

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.	47	48		49	50	
Group type	$D_{2h}^1$	$D_{2h}^2$		$D_{2h}^3$	$D_{2h}^4$	
Group	$Pmmm$	$Pnnn$		$Pccm$	$Pban$	
		Origin 1	Origin 2		Origin 1	Origin 2
$(mn0)$	$P112/m$	$P112/n$ [[ <b>a</b> + <b>b</b> + <b>c</b> ]/4]	$P112/n$	$P112/m$	$P112/n$	$P112/n$
$(\bar{m}n0)$					[[ <b>a</b> + <b>b</b> ]/4]	
$(0mn)$				$P112/b$	$P112/a$	$P112/a$
$(0\bar{m}n)$					[[ <b>a</b> + <b>b</b> ]/4]	
$(n0m)$				$P112/a$	$P112/b$	$P112/b$
$(n0\bar{m})$					[[ <b>a</b> + <b>b</b> ]/4]	

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

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

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	$Amm2$	$Aem2$	$Ama2$	$Aea2$
$(mn0)$ $(\bar{m}n0)$	$A112$	$A112$	$A112$	$A112$
$(0kl)$ $(0\bar{k}l)$	$P11m$	$P11n$	$P11m$ $(a/4)$	$P11n$ $(a/4)$
$(n0m)$ $(n0\bar{m})$	$B11m$	$B11m$ $(b/4)$	$B11b$	$B11b$ $(b/4)$