

## 1.1. Printed symbols for crystallographic items

BY TH. HAHN

### 1.1.1. Vectors, coefficients and coordinates

Printed symbol	Explanation
<b>a, b, c</b> ; or <b>a<sub>i</sub></b> <i>a, b, c</i>	Basis vectors of the direct lattice Lengths of basis vectors, lengths of cell edges
$\alpha, \beta, \gamma$	Interaxial (lattice) angles <b>b</b> $\wedge$ <b>c</b> , <b>c</b> $\wedge$ <b>a</b> , <b>a</b> $\wedge$ <b>b</b>
<i>V</i>	Cell volume of the direct lattice
<b>G</b>	Matrix of the geometrical coefficients (metric tensor) of the direct lattice
<i>g<sub>ij</sub></i>	Element of metric matrix (tensor) <b>G</b>
<b>r</b> ; or <b>x</b>	Position vector (of a point or an atom)
<i>r</i>	Length of the position vector <b>r</b>
<b>xa, yb, zc</b> <i>x, y, z</i> ; or <i>x<sub>i</sub></i>	Components of the position vector <b>r</b> Coordinates of a point (location of an atom) expressed in units of <i>a, b, c</i> ; coordinates of end point of position vector <b>r</b> ; coefficients of position vector <b>r</b>
$\mathbf{x} = \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$	Column of point coordinates or vector coefficients
<b>t</b>	Translation vector
<i>t</i>	Length of the translation vector <b>t</b>
<i>t<sub>1</sub>, t<sub>2</sub>, t<sub>3</sub></i> ; or <i>t<sub>i</sub></i>	Coefficients of translation vector <b>t</b>
$\mathbf{t} = \begin{pmatrix} t_1 \\ t_2 \\ t_3 \end{pmatrix}$	Column of coefficients of translation vector <b>t</b>
<b>u</b>	Vector with integral coefficients
<i>u, v, w</i> ; or <i>u<sub>i</sub></i>	Integers, coordinates of a (primitive) lattice point; coefficients of vector <b>u</b>
$\mathbf{u} = \begin{pmatrix} u \\ v \\ w \end{pmatrix} = \begin{pmatrix} u_1 \\ u_2 \\ u_3 \end{pmatrix}$	Column of integral point coordinates or vector coefficients
<b>o</b>	Zero vector
<i>o</i>	Column of zero coefficients
<b>a', b', c'</b> ; or <b>a'<sub>i</sub></b>	New basis vectors after a transformation of the coordinate system (basis transformation)
<b>r'</b> ; or <b>x', y', z'</b> ; or <i>x'<sub>i</sub></i>	Position vector and point coordinates after a transformation of the coordinate system (basis transformation)
<b>ř</b> ; or <b>ř</b> ; <b>ř</b> , <b>ř</b> , <b>ř</b> ; or <i>ř<sub>i</sub></i>	New position vector and point coordinates after a symmetry operation (motion)

### 1.1.2. Directions and planes

Printed symbol	Explanation
<i>[uvw]</i>	Indices of a lattice direction (zone axis)
<i>⟨uvw⟩</i>	Indices of a set of all symmetrically equivalent lattice directions
<i>(hkl)</i>	Indices of a crystal face, or of a single net plane (Miller indices)
<i>(hkil)</i>	Indices of a crystal face, or of a single net plane, for the hexagonal axes <b>a<sub>1</sub>, a<sub>2</sub>, a<sub>3</sub>, c</b> (Bravais–Miller indices)
<i>{hkl}</i>	Indices of a set of all symmetrically equivalent crystal faces ('crystal form'), or net planes
<i>{hkil}</i>	Indices of a set of all symmetrically equivalent crystal faces ('crystal form'), or net planes, for the hexagonal axes <b>a<sub>1</sub>, a<sub>2</sub>, a<sub>3</sub>, c</b>
<i>hkl</i>	Indices of the Bragg reflection (Laue indices) from the set of parallel equidistant net planes ( <i>hkl</i> )
<i>d<sub>hkl</sub></i>	Interplanar distance, or spacing, of neighbouring net planes ( <i>hkl</i> )

### 1.1.3. Reciprocal space

Printed symbol	Explanation
<b>a*, b*, c*</b> ; or <b>a'<sub>i</sub>*</b> <i>a*, b*, c*</i>	Basis vectors of the reciprocal lattice Lengths of basis vectors of the reciprocal lattice
$\alpha^*, \beta^*, \gamma^*$	Interaxial (lattice) angles of the reciprocal lattice <b>b*</b> $\wedge$ <b>c*</b> , <b>c*</b> $\wedge$ <b>a*</b> , <b>a*</b> $\wedge$ <b>b*</b>
<b>r*</b> ; or <b>h</b>	Reciprocal-lattice vector
<i>h, k, l</i> ; or <i>h<sub>i</sub></i>	Coordinates of a reciprocal-lattice point, expressed in units of <i>a*, b*, c*</i> , coefficients of the reciprocal-lattice vector <b>r*</b>
<i>V*</i>	Cell volume of the reciprocal lattice
<b>G*</b>	Matrix of the geometrical coefficients (metric tensor) of the reciprocal lattice

### 1.1.4. Functions

Printed symbol	Explanation
$\rho(xyz)$	Electron density at the point <i>x, y, z</i>
<i>P(xyz)</i>	Patterson function at the point <i>x, y, z</i>
<i>F(hkl)</i> ; or <i>F</i>	Structure factor (of the unit cell), corresponding to the Bragg reflection <i>hkl</i>
$ F(hkl) $ ; or $ F $	Modulus of the structure factor <i>F(hkl)</i>
$\alpha(hkl)$ ; or $\alpha$	Phase angle of the structure factor <i>F(hkl)</i>