

Orthorhombic

6. SCANNING TABLES

Laue class  $D_{2h} - mmm$ No. 59  $Pmmn$ 

$$\mathcal{G} = P \begin{smallmatrix} 2_1 & 2_1 & 2 \\ m & m & n \end{smallmatrix} \text{ origin } 2$$

 $D_{2h}^{13}$ 

Orientation orbit ( <i>hkl</i> )	Conventional basis of the scanning group <b>a'</b> <b>b'</b> <b>d</b>	Scanning group $\mathcal{H}$	Linear orbit <b>sd</b>	Sectional layer group $\mathcal{L}(\mathbf{sd})$	
(001)	<b>a</b> <b>b</b> <b>c</b>	$Pmmn$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\mathbf{sd}, -\mathbf{sd}]$	$pmmn$ $pmm2 [(\mathbf{a} + \mathbf{b})/4]$	L46 L23
(100)	<b>b</b> <b>c</b> <b>a</b>	$Pmnm$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p2_1/m11$ $pm2m (\mathbf{a}'/4)$ $pm11 (\mathbf{a}'/4)$	L15 L27 L11
(010)	<b>c</b> <b>a</b> <b>b</b>	$Pnmm$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p12_1/m1$ $p2mm (\mathbf{b}'/4)$ $p1m1 (\mathbf{b}'/4)$	L15 L27 L11

No. 60  $Pbcn$ 

$$\mathcal{G} = P \begin{smallmatrix} 2_1 & 2_1 & 2_1 \\ b & c & n \end{smallmatrix}$$

 $D_{2h}^{14}$ 

Orientation orbit ( <i>hkl</i> )	Conventional basis of the scanning group <b>a'</b> <b>b'</b> <b>d</b>	Scanning group $\mathcal{H}$	Linear orbit <b>sd</b>	Sectional layer group $\mathcal{L}(\mathbf{sd})$	
(001)	<b>a</b> <b>b</b> <b>c</b>	$Pbcn$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p2_1/b11$ $pb2n$ $pb11 (\mathbf{a}/4)$	L17 L34 L12
(100)	<b>b</b> <b>c</b> <b>a</b>	$Pbna$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p2/b11$ $pb2_1a (\mathbf{a}'/4)$ $pb11$	L16 L33 L12
(010)	<b>c</b> <b>a</b> <b>b</b>	$Pnca$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ $[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p112/a$ $p2_12_12 (\mathbf{a}'/4)$ $p112 (\mathbf{a}'/4)$	L07 L21 L03

No. 61  $Pbca$ 

$$\mathcal{G} = P \begin{smallmatrix} 2_1 & 2_1 & 2_1 \\ b & c & a \end{smallmatrix}$$

 $D_{2h}^{15}$ 

Orientation orbit ( <i>hkl</i> )	Conventional basis of the scanning group <b>a'</b> <b>b'</b> <b>d</b>	Scanning group $\mathcal{H}$	Linear orbit <b>sd</b>	Sectional layer group $\mathcal{L}(\mathbf{sd})$	
(001)	<b>a</b> <b>b</b> <b>c</b>	$Pbca$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$	$p2_1/b11$	L17
(100)	<b>b</b> <b>c</b> <b>a</b>		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$pb2_1a$	L33
(010)	<b>c</b> <b>a</b> <b>b</b>		$[\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}]$	$pb11 (\mathbf{a}'/4)$	L12

Auxiliary tables for Laue class  $D_{2h} - mmm$ Centring types  $P$  and  $I$ 

Orientation orbit ( $hkl$ )	Conventional basis of the scanning group			Auxiliary basis of the scanning group		
	$\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$	$\hat{\mathbf{a}}$	$\hat{\mathbf{b}}$	$\hat{\mathbf{c}}$
( $mn0$ )	$\mathbf{c}$	$n\mathbf{a} - m\mathbf{b}$	$p\mathbf{a} + q\mathbf{b}$	$\mathbf{a}$	$\mathbf{b}$	$\mathbf{c}$
( $\bar{m}n0$ )	$\mathbf{c}$	$n\mathbf{a} + m\mathbf{b}$	$-p\mathbf{a} + q\mathbf{b}$			
( $0mn$ )	$\mathbf{a}$	$n\mathbf{b} - m\mathbf{c}$	$p\mathbf{b} + q\mathbf{c}$	$\mathbf{b}$	$\mathbf{c}$	$\mathbf{a}$
( $0\bar{m}n$ )	$\mathbf{a}$	$n\mathbf{b} + m\mathbf{c}$	$-p\mathbf{b} + q\mathbf{c}$			
( $n0m$ )	$\mathbf{b}$	$n\mathbf{c} - m\mathbf{a}$	$p\mathbf{c} + q\mathbf{a}$	$\mathbf{c}$	$\mathbf{a}$	$\mathbf{b}$
( $n0\bar{m}$ )	$\mathbf{b}$	$n\mathbf{c} + m\mathbf{a}$	$-p\mathbf{c} + q\mathbf{a}$			

Arithmetic class  $222P$ 

Serial No.	16	17	18	19
Group type	$D_2^1$	$D_2^2$	$D_2^3$	$D_2^4$
Group	$P222$	$P222_1$	$P2_12_12$	$P2_12_12_1$
( $mn0$ )	$P112$	$P112_1$	$P112$	$P112_1$
( $\bar{m}n0$ )				( $\mathbf{a}/4$ )
( $0mn$ )		$P112$	$P112_1$	$P112_1$
( $0\bar{m}n$ )			( $\mathbf{b}/4$ )	( $\mathbf{b}/4$ )
( $n0m$ )		$P112$	$P112_1$	$P112_1$
( $n0\bar{m}$ )		( $\mathbf{c}/4$ )	( $\mathbf{a}/4$ )	( $\mathbf{c}/4$ )

Arithmetic class  $mm2P$ 

Serial No.	25	26	27	28	29	30	31	32	33	34
Group type	$C_{2v}^1$	$C_{2v}^2$	$C_{2v}^3$	$C_{2v}^4$	$C_{2v}^5$	$C_{2v}^6$	$C_{2v}^7$	$C_{2v}^8$	$C_{2v}^9$	$C_{2v}^{10}$
Group	$Pmm2$	$Pmc2_1$	$Pcc2$	$Pma2$	$Pca2_1$	$Pnc2$	$Pmn2_1$	$Pba2$	$Pna2_1$	$Pnm2$
( $mn0$ )	$P112$	$P112_1$	$P112$	$P112$	$P112_1$	$P112$	$P112_1$	$P112$	$P112_1$	$P112$
( $\bar{m}n0$ )							( $\mathbf{a}/4$ )			
( $0mn$ )	$P11m$	$P11m$	$P11b$	$P11m$	$P11b$	$P11n$	$P11m$	$P11a$	$P11n$	$P11n$
( $0\bar{m}n$ )				( $\mathbf{a}/4$ )	( $\mathbf{a}/4$ )			( $\mathbf{a}/4$ )	( $\mathbf{a}/4$ )	( $\mathbf{a}/4$ )
( $n0m$ )		$P11a$	$P11a$	$P11b$	$P11b$	$P11a$	$P11n$	$P11b$	$P11b$	$P11n$
( $n0\bar{m}$ )						( $\mathbf{b}/4$ )		( $\mathbf{b}/4$ )	( $\mathbf{b}/4$ )	( $\mathbf{b}/4$ )

Arithmetic classes  $222I$ ,  $mm2I$  and  $mmmI$ 

Serial No.	23	24	44	45	46	71	72	73	74
Group type	$D_2^8$	$D_{2v}^9$	$C_{2v}^{20}$	$C_{2v}^{21}$	$C_{2v}^{22}$	$D_{2h}^{25}$	$D_{2h}^{26}$	$D_{2h}^{27}$	$D_{2h}^{28}$
Group	$I222$	$I2_12_12_1$	$Imm2$	$Iba2$	$Ima2$	$Immm$	$Ibam$	$Ibca$	$Imma$
( $mn0$ )	$I112$	$I112$	$I112$	$I112$	$I112$	$I112/m$	$I112/m$	$I112/b$	$I112/b$
( $\bar{m}n0$ )		( $\mathbf{b}/4$ )							
( $0mn$ )		$I112$	$I11m$	$I11b$	$I11m$		$I112/b$		$I112/m$
( $0\bar{m}n$ )		( $\mathbf{c}/4$ )			( $\mathbf{a}/4$ )				
( $n0m$ )		$I112$		$I11a$	$I11b$		$I112/a$		$I112/m$
( $n0\bar{m}$ )		( $\mathbf{a}/4$ )							$[(\mathbf{a} + \mathbf{b} + \mathbf{c})/4]$

Arithmetic class  $mmmP$

Serial No. Group type Group	47 $D_{2h}^1$ $Pmmm$	48 $D_{2h}^2$ $Pnnn$		49 $D_{2h}^3$ $Pccm$	50 $D_{2h}^4$ $Pban$	
		Origin 1	Origin 2		Origin 1	Origin 2
$(mn0)$ $(\bar{m}n0)$	$P112/m$	$P112/n$ [[ <b>a</b> + <b>b</b> + <b>c</b> ]/4]	$P112/n$	$P112/m$	$P112/n$ [[ <b>a</b> + <b>b</b> ]/4]	$P112/n$
$(0mn)$ $(0\bar{m}n)$				$P112/b$	$P112/a$ [[ <b>a</b> + <b>b</b> ]/4]	$P112/a$
$(n0m)$ $(n0\bar{m})$				$P112/a$	$P112/b$ [[ <b>a</b> + <b>b</b> ]/4]	$P112/b$

Serial No. Group type Group	51 $D_{2h}^5$ $Pmma$	52 $D_{2h}^6$ $Pnna$	53 $D_{2h}^7$ $Pmna$	54 $D_{2h}^8$ $Pcca$	55 $D_{2h}^9$ $Pbam$	56 $D_{2h}^{10}$ $Pccn$
	$(mn0)$ $(\bar{m}n0)$	$P112/a$	$P112/a$	$P112_1/a$	$P112/a$	$P112/m$
$(0mn)$ $(0\bar{m}n)$	$P112_1/m$	$P112/n$	$P112/m$	$P112_1/b$	$P112_1/a$	$P112_1/b$
$(n0m)$ $(n0\bar{m})$	$P112/m$	$P112_1/n$	$P112/n$	$P112/a$	$P112_1/b$	$P112_1/a$

Serial No. Group type Group	57 $D_{2h}^{11}$ $Pbcm$	58 $D_{2h}^{12}$ $Pnnm$	59 $D_{2h}^{13}$ $Pmnn$		60 $D_{2h}^{14}$ $Pbcn$	61 $D_{2h}^{15}$ $Pbca$	62 $D_{2h}^{16}$ $Pnma$
			Origin 1	Origin 2			
$(mn0)$ $(\bar{m}n0)$	$P112_1/m$	$P112/m$	$P112/n$ [[ <b>a</b> + <b>b</b> ]/4]	$P112/n$	$P112_1/n$	$P112_1/a$	$P112_1/a$
$(0mn)$ $(0\bar{m}n)$	$P112/a$	$P112_1/n$	$P112_1/m$ [[ <b>a</b> + <b>b</b> ]/4]	$P112_1/m$	$P112_1/a$		$P112_1/n$
$(n0m)$ $(n0\bar{m})$	$P112_1/a$				$P112/a$		$P112_1/m$

Centring type  $C$

Orientation orbit ( $hkl$ )	Conventional basis of the scanning group <b>a'</b> <b>b'</b> <b>d</b>			Auxiliary basis of the scanning group $\hat{\mathbf{a}}$ $\hat{\mathbf{b}}$ $\hat{\mathbf{c}}$		
$(hk0)$	<b>c</b>	$n\hat{\mathbf{a}} - m\hat{\mathbf{b}}$	$p\hat{\mathbf{a}} + q\hat{\mathbf{b}}$	$(\mathbf{a} - \mathbf{b})/2$	$(\mathbf{a} + \mathbf{b})/2$	<b>c</b>
$(\bar{h}k0)$	<b>c</b>	$n\hat{\mathbf{a}} + m\hat{\mathbf{b}}$	$-p\hat{\mathbf{a}} + q\hat{\mathbf{b}}$			
$h$ even, $k$ odd or $h$ odd, $k$ even $\Rightarrow n = h + k, m = h - k$						
$h, k$ odd $\Rightarrow n = (h + k)/2, m = (h - k)/2$						
$(0mn)$	<b>a</b>	$n\mathbf{b} - m\mathbf{c}$	$p\mathbf{b} + q\mathbf{c}$	<b>b</b>	<b>c</b>	<b>a</b>
$(0\bar{m}n)$	<b>a</b>	$n\mathbf{b} + m\mathbf{c}$	$-p\mathbf{b} + q\mathbf{c}$			
$(n0m)$	<b>b</b>	$n\mathbf{c} - m\mathbf{a}$	$p\mathbf{c} + q\mathbf{a}$	<b>c</b>	<b>a</b>	<b>b</b>
$(n0\bar{m})$	<b>b</b>	$n\mathbf{c} + m\mathbf{a}$	$-p\mathbf{c} + q\mathbf{a}$			