# SG No. 12 $C_{2h}^3$ $C2/m$ (b-axis setting) [ monoclinic ]

* plus set: $+[0, 0, 0]$, $+\left[\frac{1}{2}, \frac{1}{2}, 0\right]$
* Wyckoff site: `2a`, site symmetry: `2/m`

Table 1: Wyckoff bond: `2a@2a`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, 0, Z]$ | $[0, 0, 0]$ | `[1,-2,-3,4]` |

Table 2: Wyckoff bond: `2b@2a`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[0, Y, 0]$ | $[0, 0, 0]$ | `[1,2,-3,-4]` |

Table 3: Wyckoff bond: `4c@2a`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, Y, Z]$ | $[0, 0, 0]$ | `[1,-3]` |
| 2 | $[-X, Y, -Z]$ | $[0, 0, 0]$ | `[2,-4]` |

* Wyckoff site: `2b`, site symmetry: `2/m`

Table 4: Wyckoff bond: `2a@2b`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, 0, Z]$ | $\left[0, \frac{1}{2}, 0\right]$ | `[1,-2,-3,4]` |

Table 5: Wyckoff bond: `2b@2b`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[0, Y, 0]$ | $\left[0, \frac{1}{2}, 0\right]$ | `[1,2,-3,-4]` |

Table 6: Wyckoff bond: `4c@2b`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, Y, Z]$ | $\left[0, \frac{1}{2}, 0\right]$ | `[1,-3]` |
| 2 | $[-X, Y, -Z]$ | $\left[0, \frac{1}{2}, 0\right]$ | `[2,-4]` |

* Wyckoff site: 2c, site symmetry: 2/m

Table 7: Wyckoff bond: 2a@2c

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, 0, Z]$ | $[0, 0, \frac{1}{2}]$ | [1,-2,-3,4] |

Table 8: Wyckoff bond: 2b@2c

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[0, Y, 0]$ | $[0, 0, \frac{1}{2}]$ | [1,2,-3,-4] |

Table 9: Wyckoff bond: 4c@2c

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, Y, Z]$ | $[0, 0, \frac{1}{2}]$ | [1,-3] |
| 2 | $[-X, Y, -Z]$ | $[0, 0, \frac{1}{2}]$ | [2,-4] |

* Wyckoff site: 2d, site symmetry: 2/m

Table 10: Wyckoff bond: 2a@2d

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, 0, Z]$ | $[0, \frac{1}{2}, \frac{1}{2}]$ | [1,-2,-3,4] |

Table 11: Wyckoff bond: 2b@2d

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[0, Y, 0]$ | $[0, \frac{1}{2}, \frac{1}{2}]$ | [1,2,-3,-4] |

Table 12: Wyckoff bond: 4c@2d

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, Y, Z]$ | $[0, \frac{1}{2}, \frac{1}{2}]$ | [1,-3] |
| 2 | $[-X, Y, -Z]$ | $[0, \frac{1}{2}, \frac{1}{2}]$ | [2,-4] |

* Wyckoff site: 4e, site symmetry: -1

Table 13: Wyckoff bond: `4a@4e`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, Y, Z]$ | $[\frac{1}{4}, \frac{1}{4}, 0]$ | `[1,-3]` |
| 2 | $[-X, Y, -Z]$ | $[\frac{3}{4}, \frac{1}{4}, 0]$ | `[2,-4]` |

* Wyckoff site: `4f`, site symmetry: `-1`

Table 14: Wyckoff bond: `4a@4f`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, Y, Z]$ | $[\frac{1}{4}, \frac{1}{4}, \frac{1}{2}]$ | `[1,-3]` |
| 2 | $[-X, Y, -Z]$ | $[\frac{3}{4}, \frac{1}{4}, \frac{1}{2}]$ | `[2,-4]` |

* Wyckoff site: `4g`, site symmetry: `2`

Table 15: Wyckoff bond: `4a@4g`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, 0, Z]$ | $[0, y, 0]$ | `[1,-2]` |
| 2 | $[-X, 0, -Z]$ | $[0, -y, 0]$ | `[3,-4]` |

Table 16: Wyckoff bond: `4b@4g`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[0, Y, 0]$ | $[0, y, 0]$ | `[1,2]` |
| 2 | $[0, -Y, 0]$ | $[0, -y, 0]$ | `[3,4]` |

Table 17: Wyckoff bond: `8c@4g`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, Y, Z]$ | $[0, y, 0]$ | `[1]` |
| 2 | $[-X, Y, -Z]$ | $[0, y, 0]$ | `[2]` |
| 3 | $[-X, -Y, -Z]$ | $[0, -y, 0]$ | `[3]` |
| 4 | $[X, -Y, Z]$ | $[0, -y, 0]$ | `[4]` |

* Wyckoff site: `4h`, site symmetry: `2`

Table 18: Wyckoff bond: `4a@4h`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, 0, Z]$ | $\left[0, y, \frac{1}{2}\right]$ | `[1,-2]` |
| 2 | $[-X, 0, -Z]$ | $\left[0, -y, \frac{1}{2}\right]$ | `[3,-4]` |

Table 19: Wyckoff bond: `4b@4h`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[0, Y, 0]$ | $\left[0, y, \frac{1}{2}\right]$ | `[1,2]` |
| 2 | $[0, -Y, 0]$ | $\left[0, -y, \frac{1}{2}\right]$ | `[3,4]` |

Table 20: Wyckoff bond: `8c@4h`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, Y, Z]$ | $\left[0, y, \frac{1}{2}\right]$ | `[1]` |
| 2 | $[-X, Y, -Z]$ | $\left[0, y, \frac{1}{2}\right]$ | `[2]` |
| 3 | $[-X, -Y, -Z]$ | $\left[0, -y, \frac{1}{2}\right]$ | `[3]` |
| 4 | $[X, -Y, Z]$ | $\left[0, -y, \frac{1}{2}\right]$ | `[4]` |

* Wyckoff site: `4i`, site symmetry: `m`

Table 21: Wyckoff bond: `4a@4i`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, 0, Z]$ | $[x, 0, z]$ | `[1,4]` |
| 2 | $[-X, 0, -Z]$ | $[-x, 0, -z]$ | `[2,3]` |

Table 22: Wyckoff bond: `4b@4i`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[0, Y, 0]$ | $[x, 0, z]$ | `[1,-4]` |
| 2 | $[0, Y, 0]$ | $[-x, 0, -z]$ | `[2,-3]` |

Table 23: Wyckoff bond: `8c@4i`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, Y, Z]$ | $[x, 0, z]$ | `[1]` |
| 2 | $[-X, Y, -Z]$ | $[-x, 0, -z]$ | `[2]` |
| 3 | $[-X, -Y, -Z]$ | $[-x, 0, -z]$ | `[3]` |
| 4 | $[X, -Y, Z]$ | $[x, 0, z]$ | `[4]` |

* Wyckoff site: `8j`, site symmetry: `1`

Table 24: Wyckoff bond: `8a@8j`

| No. | vector | center | mapping |
|---|---|---|---|
| 1 | $[X, Y, Z]$ | $[x, y, z]$ | `[1]` |
| 2 | $[-X, Y, -Z]$ | $[-x, y, -z]$ | `[2]` |
| 3 | $[-X, -Y, -Z]$ | $[-x, -y, -z]$ | `[3]` |
| 4 | $[X, -Y, Z]$ | $[x, -y, z]$ | `[4]` |