

MSG No. 131.436 $P4_2/mmc1'$ [Type II, tetragonal]

Table 1: Wyckoff site: 2a, site symmetry: $\text{mmm.1}'$

No.	position	mapping
1	$[0, 0, 0]$	$[1, 4, 5, 6, 9, 12, 13, 14, 17, 20, 21, 22, 25, 28, 29, 30]$
2	$[0, 0, \frac{1}{2}]$	$[2, 3, 7, 8, 10, 11, 15, 16, 18, 19, 23, 24, 26, 27, 31, 32]$

Table 2: Wyckoff site: 2b, site symmetry: $\text{mmm.1}'$

No.	position	mapping
1	$[\frac{1}{2}, \frac{1}{2}, 0]$	$[1, 4, 5, 6, 9, 12, 13, 14, 17, 20, 21, 22, 25, 28, 29, 30]$
2	$[\frac{1}{2}, \frac{1}{2}, \frac{1}{2}]$	$[2, 3, 7, 8, 10, 11, 15, 16, 18, 19, 23, 24, 26, 27, 31, 32]$

Table 3: Wyckoff site: 2c, site symmetry: $\text{mmm.1}'$

No.	position	mapping
1	$[0, \frac{1}{2}, 0]$	$[1, 4, 5, 6, 9, 12, 13, 14, 17, 20, 21, 22, 25, 28, 29, 30]$
2	$[\frac{1}{2}, 0, \frac{1}{2}]$	$[2, 3, 7, 8, 10, 11, 15, 16, 18, 19, 23, 24, 26, 27, 31, 32]$

Table 4: Wyckoff site: 2d, site symmetry: $\text{mmm.1}'$

No.	position	mapping
1	$[0, \frac{1}{2}, \frac{1}{2}]$	$[1, 4, 5, 6, 9, 12, 13, 14, 17, 20, 21, 22, 25, 28, 29, 30]$
2	$[\frac{1}{2}, 0, 0]$	$[2, 3, 7, 8, 10, 11, 15, 16, 18, 19, 23, 24, 26, 27, 31, 32]$

Table 5: Wyckoff site: 2e, site symmetry: $-4\bar{m}21'$

No.	position	mapping
1	$[0, 0, \frac{1}{4}]$	$[1, 6, 7, 8, 10, 11, 12, 13, 17, 22, 23, 24, 26, 27, 28, 29]$
2	$[0, 0, \frac{3}{4}]$	$[2, 3, 4, 5, 9, 14, 15, 16, 18, 19, 20, 21, 25, 30, 31, 32]$

Table 6: Wyckoff site: 2f, site symmetry: $-4\bar{m}21'$

No.	position	mapping
1	$[\frac{1}{2}, \frac{1}{2}, \frac{1}{4}]$	$[1, 6, 7, 8, 10, 11, 12, 13, 17, 22, 23, 24, 26, 27, 28, 29]$
2	$[\frac{1}{2}, \frac{1}{2}, \frac{3}{4}]$	$[2, 3, 4, 5, 9, 14, 15, 16, 18, 19, 20, 21, 25, 30, 31, 32]$

Table 7: Wyckoff site: 4g, site symmetry: 2mm.1'

No.	position	mapping
1	$[0, 0, z]$	[1, 6, 12, 13, 17, 22, 28, 29]
2	$[0, 0, z + \frac{1}{2}]$	[2, 3, 15, 16, 18, 19, 31, 32]
3	$[0, 0, -z]$	[4, 5, 9, 14, 20, 21, 25, 30]
4	$[0, 0, \frac{1}{2} - z]$	[7, 8, 10, 11, 23, 24, 26, 27]

Table 8: Wyckoff site: 4h, site symmetry: 2mm.1'

No.	position	mapping
1	$[\frac{1}{2}, \frac{1}{2}, z]$	[1, 6, 12, 13, 17, 22, 28, 29]
2	$[\frac{1}{2}, \frac{1}{2}, z + \frac{1}{2}]$	[2, 3, 15, 16, 18, 19, 31, 32]
3	$[\frac{1}{2}, \frac{1}{2}, -z]$	[4, 5, 9, 14, 20, 21, 25, 30]
4	$[\frac{1}{2}, \frac{1}{2}, \frac{1}{2} - z]$	[7, 8, 10, 11, 23, 24, 26, 27]

Table 9: Wyckoff site: 4i, site symmetry: 2mm.1'

No.	position	mapping
1	$[0, \frac{1}{2}, z]$	[1, 6, 12, 13, 17, 22, 28, 29]
2	$[\frac{1}{2}, 0, z + \frac{1}{2}]$	[2, 3, 15, 16, 18, 19, 31, 32]
3	$[0, \frac{1}{2}, -z]$	[4, 5, 9, 14, 20, 21, 25, 30]
4	$[\frac{1}{2}, 0, \frac{1}{2} - z]$	[7, 8, 10, 11, 23, 24, 26, 27]

Table 10: Wyckoff site: 4j, site symmetry: m2m.1'

No.	position	mapping
1	$[x, 0, 0]$	[1, 4, 13, 14, 17, 20, 29, 30]
2	$[0, x, \frac{1}{2}]$	[2, 7, 11, 16, 18, 23, 27, 32]
3	$[0, -x, \frac{1}{2}]$	[3, 8, 10, 15, 19, 24, 26, 31]
4	$[-x, 0, 0]$	[5, 6, 9, 12, 21, 22, 25, 28]

Table 11: Wyckoff site: 4k, site symmetry: m2m.1'

No.	position	mapping
1	$[x, \frac{1}{2}, \frac{1}{2}]$	[1, 4, 13, 14, 17, 20, 29, 30]
2	$[\frac{1}{2}, x, 0]$	[2, 7, 11, 16, 18, 23, 27, 32]
3	$[\frac{1}{2}, -x, 0]$	[3, 8, 10, 15, 19, 24, 26, 31]
4	$[-x, \frac{1}{2}, \frac{1}{2}]$	[5, 6, 9, 12, 21, 22, 25, 28]

Table 12: Wyckoff site: 4l, site symmetry: $\text{m}2\text{m.1'}$

No.	position	mapping
1	$[x, 0, \frac{1}{2}]$	[1, 4, 13, 14, 17, 20, 29, 30]
2	$[0, x, 0]$	[2, 7, 11, 16, 18, 23, 27, 32]
3	$[0, -x, 0]$	[3, 8, 10, 15, 19, 24, 26, 31]
4	$[-x, 0, \frac{1}{2}]$	[5, 6, 9, 12, 21, 22, 25, 28]

Table 13: Wyckoff site: 4m, site symmetry: $\text{m}2\text{m.1'}$

No.	position	mapping
1	$[x, \frac{1}{2}, 0]$	[1, 4, 13, 14, 17, 20, 29, 30]
2	$[\frac{1}{2}, x, \frac{1}{2}]$	[2, 7, 11, 16, 18, 23, 27, 32]
3	$[\frac{1}{2}, -x, \frac{1}{2}]$	[3, 8, 10, 15, 19, 24, 26, 31]
4	$[-x, \frac{1}{2}, 0]$	[5, 6, 9, 12, 21, 22, 25, 28]

Table 14: Wyckoff site: 8n, site symmetry: .21'

No.	position	mapping
1	$[x, x, \frac{1}{4}]$	[1, 7, 17, 23]
2	$[-x, x, \frac{3}{4}]$	[2, 5, 18, 21]
3	$[x, -x, \frac{3}{4}]$	[3, 4, 19, 20]
4	$[-x, -x, \frac{1}{4}]$	[6, 8, 22, 24]
5	$[-x, -x, \frac{3}{4}]$	[9, 15, 25, 31]
6	$[x, -x, \frac{1}{4}]$	[10, 13, 26, 29]
7	$[-x, x, \frac{1}{4}]$	[11, 12, 27, 28]
8	$[x, x, \frac{3}{4}]$	[14, 16, 30, 32]

Table 15: Wyckoff site: 8o, site symmetry: .m.1'

No.	position	mapping
1	$[0, y, z]$	[1, 12, 17, 28]
2	$[-y, 0, z + \frac{1}{2}]$	[2, 15, 18, 31]
3	$[y, 0, z + \frac{1}{2}]$	[3, 16, 19, 32]
4	$[0, -y, -z]$	[4, 9, 20, 25]
5	$[0, y, -z]$	[5, 14, 21, 30]
6	$[0, -y, z]$	[6, 13, 22, 29]
7	$[y, 0, \frac{1}{2} - z]$	[7, 10, 23, 26]
8	$[-y, 0, \frac{1}{2} - z]$	[8, 11, 24, 27]

Table 16: Wyckoff site: 8p, site symmetry: .m.1'

No.	position	mapping
1	$[\frac{1}{2}, y, z]$	[1,12,17,28]
2	$[-y, \frac{1}{2}, z + \frac{1}{2}]$	[2,15,18,31]
3	$[y, \frac{1}{2}, z + \frac{1}{2}]$	[3,16,19,32]
4	$[\frac{1}{2}, -y, -z]$	[4,9,20,25]
5	$[\frac{1}{2}, y, -z]$	[5,14,21,30]
6	$[\frac{1}{2}, -y, z]$	[6,13,22,29]
7	$[y, \frac{1}{2}, \frac{1}{2} - z]$	[7,10,23,26]
8	$[-y, \frac{1}{2}, \frac{1}{2} - z]$	[8,11,24,27]

Table 17: Wyckoff site: 8q, site symmetry: m..1'

No.	position	mapping
1	$[x, y, 0]$	[1,14,17,30]
2	$[-y, x, \frac{1}{2}]$	[2,11,18,27]
3	$[y, -x, \frac{1}{2}]$	[3,10,19,26]
4	$[x, -y, 0]$	[4,13,20,29]
5	$[-x, y, 0]$	[5,12,21,28]
6	$[-x, -y, 0]$	[6,9,22,25]
7	$[y, x, \frac{1}{2}]$	[7,16,23,32]
8	$[-y, -x, \frac{1}{2}]$	[8,15,24,31]

Table 18: Wyckoff site: 16r, site symmetry: 11'

No.	position	mapping
1	$[x, y, z]$	[1,17]
2	$[-y, x, z + \frac{1}{2}]$	[2,18]
3	$[y, -x, z + \frac{1}{2}]$	[3,19]
4	$[x, -y, -z]$	[4,20]
5	$[-x, y, -z]$	[5,21]
6	$[-x, -y, z]$	[6,22]
7	$[y, x, \frac{1}{2} - z]$	[7,23]
8	$[-y, -x, \frac{1}{2} - z]$	[8,24]
9	$[-x, -y, -z]$	[9,25]
10	$[y, -x, \frac{1}{2} - z]$	[10,26]
11	$[-y, x, \frac{1}{2} - z]$	[11,27]
12	$[-x, y, z]$	[12,28]
13	$[x, -y, z]$	[13,29]
14	$[x, y, -z]$	[14,30]
15	$[-y, -x, z + \frac{1}{2}]$	[15,31]
16	$[y, x, z + \frac{1}{2}]$	[16,32]