

1.3: Affine Isomorphism

Each symmetry operation of crystallographic group in E^3 may be represented by a 3×3 matrix \mathbf{W} (the *linear part*) and a vector \mathbf{w} . Two crystallographic groups $G_1 = \{(\mathbf{W}_{1i}, \mathbf{w}_{1i})\}$ and $G_2 = \{(\mathbf{W}_{2i}, \mathbf{w}_{2i})\}$ are called **affine isomorphic** if there exists a non-singular 3×3 matrix \mathbf{A} and a vector \mathbf{a} such that:

$$G_2 = \{(\mathbf{A}, \mathbf{a})(\mathbf{W}_{1i}, \mathbf{w}_{1i})(\mathbf{A}, \mathbf{a})^{-1}\}$$

Two crystallographic groups are affine isomorphic if and only if their arrangement of symmetry elements may be mapped onto each other by an **affine mapping** of E^3 . Two affine isomorphic groups are always isomorphic.

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