Supplement 2: Translationengleiche character tables

This supplement provides the character tables for the factor groups G/T where G is a layer group and T is its normal subgroup of all pure translations. These can be used to understand transitions which retain the lattice of translations (translationengleiche transitions). Each of these character tables is identical to that of the corresponding isogonal point group. The header of each table gives the Seitz symbol of a point group element for each conjugacy class, although it should noted that the corresponding coset representative may also involve a translation component. The second row of each table gives the number of elements in the conjugacy class. In the remaining rows are the characters of the irreps, where each irrep is given a label on the left in Mulliken notation. The far right column gives the axial isotropy subgroups associated with each irrep.

Table 1: Character table of $p1$ (No. 1)

	1	axial subgroups
size	1	
A	1	$p1$ (1)

Table 2: Character table of $p\bar{1}$ (No. 2)

	1	$\bar{1}$	axial subgroups
size	1	1	
A_g	1	1	$p\bar{1}$ (2)
A_u	1	-1	$p1$ (1)

Table 3: Character table of $p112$ (No. 3)

	1	2_z	axial subgroups
size	1	1	
A	1	1	$p112$ (3)
B	1	-1	$p1$ (1)

Table 4: Character table of $p11m$ (No. 4)

	1	m_z	axial subgroups
size	1	1	
A'	1	1	$p11m$ (4)
A''	1	-1	$p1$ (1)

Table 5: Character table of $p11a$ (No. 5)

	1	m_z	axial subgroups
size	1	1	
A'	1	1	$p11a$ (5)
A''	1	-1	$p1$ (1)

Table 6: Character table of $p112/m$ (No. 6)

	1	2_z	$\overline{1}$	m_z	axial subgroups
size	1	1	1	1	
A_g	1	1	1	1	$p112/m$ (6)
B_g	1	-1	1	-1	$p\overline{1}$ (2)
A_u	1	1	-1	-1	$p112$ (3)
B_u	1	-1	-1	1	$p11m$ (4)

Table 7: Character table of $p112/a$ (No. 7)

	1	2_z	$\overline{1}$	m_z	axial subgroups
size	1	1	1	1	
A_g	1	1	1	1	$p112/a$ (7)
B_g	1	-1	1	-1	$p\overline{1}$ (2)
A_u	1	1	-1	-1	$p112$ (3)
B_u	1	-1	-1	1	$p11a$ (5)

Table 8: Character table of $p211$ (No. 8)

	1	2_x	axial subgroups
size	1	1	
A_1	1	1	$p211$ (8)
A_2	1	-1	$p1$ (1)

Table 9: Character table of $p2_111$ (No. 9)

	1	2_x	axial subgroups
size	1	1	
A_1	1	1	$p2_111$ (9)
A_2	1	-1	$p1$ (1)

Table 10: Character table of $c211$ (No. 10)

	1	2_x	axial subgroups
size	1	1	
A_1	1	1	$c211$ (10)
A_2	1	-1	$p1$ (1)

Table 11: Character table of $pm11$ (No. 11)

	1	m_x	axial subgroups
size	1	1	
A_1	1	1	$pm11$ (11)
A_2	1	-1	$p1$ (1)

Table 12: Character table of $pb11$ (No. 12)

	1	m_x	axial subgroups
size	1	1	
A_1	1	1	$pb11$ (12)
A_2	1	-1	$p1$ (1)

Table 13: Character table of $cm11$ (No. 13)

	1	m_x	axial subgroups
size	1	1	
A_1	1	1	$cm11$ (13)
A_2	1	-1	$p1$ (1)

Table 14: Character table of $p2/m11$ (No. 14)

	1	2_x	$\overline{1}$	m_x	axial subgroups
size	1	1	1	1	
A_{1g}	1	1	1	1	$p2/m11$ (14)
A_{2g}	1	-1	1	-1	$p\overline{1}$ (2)
A_{1u}	1	1	-1	-1	$p211$ (8)
A_{2u}	1	-1	-1	1	$pm11$ (11)

Table 15: Character table of $p2_1/m11$ (No. 15)

	1	2_x	$\overline{1}$	m_x	axial subgroups
size	1	1	1	1	
A_{1g}	1	1	1	1	$p2_1/m11$ (15)
A_{2g}	1	-1	1	-1	$p\overline{1}$ (2)
A_{1u}	1	1	-1	-1	$p2_111$ (9)
A_{2u}	1	-1	-1	1	$pm11$ (11)

Table 16: Character table of $p2/b11$ (No. 16)

	1	2_x	$\overline{1}$	m_x	axial subgroups
size	1	1	1	1	
A_{1g}	1	1	1	1	$p2/b11$ (16)
A_{2g}	1	-1	1	-1	$p\overline{1}$ (2)
A_{1u}	1	1	-1	-1	$p211$ (8)
A_{2u}	1	-1	-1	1	$pb11$ (12)

Table 17: Character table of $p2_1/b11$ (No. 17)

	1	2_x	$\overline{1}$	m_x	axial subgroups
size	1	1	1	1	
A_{1g}	1	1	1	1	$p2_1/b11$ (17)
A_{2g}	1	−1	1	−1	$p\overline{1}$ (2)
A_{1u}	1	1	−1	−1	$p2_111$ (9)
A_{2u}	1	−1	−1	1	$pb11$ (12)

Table 18: Character table of $c2/m11$ (No. 18)

	1	2_x	$\overline{1}$	m_x	axial subgroups
size	1	1	1	1	
A_{1g}	1	1	1	1	$c2/m11$ (18)
A_{2g}	1	−1	1	−1	$p\overline{1}$ (2)
A_{1u}	1	1	−1	−1	$c211$ (10)
A_{2u}	1	−1	−1	1	$cm11$ (13)

Table 19: Character table of $p222$ (No. 19)

	1	2_z	2_y	2_x	axial subgroups
size	1	1	1	1	
A	1	1	1	1	$p222$ (19)
B_1	1	1	−1	−1	$p112$ (3)
B_2	1	−1	1	−1	$p211$ (8)
B_3	1	−1	−1	1	$p211$ (8)

Table 20: Character table of $p2_122$ (No. 20)

	1	2_x	2_y	2_z	axial subgroups
size	1	1	1	1	
A	1	1	1	1	$p2_122$ (20)
B_1	1	−1	−1	1	$p112$ (3)
B_2	1	−1	1	−1	$p211$ (8)
B_3	1	1	−1	−1	$p2_111$ (9)

Table 21: Character table of $p2_12_12$ (No. 21)

	1	2_z	2_y	2_x	axial subgroups
size	1	1	1	1	
A	1	1	1	1	$p2_12_12$ (21)
B_1	1	1	−1	−1	$p112$ (3)
B_2	1	−1	1	−1	$p2_111$ (9)
B_3	1	−1	−1	1	$p2_111$ (9)

Table 22: Character table of $c222$ (No. 22)

	1	2_z	2_y	2_x	axial subgroups
size	1	1	1	1	
A	1	1	1	1	$c222$ (22)
B_1	1	1	−1	−1	$p112$ (3)
B_2	1	−1	1	−1	$c211$ (10)
B_3	1	−1	−1	1	$c211$ (10)

Table 23: Character table of $pmm2$ (No. 23)

	1	2_z	m_y	m_x	axial subgroups
size	1	1	1	1	
A_1	1	1	1	1	$pmm2$ (23)
A_2	1	1	−1	−1	$p112$ (3)
B_1	1	−1	1	−1	$pm11$ (11)
B_2	1	−1	−1	1	$pm11$ (11)

Table 24: Character table of $pma2$ (No. 24)

	1	2_z	m_y	m_x	axial subgroups
size	1	1	1	1	
A_1	1	1	1	1	$pma2$ (24)
A_2	1	1	−1	−1	$p112$ (3)
B_1	1	−1	1	−1	$pb11$ (12)
B_2	1	−1	−1	1	$pm11$ (11)

Table 25: Character table of $pba2$ (No. 25)

	1	2_z	m_y	m_x	axial subgroups
size	1	1	1	1	
A_1	1	1	1	1	$pba2$ (25)
A_2	1	1	−1	−1	$p112$ (3)
B_1	1	−1	1	−1	$pb11$ (12)
B_2	1	−1	−1	1	$pb11$ (12)

Table 26: Character table of $cmm2$ (No. 26)

	1	2_z	m_y	m_x	axial subgroups
size	1	1	1	1	
A_1	1	1	1	1	$cmm2$ (26)
A_2	1	1	−1	−1	$p112$ (3)
B_1	1	−1	1	−1	$cm11$ (13)
B_2	1	−1	−1	1	$cm11$ (13)

Table 27: Character table of $pm2m$ (No. 27)

	1	2_y	m_x	m_z	axial subgroups
size	1	1	1	1	
A_1'	1	1	1	1	$pm2m$ (27)
A_1''	1	1	−1	−1	$p211$ (8)
A_2'	1	−1	−1	1	$p11m$ (4)
A_2''	1	−1	1	−1	$pm11$ (11)

Table 28: Character table of $pm2_1b$ (No. 28)

	1	2_y	m_z	m_x	axial subgroups
size	1	1	1	1	
A_1'	1	1	1	1	$pm2_1b$ (28)
A_1''	1	1	−1	−1	$p2_111$ (9)
A_2'	1	−1	1	−1	$p11a$ (5)
A_2''	1	−1	−1	1	$pm11$ (11)

Table 29: Character table of $pm2_1m$ (No. 29)

	1	2_y	m_x	m_z	axial subgroups
size	1	1	1	1	
A_1'	1	1	1	1	$pm2_1m$ (29)
A_1''	1	1	−1	−1	$p2_111$ (9)
A_2'	1	−1	−1	1	$p11m$ (4)
A_2''	1	−1	1	−1	$pb11$ (12)

Table 30: Character table of $pb2b$ (No. 30)

	1	2_y	m_z	m_x	axial subgroups
size	1	1	1	1	
A_1'	1	1	1	1	$pb2b$ (30)
A_1''	1	1	−1	−1	$p211$ (8)
A_2'	1	−1	1	−1	$p11a$ (5)
A_2''	1	−1	−1	1	$pb11$ (12)

Table 31: Character table of $pm2a$ (No. 31)

	1	2_y	m_z	m_x	axial subgroups
size	1	1	1	1	
A_1'	1	1	1	1	$pm2a$ (31)
A_1''	1	1	−1	−1	$p211$ (8)
A_2'	1	−1	1	−1	$p11a$ (5)
A_2''	1	−1	−1	1	$pm11$ (11)

Table 32: Character table of $pm2_1n$ (No. 32)

	1	2_y	m_z	m_x	axial subgroups
size	1	1	1	1	
A_1'	1	1	1	1	$pm2_1n$ (32)
A_1''	1	1	−1	−1	$p2_111$ (9)
A_2'	1	−1	1	−1	$p11a$ (5)
A_2''	1	−1	−1	1	$pm11$ (11)

Table 33: Character table of $pb2_1a$ (No. 33)

	1	2_y	m_z	m_x	axial subgroups
size	1	1	1	1	
A_1'	1	1	1	1	$pb2_1a$ (33)
A_1''	1	1	−1	−1	$p2_111$ (9)
A_2'	1	−1	1	−1	$p11a$ (5)
A_2''	1	−1	−1	1	$pb11$ (12)

Table 34: Character table of $pb2n$ (No. 34)

	1	2_y	m_x	m_z	axial subgroups
size	1	1	1	1	
A_1'	1	1	1	1	$pb2n$ (34)
A_1''	1	1	−1	−1	$p211$ (8)
A_2'	1	−1	−1	1	$p11a$ (5)
A_2''	1	−1	1	−1	$pb11$ (12)

Table 35: Character table of $cm2m$ (No. 35)

	1	2_y	m_x	m_z	axial subgroups
size	1	1	1	1	
A_1'	1	1	1	1	$cm2m$ (35)
A_1''	1	1	−1	−1	$c211$ (10)
A_2'	1	−1	−1	1	$p11m$ (4)
A_2''	1	−1	1	−1	$cm11$ (13)

Table 36: Character table of $cm2e$ (No. 36)

	1	2_y	m_x	m_z	axial subgroups
size	1	1	1	1	
A_1'	1	1	1	1	$cm2e$ (36)
A_1''	1	1	−1	−1	$c211$ (10)
A_2'	1	−1	−1	1	$p11a$ (5)
A_2''	1	−1	1	−1	$cm11$ (13)

Table 37: Character table of *pmmm* (No. 37)

	1	2_z	2_y	2_x	$\overline{1}$	m_z	m_y	m_x	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	*pmmm* (37)
B_{1g}	1	1	−1	−1	1	1	−1	−1	$p112/m$ (6)
B_{2g}	1	−1	1	−1	1	−1	1	−1	$p2/m11$ (14)
B_{3g}	1	−1	−1	1	1	−1	−1	1	$p2/m11$ (14)
A_u	1	1	1	1	−1	−1	−1	−1	*p*222 (19)
B_{1u}	1	1	−1	−1	−1	−1	1	1	*pmm*2 (23)
B_{2u}	1	−1	1	−1	−1	1	−1	1	*pm*2*m* (27)
B_{3u}	1	−1	−1	1	−1	1	1	−1	*pm*2*m* (27)

Table 38: Character table of *pmaa* (No. 38)

	1	2_x	2_z	2_y	$\overline{1}$	m_x	m_z	m_y	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	*pmaa* (38)
B_{1g}	1	−1	1	−1	1	−1	1	−1	$p112/a$ (7)
B_{2g}	1	−1	−1	1	1	−1	−1	1	$p2/b11$ (16)
B_{3g}	1	1	−1	−1	1	1	−1	−1	$p2/m11$ (14)
A_u	1	1	1	1	−1	−1	−1	−1	*p*222 (19)
B_{1u}	1	−1	1	−1	−1	1	−1	1	*pma*2 (24)
B_{2u}	1	−1	−1	1	−1	1	1	−1	*pm*2*a* (31)
B_{3u}	1	1	−1	−1	−1	−1	1	1	*pb*2*b* (30)

Table 39: Character table of *pban* (No. 39)

	1	2_z	2_y	2_x	$\overline{1}$	m_z	m_y	m_x	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	*pban* (39)
B_{1g}	1	1	−1	−1	1	1	−1	−1	$p112/a$ (7)
B_{2g}	1	−1	1	−1	1	−1	1	−1	$p2/b11$ (16)
B_{3g}	1	−1	−1	1	1	−1	−1	1	$p2/b11$ (16)
A_u	1	1	1	1	−1	−1	−1	−1	*p*222 (19)
B_{1u}	1	1	−1	−1	−1	−1	1	1	*pba*2 (25)
B_{2u}	1	−1	1	−1	−1	1	−1	1	*pb*2*n* (34)
B_{3u}	1	−1	−1	1	−1	1	1	−1	*pb*2*n* (34)

Table 40: Character table of *pmam* (No. 40)

	1	2_y	2_z	2_x	$\overline{1}$	m_y	m_z	m_x	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	*pmam* (40)
B_{1g}	1	−1	1	−1	1	−1	1	−1	$p112/m$ (6)
B_{2g}	1	1	−1	−1	1	1	−1	−1	$p2/b11$ (16)
B_{3g}	1	−1	−1	1	1	−1	−1	1	$p2_1/m11$ (15)
A_u	1	1	1	1	−1	−1	−1	−1	$p2_122$ (20)
B_{1u}	1	−1	1	−1	−1	1	−1	1	*pma*2 (24)
B_{2u}	1	1	−1	−1	−1	−1	1	1	*pm*2*m* (27)
B_{3u}	1	−1	−1	1	−1	1	1	−1	$pm2_1m$ (29)

Table 41: Character table of *pmma* (No. 41)

	1	2_z	2_y	2_x	$\overline{1}$	m_z	m_y	m_x	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	*pmma* (41)
B_{1g}	1	1	−1	−1	1	1	−1	−1	$p112/a$ (7)
B_{2g}	1	−1	1	−1	1	−1	1	−1	$p2/m11$ (14)
B_{3g}	1	−1	−1	1	1	−1	−1	1	$p2_1/m11$ (15)
A_u	1	1	1	1	−1	−1	−1	−1	$p2_122$ (20)
B_{1u}	1	1	−1	−1	−1	−1	1	1	*pmm*2 (23)
B_{2u}	1	−1	1	−1	−1	1	−1	1	*pm*2*a* (31)
B_{3u}	1	−1	−1	1	−1	1	1	−1	$pm2_1b$ (28)

Table 42: Character table of *pman* (No. 42)

	1	2_y	2_z	2_x	$\overline{1}$	m_y	m_z	m_x	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	*pman* (42)
B_{1g}	1	−1	1	−1	1	−1	1	−1	$p112/a$ (7)
B_{2g}	1	1	−1	−1	1	1	−1	−1	$p2_1/b11$ (17)
B_{3g}	1	−1	−1	1	1	−1	−1	1	$p2/m11$ (14)
A_u	1	1	1	1	−1	−1	−1	−1	$p2_122$ (20)
B_{1u}	1	−1	1	−1	−1	1	−1	1	*pma*2 (24)
B_{2u}	1	1	−1	−1	−1	−1	1	1	$pm2_1n$ (32)
B_{3u}	1	−1	−1	1	−1	1	1	−1	*pb*2*n* (34)

Table 43: Character table of *pbaa* (No. 43)

	1	2_x	2_z	2_y	$\overline{1}$	m_x	m_z	m_y	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	*pbaa* (43)
B_{1g}	1	−1	1	−1	1	−1	1	−1	$p112/a$ (7)
B_{2g}	1	−1	−1	1	1	−1	−1	1	$p2_1/b11$ (17)
B_{3g}	1	1	−1	−1	1	1	−1	−1	$p2/b11$ (16)
A_u	1	1	1	1	−1	−1	−1	−1	$p2_122$ (20)
B_{1u}	1	−1	1	−1	−1	1	−1	1	*pba*2 (25)
B_{2u}	1	−1	−1	1	−1	1	1	−1	$pb2_1a$ (33)
B_{3u}	1	1	−1	−1	−1	−1	1	1	*pb*2*b* (30)

Table 44: Character table of *pbam* (No. 44)

	1	2_z	2_y	2_x	$\overline{1}$	m_z	m_y	m_x	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	*pbam* (44)
B_{1g}	1	1	−1	−1	1	1	−1	−1	$p112/m$ (6)
B_{2g}	1	−1	1	−1	1	−1	1	−1	$p2_1/b11$ (17)
B_{3g}	1	−1	−1	1	1	−1	−1	1	$p2_1/b11$ (17)
A_u	1	1	1	1	−1	−1	−1	−1	$p2_12_12$ (21)
B_{1u}	1	1	−1	−1	−1	−1	1	1	*pba*2 (25)
B_{2u}	1	−1	1	−1	−1	1	−1	1	$pm2_1m$ (29)
B_{3u}	1	−1	−1	1	−1	1	1	−1	$pm2_1m$ (29)

Table 45: Character table of *pbma* (No. 45)

	1	2_y	2_x	2_z	$\overline{1}$	m_y	m_x	m_z	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	*pbma* (45)
B_{1g}	1	−1	−1	1	1	−1	−1	1	$p112/a$ (7)
B_{2g}	1	1	−1	−1	1	1	−1	−1	$p2_1/m11$ (15)
B_{3g}	1	−1	1	−1	1	−1	1	−1	$p2_1/b11$ (17)
A_u	1	1	1	1	−1	−1	−1	−1	$p2_12_12$ (21)
B_{1u}	1	−1	−1	1	−1	1	1	−1	*pma*2 (24)
B_{2u}	1	1	−1	−1	−1	−1	1	1	$pb2_1a$ (33)
B_{3u}	1	−1	1	−1	−1	1	−1	1	$pm2_1b$ (28)

Table 46: Character table of $pmmn$ (No. 46)

	1	2_z	2_y	2_x	$\overline{1}$	m_z	m_y	m_x	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	$pmmn$ (46)
B_{1g}	1	1	−1	−1	1	1	−1	−1	$p112/a$ (7)
B_{2g}	1	−1	1	−1	1	−1	1	−1	$p2_1/m11$ (15)
B_{3g}	1	−1	−1	1	1	−1	−1	1	$p2_1/m11$ (15)
A_u	1	1	1	1	−1	−1	−1	−1	$p2_12_12$ (21)
B_{1u}	1	1	−1	−1	−1	−1	1	1	$pmm2$ (23)
B_{2u}	1	−1	1	−1	−1	1	−1	1	$pm2_1n$ (32)
B_{3u}	1	−1	−1	1	−1	1	1	−1	$pm2_1n$ (32)

Table 47: Character table of $cmmm$ (No. 47)

	1	2_z	2_y	2_x	$\overline{1}$	m_z	m_y	m_x	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	$cmmm$ (47)
B_{1g}	1	1	−1	−1	1	1	−1	−1	$p112/m$ (6)
B_{2g}	1	−1	1	−1	1	−1	1	−1	$c2/m11$ (18)
B_{3g}	1	−1	−1	1	1	−1	−1	1	$c2/m11$ (18)
A_u	1	1	1	1	−1	−1	−1	−1	$c222$ (22)
B_{1u}	1	1	−1	−1	−1	−1	1	1	$cmm2$ (26)
B_{2u}	1	−1	1	−1	−1	1	−1	1	$cm2m$ (35)
B_{3u}	1	−1	−1	1	−1	1	1	−1	$cm2m$ (35)

Table 48: Character table of $cmme$ (No. 48)

	1	2_z	2_y	2_x	$\overline{1}$	m_z	m_y	m_x	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	$cmme$ (48)
B_{1g}	1	1	−1	−1	1	1	−1	−1	$p112/a$ (7)
B_{2g}	1	−1	1	−1	1	−1	1	−1	$c2/m11$ (18)
B_{3g}	1	−1	−1	1	1	−1	−1	1	$c2/m11$ (18)
A_u	1	1	1	1	−1	−1	−1	−1	$c222$ (22)
B_{1u}	1	1	−1	−1	−1	−1	1	1	$cmm2$ (26)
B_{2u}	1	−1	1	−1	−1	1	−1	1	$cm2e$ (36)
B_{3u}	1	−1	−1	1	−1	1	1	−1	$cm2e$ (36)

Table 49: Character table of $p4$ (No. 49)

	1	2_z	4_z	4_z^{-1}	axial subgroups
size	1	1	1	1	
A	1	1	1	1	$p4$ (49)
B	1	1	−1	−1	$p112$ (3)
${}^1E$	1	−1	$-i$	i	$p1$ (1)
${}^2E$	1	−1	i	$-i$	$p1$ (1)

Table 50: Character table of $p\overline{4}$ (No. 50)

	1	2_z	$\overline{4}_z$	$\overline{4}_z^{-1}$	axial subgroups
size	1	1	1	1	
A	1	1	1	1	$p\overline{4}$ (50)
B	1	1	-1	-1	$p112$ (3)
${}^1E$	1	-1	$-i$	i	$p1$ (1)
${}^2E$	1	-1	i	$-i$	$p1$ (1)

Table 51: Character table of $p4/m$ (No. 51)

	1	2_z	4_z	4_z^{-1}	$\overline{1}$	m_z	$\overline{4}_z$	$\overline{4}_z^{-1}$	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	$p4/m$ (51)
B_g	1	1	-1	-1	1	1	-1	-1	$p112/m$ (6)
${}^1E_g$	1	-1	$-i$	i	1	-1	$-i$	i	$p\overline{1}$ (2)
${}^2E_g$	1	-1	i	$-i$	1	-1	i	$-i$	$p\overline{1}$ (2)
A_u	1	1	1	1	-1	-1	-1	-1	$p4$ (49)
B_u	1	1	-1	-1	-1	-1	1	1	$p\overline{4}$ (50)
${}^1E_u$	1	-1	$-i$	i	-1	1	i	$-i$	$p11m$ (4)
${}^2E_u$	1	-1	i	$-i$	-1	1	$-i$	i	$p11m$ (4)

Table 52: Character table of $p4/n$ (No. 52)

	1	2_z	4_z	4_z^{-1}	$\overline{1}$	m_z	$\overline{4}_z$	$\overline{4}_z^{-1}$	axial subgroups
size	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	$p4/n$ (52)
B_g	1	1	-1	-1	1	1	-1	-1	$p112/a$ (7)
${}^1E_g$	1	-1	$-i$	i	1	-1	$-i$	i	$p\overline{1}$ (2)
${}^2E_g$	1	-1	i	$-i$	1	-1	i	$-i$	$p\overline{1}$ (2)
A_u	1	1	1	1	-1	-1	-1	-1	$p4$ (49)
B_u	1	1	-1	-1	-1	-1	1	1	$p\overline{4}$ (50)
${}^1E_u$	1	-1	$-i$	i	-1	1	i	$-i$	$p11a$ (5)
${}^2E_u$	1	-1	i	$-i$	-1	1	$-i$	i	$p11a$ (5)

Table 53: Character table of $p422$ (No. 53)

	1	2_z	4_z	2_y	2_{xy}	axial subgroups
size	1	1	2	2	2	
A_1	1	1	1	1	1	$p422$ (53)
A_2	1	1	1	−1	−1	$p4$ (49)
B_1	1	1	−1	1	−1	$p222$ (19)
B_2	1	1	−1	−1	1	$c222$ (22)
E	2	−2	0	0	0	$p211$ (8), $c211$ (10)

Table 54: Character table of $p42_12$ (No. 54)

	1	2_z	4_z	2_y	2_{xy}	axial subgroups
size	1	1	2	2	2	
A_1	1	1	1	1	1	$p42_12$ (54)
A_2	1	1	1	−1	−1	$p4$ (49)
B_1	1	1	−1	1	−1	$p2_12_12$ (21)
B_2	1	1	−1	−1	1	$c222$ (22)
E	2	−2	0	0	0	$p2_111$ (9), $c211$ (10)

Table 55: Character table of $p4mm$ (No. 55)

	1	2_z	4_z	m_y	m_{xy}	axial subgroups
size	1	1	2	2	2	
A_1	1	1	1	1	1	$p4mm$ (55)
A_2	1	1	1	−1	−1	$p4$ (49)
B_1	1	1	−1	1	−1	$pmm2$ (23)
B_2	1	1	−1	−1	1	$cmm2$ (26)
E	2	−2	0	0	0	$pm11$ (11), $cm11$ (13)

Table 56: Character table of $p4bm$ (No. 56)

	1	2_z	4_z	m_y	m_{xy}	axial subgroups
size	1	1	2	2	2	
A_1	1	1	1	1	1	$p4bm$ (56)
A_2	1	1	1	−1	−1	$p4$ (49)
B_1	1	1	−1	1	−1	$pba2$ (25)
B_2	1	1	−1	−1	1	$cmm2$ (26)
E	2	−2	0	0	0	$pb11$ (12), $cm11$ (13)

Table 57: Character table of $p\bar{4}2m$ (No. 57)

	1	2_z	$\bar{4}_z$	2_y	m_{xy}	axial subgroups
size	1	1	2	2	2	
A_1	1	1	1	1	1	$p\bar{4}2m$ (57)
A_2	1	1	1	−1	−1	$p\bar{4}$ (50)
B_1	1	1	−1	1	−1	$p222$ (19)
B_2	1	1	−1	−1	1	$cmm2$ (26)
E	2	−2	0	0	0	$p211$ (8), $cm11$ (13)

Table 58: Character table of $p\bar{4}2_1m$ (No. 58)

	1	2_z	$\bar{4}_z$	2_y	m_{xy}	axial subgroups
size	1	1	2	2	2	
A_1	1	1	1	1	1	$p\bar{4}2_1m$ (58)
A_2	1	1	1	−1	−1	$p\bar{4}$ (50)
B_1	1	1	−1	1	−1	$p2_12_12$ (21)
B_2	1	1	−1	−1	1	$cmm2$ (26)
E	2	−2	0	0	0	$p2_111$ (9), $cm11$ (13)

Table 59: Character table of $p\bar{4}m2$ (No. 59)

	1	2_z	$\bar{4}_z$	m_y	2_{xy}	axial subgroups
size	1	1	2	2	2	
A_1	1	1	1	1	1	$p\bar{4}m2$ (59)
A_2	1	1	1	−1	−1	$p\bar{4}$ (50)
B_1	1	1	−1	−1	1	$c222$ (22)
B_2	1	1	−1	1	−1	$pmm2$ (23)
E	2	−2	0	0	0	$pm11$ (11), $c211$ (10)

Table 60: Character table of $p\bar{4}b2$ (No. 60)

	1	2_z	$\bar{4}_z$	m_y	2_{xy}	axial subgroups
size	1	1	2	2	2	
A_1	1	1	1	1	1	$p\bar{4}b2$ (60)
A_2	1	1	1	−1	−1	$p\bar{4}$ (50)
B_1	1	1	−1	−1	1	$c222$ (22)
B_2	1	1	−1	1	−1	$pba2$ (25)
E	2	−2	0	0	0	$pb11$ (12), $c211$ (10)

Table 61: Character table of $p4/mmm$ (No. 61)

	1	2_z	4_z	2_y	2_{xy}	$\overline{1}$	m_z	$\overline{4}_z$	m_y	m_{xy}	axial subgroups
size	1	1	2	2	2	1	1	2	2	2	
A_{1g}	1	1	1	1	1	1	1	1	1	1	$p4/mmm$ (61)
A_{2g}	1	1	1	−1	−1	1	1	1	−1	−1	$p4/m$ (51)
B_{1g}	1	1	−1	1	−1	1	1	−1	1	−1	$pmmm$ (37)
B_{2g}	1	1	−1	−1	1	1	1	−1	−1	1	$cmmm$ (47)
E_g	2	−2	0	0	0	2	−2	0	0	0	$p2/m11$ (14), $c2/m11$ (18)
A_{1u}	1	1	1	1	1	−1	−1	−1	−1	−1	$p422$ (53)
A_{2u}	1	1	1	−1	−1	−1	−1	−1	1	1	$p4mm$ (55)
B_{1u}	1	1	−1	1	−1	−1	−1	1	−1	1	$p\overline{4}2m$ (57)
B_{2u}	1	1	−1	−1	1	−1	−1	1	1	−1	$p\overline{4}m2$ (59)
E_u	2	−2	0	0	0	−2	2	0	0	0	$pm2m$ (27), $cm2m$ (35)

Table 62: Character table of $p4/nbm$ (No. 62)

	1	2_z	4_z	2_y	2_{xy}	$\overline{1}$	m_z	$\overline{4}_z$	m_y	m_{xy}	axial subgroups
size	1	1	2	2	2	1	1	2	2	2	
A_{1g}	1	1	1	1	1	1	1	1	1	1	$p4/nbm$ (62)
A_{2g}	1	1	1	−1	−1	1	1	1	−1	−1	$p4/n$ (52)
B_{1g}	1	1	−1	1	−1	1	1	−1	1	−1	$pban$ (39)
B_{2g}	1	1	−1	−1	1	1	1	−1	−1	1	$cmme$ (48)
E_g	2	−2	0	0	0	2	−2	0	0	0	$p2/b11$ (16), $c2/m11$ (18)
A_{1u}	1	1	1	1	1	−1	−1	−1	−1	−1	$p422$ (53)
A_{2u}	1	1	1	−1	−1	−1	−1	−1	1	1	$p4bm$ (56)
B_{1u}	1	1	−1	1	−1	−1	−1	1	−1	1	$p\overline{4}2m$ (57)
B_{2u}	1	1	−1	−1	1	−1	−1	1	1	−1	$p\overline{4}b2$ (60)
E_u	2	−2	0	0	0	−2	2	0	0	0	$pb2n$ (34), $cm2e$ (36)

Table 63: Character table of $p4/mbm$ (No. 63)

	1	2_z	4_z	2_y	2_{xy}	$\overline{1}$	m_z	$\overline{4}_z$	m_y	m_{xy}	axial subgroups
size	1	1	2	2	2	1	1	2	2	2	
A_{1g}	1	1	1	1	1	1	1	1	1	1	$p4/mbm$ (63)
A_{2g}	1	1	1	−1	−1	1	1	1	−1	−1	$p4/m$ (51)
B_{1g}	1	1	−1	1	−1	1	1	−1	1	−1	$pbam$ (44)
B_{2g}	1	1	−1	−1	1	1	1	−1	−1	1	$cmmm$ (47)
E_g	2	−2	0	0	0	2	−2	0	0	0	$p2_1/b11$ (17), $c2/m11$ (18)
A_{1u}	1	1	1	1	1	−1	−1	−1	−1	−1	$p42_12$ (54)
A_{2u}	1	1	1	−1	−1	−1	−1	−1	1	1	$p4bm$ (56)
B_{1u}	1	1	−1	1	−1	−1	−1	1	−1	1	$p\overline{4}2_1m$ (58)
B_{2u}	1	1	−1	−1	1	−1	−1	1	1	−1	$p\overline{4}b2$ (60)
E_u	2	−2	0	0	0	−2	2	0	0	0	$pm2_1m$ (29), $cm2m$ (35)

Table 64: Character table of $p4/nmm$ (No. 64)

	1	2_z	4_z	2_y	2_{xy}	$\overline{1}$	m_z	$\overline{4}_z$	m_y	m_{xy}	axial subgroups
size	1	1	2	2	2	1	1	2	2	2	
A_{1g}	1	1	1	1	1	1	1	1	1	1	$p4/nmm$ (64)
A_{2g}	1	1	1	−1	−1	1	1	1	−1	−1	$p4/n$ (52)
B_{1g}	1	1	−1	1	−1	1	1	−1	1	−1	$pmmn$ (46)
B_{2g}	1	1	−1	−1	1	1	1	−1	−1	1	$cmme$ (48)
E_g	2	−2	0	0	0	2	−2	0	0	0	$p2_1/m11$ (15), $c2/m11$ (18)
A_{1u}	1	1	1	1	1	−1	−1	−1	−1	−1	$p42_12$ (54)
A_{2u}	1	1	1	−1	−1	−1	−1	−1	1	1	$p4mm$ (55)
B_{1u}	1	1	−1	1	−1	−1	−1	1	−1	1	$p\overline{4}2_1m$ (58)
B_{2u}	1	1	−1	−1	1	−1	−1	1	1	−1	$p\overline{4}m2$ (59)
E_u	2	−2	0	0	0	−2	2	0	0	0	$pm2_1n$ (32), $cm2e$ (36)

Table 65: Character table of $p3$ (No. 65)

	1	3_z	3_z^{-1}	axial subgroups
size	1	1	1	
A	1	1	1	$p3$ (65)
${}^1E$	1	ω^2	ω	$p1$ (1)
${}^2E$	1	ω	ω^2	$p1$ (1)

Table 66: Character table of $p\overline{3}$ (No. 66)

	1	3_z	3_z^{-1}	$\overline{1}$	$\overline{3}_z$	$\overline{3}_z^{-1}$	axial subgroups
size	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	$p\overline{3}$ (66)
${}^1E_g$	1	ω^2	ω	1	ω^2	ω	$p\overline{1}$ (2)
${}^2E_g$	1	ω	ω^2	1	ω	ω^2	$p\overline{1}$ (2)
A_u	1	1	1	−1	−1	−1	$p3$ (65)
${}^1E_u$	1	ω^2	ω	−1	$-\omega^2$	$-\omega$	$p1$ (1)
${}^2E_u$	1	ω	ω^2	−1	$-\omega$	$-\omega^2$	$p1$ (1)

Table 67: Character table of $p312$ (No. 67)

	1	3_z	2_3	axial subgroups
size	1	2	3	
A_1	1	1	1	$p312$ (67)
A_2	1	1	−1	$p3$ (65)
E	2	−1	0	$c211$ (10)

Table 68: Character table of $p321$ (No. 68)

	1	3_z	2_{xy}	axial subgroups
size	1	2	3	
A_1	1	1	1	$p321$ (68)
A_2	1	1	-1	$p3$ (65)
E	2	-1	0	$c211$ (10)

Table 69: Character table of $p3m1$ (No. 69)

	1	3_z	m_{xy}	axial subgroups
size	1	2	3	
A_1	1	1	1	$p3m1$ (69)
A_2	1	1	-1	$p3$ (65)
E	2	-1	0	$cm11$ (13)

Table 70: Character table of $p31m$ (No. 70)

	1	3_z	m_3	axial subgroups
size	1	2	3	
A_1	1	1	1	$p31m$ (70)
A_2	1	1	-1	$p3$ (65)
E	2	-1	0	$cm11$ (13)

Table 71: Character table of $p\bar{3}1m$ (No. 71)

	1	3_z	2_3	$\bar{1}$	$\bar{3}_z$	m_3	axial subgroups
size	1	2	3	1	2	3	
A_{1g}	1	1	1	1	1	1	$p\bar{3}1m$ (71)
A_{2g}	1	1	-1	1	1	-1	$p\bar{3}$ (66)
E_g	2	-1	0	2	-1	0	$c2/m11$ (18)
A_{1u}	1	1	1	-1	-1	-1	$p312$ (67)
A_{2u}	1	1	-1	-1	-1	1	$p31m$ (70)
E_u	2	-1	0	-2	1	0	$c211$ (10), $cm11$ (13)

Table 72: Character table of $p\bar{3}m1$ (No. 72)

	1	3_z	2_{xy}	$\bar{1}$	$\bar{3}_z$	m_{xy}	axial subgroups
size	1	2	3	1	2	3	
A_{1g}	1	1	1	1	1	1	$p\bar{3}m1$ (72)
A_{2g}	1	1	-1	1	1	-1	$p\bar{3}$ (66)
E_g	2	-1	0	2	-1	0	$c2/m11$ (18)
A_{1u}	1	1	1	-1	-1	-1	$p321$ (68)
A_{2u}	1	1	-1	-1	-1	1	$p3m1$ (69)
E_u	2	-1	0	-2	1	0	$c211$ (10), $cm11$ (13)

Table 73: Character table of $p6$ (No. 73)

	1	3_z	3_z^{-1}	2_z	6_z^{-1}	6_z	axial subgroups
size	1	1	1	1	1	1	
A	1	1	1	1	1	1	$p6$ (73)
B	1	1	1	-1	-1	-1	$p3$ (65)
${}^1E_1$	1	ω^2	ω	-1	$-\omega^2$	$-\omega$	$p1$ (1)
${}^2E_1$	1	ω	ω^2	-1	$-\omega$	$-\omega^2$	$p1$ (1)
${}^1E_2$	1	ω^2	ω	1	ω^2	ω	$p112$ (3)
${}^2E_2$	1	ω	ω^2	1	ω	ω^2	$p112$ (3)

Table 74: Character table of $p\overline{6}$ (No. 74)

	1	3_z	3_z^{-1}	m_z	$\overline{6}_z^{-1}$	$\overline{6}_z$	axial subgroups
size	1	1	1	1	1	1	
A'	1	1	1	1	1	1	$p\overline{6}$ (74)
A''	1	1	1	-1	-1	-1	$p3$ (65)
${}^1E'$	1	ω^2	ω	1	ω^2	ω	$p11m$ (4)
${}^2E'$	1	ω	ω^2	1	ω	ω^2	$p11m$ (4)
${}^1E''$	1	ω^2	ω	-1	$-\omega^2$	$-\omega$	$p1$ (1)
${}^2E''$	1	ω	ω^2	-1	$-\omega$	$-\omega^2$	$p1$ (1)

Table 75: Character table of $p6/m$ (No. 75)

	1	3_z	3_z^{-1}	2_z	6_z^{-1}	6_z	$\overline{1}$	$\overline{3}_z$	$\overline{3}_z^{-1}$	m_z	$\overline{6}_z^{-1}$	$\overline{6}_z$	axial subgroups
size	1	1	1	1	1	1	1	1	1	1	1	1	
A_g	1	1	1	1	1	1	1	1	1	1	1	1	$p6/m$ (75)
B_g	1	1	1	-1	-1	-1	1	1	1	-1	-1	-1	$p\overline{3}$ (66)
${}^1E_{1g}$	1	ω^2	ω	-1	$-\omega^2$	$-\omega$	1	ω^2	ω	-1	$-\omega^2$	$-\omega$	$p\overline{1}$ (2)
${}^2E_{1g}$	1	ω	ω^2	-1	$-\omega$	$-\omega^2$	1	ω	ω^2	-1	$-\omega$	$-\omega^2$	$p\overline{1}$ (2)
${}^1E_{2g}$	1	ω^2	ω	1	ω^2	ω	1	ω^2	ω	1	ω^2	ω	$p112/m$ (6)
${}^2E_{2g}$	1	ω	ω^2	1	ω	ω^2	1	ω	ω^2	1	ω	ω^2	$p112/m$ (6)
A_u	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	$p6$ (73)
B_u	1	1	1	-1	-1	-1	-1	-1	-1	1	1	1	$p\overline{6}$ (74)
${}^1E_{1u}$	1	ω^2	ω	-1	$-\omega^2$	$-\omega$	-1	$-\omega^2$	$-\omega$	1	ω^2	ω	$p11m$ (4)
${}^2E_{1u}$	1	ω	ω^2	-1	$-\omega$	$-\omega^2$	-1	$-\omega$	$-\omega^2$	1	ω	ω^2	$p11m$ (4)
${}^1E_{2u}$	1	ω^2	ω	1	ω^2	ω	-1	$-\omega^2$	$-\omega$	-1	$-\omega^2$	$-\omega$	$p112$ (3)
${}^2E_{2u}$	1	ω	ω^2	1	ω	ω^2	-1	$-\omega$	$-\omega^2$	-1	$-\omega$	$-\omega^2$	$p112$ (3)

Table 76: Character table of $p622$ (No. 76)

	1	3_z	2_z	6_z	2_{xy}	2_3	axial subgroups
size	1	2	1	2	3	3	
A_1	1	1	1	1	1	1	$p622$ (76)
A_2	1	1	1	1	-1	-1	$p6$ (73)
B_1	1	1	-1	-1	1	-1	$p321$ (68)
B_2	1	1	-1	-1	-1	1	$p312$ (67)
E_1	2	-1	-2	1	0	0	$c211$ (10), $c211$ (10)
E_2	2	-1	2	-1	0	0	$c222$ (22)

Table 77: Character table of $p6mm$ (No. 77)

	1	3_z	2_z	6_z	m_{xy}	m_3	axial subgroups
size	1	2	1	2	3	3	
A_1	1	1	1	1	1	1	$p6mm$ (77)
A_2	1	1	1	1	-1	-1	$p6$ (73)
B_1	1	1	-1	-1	1	-1	$p3m1$ (69)
B_2	1	1	-1	-1	-1	1	$p31m$ (70)
E_1	2	-1	-2	1	0	0	$cm11$ (13), $cm11$ (13)
E_2	2	-1	2	-1	0	0	$cmm2$ (26)

Table 78: Character table of $p\bar{6}m2$ (No. 78)

	1	3_z	m_z	$\bar{6}_z$	m_{xy}	2_3	axial subgroups
size	1	2	1	2	3	3	
A_1'	1	1	1	1	1	1	$p\bar{6}m2$ (78)
A_1''	1	1	-1	-1	-1	1	$p312$ (67)
A_2'	1	1	1	1	-1	-1	$p\bar{6}$ (74)
A_2''	1	1	-1	-1	1	-1	$p3m1$ (69)
E'	2	-1	2	-1	0	0	$cm2m$ (35)
E''	2	-1	-2	1	0	0	$cm11$ (13), $c211$ (10)

Table 79: Character table of $p\bar{6}2m$ (No. 79)

	1	3_z	m_z	$\bar{6}_z$	2_{xy}	m_3	axial subgroups
size	1	2	1	2	3	3	
A_1'	1	1	1	1	1	1	$p\bar{6}2m$ (79)
A_1''	1	1	-1	-1	1	-1	$p321$ (68)
A_2'	1	1	1	1	-1	-1	$p\bar{6}$ (74)
A_2''	1	1	-1	-1	-1	1	$p31m$ (70)
E'	2	-1	2	-1	0	0	$cm2m$ (35)
E''	2	-1	-2	1	0	0	$cm11$ (13), $c211$ (10)

Table 80: Character table of $p6/mmm$ (No. 80)

	1	3_z	2_z	6_z	2_{xy}	2_3	$\overline{1}$	$\overline{3}_z$	m_z	$\overline{6}_z$	m_{xy}	m_3	axial subgroups
size	1	2	1	2	3	3	1	2	1	2	3	3	
A_{1g}	1	1	1	1	1	1	1	1	1	1	1	1	$p6/mmm$ (80)
A_{2g}	1	1	1	1	−1	−1	1	1	1	1	−1	−1	$p6/m$ (75)
B_{1g}	1	1	−1	−1	1	−1	1	1	−1	−1	1	−1	$p\overline{3}m1$ (72)
B_{2g}	1	1	−1	−1	−1	1	1	1	−1	−1	−1	1	$p\overline{3}1m$ (71)
E_{1g}	2	−1	−2	1	0	0	2	−1	−2	1	0	0	$c2/m11$ (18), $c2/m11$ (18)
E_{2g}	2	−1	2	−1	0	0	2	−1	2	−1	0	0	$cmmm$ (47)
A_{1u}	1	1	1	1	1	1	−1	−1	−1	−1	−1	−1	$p622$ (76)
A_{2u}	1	1	1	1	−1	−1	−1	−1	−1	−1	1	1	$p6mm$ (77)
B_{1u}	1	1	−1	−1	1	−1	−1	−1	1	1	−1	1	$p\overline{6}2m$ (79)
B_{2u}	1	1	−1	−1	−1	1	−1	−1	1	1	1	−1	$p\overline{6}m2$ (78)
E_{1u}	2	−1	−2	1	0	0	−2	1	2	−1	0	0	$cm2m$ (35), $cm2m$ (35)
E_{2u}	2	−1	2	−1	0	0	−2	1	−2	1	0	0	$cmm2$ (26), $c222$ (22)