

Orthorhombic

6. SCANNING TABLES

Laue class  $D_{2h} - mmm$ No. 65  $Cmmm$  $D_{2h}^{19}$ 

$$\mathcal{G} = C_{m m m}^{\frac{2}{2} \frac{2}{2} \frac{2}{2}}$$

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>	$Cmmm$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ [ $\mathbf{sd}, -\mathbf{sd}$ ]	$cmmm$ $cmm2$	L47 L26
(100)	<b>b</b> <b>c</b> <b>a</b>	$Bmmm$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ [ $\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}$ ]	$pmmm$ $pmma (\mathbf{a}'/4)$ $pmm2$	L37 L41 L23
(010)	<b>c</b> <b>a</b> <b>b</b>	$Ammm$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ [ $\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}$ ]	$pmmm$ $pmmb (\mathbf{b}'/4)$ $pmm2$	L37 L41 L23

No. 66  $Cccm$  $D_{2h}^{20}$ 

$$\mathcal{G} = C_{c c m}^{\frac{2}{2} \frac{2}{2} \frac{2}{2}}$$

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>	$Cccm$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ [ $\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}$ ]	$\widehat{p}112/m$ $c222$ $\widehat{p}112$	L06 L22 L03
(100)	<b>b</b> <b>c</b> <b>a</b>	$Bbmb$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ [ $\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}$ ]	$pbmb$ $pbmn (\mathbf{a}'/4)$ $pbm2 (\mathbf{b}'/4)$	L38 L42 L24
(010)	<b>c</b> <b>a</b> <b>b</b>	$Amaa$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ [ $\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}$ ]	$pmaa$ $pman (\mathbf{b}'/4)$ $pma2 (\mathbf{a}'/4)$	L38 L42 L24

No. 67\*  $Cmme$  $D_{2h}^{21}$ 

$$\mathcal{G} = C_{m m a}^{\frac{2}{2} \frac{2}{2} \frac{2}{2}}$$

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>	$Cmma$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ [ $\mathbf{sd}, -\mathbf{sd}$ ]	$cmme$ $cmm2 (\mathbf{b}/4)$	L48 L26
(100)	<b>b</b> <b>c</b> <b>a</b>	$Bmcm$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ [ $\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}$ ]	$pmam$ $pmaa (\mathbf{a}'/4)$ $pma2$	L40 L38 L24
(010)	<b>c</b> <b>a</b> <b>b</b>	$Abmm$	$0\mathbf{d}, \frac{1}{2}\mathbf{d}$ $[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$ [ $\pm\mathbf{sd}, (\pm s + \frac{1}{2})\mathbf{d}$ ]	$pbmb$ $pbmm (\mathbf{b}'/4)$ $pbm2 (\mathbf{b}'/4)$	L38 L40 L24

\*New symbol. Old symbol:  $Cmma$ .

Arithmetic class  $mmmP$

Serial No. Group type Group	47 $D_{2h}^1$ $Pmmm$	48 $D_{2h}^2$ $Pnmm$		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 $D_{2h}^{10}$ $Pccn$
$(mn0)$ $(\bar{m}n0)$	$P112/a$	$P112/a$	$P112_1/a$	$P112/a$	$P112/m$	$P112/n$
$(0mn)$ $(0\bar{m}n)$	$P112_1/m$	$P112/n$	$P112/m$	$P112_1/b$	$P112_1/a$	$P112_1/b$
$(n0m)$ $(n0\bar{m})$	$P112/m$	$P112_1/n$	$P112/n$	$P112/a$	$P112_1/b$	$P112_1/a$

Serial No. Group type Group	57 $D_{2h}^{11}$ $Pbcm$	58 $D_{2h}^{12}$ $Pnmm$	59 $D_{2h}^{13}$ $Pmnm$		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]	$P112/n$	$P112_1/n$	$P112_1/a$	$P112_1/a$				
$(0mn)$ $(0\bar{m}n)$							$P112/a$	$P112_1/n$	$P112_1/m$	$P112_1/a$	$P112_1/n$
$(n0m)$ $(n0\bar{m})$							$P112_1/a$			$P112/a$	$P112_1/m$

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>	$nb - mc$	$pb + qc$	<b>b</b>	<b>c</b>	<b>a</b>
$(0\bar{m}n)$	<b>a</b>	$nb + mc$	$-pb + qc$			
$(n0m)$	<b>b</b>	$nc - ma$	$pc + qa$	<b>c</b>	<b>a</b>	<b>b</b>
$(n0\bar{m})$	<b>b</b>	$nc + ma$	$-pc + qa$			

Arithmetic classes  $222C$  and  $mm2C$ 

Serial No.	20	21	35	36	37
Group type	$D_2^5$	$D_2^6$	$C_{2v}^{11}$	$C_{2v}^{12}$	$C_{2v}^{13}$
Group	$C222_1$	$C222$	$Cmm2$	$Cmc2_1$	$Ccc2$
$(hk0)$ $(\bar{h}k0)$	$P112_1$	$P112$	$P112$	$P112_1$	$P112$
$(0mn)$ $(0\bar{m}n)$	$B112$	$B112$	$B11m$	$B11m$	$B11b$
$(n0m)$ $(n0\bar{m})$	$A112$ $(c/4)$	$A112$	$A11m$	$A11a$	$A11a$

Arithmetic class  $mmmC$ 

Serial No.	63	64	65	66	67	68	
Group type	$D_{2h}^{17}$	$D_{2h}^{18}$	$D_{2h}^{19}$	$D_{2h}^{20}$	$D_{2h}^{21}$	$D_{2h}^{22}$	
Group	$Cmcm$	$Cmce$	$Cmmm$	$Cccm$	$Cmme$	$Ccce$	
$(hk0)$ $(\bar{h}k0)$	$P112_1/m$	$P112_1/n$	$P112/m$	$P112/m$	$P112/n$	Origin 1 $[(b+c)/4]$	Origin 2 $P112/n$
$(0mn)$ $(0\bar{m}n)$	$B112/m$	$B112/m$	$B112/m$	$B112/b$	$B112/m$	$B112/n$ $[(a+c)/4]$	$B112/n$
$(n0m)$ $(n0\bar{m})$	$A112/a$	$A112/n$	$A112/m$	$A112/a$	$A112/m$ $[(a+b)/4]$	$A112/a$ $[(b+c)/4]$	$A112/a$

## Centring type A

Orientation orbit $(hkl)$	Conventional basis of the scanning group			Auxiliary basis of the scanning group		
	$\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$	$\hat{\mathbf{a}}$	$\hat{\mathbf{b}}$	$\hat{\mathbf{c}}$
$(mn0)$	$\mathbf{c}$	$n\mathbf{a} - m\mathbf{b}$	$p\mathbf{a} + q\mathbf{b}$	$\mathbf{a}$	$\mathbf{b}$	$\mathbf{c}$
$(\bar{m}n0)$	$\mathbf{c}$	$n\mathbf{a} + m\mathbf{b}$	$-p\mathbf{a} + q\mathbf{b}$			
$(0kl)$	$\mathbf{a}$	$n\hat{\mathbf{a}} - m\hat{\mathbf{b}}$	$p\hat{\mathbf{a}} + q\hat{\mathbf{b}}$	$(b-c)/2$	$(b+c)/2$	$\mathbf{a}$
$(\bar{k}l0)$	$\mathbf{a}$	$n\hat{\mathbf{a}} + m\hat{\mathbf{b}}$	$-p\hat{\mathbf{a}} + q\hat{\mathbf{b}}$			
$k$ even, $l$ odd or $k$ odd, $l$ even $\Rightarrow n = k + l, m = k - l$						
$k, l$ odd $\Rightarrow n = (k + l)/2, m = (k - l)/2$						
$(n0m)$	$\mathbf{b}$	$nc - ma$	$pc + qa$	$\mathbf{c}$	$\mathbf{a}$	$\mathbf{b}$
$(n0\bar{m})$	$\mathbf{b}$	$nc + ma$	$-pc + qa$			

Arithmetic class  $mm2A$ 

Serial No.	38	39	40	41
Group type	$C_{2v}^{14}$	$C_{2v}^{15}$	$C_{2v}^{16}$	$C_{2v}^{17}$
Group	$Amm2$	$Aem2$	$Ama2$	$Aea2$
$(mn0)$ $(\bar{m}n0)$	$A112$	$A112$	$A112$	$A112$
$(0kl)$ $(0\bar{k}l)$	$P11m$	$P11n$	$P11m$ $(a/4)$	$P11n$ $(a/4)$
$(n0m)$ $(n0\bar{m})$	$B11m$	$B11m$ $(b/4)$	$B11b$	$B11b$ $(b/4)$