Table 3.1.3.1
The parameters $D = \mathbf{b} \cdot \mathbf{c}$, $E = \mathbf{a} \cdot \mathbf{c}$ and $F = \mathbf{a} \cdot \mathbf{b}$ of the 44 lattice characters ($A = \mathbf{a} \cdot \mathbf{a}$, $B = \mathbf{b} \cdot \mathbf{b}$, $C = \mathbf{c} \cdot \mathbf{c}$)

The character of a lattice given by its reduced form (3.1.3.1) is the first one that agrees when the 44 entries are compared with that reduced form in the sequence given below (suggested by Gruber). Such a logical order is not always obeyed by the widely used character numbers (first column), which therefore show some reversals, *e.g.* 4 and 5.

No.	Type	D	E	F	Lattice symmetry	Bravais type of lattice†	Transformation to a conventional basis (*cf.* footnote ‡ to Table 3.1.3.2)
$A = B = C$							
1	I	$A/2$	$A/2$	$A/2$	Cubic	*cF*	$1\bar{1}1/11\bar{1}/\bar{1}11$
2	I	D	D	D	Rhombohedral	*hR*	$1\bar{1}0/\bar{1}01/\bar{1}\bar{1}\bar{1}$
3	II	0	0	0	Cubic	*cP*	100/010/001
5	II	$-A/3$	$-A/3$	$-A/3$	Cubic	*cI*	101/110/011
4	II	D	D	D	Rhombohedral	*hR*	$1\bar{1}0/\bar{1}01/\bar{1}\bar{1}\bar{1}$
6	II	D‡	D	F	Tetragonal	*tI*	011/101/110
7	II	D‡	E	E	Tetragonal	*tI*	101/110/011
8	II	D‡	E	F	Orthorhombic	*oI*	$\bar{1}\bar{1}0/\bar{1}0\bar{1}/0\bar{1}\bar{1}$
$A = B$, no conditions on C							
9	I	$A/2$	$A/2$	$A/2$	Rhombohedral	*hR*	$100/\bar{1}10/\bar{1}\bar{1}3$
10	I	D	D	F	Monoclinic	*mC*	$110/1\bar{1}0/00\bar{1}$
11	II	0	0	0	Tetragonal	*tP*	100/010/001
12	II	0	0	$-A/2$	Hexagonal	*hP*	100/010/001
13	II	0	0	F	Orthorhombic	*oC*	$110/\bar{1}10/001$
15	II	$-A/2$	$-A/2$	0	Tetragonal	*tI*	100/010/112
16	II	D‡	D	F	Orthorhombic	*oF*	$\bar{1}\bar{1}0/1\bar{1}0/112$
14	II	D	D	F	Monoclinic	*mC*	$110/\bar{1}10/00\bar{1}$
17	II	D‡	E	F	Monoclinic	*mC*	$1\bar{1}0/110/\bar{1}0\bar{1}$
$B = C$, no conditions on A							
18	I	$A/4$	$A/2$	$A/2$	Tetragonal	*tI*	$0\bar{1}1/1\bar{1}\bar{1}/100$
19	I	D	$A/2$	$A/2$	Orthorhombic	*oI*	$\bar{1}00/0\bar{1}1/\bar{1}11$
20	I	D	E	E	Monoclinic	*mC*	$011/01\bar{1}/\bar{1}00$
21	II	0	0	0	Tetragonal	*tP*	010/001/100
22	II	$-B/2$	0	0	Hexagonal	*hP*	010/001/100
23	II	D	0	0	Orthorhombic	*oC*	$011/0\bar{1}1/100$
24	II	D‡	$-A/3$	$-A/3$	Rhombohedral	*hR*	$121/0\bar{1}1/100$
25	II	D	E	E	Monoclinic	*mC*	$011/0\bar{1}1/100$
No conditions on A, B, C							
26	I	$A/4$	$A/2$	$A/2$	Orthorhombic	*oF*	$100/\bar{1}20/\bar{1}02$
27	I	D	$A/2$	$A/2$	Monoclinic	*mC*	$\bar{1}20/\bar{1}00/0\bar{1}1$
28	I	D	$A/2$	$2D$	Monoclinic	*mC*	$\bar{1}00/\bar{1}02/010$
29	I	D	$2D$	$A/2$	Monoclinic	*mC*	$100/1\bar{2}0/00\bar{1}$
30	I	$B/2$	E	$2E$	Monoclinic	*mC*	$010/01\bar{2}/\bar{1}00$
31	I	D	E	F	Triclinic	*aP*	100/010/001
32	II	0	0	0	Orthorhombic	*oP*	100/010/001
40	II	$-B/2$	0	0	Orthorhombic	*oC*	$0\bar{1}0/012/\bar{1}00$
35	II	D	0	0	Monoclinic	*mP*	$0\bar{1}0/\bar{1}00/00\bar{1}$
36	II	0	$-A/2$	0	Orthorhombic	*oC*	$100/\bar{1}0\bar{2}/010$
33	II	0	E	0	Monoclinic	*mP*	100/010/001
38	II	0	0	$-A/2$	Orthorhombic	*oC*	$\bar{1}00/120/00\bar{1}$
34	II	0	0	F	Monoclinic	*mP*	$\bar{1}00/00\bar{1}/0\bar{1}0$
42	II	$-B/2$	$-A/2$	0	Orthorhombic	*oI*	$\bar{1}00/0\bar{1}0/112$
41	II	$-B/2$	E	0	Monoclinic	*mC*	$0\bar{1}\bar{2}/0\bar{1}0/\bar{1}00$
37	II	D	$-A/2$	0	Monoclinic	*mC*	102/100/010
39	II	D	0	$-A/2$	Monoclinic	*mC*	$\bar{1}\bar{2}0/\bar{1}00/00\bar{1}$
43	II	D§	E	F	Monoclinic	*mI*	$\bar{1}00/\bar{1}\bar{1}\bar{2}/0\bar{1}0$
44	II	D	E	F	Triclinic	*aP*	100/010/001

† The symbols for Bravais types of lattices were adopted by the International Union of Crystallography in 1985; *cf.* de Wolff *et al.* (1985). The capital letter of the symbols in this column indicates the centring type of the cell as obtained by the transformation in the last column. For this reason, the standard symbols *mS* and *oS* are not used here. ‡ $2|D + E + F| = A + B$. § $2|D + E + F| = A + B$ plus $|2D + F| = B$.

with Fig. 3.1.3.3. This compressed type of centred orthogonal **a**, **b** net is limited by the case of a hexagonal net (where it merges with the elongated type, Fig. 3.1.3.4) and by the centred quadratic net (where it merges with the primitive orthogonal net, Fig. 3.1.3.2). In the limit of the hexagonal net, the triangle *Ohh* in Figs. 3.1.3.4 and 3.1.3.5 is all that remains, it is of type I except for the point *O*. For the quadratic net, only the type-II region in Fig. 3.1.3.5, then a triangle with all edges inclusive, is left. It corresponds to the triangle *Oqq* in Fig. 3.1.3.2.

3.1.3.5. Lattice characters

Apart from being unique, the reduced cell has the further advantage of allowing a much finer differentiation between types of lattices than is given by the Bravais types. For two-dimensional lattices, this is apparent already in the last section where the centred orthogonal class is subdivided into nets with elongated character and those with compressed character, depending on whether the shortest net vector is, or is not, a symmetry direction.

references