

# 32 Point Groups (detail)

表 1: No. 1  $C_1$  1 [ triclinic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$

表 2: No. 2  $C_i = -1$  [ triclinic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② -1	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$

表 3: No. 3  $C_2$  2 (b-axis setting) [ monoclinic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$

表 4: No. 4  $C_s$   $m$  (b-axis setting) [ monoclinic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$

表 5: No. 5  $C_{2h}$   $2/m$  (b-axis setting) [ monoclinic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
③ $-1$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
④ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$

表 6: No. 6  $D_2$  222 [ orthorhombic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
④ $2_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$

表 7: No. 7  $C_{2v}$   $mm2$  [ orthorhombic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
④ $m_{100}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$

表 8: No. 8  $D_{2h}$   $mmm$  [ orthorhombic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
④ $2_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$
⑤ $-1$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$

*continued ...*



表 8

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $m_{001}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
⑦ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑧ $m_{100}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$

表 9: No. 9  $C_4$  4 [ tetragonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $4_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
④ $4_{001}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$

表 10: No. 10  $S_4$   $-4$  [ tetragonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $-4_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
④ $-4_{001}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$

表 11: No. 11  $C_{4h}$   $4/m$  [ tetragonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $4_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
④ $4_{001}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$
⑤ $-1$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$

*continued ...*

表 11

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $m_{001}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
⑦ $-4_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
⑧ $-4_{001}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$

表 12: No. 12  $D_4$  422 [ tetragonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$
④ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑤ $2_{110}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$

*continued ...*

表 12

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $2_{1-10}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑦ $4_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
⑧ $4_{001}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$

表 13: No. 13  $C_{4v}$   $4mm$  [ tetragonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $4_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
④ $4_{001}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$
⑤ $m_{100}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$

*continued ...*



表 13

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑦ $m_{110}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$
⑧ $m_{1-10}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$

表 14: No. 14  $D_{2d}$   $-42m$  ( $-42m$  setting) [ tetragonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$
④ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑤ $m_{110}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$

*continued ...*

表 14

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $m_{1-10}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑦ $-4_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
⑧ $-4_{001}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$

表 15: No. 14  $D_{2d} - 1$   $-4m2$  ( $-4m2$  setting) [ tetragonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{110}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$
④ $2_{1-10}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑤ $m_{100}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$

*continued ...*

表 15

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑦ $-4_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
⑧ $-4_{001}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$

表 16: No. 15  $D_{4h}$   $4/mmm$  [ tetragonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$
④ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑤ $2_{110}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$

*continued ...*

表 16

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $2_{1-10}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑦ $4_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
⑧ $4_{001}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$
⑨ $-1$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
⑩ $m_{001}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
⑪ $m_{100}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$

continued ...

表 16

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑬ $m_{110}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$
⑭ $m_{1-10}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑮ $-4_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
⑯ $-4_{001}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$



表 17: No. 16  $C_3$  3 [ trigonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
③ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$

表 18: No. 17  $C_{3i}$   $-3$  [ trigonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
③ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
④ $-1$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
⑤ $-3_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x+y & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$

continued ...

表 18

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $-3_{001}^-$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x-y & x & -z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$

表 19: No. 18  $D_3$   $312$  (312 setting) [ trigonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{120}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x+y & y & -z \end{pmatrix}$	$\begin{pmatrix} -X+Y & Y & -Z \end{pmatrix}$
③ $2_{210}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & x-y & -z \end{pmatrix}$	$\begin{pmatrix} X & X-Y & -Z \end{pmatrix}$
④ $2_{1-10}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑤ $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$

*continued ...*

表 19

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$

表 20: No. 18  $D_3 - 1$  321 (321 setting) [ trigonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{100}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x-y & -y & -z \end{pmatrix}$	$\begin{pmatrix} X-Y & -Y & -Z \end{pmatrix}$
③ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & -x+y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -X+Y & -Z \end{pmatrix}$
④ $2_{110}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$
⑤ $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$

*continued ...*

表 20

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $3^-_{001}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$

表 21: No. 19  $C_{3v}$   $3m1$  (3m1 setting) [ trigonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
③ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
④ $m_{100}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x+y & y & z \end{pmatrix}$	$\begin{pmatrix} X-Y & -Y & -Z \end{pmatrix}$
⑤ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & x-y & z \end{pmatrix}$	$\begin{pmatrix} -X & -X+Y & -Z \end{pmatrix}$

*continued ...*



表 21

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $m_{110}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$

表 22: No. 19  $C_{3v} - 1 \quad 31m$  (31m setting) [ trigonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① $1$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
③ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
④ $m_{120}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x-y & -y & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & Y & -Z \end{pmatrix}$
⑤ $m_{210}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & -x+y & z \end{pmatrix}$	$\begin{pmatrix} X & X-Y & -Z \end{pmatrix}$

continued ...

表 22

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $m_{1-10}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$

表 23: No. 20  $D_{3d}$   $-31m$  ( $-31m$  setting) [ trigonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{120}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x+y & y & -z \end{pmatrix}$	$\begin{pmatrix} -X+Y & Y & -Z \end{pmatrix}$
③ $2_{210}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & x-y & -z \end{pmatrix}$	$\begin{pmatrix} X & X-Y & -Z \end{pmatrix}$
④ $2_{1-10}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑤ $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$

continued ...

表 23

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
⑦ $-1$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
⑧ $m_{120}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x-y & -y & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & Y & -Z \end{pmatrix}$
⑨ $m_{210}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & -x+y & z \end{pmatrix}$	$\begin{pmatrix} X & X-Y & -Z \end{pmatrix}$
⑩ $m_{1-10}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑪ $-3_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x+y & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$

continued ...

表 23

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $-3_{001}^-$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x-y & x & -z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$

表 24: No. 20  $D_{3d} - 1$   $-3m1$  ( $-3m1$  setting) [ trigonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{100}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x-y & -y & -z \end{pmatrix}$	$\begin{pmatrix} X-Y & -Y & -Z \end{pmatrix}$
③ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & -x+y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -X+Y & -Z \end{pmatrix}$
④ $2_{110}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$
⑤ $3^+_{001}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$

*continued ...*

表 24

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
⑦ $-1$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
⑧ $m_{100}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x+y & y & z \end{pmatrix}$	$\begin{pmatrix} X-Y & -Y & -Z \end{pmatrix}$
⑨ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & x-y & z \end{pmatrix}$	$\begin{pmatrix} -X & -X+Y & -Z \end{pmatrix}$
⑩ $m_{110}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$
⑪ $-3_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x+y & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$

continued ...



表 24

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $-3_{001}^-$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x-y & x & -z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$

表 25: No. 21  $C_6$  6 [ hexagonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $3^+_{001}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
④ $3^-_{001}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
⑤ $6^+_{001}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x-y & x & z \end{pmatrix}$	$\begin{pmatrix} X-Y & X & Z \end{pmatrix}$

continued ...

表 25

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $6_{001}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x+y & z \end{pmatrix}$	$\begin{pmatrix} Y & -X+Y & Z \end{pmatrix}$

表 26: No. 22  $C_{3h}$  -6 [ hexagonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
③ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
④ $m_{001}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
⑤ $-6_{001}^+$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & -z \end{pmatrix}$	$\begin{pmatrix} X-Y & X & Z \end{pmatrix}$

continued ...

表 26

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $-6^-_{001}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X+Y & Z \end{pmatrix}$

表 27: No. 23  $C_{6h}$   $6/m$  [ hexagonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
④ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
⑤ $6_{001}^+$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x-y & x & z \end{pmatrix}$	$\begin{pmatrix} X-Y & X & Z \end{pmatrix}$

*continued ...*

表 27

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $6_{001}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x+y & z \end{pmatrix}$	$\begin{pmatrix} Y & -X+Y & Z \end{pmatrix}$
⑦ $-1$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
⑧ $m_{001}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
⑨ $-3_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x+y & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
⑩ $-3_{001}^-$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x-y & x & -z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
⑪ $-6_{001}^+$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & -z \end{pmatrix}$	$\begin{pmatrix} X-Y & X & Z \end{pmatrix}$

continued ...

表 27

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $-6_{001}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X+Y & Z \end{pmatrix}$



表 28: No. 24  $D_6$  622 [ hexagonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{100}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x-y & -y & -z \end{pmatrix}$	$\begin{pmatrix} X-Y & -Y & -Z \end{pmatrix}$
④ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & -x+y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -X+Y & -Z \end{pmatrix}$
⑤ $2_{110}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$

continued ...

表 28

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $2_{120}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x+y & y & -z \end{pmatrix}$	$\begin{pmatrix} -X+Y & Y & -Z \end{pmatrix}$
⑦ $2_{210}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & x-y & -z \end{pmatrix}$	$\begin{pmatrix} X & X-Y & -Z \end{pmatrix}$
⑧ $2_{1-10}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑨ $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
⑩ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
⑪ $6_{001}^+$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x-y & x & z \end{pmatrix}$	$\begin{pmatrix} X-Y & X & Z \end{pmatrix}$

continued ...

表 28

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $6_{001}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x+y & z \end{pmatrix}$	$\begin{pmatrix} Y & -X+Y & Z \end{pmatrix}$

表 29: No. 25  $C_{6v}$   $6mm$  [ hexagonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $3^+_{001}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
④ $3^-_{001}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
⑤ $6^+_{001}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x-y & x & z \end{pmatrix}$	$\begin{pmatrix} X-Y & X & Z \end{pmatrix}$

continued ...

表 29

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $6_{001}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x+y & z \end{pmatrix}$	$\begin{pmatrix} Y & -X+Y & Z \end{pmatrix}$
⑦ $m_{100}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x+y & y & z \end{pmatrix}$	$\begin{pmatrix} X-Y & -Y & -Z \end{pmatrix}$
⑧ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & x-y & z \end{pmatrix}$	$\begin{pmatrix} -X & -X+Y & -Z \end{pmatrix}$
⑨ $m_{110}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$
⑩ $m_{120}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x-y & -y & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & Y & -Z \end{pmatrix}$
⑪ $m_{210}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & -x+y & z \end{pmatrix}$	$\begin{pmatrix} X & X-Y & -Z \end{pmatrix}$

continued ...

表 29

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $m_{1-10}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$

表 30: No. 26  $D_{3h}$   $-6m2$  (-6m2 setting) [ hexagonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{120}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x+y & y & -z \end{pmatrix}$	$\begin{pmatrix} -X+Y & Y & -Z \end{pmatrix}$
③ $2_{210}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & x-y & -z \end{pmatrix}$	$\begin{pmatrix} X & X-Y & -Z \end{pmatrix}$
④ $2_{1-10}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑤ $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$

*continued ...*

表 30

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
⑦ $m_{100}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x+y & y & z \end{pmatrix}$	$\begin{pmatrix} X-Y & -Y & -Z \end{pmatrix}$
⑧ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & x-y & z \end{pmatrix}$	$\begin{pmatrix} -X & -X+Y & -Z \end{pmatrix}$
⑨ $m_{110}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$
⑩ $m_{001}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
⑪ $-6_{001}^+$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & -z \end{pmatrix}$	$\begin{pmatrix} X-Y & X & Z \end{pmatrix}$

continued ...



表 30

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $-6_{001}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X+Y & Z \end{pmatrix}$

表 31: No. 26  $D_{3h} - 1$   $-62m$  (-62m setting) [ hexagonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{100}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x-y & -y & -z \end{pmatrix}$	$\begin{pmatrix} X-Y & -Y & -Z \end{pmatrix}$
③ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & -x+y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -X+Y & -Z \end{pmatrix}$
④ $2_{110}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$
⑤ $3^+_{001}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$

*continued ...*

表 31

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
⑦ $m_{001}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
⑧ $m_{120}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x-y & -y & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & Y & -Z \end{pmatrix}$
⑨ $m_{210}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & -x+y & z \end{pmatrix}$	$\begin{pmatrix} X & X-Y & -Z \end{pmatrix}$
⑩ $m_{1-10}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑪ $-6_{001}^+$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & -z \end{pmatrix}$	$\begin{pmatrix} X-Y & X & Z \end{pmatrix}$

continued ...

表 31

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $-6_{001}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X+Y & Z \end{pmatrix}$

表 32: No. 27  $D_{6h}$   $6/mmm$  [ hexagonal ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{100}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x-y & -y & -z \end{pmatrix}$	$\begin{pmatrix} X-Y & -Y & -Z \end{pmatrix}$
④ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & -x+y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -X+Y & -Z \end{pmatrix}$
⑤ $2_{110}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$

continued ...

表 32

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $2_{120}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x+y & y & -z \end{pmatrix}$	$\begin{pmatrix} -X+Y & Y & -Z \end{pmatrix}$
⑦ $2_{210}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & x-y & -z \end{pmatrix}$	$\begin{pmatrix} X & X-Y & -Z \end{pmatrix}$
⑧ $2_{1-10}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑨ $3_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
⑩ $3_{001}^-$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
⑪ $6_{001}^+$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x-y & x & z \end{pmatrix}$	$\begin{pmatrix} X-Y & X & Z \end{pmatrix}$

continued ...

表 32

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $6_{001}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x+y & z \end{pmatrix}$	$\begin{pmatrix} Y & -X+Y & Z \end{pmatrix}$
⑬ $-1$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
⑭ $m_{100}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x+y & y & z \end{pmatrix}$	$\begin{pmatrix} X-Y & -Y & -Z \end{pmatrix}$
⑮ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & x-y & z \end{pmatrix}$	$\begin{pmatrix} -X & -X+Y & -Z \end{pmatrix}$
⑯ $m_{110}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$
⑰ $m_{001}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$

continued ...

表 32

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑮ $m_{120}$	$\begin{pmatrix} 1 & -1 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x-y & -y & z \end{pmatrix}$	$\begin{pmatrix} -X+Y & Y & -Z \end{pmatrix}$
⑯ $m_{210}$	$\begin{pmatrix} -1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & -x+y & z \end{pmatrix}$	$\begin{pmatrix} X & X-Y & -Z \end{pmatrix}$
⑰ $m_{1-10}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑱ $-3_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x+y & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X-Y & Z \end{pmatrix}$
㉑ $-3_{001}^-$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x-y & x & -z \end{pmatrix}$	$\begin{pmatrix} -X+Y & -X & Z \end{pmatrix}$
㉒ $-6_{001}^+$	$\begin{pmatrix} -1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x+y & -x & -z \end{pmatrix}$	$\begin{pmatrix} X-Y & X & Z \end{pmatrix}$

continued ...



表 32

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
②4 $-6_{001}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x-y & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X+Y & Z \end{pmatrix}$

表 33: No. 28  $T = 23$  [ cubic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$
④ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑤ $3^+_{111}$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & x & y \end{pmatrix}$	$\begin{pmatrix} Z & X & Y \end{pmatrix}$

*continued ...*

表 33

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $3_{1-1-1}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & -x & y \end{pmatrix}$	$\begin{pmatrix} -Z & -X & Y \end{pmatrix}$
⑦ $3_{-11-1}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & -x & -y \end{pmatrix}$	$\begin{pmatrix} Z & -X & -Y \end{pmatrix}$
⑧ $3_{-1-11}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & x & -y \end{pmatrix}$	$\begin{pmatrix} -Z & X & -Y \end{pmatrix}$
⑨ $3_{111}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & z & x \end{pmatrix}$	$\begin{pmatrix} Y & Z & X \end{pmatrix}$
⑩ $3_{1-1-1}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & z & -x \end{pmatrix}$	$\begin{pmatrix} -Y & Z & -X \end{pmatrix}$
⑪ $3_{-11-1}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & -z & x \end{pmatrix}$	$\begin{pmatrix} -Y & -Z & X \end{pmatrix}$

continued ...

表 33

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $3^-_{-1-11}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & -z & -x \end{pmatrix}$	$\begin{pmatrix} Y & -Z & -X \end{pmatrix}$

表 34: No. 29  $T_h$   $m = 3$  [ cubic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$
④ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑤ $3^+_{111}$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & x & y \end{pmatrix}$	$\begin{pmatrix} Z & X & Y \end{pmatrix}$

*continued ...*

表 34

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $3_{1-1-1}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & -x & y \end{pmatrix}$	$\begin{pmatrix} -Z & -X & Y \end{pmatrix}$
⑦ $3_{-11-1}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & -x & -y \end{pmatrix}$	$\begin{pmatrix} Z & -X & -Y \end{pmatrix}$
⑧ $3_{-1-11}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & x & -y \end{pmatrix}$	$\begin{pmatrix} -Z & X & -Y \end{pmatrix}$
⑨ $3_{111}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & z & x \end{pmatrix}$	$\begin{pmatrix} Y & Z & X \end{pmatrix}$
⑩ $3_{1-1-1}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & z & -x \end{pmatrix}$	$\begin{pmatrix} -Y & Z & -X \end{pmatrix}$
⑪ $3_{-11-1}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & -z & x \end{pmatrix}$	$\begin{pmatrix} -Y & -Z & X \end{pmatrix}$

continued ...

表 34

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $3^-_{-1-11}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & -z & -x \end{pmatrix}$	$\begin{pmatrix} Y & -Z & -X \end{pmatrix}$
⑬ $-1$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
⑭ $m_{001}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
⑮ $m_{100}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$
⑯ $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑰ $-3^+_{111}$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & -x & -y \end{pmatrix}$	$\begin{pmatrix} Z & X & Y \end{pmatrix}$

continued ...

表 34

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑮ $-3_{1-1-1}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & x & -y \end{pmatrix}$	$\begin{pmatrix} -Z & -X & Y \end{pmatrix}$
⑰ $-3_{-11-1}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & x & y \end{pmatrix}$	$\begin{pmatrix} Z & -X & -Y \end{pmatrix}$
⑳ $-3_{-1-11}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & -x & y \end{pmatrix}$	$\begin{pmatrix} -Z & X & -Y \end{pmatrix}$
㉑ $-3_{111}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & -z & -x \end{pmatrix}$	$\begin{pmatrix} Y & Z & X \end{pmatrix}$
㉒ $-3_{1-1-1}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & -z & x \end{pmatrix}$	$\begin{pmatrix} -Y & Z & -X \end{pmatrix}$
㉓ $-3_{-11-1}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & z & -x \end{pmatrix}$	$\begin{pmatrix} -Y & -Z & X \end{pmatrix}$

continued ...



表 34

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
②④ $-3_{-1-11}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & z & x \end{pmatrix}$	$\begin{pmatrix} Y & -Z & -X \end{pmatrix}$

表 35: No. 30  $O$  432 [ cubic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$
④ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑤ $2_{110}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$

*continued ...*

表 35

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $2_{101}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & -1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & -1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} z & -y & x \end{pmatrix}$	$\begin{pmatrix} Z & -Y & X \end{pmatrix}$
⑦ $2_{011}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -x & z & y \end{pmatrix}$	$\begin{pmatrix} -X & Z & Y \end{pmatrix}$
⑧ $2_{1-10}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑨ $2_{-101}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & -y & -x \end{pmatrix}$	$\begin{pmatrix} -Z & -Y & -X \end{pmatrix}$
⑩ $2_{01-1}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -x & -z & -y \end{pmatrix}$	$\begin{pmatrix} -X & -Z & -Y \end{pmatrix}$
⑪ $3_{111}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & x & y \end{pmatrix}$	$\begin{pmatrix} Z & X & Y \end{pmatrix}$

continued ...

表 35

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $3^+_{1-1-1}$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & -x & y \end{pmatrix}$	$\begin{pmatrix} -Z & -X & Y \end{pmatrix}$
⑬ $3^+_{-11-1}$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & -x & -y \end{pmatrix}$	$\begin{pmatrix} Z & -X & -Y \end{pmatrix}$
⑭ $3^+_{-1-11}$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & x & -y \end{pmatrix}$	$\begin{pmatrix} -Z & X & -Y \end{pmatrix}$
⑮ $3^-_{111}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & z & x \end{pmatrix}$	$\begin{pmatrix} Y & Z & X \end{pmatrix}$
⑯ $3^-_{1-1-1}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & z & -x \end{pmatrix}$	$\begin{pmatrix} -Y & Z & -X \end{pmatrix}$
⑰ $3^-_{-11-1}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & -z & x \end{pmatrix}$	$\begin{pmatrix} -Y & -Z & X \end{pmatrix}$

continued ...

表 35

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑮ $3_{-1-11}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & -z & -x \end{pmatrix}$	$\begin{pmatrix} Y & -Z & -X \end{pmatrix}$
⑰ $4_{001}^+$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
⑳ $4_{100}^+$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} x & -z & y \end{pmatrix}$	$\begin{pmatrix} X & -Z & Y \end{pmatrix}$
㉑ $4_{010}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} z & y & -x \end{pmatrix}$	$\begin{pmatrix} Z & Y & -X \end{pmatrix}$
㉒ $4_{001}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$
㉓ $4_{100}^-$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} x & z & -y \end{pmatrix}$	$\begin{pmatrix} X & Z & -Y \end{pmatrix}$

continued ...

表 35

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
$\textcircled{24} \quad 4^-_{010}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & y & x \end{pmatrix}$	$\begin{pmatrix} -Z & Y & X \end{pmatrix}$

表 36: No. 31  $T_d$   $-43m$  [ cubic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$
④ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑤ $3_{111}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & x & y \end{pmatrix}$	$\begin{pmatrix} Z & X & Y \end{pmatrix}$

*continued ...*

表 36

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $3_{1-1-1}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & -x & y \end{pmatrix}$	$\begin{pmatrix} -Z & -X & Y \end{pmatrix}$
⑦ $3_{-11-1}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & -x & -y \end{pmatrix}$	$\begin{pmatrix} Z & -X & -Y \end{pmatrix}$
⑧ $3_{-1-11}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & x & -y \end{pmatrix}$	$\begin{pmatrix} -Z & X & -Y \end{pmatrix}$
⑨ $3_{111}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & z & x \end{pmatrix}$	$\begin{pmatrix} Y & Z & X \end{pmatrix}$
⑩ $3_{1-1-1}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & z & -x \end{pmatrix}$	$\begin{pmatrix} -Y & Z & -X \end{pmatrix}$
⑪ $3_{-11-1}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & -z & x \end{pmatrix}$	$\begin{pmatrix} -Y & -Z & X \end{pmatrix}$

continued ...



表 36

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $3^-_{-1-11}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & -z & -x \end{pmatrix}$	$\begin{pmatrix} Y & -Z & -X \end{pmatrix}$
⑬ $m_{110}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$
⑭ $m_{101}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & -1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & y & -x \end{pmatrix}$	$\begin{pmatrix} Z & -Y & X \end{pmatrix}$
⑮ $m_{011}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} x & -z & -y \end{pmatrix}$	$\begin{pmatrix} -X & Z & Y \end{pmatrix}$
⑯ $m_{1-10}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑰ $m_{-101}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} z & y & x \end{pmatrix}$	$\begin{pmatrix} -Z & -Y & -X \end{pmatrix}$

continued ...

表 36

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑮ $m_{01-1}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} x & z & y \end{pmatrix}$	$\begin{pmatrix} -X & -Z & -Y \end{pmatrix}$
⑰ $-4_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
⑳ $-4_{100}^+$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -x & z & -y \end{pmatrix}$	$\begin{pmatrix} X & -Z & Y \end{pmatrix}$
㉑ $-4_{010}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & -y & x \end{pmatrix}$	$\begin{pmatrix} Z & Y & -X \end{pmatrix}$
㉒ $-4_{001}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$
㉓ $-4_{100}^-$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -x & -z & y \end{pmatrix}$	$\begin{pmatrix} X & Z & -Y \end{pmatrix}$

continued ...

表 36

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
②④ $-4_{010}^-$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} z & -y & -x \end{pmatrix}$	$\begin{pmatrix} -Z & Y & X \end{pmatrix}$

表 37: No. 32  $O_h$   $m - 3m$  [ cubic ]

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
① 1	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
② $2_{001}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
③ $2_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$
④ $2_{010}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
⑤ $2_{110}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$

*continued ...*

表 37

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑥ $2_{101}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & -1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & -1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} z & -y & x \end{pmatrix}$	$\begin{pmatrix} Z & -Y & X \end{pmatrix}$
⑦ $2_{011}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -x & z & y \end{pmatrix}$	$\begin{pmatrix} -X & Z & Y \end{pmatrix}$
⑧ $2_{1-10}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
⑨ $2_{-101}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & -y & -x \end{pmatrix}$	$\begin{pmatrix} -Z & -Y & -X \end{pmatrix}$
⑩ $2_{01-1}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -x & -z & -y \end{pmatrix}$	$\begin{pmatrix} -X & -Z & -Y \end{pmatrix}$
⑪ $3_{111}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & x & y \end{pmatrix}$	$\begin{pmatrix} Z & X & Y \end{pmatrix}$

continued ...

表 37

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑫ $3_{1-1-1}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & -x & y \end{pmatrix}$	$\begin{pmatrix} -Z & -X & Y \end{pmatrix}$
⑬ $3_{-11-1}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & -x & -y \end{pmatrix}$	$\begin{pmatrix} Z & -X & -Y \end{pmatrix}$
⑭ $3_{-1-11}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & x & -y \end{pmatrix}$	$\begin{pmatrix} -Z & X & -Y \end{pmatrix}$
⑮ $3_{111}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & z & x \end{pmatrix}$	$\begin{pmatrix} Y & Z & X \end{pmatrix}$
⑯ $3_{1-1-1}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & z & -x \end{pmatrix}$	$\begin{pmatrix} -Y & Z & -X \end{pmatrix}$
⑰ $3_{-11-1}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & -z & x \end{pmatrix}$	$\begin{pmatrix} -Y & -Z & X \end{pmatrix}$

continued ...

表 37

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
⑮ $3^-_{-1-11}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & -z & -x \end{pmatrix}$	$\begin{pmatrix} Y & -Z & -X \end{pmatrix}$
⑰ $4^+_{001}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
⑳ $4^+_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} x & -z & y \end{pmatrix}$	$\begin{pmatrix} X & -Z & Y \end{pmatrix}$
㉑ $4^+_{010}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} z & y & -x \end{pmatrix}$	$\begin{pmatrix} Z & Y & -X \end{pmatrix}$
㉒ $4^-_{001}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$
㉓ $4^-_{100}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} x & z & -y \end{pmatrix}$	$\begin{pmatrix} X & Z & -Y \end{pmatrix}$

continued ...

表 37

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
②4 $4^-_{010}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & y & x \end{pmatrix}$	$\begin{pmatrix} -Z & Y & X \end{pmatrix}$
②5 $-1$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -x & -y & -z \end{pmatrix}$	$\begin{pmatrix} X & Y & Z \end{pmatrix}$
②6 $m_{001}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} x & y & -z \end{pmatrix}$	$\begin{pmatrix} -X & -Y & Z \end{pmatrix}$
②7 $m_{100}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -x & y & z \end{pmatrix}$	$\begin{pmatrix} X & -Y & -Z \end{pmatrix}$
②8 $m_{010}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} x & -y & z \end{pmatrix}$	$\begin{pmatrix} -X & Y & -Z \end{pmatrix}$
②9 $m_{110}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} -y & -x & z \end{pmatrix}$	$\begin{pmatrix} Y & X & -Z \end{pmatrix}$

continued ...



表 37

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
③⑩ $m_{101}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & -1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & y & -x \end{pmatrix}$	$\begin{pmatrix} Z & -Y & X \end{pmatrix}$
③⑪ $m_{011}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} x & -z & -y \end{pmatrix}$	$\begin{pmatrix} -X & Z & Y \end{pmatrix}$
③⑫ $m_{1-10}$	$\begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} y & x & z \end{pmatrix}$	$\begin{pmatrix} -Y & -X & -Z \end{pmatrix}$
③⑬ $m_{-101}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} z & y & x \end{pmatrix}$	$\begin{pmatrix} -Z & -Y & -X \end{pmatrix}$
③⑭ $m_{01-1}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} x & z & y \end{pmatrix}$	$\begin{pmatrix} -X & -Z & -Y \end{pmatrix}$
③⑮ $-3_{111}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & -x & -y \end{pmatrix}$	$\begin{pmatrix} Z & X & Y \end{pmatrix}$

continued ...

表 37

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
③⑥ $-3_{1-1-1}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & x & -y \end{pmatrix}$	$\begin{pmatrix} -Z & -X & Y \end{pmatrix}$
③⑦ $-3_{-11-1}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & x & y \end{pmatrix}$	$\begin{pmatrix} Z & -X & -Y \end{pmatrix}$
③⑧ $-3_{-1-11}^+$	$\begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 1 & 0 & 0 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} z & -x & y \end{pmatrix}$	$\begin{pmatrix} -Z & X & -Y \end{pmatrix}$
③⑨ $-3_{111}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & -z & -x \end{pmatrix}$	$\begin{pmatrix} Y & Z & X \end{pmatrix}$
④⑩ $-3_{1-1-1}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & -z & x \end{pmatrix}$	$\begin{pmatrix} -Y & Z & -X \end{pmatrix}$
④⑪ $-3_{-11-1}^-$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} y & z & -x \end{pmatrix}$	$\begin{pmatrix} -Y & -Z & X \end{pmatrix}$

continued ...

表 37

sym. op.	polar vector	axial vector	EP (polar)	EP (axial)
④② $-3_{-1-11}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -y & z & x \end{pmatrix}$	$\begin{pmatrix} Y & -Z & -X \end{pmatrix}$
④③ $-4_{001}^+$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} y & -x & -z \end{pmatrix}$	$\begin{pmatrix} -Y & X & Z \end{pmatrix}$
④④ $-4_{100}^+$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} -x & z & -y \end{pmatrix}$	$\begin{pmatrix} X & -Z & Y \end{pmatrix}$
④⑤ $-4_{010}^+$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} -z & -y & x \end{pmatrix}$	$\begin{pmatrix} Z & Y & -X \end{pmatrix}$
④⑥ $-4_{001}^-$	$\begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$\begin{pmatrix} -y & x & -z \end{pmatrix}$	$\begin{pmatrix} Y & -X & Z \end{pmatrix}$
④⑦ $-4_{100}^-$	$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{pmatrix}$	$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & -1 & 0 \end{pmatrix}$	$\begin{pmatrix} -x & -z & y \end{pmatrix}$	$\begin{pmatrix} X & Z & -Y \end{pmatrix}$

continued ...

表 37

sym. op.		polar vector	axial vector	EP (polar)	EP (axial)
④8	$-4_{010}^-$	$\begin{pmatrix} 0 & 0 & 1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} 0 & 0 & -1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$	$\begin{pmatrix} z & -y & -x \end{pmatrix}$	$\begin{pmatrix} -Z & Y & X \end{pmatrix}$