feldspars have been studied earlier by Gay and Roy (1968), Vermaas (1953), and Yosimura (1939). Yosimura studied the optical properties and observed a discontinuity at 40-5% Cn; Vermaas's X-ray powder data appear to support this discontinuity. On the basis of their observations Gay and Roy had considered that a compositional gap between 80% Cn and 65% Cn for natural specimens was fortuitous, although they had predicted that an unmixing solvus should exist at the K-end of the series. However, a direct observation of an occurrence of coexisting Ba-rich and Ba-poor feldspars has not hitherto been made either in single crystals as intergrowths or as separate phases (as contact paragenesis) in thin sections. Such an observation would not only prove the existence of a compositional gap in the subsolidus field of barium feldspars but also throw light on the complex subsolidus relations existing in the plagioclases.

A submicroscopic intergrowth of Ba-poor and Ba-rich phases has now been found in barium feldspars that occur associated with the metamorphosed manganese ores in Otjosondu, South-West Africa (Vermaas, 1953). The crystals have an approximate bulk composition $Or_{27}Cn_{71}Ab_2$. All attempts to distinguish the coexisting phases with microscope or with electron microprobe analyser proved futile. Hence the compositions of the individual phases had to be determined only with the lattice dimensions obtained from the Guinier powder patterns and single crystal photographs (Table I). The lattice constants and the cell volume of the Ba-rich phase indicate that it is almost a pure celsian. If the β angle of the Ba-poor phase is plotted in the fig. 1 of Gay and Roy (1968), one arrives at a composition of $Cn_{46}Or_{54}$ for the same; the data of Gay and Roy as well as those collected by the author recently (to be published) suggest that the β angle is least influenced by the presence of the albite component.

TABLE I. *Lattice constants of Ba-feldspars from South-West Africa*

	a	*b*	*c*	*β*	Vol.	
Ba-poor phase	8·569 Å	13·059 Å	14·428 Å	115·65°	1455·6	
Ba-rich phase	8·645	13·064	14·425	115·09	1475·4	
To enable a comparison to be made, data on one nearly pure and one pure celsian are presented from the literature:						
$Cn_{98.9}$	8·641	13·053	14·411	115·19	1470·9	(Sp. No. 102264, Gay and Roy, 1968)
Cn_{100} (synthetic)	8·640	13·046	14·404	115·11	1470·0	(J. V. Smith, 1974, p. 219)

Precession photographs show that the b^* and c^* axes of both the phases coincide. However, the a^* axes can be clearly distinguished because they differ both in magnitude and directions, the angle between the respective axes being approximately 30′. Moreover (*b*)-type reflections are also observed.

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