

General Position of the Group *Fm-3m* (No. 225)

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No.	(x,y,z) form	Matrix form	Symmetry operation	
			ITA	Seitz ⓘ
(0,0,0) + set				
1	x,y,z	$\left(\begin{array}{cccc} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{array}\right)$	1	{ 1 0 }
2	-x,-y,z	$\left(\begin{array}{cccc} -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{array}\right)$	2 0,0,z	{ 2 ₀₀₁ 0 }
3	-x,y,-z	$\left(\begin{array}{cccc} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{array}\right)$	2 0,y,0	{ 2 ₀₁₀ 0 }
4	x,-y,-z	$\left(\begin{array}{cccc} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{array}\right)$	2 x,0,0	{ 2 ₁₀₀ 0 }
5	z,x,y	$\left(\begin{array}{cccc} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{array}\right)$	3 ⁺ x,x,x	{ 3 ⁺ ₁₁₁ 0 }
6	z,-x,-y	$\left(\begin{array}{cccc} 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{array}\right)$	3 ⁺ -x,x,-x	{ 3 ⁺ ₋₁₁₋₁ 0 }
7	-z,-x,y	$\left(\begin{array}{cccc} 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{array}\right)$	3 ⁺ x,-x,-x	{ 3 ⁺ ₁₋₁₋₁ 0 }

8	-z,x,-y	$\begin{pmatrix} 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}$	$3^+ -x,-x,x$	$\{3^+_{-1-11} 0\}$
9	y,z,x	$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$	$3^- x,x,x$	$\{3^-_{111} 0\}$
10	-y,z,-x	$\begin{pmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & 0 \end{pmatrix}$	$3^- x,-x,-x$	$\{3^-_{1-1-1} 0\}$
11	y,-z,-x	$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & 0 \end{pmatrix}$	$3^- -x,-x,x$	$\{3^-_{-1-11} 0\}$
12	-y,-z,x	$\begin{pmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$	$3^- -x,x,-x$	$\{3^-_{-11-1} 0\}$
13	y,x,-z	$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{pmatrix}$	$2 x,x,0$	$\{2_{110} 0\}$
14	-y,-x,-z	$\begin{pmatrix} 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{pmatrix}$	$2 x,-x,0$	$\{2_{1-10} 0\}$
15	y,-x,z	$\begin{pmatrix} 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$	$4^- 0,0,z$	$\{4^-_{001} 0\}$
16	-y,x,z	$\begin{pmatrix} 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$	$4^+ 0,0,z$	$\{4^+_{001} 0\}$
17	x,z,-y	$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}$	$4^- x,0,0$	$\{4^-_{100} 0\}$

18	$-x, z, y$	$\begin{pmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$	$2\ 0, y, y$	$\{2_{011} \mid 0\}$
19	$-x, -z, -y$	$\begin{pmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}$	$2\ 0, y, -y$	$\{2_{01-1} \mid 0\}$
20	$x, -z, y$	$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$	$4^+ x, 0, 0$	$\{4^+_{100} \mid 0\}$
21	$z, y, -x$	$\begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \end{pmatrix}$	$4^+ 0, y, 0$	$\{4^+_{010} \mid 0\}$
22	$z, -y, x$	$\begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$	$2\ x, 0, x$	$\{2_{101} \mid 0\}$
23	$-z, y, x$	$\begin{pmatrix} 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$	$4^- 0, y, 0$	$\{4^-_{010} \mid 0\}$
24	$-z, -y, -x$	$\begin{pmatrix} 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \end{pmatrix}$	$2\ -x, 0, x$	$\{2_{-101} \mid 0\}$
25	$-x, -y, -z$	$\begin{pmatrix} -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{pmatrix}$	$-1\ 0, 0, 0$	$\{-1 \mid 0\}$
26	$x, y, -z$	$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{pmatrix}$	$m\ x, y, 0$	$\{m_{001} \mid 0\}$
27	$x, -y, z$	$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$	$m\ x, 0, z$	$\{m_{010} \mid 0\}$

28	$-x,y,z$	$\begin{pmatrix} -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$	$m\ 0,y,z$	$\{m_{100} 0\}$
29	$-z,-x,-y$	$\begin{pmatrix} 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}$	$-3^+ x,x,x; 0,0,0$	$\{-3^+_{111} 0\}$
30	$-z,x,y$	$\begin{pmatrix} 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$	$-3^+ -x,x,-x; 0,0,0$	$\{-3^+_{-11-1} 0\}$
31	$z,x,-y$	$\begin{pmatrix} 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}$	$-3^+ x,-x,-x; 0,0,0$	$\{-3^+_{1-1-1} 0\}$
32	$z,-x,y$	$\begin{pmatrix} 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$	$-3^+ -x,-x,x; 0,0,0$	$\{-3^+_{-1-11} 0\}$
33	$-y,-z,-x$	$\begin{pmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ -1 & 0 & 0 & 0 \end{pmatrix}$	$-3^- x,x,x; 0,0,0$	$\{-3^-_{111} 0\}$
34	$y,-z,x$	$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$	$-3^- x,-x,-x; 0,0,0$	$\{-3^-_{1-1-1} 0\}$
35	$-y,z,x$	$\begin{pmatrix} 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$	$-3^- -x,-x,x; 0,0,0$	$\{-3^-_{-1-11} 0\}$
36	$y,z,-x$	$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ -1 & 0 & 0 & 0 \end{pmatrix}$	$-3^- -x,x,-x; 0,0,0$	$\{-3^-_{-11-1} 0\}$
37	$-y,-x,z$	$\begin{pmatrix} 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$	$m\ x,-x,z$	$\{m_{110} 0\}$

38	y, x, z	$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$	$m \ x, x, z$	$\{ m_{1-10} 0 \}$
39	$-y, x, -z$	$\begin{pmatrix} 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{pmatrix}$	$-4^- \ 0, 0, z; \ 0, 0, 0$	$\{ -4_{001}^- 0 \}$
40	$y, -x, -z$	$\begin{pmatrix} 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \end{pmatrix}$	$-4^+ \ 0, 0, z; \ 0, 0, 0$	$\{ -4_{001}^+ 0 \}$
41	$-x, -z, y$	$\begin{pmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$	$-4^- \ x, 0, 0; \ 0, 0, 0$	$\{ -4_{100}^- 0 \}$
42	$x, -z, -y$	$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}$	$m \ x, y, -y$	$\{ m_{011} 0 \}$
43	x, z, y	$\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$	$m \ x, y, y$	$\{ m_{01-1} 0 \}$
44	$-x, z, -y$	$\begin{pmatrix} -1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}$	$-4^+ \ x, 0, 0; \ 0, 0, 0$	$\{ -4_{100}^+ 0 \}$
45	$-z, -y, x$	$\begin{pmatrix} 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$	$-4^+ \ 0, y, 0; \ 0, 0, 0$	$\{ -4_{010}^+ 0 \}$
46	$-z, y, -x$	$\begin{pmatrix} 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \\ -1 & 0 & 0 & 0 \end{pmatrix}$	$m \ -x, y, x$	$\{ m_{101} 0 \}$
47	$z, -y, -x$	$\begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 0 \end{pmatrix}$	$-4^- \ 0, y, 0; \ 0, 0, 0$	$\{ -4_{010}^- 0 \}$

48	z,y,x	$\begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$	$m\ x,y,x$	$\{m_{-101} \mid 0\}$
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For comments, please mail to
administrador.bcs@ehu.eus