The Fascination of Crystals and Symmetry

Unit 1.9

by Frank Hoffmann & Michael Sartor
crystals have a

*crystal structure*

\[\text{crystal structure} = \text{lattice} + \text{motif}\]
Lattice

- Lattice = infinite arrangement of points in space (3D) / in the plane (2D) / on a line (1D), in which all points have the same surroundings
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Lattice – Surroundings

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Lattice Points

- the lattice points are the connection points between the unit cells
Crystal Structure = Lattice + Base/Motif

- every corner of all unit cells builds a lattice point
- a lattice is characterized by its lattice vectors (translation vectors) = they span the unit cell
- the lattice points can be transferred into each other by these vectors
Crystal Structure = Lattice + Base/Motif

- the motif consists of the arrangement of the building blocks (atoms, molecules) of a unit cell
- the motif is *represented* by a lattice point
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→ All building blocks of a crystal structure are subject to the same translation principle!
→ All atoms of a crystal build *congruent* crystal lattices!