International Tables for Crystallography (2006). Vol. E, Scanning table for space group 209, p. 535.

No. 208 $P4_232$ O^2

$$\mathcal{G} = P4_232$$

Orientation orbit (hkl)	Conventional basis of the scanning group $\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$	Scanning group $\mathcal{H}$	Linear orbit $s\mathbf{d}$	Sectional layer group $\mathcal{L}(s\mathbf{d})$	
(001)	$\mathbf{a}$	$\mathbf{b}$	$\mathbf{c}$	$P4_222$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$p222$	L19
(100)	$\mathbf{b}$	$\mathbf{c}$	$\mathbf{a}$	$(\mathbf{a}'/2$ or $\mathbf{b}'/2)$	$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$\widehat{c}222$ $(\mathbf{a}'/2$ or $\mathbf{b}'/2)$	L22
(010)	$\mathbf{c}$	$\mathbf{a}$	$\mathbf{b}$		$[\pm s\mathbf{d}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p112$	L03
(110)	$\mathbf{c}$	$\mathbf{a}-\mathbf{b}$	$\mathbf{a}+\mathbf{b}$	$A222$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$p22_12$ $[(\mathbf{a}'+\mathbf{b}')/4]$	L20
$(1\overline{1}0)$	$\mathbf{c}$	$\mathbf{a}+\mathbf{b}$	$\mathbf{b}-\mathbf{a}$	$[(\mathbf{a}'+\mathbf{b}'+\mathbf{d})/4]$	$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p222$ $[(\mathbf{a}'+\mathbf{b}')/4]$	L19
(011)	$\mathbf{a}$	$\mathbf{b}-\mathbf{c}$	$\mathbf{b}+\mathbf{c}$		$[\pm s\mathbf{d}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p112$ $[(\mathbf{a}'+\mathbf{b}')/4]$	L03
$(01\overline{1})$	$\mathbf{a}$	$\mathbf{b}+\mathbf{c}$	$\mathbf{c}-\mathbf{b}$				
(101)	$\mathbf{b}$	$\mathbf{c}-\mathbf{a}$	$\mathbf{c}+\mathbf{a}$				
$(\overline{1}01)$	$\mathbf{b}$	$\mathbf{c}+\mathbf{a}$	$\mathbf{a}-\mathbf{c}$				
(111)	$\mathbf{a}-\mathbf{b}$	$\mathbf{b}-\mathbf{c}$	$\boldsymbol{\tau}$	$R32$	$[\frac{1}{4}\mathbf{d},$ $[\frac{3}{4}\mathbf{d},$	$p321$	L68
$(\overline{1}\overline{1}1)$	$\mathbf{b}-\mathbf{a}$	$-\mathbf{b}-\mathbf{c}$	$\boldsymbol{\tau}_3$	$(\mathbf{d}/4)$	$\frac{7}{12}\mathbf{d},$ $\parallel$ $\frac{1}{12}\mathbf{d},$	$p321$ $[(2\mathbf{a}'+\mathbf{b}')/3]$	L68
$(1\overline{1}\overline{1})$	$\mathbf{a}+\mathbf{b}$	$\mathbf{c}-\mathbf{b}$	$\boldsymbol{\tau}_1$		$\frac{11}{12}\mathbf{d}]$ $\frac{5}{12}\mathbf{d}]$	$p321$ $[(\mathbf{a}'+2\mathbf{b}')/3]$	L68
$(\overline{1}1\overline{1})$	$-\mathbf{a}-\mathbf{b}$	$\mathbf{b}+\mathbf{c}$	$\boldsymbol{\tau}_2$		$[(\pm s + \frac{1}{4})\mathbf{d}, (\pm s + \frac{7}{12})\mathbf{d},$		
					$(\pm s + \frac{11}{12})\mathbf{d}]$	$p3$	L65

No. 209 $F432$ O^3

$$\mathcal{G} = F432$$

Orientation orbit (hkl)	Conventional basis of the scanning group $\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$	Scanning group $\mathcal{H}$	Linear orbit $s\mathbf{d}$	Sectional layer group $\mathcal{L}(s\mathbf{d})$	
(001)	$(\mathbf{a}-\mathbf{b})/2$	$(\mathbf{a}+\mathbf{b})/2$	$\mathbf{c}$	$I422$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$p422$	L53
(100)	$(\mathbf{b}-\mathbf{c})/2$	$(\mathbf{b}+\mathbf{c})/2$	$\mathbf{a}$		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p42_12$	L54
(010)	$(\mathbf{c}-\mathbf{a})/2$	$(\mathbf{c}+\mathbf{a})/2$	$\mathbf{b}$		$[\pm s\mathbf{d}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p4$	L49
(110)	$\mathbf{c}$	$(\mathbf{a}-\mathbf{b})/2$	$(\mathbf{a}+\mathbf{b})/2$	$I222$	$[0\mathbf{d}, \frac{1}{2}\mathbf{d}]$	$p222$	L19
$(1\overline{1}0)$	$\mathbf{c}$	$(\mathbf{a}+\mathbf{b})/2$	$(\mathbf{b}-\mathbf{a})/2$		$[\frac{1}{4}\mathbf{d}, \frac{3}{4}\mathbf{d}]$	$p2_12_12$	L21
(011)	$\mathbf{a}$	$(\mathbf{b}-\mathbf{c})/2$	$(\mathbf{b}+\mathbf{c})/2$		$[\pm s\mathbf{d}, (\pm s + \frac{1}{2})\mathbf{d}]$	$p112$	L03
$(01\overline{1})$	$\mathbf{a}$	$(\mathbf{b}+\mathbf{c})/2$	$(\mathbf{c}-\mathbf{b})/2$				
(101)	$\mathbf{b}$	$(\mathbf{c}-\mathbf{a})/2$	$(\mathbf{c}+\mathbf{a})/2$				
$(\overline{1}01)$	$\mathbf{b}$	$(\mathbf{c}+\mathbf{a})/2$	$(\mathbf{a}-\mathbf{c})/2$				
(111)	$(\mathbf{a}-\mathbf{c})/2$	$(\mathbf{b}-\mathbf{a})/2$	$\boldsymbol{\tau}$	$R32$	$[0\mathbf{d},$ $[\frac{1}{2}\mathbf{d},$	$p321$	L68
$(\overline{1}\overline{1}1)$	$(-\mathbf{a}-\mathbf{c})/2$	$(\mathbf{a}-\mathbf{b})/2$	$\boldsymbol{\tau}_3$		$\frac{1}{3}\mathbf{d},$ $\parallel$ $\frac{5}{6}\mathbf{d},$	$p321$ $[(2\mathbf{a}'+\mathbf{b}')/3]$	L68
$(1\overline{1}\overline{1})$	$(\mathbf{a}+\mathbf{c})/2$	$(-\mathbf{a}-\mathbf{b})/2$	$\boldsymbol{\tau}_1$		$\frac{2}{3}\mathbf{d}]$ $\frac{1}{6}\mathbf{d}]$	$p321$ $[(\mathbf{a}'+2\mathbf{b}')/3]$	L68
$(\overline{1}1\overline{1})$	$(\mathbf{c}-\mathbf{a})/2$	$(\mathbf{a}+\mathbf{b})/2$	$\boldsymbol{\tau}_2$		$[\pm s\mathbf{d}, (\pm s + \frac{1}{3})\mathbf{d},$		
					$(\pm s + \frac{2}{3})\mathbf{d}]$	$p3$	L65

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Centring type *F*

Orientation orbit (hkl)	Conventional basis of the scanning group $\mathbf{a}'$	$\mathbf{b}'$	$\mathbf{d}$	Auxiliary basis of the scanning group $\widehat{\mathbf{a}}$	$\widehat{\mathbf{b}}$	$\widehat{\mathbf{c}}$
$(hk0)$	$\mathbf{c}$	$n\widehat{\mathbf{a}} - m\widehat{\mathbf{b}}$	$p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$	$(\mathbf{a}-\mathbf{b})/2$	$(\mathbf{a}+\mathbf{b})/2$	$\mathbf{c}$
$(\overline{h}k0)$	$\mathbf{c}$	$n\widehat{\mathbf{a}} + m\widehat{\mathbf{b}}$	$-p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$			
$(kh0)$	$\mathbf{c}$	$m\widehat{\mathbf{a}} + n\mathbf{b}$	$q\widehat{\mathbf{a}} + p\widehat{\mathbf{b}}$			
$(\overline{k}h0)$	$\mathbf{c}$	$m\widehat{\mathbf{a}} - n\widehat{\mathbf{b}}$	$-q\widehat{\mathbf{a}} + p\widehat{\mathbf{b}}$			
$(0hk)$	$\mathbf{a}$	$n\widehat{\mathbf{a}} - m\widehat{\mathbf{b}}$	$p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$	$(\mathbf{b}-\mathbf{c})/2$	$(\mathbf{b}+\mathbf{c})/2$	$\mathbf{a}$
$(0\overline{h}k)$	$\mathbf{a}$	$n\widehat{\mathbf{a}} + m\widehat{\mathbf{b}}$	$-p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$			
$(0kh)$	$\mathbf{a}$	$m\widehat{\mathbf{a}} - n\widehat{\mathbf{b}}$	$q\widehat{\mathbf{a}} + p\widehat{\mathbf{b}}$			
$(0\overline{k}h)$	$\mathbf{a}$	$m\widehat{\mathbf{a}} + n\widehat{\mathbf{b}}$	$-q\widehat{\mathbf{a}} + p\widehat{\mathbf{b}}$			
$(k0h)$	$\mathbf{b}$	$n\widehat{\mathbf{a}} - m\widehat{\mathbf{b}}$	$p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$	$(\mathbf{c}-\mathbf{a})/2$	$(\mathbf{c}+\mathbf{a})/2$	$\mathbf{b}$
$(k0\overline{h})$	$\mathbf{b}$	$n\widehat{\mathbf{a}} + m\widehat{\mathbf{b}}$	$-p\widehat{\mathbf{a}} + q\widehat{\mathbf{b}}$			
$(h0k)$	$\mathbf{b}$	$m\widehat{\mathbf{a}} - n\widehat{\mathbf{b}}$	$q\widehat{\mathbf{a}} + p\widehat{\mathbf{b}}$			
$(h0\overline{k})$	$\mathbf{b}$	$m\widehat{\mathbf{a}} + n\widehat{\mathbf{b}}$	$-q\widehat{\mathbf{a}} + p\widehat{\mathbf{b}}$			
h even, k odd or h odd, k even $\Rightarrow n = h+k$, $m = h-k$ h, k odd $\Rightarrow n = (h+k)/2$, $m = (h-k)/2$						
(hhl)	$(\mathbf{a}-\mathbf{b})/2$	$n\widehat{\mathbf{a}} - m\mathbf{c}$	$p\widehat{\mathbf{a}} + q\mathbf{c}$	$(\mathbf{a}+\mathbf{b})/2$	$\mathbf{c}$	$(\mathbf{a}-\mathbf{b})/2$
$(\overline{h}\overline{h}l)$	$(\mathbf{a}-\mathbf{b})/2$	$n\widehat{\mathbf{a}} + m\mathbf{c}$	$-p\widehat{\mathbf{a}} + q\mathbf{c}$			
$(h\overline{h}l)$	$(\mathbf{a}+\mathbf{b})/2$	$n\widehat{\mathbf{a}} - m\mathbf{c}$	$p\widehat{\mathbf{a}} + q\mathbf{c}$	$(\mathbf{b}-\mathbf{a})/2$	$\mathbf{c}$	$(\mathbf{a}+\mathbf{b})/2$
$(\overline{h}hl)$	$(\mathbf{a}+\mathbf{b})/2$	$n\widehat{\mathbf{a}} + m\mathbf{c}$	$-p\widehat{\mathbf{a}} + q\mathbf{c}$			
(lhh)	$(\mathbf{b}-\mathbf{c})/2$	$n\widehat{\mathbf{a}} - m\mathbf{a}$	$p\widehat{\mathbf{a}} + q\mathbf{a}$	$(\mathbf{b}+\mathbf{c})/2$	$\mathbf{a}$	$(\mathbf{b}-\mathbf{c})/2$
$(l\overline{h}\overline{h})$	$(\mathbf{b}-\mathbf{c})/2$	$n\widehat{\mathbf{a}} + m\mathbf{a}$	$-p\widehat{\mathbf{a}} + q\mathbf{a}$			
$(lh\overline{h})$	$(\mathbf{b}+\mathbf{c})/2$	$n\widehat{\mathbf{a}} - m\mathbf{a}$	$p\widehat{\mathbf{a}} + q\mathbf{a}$	$(\mathbf{c}-\mathbf{b})/2$	$\mathbf{a}$	$(\mathbf{b}+\mathbf{c})/2$
$(l\overline{h}h)$	$(\mathbf{b}+\mathbf{c})/2$	$n\widehat{\mathbf{a}} + m\mathbf{a}$	$-p\widehat{\mathbf{a}} + q\mathbf{a}$			
(hlh)	$(\mathbf{c}-\mathbf{a})/2$	$n\widehat{\mathbf{a}} - m\mathbf{b}$	$p\widehat{\mathbf{a}} + q\mathbf{b}$	$(\mathbf{c}+\mathbf{a})/2$	$\mathbf{b}$	$(\mathbf{c}-\mathbf{a})/2$
$(\overline{h}l\overline{h})$	$(\mathbf{c}-\mathbf{a})/2$	$n\widehat{\mathbf{a}} + m\mathbf{b}$	$-p\widehat{\mathbf{a}} + q\mathbf{b}$			
$(\overline{h}lh)$	$(\mathbf{c}+\mathbf{a})/2$	$n\widehat{\mathbf{a}} - m\mathbf{b}$	$p\widehat{\mathbf{a}} + q\mathbf{b}$	$(\mathbf{a}-\mathbf{c})/2$	$\mathbf{b}$	$(\mathbf{c}+\mathbf{a})/2$
$(hl\overline{h})$	$(\mathbf{c}+\mathbf{a})/2$	$n\widehat{\mathbf{a}} + m\mathbf{b}$	$-p\widehat{\mathbf{a}} + q\mathbf{b}$			
h odd $\Rightarrow m = h$, $n = 2l$; h even $\Rightarrow m = h/2$, $n = l$						

Arithmetic classes $432F$ and $\overline{4}3mF$

Serial No.	209	210	216	219
Group type	O^3	O^4	T_d^2	T_d^5
Group	$F432$	$F4_132$	$F\overline{4}3m$	$F\overline{4}3c$
$(hk0)$	$I112$	$I112$	$I112$	$I112$
$(\overline{h}k0)$				
$(kh0)$				
$(\overline{k}h0)$				
$(0hk)$				
$(0\overline{h}k)$				
$(0kh)$				
$(0\overline{k}h)$				
$(k0h)$				
$(k0\overline{h})$				
$(h0k)$				
$(h0\overline{k})$				
(hhl)	$I112$	$I112$	$I11m$	$I11a$
$(\overline{h}\overline{h}l)$		$(\mathbf{a}/4+\mathbf{c}/8)$		
$(h\overline{h}l)$		$I112$		$I11b$
$(\overline{h}hl)$		$(\mathbf{a}/4+3\mathbf{c}/8)$		
(lhh)		$I112$		$I11a$
$(l\overline{h}\overline{h})$		$(\mathbf{b}/4+\mathbf{a}/8)$		
$(lh\overline{h})$		$I112$		$I11b$
$(l\overline{h}h)$		$(\mathbf{b}/4+3\mathbf{a}/8)$		
(hlh)		$I112$		$I11a$
$(\overline{h}l\overline{h})$		$(\mathbf{c}/4+\mathbf{b}/8)$		
$(\overline{h}lh)$		$I112$		$I11b$
$(hl\overline{h})$		$(\mathbf{c}/4+3\mathbf{b}/8)$		