

Cordylite-(Ce): A crystal chemical investigation of material from four localities, including type material

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ABSTRACT

Six cordylites from the four known localities [Narsarsssuk (Greenland), Mont St. Hilaire (Canada), Bayan Obo (China), and Kola Peninsula (Russia)] were investigated by electron microprobe and X-ray single-crystal structure determination, and a seventh sample was investigated by X-ray methods only. The material studied included type cordylite. The idealized formula for cordylite is redefined as $(\text{Na}_{1-x}\text{Ca}_x)\text{BaCe}_2(\text{CO}_3)_4\text{F}$, $0 < x < 1$, with Ce for the sum of REE; the SrO content may reach about 5.7%. All of our structure refinements ($P6_3/mmc$; $a \cong 5.10$, $c \cong 23.10$ Å) agree very well among themselves and with the published structures of “baiyuneboite-(Ce)” and unnamed $(\text{Ca}_{0.5}\square_{0.5})\text{BaCe}_2(\text{CO}_3)_4\text{F}$. Cordylite has a sheet structure formed of (001) layers of [Ba] [CO₃] [Ce,CO₃] [Na,F] [Ce,CO₃] [CO₃] [Ba] stacked along [001]. The interatomic distances are as expected, with the exception of unshielded Na-F distances of 2.94 Å; unlike the carbonate groups in basnäsite and synchysite, the carbonate groups in cordylite-(Ce) are parallel (001). Investigation of type cordylite showed that the formula proposed by Flink, i.e., $\text{BaCe}_2(\text{CO}_3)_3\text{F}_2$, is to be modified to that given above, with $x \cong 0$ for Flink’s material. Baiyuneboite-(Ce), a mineral previously approved by the IMA CNMMN but later withdrawn because of potential similarities with cordylite, is confirmed here as being essentially identical to type cordylite.