7.4: Zone axis

A zone axis is a lattice row parallel to the intersection of two (or more) families of lattices 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

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