

7.4: Zone axis

A zone axis is a lattice row parallel to the intersection of two (or more) families of lattice planes. It is denoted by $[u \ v \ w]$. A zone axis $[u \ v \ w]$ is parallel to a family of lattice planes of Miller indices (hkl) if:

$$uh + vk + wl = 0$$


This is the so-called Weiss law.

The indices of the zone axis defined by two lattice planes (h_1, k_1, l_1) , (h_2, k_2, l_2) are given by:

$$\frac{u}{\begin{vmatrix} k_1 & l_1 \\ k_2 & l_2 \end{vmatrix}} = \frac{v}{\begin{vmatrix} l_1 & h_1 \\ l_2 & h_2 \end{vmatrix}} = \frac{w}{\begin{vmatrix} h_1 & k_1 \\ h_2 & k_2 \end{vmatrix}}$$

Conversely, any crystal face can be determined if one knows two zone axes parallel to it. It is the zone law, or *Zonenverbandgesetz*.

Three lattice planes have a common zone axis (*are in zone*) if their Miller indices (h_1, k_1, l_1) , (h_2, k_2, l_2) , (h_3, k_3, l_3) satisfy the relation:

 `\begin{vmatrix} h_1 & k_1 & l_1 \\ h_2 & k_2 & l_2 \\ h_3 & k_3 & l_3 \end{vmatrix} = 0`

$$\begin{vmatrix} h_1 & k_1 & l_1 \\ h_2 & k_2 & l_2 \\ h_3 & k_3 & l_3 \end{vmatrix} = 0$$

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