

MSG No. 208.47  $P_{I4_2}32$  [ Type IV, cubic ]

Table 1: Wyckoff site: 2a, site symmetry: 4'32'

No.	position	mapping
1	[0, 0, 0]	[1,8,9,10,17,18,19,20,21,22,23,24,26,27,28,29,30,31,35,36,37,38,39,40]
2	[\frac{1}{2}, \frac{1}{2}, \frac{1}{2}]	[2,3,4,5,6,7,11,12,13,14,15,16,25,32,33,34,41,42,43,44,45,46,47,48]

Table 2: Wyckoff site: 6b, site symmetry: 4'2.2'

No.	position	mapping
1	[0, \frac{1}{2}, \frac{1}{2}]	[1,8,9,10,26,27,37,38]
2	[\frac{1}{2}, 0, 0]	[2,3,13,14,25,32,33,34]
3	[0, 0, \frac{1}{2}]	[4,5,15,16,42,43,45,47]
4	[0, \frac{1}{2}, 0]	[6,7,11,12,41,44,46,48]
5	[\frac{1}{2}, 0, \frac{1}{2}]	[17,20,22,24,30,31,35,36]
6	[\frac{1}{2}, \frac{1}{2}, 0]	[18,19,21,23,28,29,39,40]

Table 3: Wyckoff site: 8c, site symmetry: .32

No.	position	mapping
1	[\frac{1}{4}, \frac{1}{4}, \frac{1}{4}]	[1,12,14,16,17,18]
2	[\frac{3}{4}, \frac{1}{4}, \frac{3}{4}]	[2,7,9,15,19,24]
3	[\frac{3}{4}, \frac{3}{4}, \frac{1}{4}]	[3,4,10,11,20,21]
4	[\frac{1}{4}, \frac{3}{4}, \frac{3}{4}]	[5,6,8,13,22,23]
5	[\frac{3}{4}, \frac{3}{4}, \frac{3}{4}]	[25,36,38,40,41,42]
6	[\frac{1}{4}, \frac{3}{4}, \frac{1}{4}]	[26,31,33,39,43,48]
7	[\frac{1}{4}, \frac{1}{4}, \frac{3}{4}]	[27,28,34,35,44,45]
8	[\frac{3}{4}, \frac{1}{4}, \frac{1}{4}]	[29,30,32,37,46,47]

Table 4: Wyckoff site: 12d, site symmetry: 2.22

No.	position	mapping
1	[\frac{1}{4}, \frac{1}{2}, 0]	[1,8,13,14]
2	[\frac{3}{4}, \frac{1}{2}, 0]	[2,3,9,10]
3	[\frac{1}{2}, 0, \frac{1}{4}]	[4,16,18,21]
4	[\frac{1}{2}, 0, \frac{3}{4}]	[5,15,19,23]
5	[0, \frac{3}{4}, \frac{1}{2}]	[6,11,20,22]
6	[0, \frac{1}{4}, \frac{1}{2}]	[7,12,17,24]
7	[\frac{3}{4}, 0, \frac{1}{2}]	[25,32,37,38]
8	[\frac{1}{4}, 0, \frac{1}{2}]	[26,27,33,34]
9	[0, \frac{1}{2}, \frac{3}{4}]	[28,40,42,45]

*continued ...*

Table 4

No.	position	mapping
10	$[0, \frac{1}{2}, \frac{1}{4}]$	[29,39,43,47]
11	$[\frac{1}{2}, \frac{1}{4}, 0]$	[30,35,44,46]
12	$[\frac{1}{2}, \frac{3}{4}, 0]$	[31,36,41,48]

Table 5: Wyckoff site: 12e, site symmetry: 4' . .

No.	position	mapping
1	$[x, 0, 0]$	[1,8,26,27]
2	$[x + \frac{1}{2}, \frac{1}{2}, \frac{1}{2}]$	[2,3,25,32]
3	$[\frac{1}{2}, \frac{1}{2}, \frac{1}{2} - x]$	[4,16,43,47]
4	$[\frac{1}{2}, \frac{1}{2}, x + \frac{1}{2}]$	[5,15,42,45]
5	$[\frac{1}{2}, x + \frac{1}{2}, \frac{1}{2}]$	[6,11,41,48]
6	$[\frac{1}{2}, \frac{1}{2} - x, \frac{1}{2}]$	[7,12,44,46]
7	$[-x, 0, 0]$	[9,10,37,38]
8	$[\frac{1}{2} - x, \frac{1}{2}, \frac{1}{2}]$	[13,14,33,34]
9	$[0, x, 0]$	[17,24,30,35]
10	$[0, 0, x]$	[18,21,29,39]
11	$[0, 0, -x]$	[19,23,28,40]
12	$[0, -x, 0]$	[20,22,31,36]

Table 6: Wyckoff site: 16f, site symmetry: .3.

No.	position	mapping
1	$[x, x, x]$	[1,17,18]
2	$[x + \frac{1}{2}, \frac{1}{2} - x, x + \frac{1}{2}]$	[2,7,15]
3	$[x + \frac{1}{2}, x + \frac{1}{2}, \frac{1}{2} - x]$	[3,4,11]
4	$[\frac{1}{2} - x, x + \frac{1}{2}, x + \frac{1}{2}]$	[5,6,13]
5	$[x, -x, -x]$	[8,22,23]
6	$[-x, x, -x]$	[9,19,24]
7	$[-x, -x, x]$	[10,20,21]
8	$[\frac{1}{2} - x, \frac{1}{2} - x, \frac{1}{2} - x]$	[12,14,16]
9	$[x + \frac{1}{2}, x + \frac{1}{2}, x + \frac{1}{2}]$	[25,41,42]
10	$[x, -x, x]$	[26,31,39]
11	$[x, x, -x]$	[27,28,35]
12	$[-x, x, x]$	[29,30,37]
13	$[x + \frac{1}{2}, \frac{1}{2} - x, \frac{1}{2} - x]$	[32,46,47]
14	$[\frac{1}{2} - x, x + \frac{1}{2}, \frac{1}{2} - x]$	[33,43,48]
15	$[\frac{1}{2} - x, \frac{1}{2} - x, x + \frac{1}{2}]$	[34,44,45]
16	$[-x, -x, -x]$	[36,38,40]

Table 7: Wyckoff site: 24g, site symmetry: 2..

No.	position	mapping
1	$[x, \frac{1}{2}, 0]$	[1,8]
2	$[x + \frac{1}{2}, \frac{1}{2}, 0]$	[2,3]
3	$[\frac{1}{2}, 0, \frac{1}{2} - x]$	[4,16]
4	$[\frac{1}{2}, 0, x + \frac{1}{2}]$	[5,15]
5	$[0, x + \frac{1}{2}, \frac{1}{2}]$	[6,11]
6	$[0, \frac{1}{2} - x, \frac{1}{2}]$	[7,12]
7	$[-x, \frac{1}{2}, 0]$	[9,10]
8	$[\frac{1}{2} - x, \frac{1}{2}, 0]$	[13,14]
9	$[0, x, \frac{1}{2}]$	[17,24]
10	$[\frac{1}{2}, 0, x]$	[18,21]
11	$[\frac{1}{2}, 0, -x]$	[19,23]
12	$[0, -x, \frac{1}{2}]$	[20,22]
13	$[x + \frac{1}{2}, 0, \frac{1}{2}]$	[25,32]
14	$[x, 0, \frac{1}{2}]$	[26,27]
15	$[0, \frac{1}{2}, -x]$	[28,40]
16	$[0, \frac{1}{2}, x]$	[29,39]
17	$[\frac{1}{2}, x, 0]$	[30,35]
18	$[\frac{1}{2}, -x, 0]$	[31,36]
19	$[\frac{1}{2} - x, 0, \frac{1}{2}]$	[33,34]
20	$[-x, 0, \frac{1}{2}]$	[37,38]
21	$[\frac{1}{2}, x + \frac{1}{2}, 0]$	[41,48]
22	$[0, \frac{1}{2}, x + \frac{1}{2}]$	[42,45]
23	$[0, \frac{1}{2}, \frac{1}{2} - x]$	[43,47]
24	$[\frac{1}{2}, \frac{1}{2} - x, 0]$	[44,46]

Table 8: Wyckoff site: 24h, site symmetry: ..2'

No.	position	mapping
1	$[0, y, y]$	[1,37]
2	$[\frac{1}{2}, \frac{1}{2} - y, y + \frac{1}{2}]$	[2,34]
3	$[\frac{1}{2}, y + \frac{1}{2}, \frac{1}{2} - y]$	[3,33]
4	$[y + \frac{1}{2}, y + \frac{1}{2}, \frac{1}{2}]$	[4,42]
5	$[\frac{1}{2} - y, y + \frac{1}{2}, \frac{1}{2}]$	[5,43]
6	$[\frac{1}{2} - y, \frac{1}{2}, y + \frac{1}{2}]$	[6,44]
7	$[y + \frac{1}{2}, \frac{1}{2}, y + \frac{1}{2}]$	[7,41]
8	$[0, -y, -y]$	[8,38]
9	$[0, y, -y]$	[9,27]
10	$[0, -y, y]$	[10,26]
11	$[y + \frac{1}{2}, \frac{1}{2}, \frac{1}{2} - y]$	[11,46]
12	$[\frac{1}{2} - y, \frac{1}{2}, \frac{1}{2} - y]$	[12,48]
13	$[\frac{1}{2}, y + \frac{1}{2}, y + \frac{1}{2}]$	[13,25]
14	$[\frac{1}{2}, \frac{1}{2} - y, \frac{1}{2} - y]$	[14,32]
15	$[y + \frac{1}{2}, \frac{1}{2} - y, \frac{1}{2}]$	[15,47]

continued ...

Table 8

No.	position	mapping
16	$[\frac{1}{2} - y, \frac{1}{2} - y, \frac{1}{2}]$	[16,45]
17	$[y, 0, y]$	[17,31]
18	$[y, y, 0]$	[18,28]
19	$[-y, y, 0]$	[19,29]
20	$[-y, 0, y]$	[20,30]
21	$[-y, -y, 0]$	[21,40]
22	$[y, 0, -y]$	[22,35]
23	$[y, -y, 0]$	[23,39]
24	$[-y, 0, -y]$	[24,36]

Table 9: Wyckoff site: 24i, site symmetry: ...2

No.	position	mapping
1	$[\frac{1}{4}, y, \frac{1}{2} - y]$	[1,14]
2	$[\frac{3}{4}, y, y + \frac{1}{2}]$	[2,9]
3	$[\frac{3}{4}, -y, \frac{1}{2} - y]$	[3,10]
4	$[-y, y + \frac{1}{2}, \frac{1}{4}]$	[4,21]
5	$[y, y + \frac{1}{2}, \frac{3}{4}]$	[5,23]
6	$[\frac{1}{2} - y, \frac{3}{4}, -y]$	[6,22]
7	$[y + \frac{1}{2}, \frac{1}{4}, -y]$	[7,24]
8	$[\frac{1}{4}, -y, y + \frac{1}{2}]$	[8,13]
9	$[y + \frac{1}{2}, \frac{3}{4}, y]$	[11,20]
10	$[\frac{1}{2} - y, \frac{1}{4}, y]$	[12,17]
11	$[-y, \frac{1}{2} - y, \frac{3}{4}]$	[15,19]
12	$[y, \frac{1}{2} - y, \frac{1}{4}]$	[16,18]
13	$[\frac{3}{4}, y + \frac{1}{2}, -y]$	[25,38]
14	$[\frac{1}{4}, y + \frac{1}{2}, y]$	[26,33]
15	$[\frac{1}{4}, \frac{1}{2} - y, -y]$	[27,34]
16	$[\frac{1}{2} - y, y, \frac{3}{4}]$	[28,45]
17	$[y + \frac{1}{2}, y, \frac{1}{4}]$	[29,47]
18	$[-y, \frac{1}{4}, \frac{1}{2} - y]$	[30,46]
19	$[y, \frac{3}{4}, \frac{1}{2} - y]$	[31,48]
20	$[\frac{3}{4}, \frac{1}{2} - y, y]$	[32,37]
21	$[y, \frac{1}{4}, y + \frac{1}{2}]$	[35,44]
22	$[-y, \frac{3}{4}, y + \frac{1}{2}]$	[36,41]
23	$[\frac{1}{2} - y, -y, \frac{1}{4}]$	[39,43]
24	$[y + \frac{1}{2}, -y, \frac{3}{4}]$	[40,42]

Table 10: Wyckoff site: 48j, site symmetry: 1

No.	position	mapping
1	$[x, y, z]$	[1]
2	$[x + \frac{1}{2}, \frac{1}{2} - z, y + \frac{1}{2}]$	[2]
3	$[x + \frac{1}{2}, z + \frac{1}{2}, \frac{1}{2} - y]$	[3]
4	$[z + \frac{1}{2}, y + \frac{1}{2}, \frac{1}{2} - x]$	[4]
5	$[\frac{1}{2} - z, y + \frac{1}{2}, x + \frac{1}{2}]$	[5]
6	$[\frac{1}{2} - y, x + \frac{1}{2}, z + \frac{1}{2}]$	[6]
7	$[y + \frac{1}{2}, \frac{1}{2} - x, z + \frac{1}{2}]$	[7]
8	$[x, -y, -z]$	[8]
9	$[-x, y, -z]$	[9]
10	$[-x, -y, z]$	[10]
11	$[y + \frac{1}{2}, x + \frac{1}{2}, \frac{1}{2} - z]$	[11]
12	$[\frac{1}{2} - y, \frac{1}{2} - x, \frac{1}{2} - z]$	[12]
13	$[\frac{1}{2} - x, z + \frac{1}{2}, y + \frac{1}{2}]$	[13]
14	$[\frac{1}{2} - x, \frac{1}{2} - z, \frac{1}{2} - y]$	[14]
15	$[z + \frac{1}{2}, \frac{1}{2} - y, x + \frac{1}{2}]$	[15]
16	$[\frac{1}{2} - z, \frac{1}{2} - y, \frac{1}{2} - x]$	[16]
17	$[z, x, y]$	[17]
18	$[y, z, x]$	[18]
19	$[-y, z, -x]$	[19]
20	$[-z, -x, y]$	[20]
21	$[-y, -z, x]$	[21]
22	$[z, -x, -y]$	[22]
23	$[y, -z, -x]$	[23]
24	$[-z, x, -y]$	[24]
25	$[x + \frac{1}{2}, y + \frac{1}{2}, z + \frac{1}{2}]$	[25]
26	$[x, -z, y]$	[26]
27	$[x, z, -y]$	[27]
28	$[z, y, -x]$	[28]
29	$[-z, y, x]$	[29]
30	$[-y, x, z]$	[30]
31	$[y, -x, z]$	[31]
32	$[x + \frac{1}{2}, \frac{1}{2} - y, \frac{1}{2} - z]$	[32]
33	$[\frac{1}{2} - x, y + \frac{1}{2}, \frac{1}{2} - z]$	[33]
34	$[\frac{1}{2} - x, \frac{1}{2} - y, z + \frac{1}{2}]$	[34]
35	$[y, x, -z]$	[35]
36	$[-y, -x, -z]$	[36]
37	$[-x, z, y]$	[37]
38	$[-x, -z, -y]$	[38]
39	$[z, -y, x]$	[39]
40	$[-z, -y, -x]$	[40]
41	$[z + \frac{1}{2}, x + \frac{1}{2}, y + \frac{1}{2}]$	[41]
42	$[y + \frac{1}{2}, z + \frac{1}{2}, x + \frac{1}{2}]$	[42]
43	$[\frac{1}{2} - y, z + \frac{1}{2}, \frac{1}{2} - x]$	[43]
44	$[\frac{1}{2} - z, \frac{1}{2} - x, y + \frac{1}{2}]$	[44]
45	$[\frac{1}{2} - y, \frac{1}{2} - z, x + \frac{1}{2}]$	[45]
46	$[z + \frac{1}{2}, \frac{1}{2} - x, \frac{1}{2} - y]$	[46]

*continued ...*

Table 10

No.	position	mapping
47	$[y + \frac{1}{2}, \frac{1}{2} - z, \frac{1}{2} - x]$	[47]
48	$[\frac{1}{2} - z, x + \frac{1}{2}, \frac{1}{2} - y]$	[48]