A CHECK ON UNIT CELL CONSTANTS DERIVED FROM 1-LAYER-LINE WEISSENBERG PICTURES


Buerger (Am. Mineral., 22, 416–435, 1937) has summarized the methods of obtaining all lattice constants from one crystal setting. A check on the constants which are derived from 1-layer-line Weissenberg pictures is here proposed, since these constants cannot be obtained so accurately, as a rule. The volume of the unit cell of a triclinic mineral may be computed from constants derived from rotation and 0-layer-line pictures, alone. The result is more accurate than that obtained when constants derived from the 1-layer-line picture are also used. Consequently, any considerable variation in the volumes obtained in these two ways indicates an error in the determination of the 1-layer-line constants. For example:

Rotation and 0-layer-line Weissenberg pictures about c[001] give the values for \( a^* \), \( b^* \), \( \gamma^* \) and \( c_0 \), all of which may be accurately derived. Now:

\[
\begin{align*}
  a_0 &= \frac{\lambda}{a^*} \frac{1}{\sin \beta \sin \gamma^*} = \frac{d_{(100)}}{\sin \beta \sin \gamma^*}, \\
  b_0 &= \frac{\lambda}{b^*} \frac{1}{\sin \alpha \sin \gamma^*} = \frac{d_{(010)}}{\sin \alpha \sin \gamma^*},
\end{align*}
\]

The volume is:

\[
V_0 = a_0 b_0 c_0 \sin \alpha \sin \beta \sin \gamma^* = \frac{\lambda}{a^* \sin \beta \sin \gamma^*} \frac{\lambda}{b^* \sin \alpha \sin \gamma^*} \frac{c_0 \sin \alpha \sin \beta \sin \gamma^*}{\lambda^2 c_0} = \frac{d_{(100)} \cdot d_{(010)}}{a^* b^* \sin \gamma^*} = \frac{d_{(010)}}{c_0}.\]