International Tables for Crystallography (2006). Vol. A1, Wyckoff relations for space group 149, pp. 632–633.

	Axes	Coordinates	Wyckoff positions									
			$1a$	$1b$	$1c$	$1d$	$1e$	$1f$	$2g$	$2h$	$2i$ $3k$	$3j$ $6l$
I Maximal *translationengleiche* subgroups												
[2] $P3$ (143)			$1a$	$1a$	$1b$	$1b$	$1c$	$1c$	$2\times1a$	$2\times1b$	$2\times1c$ $3d$	$3d$ $2\times3d$
[3] $C121$ (5)	$\mathbf{a}, \mathbf{a}+2\mathbf{b}, \mathbf{c}$	$x-\frac{1}{2}y, \frac{1}{2}y, z$	$2a$	$2b$	$2a$	$2b$	$2a$	$2b$	$4c$	$4c$	$4c$ $2b;4c$	$2a;4c$ $3\times4c$
conjugate:	$\mathbf{b}, -2\mathbf{a}-\mathbf{b}, \mathbf{c}$	$-\frac{1}{2}x+y, -\frac{1}{2}x, z$										
conjugate:	$-\mathbf{a}-\mathbf{b}, \mathbf{a}-\mathbf{b}, \mathbf{c}$	$-\frac{1}{2}(x+y), \frac{1}{2}(x-y), z$										
II Maximal *klassengleiche* subgroups												
Enlarged unit cell, non-isomorphic												
[3] $R32$ (155)	$\mathbf{a}-\mathbf{b}, \mathbf{a}+2\mathbf{b}, 3\mathbf{c}$ (hexagonal axes)	$\frac{1}{3}(2x-y), \frac{1}{3}(x+y), \frac{1}{3}z; \pm(0,0,\frac{1}{3})$	$3a;6c$	$3b;6c$	$9d$	$9e$	$9d$	$9e$	$3\times6c$	$18f$	$18f$ $9e;18f$	$9d;18f$ $3\times18f$
[3] $R32$ (155)	$\mathbf{a}-\mathbf{b}, \mathbf{a}+2\mathbf{b}, 3\mathbf{c}$ (hexagonal axes)	$\frac{1}{3}(2x-y)-\frac{1}{3}, \frac{1}{3}(x+y), \frac{1}{3}z; \pm(0,0,\frac{1}{3})$	$9d$	$9e$	$3a;6c$	$3b;6c$	$9d$	$9e$	$18f$	$3\times6c$	$18f$ $9e;18f$	$9d;18f$ $3\times18f$
[3] $R32$ (155)	$\mathbf{a}-\mathbf{b}, \mathbf{a}+2\mathbf{b}, 3\mathbf{c}$ (hexagonal axes)	$\frac{1}{3}(2x-y)+\frac{1}{3}, \frac{1}{3}(x+y), \frac{1}{3}z; \pm(0,0,\frac{1}{3})$	$9d$	$9e$	$9d$	$9e$	$3a;6c$	$3b;6c$	$18f$	$18f$	$3\times6c$ $9e;18f$	$9d;18f$ $3\times18f$
[3] $R32$ (155)	$2\mathbf{a}+\mathbf{b}, -\mathbf{a}+\mathbf{b}, 3\mathbf{c}$ (hexagonal axes)	$\frac{1}{3}(x+y), \frac{1}{3}(-x+2y), \frac{1}{3}z; \pm(0,0,\frac{1}{3})$	$3a;6c$	$3b;6c$	$9d$	$9e$	$9d$	$9e$	$3\times6c$	$18f$	$18f$ $9e;18f$	$9d;18f$ $3\times18f$
[3] $R32$ (155)	$2\mathbf{a}+\mathbf{b}, -\mathbf{a}+\mathbf{b}, 3\mathbf{c}$ (hexagonal axes)	$\frac{1}{3}(x+y)-\frac{1}{3}, \frac{1}{3}(-x+2y), \frac{1}{3}z; \pm(0,0,\frac{1}{3})$	$9d$	$9e$	$9d$	$9e$	$3a;6c$	$3b;6c$	$18f$	$18f$	$3\times6c$ $9e;18f$	$9d;18f$ $3\times18f$
[3] $R32$ (155)	$2\mathbf{a}+\mathbf{b}, -\mathbf{a}+\mathbf{b}, 3\mathbf{c}$ (hexagonal axes)	$\frac{1}{3}(x+y)+\frac{1}{3}, \frac{1}{3}(-x+2y), \frac{1}{3}z; \pm(0,0,\frac{1}{3})$	$9d$	$9e$	$3a;6c$	$3b;6c$	$9d$	$9e$	$18f$	$3\times6c$	$18f$ $9e;18f$	$9d;18f$ $3\times18f$
[3] $P3_212$ (153)	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	$x, y, \frac{1}{3}z; \pm(0,0,\frac{1}{3})$	$3a$	$3b$	$3a$	$3b$	$3a$	$3b$	$6c$	$6c$	$6c$ $3b;6c$	$3a;6c$ $3\times6c$
[3] $P3_112$ (151)	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	$x, y, \frac{1}{3}z; \pm(0,0,\frac{1}{3})$	$3a$	$3b$	$3a$	$3b$	$3a$	$3b$	$6c$	$6c$	$6c$ $3b;6c$	$3a;6c$ $3\times6c$
[3] $P321$ (150)	$2\mathbf{a}+\mathbf{b}, -\mathbf{a}+\mathbf{b}, \mathbf{c}$	$\frac{1}{3}(x+y), \frac{1}{3}(-x+2y), z; \pm(\frac{1}{3},\frac{2}{3},0)$	$1a;2d$	$1b;2d$	$3e$	$3f$	$3e$	$3f$	$2c;2\times2d$	$6g$	$6g$ $3f;6g$	$3e;6g$ $3\times6g$
[3] $P321$ (150)	$2\mathbf{a}+\mathbf{b}, -\mathbf{a}+\mathbf{b}, \mathbf{c}$	$\frac{1}{3}(x+y)-\frac{1}{3}, \frac{1}{3}(-x+2y), z; \pm(\frac{1}{3},\frac{2}{3},0)$	$3e$	$3f$	$3e$	$3f$	$1a;2d$	$1b;2d$	$6g$	$6g$	$2c;2\times2d$ $3f;6g$	$3e;6g$ $3\times6g$
[3] $P321$ (150)	$2\mathbf{a}+\mathbf{b}, -\mathbf{a}+\mathbf{b}, \mathbf{c}$	$\frac{1}{3}(x+y)+\frac{1}{3}, \frac{1}{3}(-x+2y), z; \pm(\frac{1}{3},\frac{2}{3},0)$	$3e$	$3f$	$1a;2d$	$1b;2d$	$3e$	$3f$	$6g$	$2c;2\times2d$	$6g$ $3f;6g$	$3e;6g$ $3\times6g$
Enlarged unit cell, isomorphic												
[2] $P312$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	$x, y, \frac{1}{2}z; +(0,0,\frac{1}{2})$	$1a;1b$	$2g$	$1c;1d$	$2h$	$1e;1f$	$2i$	$2\times2g$	$2\times2h$	$2\times2i$ $6l$	$3j;3k$ $2\times6l$
[2] $P312$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	$x, y, \frac{1}{2}z+\frac{1}{4}; +(0,0,\frac{1}{2})$	$2g$	$1a;1b$	$2h$	$1c;1d$	$2i$	$1e;1f$	$2\times2g$	$2\times2h$	$2\times2i$ $3j;3k$	$6l$ $2\times6l$
[3] $P312$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	$x, y, \frac{1}{3}z; \pm(0,0,\frac{1}{3})$	$1a;2g$	$1b;2g$	$1c;2h$	$1d;2h$	$1e;2i$	$1f;2i$	$3\times2g$	$3\times2h$	$3\times2i$ $3k;6l$	$3j;6l$ $3\times6l$

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$R\bar{3}$ No. 148 C_{3i}^{2}

HEXAGONAL AXES

Axes	Coordinates	Wyckoff positions $3a$	$3b$	$6c$	$9d$	$9e$	$18f$
I Maximal *translationengleiche* subgroups							
[2] $R3$ (146)		$3a$	$3a$	$2\times3a$	$9b$	$9b$	$2\times9b$
[3] $P\bar{1}$ $\frac{1}{3}(2\mathbf{a}+\mathbf{b}+\mathbf{c})$, $\frac{1}{3}(-\mathbf{a}+\mathbf{b}+\mathbf{c})$, $\frac{1}{3}(-\mathbf{a}-2\mathbf{b}+\mathbf{c})$ (2) rhombo. axes: $\mathbf{a}, \mathbf{b}, \mathbf{c}$	$x+z, -x+y+z, -y+z$; x, y, z	$1a$	$1h$	$2i$	$1b; 1c; 1d$	$1e; 1f; 1g$	$3\times2i$
II Maximal *klassengleiche* subgroups							
Loss of centring translations							
[3] $P\bar{3}$ (147)		$1a; 2d$	$1b; 2d$	$2c; 2\times2d$	$3f; 6g$	$3e; 6g$	$3\times6g$
Enlarged unit cell, isomorphic							
[2] $R\bar{3}$ $-\mathbf{a}, -\mathbf{b}, 2\mathbf{c}$	$-x, -y, \frac{1}{2}z; +(0,0,\frac{1}{2})$	$3a; 3b$	$6c$	$2\times6c$	$18f$	$9d; 9e$	$2\times18f$
[2] $R\bar{3}$ $-\mathbf{a}, -\mathbf{b}, 2\mathbf{c}$	$-x, -y, \frac{1}{2}z+\frac{1}{4}; +(0,0,\frac{1}{2})$	$6c$	$3a; 3b$	$2\times6c$	$9d; 9e$	$18f$	$2\times18f$
[p] $R\bar{3}$ $-\mathbf{a}, -\mathbf{b}, p\mathbf{c}$ $p=\text{prime}=6n-1; u=1,\ldots,p-1$	$-x, -y, \frac{1}{p}z; +(0,0,\frac{u}{p})$	$3a; \frac{p-1}{2}\times6c$	$3b; \frac{p-1}{2}\times6c$	$p\times6c$	$9d; \frac{p-1}{2}\times18f$	$9e; \frac{p-1}{2}\times18f$	$p\times18f$
$\mathbf{a}, \mathbf{b}, p\mathbf{c}$ $p=\text{prime}=6n+1; u=1,\ldots,p-1$	$x, y, \frac{1}{p}z; +(0,0,\frac{u}{p})$						
[7] $R\bar{3}$ $3\mathbf{a}+\mathbf{b}$, $-\mathbf{a}+2\mathbf{b}, \mathbf{c}$	$\frac{1}{7}(2x+y), \frac{1}{7}(-x+3y), z$; $\pm(\frac{1}{7},\frac{3}{7},0); \pm(\frac{5}{7},\frac{1}{7},0); \pm(\frac{3}{7},\frac{2}{7},0)$	$3a; 18f$	$3b; 18f$	$6c; 2\times18f$	$9d; 3\times18f$	$9e; 3\times18f$	$7\times18f$
[7] $R\bar{3}$ $\mathbf{a}+3\mathbf{b}$, $-3\mathbf{a}-2\mathbf{b}, \mathbf{c}$	$\frac{1}{7}(-2x+3y), \frac{1}{7}(-3x+y), z$; $\pm(\frac{1}{7},\frac{5}{7},0); \pm(\frac{2}{7},\frac{3}{7},0); \pm(\frac{3}{7},\frac{1}{7},0)$	$3a; 18f$	$3b; 18f$	$6c; 2\times18f$	$9d; 3\times18f$	$9e; 3\times18f$	$7\times18f$
[p] $R\bar{3}$ $q\mathbf{a}+r\mathbf{b}$, $-r\mathbf{a}+(q-r)\mathbf{b}, \mathbf{c}$ $p=q^2-qr+r^2=\text{prime}=6n+1$; $q,r=1,2,\ldots; q\neq r; q+r=3n+1$; $u=1,\ldots,p-1$	$\frac{1}{p}((q-r)x+ry)$, $\frac{1}{p}(-rx+qy), z; +(\frac{ur}{p},\frac{uq}{p},0)$	$3a; \frac{p-1}{6}\times18f$	$3b; \frac{p-1}{6}\times18f$	$6c; \frac{p-1}{3}\times18f$	$9d; \frac{p-1}{2}\times18f$	$9e; \frac{p-1}{2}\times18f$	$p\times18f$
[4] $R\bar{3}$ $-2\mathbf{a}, -2\mathbf{b}, \mathbf{c}$	$-\frac{1}{2}x, -\frac{1}{2}y, z; +(\frac{1}{2},0,0)$; $+(0,\frac{1}{2},0); +(\frac{1}{2},\frac{1}{2},0)$	$3a; 9e$	$3b; 9d$	$6c; 18f$	$2\times18f$	$2\times18f$	$4\times18f$
[p^2] $R\bar{3}$ $-p\mathbf{a}, -p\mathbf{b}, \mathbf{c}$ $p=\text{prime}=6n-1$; $u,v=1,\ldots,p-1$	$-\frac{1}{p}x, -\frac{1}{p}y, z; +(\frac{u}{p},\frac{v}{p},0)$	$3a; \frac{p^2-1}{6}\times18f$	$3b; \frac{p^2-1}{6}\times18f$	$6c; \frac{p^2-1}{3}\times18f$	$9d; \frac{p^2-1}{2}\times18f$	$9e; \frac{p^2-1}{2}\times18f$	$p^2\times18f$

$P312$ No. 149

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Axes	Coordinates	Wyckoff positions $1a$	$1b$	$1c$ $2h$	$1d$ $2i$	$1e$ $3j$	$1f$ $3k$	$2g$ $6l$
[p] $P312$ $\mathbf{a}, \mathbf{b}, p\mathbf{c}$ $p=\text{prime}>2$; $u=1,\ldots,p-1$	$x, y, \frac{1}{p}z; +(0,0,\frac{u}{p})$	$1a; \frac{p-1}{2}\times2g$	$1b; \frac{p-1}{2}\times2g$	$1c; \frac{p-1}{2}\times2h$ $p\times2h$	$1d; \frac{p-1}{2}\times2h$ $p\times2i$	$1e; \frac{p-1}{2}\times2i$ $3j; \frac{p-1}{2}\times6l$	$1f; \frac{p-1}{2}\times2i$ $3k; \frac{p-1}{2}\times6l$	$p\times2g$ $p\times6l$
[4] $P312$ $2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	$\frac{1}{2}x, \frac{1}{2}y, z; +(\frac{1}{2},0,0)$; $+(0,\frac{1}{2},0); +(\frac{1}{2},\frac{1}{2},0)$	$1a; 3j$	$1b; 3k$	$1e; 3j$ $2i; 6l$	$1f; 3k$ $2h; 6l$	$1c; 3j$ $2\times3j; 6l$	$1d; 3k$ $2\times3k; 6l$	$2g; 6l$ $4\times6l$
[p^2] $P312$ $p\mathbf{a}, p\mathbf{b}, \mathbf{c}$ $p=\text{prime}>4$; $u,v=1,\ldots,p-1$	$\frac{1}{p}x, \frac{1}{p}y, z; +(\frac{u}{p},\frac{v}{p},0)$	$1a$; $(p-1)\times3j$; $\frac{(p-1)(p-2)}{6}\times6l$	$1b$; $(p-1)\times3k$; $\frac{(p-1)(p-2)}{6}\times6l$	$1c(e^*)$; $(p-1)\times3j$; $\frac{(p-1)(p-2)}{6}\times6l$ $2h(i^*)$; $\frac{p^2-1}{3}\times6l$	$1d(f^*)$; $(p-1)\times3k$; $\frac{(p-1)(p-2)}{6}\times6l$ $2i(h^*)$; $\frac{p^2-1}{3}\times6l$	$1e(c^*)$; $(p-1)\times3j$; $\frac{(p-1)(p-2)}{6}\times6l$ $p\times3j$; $\frac{p(p-1)}{2}\times6l$	$1f(d^*)$; $(p-1)\times3k$; $\frac{(p-1)(p-2)}{6}\times6l$ $p\times3k$; $\frac{p(p-1)}{2}\times6l$	$2g; \frac{p^2-1}{3}\times6l$ $p^2\times6l$

$^*p=6n-1$