LESSERITE, A NEW BORATE MINERAL*

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Lesserite is a new monoclinic polymorph of the triclinic mineral inderite, Mg\(_2\)B\(_6\)O\(_{11}\)·15H\(_2\)O. It occurs in the Jenifer mine in the Kramer district, Kern County, California, associated with inderite,\(^1\) borax, ulexite, and realgar in a buried erosional valley that locally cuts the upper portion of the borate beds. Apparently, magnesium-rich seepage through the valley fill has reacted with the sodium borates to form the relatively insoluble magnesium borates. Lesserite occurs associated with inderite, and both minerals have formed at temperatures and pressures not far above ordinary. The mineralogy and geology of the Kramer deposit has been described by Schaller (1929).

Lesserite occurs as prismatic crystals up to 10 cm. in length and 1 cm. in cross-section. The monoclinic crystals show only the forms (110), (120) and (001). Doubly terminated crystals were observed. (110) usually is preponderant, and the prisms then have a nearly square cross-section with (110) \(\wedge\) (110) = 96°44'. X-ray study by the Laue and Weissenberg methods established the diffraction symmetry as 2/m. The crystal class is uniquely established as monoclinic prismatic, 2/m, by the observed space group, \(P2_1/\alpha\).

The cell dimensions are:

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\begin{align*}
  a_0 & = 12.12 \pm .04 \text{ Å} \\
  b_0 & = 13.18 \pm .04 \\
  c_0 & = 6.83 \pm .01
\end{align*}
\]

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\beta = 104°49' \text{ (x-ray)}, \quad 104°32' \text{ (morph.)}
\]

The measured morphological angles are (001) \(\rho = 104°32'\); (110) \(\rho = 90°, \phi = 48°22'\); (120) \(\rho = 90°, \phi = 29°21'\); the corresponding angles calculated from the x-ray data are 104°49', 48°20' and 29°20'. X-ray powder spacing data are given in Table 1.

Lesserite has an indistinct cleavage on (001) and a good cleavage on (110); the (110) cleavage is not as easy or perfect as the (010) cleavage of inderite. The fracture is flat conchoidal to irregular. The mineral is colorless and transparent, with a weak vitreous luster. The hardness is 2\(\frac{1}{2}\), apparently a little less than in inderite, and the specific gravity is 1.785 ± 0.002 (meas.), 1.76 (calc.). Optically positive, with \(n_X = 1.488, n_Y = 1.491, n_Z = 1.505 \) (all ± 0.002); \(2V = 37° ± 2°\) (meas.); \(Z \wedge c = 9°\) in the

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* Contribution from the Department of Mineralogy and Petrography, Harvard University, No. 364.

\(^1\) Inderite as used herein refers to the mineral conditionally described as inderite by Frondel and Morgan, reference below.
obtuse angle. Dispersion not perceptible. A chemical analysis, cited below, is in very close agreement with the formula \( \text{Mg}_2\text{B}_2\text{O}_2\text{H}_{11} \cdot 15\text{H}_2\text{O} \). The formula of inderite is known with equal certainty (Frondel and Morgan (1956)). Lesserite is insoluble in water, but dissolves readily in dilute HCl. Before the blowpipe it fuses to a white enamel. Kurnakovite, \( \text{Mg}_2\text{B}_2\text{O}_2\text{H}_{11} \cdot 13\text{H}_2\text{O} \), is close in composition to lesserite. The properties of this mineral, described by Godlevsky (1940) from Kazakhstan, differ from those of lesserite but are suspiciously close to those of inderite. The name lesserite is after the late Mr. Federico Lesser, one of the founders of the international borate industry.

### References


*Manuscript received May 19, 1956*