
Let $G$ be a space group and $x_0 \in \mathbb{R}^3$ an arbitrary point. For example, $x_0$ might be the position of an atom of a crystal with symmetry group $G$. The set of points $Gx_0 = \{g(x_0); g \in G\}$ obtained by applying the symmetries of $G$ to $x_0$ has been given various names: 'point configuration', 'crystallographic orbit' and even 'lattice complex' although $Gx_0$ is not necessarily a lattice. In more recent work, most significantly the series of papers by W. Fischer & E. Koch, the name 'lattice complex' is used instead for a class of sets $Gx_0$ arising from a natural equivalence relation that stems from the classification of space groups into 219 (or 230) space-group types. Each point of $Gx_0$ corresponds to a coset of the subgroup $S(x_0)$ of $G$ called the site-symmetry group of $x_0$; this is just the set of all symmetries in $G$ that keep the point $x_0$ fixed.

Now forget the original space group $G$ and consider the set $Gx_0$ in its own right. Its symmetries form a space group $E$ and again there is a subgroup $S_E(x_0)$ of those symmetries that do not move the point $x_0$. In fact, $G$ is a subgroup of $E$ and its index in $E$ coincides with the index, which is necessarily finite, of the subgroup $S_E(x_0)$ in $S_E(x_0)$. Even the lattices of the two space groups need not coincide: the lattice of $E$ is a 'superlattice' of the lattice of $G$ (i.e. it contains additional points in general).

Previous work concentrated mainly on the case where $E$ coincides with $G$ and on choosing a single representative $Gx_0$ for all points $x_0$ sharing the same Wyckoff position [i.e. with conjugate subgroups $S_E(x_0)$]. It is this work that is reflected in International Tables for Crystallography published in 1983. The present volume is intended as an addition to Vol. A of International Tables for Crystallography. It gives a complete listing, for each of the 230 space-group types and for each possible position of $x_0$, of the corresponding groups $E$ and $S_E(x_0)$. Conversely they can be used to search from what possible space groups $G$ an observed symmetry group $E$ might have arisen. There is also a summary table of the different superlattices that can arise in each crystal system. Applications are foreseen to extinction rules, phase transitions and structure determination.

There are brief explanations of the mathematics lying behind the tables, and an even briefer historical note, which cannot do justice to the rather complicated development of these topics.

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