

3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2

The 32 three-dimensional crystallographic point groups

The point groups are listed in blocks according to crystal system and are specified by their short and (if different) full Hermann–Mauguin symbols and their Schoenflies symbols. For each point group, the stereographic projections show (on the left) the general position and (on the right) the symmetry elements.

The list of Wyckoff positions includes:

Columns 1 to 4: multiplicity, Wyckoff letter, oriented site-symmetry symbol, coordinate triplets;

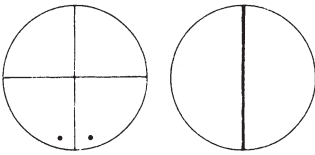
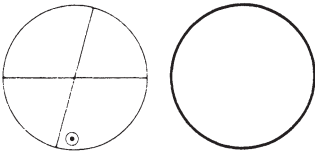
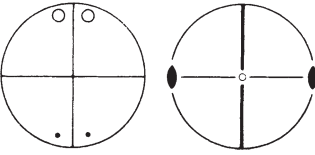
Under the stereographic projections: face forms (in roman type) and point forms (in italics); if there is more than one entry, subsequent entries refer to limiting (noncharacteristic) forms;

Last column: Miller indices of equivalent faces [for trigonal and hexagonal groups, Bravais–Miller indices (*hkl*) are used if referred to hexagonal axes].

TRICLINIC SYSTEM					
1		C_1			
1	<i>a</i>	1	<i>x, y, z</i>	Pedion or monohedron <i>Single point</i>	(<i>hkl</i>)
				Symmetry of special projections Along any direction 1	
$\bar{1}$		C_i			
2	<i>a</i>	1	<i>x, y, z</i> $\bar{x}, \bar{y}, \bar{z}$	Pinacoid or parallelohedron <i>Line segment through origin</i>	(<i>hkl</i>) ($\bar{h}\bar{k}\bar{l}$)
1	<i>o</i>	$\bar{1}$	0, 0, 0	<i>Point in origin</i>	
				Symmetry of special projections Along any direction 2	
MONOCLINIC SYSTEM					
2		C_2			
	UNIQUE AXIS <i>b</i>				
2	<i>b</i>	1	<i>x, y, z</i> $\bar{x}, \bar{y}, \bar{z}$	Sphenoid or dihedron <i>Line segment</i>	(<i>hkl</i>) ($\bar{h}\bar{k}\bar{l}$)
				Pinacoid or parallelohedron <i>Line segment through origin</i>	(<i>h0l</i>) ($\bar{h}\bar{0}\bar{l}$)
1	<i>a</i>	2	0, <i>y</i> , 0	Pedion or monohedron <i>Single point</i>	(010) or (0 $\bar{1}$ 0)
				Symmetry of special projections Along [100] Along [010] Along [001] <i>m</i> 2 <i>m</i>	
2		C_2			
	UNIQUE AXIS <i>c</i>				
2	<i>b</i>	1	<i>x, y, z</i> $\bar{x}, \bar{y}, \bar{z}$	Sphenoid or dihedron <i>Line segment</i>	(<i>hkl</i>) ($\bar{h}\bar{k}\bar{l}$)
				Pinacoid or parallelohedron <i>Line segment through origin</i>	(<i>hk0</i>) ($\bar{h}\bar{k}\bar{0}$)
1	<i>a</i>	2	0, 0, <i>z</i>	Pedion or monohedron <i>Single point</i>	(001) or (00 $\bar{1}$)
				Symmetry of special projections Along [100] Along [010] Along [001] <i>m</i> <i>m</i> 2	

3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

MONOCLINIC SYSTEM (<i>cont.</i>)					
m UNIQUE AXIS b		C_s			
2	b	1	x, y, z x, \bar{y}, z	Dome or dihedron Line segment	(hkl) $(h\bar{k}l)$
				Pinacoid or parallelohedron Line segment through origin	(010) $(0\bar{1}0)$
1	a	m	$x, 0, z$	Pedion or monohedron Single point	$(h0l)$
Symmetry of special projections					
Along [100] Along [010] Along [001]					
m 1 m					
m UNIQUE AXIS c		C_s			
2	b	1	x, y, z x, y, \bar{z}	Dome or dihedron Line segment	(hkl) $(h\bar{k}\bar{l})$
				Pinacoid or parallelohedron Line segment through origin	(001) $(00\bar{1})$
1	a	m	$x, y, 0$	Pedion or monohedron Single point	$(hk0)$
Symmetry of special projections					
Along [100] Along [010] Along [001]					
m m 1					
$2/m$ UNIQUE AXIS b		C_{2h}			
4	c	1	x, y, z \bar{x}, y, \bar{z} $\bar{x}, \bar{y}, \bar{z}$ x, \bar{y}, z	Rhombic prism Rectangle through origin	(hkl) $(\bar{h}\bar{k}\bar{l})$ $(\bar{h}\bar{k}l)$ $(h\bar{k}l)$
2	b	m	$x, 0, z$ $\bar{x}, 0, \bar{z}$	Pinacoid or parallelohedron Line segment through origin	$(h0l)$ $(\bar{h}0\bar{l})$
2	a	2	$0, y, 0$ $0, \bar{y}, 0$	Pinacoid or parallelohedron Line segment through origin	(010) $(0\bar{1}0)$
1	o	$2/m$	$0, 0, 0$	Point in origin	
Symmetry of special projections					
Along [100] Along [010] Along [001]					
$2mm$ 2 $2mm$					

3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

MONOCLINIC SYSTEM (cont.)											
$2/m$		C_{2h}									
UNIQUE AXIS c											
4	c	1	x, y, z	\bar{x}, \bar{y}, z	$\bar{x}, \bar{y}, \bar{z}$	x, y, \bar{z}	Rhombic prism Rectangle through origin	(hkl)	$(\bar{h}\bar{k}l)$	$(\bar{h}\bar{k}\bar{l})$	$(hk\bar{l})$
2	b	m	$x, y, 0$	$\bar{x}, \bar{y}, 0$			Pinacoid or parallelohedron Line segment through origin	$(hk0)$	$(\bar{h}\bar{k}0)$		
2	a	2	$0, 0, z$	$0, 0, \bar{z}$			Pinacoid or parallelohedron Line segment through origin	(001)	$(00\bar{1})$		
1	o	$2/m$	$0, 0, 0$				Point in origin				
Symmetry of special projections											
			Along [100]	Along [010]	Along [001]						
			$2mm$	$2mm$	2						
ORTHORHOMBIC SYSTEM											
222		D_2									
4	d	1	x, y, z	\bar{x}, \bar{y}, z	\bar{x}, y, \bar{z}	x, \bar{y}, \bar{z}	Rhombic disphenoid or rhombic tetrahedron Rhombic tetrahedron	(hkl)	$(\bar{h}\bar{k}l)$	$(\bar{h}k\bar{l})$	$(hk\bar{l})$
							Rhombic prism Rectangle through origin	$(hk0)$	$(\bar{h}\bar{k}0)$	$(\bar{h}k0)$	$(hk0)$
							Rhombic prism Rectangle through origin	$(h0l)$	$(\bar{h}0l)$	$(\bar{h}0\bar{l})$	$(h0\bar{l})$
							Rhombic prism Rectangle through origin	$(0kl)$	$(0\bar{k}l)$	$(0k\bar{l})$	$(0\bar{k}\bar{l})$
2	c	$..2$	$0, 0, z$	$0, 0, \bar{z}$			Pinacoid or parallelohedron Line segment through origin	(001)	$(00\bar{1})$		
2	b	$.2.$	$0, y, 0$	$0, \bar{y}, 0$			Pinacoid or parallelohedron Line segment through origin	(010)	$(0\bar{1}0)$		
2	a	$2..$	$x, 0, 0$	$\bar{x}, 0, 0$			Pinacoid or parallelohedron Line segment through origin	(100)	$(\bar{1}00)$		
1	o	222	$0, 0, 0$				Point in origin				
Symmetry of special projections											
			Along [100]	Along [010]	Along [001]						
			$2mm$	$2mm$	$2mm$						

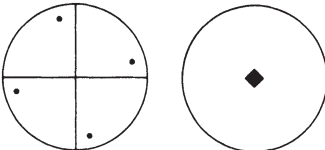
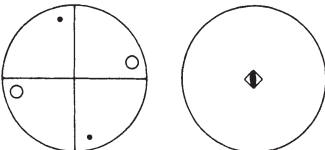
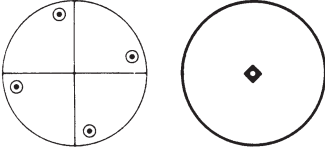
3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

ORTHORHOMBIC SYSTEM (<i>cont.</i>)											
$mm2$		C_{2v}									
4	d	1	x, y, z	\bar{x}, \bar{y}, z	x, \bar{y}, z	\bar{x}, y, z	Rhombic pyramid <i>Rectangle</i>	(hkl)	$(\bar{h}\bar{k}l)$	$(h\bar{k}l)$	$(\bar{h}kl)$
							Rhombic prism <i>Rectangle through origin</i>	$(hk0)$	$(\bar{h}\bar{k}0)$	$(h\bar{k}0)$	$(\bar{h}k0)$
2	c	$m..$	$0, y, z$	$0, \bar{y}, z$			Dome or dihedron <i>Line segment</i>	$(0kl)$	$(0\bar{k}l)$		
							Pinacoid or parallelohedron <i>Line segment through origin</i>	(010)	$(0\bar{1}0)$		
2	b	$.m.$	$x, 0, z$	$\bar{x}, 0, z$			Dome or dihedron <i>Line segment</i>	$(h0l)$	$(\bar{h}0l)$		
							Pinacoid or parallelohedron <i>Line segment through origin</i>	(100)	$(\bar{1}00)$		
1	a	$mm2$	$0, 0, z$				Pedion or monohedron <i>Single point</i>	(001)	or $(00\bar{1})$		
Symmetry of special projections											
			Along [100]	Along [010]	Along [001]						
			m	m	$2mm$						
$m m m$		D_{2h}									
8	g	1	x, y, z	\bar{x}, \bar{y}, z	\bar{x}, y, \bar{z}	x, \bar{y}, \bar{z}	Rhombic dipyrmaid <i>Rectangular prism</i>	(hkl)	$(\bar{h}\bar{k}l)$	$(\bar{h}k\bar{l})$	$(h\bar{k}\bar{l})$
			$\bar{x}, \bar{y}, \bar{z}$	x, y, \bar{z}	x, \bar{y}, z	\bar{x}, y, z		$(\bar{h}\bar{k}\bar{l})$	$(hk\bar{l})$	$(\bar{h}kl)$	$(h\bar{k}l)$
4	f	$.m$	$x, y, 0$	$\bar{x}, \bar{y}, 0$	$\bar{x}, y, 0$	$x, \bar{y}, 0$	Rhombic prism <i>Rectangle through origin</i>	$(hk0)$	$(\bar{h}\bar{k}0)$	$(\bar{h}k0)$	$(h\bar{k}0)$
4	e	$.m.$	$x, 0, z$	$\bar{x}, 0, z$	$\bar{x}, 0, \bar{z}$	$x, 0, \bar{z}$	Rhombic prism <i>Rectangle through origin</i>	$(h0l)$	$(\bar{h}0l)$	$(\bar{h}0\bar{l})$	$(h0\bar{l})$
4	d	$m..$	$0, y, z$	$0, \bar{y}, z$	$0, y, \bar{z}$	$0, \bar{y}, \bar{z}$	Rhombic prism <i>Rectangle through origin</i>	$(0kl)$	$(0\bar{k}l)$	$(0k\bar{l})$	$(0\bar{k}\bar{l})$
2	c	$mm2$	$0, 0, z$	$0, 0, \bar{z}$			Pinacoid or parallelohedron <i>Line segment through origin</i>	(001)	$(00\bar{1})$		
2	b	$m2m$	$0, y, 0$	$0, \bar{y}, 0$			Pinacoid or parallelohedron <i>Line segment through origin</i>	(010)	$(0\bar{1}0)$		
2	a	$2mm$	$x, 0, 0$	$\bar{x}, 0, 0$			Pinacoid or parallelohedron <i>Line segment through origin</i>	(100)	$(\bar{1}00)$		
1	o	mmm	$0, 0, 0$				Point in origin				
Symmetry of special projections											
			Along [100]	Along [010]	Along [001]						
			$2mm$	$2mm$	$2mm$						

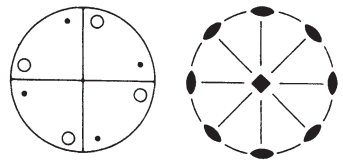
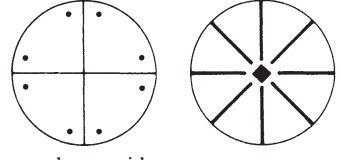
3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

TETRAGONAL SYSTEM											
4		C_4									
4	<i>b</i>	1	x, y, z	\bar{x}, \bar{y}, z	\bar{y}, x, z	y, \bar{x}, z	Tetragonal pyramid <i>Square</i>	(hkl)	$(\bar{h}\bar{k}l)$	$(\bar{k}hl)$	$(k\bar{h}l)$
							Tetragonal prism <i>Square through origin</i>	$(hk0)$	$(\bar{h}\bar{k}0)$	$(\bar{k}h0)$	$(k\bar{h}0)$
1	<i>a</i>	4..	0, 0, z				Pedion or monohedron <i>Single point</i>	(001)	or	$(00\bar{1})$	
Symmetry of special projections											
			Along [001]	Along [100]	Along [110]						
			4	<i>m</i>	<i>m</i>						
$\bar{4}$		S_4									
4	<i>b</i>	1	x, y, z	\bar{x}, \bar{y}, z	y, \bar{x}, \bar{z}	\bar{y}, x, \bar{z}	Tetragonal disphenoid or tetragonal tetrahedron <i>Tetragonal tetrahedron</i>	(hkl)	$(\bar{h}\bar{k}l)$	$(\bar{k}hl)$	$(k\bar{h}l)$
							Tetragonal prism <i>Square through origin</i>	$(hk0)$	$(\bar{h}\bar{k}0)$	$(\bar{k}h0)$	$(k\bar{h}0)$
2	<i>a</i>	2..	0, 0, z	0, 0, \bar{z}			Pinacoid or parallelohedron <i>Line segment through origin</i>	(001)		$(00\bar{1})$	
1	<i>o</i>	$\bar{4}$..	0, 0, 0				<i>Point in origin</i>				
Symmetry of special projections											
			Along [001]	Along [100]	Along [110]						
			4	<i>m</i>	<i>m</i>						
$4/m$		C_{4h}									
8	<i>c</i>	1	x, y, z	\bar{x}, \bar{y}, z	\bar{y}, x, z	y, \bar{x}, z	Tetragonal dipyramid <i>Tetragonal prism</i>	(hkl)	$(\bar{h}\bar{k}l)$	$(\bar{k}hl)$	$(k\bar{h}l)$
			$\bar{x}, \bar{y}, \bar{z}$	x, y, \bar{z}	y, \bar{x}, \bar{z}	\bar{y}, x, \bar{z}		$(\bar{h}\bar{k}l)$	$(hk\bar{l})$	$(k\bar{h}\bar{l})$	$(\bar{k}h\bar{l})$
4	<i>b</i>	<i>m</i> ..	$x, y, 0$	$\bar{x}, \bar{y}, 0$	$\bar{y}, x, 0$	$y, \bar{x}, 0$	Tetragonal prism <i>Square through origin</i>	$(hk0)$	$(\bar{h}\bar{k}0)$	$(\bar{k}h0)$	$(k\bar{h}0)$
2	<i>a</i>	4..	0, 0, z	0, 0, \bar{z}			Pinacoid or parallelohedron <i>Line segment through origin</i>	(001)		$(00\bar{1})$	
1	<i>o</i>	$4/m$..	0, 0, 0				<i>Point in origin</i>				
Symmetry of special projections											
			Along [001]	Along [100]	Along [110]						
			4	$2mm$	$2mm$						

3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

TETRAGONAL SYSTEM (<i>cont.</i>)									
422		D_4							
8	<i>d</i>	1	x, y, z \bar{x}, \bar{y}, z \bar{y}, x, z y, \bar{x}, z \bar{x}, y, \bar{z} x, \bar{y}, \bar{z} y, x, \bar{z} $\bar{y}, \bar{x}, \bar{z}$		Tetragonal trapezohedron Twisted tetragonal antiprism	(hkl) $(\bar{h}\bar{k}l)$ $(\bar{k}hl)$ $(k\bar{h}l)$ $(\bar{h}k\bar{l})$ $(h\bar{k}\bar{l})$ (khl) $(\bar{k}\bar{h}\bar{l})$			
					Ditetragonal prism Truncated square through origin	$(hk0)$ $(\bar{h}\bar{k}0)$ $(\bar{k}h0)$ $(k\bar{h}0)$ $(\bar{h}k0)$ $(h\bar{k}0)$ $(kh0)$ $(\bar{k}h0)$			
					Tetragonal dipyramid Tetragonal prism	$(h0l)$ $(\bar{h}0l)$ $(0hl)$ $(0\bar{h}l)$ $(\bar{h}0\bar{l})$ $(h0\bar{l})$ $(0h\bar{l})$ $(0\bar{h}\bar{l})$			
					Tetragonal dipyramid Tetragonal prism	(hhl) $(\bar{h}\bar{h}l)$ $(\bar{h}hl)$ $(h\bar{h}l)$ $(\bar{h}h\bar{l})$ $(h\bar{h}\bar{l})$ (hhl) $(\bar{h}\bar{h}\bar{l})$			
4	<i>c</i>	.2	$x, 0, 0$ $\bar{x}, 0, 0$ $0, x, 0$ $0, \bar{x}, 0$		Tetragonal prism Square through origin	(100) $(\bar{1}00)$ (010) $(0\bar{1}0)$			
4	<i>b</i>	.2	$x, x, 0$ $\bar{x}, \bar{x}, 0$ $\bar{x}, x, 0$ $x, \bar{x}, 0$		Tetragonal prism Square through origin	(110) $(\bar{1}\bar{1}0)$ $(\bar{1}10)$ $(1\bar{1}0)$			
2	<i>a</i>	4.	$0, 0, z$ $0, 0, \bar{z}$		Pinacoid or parallelohedron Line segment through origin	(001) $(00\bar{1})$			
1	<i>o</i>	422	$0, 0, 0$		Point in origin				
Symmetry of special projections									
Along [001] Along [100] Along [110] 4mm 2mm 2mm									
$4mm$		C_{4v}							
8	<i>d</i>	1	x, y, z \bar{x}, \bar{y}, z \bar{y}, x, z y, \bar{x}, z x, \bar{y}, z \bar{x}, y, z \bar{y}, \bar{x}, z y, x, z		Ditetragonal pyramid Truncated square	(hkl) $(\bar{h}\bar{k}l)$ $(\bar{k}hl)$ $(k\bar{h}l)$ $(\bar{h}k\bar{l})$ $(h\bar{k}\bar{l})$ $(\bar{k}\bar{h}l)$ (khl)			
					Ditetragonal prism Truncated square through origin	$(hk0)$ $(\bar{h}\bar{k}0)$ $(\bar{k}h0)$ $(k\bar{h}0)$ $(\bar{h}k0)$ $(h\bar{k}0)$ $(\bar{k}\bar{h}0)$ $(kh0)$			
4	<i>c</i>	.m	$x, 0, z$ $\bar{x}, 0, z$ $0, x, z$ $0, \bar{x}, z$		Tetragonal pyramid Square	$(h0l)$ $(\bar{h}0l)$ $(0hl)$ $(0\bar{h}l)$			
					Tetragonal prism Square through origin	(100) $(\bar{1}00)$ (010) $(0\bar{1}0)$			
4	<i>b</i>	.m	x, x, z \bar{x}, \bar{x}, z \bar{x}, x, z x, \bar{x}, z		Tetragonal pyramid Square	(hhl) $(\bar{h}\bar{h}l)$ $(\bar{h}hl)$ $(h\bar{h}l)$			
					Tetragonal prism Square through origin	(110) $(\bar{1}\bar{1}0)$ $(\bar{1}10)$ $(1\bar{1}0)$			
1	<i>a</i>	4mm	$0, 0, z$		Pedion or monohedron Single point	(001) or $(00\bar{1})$			
Symmetry of special projections									
Along [001] Along [100] Along [110] 4mm m m									

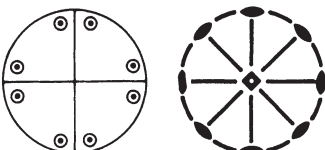
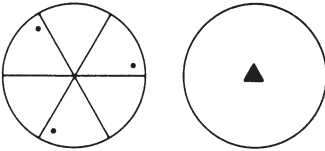
3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

TETRAGONAL SYSTEM (cont.)									
$\bar{4}2m$		D_{2d}							
8	<i>d</i>	1	x, y, z $\bar{x}, \bar{y}, \bar{z}$	\bar{x}, \bar{y}, z x, \bar{y}, \bar{z}	y, \bar{x}, \bar{z} \bar{y}, \bar{x}, z	\bar{y}, x, \bar{z} y, x, z	Tetragonal scalenohedron <i>Tetragonal tetrahedron cut off by pinacoid</i>	(hkl) $(\bar{h}\bar{k}\bar{l})$	$(\bar{h}kl)$ $(h\bar{k}l)$
								$(k\bar{h}\bar{l})$ (khl)	$(\bar{k}h\bar{l})$ $(\bar{k}hl)$
							Ditetragonal prism <i>Truncated square through origin</i>	$(hk0)$ $(\bar{h}\bar{k}0)$	$(\bar{h}k0)$ $(h\bar{k}0)$
							Tetragonal dipyramid <i>Tetragonal prism</i>	$(h0l)$ $(\bar{h}0\bar{l})$	$(0\bar{h}\bar{l})$ $(0hl)$
4	<i>c</i>	$.m$	x, x, z	\bar{x}, \bar{x}, z	x, \bar{x}, \bar{z}	\bar{x}, x, \bar{z}	Tetragonal disphenoid or tetragonal tetrahedron <i>Tetragonal tetrahedron</i>	(hhl) $(\bar{h}\bar{h}l)$	$(h\bar{h}\bar{l})$ $(\bar{h}hl)$
							Tetragonal prism <i>Square through origin</i>	(110)	$(\bar{1}\bar{1}0)$ $(1\bar{1}0)$ $(\bar{1}10)$
4	<i>b</i>	$.2$	$x, 0, 0$	$\bar{x}, 0, 0$	$0, \bar{x}, 0$	$0, x, 0$	Tetragonal prism <i>Square through origin</i>	(100)	$(\bar{1}00)$ $(0\bar{1}0)$ (010)
2	<i>a</i>	$2mm$	$0, 0, z$	$0, 0, \bar{z}$			Pinacoid or parallelohedron <i>Line segment through origin</i>	(001)	$(00\bar{1})$
1	<i>o</i>	$\bar{4}2m$	$0, 0, 0$				<i>Point in origin</i>		
Symmetry of special projections									
Along [001] Along [100] Along [110]									
$4mm$ $2mm$ m									
$\bar{4}m2$		D_{2d}							
8	<i>d</i>	1	x, y, z x, \bar{y}, z	\bar{x}, \bar{y}, z \bar{x}, y, z	y, \bar{x}, \bar{z} y, x, \bar{z}	\bar{y}, x, \bar{z} $\bar{y}, \bar{x}, \bar{z}$	Tetragonal scalenohedron <i>Tetragonal tetrahedron cut off by pinacoid</i>	(hkl) $(\bar{h}\bar{k}\bar{l})$	$(\bar{h}kl)$ $(h\bar{k}l)$
								$(k\bar{h}\bar{l})$ (khl)	$(\bar{k}h\bar{l})$ $(\bar{k}hl)$
							Ditetragonal prism <i>Truncated square through origin</i>	$(hk0)$ $(\bar{h}\bar{k}0)$	$(\bar{h}k0)$ $(h\bar{k}0)$
							Tetragonal dipyramid <i>Tetragonal prism</i>	(hhl) $(\bar{h}\bar{h}l)$	$(h\bar{h}\bar{l})$ $(\bar{h}hl)$
4	<i>c</i>	$.m$	$x, 0, z$	$\bar{x}, 0, z$	$0, \bar{x}, \bar{z}$	$0, x, \bar{z}$	Tetragonal disphenoid or tetragonal tetrahedron <i>Tetragonal tetrahedron</i>	$(h0l)$ $(\bar{h}0\bar{l})$	$(0\bar{h}\bar{l})$ $(0hl)$
							Tetragonal prism <i>Square through origin</i>	(100)	$(\bar{1}00)$ $(0\bar{1}0)$ (010)
4	<i>b</i>	$.2$	$x, x, 0$	$\bar{x}, \bar{x}, 0$	$x, \bar{x}, 0$	$\bar{x}, x, 0$	Tetragonal prism <i>Square through origin</i>	(110)	$(\bar{1}\bar{1}0)$ $(1\bar{1}0)$ $(\bar{1}10)$
2	<i>a</i>	$2mm$	$0, 0, z$	$0, 0, \bar{z}$			Pinacoid or parallelohedron <i>Line segment through origin</i>	(001)	$(00\bar{1})$
1	<i>o</i>	$\bar{4}m2$	$0, 0, 0$				<i>Point in origin</i>		
Symmetry of special projections									
Along [001] Along [100] Along [110]									
$4mm$ m $2mm$									

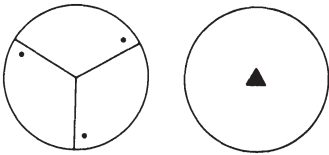
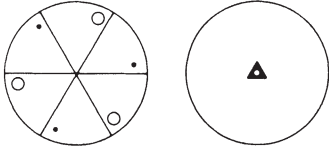
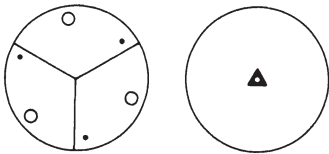
3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

TETRAGONAL SYSTEM (cont.)																													
$4/mmm$		D_{4h}																											
$\frac{4}{m} \frac{2}{m} \frac{2}{m}$																													
16	<i>g</i>	1	x, y, z \bar{x}, y, \bar{z} $\bar{x}, \bar{y}, \bar{z}$ x, \bar{y}, z	\bar{x}, \bar{y}, z x, y, \bar{z} x, y, z \bar{x}, \bar{y}, z	\bar{y}, x, z y, x, \bar{z} y, x, z $\bar{y}, \bar{x}, \bar{z}$	y, \bar{x}, z $\bar{y}, \bar{x}, \bar{z}$ y, x, z $\bar{y}, \bar{x}, \bar{z}$	Ditetragonal dipyramid Edge-truncated tetragonal prism	(hkl) $(\bar{h}\bar{k}\bar{l})$ $(\bar{h}k\bar{l})$ $(h\bar{k}l)$	$(\bar{k}hl)$ $(k\bar{h}l)$ (khl) $(\bar{k}\bar{h}l)$																				
8	<i>f</i>	. <i>m</i>	$x, 0, z$ $\bar{x}, 0, \bar{z}$	$\bar{x}, 0, z$ $x, 0, \bar{z}$	$0, x, z$ $0, x, \bar{z}$	$0, \bar{x}, z$ $0, \bar{x}, \bar{z}$	Tetragonal dipyramid Tetragonal prism	$(h0l)$ $(\bar{h}0\bar{l})$	$(0hl)$ $(0h\bar{l})$																				
8	<i>e</i>	. <i>m</i>	x, x, z \bar{x}, x, \bar{z}	\bar{x}, \bar{x}, z x, \bar{x}, \bar{z}	\bar{x}, x, z x, x, \bar{z}	x, \bar{x}, z $\bar{x}, \bar{x}, \bar{z}$	Tetragonal dipyramid Tetragonal prism	(hhl) $(\bar{h}\bar{h}\bar{l})$	$(\bar{h}hl)$ (hhl)																				
8	<i>d</i>	. <i>m</i>	$x, y, 0$ $\bar{x}, y, 0$	$\bar{x}, \bar{y}, 0$ $x, \bar{y}, 0$	$\bar{y}, x, 0$ $y, x, 0$	$y, \bar{x}, 0$ $\bar{y}, \bar{x}, 0$	Ditetragonal prism Truncated square through origin	$(hk0)$ $(\bar{h}\bar{k}0)$	$(\bar{k}h0)$ $(k\bar{h}0)$																				
4	<i>c</i>	<i>m</i> 2 <i>m</i>	$x, 0, 0$ $\bar{x}, 0, 0$	$0, x, 0$ $0, x, 0$	$0, \bar{x}, 0$ $0, \bar{x}, 0$		Tetragonal prism Square through origin	(100) $(\bar{1}00)$	(010) $(0\bar{1}0)$																				
4	<i>b</i>	<i>m</i> . <i>m</i> 2	$x, x, 0$ $\bar{x}, \bar{x}, 0$	$\bar{x}, \bar{x}, 0$ $x, x, 0$	$x, \bar{x}, 0$ $\bar{x}, x, 0$		Tetragonal prism Square through origin	(110) $(\bar{1}\bar{1}0)$	$(\bar{1}10)$ $(1\bar{1}0)$																				
2	<i>a</i>	4 <i>mm</i>	$0, 0, z$ $0, 0, \bar{z}$				Pinacoid or parallelohedron Line segment through origin	(001) $(00\bar{1})$																					
1	<i>o</i>	4/ <i>m</i> <i>mm</i>	$0, 0, 0$				Point in origin																						
Symmetry of special projections																													
<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Along [001]</td> <td style="text-align: center;">Along [100]</td> <td style="text-align: center;">Along [110]</td> <td colspan="7"></td> </tr> <tr> <td style="text-align: center;">4<i>mm</i></td> <td style="text-align: center;">2<i>mm</i></td> <td style="text-align: center;">2<i>mm</i></td> <td colspan="7"></td> </tr> </table>										Along [001]	Along [100]	Along [110]								4 <i>mm</i>	2 <i>mm</i>	2 <i>mm</i>							
Along [001]	Along [100]	Along [110]																											
4 <i>mm</i>	2 <i>mm</i>	2 <i>mm</i>																											
TRIGONAL SYSTEM																													
3		C_3																											
HEXAGONAL AXES																													
3	<i>b</i>	1	x, y, z $\bar{y}, x - y, z$	$\bar{y}, x - y, z$ $\bar{x} + y, \bar{x}, z$	$\bar{x} + y, \bar{x}, z$ $\bar{x} + y, \bar{x}, z$		Trigonal pyramid Trigon	(hki) (ihk)	(kih) (kih)																				
							Trigonal prism Trigon through origin	$(hki0)$ $(ihk0)$	$(kih0)$ $(kih0)$																				
1	<i>a</i>	3.	$0, 0, z$				Pedion or monohedron Single point	(0001) $(000\bar{1})$																					
Symmetry of special projections																													
<table border="0" style="width: 100%;"> <tr> <td style="text-align: center;">Along [001]</td> <td style="text-align: center;">Along [100]</td> <td style="text-align: center;">Along [210]</td> <td colspan="7"></td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td colspan="7"></td> </tr> </table>										Along [001]	Along [100]	Along [210]								3	1	1							
Along [001]	Along [100]	Along [210]																											
3	1	1																											

3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

TRIGONAL SYSTEM (<i>cont.</i>)					
3	C_3				
RHOMBOHEDRAL AXES					
3	b 1	$x, y, z \quad z, x, y \quad y, z, x$	Trigonal pyramid <i>Trigon</i>	$(hkl) \quad (lhk) \quad (klh)$	
			Trigonal prism <i>Trigon through origin</i>	$(hk(\overline{h+k}) \quad ((\overline{h+k})hk) \quad (k(\overline{h+k})h)$	
1	a 3.	x, x, x	Pedion or monohedron <i>Single point</i>	$(111) \text{ or } (\overline{1}\overline{1}\overline{1})$	
			Symmetry of special projections		
			Along $[111]$	Along $[1\overline{1}0]$	Along $[2\overline{1}\overline{1}]$
			3	1	1
$\overline{3}$					
HEXAGONAL AXES			C_{3i}		
6	b 1	$x, y, z \quad \overline{y}, x - y, z \quad \overline{x} + y, \overline{x}, z$ $\overline{x}, \overline{y}, \overline{z} \quad y, \overline{x} + y, \overline{z} \quad x - y, x, \overline{z}$	Rhombohedron <i>Trigonal antiprism</i>	$(hkl) \quad (ihkl) \quad (kihl)$ $(\overline{h}\overline{k}\overline{l}) \quad (\overline{i}\overline{h}\overline{k}\overline{l}) \quad (\overline{k}\overline{i}\overline{h}\overline{l})$	
			Hexagonal prism <i>Hexagon through origin</i>	$(hki0) \quad (ihk0) \quad (kih0)$ $(\overline{h}\overline{k}\overline{i}0) \quad (\overline{i}\overline{h}\overline{k}0) \quad (\overline{k}\overline{i}\overline{h}0)$	
2	a 3..	$0, 0, z \quad 0, 0, \overline{z}$	Pinacoid or parallelohedron <i>Line segment through origin</i>	$(0001) \quad (000\overline{1})$	
1	o $\overline{3}$..	$0, 0, 0$	<i>Point in origin</i>		
			Symmetry of special projections		
			Along $[001]$	Along $[100]$	Along $[210]$
			6	2	2
$\overline{3}$					
RHOMBOHEDRAL AXES			C_{3i}		
6	b 1	$x, y, z \quad z, x, y \quad y, z, x$ $\overline{x}, \overline{y}, \overline{z} \quad \overline{z}, \overline{x}, \overline{y} \quad \overline{y}, \overline{z}, \overline{x}$	Rhombohedron <i>Trigonal antiprism</i>	$(hkl) \quad (lhk) \quad (klh)$ $(\overline{h}\overline{k}\overline{l}) \quad (\overline{l}\overline{h}\overline{k}) \quad (\overline{k}\overline{l}\overline{h})$	
			Hexagonal prism <i>Hexagon through origin</i>	$(hk(\overline{h+k}) \quad ((\overline{h+k})hk) \quad (k(\overline{h+k})h)$ $(\overline{h}\overline{k}(h+k) \quad ((h+k)\overline{h}\overline{k}) \quad (\overline{k}(h+k)\overline{h})$	
2	a 3.	$x, x, x \quad \overline{x}, \overline{x}, \overline{x}$	Pinacoid or parallelohedron <i>Line segment through origin</i>	$(111) \quad (\overline{1}\overline{1}\overline{1})$	
1	o $\overline{3}$..	$0, 0, 0$	<i>Point in origin</i>		
			Symmetry of special projections		
			Along $[111]$	Along $[1\overline{1}0]$	Along $[2\overline{1}\overline{1}]$
			6	2	2

3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

TRIGONAL SYSTEM (<i>cont.</i>)									
312		D_3							
HEXAGONAL AXES									
6	<i>c</i>	1	x, y, z $\bar{y}, x - y, z$ $\bar{x} + y, \bar{x}, z$ $\bar{y}, \bar{x}, \bar{z}$ $\bar{x} + y, y, \bar{z}$ $x, x - y, \bar{z}$	Trigonal trapezohedron Twisted trigonal antiprism	(hkl) $(ihkl)$ $(kihl)$ $(\bar{k}\bar{h}\bar{l})$ $(\bar{h}\bar{i}\bar{k}\bar{l})$ $(\bar{i}\bar{k}\bar{h}\bar{l})$				
				Ditrigonal prism Truncated trigon through origin	$(hki0)$ $(ihk0)$ $(kih0)$ $(\bar{k}\bar{h}\bar{i}0)$ $(\bar{h}\bar{i}\bar{k}0)$ $(\bar{i}\bar{k}\bar{h}0)$				
				Trigonal dipyramid Trigonal prism	$(h0\bar{h}l)$ $(\bar{h}0hl)$ $(0\bar{h}hl)$ $(0\bar{h}\bar{h}l)$ $(\bar{h}h0l)$ $(h0\bar{h}l)$				
				Rhombohedron Trigonal antiprism	$(hh\bar{2}hl)$ $(\bar{2}hhhl)$ $(h\bar{2}hhl)$ $(\bar{h}\bar{h}2h\bar{l})$ $(\bar{h}2h\bar{h}\bar{l})$ $(2h\bar{h}\bar{h}\bar{l})$				
				Hexagonal prism Hexagon through origin	$(11\bar{2}0)$ $(\bar{2}110)$ $(1\bar{2}10)$ $(\bar{1}\bar{1}20)$ $(1\bar{2}\bar{1}0)$ $(2\bar{1}\bar{1}0)$				
3	<i>b</i>	..2	$x, \bar{x}, 0$ $x, 2x, 0$ $2\bar{x}, \bar{x}, 0$	Trigonal prism Trigon through origin	$(10\bar{1}0)$ $(\bar{1}100)$ $(0\bar{1}10)$ or (1010) $(1\bar{1}00)$ (0110)				
2	<i>a</i>	3..	$0, 0, z$ $0, 0, \bar{z}$	Pinacoid or parallelohedron Line segment through origin	(0001) $(000\bar{1})$				
1	<i>o</i>	3.2	$0, 0, 0$	Point in origin					
Symmetry of special projections									
Along [001] Along [100] Along [210] $3m$ 1 2									
321									
321		D_3							
HEXAGONAL AXES									
6	<i>c</i>	1	x, y, z $\bar{y}, x - y, z$ $\bar{x} + y, \bar{x}, z$ y, x, \bar{z} $x - y, \bar{y}, \bar{z}$ $\bar{x}, \bar{x} + y, \bar{z}$	Trigonal trapezohedron Twisted trigonal antiprism	(hkl) $(ihkl)$ $(kihl)$ $(\bar{k}\bar{h}\bar{l})$ $(\bar{h}\bar{i}\bar{k}\bar{l})$ $(\bar{i}\bar{k}\bar{h}\bar{l})$				
				Ditrigonal prism Truncated trigon through origin	$(hki0)$ $(ihk0)$ $(kih0)$ $(khi0)$ $(hik0)$ $(ikh0)$				
				Trigonal dipyramid Trigonal prism	$(hh\bar{2}hl)$ $(\bar{2}hhhl)$ $(h\bar{2}hhl)$ $(hh\bar{2}h\bar{l})$ $(h\bar{2}h\bar{h}\bar{l})$ $(2h\bar{h}\bar{h}\bar{l})$				
				Rhombohedron Trigonal antiprism	$(h0\bar{h}l)$ $(\bar{h}0hl)$ $(0\bar{h}hl)$ $(0\bar{h}\bar{h}l)$ $(\bar{h}h0l)$ $(h0\bar{h}l)$				
				Hexagonal prism Hexagon through origin	$(10\bar{1}0)$ $(\bar{1}100)$ $(0\bar{1}10)$ $(01\bar{1}0)$ $(1\bar{1}00)$ $(\bar{1}010)$				
3	<i>b</i>	.2.	$x, 0, 0$ $0, x, 0$ $\bar{x}, \bar{x}, 0$	Trigonal prism Trigon through origin	$(11\bar{2}0)$ $(\bar{2}110)$ $(1\bar{2}10)$ or $(\bar{1}\bar{1}20)$ $(2\bar{1}\bar{1}0)$ $(\bar{1}2\bar{1}0)$				
2	<i>a</i>	3..	$0, 0, z$ $0, 0, \bar{z}$	Pinacoid or parallelohedron Line segment through origin	(0001) $(000\bar{1})$				
1	<i>o</i>	32.	$0, 0, 0$	Point in origin					
Symmetry of special projections									
Along [001] Along [100] Along [210] $3m$ 2 1									

3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

TRIGONAL SYSTEM (cont.)									
32 D_3 RHOMBOHEDRAL AXES									
6	c	1	x, y, z $\bar{z}, \bar{y}, \bar{x}$	z, x, y $\bar{y}, \bar{x}, \bar{z}$	y, z, x $\bar{x}, \bar{z}, \bar{y}$	Trigonal trapezohedron <i>Twisted trigonal antiprism</i>	(hkl) $(\bar{k}\bar{h}\bar{l})$	(lhk) $(\bar{h}\bar{l}\bar{k})$	(klh) $(\bar{l}\bar{k}\bar{h})$
						Ditrigonal prism <i>Truncated trigon through origin</i>	$(hk(\bar{h}+\bar{k}))$ $(\bar{k}\bar{h}(h+k))$	$((\bar{h}+\bar{k})hk)$ $(\bar{h}(h+k)\bar{k})$	$(k(\bar{h}+\bar{k})h)$ $((h+k)\bar{k}\bar{h})$
						Trigonal dipyramid <i>Trigonal prism</i>	$(hk(2k-h))$ $(\bar{k}\bar{h}(h-2k))$	$((2k-h)hk)$ $(\bar{h}(h-2k)\bar{k})$	$(k(2k-h)h)$ $((h-2k)\bar{k}\bar{h})$
						Rhombohedron <i>Trigonal antiprism</i>	(hhl) $(\bar{h}\bar{h}\bar{l})$	$(lh\bar{h})$ $(\bar{h}\bar{l}\bar{h})$	(hlh) $(\bar{l}\bar{h}\bar{h})$
						Hexagonal prism <i>Hexagon through origin</i>	$(11\bar{2})$ $(\bar{1}\bar{1}2)$	$(\bar{2}11)$ $(\bar{1}2\bar{1})$	$(\bar{1}2\bar{1})$ $(2\bar{1}\bar{1})$
3	b	2	$x, \bar{x}, 0$	$0, x, \bar{x}$	$\bar{x}, 0, x$	Trigonal prism <i>Trigon through origin</i>	$(01\bar{1})$ or $(0\bar{1}1)$	$(\bar{1}01)$ $(10\bar{1})$	$(\bar{1}10)$ $(\bar{1}10)$
2	a	3	x, x, x	$\bar{x}, \bar{x}, \bar{x}$		Pinacoid or parallelohedron <i>Line segment through origin</i>	(111)	$(\bar{1}\bar{1}\bar{1})$	
1	o	32	$0, 0, 0$			<i>Point in origin</i>			
Symmetry of special projections									
			Along $[111]$	Along $[1\bar{1}0]$	Along $[2\bar{1}\bar{1}]$				
			3m	2	1				
$3m1$ C_{3v} HEXAGONAL AXES									
6	c	1	x, y, z \bar{y}, \bar{x}, z	$\bar{y}, x-y, z$ $\bar{x}+y, y, z$	$\bar{x}+y, \bar{x}, z$ $x, x-y, z$	Ditrigonal pyramid <i>Truncated trigon</i>	$(hki\bar{l})$ $(\bar{k}\bar{h}\bar{i}\bar{l})$	$(ihkl)$ $(\bar{h}\bar{i}\bar{k}\bar{l})$	$(kihl)$ $(\bar{i}\bar{k}\bar{h}\bar{l})$
						Ditrigonal prism <i>Truncated trigon through origin</i>	$(hki0)$ $(\bar{k}\bar{h}\bar{i}0)$	$(ihk0)$ $(\bar{h}\bar{i}\bar{k}0)$	$(kih0)$ $(\bar{i}\bar{k}\bar{h}0)$
						Hexagonal pyramid <i>Hexagon</i>	$(hh\bar{2}hl)$ $(\bar{h}\bar{h}2hl)$	$(\bar{2}hhhl)$ $(h2hhl)$	$(h\bar{2}hhl)$ $(\bar{h}2hhl)$
						Hexagonal prism <i>Hexagon through origin</i>	$(11\bar{2}0)$ $(\bar{1}\bar{1}20)$	$(\bar{2}110)$ $(\bar{1}2\bar{1}0)$	$(\bar{1}2\bar{1}0)$ $(2\bar{1}\bar{1}0)$
3	b	m.	x, \bar{x}, z	$x, 2x, z$	$2\bar{x}, \bar{x}, z$	Trigonal pyramid <i>Trigon</i>	$(h0\bar{h}l)$	$(\bar{h}0l)$	$(0\bar{h}hl)$
						Trigonal prism <i>Trigon through origin</i>	$(10\bar{1}0)$ or $(\bar{1}010)$	$(\bar{1}100)$ $(\bar{1}100)$	$(0\bar{1}10)$ $(01\bar{1}0)$
1	a	3m.	$0, 0, z$			Pedion or monohedron <i>Single point</i>	(0001) or $(000\bar{1})$		
Symmetry of special projections									
			Along $[001]$	Along $[100]$	Along $[210]$				
			3m	1	m				

3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

TRIGONAL SYSTEM (<i>cont.</i>)									
31m		C_{3v}							
HEXAGONAL AXES									
6	c	1	x, y, z y, x, z	$\bar{y}, x - y, z$ $x - y, \bar{y}, z$	$\bar{x} + y, \bar{x}, z$ $\bar{x}, \bar{x} + y, z$	Ditrigonal pyramid Truncated trigon Ditrigonal prism Truncated trigon through origin Hexagonal pyramid Hexagon Hexagonal prism Hexagon through origin	(hkl) $(ihkl)$ $(kihl)$ (khl) $(hikl)$ (ikh) $(hki0)$ $(ihk0)$ $(kih0)$ $(khi0)$ $(hik0)$ $(ikh0)$ $(h\bar{0}hl)$ $(\bar{h}h0l)$ $(0\bar{h}hl)$ $(0h\bar{h}l)$ $(h\bar{h}0l)$ $(\bar{h}0hl)$ $(10\bar{1}0)$ $(\bar{1}100)$ $(0\bar{1}10)$ $(01\bar{1}0)$ $(\bar{1}\bar{1}00)$ $(\bar{1}010)$		
3	b	.m	$x, 0, z$ $0, x, z$	\bar{x}, \bar{x}, z		Trigonal pyramid Trigon Trigonal prism Trigon through origin	$(hh\bar{2}hl)$ $(\bar{2}hhhl)$ $(h\bar{2}hhl)$ $(11\bar{2}0)$ $(\bar{2}110)$ $(1\bar{2}10)$ or $(\bar{1}\bar{1}20)$ $(2\bar{1}\bar{1}0)$ $(\bar{1}2\bar{1}0)$		
1	a	3.m	$0, 0, z$			Pedion or monohedron Single point	(0001) or $(000\bar{1})$		
Symmetry of special projections									
Along [001] Along [100] Along [210] 3m m 1									
3m		C_{3v}							
RHOMBOHEDRAL AXES									
6	c	1	x, y, z z, y, x	z, x, y y, x, z	y, z, x x, z, y	Ditrigonal pyramid Truncated trigon Ditrigonal prism Truncated trigon through origin Hexagonal pyramid Hexagon Hexagonal prism Hexagon through origin	(hkl) (lkh) (klh) (khl) (hlk) (lkh) $(hk(\bar{h}+\bar{k}))$ $((\bar{h}+\bar{k})hk)$ $(k(\bar{h}+\bar{k})h)$ $(kh(\bar{h}+\bar{k}))$ $(h(\bar{h}+\bar{k})k)$ $((\bar{h}+\bar{k})kh)$ $(hk(2k-h))$ $((2k-h)hk)$ $(k(2k-h)h)$ $(kh(2k-h))$ $(h(2k-h)k)$ $((2k-h)kh)$ $(0\bar{1}\bar{1})$ $(\bar{1}0\bar{1})$ $(\bar{1}\bar{1}0)$ $(10\bar{1})$ $(0\bar{1}1)$ $(\bar{1}10)$		
3	b	.m	x, y, x x, x, y	y, x, x		Trigonal pyramid Trigon Trigonal prism Trigon through origin	(hhl) (lhh) (hll) $(11\bar{2})$ $(\bar{2}11)$ $(1\bar{2}1)$ or $(\bar{1}\bar{1}2)$ $(2\bar{1}\bar{1})$ $(\bar{1}2\bar{1})$		
1	a	3m	x, x, x			Pedion or monohedron Single point	(111) or $(\bar{1}\bar{1}\bar{1})$		
Symmetry of special projections									
Along [111] Along [1 $\bar{1}$ 0] Along [2 $\bar{1}\bar{1}$] 3m 1 m									

3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

TRIGONAL SYSTEM (<i>cont.</i>)									
$\bar{3}1m$		D_{3d}							
$\bar{3}1\frac{2}{m}$									
HEXAGONAL AXES									
12	<i>d</i>	1	x, y, z	$\bar{y}, x - y, z$	$\bar{x} + y, \bar{x}, z$	Ditrigonal scalenohedron or hexagonal scalenohedron	(hkl)	$(ihkl)$	$(kihl)$
			$\bar{y}, \bar{x}, \bar{z}$	$\bar{x} + y, y, \bar{z}$	$x, x - y, \bar{z}$	Trigonal antiprism sliced off by pinacoid	$(\bar{k}\bar{h}\bar{l})$	$(\bar{h}\bar{i}\bar{k}\bar{l})$	$(\bar{i}\bar{k}\bar{h}\bar{l})$
			$\bar{x}, \bar{y}, \bar{z}$	$y, \bar{x} + y, \bar{z}$	$x - y, x, \bar{z}$		$(\bar{h}\bar{k}\bar{i}\bar{l})$	$(\bar{i}\bar{h}\bar{k}\bar{l})$	$(\bar{k}\bar{i}\bar{h}\bar{l})$
			y, x, z	$x - y, \bar{y}, z$	$\bar{x}, \bar{x} + y, z$	Dihexagonal prism	(khl)	$(hikl)$	$(ikh l)$
						Truncated hexagon through origin	$(hki0)$	$(ihk0)$	$(kih0)$
							$(\bar{k}\bar{h}\bar{i}0)$	$(\bar{h}\bar{i}\bar{k}0)$	$(\bar{i}\bar{k}\bar{h}0)$
							$(\bar{h}\bar{k}\bar{i}0)$	$(\bar{i}\bar{h}\bar{k}0)$	$(\bar{k}\bar{i}\bar{h}0)$
							$(khi0)$	$(hik0)$	$(ikh0)$
						Hexagonal dipyrmaid	$(h0\bar{h}l)$	$(\bar{h}h0l)$	$(0\bar{h}hl)$
						Hexagonal prism	$(0\bar{h}h\bar{l})$	$(\bar{h}h0\bar{l})$	$(h0\bar{h}\bar{l})$
							$(\bar{h}0h\bar{l})$	$(h\bar{h}0\bar{l})$	$(0h\bar{h}\bar{l})$
							$(0hhl)$	$(h\bar{h}0l)$	$(h0hl)$
6	<i>c</i>	$\dots m$	$x, 0, z$	$0, x, z$	\bar{x}, \bar{x}, z	Rhombohedron	$(hh\bar{2}hl)$	$(\bar{2}hhhl)$	$(h\bar{2}hhl)$
			$0, \bar{x}, \bar{z}$	$\bar{x}, 0, \bar{z}$	x, x, \bar{z}	Trigonal antiprism	$(\bar{h}\bar{h}\bar{2}hl)$	$(\bar{h}\bar{2}hhl)$	$(2hh\bar{h}\bar{l})$
						Hexagonal prism	$(11\bar{2}0)$	$(\bar{2}110)$	$(1\bar{2}10)$
						Hexagon through origin	$(\bar{1}\bar{1}20)$	$(\bar{1}\bar{2}10)$	$(2\bar{1}\bar{1}0)$
6	<i>b</i>	$\dots 2$	$x, \bar{x}, 0$	$x, 2x, 0$	$2\bar{x}, \bar{x}, 0$	Hexagonal prism	$(10\bar{1}0)$	$(\bar{1}100)$	$(0\bar{1}10)$
			$\bar{x}, x, 0$	$\bar{x}, 2\bar{x}, 0$	$2x, x, 0$	Hexagon through origin	$(\bar{1}010)$	$(1\bar{1}00)$	$(01\bar{1}0)$
2	<i>a</i>	$\dots 3.m$	$0, 0, z$	$0, 0, \bar{z}$		Pinacoid or parallelohedron	(0001)	$(000\bar{1})$	
						Line segment through origin			
1	<i>o</i>	$\bar{3}.m$	$0, 0, 0$			Point in origin			
Symmetry of special projections									
			Along [001]	Along [100]	Along [210]				
			6mm	2mm	2				

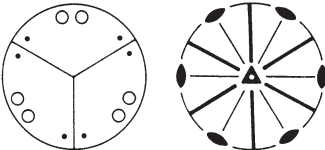
3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

TRIGONAL SYSTEM (<i>cont.</i>)						
$\bar{3}m1$						
$\bar{3}2$						
$\bar{3}1$						
m						
HEXAGONAL AXES						
12	<i>d</i>	1	x, y, z $\bar{y}, x - y, z$ $\bar{x} + y, \bar{x}, z$ y, x, \bar{z} $x - y, \bar{y}, \bar{z}$ $\bar{x}, \bar{x} + y, \bar{z}$ $\bar{x}, \bar{y}, \bar{z}$ $y, \bar{x} + y, \bar{z}$ $x - y, x, \bar{z}$ \bar{y}, \bar{x}, z $\bar{x} + y, y, z$ $x, x - y, z$	Ditrigonal scalenohedron or hexagonal scalenohedron <i>Trigonal antiprism sliced off by pinacoid</i> Dihexagonal prism <i>Truncated hexagon through origin</i> Hexagonal dipyrmaid <i>Hexagonal prism</i>	(hkl) $(ihkl)$ $(kihl)$ $(k\bar{h}l)$ $(h\bar{i}l)$ $(i\bar{k}l)$ $(\bar{h}k\bar{l})$ $(\bar{i}h\bar{k}l)$ $(k\bar{i}\bar{h}l)$ $(\bar{k}\bar{h}\bar{l})$ $(\bar{h}\bar{i}\bar{k}l)$ $(\bar{i}\bar{k}\bar{h}l)$ $(hki0)$ $(ihk0)$ $(kih0)$ $(khi0)$ $(hik0)$ $(ikh0)$ $(\bar{h}\bar{k}\bar{i}0)$ $(\bar{i}\bar{h}\bar{k}0)$ $(\bar{k}\bar{i}\bar{h}0)$ $(\bar{k}\bar{h}\bar{i}0)$ $(\bar{h}\bar{i}\bar{k}0)$ $(\bar{i}\bar{k}\bar{h}0)$ $(hh\bar{2}hl)$ $(\bar{2}hhhl)$ $(h\bar{2}hhl)$ $(h\bar{h}\bar{2}h\bar{l})$ $(\bar{h}\bar{2}hh\bar{l})$ $(\bar{2}hhhl)$ $(\bar{h}\bar{h}\bar{2}h\bar{l})$ $(2hh\bar{h}\bar{l})$ $(\bar{h}2h\bar{h}\bar{l})$ $(\bar{h}\bar{h}2hl)$ $(\bar{h}2h\bar{h}l)$ $(2h\bar{h}\bar{h}l)$	
6	<i>c</i>	<i>.m.</i>	x, \bar{x}, z $x, 2x, z$ $2\bar{x}, \bar{x}, z$ \bar{x}, x, \bar{z} $2x, x, \bar{z}$ $\bar{x}, 2\bar{x}, \bar{z}$	Rhombohedron <i>Trigonal antiprism</i> Hexagonal prism <i>Hexagon through origin</i>	$(h0\bar{h}l)$ $(\bar{h}h0l)$ $(0\bar{h}hl)$ $(0h\bar{h}l)$ $(h\bar{h}0l)$ $(h0\bar{h}l)$ $(10\bar{1}0)$ $(\bar{1}100)$ $(0\bar{1}10)$ $(01\bar{1}0)$ $(1\bar{1}00)$ $(\bar{1}010)$	
6	<i>b</i>	<i>.2.</i>	$x, 0, 0$ $0, x, 0$ $\bar{x}, \bar{x}, 0$ $\bar{x}, 0, 0$ $0, \bar{x}, 0$ $x, x, 0$	Hexagonal prism <i>Hexagon through origin</i>	$(11\bar{2}0)$ $(\bar{2}110)$ $(1\bar{2}10)$ $(\bar{1}\bar{1}20)$ $(\bar{1}\bar{2}10)$ $(2\bar{1}\bar{1}0)$	
2	<i>a</i>	<i>3m.</i>	$0, 0, z$ $0, 0, \bar{z}$	Pinacoid or parallelohedron <i>Line segment through origin</i>	(0001) $(000\bar{1})$	
1	<i>o</i>	$\bar{3}m.$	$0, 0, 0$	Point in origin		
Symmetry of special projections						
		Along [001]	Along [100]	Along [210]		
		6mm	2	2mm		

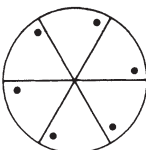
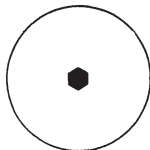
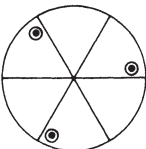
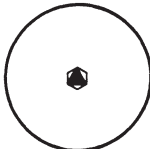
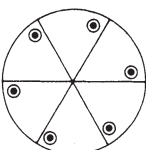
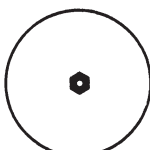
3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

TRIGONAL SYSTEM (<i>cont.</i>)							
$\bar{3}m$							
$\bar{2}$							
$\bar{3}$							
m							
RHOMBOHEDRAL AXES							
12	<i>d</i>	1	x, y, z $\bar{z}, \bar{y}, \bar{x}$ $\bar{x}, \bar{y}, \bar{z}$ z, y, x	z, x, y $\bar{y}, \bar{x}, \bar{z}$ $\bar{z}, \bar{x}, \bar{y}$ y, x, z	y, z, x $\bar{x}, \bar{z}, \bar{y}$ $\bar{y}, \bar{z}, \bar{x}$ x, z, y		
						Ditrigonal scalenohedron or hexagonal scalenohedron <i>Trigonal antiprism sliced off by pinacoid</i>	(hkl) (lhk) (klh) $(\bar{k}\bar{h}\bar{l})$ $(\bar{h}\bar{l}\bar{k})$ $(\bar{l}\bar{k}\bar{h})$ $(\bar{h}\bar{k}\bar{l})$ $(\bar{l}\bar{h}\bar{k})$ $(\bar{k}\bar{l}\bar{h})$ (khl) (hlk) (lkh)
						Dihexagonal prism <i>Truncated hexagon through origin</i>	$(hk(\bar{h}+\bar{k}))$ $(\bar{h}+\bar{k})hk$ $(k(\bar{h}+\bar{k})h)$ $(\bar{k}\bar{h}(h+k))$ $(\bar{h}(h+k)\bar{k})$ $((h+k)\bar{k}\bar{h})$ $(\bar{h}\bar{k}(h+k))$ $((h+k)\bar{h}\bar{k})$ $(\bar{k}(h+k)\bar{h})$ $(kh(\bar{h}+\bar{k}))$ $(h(\bar{h}+\bar{k})k)$ $((\bar{h}+\bar{k})kh)$
						Hexagonal dipyrmaid <i>Hexagonal prism</i>	$(hk(2k-h))$ $((2k-h)hk)$ $(k(2k-h)h)$ $(\bar{k}\bar{h}(h-2k))$ $(\bar{h}(h-2k)\bar{k})$ $((h-2k)\bar{k}\bar{h})$ $(\bar{h}\bar{k}(h-2k))$ $((h-2k)\bar{h}\bar{k})$ $(\bar{k}(h-2k)\bar{h})$ $(kh(2k-h))$ $(h(2k-h)k)$ $((2k-h)kh)$
6	<i>c</i>	<i>.m</i>	x, y, x $\bar{x}, \bar{y}, \bar{x}$	x, x, y $\bar{y}, \bar{x}, \bar{x}$	y, x, x $\bar{x}, \bar{x}, \bar{y}$	Rhombohedron <i>Trigonal antiprism</i>	(hhl) (lhh) (hll) $(\bar{h}\bar{h}\bar{l})$ $(\bar{h}\bar{l}\bar{h})$ $(\bar{l}\bar{h}\bar{h})$
						Hexagonal prism <i>Hexagon through origin</i>	$(11\bar{2})$ $(\bar{2}11)$ $(1\bar{2}1)$ $(\bar{1}\bar{1}2)$ $(\bar{1}\bar{2}1)$ $(2\bar{1}\bar{1})$
6	<i>b</i>	<i>.2</i>	$x, \bar{x}, 0$ $\bar{x}, x, 0$	$0, x, \bar{x}$ $0, \bar{x}, x$	$\bar{x}, 0, x$ $x, 0, \bar{x}$	Hexagonal prism <i>Hexagon through origin</i>	$(01\bar{1})$ $(\bar{1}01)$ $(1\bar{1}0)$ $(0\bar{1}1)$ $(10\bar{1})$ $(\bar{1}10)$
2	<i>a</i>	<i>3m</i>	x, x, x	$\bar{x}, \bar{x}, \bar{x}$		Pinacoid or parallelohedron <i>Line segment through origin</i>	(111) $(\bar{1}\bar{1}\bar{1})$
1	<i>o</i>	$\bar{3}m$	$0, 0, 0$			<i>Point in origin</i>	
Symmetry of special projections							
		Along $[111]$	Along $[1\bar{1}0]$	Along $[2\bar{1}\bar{1}]$			
		$6mm$	2	$2mm$			

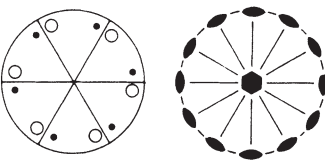
3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

HEXAGONAL SYSTEM									
6	b	1	x, y, z \bar{x}, \bar{y}, z	$\bar{y}, x - y, z$ $y, \bar{x} + y, z$	$\bar{x} + y, \bar{x}, z$ $x - y, x, z$	 	Hexagonal pyramid Hexagon Hexagonal prism Hexagon through origin	(hkl) $(ihkl)$ $(kihl)$ $(\bar{h}\bar{k}\bar{l})$ $(\bar{i}\bar{h}\bar{k}\bar{l})$ $(\bar{k}\bar{i}\bar{h}\bar{l})$ $(hki0)$ $(ihk0)$ $(kih0)$ $(\bar{h}\bar{k}\bar{i}0)$ $(\bar{i}\bar{h}\bar{k}0)$ $(\bar{k}\bar{i}\bar{h}0)$	
									1
Symmetry of special projections Along [001] Along [100] Along [210] 6 m m									
6	c	1	x, y, z x, y, \bar{z}	$\bar{y}, x - y, z$ $\bar{y}, x - y, \bar{z}$	$\bar{x} + y, \bar{x}, z$ $\bar{x} + y, \bar{x}, \bar{z}$	 	Trigonal dipyrmaid Trigonal prism Trigonal prism Trigon through origin	(hkl) $(ihkl)$ $(kihl)$ $(h\bar{k}\bar{l})$ $(i\bar{h}\bar{k}\bar{l})$ $(k\bar{i}\bar{h}\bar{l})$ $(hki0)$ $(ihk0)$ $(kih0)$	
									3
2	a	3..	0, 0, z	0, 0, \bar{z}	Pinacoid or parallelohedron Line segment through origin	(0001) $(000\bar{1})$			
1	o	6..	0, 0, 0	0, 0, 0	Point in origin				
Symmetry of special projections Along [001] Along [100] Along [210] 3 m m									
6/m	b	m..	x, y, z \bar{x}, \bar{y}, z $\bar{x}, \bar{y}, \bar{z}$ x, y, \bar{z}	$\bar{y}, x - y, z$ $y, \bar{x} + y, z$ $y, \bar{x} + y, \bar{z}$ $\bar{y}, x - y, \bar{z}$	$\bar{x} + y, \bar{x}, z$ $x - y, x, z$ $x - y, x, \bar{z}$ $\bar{x} + y, \bar{x}, \bar{z}$	 	Hexagonal dipyrmaid Hexagonal prism Hexagonal prism Hexagon through origin	(hkl) $(ihkl)$ $(kihl)$ $(\bar{h}\bar{k}\bar{l})$ $(\bar{i}\bar{h}\bar{k}\bar{l})$ $(\bar{k}\bar{i}\bar{h}\bar{l})$ $(h\bar{k}\bar{l})$ $(i\bar{h}\bar{k}\bar{l})$ $(k\bar{i}\bar{h}\bar{l})$ $(\bar{h}\bar{k}\bar{i}\bar{l})$ $(\bar{i}\bar{h}\bar{k}\bar{i}\bar{l})$ $(\bar{k}\bar{i}\bar{h}\bar{i}\bar{l})$	
									6
2	a	6..	0, 0, z	0, 0, \bar{z}	Pinacoid or parallelohedron Line segment through origin	(0001) $(000\bar{1})$			
1	o	6/m..	0, 0, 0	0, 0, 0	Point in origin				
Symmetry of special projections Along [001] Along [100] Along [210] 6 2mm 2mm									

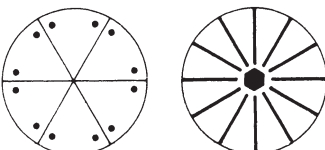
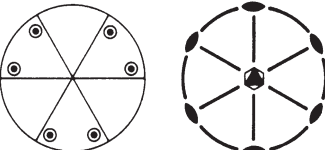
3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

HEXAGONAL SYSTEM (<i>cont.</i>)						
622	D_6					
12	<i>d</i>	1	x, y, z $\bar{y}, x - y, z$ $\bar{x} + y, \bar{x}, z$ \bar{x}, \bar{y}, z $y, \bar{x} + y, z$ $x - y, x, z$ y, x, \bar{z} $x - y, \bar{y}, \bar{z}$ $\bar{x}, \bar{x} + y, \bar{z}$ $\bar{y}, \bar{x}, \bar{z}$ $\bar{x} + y, y, \bar{z}$ $x, x - y, \bar{z}$	Hexagonal trapezohedron Twisted hexagonal antiprism	(hkl) $(ihkl)$ $(kihl)$ $(\bar{h}\bar{k}\bar{l})$ $(\bar{i}\bar{h}\bar{k}\bar{l})$ $(\bar{k}\bar{i}\bar{h}\bar{l})$ $(kh\bar{l})$ $(hik\bar{l})$ $(ikh\bar{l})$ $(k\bar{h}\bar{l})$ $(\bar{h}i\bar{k}\bar{l})$ $(\bar{i}k\bar{h}\bar{l})$	
				Dihexagonal prism Truncated hexagon through origin	$(hki0)$ $(ihk0)$ $(kih0)$ $(\bar{h}\bar{k}\bar{i}0)$ $(\bar{i}\bar{h}\bar{k}0)$ $(\bar{k}\bar{i}\bar{h}0)$ $(khi0)$ $(hik0)$ $(ikh0)$ $(\bar{k}\bar{h}\bar{i}0)$ $(\bar{h}\bar{i}\bar{k}0)$ $(\bar{i}\bar{k}\bar{h}0)$	
				Hexagonal dipyramid Hexagonal prism	$(h0hl)$ $(\bar{h}0hl)$ $(0\bar{h}hl)$ $(h0hl)$ $(h\bar{h}0l)$ $(0hhl)$ $(0hhl)$ $(h\bar{h}0l)$ $(h0hl)$ $(0\bar{h}hl)$ $(\bar{h}h0l)$ $(h0\bar{h}l)$	
				Hexagonal dipyramid Hexagonal prism	$(hh\bar{2}hl)$ $(\bar{2}hhhl)$ $(h\bar{2}hhl)$ $(\bar{h}\bar{h}2hl)$ $(2hh\bar{h}l)$ $(\bar{h}2hhl)$ $(hh\bar{2}hl)$ $(h\bar{2}hhl)$ $(\bar{2}hhhl)$ $(\bar{h}\bar{h}2hl)$ $(\bar{h}2hhl)$ $(2hh\bar{h}l)$	
6	<i>c</i>	.2	$x, \bar{x}, 0$ $x, 2x, 0$ $2\bar{x}, \bar{x}, 0$ $\bar{x}, x, 0$ $\bar{x}, 2\bar{x}, 0$ $2x, x, 0$	Hexagonal prism Hexagon through origin	$(10\bar{1}0)$ $(\bar{1}100)$ $(0\bar{1}10)$ $(\bar{1}010)$ $(\bar{1}\bar{1}00)$ $(01\bar{1}0)$	
6	<i>b</i>	.2	$x, 0, 0$ $0, x, 0$ $\bar{x}, \bar{x}, 0$ $\bar{x}, 0, 0$ $0, \bar{x}, 0$ $x, x, 0$	Hexagonal prism Hexagon through origin	$(11\bar{2}0)$ $(\bar{2}110)$ $(\bar{1}210)$ $(\bar{1}\bar{1}20)$ $(\bar{2}\bar{1}\bar{1}0)$ $(\bar{1}\bar{2}10)$	
2	<i>a</i>	6.	$0, 0, z$ $0, 0, \bar{z}$	Pinacoid or parallelohedron Line segment through origin	(0001) $(000\bar{1})$	
1	<i>o</i>	622	$0, 0, 0$	Point in origin		
				Symmetry of special projections		
				Along [001]	Along [100]	Along [210]
				<i>6mm</i>	<i>2mm</i>	<i>2mm</i>

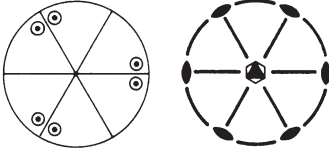
3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

HEXAGONAL SYSTEM (<i>cont.</i>)									
$6mm$	C_{6v}								
12	d	1	x, y, z $\bar{y}, x - y, z$ $\bar{x} + y, \bar{x}, z$ \bar{x}, \bar{y}, z $y, \bar{x} + y, z$ $x - y, x, z$ \bar{y}, \bar{x}, z $\bar{x} + y, y, z$ $x, x - y, z$ y, x, z $x - y, \bar{y}, z$ $\bar{x}, \bar{x} + y, z$	Dihexagonal pyramid Truncated hexagon	(hkl) $(ihkl)$ $(kihl)$ $(\bar{h}\bar{k}\bar{l})$ $(\bar{i}\bar{h}\bar{k}\bar{l})$ $(\bar{k}\bar{i}\bar{h}\bar{l})$ (khl) $(hikl)$ $(ikh\bar{l})$ $(\bar{k}\bar{h}\bar{l})$ $(\bar{h}\bar{i}\bar{k}\bar{l})$ $(\bar{i}\bar{k}\bar{h}\bar{l})$				
				Dihexagonal prism Truncated hexagon through origin	$(hki0)$ $(ihk0)$ $(kih0)$ $(\bar{h}\bar{k}\bar{i}0)$ $(\bar{i}\bar{h}\bar{k}0)$ $(\bar{k}\bar{i}\bar{h}0)$ $(khi0)$ $(hik0)$ $(ikh0)$ $(\bar{k}\bar{h}\bar{i}0)$ $(\bar{h}\bar{i}\bar{k}0)$ $(\bar{i}\bar{k}\bar{h}0)$				
6	c	$.m$	x, \bar{x}, z $x, 2x, z$ $2\bar{x}, \bar{x}, z$ \bar{x}, x, z $\bar{x}, 2\bar{x}, z$ $2x, x, z$	Hexagonal pyramid Hexagon	$(h0\bar{h}l)$ $(\bar{h}h0l)$ $(0\bar{h}hl)$ $(\bar{h}0hl)$ $(hh0l)$ $(0hhl)$				
				Hexagonal prism Hexagon through origin	$(10\bar{1}0)$ $(\bar{1}100)$ $(0\bar{1}10)$ $(\bar{1}010)$ (1100) $(01\bar{1}0)$				
6	b	$.m$	$x, 0, z$ $0, x, z$ \bar{x}, \bar{x}, z $\bar{x}, 0, z$ $0, \bar{x}, z$ x, x, z	Hexagonal pyramid Hexagon	$(hh\bar{2}hl)$ $(\bar{2}hhhl)$ $(h\bar{2}hhl)$ $(\bar{h}\bar{h}2hl)$ $(2h\bar{h}\bar{h}l)$ $(\bar{h}2h\bar{h}l)$				
				Hexagonal prism Hexagon through origin	$(11\bar{2}0)$ $(\bar{2}110)$ $(1\bar{2}10)$ $(\bar{1}\bar{1}20)$ $(2\bar{1}\bar{1}0)$ $(1\bar{2}\bar{1}0)$				
1	a	$6mm$	$0, 0, z$	Pedion or monohedron Single point	(0001) or $(000\bar{1})$				
Symmetry of special projections									
Along [001] Along [100] Along [210]									
$6mm$ m m									
$\bar{6}m2$	D_{3h}								
12	e	1	x, y, z $\bar{y}, x - y, z$ $\bar{x} + y, \bar{x}, z$ x, y, \bar{z} $\bar{y}, x - y, \bar{z}$ $\bar{x} + y, \bar{x}, \bar{z}$ \bar{y}, \bar{x}, z $\bar{x} + y, y, z$ $x, x - y, z$ $\bar{y}, \bar{x}, \bar{z}$ $\bar{x} + y, y, \bar{z}$ $x, x - y, \bar{z}$	Ditrigonal dipyramid Edge-truncated trigonal prism	(hkl) $(ihkl)$ $(kihl)$ $(\bar{h}\bar{k}\bar{l})$ $(\bar{i}\bar{h}\bar{k}\bar{l})$ $(\bar{k}\bar{i}\bar{h}\bar{l})$ (khl) $(hikl)$ $(ikh\bar{l})$ $(\bar{k}\bar{h}\bar{l})$ $(\bar{h}\bar{i}\bar{k}\bar{l})$ $(\bar{i}\bar{k}\bar{h}\bar{l})$				
				Hexagonal dipyramid Hexagonal prism	$(hh\bar{2}hl)$ $(\bar{2}hhhl)$ $(h\bar{2}hhl)$ $(\bar{h}\bar{h}2\bar{h}\bar{l})$ $(\bar{2}\bar{h}\bar{h}\bar{h}\bar{l})$ $(h\bar{2}\bar{h}\bar{h}\bar{l})$ $(\bar{h}\bar{h}2hl)$ $(\bar{h}2h\bar{h}l)$ $(2h\bar{h}\bar{h}l)$ $(\bar{h}\bar{h}2hl)$ $(\bar{h}2h\bar{h}l)$ $(2h\bar{h}\bar{h}l)$				
6	d	$.m$	$x, y, 0$ $\bar{y}, x - y, 0$ $\bar{x} + y, \bar{x}, 0$ $\bar{y}, \bar{x}, 0$ $\bar{x} + y, y, 0$ $x, x - y, 0$	Ditrigonal prism Truncated trigon through origin	$(hki0)$ $(ihk0)$ $(kih0)$ $(\bar{k}\bar{h}\bar{i}0)$ $(\bar{h}\bar{i}\bar{k}0)$ $(\bar{i}\bar{k}\bar{h}0)$				
				Hexagonal prism Hexagon through origin	$(11\bar{2}0)$ $(\bar{2}110)$ $(1\bar{2}10)$ $(\bar{1}\bar{1}20)$ $(\bar{1}2\bar{1}0)$ $(2\bar{1}\bar{1}0)$				
6	c	$.m$	x, \bar{x}, z $x, 2x, z$ $2\bar{x}, \bar{x}, z$ x, \bar{x}, \bar{z} $x, 2x, \bar{z}$ $2\bar{x}, \bar{x}, \bar{z}$	Trigonal dipyramid Trigonal prism	$(h0\bar{h}l)$ $(\bar{h}h0l)$ $(0\bar{h}hl)$ $(\bar{h}0\bar{h}\bar{l})$ $(\bar{h}h0\bar{l})$ $(0\bar{h}\bar{h}\bar{l})$				
3	b	$mm2$	$x, \bar{x}, 0$ $x, 2x, 0$ $2\bar{x}, \bar{x}, 0$	Trigonal prism Trigon through origin	$(10\bar{1}0)$ $(\bar{1}100)$ $(0\bar{1}10)$ or (1010) $(1\bar{1}00)$ $(01\bar{1}0)$				
2	a	$3m$	$0, 0, z$ $0, 0, \bar{z}$	Pinacoid or parallelohedron Line segment through origin	(0001) $(000\bar{1})$				
1	o	$\bar{6}m2$	$0, 0, 0$	Point in origin					
Symmetry of special projections									
Along [001] Along [100] Along [210]									
$3m$ m $2mm$									

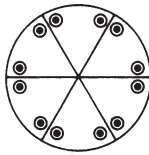

3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

HEXAGONAL SYSTEM (<i>cont.</i>)									
$\bar{6}2m$		D_{3h}							
12	<i>e</i>	1	x, y, z $\bar{y}, x - y, z$ $\bar{x} + y, \bar{x}, z$ x, y, \bar{z} $\bar{y}, x - y, \bar{z}$ $\bar{x} + y, \bar{x}, \bar{z}$ y, x, \bar{z} $x - y, \bar{y}, \bar{z}$ $\bar{x}, \bar{x} + y, \bar{z}$ y, x, z $x - y, \bar{y}, z$ $\bar{x}, \bar{x} + y, z$	Ditrigonal dipyrmaid Edge-truncated trigonal prism	$(hki\bar{l})$ $(ihk\bar{l})$ $(ki\bar{h}l)$ $(hk\bar{i}l)$ $(ihk\bar{l})$ $(ki\bar{h}l)$ $(kh\bar{i}l)$ $(hik\bar{l})$ $(ik\bar{h}l)$ $(khil)$ $(hikl)$ $(ikh\bar{l})$				
				Hexagonal dipyrmaid Hexagonal prism	$(h0\bar{h}l)$ $(\bar{h}h0l)$ $(0\bar{h}hl)$ $(h0\bar{h}l)$ $(\bar{h}h0l)$ $(0\bar{h}hl)$ $(0h\bar{h}l)$ $(h\bar{h}0l)$ $(\bar{h}0hl)$ $(0h\bar{h}l)$ $(h\bar{h}0l)$ $(\bar{h}0hl)$				
6	<i>d</i>	<i>m.</i>	$x, y, 0$ $\bar{y}, x - y, 0$ $\bar{x} + y, \bar{x}, 0$ $y, x, 0$ $x - y, \bar{y}, 0$ $\bar{x}, \bar{x} + y, 0$	Ditrigonal prism Truncated trigon through origin	$(hki0)$ $(ihk0)$ $(ki\bar{h}0)$ $(khi0)$ $(hik0)$ $(ikh0)$				
				Hexagonal prism Hexagon through origin	$(10\bar{1}0)$ $(\bar{1}100)$ $(0\bar{1}10)$ $(01\bar{1}0)$ $(1\bar{1}00)$ $(\bar{1}010)$				
6	<i>c</i>	<i>.m</i>	$x, 0, z$ $0, x, z$ \bar{x}, \bar{x}, z $x, 0, \bar{z}$ $0, x, \bar{z}$ $\bar{x}, \bar{x}, \bar{z}$	Trigonal dipyrmaid Trigonal prism	$(hh\bar{2}hl)$ $(\bar{2}hhhl)$ $(h\bar{2}hhl)$ $(hh\bar{2}h\bar{l})$ $(\bar{2}hh\bar{h}l)$ $(h\bar{2}h\bar{h}l)$				
3	<i>b</i>	<i>m2m</i>	$x, 0, 0$ $0, x, 0$ $\bar{x}, \bar{x}, 0$	Trigonal prism Trigon through origin	$(11\bar{2}0)$ $(\bar{2}110)$ $(1\bar{2}10)$ or $(\bar{1}1\bar{2}0)$ $(2\bar{1}\bar{1}0)$ $(12\bar{1}0)$				
2	<i>a</i>	<i>3.m</i>	$0, 0, z$ $0, 0, \bar{z}$	Pinacoid or parallelohedron Line segment through origin	(0001) $(000\bar{1})$				
1	<i>o</i>	$\bar{6}2m$	$0, 0, 0$	Point in origin					
Symmetry of special projections									
Along [001] Along [100] Along [210]									
$3m$ $2mm$ m									

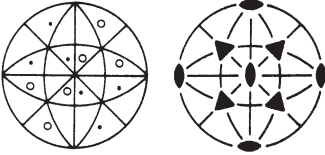
3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

HEXAGONAL SYSTEM (<i>cont.</i>)					
$6/mmm$					
$\frac{6}{m} \frac{2}{m} \frac{2}{m}$	D_{6h}				
24	<i>g</i> 1	x, y, z $\bar{y}, x - y, z$ $\bar{x} + y, \bar{x}, z$ \bar{x}, \bar{y}, z $y, \bar{x} + y, z$ $x - y, x, z$ y, x, \bar{z} $x - y, \bar{y}, \bar{z}$ $\bar{x}, \bar{x} + y, \bar{z}$ $\bar{y}, \bar{x}, \bar{z}$ $\bar{x} + y, y, \bar{z}$ $x, x - y, \bar{z}$	Dihexagonal dipyramid Edge-truncated hexagonal prism	(hkl) $(ihkl)$ $(kihl)$ $(\bar{h}\bar{k}\bar{l})$ $(\bar{i}\bar{h}\bar{k}\bar{l})$ $(\bar{k}\bar{i}\bar{h}\bar{l})$ $(k\bar{h}\bar{l})$ $(h\bar{k}\bar{l})$ $(i\bar{k}\bar{h}\bar{l})$ $(\bar{k}\bar{h}\bar{l})$ $(\bar{h}\bar{i}\bar{k}\bar{l})$ $(\bar{i}\bar{k}\bar{h}\bar{l})$	
		$\bar{x}, \bar{y}, \bar{z}$ $y, \bar{x} + y, \bar{z}$ $x - y, x, \bar{z}$ x, y, \bar{z} $\bar{y}, x - y, \bar{z}$ $\bar{x} + y, \bar{x}, \bar{z}$ \bar{y}, \bar{x}, z $\bar{x} + y, y, z$ $x, x - y, z$ y, x, z $x - y, \bar{y}, z$ $\bar{x}, \bar{x} + y, z$		$(\bar{h}\bar{k}\bar{l})$ $(\bar{i}\bar{h}\bar{k}\bar{l})$ $(\bar{k}\bar{i}\bar{h}\bar{l})$ $(h\bar{k}\bar{l})$ $(ih\bar{k}\bar{l})$ $(ki\bar{h}\bar{l})$ $(\bar{k}\bar{h}\bar{l})$ $(\bar{h}\bar{i}\bar{k}\bar{l})$ $(\bar{i}\bar{k}\bar{h}\bar{l})$ $(k\bar{h}\bar{l})$ $(h\bar{k}\bar{l})$ $(i\bar{k}\bar{h}\bar{l})$	
12	<i>f</i> <i>m.</i>	$x, y, 0$ $\bar{y}, x - y, 0$ $\bar{x} + y, \bar{x}, 0$ $\bar{x}, \bar{y}, 0$ $y, \bar{x} + y, 0$ $x - y, x, 0$ $y, x, 0$ $x - y, \bar{y}, 0$ $\bar{x}, \bar{x} + y, 0$ $\bar{y}, \bar{x}, 0$ $\bar{x} + y, y, 0$ $x, x - y, 0$	Dihexagonal prism Truncated hexagon through origin	$(hki0)$ $(ihk0)$ $(kih0)$ $(\bar{h}\bar{k}\bar{i}0)$ $(\bar{i}\bar{h}\bar{k}0)$ $(\bar{k}\bar{i}\bar{h}0)$ $(k\bar{h}i0)$ $(h\bar{i}k0)$ $(i\bar{k}h0)$ $(\bar{k}\bar{h}i0)$ $(\bar{h}\bar{i}k0)$ $(\bar{i}\bar{k}h0)$	
12	<i>e</i> <i>.m.</i>	$x, 2x, z$ $2\bar{x}, \bar{x}, z$ x, \bar{x}, z $\bar{x}, 2\bar{x}, z$ $2x, x, z$ \bar{x}, x, z $2x, x, \bar{z}$ $\bar{x}, 2\bar{x}, \bar{z}$ \bar{x}, x, \bar{z} $2\bar{x}, \bar{x}, \bar{z}$ $x, 2x, \bar{z}$ x, \bar{x}, \bar{z}	Hexagonal dipyramid Hexagonal prism	$(h0\bar{h}l)$ $(\bar{h}h0l)$ $(0\bar{h}hl)$ $(h0hl)$ $(h\bar{h}0l)$ $(0hhl)$ $(0h\bar{h}l)$ $(h\bar{h}0l)$ $(\bar{h}0hl)$ $(0hhl)$ $(\bar{h}h0l)$ $(h0\bar{h}l)$	
12	<i>d</i> <i>.m</i>	$x, 0, z$ $0, x, z$ \bar{x}, \bar{x}, z $\bar{x}, 0, z$ $0, \bar{x}, z$ x, x, z $0, x, \bar{z}$ $x, 0, \bar{z}$ $\bar{x}, \bar{x}, \bar{z}$ $0, \bar{x}, \bar{z}$ $\bar{x}, 0, \bar{z}$ x, x, \bar{z}	Hexagonal dipyramid Hexagonal prism	$(hh2\bar{h}l)$ $(\bar{2}hhhl)$ $(h\bar{2}hhhl)$ $(\bar{h}h2hl)$ $(2hhhl)$ $(h2hhhl)$ $(hh2\bar{h}l)$ $(h\bar{2}hhhl)$ $(2hhhl)$ $(\bar{h}h2hl)$ $(\bar{h}2hhhl)$ $(2hhhl)$	
6	<i>c</i> <i>mm2</i>	$x, 2x, 0$ $2\bar{x}, \bar{x}, 0$ $x, \bar{x}, 0$ $\bar{x}, 2\bar{x}, 0$ $2x, x, 0$ $\bar{x}, x, 0$	Hexagonal prism Hexagon through origin	$(10\bar{1}0)$ $(\bar{1}100)$ $(0\bar{1}10)$ $(\bar{1}010)$ $(1\bar{1}00)$ $(01\bar{1}0)$	
6	<i>b</i> <i>m2m</i>	$x, 0, 0$ $0, x, 0$ $\bar{x}, \bar{x}, 0$ $\bar{x}, 0, 0$ $0, \bar{x}, 0$ $x, x, 0$	Hexagonal prism Hexagon through origin	$(11\bar{2}0)$ $(\bar{2}110)$ $(1\bar{2}10)$ $(\bar{1}120)$ $(2\bar{1}\bar{1}0)$ $(\bar{1}2\bar{1}0)$	
2	<i>a</i> <i>6mm</i>	$0, 0, z$ $0, 0, \bar{z}$	Pinacoid or parallelohedron Line segment through origin	(0001) $(000\bar{1})$	
1	<i>o</i> <i>6mmm</i>	$0, 0, 0$	Point in origin		
			Symmetry of special projections		
			Along [001]	Along [100]	Along [210]
			6mm	2mm	2mm

3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

CUBIC SYSTEM																
23		T														
12	c	1	x, y, z z, x, y y, z, x	\bar{x}, \bar{y}, z z, \bar{x}, \bar{y} \bar{y}, z, \bar{x}	\bar{x}, y, \bar{z} \bar{z}, \bar{x}, y y, \bar{z}, \bar{x}	x, \bar{y}, \bar{z} \bar{z}, x, \bar{y} \bar{y}, \bar{z}, x	Pentagon-tritetrahedron or tetartoid or tetrahedral pentagon-dodecahedron <i>Snub tetrahedron</i> (= pentagon-tritetrahedron + two tetrahedra)	(hkl) (lhk) (klh)	$(\bar{h}\bar{k}l)$ $(\bar{l}\bar{h}k)$ $(\bar{k}\bar{l}h)$	$(\bar{h}k\bar{l})$ $(\bar{l}hk\bar{h})$ $(k\bar{l}\bar{h})$						
							<table border="1" style="border-collapse: collapse; margin: auto;"> <tr> <td style="padding: 5px;">Trigon-tritetrahedron or tristetrahedron (for $h < l$) <i>Tetrahedron truncated by tetrahedron</i> (for $x < z$)</td> <td style="padding: 5px;">(hhl) (lhh) $(h\bar{h}l)$</td> <td style="padding: 5px;">$(\bar{h}\bar{h}l)$ $(\bar{l}\bar{h}h)$ $(h\bar{l}h)$</td> <td style="padding: 5px;">$(\bar{h}h\bar{l})$ $(\bar{l}h\bar{h})$ $(h\bar{l}\bar{h})$</td> <td style="padding: 5px;">$(h\bar{h}\bar{l})$ $(\bar{l}h\bar{h})$ $(\bar{h}\bar{l}h)$</td> </tr> </table>	Trigon-tritetrahedron or tristetrahedron (for $ h < l $) <i>Tetrahedron truncated by tetrahedron</i> (for $ x < z $)	(hhl) (lhh) $(h\bar{h}l)$	$(\bar{h}\bar{h}l)$ $(\bar{l}\bar{h}h)$ $(h\bar{l}h)$	$(\bar{h}h\bar{l})$ $(\bar{l}h\bar{h})$ $(h\bar{l}\bar{h})$	$(h\bar{h}\bar{l})$ $(\bar{l}h\bar{h})$ $(\bar{h}\bar{l}h)$				
Trigon-tritetrahedron or tristetrahedron (for $ h < l $) <i>Tetrahedron truncated by tetrahedron</i> (for $ x < z $)	(hhl) (lhh) $(h\bar{h}l)$	$(\bar{h}\bar{h}l)$ $(\bar{l}\bar{h}h)$ $(h\bar{l}h)$	$(\bar{h}h\bar{l})$ $(\bar{l}h\bar{h})$ $(h\bar{l}\bar{h})$	$(h\bar{h}\bar{l})$ $(\bar{l}h\bar{h})$ $(\bar{h}\bar{l}h)$												
							Pentagon-dodecahedron or dihexahedron or pyritohedron <i>Irregular icosahedron</i> (= pentagon-dodecahedron + octahedron)	$(0kl)$ $(l0k)$ $(k\bar{l}0)$	$(0\bar{k}l)$ $(l0\bar{k})$ $(\bar{k}l0)$	$(0k\bar{l})$ $(\bar{l}0k)$ $(k\bar{l}0)$						
							Rhomb-dodecahedron <i>Cuboctahedron</i>	(011) (101) (110)	$(0\bar{1}\bar{1})$ $(\bar{1}01)$ $(\bar{1}\bar{1}0)$	$(01\bar{1})$ $(\bar{1}01)$ $(1\bar{1}0)$						
6	b	2..	$x, 0, 0$ $0, x, 0$ $0, 0, x$	$\bar{x}, 0, 0$ $0, \bar{x}, 0$ $0, 0, \bar{x}$			Cube or hexahedron <i>Octahedron</i>	(100) (010) (001)	$(\bar{1}00)$ $(0\bar{1}0)$ $(00\bar{1})$							
4	a	.3.	x, x, x	\bar{x}, \bar{x}, x	\bar{x}, x, \bar{x}	x, \bar{x}, \bar{x}	Tetrahedron <i>Tetrahedron</i>	(111) or $(\bar{1}\bar{1}\bar{1})$	$(\bar{1}\bar{1}1)$ (111)	$(\bar{1}1\bar{1})$ $(1\bar{1}1)$	$(1\bar{1}\bar{1})$ $(\bar{1}\bar{1}1)$					
1	o	23.	$0, 0, 0$				<i>Point in origin</i>									
Symmetry of special projections																
Along [001] Along [111] Along [110]																
$2mm$ 3 m																

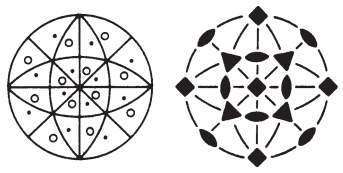
3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

CUBIC SYSTEM (<i>cont.</i>)							
$m\bar{3}$ $\frac{2}{m}\bar{3}$ m	T_h						
		24	<i>d</i>	1	<p>x, y, z \bar{x}, \bar{y}, z \bar{x}, y, \bar{z} x, \bar{y}, \bar{z}</p> <p>z, x, y z, \bar{x}, \bar{y} \bar{z}, \bar{x}, y \bar{z}, x, \bar{y}</p> <p>y, z, x \bar{y}, z, \bar{x} y, \bar{z}, \bar{x} \bar{y}, \bar{z}, x</p> <p>$\bar{x}, \bar{y}, \bar{z}$ x, y, \bar{z} x, \bar{y}, z \bar{x}, y, z</p> <p>$\bar{z}, \bar{x}, \bar{y}$ \bar{z}, x, y z, x, \bar{y} z, \bar{x}, y</p> <p>$\bar{y}, \bar{z}, \bar{x}$ \bar{y}, \bar{z}, x \bar{y}, z, x y, z, \bar{x}</p>	<p>Didodecahedron or diploid or dyakisdodecahedron <i>Cube & octahedron & pentagon-dodecahedron</i></p>	<p>(hkl) $(\bar{h}\bar{k}l)$ $(\bar{h}k\bar{l})$ $(h\bar{k}\bar{l})$</p> <p>(lhk) $(l\bar{h}\bar{k})$ $(l\bar{h}k)$ $(l\bar{h}\bar{k})$</p> <p>(klh) $(k\bar{l}h)$ $(k\bar{l}\bar{h})$ $(kl\bar{h})$</p> <p>$(\bar{h}\bar{k}l)$ $(h\bar{k}l)$ $(h\bar{k}\bar{l})$ $(\bar{h}kl)$</p> <p>$(l\bar{h}k)$ $(l\bar{h}\bar{k})$ $(lh\bar{k})$ $(l\bar{h}k)$</p> <p>$(k\bar{l}h)$ $(k\bar{l}\bar{h})$ $(kl\bar{h})$ $(kl\bar{h})$</p>
					<p>{ Tetragon-trioctahedron or trapezohedron or deltoid-icositetrahedron (for $h < l$) <i>Cube & octahedron & rhomb-dodecahedron</i> (for $x < z$)</p>	<p>(hhl) $(\bar{h}\bar{h}l)$ $(\bar{h}hl)$ $(h\bar{h}l)$</p> <p>(lhh) $(l\bar{h}\bar{h})$ $(l\bar{h}h)$ $(l\bar{h}h)$</p> <p>(hlh) $(\bar{h}l\bar{h})$ $(\bar{h}lh)$ $(\bar{h}lh)$</p>	
					<p>{ Trigon-trioctahedron or trisoctahedron (for $h > l$) <i>Cube truncated by octahedron</i> (for $x > z$)</p>	<p>$(\bar{h}\bar{h}l)$ $(h\bar{h}l)$ $(\bar{h}hl)$ $(\bar{h}hl)$</p> <p>$(l\bar{h}h)$ $(l\bar{h}h)$ $(lh\bar{h})$ $(l\bar{h}h)$</p> <p>$(\bar{h}l\bar{h})$ $(\bar{h}lh)$ $(\bar{h}lh)$ $(\bar{h}lh)$</p>	
12	<i>c</i>	$m..$	<p>$0, y, z$ $0, \bar{y}, z$ $0, y, \bar{z}$ $0, \bar{y}, \bar{z}$</p> <p>$z, 0, y$ $z, 0, \bar{y}$ $\bar{z}, 0, y$ $\bar{z}, 0, \bar{y}$</p> <p>$y, z, 0$ $\bar{y}, z, 0$ $y, \bar{z}, 0$ $\bar{y}, \bar{z}, 0$</p>	<p>Pentagon-dodecahedron or dihexahedron or pyritohedron <i>Irregular icosahedron</i> (= <i>pentagon-dodecahedron + octahedron</i>)</p>	<p>$(0kl)$ $(0\bar{k}l)$ $(0k\bar{l})$ $(0\bar{k}\bar{l})$</p> <p>$(l0k)$ $(l0\bar{k})$ $(l\bar{0}k)$ $(l\bar{0}\bar{k})$</p> <p>$(k\bar{l}0)$ $(\bar{k}l\bar{0})$ $(k\bar{l}0)$ $(\bar{k}l0)$</p>		
			<p>Rhomb-dodecahedron <i>Cuboctahedron</i></p>	<p>(011) $(0\bar{1}\bar{1})$ $(01\bar{1})$ $(0\bar{1}\bar{1})$</p> <p>(101) $(10\bar{1})$ (101) $(10\bar{1})$</p> <p>(110) $(1\bar{1}0)$ (110) $(1\bar{1}0)$</p>			
8	<i>b</i>	$.3.$	<p>x, x, x \bar{x}, \bar{x}, x \bar{x}, x, \bar{x} x, \bar{x}, \bar{x}</p> <p>$\bar{x}, \bar{x}, \bar{x}$ x, x, \bar{x} x, \bar{x}, x \bar{x}, x, x</p>	<p>Octahedron <i>Cube</i></p>	<p>(111) $(\bar{1}\bar{1}\bar{1})$ $(\bar{1}\bar{1}\bar{1})$ $(1\bar{1}\bar{1})$</p> <p>$(\bar{1}\bar{1}\bar{1})$ (111) (111) $(\bar{1}\bar{1}\bar{1})$</p>		
6	<i>a</i>	$2mm..$	<p>$x, 0, 0$ $\bar{x}, 0, 0$</p> <p>$0, x, 0$ $0, \bar{x}, 0$</p> <p>$0, 0, x$ $0, 0, \bar{x}$</p>	<p>Cube or hexahedron <i>Octahedron</i></p>	<p>(100) $(\bar{1}00)$</p> <p>(010) $(0\bar{1}0)$</p> <p>(001) $(00\bar{1})$</p>		
1	<i>o</i>	$m\bar{3}$.	$0, 0, 0$	<i>Point in origin</i>			
Symmetry of special projections							
Along [001] Along [111] Along [110]							
$2mm$ 6 $2mm$							

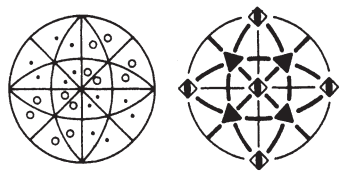
3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

CUBIC SYSTEM (cont.)							
432	<i>O</i>						
24	<i>d</i>	1	x, y, z \bar{x}, \bar{y}, z \bar{x}, y, \bar{z} x, \bar{y}, \bar{z} z, x, y z, \bar{x}, \bar{y} \bar{z}, \bar{x}, y \bar{z}, x, \bar{y} y, z, x \bar{y}, z, \bar{x} y, \bar{z}, \bar{x} \bar{y}, \bar{z}, x y, x, \bar{z} $\bar{y}, \bar{x}, \bar{z}$ y, \bar{x}, z \bar{y}, x, z x, z, \bar{y} \bar{x}, z, y $\bar{x}, \bar{z}, \bar{y}$ x, \bar{z}, y z, y, \bar{x} \bar{z}, \bar{y}, x \bar{z}, y, x $\bar{z}, \bar{y}, \bar{x}$	Pentagon-tri octahedron or gyroid or pentagon-icositetrahedron <i>Snub cube</i> (= cube + octahedron + pentagon- tri octahedron)	(hkl) $(\bar{h}\bar{k}l)$ $(\bar{h}k\bar{l})$ $(h\bar{k}\bar{l})$ (lhk) $(\bar{l}\bar{h}k)$ $(\bar{l}hk)$ $(l\bar{h}k)$ (klh) $(\bar{k}\bar{l}h)$ $(\bar{k}l\bar{h})$ $(k\bar{l}h)$ $(kh\bar{l})$ $(\bar{k}\bar{h}\bar{l})$ $(\bar{k}h\bar{l})$ $(k\bar{h}\bar{l})$ $(h\bar{l}k)$ $(\bar{h}\bar{l}k)$ $(\bar{h}l\bar{k})$ $(h\bar{l}k)$ $(l\bar{k}h)$ $(\bar{l}k\bar{h})$ $(\bar{l}kh)$ $(l\bar{k}h)$		
			{ Tetragon-tri octahedron or trapezohedron or deltoid-icositetrahedron (for $ h < l $) <i>Cube & octahedron &</i> <i>rhomb-dodecahedron</i> (for $ x < z $) Trigon-tri octahedron or trisoctahedron (for $ h > l $) <i>Cube truncated by octahedron</i> (for $ x > z $)	(hhl) $(\bar{h}\bar{h}l)$ $(\bar{h}h\bar{l})$ $(h\bar{h}\bar{l})$ (lhh) $(\bar{l}\bar{l}h)$ $(\bar{l}lh)$ $(l\bar{l}h)$ $(h\bar{l}h)$ $(\bar{h}\bar{l}h)$ $(\bar{h}l\bar{h})$ $(h\bar{l}h)$ $(h\bar{h}\bar{l})$ $(\bar{h}\bar{h}l)$ $(\bar{h}h\bar{l})$ $(h\bar{h}l)$ $(h\bar{l}h)$ $(\bar{h}l\bar{h})$ $(\bar{h}\bar{l}h)$ $(h\bar{l}h)$ $(l\bar{h}h)$ $(\bar{l}h\bar{h})$ $(\bar{l}hh)$ $(l\bar{h}h)$			
				$(0kl)$ $(0\bar{k}l)$ $(0k\bar{l})$ $(0\bar{k}\bar{l})$ $(l0k)$ $(\bar{l}0k)$ $(l0\bar{k})$ $(\bar{l}0\bar{k})$ $(k\bar{l}0)$ $(\bar{k}l0)$ $(k\bar{l}0)$ $(\bar{k}l0)$ Tetrahexahedron or tetrakisshexahedron <i>Octahedron truncated by cube</i>	$(k0\bar{l})$ $(\bar{k}0\bar{l})$ $(k0l)$ $(\bar{k}0l)$ $(0l\bar{k})$ $(0lk)$ $(0\bar{l}k)$ $(0lk)$ $(lk0)$ $(\bar{l}k0)$ $(lk0)$ $(\bar{l}k0)$		
12	<i>c</i>	.2	$0, y, y$ $0, \bar{y}, y$ $0, y, \bar{y}$ $0, \bar{y}, \bar{y}$ $y, 0, y$ $y, 0, \bar{y}$ $\bar{y}, 0, y$ $\bar{y}, 0, \bar{y}$ $y, y, 0$ $\bar{y}, y, 0$ $y, \bar{y}, 0$ $\bar{y}, \bar{y}, 0$	Rhomb-dodecahedron <i>Cuboctahedron</i>	(011) $(0\bar{1}1)$ $(01\bar{1})$ $(0\bar{1}\bar{1})$ (101) $(10\bar{1})$ $(\bar{1}01)$ $(\bar{1}0\bar{1})$ (110) $(\bar{1}10)$ $(1\bar{1}0)$ $(\bar{1}\bar{1}0)$		
8	<i>b</i>	.3	x, x, x \bar{x}, \bar{x}, x \bar{x}, x, \bar{x} x, \bar{x}, \bar{x} x, x, \bar{x} $\bar{x}, \bar{x}, \bar{x}$ x, \bar{x}, x \bar{x}, x, x	Octahedron <i>Cube</i>	(111) $(\bar{1}\bar{1}1)$ $(\bar{1}1\bar{1})$ $(1\bar{1}\bar{1})$ $(1\bar{1}1)$ $(\bar{1}\bar{1}\bar{1})$ $(\bar{1}11)$ $(1\bar{1}1)$		
6	<i>a</i>	4.	$x, 0, 0$ $\bar{x}, 0, 0$ $0, x, 0$ $0, \bar{x}, 0$ $0, 0, x$ $0, 0, \bar{x}$	Cube or hexahedron <i>Octahedron</i>	(100) $(\bar{1}00)$ (010) $(0\bar{1}0)$ (001) $(00\bar{1})$		
1	<i>o</i>	432	0, 0, 0	Point in origin			
				Symmetry of special projections			
				Along [001]	Along [111]	Along [110]	
				4mm	3m	2mm	

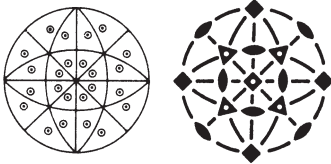
3. ADVANCED TOPICS ON SPACE-GROUP SYMMETRY

Table 3.2.3.2 (continued)

CUBIC SYSTEM (cont.)			
$\bar{4}3m$	T_d		
24	d	1	<p> x, y, z \bar{x}, \bar{y}, z \bar{x}, y, \bar{z} x, \bar{y}, \bar{z} z, x, y z, \bar{x}, \bar{y} \bar{z}, \bar{x}, y \bar{z}, x, \bar{y} y, z, x \bar{y}, z, \bar{x} y, \bar{z}, \bar{x} \bar{y}, \bar{z}, x </p> <p> y, x, z \bar{y}, \bar{x}, z y, \bar{x}, \bar{z} \bar{y}, x, \bar{z} x, z, y \bar{x}, z, \bar{y} \bar{x}, \bar{z}, y x, \bar{z}, \bar{y} z, y, x z, \bar{y}, \bar{x} \bar{z}, y, \bar{x} \bar{z}, \bar{y}, x </p> <p> Hexatetrahedron or hexakistetrahedron <i>Cube truncated by two tetrahedra</i> </p> <p> (hkl) $(\bar{h}\bar{k}l)$ $(\bar{h}k\bar{l})$ $(h\bar{k}\bar{l})$ (lhk) $(\bar{l}\bar{h}k)$ $(\bar{l}hk)$ $(l\bar{h}k)$ (klh) $(\bar{k}\bar{l}h)$ $(\bar{k}lh)$ $(k\bar{l}h)$ </p> <p> (khl) $(\bar{k}\bar{h}l)$ $(\bar{k}h\bar{l})$ $(k\bar{h}\bar{l})$ (hlk) $(\bar{h}\bar{l}k)$ $(\bar{h}lk)$ $(h\bar{l}k)$ (lkh) $(\bar{l}\bar{k}h)$ $(\bar{l}kh)$ $(l\bar{k}h)$ </p> <p> $(0kl)$ $(0\bar{k}l)$ $(0k\bar{l})$ $(0\bar{k}\bar{l})$ $(l0k)$ $(l0\bar{k})$ $(\bar{l}0k)$ $(\bar{l}0\bar{k})$ $(k10)$ $(\bar{k}10)$ $(k1\bar{0})$ $(\bar{k}1\bar{0})$ </p> <p> Tetrahexahedron or tetrakisshexahedron <i>Octahedron truncated by cube</i> </p> <p> $(k0l)$ $(\bar{k}0l)$ $(k0\bar{l})$ $(\bar{k}0\bar{l})$ $(0lk)$ $(0l\bar{k})$ $(0\bar{l}k)$ $(0\bar{l}\bar{k})$ $(lk0)$ $(l\bar{k}0)$ $(lk0)$ $(l\bar{k}0)$ </p>
12	c	$.m$	<p> x, x, z \bar{x}, \bar{x}, z \bar{x}, x, \bar{z} x, \bar{x}, \bar{z} z, x, x z, \bar{x}, \bar{x} \bar{z}, \bar{x}, x \bar{z}, x, \bar{x} x, z, x \bar{x}, z, \bar{x} x, \bar{z}, \bar{x} \bar{x}, \bar{z}, x </p> <p> Trigon-tritetrahedron or tristetrahedron (for $h < l$) <i>Tetrahedron truncated by tetrahedron</i> (for $x < z$) </p> <p> Tetragon-tritetrahedron or deltohedron or deltoid-dodecahedron (for $h > l$) <i>Cube & two tetrahedra</i> (for $x > z$) </p> <p> (hhl) $(\bar{h}\bar{h}l)$ $(\bar{h}h\bar{l})$ $(h\bar{h}\bar{l})$ (lhh) $(\bar{l}\bar{l}h)$ $(\bar{l}h\bar{h})$ $(l\bar{h}\bar{h})$ $(h\bar{h}l)$ $(\bar{h}l\bar{h})$ $(h\bar{l}\bar{h})$ $(\bar{h}l\bar{h})$ </p> <p> Rhomb-dodecahedron <i>Cuboctahedron</i> </p> <p> (110) $(\bar{1}\bar{1}0)$ $(\bar{1}10)$ $(1\bar{1}0)$ (011) $(0\bar{1}\bar{1})$ $(0\bar{1}1)$ $(01\bar{1})$ (101) $(\bar{1}0\bar{1})$ $(10\bar{1})$ $(\bar{1}01)$ </p>
6	b	$2.mm$	<p> $x, 0, 0$ $\bar{x}, 0, 0$ $0, x, 0$ $0, \bar{x}, 0$ $0, 0, x$ $0, 0, \bar{x}$ </p> <p> Cube or hexahedron <i>Octahedron</i> </p> <p> (100) $(\bar{1}00)$ (010) $(0\bar{1}0)$ (001) $(00\bar{1})$ </p>
4	a	$.3m$	<p> x, x, x \bar{x}, \bar{x}, x \bar{x}, x, \bar{x} x, \bar{x}, \bar{x} </p> <p> Tetrahedron <i>Tetrahedron</i> </p> <p> (111) $(\bar{1}\bar{1}\bar{1})$ $(\bar{1}\bar{1}1)$ $(1\bar{1}\bar{1})$ or $(\bar{1}\bar{1}\bar{1})$ $(11\bar{1})$ $(1\bar{1}1)$ $(\bar{1}11)$ </p>
1	o	$\bar{4}3m$	<p> $0, 0, 0$ </p> <p> Point in origin </p>
Symmetry of special projections Along [001] Along [111] Along [110] $4mm$ $3m$ m			

3.2. POINT GROUPS AND CRYSTAL CLASSES

Table 3.2.3.2 (continued)

CUBIC SYSTEM (cont.)													
$m\bar{3}m$	O_h												
$\frac{4}{m} \frac{3}{m} \frac{2}{m}$													
48	f	1											
	x, y, z	$\bar{x}, \bar{y}, \bar{z}$	\bar{x}, y, \bar{z}	x, \bar{y}, \bar{z}	Hexaoctahedron or hexakisoctahedron Cube truncated by octahedron and by rhomb- dodecahedron	(hkl)	$(\bar{h}\bar{k}\bar{l})$	$(\bar{h}k\bar{l})$	$(h\bar{k}\bar{l})$				
	z, x, y	$\bar{z}, \bar{x}, \bar{y}$	\bar{z}, x, \bar{y}	\bar{z}, x, \bar{y}		(lhk)	$(\bar{l}\bar{h}\bar{k})$	$(\bar{l}hk)$	$(l\bar{h}\bar{k})$				
	y, z, x	$\bar{y}, \bar{z}, \bar{x}$	\bar{y}, z, \bar{x}	\bar{y}, z, \bar{x}		(kly)	$(\bar{k}\bar{l}\bar{h})$	$(\bar{k}ly)$	$(k\bar{l}\bar{h})$				
	y, x, \bar{z}	$\bar{y}, \bar{x}, \bar{z}$	\bar{y}, x, \bar{z}	\bar{y}, x, \bar{z}		$(k\bar{h}\bar{l})$	$(\bar{k}h\bar{l})$	$(\bar{k}\bar{h}l)$	$(k\bar{h}l)$				
	x, z, \bar{y}	$\bar{x}, \bar{z}, \bar{y}$	\bar{x}, z, \bar{y}	\bar{x}, z, \bar{y}		$(h\bar{l}k)$	$(\bar{h}lk)$	$(\bar{h}\bar{l}k)$	$(h\bar{l}k)$				
	z, y, \bar{x}	$\bar{z}, \bar{y}, \bar{x}$	\bar{z}, y, \bar{x}	\bar{z}, y, \bar{x}		$(l\bar{k}h)$	$(\bar{l}kh)$	$(\bar{l}k\bar{h})$	$(l\bar{k}h)$				
	$\bar{x}, \bar{y}, \bar{z}$	x, y, \bar{z}	x, \bar{y}, \bar{z}	x, y, \bar{z}		$(\bar{h}\bar{k}\bar{l})$	$(h\bar{k}\bar{l})$	$(\bar{h}k\bar{l})$	$(h\bar{k}\bar{l})$				
	$\bar{z}, \bar{x}, \bar{y}$	\bar{z}, x, y	\bar{z}, x, \bar{y}	\bar{z}, x, \bar{y}		$(\bar{l}\bar{h}\bar{k})$	$(l\bar{h}\bar{k})$	$(\bar{l}h\bar{k})$	$(l\bar{h}\bar{k})$				
	$\bar{y}, \bar{z}, \bar{x}$	\bar{y}, z, x	\bar{y}, z, \bar{x}	\bar{y}, z, \bar{x}		$(\bar{k}\bar{l}\bar{h})$	$(k\bar{l}\bar{h})$	$(\bar{k}l\bar{h})$	$(k\bar{l}\bar{h})$				
	$\bar{y}, \bar{x}, \bar{z}$	\bar{y}, x, \bar{z}	\bar{y}, x, \bar{z}	\bar{y}, x, \bar{z}		$(\bar{k}\bar{h}\bar{l})$	$(k\bar{h}\bar{l})$	$(\bar{k}h\bar{l})$	$(k\bar{h}\bar{l})$				
	$\bar{x}, \bar{z}, \bar{y}$	\bar{x}, z, \bar{y}	\bar{x}, z, \bar{y}	\bar{x}, z, \bar{y}		$(\bar{h}\bar{l}k)$	$(h\bar{l}k)$	$(\bar{h}lk)$	$(h\bar{l}k)$				
	$\bar{z}, \bar{y}, \bar{x}$	\bar{z}, y, \bar{x}	\bar{z}, y, \bar{x}	\bar{z}, y, \bar{x}		$(\bar{l}\bar{k}h)$	$(l\bar{k}h)$	$(\bar{l}kh)$	$(l\bar{k}h)$				
24	e	$.m$	x, x, z	$\bar{x}, \bar{x}, \bar{z}$	\bar{x}, x, \bar{z}	x, \bar{x}, \bar{z}	Tetragon-trioctahedron or trapezohedron or deltoid-icositetrahedron (for $ h < l $) Cube & octahedron & rhomb- dodecahedron (for $ x < z $) Trigon-trioctahedron or trisoctahedron (for $ h > l $) Cube truncated by octahedron (for $ x > z $)						
			z, x, x	$\bar{z}, \bar{x}, \bar{x}$	\bar{z}, x, \bar{x}	\bar{z}, x, \bar{x}				(hhl)	$(\bar{h}\bar{h}\bar{l})$	$(\bar{h}h\bar{l})$	$(h\bar{h}\bar{l})$
			x, z, x	$\bar{x}, \bar{z}, \bar{x}$	\bar{x}, z, \bar{x}	\bar{x}, z, \bar{x}				(lhh)	$(\bar{l}\bar{h}\bar{h})$	$(\bar{l}h\bar{h})$	$(l\bar{h}\bar{h})$
			x, x, \bar{z}	$\bar{x}, \bar{x}, \bar{z}$	\bar{x}, x, \bar{z}	\bar{x}, x, \bar{z}				$(h\bar{h}\bar{l})$	$(\bar{h}h\bar{l})$	$(\bar{h}\bar{h}l)$	$(h\bar{h}l)$
			x, z, \bar{x}	$\bar{x}, \bar{z}, \bar{x}$	\bar{x}, z, \bar{x}	\bar{x}, z, \bar{x}	$(h\bar{l}\bar{h})$	$(\bar{h}l\bar{h})$	$(\bar{h}\bar{l}h)$	$(h\bar{l}h)$			
			z, x, \bar{x}	$\bar{z}, \bar{x}, \bar{x}$	\bar{z}, x, \bar{x}	\bar{z}, x, \bar{x}	$(l\bar{h}\bar{h})$	$(\bar{l}h\bar{h})$	$(\bar{l}h\bar{h})$	$(l\bar{h}\bar{h})$			
24	d	$m..$	$0, y, z$	$0, \bar{y}, \bar{z}$	$0, y, \bar{z}$	$0, \bar{y}, \bar{z}$	Tetrahexahedron or tetrakisshexahedron Octahedron truncated by cube						
			$z, 0, y$	$\bar{z}, 0, \bar{y}$	$\bar{z}, 0, \bar{y}$	$\bar{z}, 0, \bar{y}$				$(0kl)$	$(\bar{0}\bar{k}\bar{l})$	$(\bar{0}k\bar{l})$	$(0\bar{k}\bar{l})$
			$y, z, 0$	$\bar{y}, \bar{z}, 0$	$\bar{y}, z, 0$	$\bar{y}, z, 0$				$(l0k)$	$(\bar{l}\bar{0}\bar{k})$	$(\bar{l}0k)$	$(l\bar{0}\bar{k})$
			$y, 0, \bar{z}$	$\bar{y}, 0, \bar{z}$	$\bar{y}, 0, \bar{z}$	$\bar{y}, 0, \bar{z}$				$(k0l)$	$(\bar{k}\bar{0}\bar{l})$	$(\bar{k}0l)$	$(k\bar{0}\bar{l})$
			$0, z, \bar{y}$	$0, \bar{z}, \bar{y}$	$0, z, \bar{y}$	$0, \bar{z}, \bar{y}$	$(0lk)$	$(\bar{0}\bar{l}k)$	$(\bar{0}lk)$	$(0\bar{l}k)$			
			$z, y, 0$	$\bar{z}, \bar{y}, 0$	$\bar{z}, y, 0$	$\bar{z}, y, 0$	$(lk0)$	$(\bar{l}\bar{k}\bar{0})$	$(\bar{l}k0)$	$(lk\bar{0})$			
12	c	$m.m2$	$0, y, y$	$0, \bar{y}, \bar{y}$	$0, y, \bar{y}$	$0, \bar{y}, \bar{y}$	Rhomb-dodecahedron Cuboctahedron						
			$y, 0, y$	$\bar{y}, 0, \bar{y}$	$\bar{y}, 0, \bar{y}$	$\bar{y}, 0, \bar{y}$				(011)	$(\bar{0}\bar{1}\bar{1})$	$(\bar{0}1\bar{1})$	$(0\bar{1}\bar{1})$
			$y, y, 0$	$\bar{y}, \bar{y}, 0$	$\bar{y}, y, 0$	$\bar{y}, y, 0$				(101)	$(\bar{1}\bar{0}\bar{1})$	$(\bar{1}0\bar{1})$	$(1\bar{0}\bar{1})$
			$0, y, 0$	$0, \bar{y}, 0$	$0, y, 0$	$0, \bar{y}, 0$	(110)	$(\bar{1}\bar{1}\bar{0})$	$(\bar{1}1\bar{0})$	$(1\bar{1}\bar{0})$			
8	b	$.3m$	x, x, x	$\bar{x}, \bar{x}, \bar{x}$	\bar{x}, x, \bar{x}	x, \bar{x}, \bar{x}	Octahedron Cube						
			x, x, \bar{x}	$\bar{x}, \bar{x}, \bar{x}$	x, \bar{x}, \bar{x}	x, \bar{x}, \bar{x}				(111)	$(\bar{1}\bar{1}\bar{1})$	$(\bar{1}\bar{1}\bar{1})$	$(\bar{1}\bar{1}\bar{1})$
			x, x, \bar{x}	$\bar{x}, \bar{x}, \bar{x}$	x, \bar{x}, \bar{x}	x, \bar{x}, \bar{x}	$(1\bar{1}\bar{1})$	$(\bar{1}\bar{1}\bar{1})$	$(\bar{1}\bar{1}\bar{1})$	$(\bar{1}\bar{1}\bar{1})$			
6	a	$4m.m$	$x, 0, 0$	$\bar{x}, 0, 0$			Cube or hexahedron Octahedron						
			$0, x, 0$	$0, \bar{x}, 0$						(100)	$(\bar{1}\bar{0}\bar{0})$		
			$0, 0, x$	$0, 0, \bar{x}$						(010)	$(\bar{0}\bar{1}\bar{0})$		
							(001)	$(\bar{0}\bar{0}\bar{1})$					
1	o	$m\bar{3}m$	$0, 0, 0$				Point in origin						

Symmetry of special projections
 Along [001] Along [111] Along [110]
 4mm 6mm 2mm