

Symmetry Point Group Character Tables:

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Point Group Identification Flow Chart:

Non-Axial: C_S , and C_i

C_n : C_2 , C_3 , C_4 , C_5 , and C_6

C_{nv} : C_{2v} , C_{3v} , C_{4v} , C_{5v} , and C_{6v}

C_{nh} : C_{2h} , C_{3h} , C_{4h} , C_{5h} , and C_{6h}

D_n : D_2 , D_3 , D_4 , D_5 , and D_6

D_{nh} : D_{2h} , D_{3h} , D_{4h} , D_{5h} , and D_{6h}

D_{nd} : D_{2d} , D_{3d} , D_{4d} , D_{5d} , and D_{6d}

S_n : S_4 , S_6 , S_8 , and S_{10}

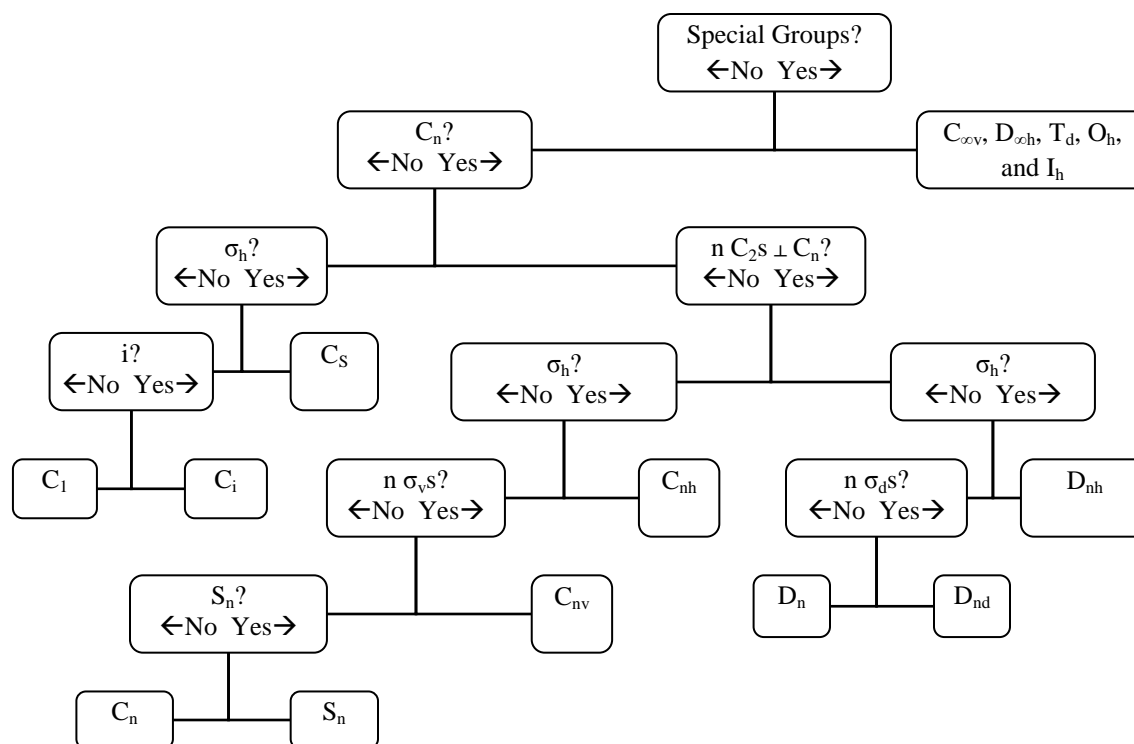
High Symmetry: T_d , O_h , and I_h

Linear: $C_{\infty v}$, and $D_{\infty h}$

Partial Correlation Tables for Linear Groups: $C_{\infty v} \rightarrow C_{2v}$, $D_{\infty h} \rightarrow D_{2h}$

Notes and Acknowledgements:

Point Group Identification Flow Chart



Non-Axial: C_S , and C_i

C_S – Abelian; $h = 2$; Subgroups = $\{\emptyset\}$

C_S	E	σ_h	linear,	quadratic
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			rotations	
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 – Abelian; h = 2 ; Subgroups = {∅}

C_i	E	i	linear, rotations	quadratic
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	

C_n: C₂, C₃, C₄, C₅, and C₆

C₂ – Abelian; h = 2; Subgroups = {∅}

C₂	E	C₂	linear, rotations	quadratic
A	1	1	z, R _z	x ² , y ² , z ² , xy
B	1	-1	x, y, R _x , R _y	yz, xz

C₃ – Abelian; h = 3; $\varepsilon = e^{2\pi i/3}$; Subgroups = {∅}

C₃	E	C₃	(C₃)²	linear, rotations	quadratic
A	1	1	1	z, R _z	x ² +y ² , z ²
E	1	ε	ε^*	(x,y), (R _x ,R _y)	(x ² -y ² , xy), (yz, xz)
	1	ε^*	ε		

C₄ – Abelian; h = 4; Subgroups = {C₂}

C₄	E	C₄	C₂	(C₄)³	linear, rotations	quadratic
A	1	1	1	1	z, R _z	x ² +y ² , z ²
B	1	-1	1	-1		x ² -y ² , xy
E	1	i	-1	-i	(x,y), (R _x ,R _y)	(yz, xz)
	1	-i	-1	i		

C₅ – Abelian; h=5; $\varepsilon = e^{2\pi i/5}$; Subgroups = {∅}

C₅	E	C₅	(C₅)²	(C₅)³	(C₅)⁴	linear, rotations	quadratic
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A	1	1	1	1	1	z, R _z	x ² +y ² , z ²
E₁	1	ε	ε ²	ε ^{2*}	ε [*]	(x,y), (R _x ,R _y)	(yz, xz)
	1	ε [*]	ε ^{2*}	ε ²	ε		
E₂	1	ε ²	ε [*]	ε	ε ^{2*}		(x ² -y ² , xy)
	1	ε ^{2*}	ε	ε [*]	ε ²		

C₆ – Abelian; h=6; $\varepsilon = e^{2\pi i/6}$; Subgroups = {C₂, C₃}

C₆	E	C₆	C₃	C₂	(C₃)²	(C₆)⁵	linear, rotations	quadratic
A	1	1	1	1	1	1	z, R _z	x ² +y ² , z ²
B	1	-1	1	-1	1	-1		
E₁	1	ε	-ε [*]	-1	-ε	ε [*]	(x,y), (R _x ,R _y)	(xz, yz)
	1	ε [*]	-ε	-1	-ε [*]	ε		
E₂	1	-ε [*]	-ε	1	-ε [*]	-ε		(x ² -y ² , xy)
	1	-ε	-ε [*]	1	-ε	-ε [*]		

C_{nv}: C_{2v}, C_{3v}, C_{4v}, C_{5v}, and C_{6v}

C_{2v} – Abelian; h = 4; Subgroups = {C_s, C₂}

C_{2v}	E	C₂ (z)	σ_v(xz)	σ_v(yz)	linear, rotations	quadratic
A₁	1	1	1	1	z	x ² , y ² , z ²
A₂	1	1	-1	-1	R _z	xy
B₁	1	-1	1	-1	x, R _y	xz
B₂	1	-1	-1	1	y, R _x	yz

C_{3v} – Not Abelian; h = 6; Subgroups = {C_s, C₃}

C_{3v}	E	2C₃ (z)	3σ_v	linear, rotations	quadratic
A₁	1	1	1	z	x ² +y ² , z ²
A₂	1	1	-1	R _z	
E	2	-1	0	(x, y), (R _x , R _y)	(x ² -y ² , xy), (xz, yz)

C_{4v} – Not Abelian; h = 8; Subgroups = {C_s, C₂, C₄, C_{2v}}

C_{4v}	E	2C₄ (z)	C₂	2σ_v	2σ_d	linear, rotations	quadratic
A₁	1	1	1	1	1	z	x ² +y ² , z ²

A₂	1	1	1	-1	-1	R _z	
B₁	1	-1	1	1	-1		x ² -y ²
B₂	1	-1	1	-1	1		xy
E	2	0	-2	0	0	(x, y), (R _x , R _y)	(xz, yz)

C_{5v} – Not Abelian; h = 10; Subgroups = {C_s, C₅}

C _{5v}	E	2C ₅ (z)	2(C ₅) ²	5σ _v	linear, rotations	quadratic
A₁	1	1	1	1	z	x ² +y ² , z ²
A₂	1	1	1	-1	R _z	
E₁	2	2cos($\frac{2\pi}{5}$)	2cos($\frac{4\pi}{5}$)	0	(x, y), (R _x , R _y)	(xz, yz)
E₂	2	2cos($\frac{4\pi}{5}$)	2cos($\frac{2\pi}{5}$)	0		(x ² -y ² , xy)

C_{6v} – Not Abelian; h = 12; Subgroups = {C_s, C₂, C₃, C₆, C_{2v}, C_{3v}}

C _{6v}	E	2C ₆ (z)	2C ₃ (z)	C ₂ (z)	3σ _v	3σ _d	linear, rotations	quadratic
A₁	1	1	1	1	1	1	z	x ² +y ² , z ²
A₂	1	1	1	1	-1	-1	R _z	
B₁	1	-1	1	-1	1	-1		
B₂	1	-1	1	-1	-1	1		
E₁	2	1	-1	-2	0	0	(x, y), (R _x , R _y)	(xz, yz)
E₂	2	-1	-1	2	0	0		(x ² -y ² , xy)

C_{nh}: C_{2h}, C_{3h}, C_{4h}, C_{5h}, and C_{6h}

C_{2h} – Abelian; h = 4; Subgroups = { C_s, C_i, C₂}

C _{2h}	E	C ₂ (z)	i	σ _h	linear, rotations	quadratic
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} – Abelian; h = 6; $\varepsilon = e^{2\pi i/3}$; Subgroups = {C_s, C₃}

C _{3h}	E	C ₃ (z)	(C ₃) ²	σ _h	S ₃	(S ₃) ⁵	linear,	quadratic
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							rotations	functions
A'	1	1	1	1	1	1	R_z	x^2+y^2, z^2
E'	1 1	ε ε^*	ε^* ε	1 1	ε ε^*	ε^* ε	(x, y)	(x^2-y^2, xy)
A''	1	1	1	-1	-1	-1	z	
E''	1 1	ε ε^*	ε^* ε	-1 -1	$-\varepsilon$ $-\varepsilon^*$	$-\varepsilon^*$ $-\varepsilon$	(R_x, R_y)	(xz, yz)

C_{4h} – Abelian; h = 8; Subgroups = $\{C_s, C_i, C_2, C_4, C_{2h}, S_4\}$

C_{4h}	E	$C_4(z)$	C_2	$(C_4)^3$	i	$(S_4)^3$	σ_h	S_4	linear, rotations	quadratic
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, xy
E_g	1 1	i -i	-1 -1	-i i	1 1	i -i	-1 -1	-i i	(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	1 1	i -i	-1 -1	-i i	-1 -1	-i i	1 1	i -i	(x, y)	

C_{5h} – Abelian; h = 10; $\varepsilon = e^{2\pi i/5}$; Subgroups = $\{C_s, C_5\}$

C_{5h}	E	C_5	$(C_5)^2$	$(C_5)^3$	$(C_5)^4$	σ_h	S_5	$(S_5)^7$	$(S_5)^3$	$(S_5)^9$	linear, rotations	quadratic
A'	1	1	1	1	1	1	1	1	1	1	R_z	x^2+y^2, z^2
E'₁	1 1	ε ε^*	ε^2 ε^{2*}	ε^{2*} ε^2	ε^* ε	1 1	ε ε^*	ε^2 ε^{2*}	ε^{2*} ε^2	ε^* ε	(x, y)	
E'₂	1 1	ε^2 ε^{2*}	ε^* ε	ε ε^*	ε^{2*} ε^2	1 1	ε^2 ε^{2*}	ε^* ε	ε ε^*	ε^{2*} ε^2		(x^2-y^2, xy)
A''	1	1	1	1	1	-1	-1	-1	-1	-1	z	
E''₁	1 1	ε ε^*	ε^2 ε^{2*}	ε^{2*} ε^2	ε^* ε	-1 -1	$-\varepsilon$ $-\varepsilon^*$	$-\varepsilon^2$ $-\varepsilon^{2*}$	$-\varepsilon^{2*}$ $-\varepsilon^2$	$-\varepsilon^*$ $-\varepsilon$	(R_x, R_y)	(xz, yz)
E''₂	1 1	ε^2 ε^{2*}	ε^* ε	ε ε^*	ε^{2*} ε^2	-1 -1	$-\varepsilon^2$ $-\varepsilon^{2*}$	$-\varepsilon^*$ $-\varepsilon$	$-\varepsilon$ $-\varepsilon^*$	$-\varepsilon^{2*}$ $-\varepsilon^2$		

C_{6h} – Abelian; h = 12; $\varepsilon = e^{2\pi i/6}$; Subgroups = $\{C_s, C_i, C_2, C_3, C_6, C_{2h}, C_{3h}, S_6\}$

C_{6h}	E	$C_6(z)$	C_3	C_2	$(C_3)^2$	$(C_6)^5$	i	$(S_3)^5$	$(S_6)^5$	σ_h	S_6	S_3	linear,	quadratic
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														rotations	
A_g	1	1	1	1	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	1	-1	1	-1			
E_{1g}	1	ε	-ε*	-1	-ε	ε*	1	ε	-ε*	-1	-ε	ε*	(R _x , R _y)	(xz, yz)	
	1	ε*	-ε	-1	-ε*	ε	1	ε*	-ε	-1	-ε*	ε			
E_{2g}	1	-ε*	-ε	1	-ε*	-ε	1	-ε*	-ε	1	-ε*	-ε		(x ² -y ² , xy)	
	1	-ε	-ε*	1	-ε	-ε*	1	-ε	-ε*	1	-ε	-ε*			
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	-ε*	-1	-ε	ε*	-1	-ε	ε*	1	ε	-ε*	(x, y)		
	1	ε*	-ε	-1	-ε*	ε	-1	-ε*	ε	1	ε*	-ε			
E_{2u}	1	-ε*	-ε	1	-ε*	-ε	-1	ε*	ε	-1	ε*	ε			
	1	-ε	-ε*	1	-ε	-ε*	-1	ε	ε*	-1	ε	ε*			

D_n: D₂, D₃, D₄, D₅, and D₆

D₂ – Abelian; h = 4; Subgroups = {C₂}

D ₂	E	C ₂ (z)	C ₂ (y)	C ₂ (x)	linear, rotations	quadratic
A	1	1	1	1		x ² , y ² , z ²
B₁	1	1	-1	-1	z, R _z	xy
B₂	1	-1	1	-1	y, R _y	xz
B₃	1	-1	-1	1	x, R _x	yz

D₃ – Not Abelian; h = 6; Subgroups = {C₂, C₃}

D ₃	E	2C ₃ (z)	3C' ₂	linear, rotations	quadratic
A₁	1	1	1		x ² +y ² , z ²
A₂	1	1	-1	z, R _z	
E	2	-1	0	(x, y), (R _x , R _y)	(x ² -y ² , xy), (xz, yz)

D₄ – Not Abelian; h = 8; Subgroups = {C₂, C₄, D₂}

D ₄	E	2C ₄ (z)	C ₂ (z)	2C' ₂	2C'' ₂	linear, rotations	quadratic
A₁	1	1	1	1	1		x ² +y ² , z ²
A₂	1	1	1	-1	-1	z, R _z	
B₁	1	-1	1	1	-1		x ² -y ²

B₂	1	-1	1	-1	1		xy
E	2	0	-2	0	0	(x, y), (R _x , R _y)	(xz, yz)

D₅ – Not Abelian; h = 10; Subgroups = {C₂, C₅}

D₅	E	2C₅ (z)	2(C₅)²	5C'₂	linear, rotations	quadratic
A₁	1	1	1	1		x ² +y ² , z ²
A₂	1	1	1	-1	z, R _z	
E₁	2	2cos($\frac{2\pi}{5}$)	2cos($\frac{4\pi}{5}$)	0	(x, y), (R _x , R _y)	(xz, yz)
E₂	2	2cos($\frac{4\pi}{5}$)	2cos($\frac{2\pi}{5}$)	0		

D₆ – Not Abelian; h = 12; Subgroups = {C₂, C₃, C₆, D₂, D₃}

D₆	E	2C₆ (z)	2C₃ (z)	C₂ (z)	3C'₂	3C''₂	linear, rotations	quadratic
A₁	1	1	1	1	1	1		x ² +y ² , z ²
A₂	1	1	1	1	-1	-1	z, R _z	
B₁	1	-1	1	-1	1	-1		
B₂	1	-1	1	-1	-1	1		
E₁	2	1	-1	-2	0	0	(x, y), (R _x , R _y)	(xz, yz)
E₂	2	-1	-1	2	0	0		(x ² -y ² , xy)

D_{nh}: D_{2h}, D_{3h}, D_{4h}, D_{5h}, and D_{6h}

D_{2h} – Abelian; h = 8; Subgroups = {C_s, C_i, C₂, C_{2v}, C_{2h}}

D_{2h}	E	C₂ (z)	C₂ (y)	C₂ (x)	i	σ (xy)	σ (xz)	σ (yz)	linear, rotations	quadratic
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} – Not Abelian; $h = 12$; Subgroups = $\{C_s, C_2, C_3, C_{2v}, C_{3v}, C_{3h}, D_3\}$

D_{3h}	E	$2C_3$	$3C'_2$	σ_h	$2S_3$	$3\sigma_v$	linear, rotations	quadratic
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} – Not Abelian; $h = 16$; Subgroups = $\{C_s, C_i, C_2, C_4, C_{2v}, C_{4v}, C_{2h}, C_{4h}, D_2, D_4, D_{2h}, D_{2d}, S_4\}$

D_{4h}	E	$2C_4 (z)$	C_2	$2C'_2$	$2C''_2$	i	$2S_4$	σ_h	$2\sigma_v$	$2\sigma_d$	linears, rotations	quadratic
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)	

D_{5h} – Abelian; $h = 20$; Subgroups = $\{C_s, C_2, C_5, C_{2v}, C_{5v}, C_{5h}, D_5\}$

D_{5h}	E	$2C_5$	$2(C_5)^2$	$5C'_2$	h	$2S_5$	$2(S_5)^3$	$5\sigma_v$	linear, rotations	quadratic
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	$2\cos\left(\frac{2\pi}{5}\right)$	$2\cos\left(\frac{4\pi}{5}\right)$	0	2	$2\cos\left(\frac{2\pi}{5}\right)$	$2\cos\left(\frac{4\pi}{5}\right)$	0	(x, y)	
E'_2	2	$2\cos\left(\frac{4\pi}{5}\right)$	$2\cos\left(\frac{2\pi}{5}\right)$	0	2	$2\cos\left(\frac{4\pi}{5}\right)$	$2\cos\left(\frac{2\pi}{5}\right)$	0		(x^2-y^2, xy)
A''_1	1	1	1	1	-1	-1	-1	-1		
A''_2	1	1	1	-1	-1	-1	-1	1	z	

E''_1	2	$2\cos\left(\frac{2\pi}{5}\right)$	$2\cos\left(\frac{4\pi}{5}\right)$	0	-2	$-2\cos\left(\frac{2\pi}{5}\right)$	$-2\cos\left(\frac{4\pi}{5}\right)$	0	(R_x, R_y)	(xz, yz)
E''_2	2	$2\cos\left(\frac{4\pi}{5}\right)$	$2\cos\left(\frac{2\pi}{5}\right)$	0	-2	$-2\cos\left(\frac{4\pi}{5}\right)$	$-2\cos\left(\frac{2\pi}{5}\right)$	0		

D_{6h} – Abelian; $h = 24$

Subgroups = $\{C_S, C_i, C_2, C_3, C_6, C_{2v}, C_{3v}, C_{6v}, C_{2h}, C_{3h}, C_{6h}, D_2, D_3, D_6, D_{2h}, D_{3h}, D_{3d}, S_6\}$

D_{6h}	E	$2C_6$	$2C_3$	C_2	$3C'_2$	$3C''_2$	i	$2S_3$	$2S_6$	σ_h	$3\sigma_d$	$3\sigma_v$	Linear, rotations	Quadratic
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, xy)
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		

D_{nd} : $D_{2d}, D_{3d}, D_{4d}, D_{5d}$, and D_{6d}

D_{2d} – Not Abelian; $h = 8$; Subgroups = $\{C_S, C_2, C_{2v}, D_2, S_4\}$

D_{2d}	E	$2S_4$	$C_2(z)$	$2C'_2$	$2\sigma_d$	linear, rotations	quadratic
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} – Not Abelian; $h = 12$; Subgroups = $\{C_S, C_i, C_2, C_3, C_{3v}, D_3, S_6\}$

D_{3d}	E	$2C_3$	$3C'_2$	i	$2S_6$	$3\sigma_d$	linear, rotations	quadratic
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 , xy) (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} – Not Abelian; h = 16; Subgroups = {C₈, C₂, C₄, C_{2v}, C_{4v}, D₂, D₄, S₈}

D_{4d}	E	2S₈	2C₄	2(S₈)³	C₂	4C'₂	4σ_d	linear, rotations	quadratic
A₁	1	1	1	1	1	1	1		x ² +y ² , z ²
A₂	1	1	1	1	1	-1	-1	R _z	
B₁	1	-1	1	-1	1	1	-1		
B₂	1	-1	1	-1	1	-1	1	z	
E₁	2	√2	0	-√2	-2	0	0	(x, y)	
E₂	2	0	-2	0	2	0	0		(x ² -y ² , xy)
E₃	2	-√2	0	√2	-2	0	0	(R _x , R _y)	(xz, yz)

D_{5d} – Not Abelian; h = 20; Subgroups = {C₅, C_i, C₂, C₅, C_{5v}, D₅, S₁₀}

D_{5d}	E	2C₅	2(C₅)²	5C'₂	i	2(S₁₀)³	2S₁₀	5σ_d	linear, rotations	quadratic
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	2cos($\frac{2\pi}{5}$)	2cos($\frac{4\pi}{5}$)	0	2	2cos($\frac{2\pi}{5}$)	2cos($\frac{4\pi}{5}$)	0	(R _x , R _y)	(xz, yz)
E_{2g}	2	2cos($\frac{4\pi}{5}$)	2cos($\frac{2\pi}{5}$)	0	2	2cos($\frac{4\pi}{5}$)	2cos($\frac{2\pi}{5}$)	0		(x ² -y ² , xy)
A_{1u}	1	1	1	1	-1	-1	-1	-1		
A_{2u}	1	1	1	-1	-1	-1	-1	1	z	
E_{1u}	2	2cos($\frac{2\pi}{5}$)	2cos($\frac{4\pi}{5}$)	0	-2	-2cos($\frac{2\pi}{5}$)	-2cos($\frac{4\pi}{5}$)	0	(x, y)	
E_{2u}	2	2cos($\frac{4\pi}{5}$)	2cos($\frac{2\pi}{5}$)	0	-2	-2cos($\frac{4\pi}{5}$)	-2cos($\frac{2\pi}{5}$)	0		

D_{6d} – Not Abelian; h = 24; Subgroups = {C₆, C₂, C₃, C₆, C_{2v}, C_{3v}, C_{6v}, D₂, D₃, D₆, S₄, S₁₂}

D_{6d}	E	2S₁₂	2C₆	2S₄	2C₃	2(S₁₂)⁵	C₂	6C'₂	6σ_d	linear, rotations	quadratic
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A₁	1	1	1	1	1	1	1	1		x^2+y^2, z^2
A₂	1	1	1	1	1	1	-1	-1	R_z	
B₁	1	-1	1	-1	1	-1	1	1	-1	
B₂	1	-1	1	-1	1	-1	1	-1	1	z
E₁	2	$\sqrt{3}$	1	0	-1	$-\sqrt{3}$	-2	0	0	(x, y)
E₂	2	1	-1	-2	-1	1	2	0	0	(x^2-y^2, xy)
E₃	2	0	-2	0	2	0	-2	0	0	
E₄	2	-1	-1	2	-1	-1	2	0	0	
E₅	2	$-\sqrt{3}$	1	0	-1	$\sqrt{3}$	-2	0	0	(R_x, R_y) (xz, yz)

S_n: S₄, S₆, S₈, and S₁₀

S₄ – Abelian; h = 4; Subgroups = {C₂}

S₄	E	S₄	C₂	(S₄)³	linear, rotations	quadratic
A	1	1	1	1	R_z	x^2+y^2, z^2
B	1	-1	1	-1	z	x^2-y^2, xy
E	1 1	i -i	-1 -1	-i i	$(x, y), (R_x, R_y)$	(xz, yz)

S₆ – Abelian; h = 6; $\varepsilon = e^{2\pi i/6}$; Subgroups = {C_i, C₃}

S₆	E	C₃(z)	(C₃)²	i	(S₆)⁵	S₆	linear, rotations	quadratic
A_g	1	1	1	1	1	1	R_z	x^2+y^2, z^2
E_g	1 1	ε ε^*	ε^* ε	1 1	ε ε^*	ε^* ε	(R_x, R_y)	(x^2-y^2, xy) (xz, yz)
A_u	1	1	1	-1	-1	-1	Z	
E_u	1 1	ε ε^*	ε^* ε	-1 -1	ε ε^*	ε^* ε	(x, y)	

S₈ – Abelian; h = 8; $\varepsilon = e^{2\pi i/8}$; Subgroups = {C₂, C₄}

S₈	E	S₈	C₄ (z)	(S₈)³	C₂	(S₈)⁵	(C₄)³	(S₈)⁷	linear, rotations	quadratic
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	
E₁	1	ε	i	$-\varepsilon^*$	-1	$-\varepsilon$	-i	ε^*	(x, y)	

	1	ε^*	-i	$-\varepsilon$	-1	$-\varepsilon^*$	i	ε		
E₂	1	i	-1	-i	1	i	-1	-i		(x^2-y^2, xy)
	1	-i	-1	i	1	-i	-1	i		
E₃	1	$-\varepsilon$	i	ε^*	-1	ε	-i	$-\varepsilon^*$	(R_x, R_y)	(xz, yz)
	1	$-\varepsilon^*$	-i	ε	-1	ε^*	i	$-\varepsilon$		

S_{10} – Abelian; $h = 10$; $\varepsilon = e^{2\pi i/10}$; Subgroups = $\{C_i, C_5\}$

S_{10}	E	C_5	$(C_5)^2$	$(C_5)^3$	$(C_5)^4$	i	$(S_{10})^7$	$(S_{10})^9$	S_{10}	$(S_{10})^3$	linear, rotations	quadratic
A_g	1	1	1	1	1	1	1	1	1	1	R_z	z^2, x^2+y^2
E_{1g}	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	ε^*	ε^{2*}	ε^2	$\varepsilon+$		
E_{2g}	1	ε^2	ε^*	ε	ε^{2*}	1	$+\varepsilon^2$	$+\varepsilon^*$	$+\varepsilon$	$+\varepsilon^{2*}$		(x^2-y^2, xy)
	1	ε^{2*}	ε	ε^*	ε^2	1	ε^{2*}	$\varepsilon+$	ε^*	ε^2		
A_u	1	1	1	1	1	-1	-1	-1	-1	-1	Z	
E_{1u}	1	ε	ε^2	ε^{2*}	ε^*	-1	$-\varepsilon$	$-\varepsilon^2$	$-\varepsilon^{2*}$	$-\varepsilon^*$	(x, y)	
	1	ε^*	ε^{2*}	ε^2	ε	-1	$-\varepsilon^*$	$-\varepsilon^{2*}$	$-\varepsilon^2$	$-\varepsilon-$		
E_{2u}	1	ε^2	ε^*	ε	ε^{2*}	-1	$-\varepsilon^2$	$-\varepsilon^*$	$-\varepsilon$	$-\varepsilon^{2*}$		
	1	ε^{2*}	ε	ε^*	ε^2	-1	$-\varepsilon^{2*}$	$-\varepsilon$	$-\varepsilon^*$	$-\varepsilon^2$		

High Symmetry: T_d , O_h , and I_h

T_d – Abelian; $h = 24$; Subgroups = {Many}

T_d	E	$8C_3$	$3C_2$	$6S_4$	$6\sigma_d$	linear, rotations	quadratic
A₁	1	1	1	1	1		$x^2+y^2+z^2$
A₂	1	1	1	-1	-1		
E	2	-1	2	0	0		$(2z^2-x^2-y^2, x^2-y^2)$
T₁	3	0	-1	1	-1	(R_x, R_y, R_z)	
T₂	3	0	-1	-1	1	(x, y, z)	(xy, xz, yz)

O_h – Not Abelian; $h = 48$; Subgroups = {Many}

O_h	E	$8C_3$	$6C_2$	$6C_4$	$3C_2 = (C_4)^2$	i	$6S_4$	$8S_6$	$3\sigma_h$	$6\sigma_d$	linear, rotations	quadratic
A_{1g}	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		
E_g	2	-1	0	0	2		2	0	-1	2		$(2z^2-x^2-y^2, x^2-y^2)$

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		(xz, yz, xy)
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		

I_h – Not Abelian; h = 120; Subgroups = {Many}

I_h	E	12C₅	12(C₅)²	20C₃	15C₂	i	12S₁₀	12(S₁₀)³	20S₆	15σ	linear, rotations	quadratic
A_g	1	1	1	1	1	1	1	1	1	1		x ² +y ² +z ²
T_{1g}	3	$-2\cos\left(\frac{4\pi}{5}\right)$	$-2\cos\left(\frac{2\pi}{5}\right)$	0	-1	3	$-2\cos\left(\frac{2\pi}{5}\right)$	$-2\cos\left(\frac{4\pi}{5}\right)$	0	-1	(R _x , R _y , R _z)	
T_{2g}	3	$-2\cos\left(\frac{2\pi}{5}\right)$	$-2\cos\left(\frac{4\pi}{5}\right)$	0	-1	3	$-2\cos\left(\frac{4\pi}{5}\right)$	$-2\cos\left(\frac{2\pi}{5}\right)$	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 , x ² -y ² , xy, xz, yz)
A_u	1	1	1	1	1	-1	-1	-1	-1	-1		
T_{1u}	3	$-2\cos\left(\frac{4\pi}{5}\right)$	$-2\cos\left(\frac{2\pi}{5}\right)$	0	-1	-3	$2\cos\left(\frac{2\pi}{5}\right)$	$2\cos\left(\frac{4\pi}{5}\right)$	0	1	(x, y, z)	
T_{2u}	3	$-2\cos\left(\frac{2\pi}{5}\right)$	$-2\cos\left(\frac{4\pi}{5}\right)$	0	-1	-3	$2\cos\left(\frac{4\pi}{5}\right)$	$2\cos\left(\frac{2\pi}{5}\right)$	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		

Linear: C_{∞v}, and D_{∞h}

C_{∞v} – Not Abelian; h = ∞; Subgroups = {Many}

$C_{\infty v}$	E	$2C_{\infty}$	...	$\infty \sigma_v$	linear, rotations	quadratic
$A_1=\Sigma^+$	1	1	...	1	z	x^2+y^2, z^2
$A_2=\Sigma^-$	1	1	...	-1	R_z	
$E_1=\Pi$	2	$2 \cos(\varphi)$	...	0	(x, y), (R_x, R_y)	(xz, yz)
$E_2=\Delta$	2	$2 \cos(2\varphi)$	...	0		(x^2-y^2, xy)
$E_3=\Phi$	2	$2 \cos(3\varphi)$	...	0		
...		

$D_{\infty h}$ – Not Abelian; $h = \infty$; Subgroups = {Many}

$D_{\infty h}$	E	$2C_{\infty}$	...	$\infty\sigma_v$	i	$2S_{\infty}$	...	$\infty C'_2$	linear functions, rotations	quadratic
$A_{1g}=\Sigma_g^+$	1	1	...	1	1	1	...	1		x^2+y^2, z^2
$A_{2g}=\Sigma_g^-$	1	1	...	-1	1	1	...	-1	R_z	
$E_{1g}=\Pi_g$	2	$2\cos(\varphi)$	...	0	2	$-2\cos(\varphi)$	...	0	(R_x, R_y)	(xz, yz)
$E_{2g}=\Delta_g$	2	$2\cos(2\varphi)$	...	0	2	$2\cos(2\varphi)$	...	0		(x^2-y^2, xy)
$E_{3g}=\Phi_g$	2	$2\cos(3\varphi)$	...	0	2	$-2\cos(3\varphi)$	...	0		
...		
$A_{1u}=\Sigma_u^+$	1	1	...	1	-1	-1	...	-1	z	
$A_{2u}=\Sigma_u^-$	1	1	...	-1	-1	-1	...	1		
$E_{1u}=\Pi_u$	2	$2\cos(\varphi)$	...	0	-2	$2\cos(\varphi)$	...	0	(x, y)	
$E_{2u}=\Delta_u$	2	$2\cos(2\varphi)$	...	0	-2	$-2\cos(2\varphi)$	...	0		
$E_{3u}=\Phi_u$	2	$2\cos(3\varphi)$	...	0	-2	$2\cos(3\varphi)$	...	0		
...		

Partial Correlation Tables for Linear Groups: $C_{\infty v} \rightarrow C_{2v}, D_{\infty h} \rightarrow D_{2h}$

$C_{\infty v} \rightarrow C_{2v}$

$C_{\infty v}$	C_{2v}
$A_1=\Sigma^+$	A_1
$A_2=\Sigma^-$	A_2
$E_1=\Pi$	$B_1 + B_2$
$E_2=\Delta$	$A_1 + A_2$

$D_{\infty h} \rightarrow D_{2h}$

$D_{\infty h}$	D_{2h}
$A_{1g}=\Sigma_g^+$	A_g
$A_{2g}=\Sigma_g^-$	B_{1g}
$E_{1g}=\Pi_g$	$B_{2g} + B_{3g}$
$E_{2g}=\Delta_g$	$A_g + B_{1g}$
...	
$A_{1u}=\Sigma_u^+$	B_{1u}

$A_{2u}=\Sigma_u^-$	A_u
$E_{1u}=\Pi_u$	$B_{2u} + B_{3u}$
$E_{2u}=\Delta_u$	$A_u + B_{1u}$
...	

Notes and Acknowledgements:

1. Linear functions x, y, and z can represent translational degrees of freedom. Linear functions R_x , R_y , and R_z can represent rotational degrees of freedom.
2. Vibrational modes which share a symmetry species with one of the three linear functions x, y, or z will be infrared active. Vibrational modes which share a symmetry species with one of the quadratic functions will be Raman active.
3. Degenerate functions $(x \pm iy)$ and $(R_x \pm iR_y)$ are represented as simply (x, y) and (R_x, R_y) .
4. While I have worked hard to ensure that this document is correct, I assume no responsibility for the accuracy of the information here.

This document was compiled with the help of these references:

1. <http://www.webqc.org/symmetry.php>
2. http://en.wikipedia.org/wiki/List_of_character_tables_for_chemically_important_3D_point_groups
3. Carter, Robert L. *Molecular Symmetry and Group Theory*. John Wiley and Sons, Inc. (Hoboken, NJ) 1998.