

D_{2h}^{17} $C2/m\bar{2}/c\bar{2}_1/m$

No. 63

 $Cmcm$

Axes	Coordinates	4a	4b	4c	8d	8e	8f	8g	16h
I Maximal translationengleiche subgroups									
[2] $C2cm$ (40) $\cong Ama2$	$\mathbf{c}, \mathbf{b}, -\mathbf{a}$ $z, y, -x$	4a	4a	4b	8c	$2\times 4a$	8c	$2\times 4b$	$2\times 8c$
[2] $Cm2m$ (38) $\cong Amm2$	$x, y, z + \frac{1}{4}$ $z + \frac{1}{4}, x, y$	4c	4c	$2a; 2b$	8f	8f	$2\times 4c$	$4d; 4e$	$2\times 8f$
[2] $Cmc2_1$ (36)		4a	4a	4a	8b	8b	$2\times 4a$	8b	$2\times 8b$
[2] $C222_1$ (20)		4a	4a	4b	8c	$2\times 4a$	8c	8c	$2\times 8c$
[2] $C12/c1$ (15)		4a	4b	4e	$4c; 4d$	8f	8f	8f	$2\times 8f$
[2] $C2/m11$ (12) $\cong C12/m1$	$\mathbf{b}, -\mathbf{a}, \mathbf{c}$ $y, -x, z$	2a; 2c	$2b; 2d$	4i	$4e; 4f$	$4g; 4h$	$2\times 4i$	8j	$2\times 8j$
[2] $P112_1/m$ (11)	$\mathbf{a}, \frac{1}{2}(-\mathbf{a}+\mathbf{b}), \mathbf{c}$ or: $\frac{1}{2}(\mathbf{a}-\mathbf{b}), \mathbf{b}, \mathbf{c}$ or: $\frac{1}{2}(\mathbf{a}-\mathbf{b}), \frac{1}{2}(\mathbf{a}+\mathbf{b}), \mathbf{c}$	x+y, 2y, z $2x, x+y, z$ $x-y, x+y, z$	2a	2c	2e	$2b; 2d$	4f	4f	$2\times 2e$
			2a	2b	2e	$2c; 2d$	4f	4f	$2\times 4f$
			2a	2d	2e	$2b; 2c$	4f	4f	$2\times 2e$
									$2\times 4f$

II Maximal klassengleiche subgroups

Loss of centring translations

[2] $Pbnm$ (62) $\cong Pnma$	$\mathbf{b}, \mathbf{c}, \mathbf{a}$ y, z, x	4a	4b	4c	8d	8d	8d	$2\times 4c$	$2\times 8d$
[2] $Pmcn$ (62) $\cong Pnma$	$x + \frac{1}{4}, y + \frac{1}{4}, z$ $z, x + \frac{1}{4}, y + \frac{1}{4}$	4c	4c	4c	$4a; 4b$	8d	$2\times 4c$	8d	$2\times 8d$
[2] $Pbcn$ (60)		4a	4b	4c	8d	8d	8d	8d	$2\times 8d$
[2] $Pmnm$ (59)	origin 1: $x, y + \frac{1}{4}, z + \frac{1}{4}$ origin 2: $x - \frac{1}{4}, y + \frac{1}{4}, z$	4f	4f	$2a; 2b$	$4c; 4d$	8g	$2\times 4f$	$2\times 4e$	$2\times 8g$
$\cong Pmmn$	$\mathbf{c}, \mathbf{a}, \mathbf{b}$ $z + \frac{1}{4}, x, y + \frac{1}{4}$ (origin 1) $z, x - \frac{1}{4}, y + \frac{1}{4}$ (origin 2)								
[2] $Pmnn$ (58) $\cong Pnnm$	$\mathbf{b}, \mathbf{c}, \mathbf{a}$ y, z, x	2a; 2c	$2b; 2d$	4g	8h	$4e; 4f$	$2\times 4g$	8h	$2\times 8h$
[2] $Pbcm$ (57)	$x + \frac{1}{4}, y + \frac{1}{4}, z$	4c	4c	4d	$4a; 4b$	$2\times 4c$	8e	$2\times 4d$	$2\times 8e$
[2] $Pbnn$ (52) $\cong Pnna$	$x + \frac{1}{4}, y + \frac{1}{4}, z$ $y + \frac{1}{4}, z, x + \frac{1}{4}$	4c	4c	4d	$4a; 4b$	$2\times 4c$	8e	8e	$2\times 8e$
[2] $Pmcm$ (51) $\cong Pmma$	$\mathbf{c}, \mathbf{a}, \mathbf{b}$ z, x, y	2a; 2d	$2b; 2c$	$2e; 2f$	8l	$4g; 4h$	$4i; 4j$	$2\times 4k$	$2\times 8l$

Enlarged unit cell, isomorphic

[3] $Cmcm$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$ $\frac{1}{3}x, y, z; \pm(\frac{1}{3}, 0, 0)$	4a; 8e	4b; 8e	4c; 8g	$8d; 16h$	$3\times 8e$	$8f; 16h$	$3\times 8g$	$3\times 16h$
[p] $Cmcm$	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$ $\frac{1}{3}x, y, z; +(\frac{u}{p}, 0, 0)$ $p = \text{prime} > 2; u = 1, \dots, p-1$	4a; $\frac{p-1}{2}\times 8e$	4b; $\frac{p-1}{2}\times 8e$	4c; $\frac{p-1}{2}\times 8g$	$8d; \frac{p-1}{2}\times 16h$	$p\times 8e$	$8f; \frac{p-1}{2}\times 16h$	$p\times 8g$	$p\times 16h$
[3] $Cmcm$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$ $x, \frac{1}{3}y, z; \pm(0, \frac{1}{3}, 0)$	4a; 8f	4b; 8f	$3\times 4c$	$8d; 16h$	$8e; 16h$	$3\times 8f$	$3\times 8g$	$3\times 16h$
[p] $Cmcm$	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$ $x, \frac{1}{p}y, z; +(0, \frac{u}{p}, 0)$ $p = \text{prime} > 2; u = 1, \dots, p-1$	4a; $\frac{p-1}{2}\times 8f$	4b; $\frac{p-1}{2}\times 8f$	$p\times 4c$	$8d; \frac{p-1}{2}\times 16h$	$8e; \frac{p-1}{2}\times 16h$	$p\times 8f$	$p\times 8g$	$p\times 16h$
[3] $Cmcm$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$ $x, y, \frac{1}{3}z; \pm(0, 0, \frac{1}{3})$	4a; 8f	4b; 8f	4c; 8f	$8d; 16h$	$8e; 16h$	$3\times 8f$	$8g; 16h$	$3\times 16h$
[p] $Cmcm$	$\mathbf{a}, \mathbf{b}, pc$ $x, y, \frac{1}{p}z; +(0, 0, \frac{u}{p})$ $p = \text{prime} > 2; u = 1, \dots, p-1$	4a; $\frac{p-1}{2}\times 8f$	4b; $\frac{p-1}{2}\times 8f$	4c; $\frac{p-1}{2}\times 8f$	$8d; \frac{p-1}{2}\times 16h$	$8e; \frac{p-1}{2}\times 16h$	$p\times 8f$	$8g; \frac{p-1}{2}\times 16h$	$p\times 16h$

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Axes	Coordinates	Wyckoff positions			
	4a	4b	4c	8d	
I Maximal translationengleiche subgroups					
[2] <i>Pn2₁a</i> (33) ≡ <i>Pna2₁</i>	a, c, -b $x, z, -y$	4a	4a	4a	$2 \times 4a$
[2] <i>Pnm2₁</i> (31) ≡ <i>Pmn2₁</i>	$x + \frac{1}{4}, y + \frac{1}{4}, z$ b, a, -c $y + \frac{1}{4}, x + \frac{1}{4}, -z$	4b	4b	$2 \times 2a$	$2 \times 4b$
[2] <i>P2₁ma</i> (26) ≡ <i>Pmc2₁</i>	$x, y + \frac{1}{4}, z + \frac{1}{4}$ b, c, a $y + \frac{1}{4}, z + \frac{1}{4}, x$	4c	4c	$2a; 2b$	$2 \times 4c$
[2] <i>P2₁2₁2₁</i> (19)	$x, y, z + \frac{1}{4}$	4a	4a	4a	$2 \times 4a$
[2] <i>P2₁/n11</i> (14) ≡ <i>P12₁/n1</i>	c, a, b z, x, y	2a; 2b	2c; 2d	4e	$2 \times 4e$
[2] <i>P112₁/a</i> (14)		2a; 2b	2c; 2d	4e	$2 \times 4e$
[2] <i>P12₁/m1</i> (11)		2a; 2d	2b; 2c	$2 \times 2e$	$2 \times 4f$

II Maximal klassengleiche subgroups

Enlarged unit cell, isomorphic

[3] <i>Pnma</i>	3a, b, c $\frac{1}{3}x, y, z; \pm(\frac{1}{3}, 0, 0)$	4a; 8d	4b; 8d	$3 \times 4c$	$3 \times 8d$
[p] <i>Pnma</i>	pa, b, c $\frac{1}{p}x, y, z; +(\frac{u}{p}, 0, 0)$ $p = \text{prime} > 2; u = 1, \dots, p-1$	$4a; \frac{p-1}{2} \times 8d$	$4b; \frac{p-1}{2} \times 8d$	$p \times 4c$	$p \times 8d$
[3] <i>Pnma</i>	a, 3b, c $x, \frac{1}{3}y, z; \pm(0, \frac{1}{3}, 0)$	4a; 8d	4b; 8d	$4c; 8d$	$3 \times 8d$
[p] <i>Pnma</i>	a, pb, c $x, \frac{1}{p}y, z; +(0, \frac{u}{p}, 0)$ $p = \text{prime} > 2; u = 1, \dots, p-1$	$4a; \frac{p-1}{2} \times 8d$	$4b; \frac{p-1}{2} \times 8d$	$4c; \frac{p-1}{2} \times 8d$	$p \times 8d$
[3] <i>Pnma</i>	a, b, 3c $x, y, \frac{1}{3}z; \pm(0, 0, \frac{1}{3})$	4a; 8d	4b; 8d	$3 \times 4c$	$3 \times 8d$
[p] <i>Pnma</i>	a, b, pc $x, y, \frac{1}{p}z; +(0, 0, \frac{u}{p})$ $p = \text{prime} > 2; u = 1, \dots, p-1$	$4a; \frac{p-1}{2} \times 8d$	$4b; \frac{p-1}{2} \times 8d$	$p \times 4c$	$p \times 8d$

Nonconventional settings

interchange letters and sequences in Hermann–Mauguin symbols, axes and coordinates:

<i>Pbnm</i>	$a \rightarrow b; c \rightarrow a$	a → b → c → a	$x \rightarrow y \rightarrow z \rightarrow x$
<i>Pmcn</i>	$a \rightarrow c; c \rightarrow b$	a ← b ← c ← a	$x \leftarrow y \leftarrow z \leftarrow x$
<i>Pmnb</i>	$a \rightleftarrows b$	a ⇌ -b	$x \rightleftarrows -y$
<i>Pcmn</i>	$a \rightleftarrows c$	a ⇌ -c	$x \rightleftarrows -z$
<i>Pnam</i>	$b \rightleftarrows c$	b ⇌ -c	$y \rightleftarrows -z$

Nonconventional settings

interchange letters and sequences in Hermann–Mauguin symbols, axes and coordinates:

<i>Amma</i>	$C \rightarrow A; A \rightarrow B$	$a \rightarrow b \rightarrow c \rightarrow a$	a → b → c → a	$x \rightarrow y \rightarrow z \rightarrow x$
<i>Bbmm</i>	$C \rightarrow B; A \rightarrow C$	$a \leftarrow b \leftarrow c \leftarrow a$	a ← b ← c ← a	$x \leftarrow y \leftarrow z \leftarrow x$
<i>Ccmm</i>	$A \rightarrow B$	$a \rightleftarrows b$	a ⇌ -b	$x \rightleftarrows -y$
<i>Amam</i>	$C \rightleftarrows A$	$a \rightleftarrows c$	a ⇌ -c	$x \rightleftarrows -z$
<i>Bmmb</i>	$C \rightarrow B$	$b \rightleftarrows c$	b ⇌ -c	$y \rightleftarrows -z$