1. The Groups C_1, C_s, C_i

C_1 (1)	E
A	1

$C_s=C_h$ (m)	E	σ_h		
A′	1	1	x, y, R_z	x^2, y^2, z^2, xy
A″	1	–1	z, R_x, R_y	yz, xz

$C_i = S_2$ ($\bar{1}$)	E	i		
A_g	1	1	R_x, R_y, R_z	$x^2, y^2, z^2,$ xy, xz, yz
A_u	1	–1	x, y, z	

2. The Groups C_n (n = 2, 3,…,8)

C_2 (2)	E	C_2		
A	1	1	z, R_z	x^2, y^2, z^2, xy
B	1	–1	x, y, R_x, R_y	yz, xz

C_3 (3)	E	C_3	C_3^2		$\varepsilon = \exp(2\pi i/3)$
A	1	1	1	z, R_z	$x^2 + y^2$, z^2
E	$\begin{Bmatrix}1 & \varepsilon & \varepsilon^* \\ 1 & \varepsilon^* & \varepsilon\end{Bmatrix}$			$(x, y)(R_x, R_y)$	$(x^2 - y^2, 2xy)(yz, xz)$

C_4 (4)	E	C_4	C_2	C_4^3		
A	1	1	1	1	z, R_z	$x^2 + y^2$, z^2
B	1	–1	1	–1		$x^2 - y^2$, $2xy$
E	$\begin{Bmatrix}1 & \mathrm{i} & -1 & -\mathrm{i} \\ 1 & -\mathrm{i} & -1 & \mathrm{i}\end{Bmatrix}$				$(x, y)(R_x, R_y)$	(yz, xz)

C_5	E	C_5	C_5^2	C_5^3	C_5^4		$\varepsilon = \exp(2\pi i/5)$
A	1	1	1	1	1	z, R_z	$x^2 + y^2$, z^2
E_1	$\begin{Bmatrix}1 & \varepsilon & \varepsilon^2 & \varepsilon^{*2} & \varepsilon^* \\ 1 & \varepsilon^* & \varepsilon^{*2} & \varepsilon^2 & \varepsilon\end{Bmatrix}$					$(x,y)(R_x, R_y)$	(yz, xz)
E_2	$\begin{Bmatrix}1 & \varepsilon^2 & \varepsilon^* & \varepsilon & \varepsilon^{*2} \\ 1 & \varepsilon^{*2} & \varepsilon & \varepsilon^* & \varepsilon^2\end{Bmatrix}$						$(x^2 - y^2, 2xy)$

C_6 (6)	E	C_6	C_3	C_2	C_3^2	C_6^5		$\varepsilon = \exp(2\pi i/6)$
A	1	1	1	1	1	1	z, R_z	$x^2 + y^2$, z^2
B	1	–1	1	–1	1	–1		
E_1	$\begin{Bmatrix}1 & \varepsilon & -\varepsilon^* & -1 & -\varepsilon & \varepsilon^* \\ 1 & \varepsilon^* & -\varepsilon & -1 & -\varepsilon^* & \varepsilon\end{Bmatrix}$						(x, y) (R_z, R_y)	(xy, yz)
E_2	$\begin{Bmatrix}1 & -\varepsilon^* & -\varepsilon & 1 & -\varepsilon^* & -\varepsilon \\ 1 & -\varepsilon & -\varepsilon^* & 1 & -\varepsilon & -\varepsilon^*\end{Bmatrix}$							$(x^2 - y^2, 2xy)$

2. The Groups C_n (n = 2, 3,…,8) (cont..)

C_7	E	C_7	C_7^2	C_7^3	C_7^4	C_7^5	C_7^6		$\varepsilon = \exp(2\pi i/7)$
A	1	1	1	1	1	1	1	z, R_z	$x^2 + y^2$, z^2
E_1	$\begin{Bmatrix}1 \\ 1\end{Bmatrix}$	$\begin{matrix}\varepsilon \\ \varepsilon^*\end{matrix}$	$\begin{matrix}\varepsilon^2 \\ \varepsilon^{*2}\end{matrix}$	$\begin{matrix}\varepsilon^3 \\ \varepsilon^{*3}\end{matrix}$	$\begin{matrix}\varepsilon^{*3} \\ \varepsilon^3\end{matrix}$	$\begin{matrix}\varepsilon^{*2} \\ \varepsilon^2\end{matrix}$	$\begin{matrix}\varepsilon^* \\ \varepsilon\end{matrix}$	(x, y) (R_x, R_y)	(xz, yz)
E_2	$\begin{Bmatrix}1 \\ 1\end{Bmatrix}$	$\begin{matrix}\varepsilon^2 \\ \varepsilon^{*2}\end{matrix}$	$\begin{matrix}\varepsilon^{*3} \\ \varepsilon^3\end{matrix}$	$\begin{matrix}\varepsilon^* \\ \varepsilon\end{matrix}$	$\begin{matrix}\varepsilon \\ \varepsilon^*\end{matrix}$	$\begin{matrix}\varepsilon^3 \\ \varepsilon^{*3}\end{matrix}$	$\begin{matrix}\varepsilon^{*2} \\ \varepsilon^2\end{matrix}$		$(x^2 - y^2, 2xy)$
E_3	$\begin{Bmatrix}1 \\ 1\end{Bmatrix}$	$\begin{matrix}\varepsilon^3 \\ \varepsilon^{*3}\end{matrix}$	$\begin{matrix}\varepsilon^* \\ \varepsilon\end{matrix}$	$\begin{matrix}\varepsilon^2 \\ \varepsilon^{*2}\end{matrix}$	$\begin{matrix}\varepsilon^{*2} \\ \varepsilon^2\end{matrix}$	$\begin{matrix}\varepsilon \\ \varepsilon^*\end{matrix}$	$\begin{matrix}\varepsilon^{*3} \\ \varepsilon^3\end{matrix}$		

C_8	E	C_8	C_4	C_2	C_4^3	C_8^3	C_8^5	C_8^7		$\varepsilon = \exp(2\pi i/8)$
A	1	1	1	1	1	1	1	1	z, R_z	$x^2 + y^2$, z^2
B	1	−1	1	1	1	−1	−1	−1		
E_1	$\begin{Bmatrix}1 \\ 1\end{Bmatrix}$	$\begin{matrix}\varepsilon \\ \varepsilon^*\end{matrix}$	$\begin{matrix}\mathrm{i} \\ -\mathrm{i}\end{matrix}$	$\begin{matrix}-1 \\ -1\end{matrix}$	$\begin{matrix}-\mathrm{i} \\ \mathrm{i}\end{matrix}$	$\begin{matrix}-\varepsilon^* \\ -\varepsilon\end{matrix}$	$\begin{matrix}-\varepsilon \\ -\varepsilon^*\end{matrix}$	$\begin{matrix}\varepsilon^* \\ \varepsilon\end{matrix}$	(x, y) (R_x, R_y)	(xz, yz)
E_2	$\begin{Bmatrix}1 \\ 1\end{Bmatrix}$	$\begin{matrix}\mathrm{i} \\ -\mathrm{i}\end{matrix}$	$\begin{matrix}-1 \\ -1\end{matrix}$	$\begin{matrix}1 \\ 1\end{matrix}$	$\begin{matrix}-1 \\ -1\end{matrix}$	$\begin{matrix}-\mathrm{i} \\ \mathrm{i}\end{matrix}$	$\begin{matrix}\mathrm{i} \\ -\mathrm{i}\end{matrix}$	$\begin{matrix}-\mathrm{i} \\ \mathrm{i}\end{matrix}$		$(x^2 - y^2, 2xy)$
E_3	$\begin{Bmatrix}1 \\ 1\end{Bmatrix}$	$\begin{matrix}-\varepsilon \\ -\varepsilon^*\end{matrix}$	$\begin{matrix}\mathrm{i} \\ -\mathrm{i}\end{matrix}$	$\begin{matrix}-1 \\ -1\end{matrix}$	$\begin{matrix}-\mathrm{i} \\ \mathrm{i}\end{matrix}$	$\begin{matrix}\varepsilon^* \\ \varepsilon\end{matrix}$	$\begin{matrix}\varepsilon \\ \varepsilon^*\end{matrix}$	$\begin{matrix}-\varepsilon^* \\ -\varepsilon\end{matrix}$		

3. The Groups D_n (n = 2, 3, 4, 5, 6)

D_2 (222)	E	$C_2(z)$	$C_2(y)$	$C_2(x)$		
A	1	1	1	1		x^2, y^2, z^2
B_1	1	1	–1	–1	z, R_z	xy
B_2	1	–1	1	–1	y, R_y	xz
B_3	1	–1	–1	1	x, R_x	yz

D_3 (32)	E	$2C_3$	$3C_2$			
A_1	1	1	1		$x^2 + y^2, z^2$	
A_2	1	1	–1	z, R_z		
E	2	–1	0	$(x, y)(R_x, R_y)$	$(x^2 - y^2, 2xy)$	(xz, yz)

D_4 (422)	E	$2C_4$	$C_2 (= C_4^2)$	$2C_2'$	$2C_2''$		
A_1	1	1	1	1	1		$x^2 + y^2, z^2$
A_2	1	1	1	–1	–1	z, R_z	
B_1	1	–1	1	1	–1		$x^2 - y^2$
B_2	1	–1	1	–1	1		xy
E	2	0	–2	0	0	$(x, y)(R_x, R_y)$	(xz, yz)

D_5	E	$2C_5$	$2C_5^2$	$5C_2$		
A_1	1	1	1	1		$x^2 + y^2, z^2$
A_2	1	1	1	–1	z, R_z	
E_1	2	$2 \cos 72^\circ$	$2 \cos 144^\circ$	0	$(x, y)(R_x, R_y)$	(xz, yz)
E_2	2	$2 \cos 144^\circ$	$2 \cos 72^\circ$	0		$(x^2 - y^2, 2xy)$

D_6 (622)	E	$2C_6$	$2C_3$	C_2	$3C_2'$	$3C_2''$		
A_1	1	1	1	1	1	1		$x^2 + y^2, z^2$
A_2	1	1	1	1	–1	–1	z, R_z	
B_1	1	–1	1	–1	1	–1		
B_2	1	–1	1	–1	–1	1		
E_1	2	1	–1	–2	0	0	$(x, y)(R_x, R_y)$	(xz, yz)
E_2	2	–1	–1	2	0	0		$(x^2 - y^2, 2xy)$

4. The Groups C_{nv} (n = 2, 3, 4, 5, 6)

C_{2v} ($2mm$)	E	C_2	$\sigma_v(xz)$	σ'_v (yz)		
A_1	1	1	1	1	z	x^2, y^2, z^2
A_2	1	1	–1	–1	R_z	xy
B_1	1	–1	1	–1	x, R_y	xz
B_2	1	–1	–1	1	y, R_x	yz

C_{3v} ($3m$)	E	$2C_3$	$3\sigma_v$			
A_1	1	1	1	z	$x^2 + y^2, z^2$	
A_2	1	1	–1	R_z		
E	2	–1	0	$(x, y)(R_x, R_y)$	$(x^2 - y^2, 2xy)(xz, yz)$	

C_{4v} ($4mm$)	E	$2C_4$	C_2	$2\sigma_v$	$2\sigma_d$		
A_1	1	1	1	1	1	z	$x^2 + y^2, z^2$
A_2	1	1	1	–1	–1	R_z	
B_1	1	–1	1	1	–1		$x^2 - y^2$
B_2	1	–1	1	–1	1		xy
E	2	0	–2	0	0	$(x, y)(R_x, R_y)$	(xz, yz)

C_{5v}	E	$2C_5$	$2C_5^2$	$5\sigma_v$		
A_1	1	1	1	1	z	$x^2 + y^2, z^2$
A_2	1	1	1	–1	R_z	
E_1	2	2 cos 72°	2 cos 144°	0	$(x, y)(R_x, R_y)$	(xz, yz)
E_2	2	2 cos 144°	2 cos 72°	0		$(x^2 - y^2, 2xy)$

C_{6v} ($6mm$)	E	$2C_6$	$2C_3$	C_2	$3\sigma_v$	$3\sigma_d$		
A_1	1	1	1	1	1	1	z	$x^2 + y^2, z^2$
A_2	1	1	1	1	–1	–1	R_z	
B_1	1	–1	1	–1	1	–1		
B_2	1	–1	1	–1	–1	1		
E_1	2	1	–1	–2	0	0	$(x, y)(R_x, R_y)$	(xz, yz)
E_2	2	–1	–1	2	0	0		$(x^2 - y^2, 2xy)$

5. The Groups C_{nh} (n = 2, 3, 4, 5, 6)

C_{2h} ($2/m$)	E	C_2	i	σ_h		
A_g	1	1	1	1	R_z	x^2, y^2, z^2, xy
B_g	1	–1	1	–1	R_x, R_y	xz, yz
A_u	1	1	–1	–1	z	
B_u	1	–1	–1	1	x, y	

C_{3h} $(\bar{6})$	E	C_3	C_3^2	σ_h	S_3	S_3^5		$\varepsilon = \exp(2\pi i/3)$
A'	1	1	1	1	1	1	R_z	$x^2 + y^2, z^2$
E'	$\begin{Bmatrix}1 & \varepsilon & \varepsilon^* & 1 & \varepsilon & \varepsilon^* \\ 1 & \varepsilon^* & \varepsilon & 1 & \varepsilon^* & \varepsilon\end{Bmatrix}$						(x, y)	$(x^2 - y^2, 2xy)$
A"	1	1	1	–1	–1	–1	z	
E"	$\begin{Bmatrix}1 & \varepsilon & \varepsilon^* & -1 & -\varepsilon & -\varepsilon^* \\ 1 & \varepsilon^* & \varepsilon & -1 & -\varepsilon^* & -\varepsilon\end{Bmatrix}$						(R_x, R_y)	(xz, yz)

C_{4h} ($4/m$)	E	C_4	C_2	C_4^3	i	S_4^3	σ_h	S_4		
A_g	1	1	1	1	1	1	1	1	R_z	$x^2 + y^2, z^2$
B_g	1	–1	1	–1	1	–1	1	–1		$(x^2 - y^2, 2xy)$
E_g	$\begin{Bmatrix}1 & i & -1 & -i & 1 & i & -1 & -i \\ 1 & -i & -1 & i & 1 & -i & -1 & i\end{Bmatrix}$								(R_x, R_y)	(xz, yz)
A_u	1	1	1	1	–1	–1	–1	–1	z	
B_u	1	–1	1	–1	–1	1	–1	1		
E_u	$\begin{Bmatrix}1 & i & -1 & -i & -1 & -i & 1 & i \\ 1 & -i & -1 & i & -1 & i & 1 & -i\end{Bmatrix}$								(x, y)	

5. The Groups C_{nh} (n = 2, 3, 4, 5, 6) (cont…)

C_{5h}	E	C_5	C_5^2	C_5^3	C_5^4	σ_h	S_5	S_5^7	S_5^3	S_5^9		$\varepsilon = \exp(2\pi i/5)$
A′	1	1	1	1	1	1	1	1	1	1	R_z	x^2+y^2, z^2
E_1'	1	ε	ε^2	ε^{*2}	ε^*	1	ε	ε^2	ε^{*2}	ε^*	(x, y)	
	1	ε^*	ε^{*2}	ε^2	ε	1	ε^*	ε^{*2}	ε^2	ε		
E_2'	1	ε^2	ε^*	ε	ε^{*2}	1	ε^2	ε^*	ε	ε^{*2}	z	$(x^2-y^2, 2xy)$
	1	ε^{*2}	ε	ε^*	ε^2	1	ε^{*2}	ε	ε^*	ε^2		
A″	1	1	1	1	1	−1	−1	−1	−1	−1		
E_1''	1	ε	ε^2	ε^{*2}	ε^*	−1	$-\varepsilon$	$-\varepsilon^2$	$-\varepsilon^{*2}$	$-\varepsilon^*$	(R_x, R_y)	(xz, yz)
	1	ε^*	ε^{*2}	ε^2	ε	−1	$-\varepsilon^*$	$-\varepsilon^{*2}$	$-\varepsilon^2$	$-\varepsilon$		
E_2''	1	ε^2	ε^*	ε	ε^{*2}	−1	$-\varepsilon^2$	$-\varepsilon^*$	$-\varepsilon$	$-\varepsilon^{*2}$		
	1	ε^{*2}	ε	ε^*	ε^2	−1	$-\varepsilon^{*2}$	$-\varepsilon$	$-\varepsilon^*$	$-\varepsilon^2$		

C_{6h} (6/m)	E	C_6	C_3	C_2	C_3^2	C_6^5	i	S_3^5	S_6^5	σ_h	S_6	S_3		$\varepsilon = \exp(2\pi i/6)$
A_g	1	1	1	1	1	1	1	1	1	1	1	1		x^2+y^2, z^2
B_g	1	−1	1	−1	1	−1	1	−1	1	−1	1	−1	(R_x, R_y)	(xz, yz)
E_{1g}	1	ε	$-\varepsilon^*$	−1	$-\varepsilon$	ε^*	1	ε	$-\varepsilon^*$	−1	$-\varepsilon$	ε^*		
	1	ε^*	$-\varepsilon$	−1	$-\varepsilon^*$	ε	1	ε^*	$-\varepsilon$	−1	$-\varepsilon^*$	ε		
E_{2g}	1	$-\varepsilon^*$	$-\varepsilon$	1	$-\varepsilon^*$	$-\varepsilon$	1	$-\varepsilon^*$	$-\varepsilon$	1	$-\varepsilon^*$	$-\varepsilon$		
	1	$-\varepsilon$	$-\varepsilon^*$	1	$-\varepsilon$	$-\varepsilon^*$	1	$-\varepsilon$	$-\varepsilon^*$	1	$-\varepsilon$	$-\varepsilon^*$		$(x^2-y^2, 2xy)$
A_u	1	1	1	1	1	1	−1	−1	−1	−1	−1	−1	z	
B_u	1	−1	1	−1	1	−1	−1	1	−1	1	−1	1		
E_{1u}	1	ε	$-\varepsilon^*$	−1	$-\varepsilon$	ε^*	−1	$-\varepsilon$	ε^*	1	ε	$-\varepsilon^*$		
	1	ε^*	$-\varepsilon$	−1	$-\varepsilon^*$	ε	−1	$-\varepsilon^*$	ε	1	ε^*	$-\varepsilon$	(x, y)	
E_{2u}	1	$-\varepsilon^*$	$-\varepsilon$	1	$-\varepsilon^*$	$-\varepsilon$	−1	ε^*	ε	−1	ε^*	ε		
	1	$-\varepsilon$	$-\varepsilon^*$	1	$-\varepsilon$	$-\varepsilon^*$	−1	ε	ε^*	−1	ε	ε^*		

Character Table 6

The Groups D_{nh} (n = 2, 3, 4, 5, 6)

D_{2h} (mmm)	E	$C_2(z)$	$C_2(y)$	$C_2(x)$	i	$\sigma(xy)$	$\sigma(xz)$	$\sigma(yz)$		
A_g	1	1	1	1	1	1	1	1		x^2, y^2, z^2
B_{1g}	1	1	–1	–1	1	1	–1	–1	R_z	xy
B_{2g}	1	–1	1	–1	1	–1	1	–1	R_y	xz
B_{3g}	1	–1	–1	1	1	–1	–1	1	R_x	yz
A_u	1	1	1	1	–1	–1	–1	–1		
B_{1u}	1	1	–1	–1	–1	–1	1	1	z	
B_{2u}	1	–1	1	–1	–1	1	–1	1	y	
B_{3u}	1	–1	–1	1	–1	1	1	–1	x	

D_{3h} $(\bar{6})m2$	E	$2C_3$	$3C_2$	σ_h	$2S_3$	$3\sigma_v$		
A_1'	1	1	1	1	1	1		x^2+y^2, z^2
A_2'	1	1	–1	1	1	–1	R_z	
E'	2	–1	0	2	–1	0	(x, y)	(x^2-y^2, xy)
A_1''	1	1	1	–1	–1	–1		
A_2''	1	1	–1	–1	–1	1	z	
E''	2	–1	0	–2	1	0	(R_x, R_y)	(xz, yz)

D_{4h} ($4/mmm$)	E	$2C_4$	C_2	$2C_2'$	$2C_2''$	i	$2S_4$	σ_h	$2\sigma_v$	$2\sigma_d$		
A_{1g}	1	1	1	1	1	1	1	1	1	1		x^2+y^2, z^2
A_{2g}	1	1	1	–1	–1	1	1	1	–1	–1	R_z	
B_{1g}	1	–1	1	1	–1	1	–1	1	1	–1		x^2-y^2
B_{2g}	1	–1	1	–1	1	1	–1	1	–1	1		xy
E_g	2	0	–2	0	0	2	0	–2	0	0	(R_x, R_y)	(xz, yz)
A_{1u}	1	1	1	1	1	–1	–1	–1	–1	–1		
A_{2u}	1	1	1	–1	–1	–1	–1	–1	1	1	z	
B_{1u}	1	–1	1	1	–1	–1	1	–1	–1	1		
B_{2u}	1	–1	1	–1	1	–1	1	–1	1	–1		
E_u	2	0	–2	0	0	–2	0	2	0	0	(x, y)	

6. The Groups D_{nh} (n = 2, 3, 4, 5, 6) (cont…)

D_{5h}	E	$2C_5$	$2C_5^2$	$5C_2$	σ_h	$2S_5$	$2S_5^3$	$5\sigma_v$		
A_1'	1	1	1	1	1	1	1	1		x^2+y^2, z^2
A_2'	1	1	1	–1	1	1	1	–1	R_z	
E_1'	2	2 cos 72°	2 cos 144°	0	2	2 cos 72°	2 cos 144°	0	(x, y)	
E_2'	2	2 cos 144°	2 cos 72°	0	2	2 cos 144°	2 cos 72°	0		$(x^2-y^2, 2xy)$
A_1''	1	1	1	1	–1	–1	–1	–1		
A_2''	1	1	1	–1	–1	–1	–1	1	z	
E_1''	2	2 cos 72°	2 cos 144°	0	–2	–2 cos 72°	–2 cos 144°	0	(R_x, R_y)	(xy, yz)
E_2''	2	2 cos 144°	2 cos 72°	0	–2	–2 cos 144°	–2 cos 72°	0		

D_{6h} (6/mmm)	E	$2C_6$	$2C_3$	C_2	$3C_2'$	$3C_2''$	i	$2S_3$	$2S_6$	σ_h	$3\sigma_d$	$3\sigma_v$		
A_{1g}	1	1	1	1	1	1	1	1	1	1	1	1		x^2+y^2, z^2
A_{2g}	1	1	1	1	–1	–1	1	1	1	1	–1	–1	R_z	
B_{1g}	1	–1	1	–1	1	–1	1	–1	1	–1	1	–1		
B_{2g}	1	–1	1	–1	–1	1	1	–1	1	–1	–1	1		
E_{1g}	2	1	–1	–2	0	0	2	1	–1	–2	0	0	(R_x-R_y)	(xz, yz)
E_{2g}	2	–1	–1	2	0	0	2	–1	–1	2	0	0		$(x^2-y^2, 2xy)$
A_{1u}	1	1	1	1	1	1	–1	–1	–1	–1	–1	–1		
A_{2u}	1	1	1	1	–1	–1	–1	–1	–1	–1	1	1	z	
B_{1u}	1	–1	1	–1	1	–1	–1	1	–1	1	–1	1		
B_{2u}	1	–1	1	–1	–1	1	–1	1	–1	1	1	–1		
E_{1u}	2	1	–1	–2	0	0	–2	–1	1	2	0	0	(x, y)	
E_{2u}	2	–1	–1	2	0	0	–2	1	1	–2	0	0		

7. The Groups D_{nd} (n = 2, 3, 4, 5, 6)

$D_{2d} = V_d$ $(\overline{4}2)m$	E	$2S_4$	C_2	$2C_2'$	$2\sigma_d$		
A_1	1	1	1	1	1		x^2+y^2, z^2
A_2	1	1	1	–1	–1	R_z	
B_1	1	–1	1	1	–1		x^2-y^2
B_2	1	–1	1	–1	1	z	xy
E	2	0	–2	0	0	(x, y) (R_x, R_y)	(xz, yz)

D_{3d} $(\overline{3})m$	E	$2C_3$	$3C_2$	i	$2S_6$	$3\sigma_d$		
A_{1g}	1	1	1	1	1	1		x^2+y^2, z^2
A_{2g}	1	1	–1	1	1	–1	R_z	
E_g	2	–1	0	2	–1	0	(R_x, R_y)	$(x^2-y^2, 2xy)$ (xz, yz)
A_{1u}	1	1	1	–1	–1	–1		
A_{2u}	1	1	–1	–1	–1	1	z	
E_u	2	–1	0	–2	1	0	(x, y)	

D_{4d}	E	$2S_8$	$2C_4$	$2S_8^3$	C_2	$4C_2'$	$4\sigma_d$		
A_1	1	1	1	1	1	1	1		x^2+y^2, z^2
A_2	1	1	1	1	1	–1	–1	R_z	
B_1	1	–1	1	–1	1	1	–1		
B_2	1	–1	1	–1	1	–1	1	z	
E_1	2	$\sqrt{2}$	0	$-\sqrt{2}$	–2	0	0	(x, y)	
E_2	2	0	–2	0	2	0	0		$(x^2-y^2, 2xy)$
E_3	2	$-\sqrt{2}$	0	$\sqrt{2}$	–2	0	0	(R_x, R_y)	(xz, yz)

7. The Groups D_{nd} (n = 2, 3, 4, 5, 6) (cont..)

D_{5d}	E	$2C_5$	$2C_5^2$	$5C_2$	i	$2S_{10}^3$	$2S_{10}$	$5\sigma_d$		
A_{1g}	1	1	1	1	1	1	1	1		x^2+y^2, z^2
A_{2g}	1	1	1	–1	1	1	1	–1	R_z	
E_{1g}	2	2 cos 72°	2 cos 144°	0	2	2 cos 72°	2 cos 144°	0	(R_x, R_y)	(xy, yz)
E_{2g}	2	2 cos 144°	2 cos 72°	0	2	2 cos 144°	2 cos 72°	0		$(x^2-y^2, 2xy)$
A_{1u}	1	1	1	1	–1	–1	–1	–1		
A_{2u}	1	1	1	–1	–1	–1	–1	1	z	
E_{1u}	2	2 cos 72°	2 cos 144°	0	–2	–2 cos 72°	–2 cos 144°	0	(x, y)	
E_{2u}	2	2 cos 144°	2 cos 72°	0	–2	–2 cos 144°	–2 cos 72°	0		

D_{6d}	E	$2S_{12}$	$2C_6$	$2S_4$	$2C_3$	$2S_{12}^5$	C_2	$6C_2'$	$6\sigma_d$		
A_1	1	1	1	1	1	1	1	1	1		x^2+y^2, z^2
A_2	1	1	1	1	1	1	1	–1	–1	R_z	
B_1	1	–1	1	–1	1	–1	1	1	–1		
B_2	1	–1	1	–1	1	–1	1	–1	1	z	
E_1	2	$\sqrt{3}$	1	0	–1	$-\sqrt{3}$	–2	0	0	(x, y)	
E_2	2	1	–1	–2	–1	1	2	0	0		$(x^2-y^2, 2xy)$
E_3	2	0	–2	0	2	0	–2	0	0		
E_4	2	–1	–1	2	–1	–1	2	0	0		
E_5	2	$-\sqrt{3}$	1	0	–1	$\sqrt{3}$	–2	0	0	(R_x, R_y)	(xy, yz)

8. The Groups S_n (n = 4, 6, 8)

S_4 ($\bar{4}$)	E	S_4	C_2	S_4^3		
A	1	1	1	1	R_z	x^2+y^2, z^2
B	1	−1	1	−1	z	$(x^2-y^2, 2xy)$
E	$\begin{Bmatrix}1 & \mathrm{i} & -1 & -\mathrm{i}\\ 1 & -\mathrm{i} & -1 & \mathrm{i}\end{Bmatrix}$				(x, y) (R_x, R_y)	(xz, yz)

S_6 ($\bar{3}$)	E	C_3	C_3^2	i	S_6^5	S_6		$\varepsilon = \exp(2\pi\mathrm{i}/3)$
A_g	1	1	1	1	1	1	R_z	x^2+y^2, z^2
E_g	$\begin{Bmatrix}1 & \varepsilon & \varepsilon^* & 1 & \varepsilon & \varepsilon^*\\ 1 & \varepsilon^* & \varepsilon & 1 & \varepsilon^* & \varepsilon\end{Bmatrix}$						(R_x, R_y)	$(x^2-y^2, 2xy)$ (xy, yz)
A_u	1	1	1	−1	−1	−1	z	
E_u	$\begin{Bmatrix}1 & \varepsilon & \varepsilon^* & 1 & \varepsilon & \varepsilon^*\\ 1 & \varepsilon^* & \varepsilon & 1 & \varepsilon^* & \varepsilon\end{Bmatrix}$						(x, y)	

S_8	E	S_8	C_4	S_8^3	C_2	S_8^5	C_4^3	S_8^7		$\varepsilon = \exp(2\pi\mathrm{i}/8)$
A	1	1	1	1	1	1	1	1	R_z	x^2+y^2, z^2
B	1	−1	1	−1	1	−1	1	−1	z	
E_1	$\begin{Bmatrix}1 & \varepsilon & \mathrm{i} & -\varepsilon^* & -1 & -\varepsilon & -\mathrm{i} & \varepsilon^*\\ 1 & \varepsilon^* & -\mathrm{i} & -\varepsilon & -1 & -\varepsilon^* & \mathrm{i} & \varepsilon\end{Bmatrix}$								(x, y)	
E_2	$\begin{Bmatrix}1 & \mathrm{i} & -1 & -\mathrm{i} & 1 & \mathrm{i} & -1 & -\mathrm{i}\\ 1 & -\mathrm{i} & -1 & \mathrm{i} & 1 & -\mathrm{i} & -1 & \mathrm{i}\end{Bmatrix}$									$(x^2-y^2, 2xy)$
E_3	$\begin{Bmatrix}1 & -\varepsilon^* & -\mathrm{i} & \varepsilon & -1 & \varepsilon^* & \mathrm{i} & -\varepsilon\\ 1 & -\varepsilon & \mathrm{i} & \varepsilon^* & -1 & \varepsilon & -\mathrm{i} & -\varepsilon^*\end{Bmatrix}$								(R_x, R_y)	(xy, yz)

9. The Cubic Groups

T (23)	E	$4C_3$	$4C_3^2$	$3C_2$		$\varepsilon = \exp(2\pi i/3)$
A	1	1	1	1		$x^2+y^2+z^2$
E	$\begin{Bmatrix}1 & \varepsilon & \varepsilon^* & 1\\ 1 & \varepsilon^* & \varepsilon & 1\end{Bmatrix}$					$(\sqrt{3}\,(x^2-y^2), 2z^2-x^2-y^2)$
T	3	0	0	–1	(x, y, z) (R_x, R_y, R_z)	(xy, xz, yz)

T_d ($\bar{4}3m$)	E	$8C_3$	$3C_2$	$6S_4$	$6\sigma_d$		
A_1	1	1	1	1	1		$x^2+y^2+z^2$
A_2	1	1	1	–1	–1		
E	2	–1	2	0	0		$(2z^2-x^2-y^2,\ \sqrt{3}\,(x^2-y^2))$
T_1	3	0	–1	1	–1	(R_x, R_y, R_z)	
T_2	3	0	–1	–1	1	(x, y, z)	(xy, xz, yz)

T_h ($m3$)	E	$4C_3$	$4C_3^2$	$3C_2$	i	$4S_6$	$4S_6^2$	$3\sigma_d$		$\varepsilon = \exp(2\pi i/3)$
A_g	1	1	1	1	1	1	1	1		$x^2+y^2+z^2$
E_g	$\begin{Bmatrix}1 & \varepsilon & \varepsilon^* & 1 & 1 & \varepsilon & \varepsilon^* & 1\\ 1 & \varepsilon^* & \varepsilon & 1 & 1 & \varepsilon^* & \varepsilon & 1\end{Bmatrix}$									$(2z^2-x^2-y^2,$ $\sqrt{3}\,(x^2-y^2))$
T_g	3	0	0	–1	3	0	0	–1	(R_x, R_y, R_z)	(xy, yz, xz)
A_u	1	1	1	1	–1	–1	–1	–1		
E_u	$\begin{Bmatrix}1 & \varepsilon & \varepsilon^* & 1 & -1 & -\varepsilon & -\varepsilon^* & -1\\ 1 & \varepsilon^* & \varepsilon & 1 & -1 & -\varepsilon^* & -\varepsilon & -1\end{Bmatrix}$									
T_u	3	0	0	–1	–3	0	0	1	(x, y, z)	

O (432)	E	$8C_3$	$3C_2$	$6C_4$	$6C_2'$		
A_1	1	1	1	1	1		$x^2+y^2+z^2$
A_2	1	1	1	–1	–1		
E	2	–1	2	0	0		$(2z^2-x^2-y^2,$ $\sqrt{3}\,(x^2-y^2))$
T_1	3	0	–1	1	–1	(x, y, z) (R_x, R_y, R_z)	
T_2	3	0	–1	–1	1		(xy, xz, yz)

9. The Cubic Groups (cont…)

O_h ($m3m$)	E	$8C_3$	$6C_2$	$6C_4$	$3C_2$ ($=C_4^2$)	i	$6S_4$	$8S_6$	$3\sigma_h$	$6\sigma_d$		
A_{1g}	1	1	1	1	1	1	1	1	1	1		$x^2+y^2+z^2$
A_{2g}	1	1	–1	–1	1	1	–1	1	1	–1		
E_g	2	–1	0	0	2	2	0	–1	2	0		$(2z^2-x^2-y^2,$ $\sqrt{3}\,(x^2-y^2))$
T_{1g}	3	0	–1	1	–1	3	1	0	–1	–1	(R_x, R_y, R_z)	
T_{2g}	3	0	1	–1	–1	3	–1	0	–1	1		(xy, xz, yz)
A_{1u}	1	1	1	1	1	–1	–1	–1	–1	–1		
A_{2u}	1	1	–1	–1	1	–1	1	–1	–1	1		
E_u	2	–1	0	0	2	–2	0	1	–2	0		
T_{1u}	3	0	–1	1	–1	–3	–1	0	1	1	(x, y, z)	
T_{2u}	3	0	1	–1	–1	–3	1	0	1	–1		

10. The Groups *I*, I_h

I	E	$12C_5$	$12C_5^2$	$20C_3$	$15C_2$		$\eta^{\pm} = \frac{1}{2}\left(1 \pm 5^{\frac{1}{2}}\right)$
A	1	1	1	1	1		$x^2+y^2+z^2$
T_1	3	η^+	η^-	0	–1	(x, y, z) (R_x, R_y, R_z)	
T_2	3	η^-	η^+	0	–1		
G	4	–1	–1	1	0		
H	5	0	0	–1	1		$(2z^2 - x^2 - y^2,$ $\sqrt{3}\ (x^2 - y^2)$ $xy, yz, zx)$

I_h	E	$12C_5$	$12C_5^2$	$20C_3$	$15C_2$	i	$12S_{10}$	$12S_{10}^3$	$20S_6$	15σ		$\eta^{\pm} = \frac{1}{2}\left(1 \pm 5^{\frac{1}{2}}\right)$
A_g	1	1	1	1	1	1	1	1	1	1		$x^2 + y^2 + z^2$
T_{1g}	3	η^+	η^-	0	–1	3	η^-	η^+	–1	–1	(R_x,R_y,R_z)	
T_{2g}	3	η^-	η^+	0	–1	3	η^+	η^-	0	–1		
G_g	4	–1	–1	1	0	4	–1	–1	1	0		
H_g	5	0	0	–1	1	5	0	0	–1	1		$(2z^2 - x^2 - y^2,$ $\sqrt{3}\ (x^2 - y^2))$ (xy, yz, zx)
A_u	1	1	1	1	1	–1	–1	–1	–1	–1		
T_{1u}	3	η^+	η^-	0	–1	–3	η^-	η^+	0	1	(x, y, z)	
T_{2u}	3	η^-	η^+	0	–1	–3	η^+	η^-	0	1		
G_u	4	–1	–1	1	0	–4	1	1	–1	0		
H_u	5	0	0	–1	1	–5	0	0	1	–1		

11. The Groups $C_{\infty v}$ and $D_{\infty h}$

$C_{\infty v}$	E	C_2	$2C_\infty^\phi$	…	$\infty\sigma_v$		
$A_1 \equiv \Sigma^+$	1	1	1	…	1	z	x^2+y^2, z^2
$A_2 \equiv \Sigma^-$	1	1	1	…	–1	R_z	
$E_1 \equiv \Pi$	2	–2	$2\cos\phi$	…	0	(x,y) (R_x,R_y)	(xz, yz)
$E_2 \equiv \Delta$	2	2	$2\cos 2\phi$	…	0		$(x^2-y^2, 2xy)$
$E_3 \equiv \Phi$	2	–2	$2\cos 3\phi$	…	0		
…	…	…	…	…	…		
…	…	…	…	…	…		

$D_{\infty h}$	E	$2C_\infty^\phi$	…	$\infty\sigma_v$	i	$2S_\infty^\phi$	…	∞C_2		
Σ_g^+	1	1	…	1	1	1	…	1		x^2+y^2, z^2
Σ_g^-	1	1	…	–1	1	1	…	–1	R_z	
Π_g	2	$2\cos\phi$	…	0	2	$-2\cos\phi$	…	0	(R_x, R_y)	(xz, yz)
Δ_g	2	$2\cos 2\phi$	…	0	2	$2\cos 2\phi$	…	0		$(x^2-y^2, 2xy)$
…	…	…	…	…	…	…	…	…		
Σ_u^+	1	1	…	1	–1	–1	…	–1	z	
Σ_u^-	1	1	…	–1	–1	–1	…	1		
Π_u	2	$2\cos\phi$	…	0	–2	$2\cos\phi$	…	0	(x,y)	
Δ_u	2	$2\cos 2\phi$	…	0	–2	$-2\cos 2\phi$	…	0		
…	…	…	…	…	…	…	…	…		