

# Model for “SnTe”

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## General Condition

- Basis type: **lgs**
- SAMB selection:
  - Type: **[Q, G]**
  - Rank: **[0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]**
  - Irrep.: **[A<sub>1</sub>, A<sub>2</sub>, B<sub>1</sub>, B<sub>2</sub>]**
  - Spin (s): **[0, 1]**
- Max. neighbor: **10**
- Search cell range: **(-2, 3), (-2, 3), (-2, 3)**
- Toroidal priority: **false**

## Group and Unit Cell

- Group: SG No. 31  $C_{2v}^7$   $Pmn2_1$  [ orthorhombic ]
- Associated point group: PG No. 31  $C_{2v}$   $mm2$  [ orthorhombic ]
- Unit cell:  
 $a = 4.55900$ ,  $b = 6.00000$ ,  $c = 4.57000$ ,  $\alpha = 90.0$ ,  $\beta = 90.0$ ,  $\gamma = 90.0$
- Lattice vectors (conventional cell):  
 $\mathbf{a}_1 = [ 4.55900, 0.00000, 0.00000 ]$   
 $\mathbf{a}_2 = [ 0.00000, 6.00000, 0.00000 ]$   
 $\mathbf{a}_3 = [ 0.00000, 0.00000, 4.57000 ]$

## Symmetry Operation

Table 1: Symmetry operation

#	SO	#	SO	#	SO	#	SO	#	SO
1	{1 0}	2	{2 <sub>001</sub>  \frac{1}{2}0\frac{1}{2}}	3	{m <sub>010</sub>  \frac{1}{2}0\frac{1}{2}}	4	{m <sub>100</sub>  0}		

Table 2: Harmonics

#	symbol	irrep.	rank	X	multiplicity	component	symmetry
1	$\mathbb{Q}_0(A_1)$	$A_1$	0	$Q, T$	-	-	1
2	$\mathbb{Q}_1(A_1)$	$A_1$	1	$Q, T$	-	-	$z$
3	$\mathbb{G}_2(A_1)$	$A_1$	2	$G, M$	-	-	$\sqrt{3}xy$
4	$\mathbb{Q}_2(A_1, 1)$	$A_1$	2	$Q, T$	1	-	$-\frac{x^2}{2} - \frac{y^2}{2} + z^2$
5	$\mathbb{Q}_2(A_1, 2)$	$A_1$	2	$Q, T$	2	-	$\frac{\sqrt{3}(x-y)(x+y)}{2}$
6	$\mathbb{G}_3(A_1)$	$A_1$	3	$G, M$	-	-	$\sqrt{15}xyz$
7	$\mathbb{Q}_3(A_1, 1)$	$A_1$	3	$Q, T$	1	-	$-\frac{z(3x^2+3y^2-2z^2)}{2}$
8	$\mathbb{Q}_3(A_1, 2)$	$A_1$	3	$Q, T$	2	-	$\frac{\sqrt{15}z(x-y)(x+y)}{2}$
9	$\mathbb{G}_4(A_1, 1)$	$A_1$	4	$G, M$	1	-	$\frac{\sqrt{35}xy(x-y)(x+y)}{2}$
10	$\mathbb{G}_0(A_2)$	$A_2$	0	$G, M$	-	-	1
11	$\mathbb{G}_1(A_2)$	$A_2$	1	$G, M$	-	-	$z$
12	$\mathbb{G}_2(A_2, 1)$	$A_2$	2	$G, M$	1	-	$-\frac{x^2}{2} - \frac{y^2}{2} + z^2$
13	$\mathbb{G}_2(A_2, 2)$	$A_2$	2	$G, M$	2	-	$\frac{\sqrt{3}(x-y)(x+y)}{2}$
14	$\mathbb{Q}_2(A_2)$	$A_2$	2	$Q, T$	-	-	$\sqrt{3}xy$
15	$\mathbb{G}_3(A_2, 1)$	$A_2$	3	$G, M$	1	-	$-\frac{z(3x^2+3y^2-2z^2)}{2}$
16	$\mathbb{G}_3(A_2, 2)$	$A_2$	3	$G, M$	2	-	$\frac{\sqrt{15}z(x-y)(x+y)}{2}$

*continued ...*

Table 2

#	symbol	irrep.	rank	X	multiplicity	component	symmetry
17	$\mathbb{Q}_3(A_2)$	$A_2$	3	$Q, T$	-	-	$\sqrt{15}xyz$
18	$\mathbb{G}_4(A_2, 1)$	$A_2$	4	$G, M$	1	-	$\frac{\sqrt{21}(x^4-3x^2y^2-3x^2z^2+y^4-3y^2z^2+z^4)}{6}$
19	$\mathbb{Q}_4(A_2, 1)$	$A_2$	4	$Q, T$	1	-	$\frac{\sqrt{35}xy(x-y)(x+y)}{2}$
20	$\mathbb{G}_1(B_1)$	$B_1$	1	$G, M$	-	-	$y$
21	$\mathbb{Q}_1(B_1)$	$B_1$	1	$Q, T$	-	-	$x$
22	$\mathbb{G}_2(B_1)$	$B_1$	2	$G, M$	-	-	$\sqrt{3}yz$
23	$\mathbb{Q}_2(B_1)$	$B_1$	2	$Q, T$	-	-	$\sqrt{3}xz$
24	$\mathbb{G}_3(B_1, 1)$	$B_1$	3	$G, M$	1	-	$-\frac{y(3x^2-2y^2+3z^2)}{2}$
25	$\mathbb{G}_3(B_1, 2)$	$B_1$	3	$G, M$	2	-	$-\frac{\sqrt{15}y(x-z)(x+z)}{2}$
26	$\mathbb{Q}_3(B_1, 1)$	$B_1$	3	$Q, T$	1	-	$\frac{x(2x^2-3y^2-3z^2)}{2}$
27	$\mathbb{Q}_3(B_1, 2)$	$B_1$	3	$Q, T$	2	-	$\frac{\sqrt{15}x(y-z)(y+z)}{2}$
28	$\mathbb{Q}_4(B_1, 1)$	$B_1$	4	$Q, T$	1	-	$-\frac{\sqrt{35}xz(x-z)(x+z)}{2}$
29	$\mathbb{G}_1(B_2)$	$B_2$	1	$G, M$	-	-	$x$
30	$\mathbb{Q}_1(B_2)$	$B_2$	1	$Q, T$	-	-	$y$
31	$\mathbb{G}_2(B_2)$	$B_2$	2	$G, M$	-	-	$\sqrt{3}xz$
32	$\mathbb{Q}_2(B_2)$	$B_2$	2	$Q, T$	-	-	$\sqrt{3}yz$
33	$\mathbb{G}_3(B_2, 1)$	$B_2$	3	$G, M$	1	-	$\frac{x(2x^2-3y^2-3z^2)}{2}$
34	$\mathbb{G}_3(B_2, 2)$	$B_2$	3	$G, M$	2	-	$\frac{\sqrt{15}x(y-z)(y+z)}{2}$
35	$\mathbb{Q}_3(B_2, 1)$	$B_2$	3	$Q, T$	1	-	$-\frac{y(3x^2-2y^2+3z^2)}{2}$
36	$\mathbb{Q}_3(B_2, 2)$	$B_2$	3	$Q, T$	2	-	$-\frac{\sqrt{15}y(x-z)(x+z)}{2}$
37	$\mathbb{Q}_4(B_2, 1)$	$B_2$	4	$Q, T$	1	-	$\frac{\sqrt{35}yz(y-z)(y+z)}{2}$

Table 3: dimension = 24

#	orbital@atom(SL)	#	orbital@atom(SL)	#	orbital@atom(SL)	#	orbital@atom(SL)	#	orbital@atom(SL)
1	$ p_x, \uparrow\rangle @\text{Sn}(1)$	2	$ p_x, \downarrow\rangle @\text{Sn}(1)$	3	$ p_y, \uparrow\rangle @\text{Sn}(1)$	4	$ p_y, \downarrow\rangle @\text{Sn}(1)$	5	$ p_z, \uparrow\rangle @\text{Sn}(1)$
6	$ p_z, \downarrow\rangle @\text{Sn}(1)$	7	$ p_x, \uparrow\rangle @\text{Sn}(2)$	8	$ p_x, \downarrow\rangle @\text{Sn}(2)$	9	$ p_y, \uparrow\rangle @\text{Sn}(2)$	10	$ p_y, \downarrow\rangle @\text{Sn}(2)$
11	$ p_z, \uparrow\rangle @\text{Sn}(2)$	12	$ p_z, \downarrow\rangle @\text{Sn}(2)$	13	$ p_x, \uparrow\rangle @\text{Te}(1)$	14	$ p_x, \downarrow\rangle @\text{Te}(1)$	15	$ p_y, \uparrow\rangle @\text{Te}(1)$
16	$ p_y, \downarrow\rangle @\text{Te}(1)$	17	$ p_z, \uparrow\rangle @\text{Te}(1)$	18	$ p_z, \downarrow\rangle @\text{Te}(1)$	19	$ p_x, \uparrow\rangle @\text{Te}(2)$	20	$ p_x, \downarrow\rangle @\text{Te}(2)$
21	$ p_y, \uparrow\rangle @\text{Te}(2)$	22	$ p_y, \downarrow\rangle @\text{Te}(2)$	23	$ p_z, \uparrow\rangle @\text{Te}(2)$	24	$ p_z, \downarrow\rangle @\text{Te}(2)$		

Table 4: Atomic basis (orbital part only)

orbital	definition
$ p_x\rangle$	$x$
$ p_y\rangle$	$y$
$ p_z\rangle$	$z$

564 (all 564) SAMBs

• 'Sn' site-cluster

\* bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

\* ket:  $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

\* wyckoff: **2a**

$$\boxed{\text{z1}} \quad \mathbb{Q}_0^{(c)}(A_1) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z2}} \quad \mathbb{Q}_1^{(c)}(A_1) = \mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z3}} \quad \mathbb{Q}_2^{(c)}(A_1, 1) = \mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z4}} \quad \mathbb{Q}_2^{(c)}(A_1, 2) = \mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z5}} \quad \mathbb{Q}_1^{(1, -1; c)}(A_1) = \mathbb{Q}_2^{(1, -1; a)}(B_2)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z6}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 1) = \mathbb{Q}_2^{(1, -1; a)}(A_1, 1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z7}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 2) = \mathbb{Q}_2^{(1, -1; a)}(A_1, 2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z8}} \quad \mathbb{Q}_1^{(1, 0; c)}(A_1) = \mathbb{G}_1^{(1, 0; a)}(B_2)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z9}} \quad \mathbb{Q}_0^{(1, 1; c)}(A_1) = \mathbb{Q}_0^{(1, 1; a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z145}} \quad \mathbb{Q}_2^{(c)}(A_2) = \mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z146}} \quad \mathbb{Q}_3^{(c)}(A_2) = \mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z147}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_2) = \mathbb{Q}_2^{(1, -1; a)}(A_2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z148}} \quad \mathbb{Q}_3^{(1, -1; c)}(A_2) = \mathbb{Q}_2^{(1, -1; a)}(B_1)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z149}} \quad \mathbb{Q}_1^{(c)}(B_1) = \mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z150}} \quad \mathbb{Q}_2^{(c)}(B_1) = \mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\begin{aligned}
\boxed{\text{z283}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_1) &= \mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_1^{(s)}(B_2) \\
\boxed{\text{z284}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_1) &= \mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_0^{(s)}(A_1) \\
\boxed{\text{z285}} \quad \mathbb{Q}_1^{(1,0;c)}(B_1) &= -\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(s)}(B_2) \\
\boxed{\text{z286}} \quad \mathbb{Q}_1^{(c)}(B_2, a) &= \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(s)}(B_2) \\
\boxed{\text{z287}} \quad \mathbb{Q}_1^{(c)}(B_2, b) &= -\frac{\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(s)}(B_2)}{2} - \frac{\sqrt{3}\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(s)}(B_2)}{2} \\
\boxed{\text{z288}} \quad \mathbb{Q}_2^{(c)}(B_2) &= \mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_0^{(s)}(A_1) \\
\boxed{\text{z421}} \quad \mathbb{Q}_3^{(c)}(B_2, 2) &= \frac{\sqrt{3}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(s)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(s)}(B_2)}{2} \\
\boxed{\text{z422}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_2) &= -\frac{\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(s)}(B_2)}{2} - \frac{\sqrt{3}\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(s)}(B_2)}{2} \\
\boxed{\text{z423}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_2) &= \mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_0^{(s)}(A_1) \\
\boxed{\text{z424}} \quad \mathbb{Q}_3^{(1,-1;c)}(B_2, 2) &= \frac{\sqrt{3}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(s)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(s)}(B_2)}{2} \\
\boxed{\text{z425}} \quad \mathbb{Q}_1^{(1,1;c)}(B_2) &= \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(s)}(B_2) \\
\boxed{\text{z426}} \quad \mathbb{G}_0^{(1,0;c)}(A_2) &= \mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(s)}(B_2) \\
\boxed{\text{z427}} \quad \mathbb{G}_1^{(1,0;c)}(A_2) &= \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(s)}(A_1) \\
\boxed{\text{z428}} \quad \mathbb{G}_1^{(1,0;c)}(B_1) &= \mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_0^{(s)}(A_1) \\
\boxed{\text{z429}} \quad \mathbb{G}_1^{(1,0;c)}(B_2) &= \mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_0^{(s)}(A_1)
\end{aligned}$$

• 'Te' site-cluster

- \* bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$
- \* ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

\* wyckoff: 2a

$$\boxed{\text{z10}} \quad \mathbb{Q}_0^{(c)}(A_1) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z11}} \quad \mathbb{Q}_1^{(c)}(A_1) = \mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z12}} \quad \mathbb{Q}_2^{(c)}(A_1, 1) = \mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z13}} \quad \mathbb{Q}_2^{(c)}(A_1, 2) = \mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z14}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_1) = \mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z15}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, 1) = \mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z16}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, 2) = \mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z17}} \quad \mathbb{Q}_1^{(1,0;c)}(A_1) = \mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z18}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z151}} \quad \mathbb{Q}_2^{(c)}(A_2) = \mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z152}} \quad \mathbb{Q}_3^{(c)}(A_2) = \mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z153}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_2) = \mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z154}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2) = \mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z155}} \quad \mathbb{Q}_1^{(c)}(B_1) = \mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z156}} \quad \mathbb{Q}_2^{(c)}(B_1) = \mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z289}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_1) = \mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z290}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_1) = \mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z291}} \quad \mathbb{Q}_1^{(1,0;c)}(B_1) = -\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z292}} \quad \mathbb{Q}_1^{(c)}(B_2, a) = \mathbb{Q}_0^{(a)}(A_1) \mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z293}} \quad \mathbb{Q}_1^{(c)}(B_2, b) = -\frac{\mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_1^{(s)}(B_2)}{2} - \frac{\sqrt{3} \mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_1^{(s)}(B_2)}{2}$$

$$\boxed{\text{z294}} \quad \mathbb{Q}_2^{(c)}(B_2) = \mathbb{Q}_2^{(a)}(B_2) \mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z430}} \quad \mathbb{Q}_3^{(c)}(B_2, 2) = \frac{\sqrt{3} \mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_1^{(s)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_1^{(s)}(B_2)}{2}$$

$$\boxed{\text{z431}} \quad \mathbb{Q}_1^{(1, -1; c)}(B_2) = -\frac{\mathbb{Q}_2^{(1, -1; a)}(A_1, 1) \mathbb{Q}_1^{(s)}(B_2)}{2} - \frac{\sqrt{3} \mathbb{Q}_2^{(1, -1; a)}(A_1, 2) \mathbb{Q}_1^{(s)}(B_2)}{2}$$

$$\boxed{\text{z432}} \quad \mathbb{Q}_2^{(1, -1; c)}(B_2) = \mathbb{Q}_2^{(1, -1; a)}(B_2) \mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z433}} \quad \mathbb{Q}_3^{(1, -1; c)}(B_2, 2) = \frac{\sqrt{3} \mathbb{Q}_2^{(1, -1; a)}(A_1, 1) \mathbb{Q}_1^{(s)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(1, -1; a)}(A_1, 2) \mathbb{Q}_1^{(s)}(B_2)}{2}$$

$$\boxed{\text{z434}} \quad \mathbb{Q}_1^{(1, 1; c)}(B_2) = \mathbb{Q}_0^{(1, 1; a)}(A_1) \mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z435}} \quad \mathbb{G}_0^{(1, 0; c)}(A_2) = \mathbb{G}_1^{(1, 0; a)}(B_1) \mathbb{Q}_1^{(s)}(B_2)$$

$$\boxed{\text{z436}} \quad \mathbb{G}_1^{(1, 0; c)}(A_2) = \mathbb{G}_1^{(1, 0; a)}(A_2) \mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z437}} \quad \mathbb{G}_1^{(1, 0; c)}(B_1) = \mathbb{G}_1^{(1, 0; a)}(B_1) \mathbb{Q}_0^{(s)}(A_1)$$

$$\boxed{\text{z438}} \quad \mathbb{G}_1^{(1, 0; c)}(B_2) = \mathbb{G}_1^{(1, 0; a)}(B_2) \mathbb{Q}_0^{(s)}(A_1)$$

• 'Sn'-'Sn' bond-cluster

\* bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

\* ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

\* wyckoff: **4a@4b**

$$\boxed{\text{z19}} \quad \mathbb{Q}_0^{(c)}(A_1, a) = \mathbb{Q}_0^{(a)}(A_1) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z20}} \quad \mathbb{Q}_0^{(c)}(A_1, b) = \mathbb{Q}_2^{(a)}(A_2) \mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z21}} \quad \mathbb{Q}_0^{(c)}(A_1, c) = \mathbb{M}_1^{(a)}(A_2) \mathbb{M}_1^{(b)}(A_2)$$



$$\boxed{\text{z22}} \quad \mathbb{Q}_1^{(c)}(A_1, a) = \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z23}} \quad \mathbb{Q}_1^{(c)}(A_1, b) = -\frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z24}} \quad \mathbb{Q}_2^{(c)}(A_1, 1) = \mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z25}} \quad \mathbb{Q}_2^{(c)}(A_1, 2) = \mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z26}} \quad \mathbb{Q}_3^{(c)}(A_1, 2) = \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z27}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_1, a) = \mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z28}} \quad \mathbb{Q}_0^{(1,-1;c)}(A_1, b) = \mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z29}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_1, a) = \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z30}} \quad \mathbb{Q}_1^{(1,-1;c)}(A_1, b) = -\frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z31}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, 1a) = \mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z32}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, 1b) = \mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z33}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, 2a) = \mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z34}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_1, 2b) = \mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z35}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, 1) = \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_2)}{4}$$

$$\boxed{\text{z36}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, 2a) = \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z37}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, 2b) = \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_1)}{8} - \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_1)}{8} + \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_2)}{8} + \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_2)}{8}$$

$$\boxed{\text{z38}} \quad \mathbb{Q}_1^{(1,0;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z39}} \quad \mathbb{Q}_1^{(1,0;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z40}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 1) = \mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z41}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 2a) = -\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z42}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 2b) = \mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z43}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 2c) = \mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z44}} \quad \mathbb{Q}_3^{(1,0;c)}(A_1, 2) = \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} - \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z45}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1, a) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z46}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1, b) = \mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z47}} \quad \mathbb{Q}_1^{(1,1;c)}(A_1) = -\frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z48}} \quad \mathbb{Q}_2^{(c)}(A_2, a) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z49}} \quad \mathbb{Q}_2^{(c)}(A_2, b) = \mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z50}} \quad \mathbb{Q}_2^{(c)}(A_2, c) = -\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z51}} \quad \mathbb{Q}_3^{(c)}(A_2) = \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z52}} \quad \mathbb{Q}_4^{(c)}(A_2, 1) = \mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z53}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_2, a) = \mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z54}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_2, b) = -\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z157}} \quad \mathbb{Q}_2^{(1,-1;c)}(A_2, c) = \mathbb{M}_3^{(1,-1;a)}(A_1) \mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z158}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, a) = \frac{\sqrt{2} \mathbb{Q}_2^{(1,-1;a)}(B_1) \mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2} \mathbb{Q}_2^{(1,-1;a)}(B_2) \mathbb{Q}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z159}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_2, b) = -\frac{\sqrt{2} \mathbb{M}_3^{(1,-1;a)}(B_1, 2) \mathbb{T}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2} \mathbb{M}_3^{(1,-1;a)}(B_2, 2) \mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z160}} \quad \mathbb{Q}_4^{(1,-1;c)}(A_2, 1) = \mathbb{Q}_2^{(1,-1;a)}(A_1, 2) \mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z161}} \quad \mathbb{Q}_2^{(1,0;c)}(A_2, a) = \mathbb{T}_2^{(1,0;a)}(A_2) \mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z162}} \quad \mathbb{Q}_2^{(1,0;c)}(A_2, b) = -\mathbb{T}_2^{(1,0;a)}(A_1, 2) \mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z163}} \quad \mathbb{Q}_3^{(1,0;c)}(A_2) = \frac{\sqrt{2} \mathbb{T}_2^{(1,0;a)}(B_1) \mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2} \mathbb{T}_2^{(1,0;a)}(B_2) \mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z164}} \quad \mathbb{Q}_2^{(1,1;c)}(A_2) = \mathbb{Q}_0^{(1,1;a)}(A_1) \mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z165}} \quad \mathbb{Q}_1^{(c)}(B_1, a) = \mathbb{Q}_0^{(a)}(A_1) \mathbb{Q}_1^{(b)}(B_1)$$

$$\boxed{\text{z166}} \quad \mathbb{Q}_1^{(c)}(B_1, b) = -\frac{\sqrt{7} \mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21} \mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21} \mathbb{Q}_2^{(a)}(A_2) \mathbb{Q}_1^{(b)}(B_2)}{7}$$

$$\boxed{\text{z167}} \quad \mathbb{Q}_1^{(c)}(B_1, c) = -\mathbb{M}_1^{(a)}(A_2) \mathbb{T}_1^{(b)}(B_2)$$

$$\boxed{\text{z168}} \quad \mathbb{Q}_2^{(c)}(B_1, a) = \mathbb{Q}_2^{(a)}(B_1) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z169}} \quad \mathbb{Q}_2^{(c)}(B_1, b) = \mathbb{Q}_2^{(a)}(B_2) \mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z170}} \quad \mathbb{Q}_2^{(c)}(B_1, c) = \mathbb{M}_1^{(a)}(B_2) \mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z171}} \quad \mathbb{Q}_3^{(c)}(B_1, 1) = -\frac{\sqrt{21} \mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_1)}{14} + \frac{3\sqrt{7} \mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_1)}{14} - \frac{2\sqrt{7} \mathbb{Q}_2^{(a)}(A_2) \mathbb{Q}_1^{(b)}(B_2)}{7}$$

$$\boxed{\text{z172}} \quad \mathbb{Q}_3^{(c)}(B_1, 2) = -\frac{\sqrt{3} \mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_1)}{2}$$

$$\begin{aligned}
\boxed{\text{z173}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_1, a) &= -\frac{\sqrt{7}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z174}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_1, b) &= -\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z175}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_1, a) &= \mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z176}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_1, b) &= \mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z177}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_1, c) &= -\frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{M}_1^{(b)}(A_2)}{4} - \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{M}_1^{(b)}(A_2)}{4} \\
\boxed{\text{z178}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_1, d) &= \mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z179}} \quad \mathbb{Q}_3^{(1,-1;c)}(B_1, 1a) &= -\frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_1)}{14} + \frac{3\sqrt{7}\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_1)}{14} - \frac{2\sqrt{7}\mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z180}} \quad \mathbb{Q}_3^{(1,-1;c)}(B_1, 1b) &= \frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_2)}{4} \\
\boxed{\text{z181}} \quad \mathbb{Q}_3^{(1,-1;c)}(B_1, 2a) &= -\frac{\sqrt{3}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z182}} \quad \mathbb{Q}_3^{(1,-1;c)}(B_1, 2b) &= \frac{2\sqrt{22}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(B_1)}{11} + \frac{\sqrt{330}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_2)}{44} + \frac{3\sqrt{22}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_2)}{44} \\
\boxed{\text{z183}} \quad \mathbb{Q}_4^{(1,-1;c)}(B_1, 1) &= -\frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{M}_1^{(b)}(A_2)}{4} + \frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{M}_1^{(b)}(A_2)}{4} \\
\boxed{\text{z184}} \quad \mathbb{Q}_1^{(1,0;c)}(B_1, a) &= -\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z185}} \quad \mathbb{Q}_1^{(1,0;c)}(B_1, b) &= -\frac{\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z186}} \quad \mathbb{Q}_2^{(1,0;c)}(B_1, a) &= \mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z187}} \quad \mathbb{Q}_2^{(1,0;c)}(B_1, b) &= \mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z188}} \quad \mathbb{Q}_2^{(1,0;c)}(B_1, c) &= \mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{M}_1^{(b)}(A_2)
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z189}} \quad \mathbb{Q}_3^{(1,0;c)}(B_1, 1) &= -\frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_1)}{14} + \frac{3\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_1)}{14} - \frac{2\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z190}} \quad \mathbb{Q}_3^{(1,0;c)}(B_1, 2) &= -\frac{\sqrt{3}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_1)}{2} - \frac{\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z191}} \quad \mathbb{Q}_1^{(1,1;c)}(B_1, a) &= \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(b)}(B_1) \\
\boxed{\text{z192}} \quad \mathbb{Q}_1^{(1,1;c)}(B_1, b) &= -\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z295}} \quad \mathbb{Q}_2^{(1,1;c)}(B_1) &= \mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z296}} \quad \mathbb{Q}_1^{(c)}(B_2, a) &= \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z297}} \quad \mathbb{Q}_1^{(c)}(B_2, b) &= -\frac{\sqrt{7}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{7} - \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_1^{(b)}(B_1)}{7} \\
\boxed{\text{z298}} \quad \mathbb{Q}_1^{(c)}(B_2, c) &= \mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(B_1) \\
\boxed{\text{z299}} \quad \mathbb{Q}_2^{(c)}(B_2, a) &= \mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z300}} \quad \mathbb{Q}_2^{(c)}(B_2, b) &= \mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z301}} \quad \mathbb{Q}_2^{(c)}(B_2, c) &= \mathbb{M}_1^{(a)}(B_1)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z302}} \quad \mathbb{Q}_3^{(c)}(B_2, 1) &= -\frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{3\sqrt{7}\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{2\sqrt{7}\mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_1^{(b)}(B_1)}{7} \\
\boxed{\text{z303}} \quad \mathbb{Q}_3^{(c)}(B_2, 2) &= \frac{\sqrt{3}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z304}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_2, a) &= -\frac{\sqrt{7}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{7} - \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_1^{(b)}(B_1)}{7} \\
\boxed{\text{z305}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_2, b) &= \mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(B_1) \\
\boxed{\text{z306}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_2, a) &= \mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z307}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_2, b) &= \mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_2^{(b)}(A_2)
\end{aligned}$$

$$\begin{aligned}
\text{z308} \quad \mathbb{Q}_2^{(1,-1;c)}(B_2, c) &= -\frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{M}_1^{(b)}(A_2)}{4} + \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{M}_1^{(b)}(A_2)}{4} \\
\text{z309} \quad \mathbb{Q}_2^{(1,-1;c)}(B_2, d) &= \mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{M}_1^{(b)}(A_2) \\
\text{z310} \quad \mathbb{Q}_3^{(1,-1;c)}(B_2, 1a) &= -\frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{3\sqrt{7}\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{2\sqrt{7}\mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_1^{(b)}(B_1)}{7} \\
\text{z311} \quad \mathbb{Q}_3^{(1,-1;c)}(B_2, 1b) &= -\frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_1)}{4} \\
\text{z312} \quad \mathbb{Q}_3^{(1,-1;c)}(B_2, 2a) &= \frac{\sqrt{3}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{2} \\
\text{z313} \quad \mathbb{Q}_3^{(1,-1;c)}(B_2, 2b) &= \frac{2\sqrt{22}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(B_2)}{11} + \frac{\sqrt{330}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_1)}{44} - \frac{3\sqrt{22}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_1)}{44} \\
\text{z314} \quad \mathbb{Q}_4^{(1,-1;c)}(B_2, 1) &= \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{M}_1^{(b)}(A_2)}{4} + \frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{M}_1^{(b)}(A_2)}{4} \\
\text{z315} \quad \mathbb{Q}_1^{(1,0;c)}(B_2, a) &= \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(B_1) \\
\text{z316} \quad \mathbb{Q}_1^{(1,0;c)}(B_2, b) &= -\frac{\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_2)}{7} - \frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_2)}{7} + \frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(B_1)}{7} \\
\text{z317} \quad \mathbb{Q}_2^{(1,0;c)}(B_2, a) &= -\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_2^{(b)}(A_2) \\
\text{z318} \quad \mathbb{Q}_2^{(1,0;c)}(B_2, b) &= \mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{T}_0^{(b)}(A_1) \\
\text{z319} \quad \mathbb{Q}_2^{(1,0;c)}(B_2, c) &= -\mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{M}_1^{(b)}(A_2) \\
\text{z320} \quad \mathbb{Q}_3^{(1,0;c)}(B_2, 1) &= -\frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_2)}{14} - \frac{3\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_2)}{14} - \frac{2\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(B_1)}{7} \\
\text{z321} \quad \mathbb{Q}_3^{(1,0;c)}(B_2, 2) &= \frac{\sqrt{3}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_2)}{2} - \frac{\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_2)}{2} \\
\text{z322} \quad \mathbb{Q}_1^{(1,1;c)}(B_2, a) &= \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(b)}(B_2) \\
\text{z323} \quad \mathbb{Q}_1^{(1,1;c)}(B_2, b) &= \mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(B_1)
\end{aligned}$$

$$\boxed{\text{z324}} \quad \mathbb{Q}_2^{(1,1;c)}(B_2) = \mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z325}} \quad \mathbb{G}_2^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z326}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_1)}{8} - \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_1)}{8} - \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_2)}{8} + \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_2)}{8}$$

$$\boxed{\text{z327}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z328}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1) = \mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z329}} \quad \mathbb{G}_4^{(1,-1;c)}(A_1, 1) = -\frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_1)}{4} + \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_2)}{4}$$

$$\boxed{\text{z330}} \quad \mathbb{G}_2^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z439}} \quad \mathbb{G}_2^{(1,1;c)}(A_1) = \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z440}} \quad \mathbb{G}_0^{(c)}(A_2) = \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z441}} \quad \mathbb{G}_1^{(c)}(A_2) = \mathbb{M}_1^{(a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z442}} \quad \mathbb{G}_2^{(c)}(A_2, 1) = \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z443}} \quad \mathbb{G}_2^{(c)}(A_2, 2) = -\frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z444}} \quad \mathbb{G}_0^{(1,-1;c)}(A_2) = \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z445}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2) = \mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z446}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 1a) = \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2}$$

$$\begin{aligned}
\boxed{\text{z447}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 1b) &= -\frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_2)}{4} + \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_1)}{4} \\
\boxed{\text{z448}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 2a) &= -\frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z449}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 2b) &= -\frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z450}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1) &= \mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z451}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2) &= \mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z452}} \quad \mathbb{G}_4^{(1,-1;c)}(A_2, 1) &= \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_2)}{4} + \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_2)}{4} + \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_1)}{4} \\
\boxed{\text{z453}} \quad \mathbb{G}_0^{(1,0;c)}(A_2) &= \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z454}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, a) &= \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z455}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, b) &= \mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z456}} \quad \mathbb{G}_2^{(1,0;c)}(A_2, 1) &= \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z457}} \quad \mathbb{G}_2^{(1,0;c)}(A_2, 2) &= -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z458}} \quad \mathbb{G}_0^{(1,1;c)}(A_2) &= \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z459}} \quad \mathbb{G}_1^{(1,1;c)}(A_2) &= \mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z460}} \quad \mathbb{G}_2^{(1,1;c)}(A_2, 2) &= -\frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z461}} \quad \mathbb{G}_1^{(c)}(B_1) &= \mathbb{M}_1^{(a)}(B_1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z462}} \quad \mathbb{G}_1^{(1,-1;c)}(B_1) &= \mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_0^{(b)}(A_1)
\end{aligned}$$



$$\boxed{\text{z463}} \quad \mathbb{G}_2^{(1,-1;c)}(B_1) = \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(B_1)}{11} - \frac{\sqrt{55}\mathbb{M}_3^{(1,-1;a)}(A_2,1)\mathbb{T}_1^{(b)}(B_2)}{11} - \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_2,2)\mathbb{T}_1^{(b)}(B_2)}{11}$$

$$\boxed{\text{z464}} \quad \mathbb{G}_3^{(1,-1;c)}(B_1,1) = \mathbb{M}_3^{(1,-1;a)}(B_1,1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z465}} \quad \mathbb{G}_3^{(1,-1;c)}(B_1,2) = \mathbb{M}_3^{(1,-1;a)}(B_1,2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z466}} \quad \mathbb{G}_1^{(1,0;c)}(B_1) = \mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z467}} \quad \mathbb{G}_1^{(1,1;c)}(B_1) = \mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z468}} \quad \mathbb{G}_1^{(c)}(B_2) = \mathbb{M}_1^{(a)}(B_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z469}} \quad \mathbb{G}_1^{(1,-1;c)}(B_2) = \mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z470}} \quad \mathbb{G}_2^{(1,-1;c)}(B_2) = \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(B_2)}{11} - \frac{\sqrt{55}\mathbb{M}_3^{(1,-1;a)}(A_2,1)\mathbb{T}_1^{(b)}(B_1)}{11} + \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_2,2)\mathbb{T}_1^{(b)}(B_1)}{11}$$

$$\boxed{\text{z471}} \quad \mathbb{G}_3^{(1,-1;c)}(B_2,1) = \mathbb{M}_3^{(1,-1;a)}(B_2,1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z472}} \quad \mathbb{G}_3^{(1,-1;c)}(B_2,2) = \mathbb{M}_3^{(1,-1;a)}(B_2,2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z473}} \quad \mathbb{G}_1^{(1,0;c)}(B_2) = \mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z474}} \quad \mathbb{G}_1^{(1,1;c)}(B_2) = \mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_0^{(b)}(A_1)$$

• 'Sn'-'Te' bond-cluster

\* bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

\* ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$

\* wyckoff: **2a02a**

$$\boxed{\text{z55}} \quad \mathbb{Q}_0^{(c)}(A_1) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z56}} \quad \mathbb{Q}_1^{(c)}(A_1, a) = \mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)$$

$$\boxed{\text{z57}} \quad \mathbb{Q}_1^{(c)}(A_1, b) = \mathbb{M}_1^{(a)}(B_2)\mathbb{T}_1^{(b)}(B_2)$$

$$\boxed{\text{z58}} \quad \mathbb{Q}_2^{(c)}(A_1, 1) = \mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\begin{aligned}
\boxed{\text{z59}} \quad \mathbb{Q}_2^{(c)}(A_1, 2) &= \mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z60}} \quad \mathbb{Q}_1^{(1, -1; c)}(A_1, a) &= \mathbb{Q}_2^{(1, -1; a)}(B_2) \mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z61}} \quad \mathbb{Q}_1^{(1, -1; c)}(A_1, b) &= \mathbb{M}_1^{(1, -1; a)}(B_2) \mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z62}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 1) &= \mathbb{Q}_2^{(1, -1; a)}(A_1, 1) \mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z63}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 2) &= \mathbb{Q}_2^{(1, -1; a)}(A_1, 2) \mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z64}} \quad \mathbb{Q}_3^{(1, -1; c)}(A_1, 1) &= -\frac{\sqrt{6} \mathbb{M}_3^{(1, -1; a)}(B_2, 1) \mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{10} \mathbb{M}_3^{(1, -1; a)}(B_2, 2) \mathbb{T}_1^{(b)}(B_2)}{4} \\
\boxed{\text{z65}} \quad \mathbb{Q}_3^{(1, -1; c)}(A_1, 2) &= \frac{\sqrt{10} \mathbb{M}_3^{(1, -1; a)}(B_2, 1) \mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{6} \mathbb{M}_3^{(1, -1; a)}(B_2, 2) \mathbb{T}_1^{(b)}(B_2)}{4} \\
\boxed{\text{z66}} \quad \mathbb{Q}_1^{(1, 0; c)}(A_1, a) &= \mathbb{G}_1^{(1, 0; a)}(B_2) \mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z67}} \quad \mathbb{Q}_1^{(1, 0; c)}(A_1, b) &= \mathbb{T}_2^{(1, 0; a)}(B_2) \mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z68}} \quad \mathbb{Q}_2^{(1, 0; c)}(A_1, 1) &= \mathbb{T}_2^{(1, 0; a)}(A_1, 1) \mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z69}} \quad \mathbb{Q}_2^{(1, 0; c)}(A_1, 2) &= \mathbb{T}_2^{(1, 0; a)}(A_1, 2) \mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z70}} \quad \mathbb{Q}_0^{(1, 1; c)}(A_1) &= \mathbb{Q}_0^{(1, 1; a)}(A_1) \mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z71}} \quad \mathbb{Q}_1^{(1, 1; c)}(A_1) &= \mathbb{M}_1^{(1, 1; a)}(B_2) \mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z72}} \quad \mathbb{Q}_2^{(c)}(A_2) &= \mathbb{Q}_2^{(a)}(A_2) \mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z193}} \quad \mathbb{Q}_3^{(c)}(A_2) &= \mathbb{Q}_2^{(a)}(B_1) \mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z194}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_2) &= \mathbb{Q}_2^{(1, -1; a)}(A_2) \mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z195}} \quad \mathbb{Q}_3^{(1, -1; c)}(A_2, a) &= \mathbb{Q}_2^{(1, -1; a)}(B_1) \mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z196}} \quad \mathbb{Q}_3^{(1, -1; c)}(A_2, b) &= -\mathbb{M}_3^{(1, -1; a)}(B_1, 2) \mathbb{T}_1^{(b)}(B_2)
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z197}} \quad \mathbb{Q}_2^{(1,0;c)}(A_2) &= \mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z198}} \quad \mathbb{Q}_3^{(1,0;c)}(A_2) &= \mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z199}} \quad \mathbb{Q}_1^{(c)}(B_1, a) &= \mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z200}} \quad \mathbb{Q}_1^{(c)}(B_1, b) &= -\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z201}} \quad \mathbb{Q}_2^{(c)}(B_1) &= \mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z202}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_1, a) &= \mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z203}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_1, b) &= -\mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z204}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_1) &= \mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z205}} \quad \mathbb{Q}_3^{(1,-1;c)}(B_1, 1) &= \frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_2)}{4} \\
\boxed{\text{z206}} \quad \mathbb{Q}_3^{(1,-1;c)}(B_1, 2) &= \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_2)}{4} + \frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_2)}{4} \\
\boxed{\text{z207}} \quad \mathbb{Q}_1^{(1,0;c)}(B_1, a) &= -\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z208}} \quad \mathbb{Q}_1^{(1,0;c)}(B_1, b) &= \mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z209}} \quad \mathbb{Q}_2^{(1,0;c)}(B_1) &= \mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z210}} \quad \mathbb{Q}_1^{(1,1;c)}(B_1) &= -\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z331}} \quad \mathbb{Q}_1^{(c)}(B_2, a) &= \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z332}} \quad \mathbb{Q}_1^{(c)}(B_2, b) &= -\frac{\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\sqrt{3}\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z333}} \quad \mathbb{Q}_2^{(c)}(B_2) &= \mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_0^{(b)}(A_1)
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z334}} \quad \mathbb{Q}_3^{(c)}(B_2, 2) &= \frac{\sqrt{3}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z335}} \quad \mathbb{Q}_1^{(1, -1; c)}(B_2) &= -\frac{\mathbb{Q}_2^{(1, -1; a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\sqrt{3}\mathbb{Q}_2^{(1, -1; a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z336}} \quad \mathbb{Q}_2^{(1, -1; c)}(B_2) &= \mathbb{Q}_2^{(1, -1; a)}(B_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z337}} \quad \mathbb{Q}_3^{(1, -1; c)}(B_2, 2a) &= \frac{\sqrt{3}\mathbb{Q}_2^{(1, -1; a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(1, -1; a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z338}} \quad \mathbb{Q}_3^{(1, -1; c)}(B_2, 2b) &= \mathbb{M}_3^{(1, -1; a)}(A_1)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z339}} \quad \mathbb{Q}_1^{(1, 0; c)}(B_2) &= -\frac{\mathbb{T}_2^{(1, 0; a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_2)}{2} - \frac{\sqrt{3}\mathbb{T}_2^{(1, 0; a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z340}} \quad \mathbb{Q}_2^{(1, 0; c)}(B_2) &= \mathbb{T}_2^{(1, 0; a)}(B_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z341}} \quad \mathbb{Q}_3^{(1, 0; c)}(B_2, 2) &= \frac{\sqrt{3}\mathbb{T}_2^{(1, 0; a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_2)}{2} - \frac{\mathbb{T}_2^{(1, 0; a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z342}} \quad \mathbb{Q}_1^{(1, 1; c)}(B_2) &= \mathbb{Q}_0^{(1, 1; a)}(A_1)\mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z343}} \quad \mathbb{G}_3^{(1, -1; c)}(A_1) &= \mathbb{M}_3^{(1, -1; a)}(A_1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z344}} \quad \mathbb{G}_0^{(c)}(A_2) &= \mathbb{M}_1^{(a)}(B_1)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z345}} \quad \mathbb{G}_1^{(c)}(A_2) &= \mathbb{M}_1^{(a)}(A_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z346}} \quad \mathbb{G}_0^{(1, -1; c)}(A_2) &= \mathbb{M}_1^{(1, -1; a)}(B_1)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z347}} \quad \mathbb{G}_1^{(1, -1; c)}(A_2) &= \mathbb{M}_1^{(1, -1; a)}(A_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z348}} \quad \mathbb{G}_2^{(1, -1; c)}(A_2, 1) &= -\mathbb{M}_3^{(1, -1; a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z475}} \quad \mathbb{G}_3^{(1, -1; c)}(A_2, 1) &= \mathbb{M}_3^{(1, -1; a)}(A_2, 1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z476}} \quad \mathbb{G}_3^{(1, -1; c)}(A_2, 2) &= \mathbb{M}_3^{(1, -1; a)}(A_2, 2)\mathbb{T}_0^{(b)}(A_1)
\end{aligned}$$

z477	$\mathbb{G}_0^{(1,0;c)}(A_2) = \mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)$
z478	$\mathbb{G}_1^{(1,0;c)}(A_2) = \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$
z479	$\mathbb{G}_0^{(1,1;c)}(A_2) = \mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)$
z480	$\mathbb{G}_1^{(1,1;c)}(A_2) = \mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$
z481	$\mathbb{G}_1^{(c)}(B_1) = \mathbb{M}_1^{(a)}(B_1)\mathbb{T}_0^{(b)}(A_1)$
z482	$\mathbb{G}_1^{(1,-1;c)}(B_1) = \mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_0^{(b)}(A_1)$
z483	$\mathbb{G}_3^{(1,-1;c)}(B_1, 1) = \mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_0^{(b)}(A_1)$
z484	$\mathbb{G}_3^{(1,-1;c)}(B_1, 2) = \mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_0^{(b)}(A_1)$
z485	$\mathbb{G}_1^{(1,0;c)}(B_1) = \mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_0^{(b)}(A_1)$
z486	$\mathbb{G}_1^{(1,1;c)}(B_1) = \mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_0^{(b)}(A_1)$
z487	$\mathbb{G}_1^{(c)}(B_2) = \mathbb{M}_1^{(a)}(B_2)\mathbb{T}_0^{(b)}(A_1)$
z488	$\mathbb{G}_1^{(1,-1;c)}(B_2) = \mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_0^{(b)}(A_1)$
z489	$\mathbb{G}_3^{(1,-1;c)}(B_2, 1) = \mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_0^{(b)}(A_1)$
z490	$\mathbb{G}_3^{(1,-1;c)}(B_2, 2) = \mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_0^{(b)}(A_1)$
z491	$\mathbb{G}_1^{(1,0;c)}(B_2) = \mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_0^{(b)}(A_1)$
z492	$\mathbb{G}_1^{(1,1;c)}(B_2) = \mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_0^{(b)}(A_1)$

• 'Sn'-'Te' bond-cluster

- \* bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$
- \* ket:  $|p_x, \uparrow \rangle, |p_x, \downarrow \rangle, |p_y, \uparrow \rangle, |p_y, \downarrow \rangle, |p_z, \uparrow \rangle, |p_z, \downarrow \rangle$
- \* wyckoff: **4a@4b**

$$\boxed{\text{z109}} \quad \mathbb{Q}_0^{(c)}(A_1, a) = \mathbb{Q}_0^{(a)}(A_1) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z110}} \quad \mathbb{Q}_0^{(c)}(A_1, b) = \mathbb{Q}_2^{(a)}(A_2) \mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z111}} \quad \mathbb{Q}_0^{(c)}(A_1, c) = \mathbb{M}_1^{(a)}(A_2) \mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z112}} \quad \mathbb{Q}_1^{(c)}(A_1, a) = \frac{\sqrt{2} \mathbb{Q}_2^{(a)}(B_1) \mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2} \mathbb{Q}_2^{(a)}(B_2) \mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z113}} \quad \mathbb{Q}_1^{(c)}(A_1, b) = -\frac{\sqrt{2} \mathbb{M}_1^{(a)}(B_1) \mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2} \mathbb{M}_1^{(a)}(B_2) \mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z114}} \quad \mathbb{Q}_2^{(c)}(A_1, 1) = \mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z115}} \quad \mathbb{Q}_2^{(c)}(A_1, 2) = \mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z116}} \quad \mathbb{Q}_3^{(c)}(A_1, 2) = \frac{\sqrt{2} \mathbb{Q}_2^{(a)}(B_1) \mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\sqrt{2} \mathbb{Q}_2^{(a)}(B_2) \mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z117}} \quad \mathbb{Q}_0^{(1, -1; c)}(A_1, a) = \mathbb{Q}_2^{(1, -1; a)}(A_2) \mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z118}} \quad \mathbb{Q}_0^{(1, -1; c)}(A_1, b) = \mathbb{M}_1^{(1, -1; a)}(A_2) \mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z119}} \quad \mathbb{Q}_1^{(1, -1; c)}(A_1, a) = \frac{\sqrt{2} \mathbb{Q}_2^{(1, -1; a)}(B_1) \mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2} \mathbb{Q}_2^{(1, -1; a)}(B_2) \mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z120}} \quad \mathbb{Q}_1^{(1, -1; c)}(A_1, b) = -\frac{\sqrt{2} \mathbb{M}_1^{(1, -1; a)}(B_1) \mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2} \mathbb{M}_1^{(1, -1; a)}(B_2) \mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z121}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 1a) = \mathbb{Q}_2^{(1, -1; a)}(A_1, 1) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z122}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 1b) = \mathbb{M}_3^{(1, -1; a)}(A_2, 1) \mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z123}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 2a) = \mathbb{Q}_2^{(1, -1; a)}(A_1, 2) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z124}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 2b) = \mathbb{M}_3^{(1, -1; a)}(A_2, 2) \mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z125}} \quad \mathbb{Q}_3^{(1, -1; c)}(A_1, 1) = \frac{\sqrt{3} \mathbb{M}_3^{(1, -1; a)}(B_1, 1) \mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{5} \mathbb{M}_3^{(1, -1; a)}(B_1, 2) \mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{3} \mathbb{M}_3^{(1, -1; a)}(B_2, 1) \mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{5} \mathbb{M}_3^{(1, -1; a)}(B_2, 2) \mathbb{T}_1^{(b)}(B_2)}{4}$$

$$\boxed{\text{z126}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, 2a) = \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z127}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, 2b) = \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_1)}{8} - \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_1)}{8} + \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_2)}{8} + \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_2)}{8}$$

$$\boxed{\text{z128}} \quad \mathbb{Q}_1^{(1,0;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z129}} \quad \mathbb{Q}_1^{(1,0;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z130}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 1) = \mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z131}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 2a) = -\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z132}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 2b) = \mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z133}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 2c) = \mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z134}} \quad \mathbb{Q}_3^{(1,0;c)}(A_1, 2) = \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} - \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z135}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1, a) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z136}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1, b) = \mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z137}} \quad \mathbb{Q}_1^{(1,1;c)}(A_1) = -\frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z138}} \quad \mathbb{Q}_2^{(c)}(A_2, a) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z139}} \quad \mathbb{Q}_2^{(c)}(A_2, b) = \mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z140}} \quad \mathbb{Q}_2^{(c)}(A_2, c) = -\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z141}} \quad \mathbb{Q}_3^{(c)}(A_2) = \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2}$$

$$\begin{aligned}
\boxed{\text{z142}} \quad & \mathbb{Q}_4^{(c)}(A_2, 1) = \mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z143}} \quad & \mathbb{Q}_2^{(1, -1; c)}(A_2, a) = \mathbb{Q}_2^{(1, -1; a)}(A_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z144}} \quad & \mathbb{Q}_2^{(1, -1; c)}(A_2, b) = -\mathbb{Q}_2^{(1, -1; a)}(A_1, 1)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z247}} \quad & \mathbb{Q}_2^{(1, -1; c)}(A_2, c) = \mathbb{M}_3^{(1, -1; a)}(A_1)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z248}} \quad & \mathbb{Q}_3^{(1, -1; c)}(A_2, a) = \frac{\sqrt{2}\mathbb{Q}_2^{(1, -1; a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{Q}_2^{(1, -1; a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z249}} \quad & \mathbb{Q}_3^{(1, -1; c)}(A_2, b) = -\frac{\sqrt{2}\mathbb{M}_3^{(1, -1; a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2}\mathbb{M}_3^{(1, -1; a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z250}} \quad & \mathbb{Q}_4^{(1, -1; c)}(A_2, 1) = \mathbb{Q}_2^{(1, -1; a)}(A_1, 2)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z251}} \quad & \mathbb{Q}_2^{(1, 0; c)}(A_2, a) = \mathbb{T}_2^{(1, 0; a)}(A_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z252}} \quad & \mathbb{Q}_2^{(1, 0; c)}(A_2, b) = -\mathbb{T}_2^{(1, 0; a)}(A_1, 2)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z253}} \quad & \mathbb{Q}_3^{(1, 0; c)}(A_2) = \frac{\sqrt{2}\mathbb{T}_2^{(1, 0; a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{T}_2^{(1, 0; a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z254}} \quad & \mathbb{Q}_2^{(1, 1; c)}(A_2) = \mathbb{Q}_0^{(1, 1; a)}(A_1)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z255}} \quad & \mathbb{Q}_1^{(c)}(B_1, a) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(b)}(B_1) \\
\boxed{\text{z256}} \quad & \mathbb{Q}_1^{(c)}(B_1, b) = -\frac{\sqrt{7}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z257}} \quad & \mathbb{Q}_1^{(c)}(B_1, c) = -\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z258}} \quad & \mathbb{Q}_2^{(c)}(B_1, a) = \mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z259}} \quad & \mathbb{Q}_2^{(c)}(B_1, b) = \mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z260}} \quad & \mathbb{Q}_2^{(c)}(B_1, c) = \mathbb{M}_1^{(a)}(B_2)\mathbb{M}_1^{(b)}(A_2)
\end{aligned}$$



$$\begin{aligned}
\boxed{\text{z261}} \quad \mathbb{Q}_3^{(c)}(B_1, 1) &= -\frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_1)}{14} + \frac{3\sqrt{7}\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_1)}{14} - \frac{2\sqrt{7}\mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z262}} \quad \mathbb{Q}_3^{(c)}(B_1, 2) &= -\frac{\sqrt{3}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z263}} \quad \mathbb{Q}_1^{(1, -1; c)}(B_1, a) &= -\frac{\sqrt{7}\mathbb{Q}_2^{(1, -1; a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(1, -1; a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(1, -1; a)}(A_2)\mathbb{Q}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z264}} \quad \mathbb{Q}_1^{(1, -1; c)}(B_1, b) &= -\mathbb{M}_1^{(1, -1; a)}(A_2)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z265}} \quad \mathbb{Q}_2^{(1, -1; c)}(B_1, a) &= \mathbb{Q}_2^{(1, -1; a)}(B_1)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z266}} \quad \mathbb{Q}_2^{(1, -1; c)}(B_1, b) &= \mathbb{Q}_2^{(1, -1; a)}(B_2)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z267}} \quad \mathbb{Q}_2^{(1, -1; c)}(B_1, c) &= -\frac{\sqrt{6}\mathbb{M}_3^{(1, -1; a)}(B_2, 1)\mathbb{M}_1^{(b)}(A_2)}{4} - \frac{\sqrt{10}\mathbb{M}_3^{(1, -1; a)}(B_2, 2)\mathbb{M}_1^{(b)}(A_2)}{4} \\
\boxed{\text{z268}} \quad \mathbb{Q}_2^{(1, -1; c)}(B_1, d) &= \mathbb{M}_1^{(1, -1; a)}(B_2)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z269}} \quad \mathbb{Q}_3^{(1, -1; c)}(B_1, 1a) &= -\frac{\sqrt{21}\mathbb{Q}_2^{(1, -1; a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_1)}{14} + \frac{3\sqrt{7}\mathbb{Q}_2^{(1, -1; a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_1)}{14} - \frac{2\sqrt{7}\mathbb{Q}_2^{(1, -1; a)}(A_2)\mathbb{Q}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z270}} \quad \mathbb{Q}_3^{(1, -1; c)}(B_1, 1b) &= \frac{\sqrt{6}\mathbb{M}_3^{(1, -1; a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{10}\mathbb{M}_3^{(1, -1; a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_2)}{4} \\
\boxed{\text{z271}} \quad \mathbb{Q}_3^{(1, -1; c)}(B_1, 2a) &= -\frac{\sqrt{3}\mathbb{Q}_2^{(1, -1; a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\mathbb{Q}_2^{(1, -1; a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z272}} \quad \mathbb{Q}_3^{(1, -1; c)}(B_1, 2b) &= \frac{2\sqrt{22}\mathbb{M}_3^{(1, -1; a)}(A_1)\mathbb{T}_1^{(b)}(B_1)}{11} + \frac{\sqrt{330}\mathbb{M}_3^{(1, -1; a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_2)}{44} + \frac{3\sqrt{22}\mathbb{M}_3^{(1, -1; a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_2)}{44} \\
\boxed{\text{z273}} \quad \mathbb{Q}_4^{(1, -1; c)}(B_1, 1) &= -\frac{\sqrt{10}\mathbb{M}_3^{(1, -1; a)}(B_2, 1)\mathbb{M}_1^{(b)}(A_2)}{4} + \frac{\sqrt{6}\mathbb{M}_3^{(1, -1; a)}(B_2, 2)\mathbb{M}_1^{(b)}(A_2)}{4} \\
\boxed{\text{z274}} \quad \mathbb{Q}_1^{(1, 0; c)}(B_1, a) &= -\mathbb{G}_1^{(1, 0; a)}(A_2)\mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z275}} \quad \mathbb{Q}_1^{(1, 0; c)}(B_1, b) &= -\frac{\sqrt{7}\mathbb{T}_2^{(1, 0; a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{T}_2^{(1, 0; a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{T}_2^{(1, 0; a)}(A_2)\mathbb{T}_1^{(b)}(B_2)}{7}
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z276}} \quad \mathbb{Q}_2^{(1,0;c)}(B_1, a) &= \mathbb{G}_1^{(1,0;a)}(B_2) \mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z277}} \quad \mathbb{Q}_2^{(1,0;c)}(B_1, b) &= \mathbb{T}_2^{(1,0;a)}(B_1) \mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z278}} \quad \mathbb{Q}_2^{(1,0;c)}(B_1, c) &= \mathbb{T}_2^{(1,0;a)}(B_2) \mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z279}} \quad \mathbb{Q}_3^{(1,0;c)}(B_1, 1) &= -\frac{\sqrt{21} \mathbb{T}_2^{(1,0;a)}(A_1, 1) \mathbb{T}_1^{(b)}(B_1)}{14} + \frac{3\sqrt{7} \mathbb{T}_2^{(1,0;a)}(A_1, 2) \mathbb{T}_1^{(b)}(B_1)}{14} - \frac{2\sqrt{7} \mathbb{T}_2^{(1,0;a)}(A_2) \mathbb{T}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z280}} \quad \mathbb{Q}_3^{(1,0;c)}(B_1, 2) &= -\frac{\sqrt{3} \mathbb{T}_2^{(1,0;a)}(A_1, 1) \mathbb{T}_1^{(b)}(B_1)}{2} - \frac{\mathbb{T}_2^{(1,0;a)}(A_1, 2) \mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z281}} \quad \mathbb{Q}_1^{(1,1;c)}(B_1, a) &= \mathbb{Q}_0^{(1,1;a)}(A_1) \mathbb{Q}_1^{(b)}(B_1) \\
\boxed{\text{z282}} \quad \mathbb{Q}_1^{(1,1;c)}(B_1, b) &= -\mathbb{M}_1^{(1,1;a)}(A_2) \mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z385}} \quad \mathbb{Q}_2^{(1,1;c)}(B_1) &= \mathbb{M}_1^{(1,1;a)}(B_2) \mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z386}} \quad \mathbb{Q}_1^{(c)}(B_2, a) &= \mathbb{Q}_0^{(a)}(A_1) \mathbb{Q}_1^{(b)}(B_2) \\
\boxed{\text{z387}} \quad \mathbb{Q}_1^{(c)}(B_2, b) &= -\frac{\sqrt{7} \mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_2)}{7} - \frac{\sqrt{21} \mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_2)}{7} + \frac{\sqrt{21} \mathbb{Q}_2^{(a)}(A_2) \mathbb{Q}_1^{(b)}(B_1)}{7} \\
\boxed{\text{z388}} \quad \mathbb{Q}_1^{(c)}(B_2, c) &= \mathbb{M}_1^{(a)}(A_2) \mathbb{T}_1^{(b)}(B_1) \\
\boxed{\text{z389}} \quad \mathbb{Q}_2^{(c)}(B_2, a) &= \mathbb{Q}_2^{(a)}(B_2) \mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z390}} \quad \mathbb{Q}_2^{(c)}(B_2, b) &= \mathbb{Q}_2^{(a)}(B_1) \mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z391}} \quad \mathbb{Q}_2^{(c)}(B_2, c) &= \mathbb{M}_1^{(a)}(B_1) \mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z392}} \quad \mathbb{Q}_3^{(c)}(B_2, 1) &= -\frac{\sqrt{21} \mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{3\sqrt{7} \mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{2\sqrt{7} \mathbb{Q}_2^{(a)}(A_2) \mathbb{Q}_1^{(b)}(B_1)}{7} \\
\boxed{\text{z393}} \quad \mathbb{Q}_3^{(c)}(B_2, 2) &= \frac{\sqrt{3} \mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z394}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_2, a) &= -\frac{\sqrt{7} \mathbb{Q}_2^{(1,-1;a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_2)}{7} - \frac{\sqrt{21} \mathbb{Q}_2^{(1,-1;a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_2)}{7} + \frac{\sqrt{21} \mathbb{Q}_2^{(1,-1;a)}(A_2) \mathbb{Q}_1^{(b)}(B_1)}{7}
\end{aligned}$$

$$\begin{aligned}
\text{z395} \quad & \mathbb{Q}_1^{(1,-1;c)}(B_2, b) = \mathbb{M}_1^{(1,-1;a)}(A_2) \mathbb{T}_1^{(b)}(B_1) \\
\text{z396} \quad & \mathbb{Q}_2^{(1,-1;c)}(B_2, a) = \mathbb{Q}_2^{(1,-1;a)}(B_2) \mathbb{Q}_0^{(b)}(A_1) \\
\text{z397} \quad & \mathbb{Q}_2^{(1,-1;c)}(B_2, b) = \mathbb{Q}_2^{(1,-1;a)}(B_1) \mathbb{Q}_2^{(b)}(A_2) \\
\text{z398} \quad & \mathbb{Q}_2^{(1,-1;c)}(B_2, c) = -\frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{M}_1^{(b)}(A_2)}{4} + \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{M}_1^{(b)}(A_2)}{4} \\
\text{z399} \quad & \mathbb{Q}_2^{(1,-1;c)}(B_2, d) = \mathbb{M}_1^{(1,-1;a)}(B_1) \mathbb{M}_1^{(b)}(A_2) \\
\text{z400} \quad & \mathbb{Q}_3^{(1,-1;c)}(B_2, 1a) = -\frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{3\sqrt{7}\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{2\sqrt{7}\mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_1^{(b)}(B_1)}{7} \\
\text{z401} \quad & \mathbb{Q}_3^{(1,-1;c)}(B_2, 1b) = -\frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_1)}{4} \\
\text{z402} \quad & \mathbb{Q}_3^{(1,-1;c)}(B_2, 2a) = \frac{\sqrt{3}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{2} \\
\text{z403} \quad & \mathbb{Q}_3^{(1,-1;c)}(B_2, 2b) = \frac{2\sqrt{22}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(B_2)}{11} + \frac{\sqrt{330}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_1)}{44} - \frac{3\sqrt{22}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_1)}{44} \\
\text{z404} \quad & \mathbb{Q}_4^{(1,-1;c)}(B_2, 1) = \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{M}_1^{(b)}(A_2)}{4} + \frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{M}_1^{(b)}(A_2)}{4} \\
\text{z405} \quad & \mathbb{Q}_1^{(1,0;c)}(B_2, a) = \mathbb{G}_1^{(1,0;a)}(A_2) \mathbb{Q}_1^{(b)}(B_1) \\
\text{z406} \quad & \mathbb{Q}_1^{(1,0;c)}(B_2, b) = -\frac{\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_2)}{7} - \frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_2)}{7} + \frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(B_1)}{7} \\
\text{z407} \quad & \mathbb{Q}_2^{(1,0;c)}(B_2, a) = -\mathbb{G}_1^{(1,0;a)}(B_1) \mathbb{Q}_2^{(b)}(A_2) \\
\text{z408} \quad & \mathbb{Q}_2^{(1,0;c)}(B_2, b) = \mathbb{T}_2^{(1,0;a)}(B_2) \mathbb{T}_0^{(b)}(A_1) \\
\text{z409} \quad & \mathbb{Q}_2^{(1,0;c)}(B_2, c) = -\mathbb{T}_2^{(1,0;a)}(B_1) \mathbb{M}_1^{(b)}(A_2) \\
\text{z410} \quad & \mathbb{Q}_3^{(1,0;c)}(B_2, 1) = -\frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_2)}{14} - \frac{3\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_2)}{14} - \frac{2\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(B_1)}{7}
\end{aligned}$$

$$\boxed{\text{z411}} \quad \mathbb{Q}_3^{(1,0;c)}(B_2, 2) = \frac{\sqrt{3}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_2)}{2} - \frac{\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z412}} \quad \mathbb{Q}_1^{(1,1;c)}(B_2, a) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(b)}(B_2)$$

$$\boxed{\text{z413}} \quad \mathbb{Q}_1^{(1,1;c)}(B_2, b) = \mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(B_1)$$

$$\boxed{\text{z414}} \quad \mathbb{Q}_2^{(1,1;c)}(B_2) = \mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z415}} \quad \mathbb{G}_2^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z416}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_1)}{8} - \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_1)}{8} - \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_2)}{8} + \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_2)}{8}$$

$$\boxed{\text{z417}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z418}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1) = \mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z419}} \quad \mathbb{G}_4^{(1,-1;c)}(A_1, 1) = -\frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_1)}{4} + \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_2)}{4}$$

$$\boxed{\text{z420}} \quad \mathbb{G}_2^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z529}} \quad \mathbb{G}_2^{(1,1;c)}(A_1) = \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z530}} \quad \mathbb{G}_0^{(c)}(A_2) = \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z531}} \quad \mathbb{G}_1^{(c)}(A_2) = \mathbb{M}_1^{(a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z532}} \quad \mathbb{G}_2^{(c)}(A_2, 1) = \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z533}} \quad \mathbb{G}_2^{(c)}(A_2, 2) = -\frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z534}} \quad \mathbb{G}_0^{(1,-1;c)}(A_2) = \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z535}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2) = \mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z536}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 1a) = \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z537}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 1b) = -\frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_2)}{4} + \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_1)}{4}$$

$$\boxed{\text{z538}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 2a) = -\frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z539}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 2b) = -\frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z540}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1) = \mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z541}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2) = \mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z542}} \quad \mathbb{G}_4^{(1,-1;c)}(A_2, 1) = \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_2)}{4} + \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_2)}{4} + \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_1)}{4}$$

$$\boxed{\text{z543}} \quad \mathbb{G}_0^{(1,0;c)}(A_2) = \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z544}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, a) = \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z545}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, b) = \mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z546}} \quad \mathbb{G}_2^{(1,0;c)}(A_2, 1) = \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z547}} \quad \mathbb{G}_2^{(1,0;c)}(A_2, 2) = -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z548}} \quad \mathbb{G}_0^{(1,1;c)}(A_2) = \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\begin{aligned}
\boxed{\text{z549}} \quad \mathbb{G}_1^{(1,1;c)}(A_2) &= \mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z550}} \quad \mathbb{G}_2^{(1,1;c)}(A_2, 2) &= -\frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z551}} \quad \mathbb{G}_1^{(c)}(B_1) &= \mathbb{M}_1^{(a)}(B_1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z552}} \quad \mathbb{G}_1^{(1,-1;c)}(B_1) &= \mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z553}} \quad \mathbb{G}_2^{(1,-1;c)}(B_1) &= \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(B_1)}{11} - \frac{\sqrt{55}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_2)}{11} - \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_2)}{11} \\
\boxed{\text{z554}} \quad \mathbb{G}_3^{(1,-1;c)}(B_1, 1) &= \mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z555}} \quad \mathbb{G}_3^{(1,-1;c)}(B_1, 2) &= \mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z556}} \quad \mathbb{G}_1^{(1,0;c)}(B_1) &= \mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z557}} \quad \mathbb{G}_1^{(1,1;c)}(B_1) &= \mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z558}} \quad \mathbb{G}_1^{(c)}(B_2) &= \mathbb{M}_1^{(a)}(B_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z559}} \quad \mathbb{G}_1^{(1,-1;c)}(B_2) &= \mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z560}} \quad \mathbb{G}_2^{(1,-1;c)}(B_2) &= \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(B_2)}{11} - \frac{\sqrt{55}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_1)}{11} + \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_1)}{11} \\
\boxed{\text{z561}} \quad \mathbb{G}_3^{(1,-1;c)}(B_2, 1) &= \mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z562}} \quad \mathbb{G}_3^{(1,-1;c)}(B_2, 2) &= \mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z563}} \quad \mathbb{G}_1^{(1,0;c)}(B_2) &= \mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z564}} \quad \mathbb{G}_1^{(1,1;c)}(B_2) &= \mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_0^{(b)}(A_1)
\end{aligned}$$

- 'Te'-'Te' bond-cluster

\* bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$

\* ket:  $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

\* wyckoff: **4a@4b**

$$\boxed{\text{z73}} \quad \mathbb{Q}_0^{(c)}(A_1, a) = \mathbb{Q}_0^{(a)}(A_1) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z74}} \quad \mathbb{Q}_0^{(c)}(A_1, b) = \mathbb{Q}_2^{(a)}(A_2) \mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z75}} \quad \mathbb{Q}_0^{(c)}(A_1, c) = \mathbb{M}_1^{(a)}(A_2) \mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z76}} \quad \mathbb{Q}_1^{(c)}(A_1, a) = \frac{\sqrt{2} \mathbb{Q}_2^{(a)}(B_1) \mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2} \mathbb{Q}_2^{(a)}(B_2) \mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z77}} \quad \mathbb{Q}_1^{(c)}(A_1, b) = -\frac{\sqrt{2} \mathbb{M}_1^{(a)}(B_1) \mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2} \mathbb{M}_1^{(a)}(B_2) \mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z78}} \quad \mathbb{Q}_2^{(c)}(A_1, 1) = \mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z79}} \quad \mathbb{Q}_2^{(c)}(A_1, 2) = \mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z80}} \quad \mathbb{Q}_3^{(c)}(A_1, 2) = \frac{\sqrt{2} \mathbb{Q}_2^{(a)}(B_1) \mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\sqrt{2} \mathbb{Q}_2^{(a)}(B_2) \mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z81}} \quad \mathbb{Q}_0^{(1, -1; c)}(A_1, a) = \mathbb{Q}_2^{(1, -1; a)}(A_2) \mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z82}} \quad \mathbb{Q}_0^{(1, -1; c)}(A_1, b) = \mathbb{M}_1^{(1, -1; a)}(A_2) \mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z83}} \quad \mathbb{Q}_1^{(1, -1; c)}(A_1, a) = \frac{\sqrt{2} \mathbb{Q}_2^{(1, -1; a)}(B_1) \mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2} \mathbb{Q}_2^{(1, -1; a)}(B_2) \mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z84}} \quad \mathbb{Q}_1^{(1, -1; c)}(A_1, b) = -\frac{\sqrt{2} \mathbb{M}_1^{(1, -1; a)}(B_1) \mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2} \mathbb{M}_1^{(1, -1; a)}(B_2) \mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z85}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 1a) = \mathbb{Q}_2^{(1, -1; a)}(A_1, 1) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z86}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 1b) = \mathbb{M}_3^{(1, -1; a)}(A_2, 1) \mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z87}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 2a) = \mathbb{Q}_2^{(1, -1; a)}(A_1, 2) \mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z88}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_1, 2b) = \mathbb{M}_3^{(1, -1; a)}(A_2, 2) \mathbb{M}_1^{(b)}(A_2)$$

$$\begin{aligned}
\boxed{\text{z89}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, 1) &= \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_2)}{4} \\
\boxed{\text{z90}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, 2a) &= \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z91}} \quad \mathbb{Q}_3^{(1,-1;c)}(A_1, 2b) &= \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_1)}{8} - \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_1)}{8} + \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_2)}{8} + \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_2)}{8} \\
\boxed{\text{z92}} \quad \mathbb{Q}_1^{(1,0;c)}(A_1, a) &= -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z93}} \quad \mathbb{Q}_1^{(1,0;c)}(A_1, b) &= \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z94}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 1) &= \mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z95}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 2a) &= -\mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z96}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 2b) &= \mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z97}} \quad \mathbb{Q}_2^{(1,0;c)}(A_1, 2c) &= \mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z98}} \quad \mathbb{Q}_3^{(1,0;c)}(A_1, 2) &= \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} - \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z99}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1, a) &= \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z100}} \quad \mathbb{Q}_0^{(1,1;c)}(A_1, b) &= \mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z101}} \quad \mathbb{Q}_1^{(1,1;c)}(A_1) &= -\frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z102}} \quad \mathbb{Q}_2^{(c)}(A_2, a) &= \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z103}} \quad \mathbb{Q}_2^{(c)}(A_2, b) &= \mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z104}} \quad \mathbb{Q}_2^{(c)}(A_2, c) &= -\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_2^{(b)}(A_2)
\end{aligned}$$



$$\begin{aligned}
\boxed{\text{z105}} \quad \mathbb{Q}_3^{(c)}(A_2) &= \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z106}} \quad \mathbb{Q}_4^{(c)}(A_2, 1) &= \mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z107}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_2, a) &= \mathbb{Q}_2^{(1, -1; a)}(A_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z108}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_2, b) &= -\mathbb{Q}_2^{(1, -1; a)}(A_1, 1)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z211}} \quad \mathbb{Q}_2^{(1, -1; c)}(A_2, c) &= \mathbb{M}_3^{(1, -1; a)}(A_1)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z212}} \quad \mathbb{Q}_3^{(1, -1; c)}(A_2, a) &= \frac{\sqrt{2}\mathbb{Q}_2^{(1, -1; a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{Q}_2^{(1, -1; a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z213}} \quad \mathbb{Q}_3^{(1, -1; c)}(A_2, b) &= -\frac{\sqrt{2}\mathbb{M}_3^{(1, -1; a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2}\mathbb{M}_3^{(1, -1; a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z214}} \quad \mathbb{Q}_4^{(1, -1; c)}(A_2, 1) &= \mathbb{Q}_2^{(1, -1; a)}(A_1, 2)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z215}} \quad \mathbb{Q}_2^{(1, 0; c)}(A_2, a) &= \mathbb{T}_2^{(1, 0; a)}(A_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z216}} \quad \mathbb{Q}_2^{(1, 0; c)}(A_2, b) &= -\mathbb{T}_2^{(1, 0; a)}(A_1, 2)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z217}} \quad \mathbb{Q}_3^{(1, 0; c)}(A_2) &= \frac{\sqrt{2}\mathbb{T}_2^{(1, 0; a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{T}_2^{(1, 0; a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z218}} \quad \mathbb{Q}_2^{(1, 1; c)}(A_2) &= \mathbb{Q}_0^{(1, 1; a)}(A_1)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z219}} \quad \mathbb{Q}_1^{(c)}(B_1, a) &= \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(b)}(B_1) \\
\boxed{\text{z220}} \quad \mathbb{Q}_1^{(c)}(B_1, b) &= -\frac{\sqrt{7}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z221}} \quad \mathbb{Q}_1^{(c)}(B_1, c) &= -\mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z222}} \quad \mathbb{Q}_2^{(c)}(B_1, a) &= \mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z223}} \quad \mathbb{Q}_2^{(c)}(B_1, b) &= \mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_2^{(b)}(A_2)
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z224}} \quad \mathbb{Q}_2^{(c)}(B_1, c) &= \mathbb{M}_1^{(a)}(B_2) \mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z225}} \quad \mathbb{Q}_3^{(c)}(B_1, 1) &= -\frac{\sqrt{21} \mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_1)}{14} + \frac{3\sqrt{7} \mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_1)}{14} - \frac{2\sqrt{7} \mathbb{Q}_2^{(a)}(A_2) \mathbb{Q}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z226}} \quad \mathbb{Q}_3^{(c)}(B_1, 2) &= -\frac{\sqrt{3} \mathbb{Q}_2^{(a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\mathbb{Q}_2^{(a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z227}} \quad \mathbb{Q}_1^{(1, -1; c)}(B_1, a) &= -\frac{\sqrt{7} \mathbb{Q}_2^{(1, -1; a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21} \mathbb{Q}_2^{(1, -1; a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21} \mathbb{Q}_2^{(1, -1; a)}(A_2) \mathbb{Q}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z228}} \quad \mathbb{Q}_1^{(1, -1; c)}(B_1, b) &= -\mathbb{M}_1^{(1, -1; a)}(A_2) \mathbb{T}_1^{(b)}(B_2) \\
\boxed{\text{z229}} \quad \mathbb{Q}_2^{(1, -1; c)}(B_1, a) &= \mathbb{Q}_2^{(1, -1; a)}(B_1) \mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z230}} \quad \mathbb{Q}_2^{(1, -1; c)}(B_1, b) &= \mathbb{Q}_2^{(1, -1; a)}(B_2) \mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z231}} \quad \mathbb{Q}_2^{(1, -1; c)}(B_1, c) &= -\frac{\sqrt{6} \mathbb{M}_3^{(1, -1; a)}(B_2, 1) \mathbb{M}_1^{(b)}(A_2)}{4} - \frac{\sqrt{10} \mathbb{M}_3^{(1, -1; a)}(B_2, 2) \mathbb{M}_1^{(b)}(A_2)}{4} \\
\boxed{\text{z232}} \quad \mathbb{Q}_2^{(1, -1; c)}(B_1, d) &= \mathbb{M}_1^{(1, -1; a)}(B_2) \mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z233}} \quad \mathbb{Q}_3^{(1, -1; c)}(B_1, 1a) &= -\frac{\sqrt{21} \mathbb{Q}_2^{(1, -1; a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_1)}{14} + \frac{3\sqrt{7} \mathbb{Q}_2^{(1, -1; a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_1)}{14} - \frac{2\sqrt{7} \mathbb{Q}_2^{(1, -1; a)}(A_2) \mathbb{Q}_1^{(b)}(B_2)}{7} \\
\boxed{\text{z234}} \quad \mathbb{Q}_3^{(1, -1; c)}(B_1, 1b) &= \frac{\sqrt{6} \mathbb{M}_3^{(1, -1; a)}(A_2, 1) \mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{10} \mathbb{M}_3^{(1, -1; a)}(A_2, 2) \mathbb{T}_1^{(b)}(B_2)}{4} \\
\boxed{\text{z235}} \quad \mathbb{Q}_3^{(1, -1; c)}(B_1, 2a) &= -\frac{\sqrt{3} \mathbb{Q}_2^{(1, -1; a)}(A_1, 1) \mathbb{Q}_1^{(b)}(B_1)}{2} - \frac{\mathbb{Q}_2^{(1, -1; a)}(A_1, 2) \mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z236}} \quad \mathbb{Q}_3^{(1, -1; c)}(B_1, 2b) &= \frac{2\sqrt{22} \mathbb{M}_3^{(1, -1; a)}(A_1) \mathbb{T}_1^{(b)}(B_1)}{11} + \frac{\sqrt{330} \mathbb{M}_3^{(1, -1; a)}(A_2, 1) \mathbb{T}_1^{(b)}(B_2)}{44} + \frac{3\sqrt{22} \mathbb{M}_3^{(1, -1; a)}(A_2, 2) \mathbb{T}_1^{(b)}(B_2)}{44} \\
\boxed{\text{z237}} \quad \mathbb{Q}_4^{(1, -1; c)}(B_1, 1) &= -\frac{\sqrt{10} \mathbb{M}_3^{(1, -1; a)}(B_2, 1) \mathbb{M}_1^{(b)}(A_2)}{4} + \frac{\sqrt{6} \mathbb{M}_3^{(1, -1; a)}(B_2, 2) \mathbb{M}_1^{(b)}(A_2)}{4} \\
\boxed{\text{z238}} \quad \mathbb{Q}_1^{(1, 0; c)}(B_1, a) &= -\mathbb{G}_1^{(1, 0; a)}(A_2) \mathbb{Q}_1^{(b)}(B_2)
\end{aligned}$$

$$\boxed{\text{z239}} \quad \mathbb{Q}_1^{(1,0;c)}(B_1, b) = -\frac{\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_1)}{7} + \frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(B_2)}{7}$$

$$\boxed{\text{z240}} \quad \mathbb{Q}_2^{(1,0;c)}(B_1, a) = \mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z241}} \quad \mathbb{Q}_2^{(1,0;c)}(B_1, b) = \mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z242}} \quad \mathbb{Q}_2^{(1,0;c)}(B_1, c) = \mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z243}} \quad \mathbb{Q}_3^{(1,0;c)}(B_1, 1) = -\frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_1)}{14} + \frac{3\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_1)}{14} - \frac{2\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(B_2)}{7}$$

$$\boxed{\text{z244}} \quad \mathbb{Q}_3^{(1,0;c)}(B_1, 2) = -\frac{\sqrt{3}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_1)}{2} - \frac{\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z245}} \quad \mathbb{Q}_1^{(1,1;c)}(B_1, a) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(b)}(B_1)$$

$$\boxed{\text{z246}} \quad \mathbb{Q}_1^{(1,1;c)}(B_1, b) = -\mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(B_2)$$

$$\boxed{\text{z349}} \quad \mathbb{Q}_2^{(1,1;c)}(B_1) = \mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z350}} \quad \mathbb{Q}_1^{(c)}(B_2, a) = \mathbb{Q}_0^{(a)}(A_1)\mathbb{Q}_1^{(b)}(B_2)$$

$$\boxed{\text{z351}} \quad \mathbb{Q}_1^{(c)}(B_2, b) = -\frac{\sqrt{7}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{7} - \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_1^{(b)}(B_1)}{7}$$

$$\boxed{\text{z352}} \quad \mathbb{Q}_1^{(c)}(B_2, c) = \mathbb{M}_1^{(a)}(A_2)\mathbb{T}_1^{(b)}(B_1)$$

$$\boxed{\text{z353}} \quad \mathbb{Q}_2^{(c)}(B_2, a) = \mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_0^{(b)}(A_1)$$

$$\boxed{\text{z354}} \quad \mathbb{Q}_2^{(c)}(B_2, b) = \mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_2^{(b)}(A_2)$$

$$\boxed{\text{z355}} \quad \mathbb{Q}_2^{(c)}(B_2, c) = \mathbb{M}_1^{(a)}(B_1)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z356}} \quad \mathbb{Q}_3^{(c)}(B_2, 1) = -\frac{\sqrt{21}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{3\sqrt{7}\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{2\sqrt{7}\mathbb{Q}_2^{(a)}(A_2)\mathbb{Q}_1^{(b)}(B_1)}{7}$$

$$\boxed{\text{z357}} \quad \mathbb{Q}_3^{(c)}(B_2, 2) = \frac{\sqrt{3}\mathbb{Q}_2^{(a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\begin{aligned}
\boxed{\text{z358}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_2, a) &= -\frac{\sqrt{7}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{7} - \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{7} + \frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_1^{(b)}(B_1)}{7} \\
\boxed{\text{z359}} \quad \mathbb{Q}_1^{(1,-1;c)}(B_2, b) &= \mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_1^{(b)}(B_1) \\
\boxed{\text{z360}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_2, a) &= \mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z361}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_2, b) &= \mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z362}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_2, c) &= -\frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{M}_1^{(b)}(A_2)}{4} + \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{M}_1^{(b)}(A_2)}{4} \\
\boxed{\text{z363}} \quad \mathbb{Q}_2^{(1,-1;c)}(B_2, d) &= \mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z364}} \quad \mathbb{Q}_3^{(1,-1;c)}(B_2, 1a) &= -\frac{\sqrt{21}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{3\sqrt{7}\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{14} - \frac{2\sqrt{7}\mathbb{Q}_2^{(1,-1;a)}(A_2)\mathbb{Q}_1^{(b)}(B_1)}{7} \\
\boxed{\text{z365}} \quad \mathbb{Q}_3^{(1,-1;c)}(B_2, 1b) &= -\frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_1)}{4} \\
\boxed{\text{z366}} \quad \mathbb{Q}_3^{(1,-1;c)}(B_2, 2a) &= \frac{\sqrt{3}\mathbb{Q}_2^{(1,-1;a)}(A_1, 1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\mathbb{Q}_2^{(1,-1;a)}(A_1, 2)\mathbb{Q}_1^{(b)}(B_2)}{2} \\
\boxed{\text{z367}} \quad \mathbb{Q}_3^{(1,-1;c)}(B_2, 2b) &= \frac{2\sqrt{22}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(B_2)}{11} + \frac{\sqrt{330}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_1)}{44} - \frac{3\sqrt{22}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_1)}{44} \\
\boxed{\text{z368}} \quad \mathbb{Q}_4^{(1,-1;c)}(B_2, 1) &= \frac{\sqrt{10}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{M}_1^{(b)}(A_2)}{4} + \frac{\sqrt{6}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{M}_1^{(b)}(A_2)}{4} \\
\boxed{\text{z369}} \quad \mathbb{Q}_1^{(1,0;c)}(B_2, a) &= \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_1^{(b)}(B_1) \\
\boxed{\text{z370}} \quad \mathbb{Q}_1^{(1,0;c)}(B_2, b) &= -\frac{\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_2)}{7} - \frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_2)}{7} + \frac{\sqrt{21}\mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(B_1)}{7} \\
\boxed{\text{z371}} \quad \mathbb{Q}_2^{(1,0;c)}(B_2, a) &= -\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_2^{(b)}(A_2) \\
\boxed{\text{z372}} \quad \mathbb{Q}_2^{(1,0;c)}(B_2, b) &= \mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z373}} \quad \mathbb{Q}_2^{(1,0;c)}(B_2, c) &= -\mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{M}_1^{(b)}(A_2)
\end{aligned}$$

$$\boxed{\text{z374}} \quad \mathbb{Q}_3^{(1,0;c)}(B_2, 1) = -\frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_2)}{14} - \frac{3\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_2)}{14} - \frac{2\sqrt{7}\mathbb{T}_2^{(1,0;a)}(A_2)\mathbb{T}_1^{(b)}(B_1)}{7}$$

$$\boxed{\text{z375}} \quad \mathbb{Q}_3^{(1,0;c)}(B_2, 2) = \frac{\sqrt{3}\mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{T}_1^{(b)}(B_2)}{2} - \frac{\mathbb{T}_2^{(1,0;a)}(A_1, 2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z376}} \quad \mathbb{Q}_1^{(1,1;c)}(B_2, a) = \mathbb{Q}_0^{(1,1;a)}(A_1)\mathbb{Q}_1^{(b)}(B_2)$$

$$\boxed{\text{z377}} \quad \mathbb{Q}_1^{(1,1;c)}(B_2, b) = \mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_1^{(b)}(B_1)$$

$$\boxed{\text{z378}} \quad \mathbb{Q}_2^{(1,1;c)}(B_2) = \mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{M}_1^{(b)}(A_2)$$

$$\boxed{\text{z379}} \quad \mathbb{G}_2^{(c)}(A_1) = \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z380}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, a) = -\frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_1)}{8} - \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_1)}{8} - \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_2)}{8} + \frac{\sqrt{30}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_2)}{8}$$

$$\boxed{\text{z381}} \quad \mathbb{G}_2^{(1,-1;c)}(A_1, b) = \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z382}} \quad \mathbb{G}_3^{(1,-1;c)}(A_1) = \mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z383}} \quad \mathbb{G}_4^{(1,-1;c)}(A_1, 1) = -\frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_1)}{4} + \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_2)}{4}$$

$$\boxed{\text{z384}} \quad \mathbb{G}_2^{(1,0;c)}(A_1) = \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z493}} \quad \mathbb{G}_2^{(1,1;c)}(A_1) = \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_1)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_2)}{2}$$

$$\boxed{\text{z494}} \quad \mathbb{G}_0^{(c)}(A_2) = \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2}$$

$$\boxed{\text{z495}} \quad \mathbb{G}_1^{(c)}(A_2) = \mathbb{M}_1^{(a)}(A_2)\mathbb{T}_0^{(b)}(A_1)$$

$$\boxed{\text{z496}} \quad \mathbb{G}_2^{(c)}(A_2, 1) = \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2}\mathbb{Q}_2^{(a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2}$$

$$\begin{aligned}
\boxed{\text{z497}} \quad \mathbb{G}_2^{(c)}(A_2, 2) &= -\frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z498}} \quad \mathbb{G}_0^{(1,-1;c)}(A_2) &= \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z499}} \quad \mathbb{G}_1^{(1,-1;c)}(A_2) &= \mathbb{M}_1^{(1,-1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z500}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 1a) &= \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2}\mathbb{Q}_2^{(1,-1;a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z501}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 1b) &= -\frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_2)}{4} + \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_2)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_1)}{4} \\
\boxed{\text{z502}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 2a) &= -\frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z503}} \quad \mathbb{G}_2^{(1,-1;c)}(A_2, 2b) &= -\frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z504}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 1) &= \mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z505}} \quad \mathbb{G}_3^{(1,-1;c)}(A_2, 2) &= \mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z506}} \quad \mathbb{G}_4^{(1,-1;c)}(A_2, 1) &= \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_1^{(b)}(B_2)}{4} + \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_1^{(b)}(B_2)}{4} + \frac{\sqrt{5}\mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_1^{(b)}(B_1)}{4} - \frac{\sqrt{3}\mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_1^{(b)}(B_1)}{4} \\
\boxed{\text{z507}} \quad \mathbb{G}_0^{(1,0;c)}(A_2) &= \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z508}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, a) &= \mathbb{G}_1^{(1,0;a)}(A_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z509}} \quad \mathbb{G}_1^{(1,0;c)}(A_2, b) &= \mathbb{T}_2^{(1,0;a)}(A_1, 1)\mathbb{M}_1^{(b)}(A_2) \\
\boxed{\text{z510}} \quad \mathbb{G}_2^{(1,0;c)}(A_2, 1) &= \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} - \frac{\sqrt{2}\mathbb{T}_2^{(1,0;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z511}} \quad \mathbb{G}_2^{(1,0;c)}(A_2, 2) &= -\frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_1^{(b)}(B_1)}{2}
\end{aligned}$$

$$\begin{aligned}
\boxed{\text{z512}} \quad \mathbb{G}_0^{(1,1;c)}(A_2) &= \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z513}} \quad \mathbb{G}_1^{(1,1;c)}(A_2) &= \mathbb{M}_1^{(1,1;a)}(A_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z514}} \quad \mathbb{G}_2^{(1,1;c)}(A_2, 2) &= -\frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_1^{(b)}(B_2)}{2} + \frac{\sqrt{2}\mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_1^{(b)}(B_1)}{2} \\
\boxed{\text{z515}} \quad \mathbb{G}_1^{(c)}(B_1) &= \mathbb{M}_1^{(a)}(B_1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z516}} \quad \mathbb{G}_1^{(1,-1;c)}(B_1) &= \mathbb{M}_1^{(1,-1;a)}(B_1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z517}} \quad \mathbb{G}_2^{(1,-1;c)}(B_1) &= \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(B_1)}{11} - \frac{\sqrt{55}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_2)}{11} - \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_2)}{11} \\
\boxed{\text{z518}} \quad \mathbb{G}_3^{(1,-1;c)}(B_1, 1) &= \mathbb{M}_3^{(1,-1;a)}(B_1, 1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z519}} \quad \mathbb{G}_3^{(1,-1;c)}(B_1, 2) &= \mathbb{M}_3^{(1,-1;a)}(B_1, 2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z520}} \quad \mathbb{G}_1^{(1,0;c)}(B_1) &= \mathbb{G}_1^{(1,0;a)}(B_1)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z521}} \quad \mathbb{G}_1^{(1,1;c)}(B_1) &= \mathbb{M}_1^{(1,1;a)}(B_1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z522}} \quad \mathbb{G}_1^{(c)}(B_2) &= \mathbb{M}_1^{(a)}(B_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z523}} \quad \mathbb{G}_1^{(1,-1;c)}(B_2) &= \mathbb{M}_1^{(1,-1;a)}(B_2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z524}} \quad \mathbb{G}_2^{(1,-1;c)}(B_2) &= \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_1)\mathbb{T}_1^{(b)}(B_2)}{11} - \frac{\sqrt{55}\mathbb{M}_3^{(1,-1;a)}(A_2, 1)\mathbb{T}_1^{(b)}(B_1)}{11} + \frac{\sqrt{33}\mathbb{M}_3^{(1,-1;a)}(A_2, 2)\mathbb{T}_1^{(b)}(B_1)}{11} \\
\boxed{\text{z525}} \quad \mathbb{G}_3^{(1,-1;c)}(B_2, 1) &= \mathbb{M}_3^{(1,-1;a)}(B_2, 1)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z526}} \quad \mathbb{G}_3^{(1,-1;c)}(B_2, 2) &= \mathbb{M}_3^{(1,-1;a)}(B_2, 2)\mathbb{T}_0^{(b)}(A_1) \\
\boxed{\text{z527}} \quad \mathbb{G}_1^{(1,0;c)}(B_2) &= \mathbb{G}_1^{(1,0;a)}(B_2)\mathbb{Q}_0^{(b)}(A_1) \\
\boxed{\text{z528}} \quad \mathbb{G}_1^{(1,1;c)}(B_2) &= \mathbb{M}_1^{(1,1;a)}(B_2)\mathbb{T}_0^{(b)}(A_1)
\end{aligned}$$

- bra:  $\langle p_x, \uparrow |, \langle p_x, \downarrow |, \langle p_y, \uparrow |, \langle p_y, \downarrow |, \langle p_z, \uparrow |, \langle p_z, \downarrow |$
- ket:  $|p_x, \uparrow\rangle, |p_x, \downarrow\rangle, |p_y, \uparrow\rangle, |p_y, \downarrow\rangle, |p_z, \uparrow\rangle, |p_z, \downarrow\rangle$

$$\boxed{\text{x1}} \quad \mathbb{Q}_0^{(a)}(A_1) = \begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \end{bmatrix}$$

$$\boxed{\text{x2}} \quad \mathbb{Q}_2^{(a)}(A_1, 1) = \begin{bmatrix} -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{3} \end{bmatrix}$$

$$\boxed{\text{x3}} \quad \mathbb{Q}_2^{(a)}(A_1, 2) = \begin{bmatrix} \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & -\frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{1}{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x4}} \quad \mathbb{Q}_2^{(a)}(A_2) = \begin{bmatrix} 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x5}} \quad \mathbb{Q}_2^{(a)}(B_1) = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$



$$\boxed{\text{x6}} \quad \mathbb{Q}_2^{(a)}(B_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} \\ 0 & 0 & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x7}} \quad \mathbb{Q}_2^{(1,-1;a)}(A_1, 1) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & \frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{12} \\ 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & \frac{\sqrt{6}i}{12} & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x8}} \quad \mathbb{Q}_2^{(1,-1;a)}(A_1, 2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & \frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x9}} \quad \mathbb{Q}_2^{(1,-1;a)}(A_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x10}} \quad \mathbb{Q}_2^{(1,-1;a)}(B_1) = \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x11}} \quad \mathbb{Q}_2^{(1,-1;a)}(B_2) = \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x12}} \quad \mathbb{Q}_0^{(1,1;a)}(A_1) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 \\ \frac{\sqrt{3}i}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x13}} \quad \mathbb{G}_1^{(1,0;a)}(A_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & -\frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x14}} \quad \mathbb{G}_1^{(1,0;a)}(B_1) = \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & \frac{\sqrt{2}i}{4} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x15}} \quad \mathbb{G}_1^{(1,0;a)}(B_2) = \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{2}}{4} & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 \\ -\frac{\sqrt{2}}{4} & 0 & 0 & 0 & 0 & 0 \\ \frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{2}i}{4} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x16}} \quad \mathbb{M}_1^{(a)}(A_2) = \begin{bmatrix} 0 & 0 & -\frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{i}{2} & 0 & 0 \\ \frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{i}{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x17}} \quad \mathbb{M}_1^{(a)}(B_1) = \begin{bmatrix} 0 & 0 & 0 & 0 & \frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{i}{2} \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ -\frac{i}{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{i}{2} & 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x18}} \quad \mathbb{M}_1^{(a)}(B_2) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -\frac{i}{2} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{i}{2} \\ 0 & 0 & \frac{i}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{i}{2} & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x19}} \quad \mathbb{M}_3^{(1,-1;a)}(A_1) = \begin{bmatrix} 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \\ \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x20}} \quad \mathbb{M}_1^{(1,-1;a)}(A_2) = \begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \end{bmatrix}$$

$$\boxed{\text{x21}} \quad \mathbb{M}_3^{(1,-1;a)}(A_2, 1) = \begin{bmatrix} -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{10} & \frac{\sqrt{5}}{5} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & -\frac{\sqrt{5}}{5} \end{bmatrix}$$

$$\boxed{\text{x22}} \quad \mathbb{M}_3^{(1,-1;a)}(A_2, 2) = \begin{bmatrix} \frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & \frac{\sqrt{3}}{6} & -\frac{\sqrt{3}i}{6} & 0 \\ 0 & \frac{\sqrt{3}}{6} & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 \\ \frac{\sqrt{3}}{6} & 0 & -\frac{\sqrt{3}i}{6} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x23}} \quad \mathbb{M}_1^{(1,-1;a)}(B_1) = \begin{bmatrix} 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}i}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}i}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}i}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x24}} \quad \mathbb{M}_3^{(1,-1;a)}(B_1, 1) = \begin{bmatrix} 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{5}}{10} & 0 & -\frac{\sqrt{5}i}{5} & -\frac{\sqrt{5}}{10} & 0 \\ -\frac{\sqrt{5}}{10} & 0 & \frac{\sqrt{5}i}{5} & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & \frac{\sqrt{5}i}{10} \\ 0 & 0 & 0 & \frac{\sqrt{5}}{10} & -\frac{\sqrt{5}i}{10} & 0 \end{bmatrix}$$

$$\boxed{\text{x25}} \quad \mathbb{M}_3^{(1,-1;a)}(B_1, 2) = \begin{bmatrix} 0 & \frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 \\ -\frac{\sqrt{3}i}{6} & 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ 0 & -\frac{\sqrt{3}}{6} & 0 & 0 & \frac{\sqrt{3}}{6} & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}i}{6} \\ 0 & 0 & 0 & -\frac{\sqrt{3}}{6} & \frac{\sqrt{3}i}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x26}} \quad \mathbb{M}_1^{(1,-1;a)}(B_2) = \begin{bmatrix} 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 \\ \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ 0 & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x27}} \quad \mathbb{M}_3^{(1,-1;a)}(B_2, 1) = \begin{bmatrix} 0 & \frac{\sqrt{5}}{5} & 0 & \frac{\sqrt{5}i}{10} & -\frac{\sqrt{5}}{10} & 0 \\ \frac{\sqrt{5}}{5} & 0 & -\frac{\sqrt{5}i}{10} & 0 & 0 & \frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 \\ -\frac{\sqrt{5}i}{10} & 0 & -\frac{\sqrt{5}}{10} & 0 & 0 & 0 \\ -\frac{\sqrt{5}}{10} & 0 & 0 & 0 & 0 & -\frac{\sqrt{5}}{10} \\ 0 & \frac{\sqrt{5}}{10} & 0 & 0 & -\frac{\sqrt{5}}{10} & 0 \end{bmatrix}$$

$$\boxed{\text{x28}} \quad \mathbb{M}_3^{(1,-1;a)}(B_2, 2) = \begin{bmatrix} 0 & 0 & 0 & -\frac{\sqrt{3}i}{6} & -\frac{\sqrt{3}}{6} & 0 \\ 0 & 0 & \frac{\sqrt{3}i}{6} & 0 & 0 & \frac{\sqrt{3}}{6} \\ 0 & -\frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 \\ \frac{\sqrt{3}i}{6} & 0 & \frac{\sqrt{3}}{6} & 0 & 0 & 0 \\ -\frac{\sqrt{3}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{3}}{6} \\ 0 & \frac{\sqrt{3}}{6} & 0 & 0 & -\frac{\sqrt{3}}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x29}} \quad \mathbb{M}_1^{(1,1;a)}(A_2) = \begin{bmatrix} -\frac{\sqrt{30}}{30} & 0 & 0 & 0 & 0 & \frac{\sqrt{30}}{20} \\ 0 & \frac{\sqrt{30}}{30} & 0 & 0 & \frac{\sqrt{30}}{20} & 0 \\ 0 & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & -\frac{\sqrt{30}i}{20} \\ 0 & 0 & 0 & \frac{\sqrt{30}}{30} & \frac{\sqrt{30}i}{20} & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{15} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{15} \end{bmatrix}$$

$$\boxed{\text{x30}} \quad \mathbb{M}_1^{(1,1;a)}(B_1) = \begin{bmatrix} 0 & \frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 \\ -\frac{\sqrt{30}i}{30} & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{30}}{20} & 0 & -\frac{\sqrt{30}i}{15} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{20} & 0 & \frac{\sqrt{30}i}{15} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & 0 & \frac{\sqrt{30}}{20} & 0 & 0 & \frac{\sqrt{30}i}{30} \\ 0 & 0 & 0 & -\frac{\sqrt{30}}{20} & -\frac{\sqrt{30}i}{30} & 0 \end{bmatrix}$$

$$\boxed{\text{x31}} \quad \mathbb{M}_1^{(1,1;a)}(B_2) = \begin{bmatrix} 0 & \frac{\sqrt{30}}{15} & 0 & -\frac{\sqrt{30}i}{20} & \frac{\sqrt{30}}{20} & 0 \\ \frac{\sqrt{30}}{15} & 0 & \frac{\sqrt{30}i}{20} & 0 & 0 & -\frac{\sqrt{30}}{20} \\ 0 & -\frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 \\ \frac{\sqrt{30}i}{20} & 0 & -\frac{\sqrt{30}}{30} & 0 & 0 & 0 \\ \frac{\sqrt{30}}{20} & 0 & 0 & 0 & 0 & -\frac{\sqrt{30}}{30} \\ 0 & -\frac{\sqrt{30}}{20} & 0 & 0 & -\frac{\sqrt{30}}{30} & 0 \end{bmatrix}$$

$$\boxed{\text{x32}} \quad \mathbb{T}_2^{(1,0;a)}(A_1, 1) = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}i}{4} \\ 0 & 0 & 0 & 0 & -\frac{\sqrt{2}i}{4} & 0 \\ 0 & 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} \\ 0 & 0 & 0 & 0 & \frac{\sqrt{2}}{4} & 0 \\ 0 & \frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 \\ -\frac{\sqrt{2}i}{4} & 0 & \frac{\sqrt{2}}{4} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x33}} \quad \mathbb{T}_2^{(1,0;a)}(A_1, 2) = \begin{bmatrix} 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{12} & 0 \\ -\frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}}{6} & 0 & 0 & \frac{\sqrt{6}}{12} & 0 \\ 0 & -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x34}} \quad \mathbb{T}_2^{(1,0;a)}(A_2) = \begin{bmatrix} \frac{\sqrt{6}}{6} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{6}}{6} & 0 & 0 & -\frac{\sqrt{6}i}{12} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{6} & \frac{\sqrt{6}i}{12} & 0 \\ 0 & -\frac{\sqrt{6}}{12} & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 \\ -\frac{\sqrt{6}}{12} & 0 & \frac{\sqrt{6}i}{12} & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\text{x35}} \quad \mathbb{T}_2^{(1,0;a)}(B_1) = \begin{bmatrix} 0 & \frac{\sqrt{6}i}{6} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 \\ -\frac{\sqrt{6}i}{6} & 0 & \frac{\sqrt{6}}{12} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} & 0 \\ \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & \frac{\sqrt{6}}{12} \\ 0 & 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}i}{6} \\ 0 & 0 & 0 & \frac{\sqrt{6}}{12} & \frac{\sqrt{6}i}{6} & 0 \end{bmatrix}$$

$$\boxed{\text{x36}} \quad \mathbb{T}_2^{(1,0;a)}(B_2) = \begin{bmatrix} 0 & 0 & 0 & \frac{\sqrt{6}i}{12} & \frac{\sqrt{6}}{12} & 0 \\ 0 & 0 & -\frac{\sqrt{6}i}{12} & 0 & 0 & -\frac{\sqrt{6}}{12} \\ 0 & \frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 \\ -\frac{\sqrt{6}i}{12} & 0 & \frac{\sqrt{6}}{6} & 0 & 0 & 0 \\ \frac{\sqrt{6}}{12} & 0 & 0 & 0 & 0 & -\frac{\sqrt{6}}{6} \\ 0 & -\frac{\sqrt{6}}{12} & 0 & 0 & -\frac{\sqrt{6}}{6} & 0 \end{bmatrix}$$

- Site cluster

\*\* Wyckoff: 2a

$$\boxed{\text{y1}} \quad \mathbb{Q}_0^{(s)}(A_1) = \left[ \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \right]$$

$$\boxed{\text{y2}} \quad \mathbb{Q}_1^{(s)}(B_2) = \left[ \frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2} \right]$$

- Bond cluster

\*\* Wyckoff: 2a@2a

$$\boxed{\text{y3}} \quad \mathbb{Q}_0^{(s)}(A_1) = \left[ \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \right]$$

$$\boxed{\text{y4}} \quad \mathbb{T}_0^{(s)}(A_1) = \left[ \frac{\sqrt{2}i}{2}, \frac{\sqrt{2}i}{2} \right]$$

$$\boxed{\text{y5}} \quad \mathbb{Q}_1^{(s)}(B_2) = \left[ \frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2} \right]$$

$$\boxed{\text{y6}} \quad \mathbb{T}_1^{(s)}(B_2) = \left[ \frac{\sqrt{2}i}{2}, -\frac{\sqrt{2}i}{2} \right]$$

\*\* Wyckoff: 4a@4b

$$\boxed{\text{y7}} \quad \mathbb{Q}_0^{(s)}(A_1) = \left[ \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2} \right]$$

$$\boxed{\text{y8}} \quad \mathbb{T}_0^{(s)}(A_1) = \left[ \frac{i}{2}, \frac{i}{2}, \frac{i}{2}, \frac{i}{2} \right]$$

$$\boxed{\text{y9}} \quad \mathbb{M}_1^{(s)}(A_2) = \left[ \frac{i}{2}, \frac{i}{2}, -\frac{i}{2}, -\frac{i}{2} \right]$$

$$\boxed{\text{y10}} \quad \mathbb{Q}_2^{(s)}(A_2) = \left[ \frac{1}{2}, \frac{1}{2}, -\frac{1}{2}, -\frac{1}{2} \right]$$

$$\boxed{\text{y11}} \quad \mathbb{Q}_1^{(s)}(B_1) = \left[ \frac{1}{2}, -\frac{1}{2}, \frac{1}{2}, -\frac{1}{2} \right]$$

$$\boxed{\text{y12}} \quad \mathbb{T}_1^{(s)}(B_1) = \left[ \frac{i}{2}, -\frac{i}{2}, \frac{i}{2}, -\frac{i}{2} \right]$$

$$\boxed{\text{y13}} \quad \mathbb{Q}_1^{(s)}(B_2) = \left[ \frac{1}{2}, -\frac{1}{2}, -\frac{1}{2}, \frac{1}{2} \right]$$

$$\boxed{\text{y14}} \quad \mathbb{T}_1^{(s)}(B_2) = \left[ \frac{i}{2}, -\frac{i}{2}, -\frac{i}{2}, \frac{i}{2} \right]$$

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**Site and Bond**


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Table 5: Orbital of each site

#	site	orbital
1	<b>Sn</b>	$ p_x, \uparrow\rangle,  p_x, \downarrow\rangle,  p_y, \uparrow\rangle,  p_y, \downarrow\rangle,  p_z, \uparrow\rangle,  p_z, \downarrow\rangle$
2	<b>Te</b>	$ p_x, \uparrow\rangle,  p_x, \downarrow\rangle,  p_y, \uparrow\rangle,  p_y, \downarrow\rangle,  p_z, \uparrow\rangle,  p_z, \downarrow\rangle$

Table 6: Neighbor and bra-ket of each bond

#	head	tail	neighbor	head (bra)	tail (ket)
1	<b>Sn</b>	<b>Sn</b>	[1]	[p]	[p]
2	<b>Sn</b>	<b>Te</b>	[1, 2]	[p]	[p]
3	<b>Te</b>	<b>Te</b>	[1]	[p]	[p]



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**Site in Unit Cell**


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Sites in (conventional) cell (no plus set), SL = sublattice

Table 7: 'Sn' (#1) site cluster (2a), m. .

SL	position ( $\mathbf{s}$ )	mapping
1	[ 0.00000, 0.40000, 0.10000]	[1,4]
2	[ 0.50000, 0.60000, 0.60000]	[2,3]

Table 8: 'Te' (#2) site cluster (2a), m. .

SL	position ( $\mathbf{s}$ )	mapping
1	[ 0.00000, 0.65000, 0.90000]	[1,4]
2	[ 0.50000, 0.35000, 0.40000]	[2,3]

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**Bond in Unit Cell**


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Bonds in (conventional) cell (no plus set): tail, head = (SL, plus set), (N)D = (non)directional (listed up to 5th neighbor at most)

Table 9: 1-th 'Sn'-'Sn' [1] (#1) bond cluster (4a@4b), D,  $|\mathbf{v}|= 3.44345$  (cartesian)

SL	vector ( $\mathbf{v}$ )	center ( $\mathbf{c}$ )	mapping	head	tail	$\mathbf{R}$ (primitive)
1	[-0.50000, 0.20000, -0.50000]	[ 0.75000, 0.50000, 0.85000]	[1]	(2,1)	(1,1)	[1,0,1]
2	[ 0.50000, -0.20000, -0.50000]	[ 0.75000, 0.50000, 0.35000]	[2]	(1,1)	(2,1)	[-1,0,0]
3	[-0.50000, -0.20000, -0.50000]	[ 0.25000, 0.50000, 0.35000]	[3]	(1,1)	(2,1)	[0,0,0]
4	[ 0.50000, 0.20000, -0.50000]	[ 0.25000, 0.50000, 0.85000]	[4]	(2,1)	(1,1)	[0,0,1]

Table 10: 1-th 'Sn'-'Te' [1] (#2) bond cluster (2a@2a), D,  $|\mathbf{v}|= 1.75653$  (cartesian)

SL	vector ( $\mathbf{v}$ )	center ( $\mathbf{c}$ )	mapping	head	tail	$\mathbf{R}$ (primitive)
1	[ 0.00000, -0.25000, 0.20000]	[ 0.00000, 0.52500, 0.00000]	[1,4]	(1,1)	(1,1)	[0,0,-1]
2	[ 0.00000, 0.25000, 0.20000]	[ 0.50000, 0.47500, 0.50000]	[2,3]	(2,1)	(2,1)	[0,0,0]

Table 11: 2-th 'Sn'-'Te' [1] (#3) bond cluster (4a@4b), D,  $|\mathbf{v}|=2.67689$  (cartesian)

SL	vector ( $\mathbf{v}$ )	center ( $\mathbf{c}$ )	mapping	head	tail	$\mathbf{R}$ (primitive)
1	[-0.50000, -0.05000, -0.30000]	[ 0.75000, 0.62500, 0.75000]	[1]	(2,1)	(1,1)	[1,0,0]
2	[ 0.50000, 0.05000, -0.30000]	[ 0.75000, 0.37500, 0.25000]	[2]	(1,1)	(2,1)	[-1,0,0]
3	[-0.50000, 0.05000, -0.30000]	[ 0.25000, 0.37500, 0.25000]	[3]	(1,1)	(2,1)	[0,0,0]
4	[ 0.50000, -0.05000, -0.30000]	[ 0.25000, 0.62500, 0.75000]	[4]	(2,1)	(1,1)	[0,0,0]

Table 12: 1-th 'Te'-'Te' [1] (#4) bond cluster (4a@4b), D,  $|\mathbf{v}|=3.69558$  (cartesian)

SL	vector ( $\mathbf{v}$ )	center ( $\mathbf{c}$ )	mapping	head	tail	$\mathbf{R}$ (primitive)
1	[-0.50000, -0.30000, -0.50000]	[ 0.75000, 0.50000, 0.65000]	[1]	(2,1)	(1,1)	[1,0,0]
2	[ 0.50000, 0.30000, -0.50000]	[ 0.75000, 0.50000, 0.15000]	[2]	(1,1)	(2,1)	[-1,0,1]
3	[-0.50000, 0.30000, -0.50000]	[ 0.25000, 0.50000, 0.15000]	[3]	(1,1)	(2,1)	[0,0,1]
4	[ 0.50000, -0.30000, -0.50000]	[ 0.25000, 0.50000, 0.65000]	[4]	(2,1)	(1,1)	[0,0,0]