

3. The D_n Groups

D_2	E	$C_2(z)$	$C_2(y)$	$C_2(x)$		
A	1	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	E	$2C_3$	$3C_2$		
A_1	1	1	1	z, R_z	$x^2 + y^2, z^2$
A_2	1	1	-1	$(x, y)(R_x, R_y)$	$(x^2 - y^2, xy)(xz, yz)$
E	2	-1	0		

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

D_5	E	$2C_5$	$2C_3^2$	$5C_2$			
A_1	1	1	1	1	1	z, R_z	$x^2 + y^2, z^2$
A_2	1	1	1	-1	-1	z, R_z	(xz, yz)
E_1	2	$2 \cos 72^\circ$	$2 \cos 144^\circ$	0	0	$(x, y)(R_x, R_y)$	(xz, yz)
E_2	2	$2 \cos 144^\circ$	$2 \cos 72^\circ$	0	0	$(x, y)(R_x, R_y)$	$(x^2 - y^2, xy)$

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

4. The C_{nh} Groups

C_{2v}	E	C_2	$\sigma_v(xz)$	$\sigma_v(yz)$		
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_x	xz
B_2	1	-1	-1	1	y, R_y	yz

C_{3v}	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	$x^2 + y^2, z^2$
E	2	-1	0	$(x, y)(R_x, R_y)$	$(x^2 - y^2, xy)(xz, yz)$

C_{4v}	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	$x^2 + y^2, z^2$
B_1	1	-1	1	1	-1	$x^2 - y^2$	$x^2 - y^2$
B_2	1	-1	1	-1	1	xy	xy
E	2	0	-2	0	0	$(x, y)(R_x, R_y)$	(xz, yz)

C_{5v}	E	$2C_5$	$2C_3^2$	$5\sigma_v$			
A_1	1	1	1	1	1	z	$x^2 + y^2, z^2$
A_2	1	1	1	-1	-1	R_z	$x^2 + y^2, z^2$
E_1	2	$2 \cos 72^\circ$	$2 \cos 144^\circ$	0	0	$(x, y)(R_x, R_y)$	(xz, yz)
E_2	2	$2 \cos 144^\circ$	$2 \cos 72^\circ$	0	0	$(x, y)(R_x, R_y)$	$(x^2 - y^2, xy)$

C_{6v}	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	$x^2 + y^2, z^2$
B_1	1	1	-1	1	1	-1	$(x, y)(R_x, R_y)$	(xz, yz)
B_2	1	1	-1	1	-1	1	$(x, y)(R_x, R_y)$	(xz, yz)
E_1	2	1	-1	-2	0	0	$(x, y)(R_x, R_y)$	(xz, yz)
E_2	2	-1	-1	2	0	0	$(x, y)(R_x, R_y)$	$(x^2 - y^2, xy)$

The C_{6h} Groups

C_{6h}	E	C_2	i	σ_h	R_2	R_2, R_2, R_2	x^2, y^2, z^2, xy xz, yz
A_g	1	1	1	1	1	1	1
B_g	1	-1	1	-1	1	1	1
A_u	1	1	-1	1	1	1	1
B_u	1	-1	-1	-1	1	1	1

C_{3h}	E	C_3	C_3^2	σ_h	S_3	S_3^5	$\epsilon = \exp(2\pi i/3)$	$x^2 + y^2, z^2$ (x, y) z (R_2, R_2) (xz, yz)
A'	1	1	1	1	1	1	1	
E'	1	ϵ	ϵ^2	1	ϵ	ϵ^2	$x^2 + y^2, z^2$ (x, y)	
A''	1	1	1	1	1	1	1	
E''	1	ϵ	ϵ^2	1	ϵ	ϵ^2	$x^2 + y^2, z^2$ (x, y)	

C_{6h}	E	C_2	C_3	C_3^2	C_4	C_4^3	i	S_6^3	σ_h	S_6	R_2	$x^2 + y^2, z^2$ $x^2 - y^2, xy$ (xz, yz)
A_g	1	1	1	1	1	1	1	1	1	1	1	1
B_g	1	-1	1	1	-1	-1	1	1	-1	-1	1	1
E_g	1	1	ϵ	ϵ^2	1	1	1	1	1	1	1	1
A_u	1	1	1	1	1	1	1	1	1	1	1	1
B_u	1	-1	1	1	-1	-1	1	1	-1	-1	1	1
E_u	1	1	ϵ	ϵ^2	1	1	1	1	1	1	1	1

C_{6h}	E	C_2	C_3	C_3^2	C_4	C_4^3	C_5	C_5^4	σ_h	S_5	S_5^7	S_5^3	S_5^9	R_2	$x^2 + y^2, z^2$ (x, y) $(x^2 - y^2, xy)$ z (R_2, R_2) (xz, yz)
A'	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
E_1'	1	ϵ	ϵ^2	ϵ^4	ϵ^3	ϵ^4	ϵ	ϵ^2	ϵ^4	ϵ	ϵ^2	ϵ^4	ϵ	ϵ^2	ϵ^4
E_2'	1	ϵ^2	ϵ^4	ϵ	ϵ^3	ϵ^4	ϵ^2	ϵ	ϵ^4	ϵ^2	ϵ	ϵ^4	ϵ^2	ϵ	ϵ^4
A''	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
E_1''	1	ϵ	ϵ^2	ϵ^4	ϵ^3	ϵ^4	ϵ	ϵ^2	ϵ^4	ϵ	ϵ^2	ϵ^4	ϵ	ϵ^2	ϵ^4
E_2''	1	ϵ^2	ϵ^4	ϵ	ϵ^3	ϵ^4	ϵ^2	ϵ	ϵ^4	ϵ^2	ϵ	ϵ^4	ϵ^2	ϵ	ϵ^4

C_{6h}	E	C_6	C_3	C_2	C_3^2	C_6^5	i	S_3^5	S_3^3	σ_h	S_6	S_3	R_2	$x^2 + y^2, z^2$ (R_2, R_2) (xz, yz) $(x^2 - y^2, xy)$ z (x, y)
A_g	1	1	1	1	1	1	1	1	1	1	1	1	1	1
B_g	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	1
E_{1g}	1	ϵ	ϵ^2	ϵ^4	ϵ^3	ϵ^4	ϵ	ϵ^2	ϵ^4	ϵ	ϵ^2	ϵ^4	ϵ	ϵ^2
E_{2g}	1	ϵ^2	ϵ^4	ϵ	ϵ^3	ϵ^4	ϵ^2	ϵ	ϵ^4	ϵ^2	ϵ	ϵ^4	ϵ^2	ϵ
A_u	1	1	1	1	1	1	1	1	1	1	1	1	1	1
B_u	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	1
E_{1u}	1	ϵ	ϵ^2	ϵ^4	ϵ^3	ϵ^4	ϵ	ϵ^2	ϵ^4	ϵ	ϵ^2	ϵ^4	ϵ	ϵ^2
E_{2u}	1	ϵ^2	ϵ^4	ϵ	ϵ^3	ϵ^4	ϵ^2	ϵ	ϵ^4	ϵ^2	ϵ	ϵ^4	ϵ^2	ϵ

The D_{6h} Groups

D_{6h}	E	$C_2(x)$	$C_2(y)$	$C_2(z)$	i	$\sigma(xy)$	$\sigma(xz)$	$\sigma(yz)$	R_2	$x^2 + y^2, z^2$ xy xz yz
A_g	1	1	1	1	1	1	1	1	1	1
B_{1g}	1	1	-1	-1	1	1	1	1	1	1
B_{2g}	1	1	1	-1	1	1	1	1	1	1
B_{3g}	1	1	-1	1	1	1	1	1	1	1
A_u	1	-1	-1	-1	1	-1	-1	-1	1	1
B_{1u}	1	-1	1	1	1	-1	-1	-1	1	1
B_{2u}	1	-1	1	-1	1	-1	-1	-1	1	1
B_{3u}	1	-1	-1	1	1	-1	-1	-1	1	1

D_{3h}	E	$2C_3$	$3C_2$	σ_h	$2S_3$	$3\sigma_v$	R_2	$x^2 + y^2, z^2$ (x, y) $(x^2 - y^2, xy)$ z (R_2, R_2) (xz, yz)
A_1'	1	1	1	1	1	1	1	
A_2'	1	-1	1	1	-1	1	1	
E'	2	-1	0	2	-1	0	(x, y)	
A_1''	1	1	1	1	1	1	1	
A_2''	1	-1	1	1	-1	1	1	
E''	2	-1	0	2	-1	0	(x, y)	

D_{6h}	E	$2C_4$	C_2	$2C_2'$	$2C_2''$	i	$2S_4$	σ_h	$2\sigma_v$	$2\sigma_d$	R_2	$x^2 + y^2, z^2$ $x^2 - y^2$ xy (xz, yz)
A_{1g}	1	1	1	1	1	1	1	1	1	1	1	1
A_{2g}	1	1	1	-1	-1	1	1	1	-1	-1	1	1
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_g	2	0	-2	0	0	2	0	-2	0	0	(R_2, R_2)	$(x^2 - y^2, xy)$
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
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_u	2	0	-2	0	0	-2	0	2	0	0	(x, y)	(xz, yz)

D_{6h}	E	$2C_3$	$2C_3^2$	$5C_2$	σ_h	$2S_3$	$2S_3^3$	$5\sigma_v$	R_2	$x^2 + y^2, z^2$ (x, y) $(x^2 - y^2, xy)$ z (R_2, R_2) (xz, yz)
A_1'	1	1	1	1	1	1	1	1	1	1
A_2'	1	$\cos 72^\circ$	$2 \cos 144^\circ$	-1	1	$\cos 72^\circ$	1	$2 \cos 144^\circ$	-1	1
E_1'	2	$2 \cos 72^\circ$	$2 \cos 144^\circ$	0	2	$2 \cos 72^\circ$	0	$2 \cos 144^\circ$	0	2
E_2'	2	$2 \cos 144^\circ$	$2 \cos 72^\circ$	0	2	$2 \cos 144^\circ$	0	$2 \cos 72^\circ$	0	2
A_1''	1	1	1	1	1	1	1	1	1	1
A_2''	1	$\cos 72^\circ$	$2 \cos 144^\circ$	-1	1	$\cos 72^\circ$	1	$2 \cos 144^\circ$	-1	1
E_1''	2	$2 \cos 72^\circ$	$2 \cos 144^\circ$	0	-2	$-2 \cos 72^\circ$	0	$-2 \cos 144^\circ$	0	-2
E_2''	2	$2 \cos 144^\circ$	$2 \cos 72^\circ$	0	-2	$-2 \cos 144^\circ$	0	$-2 \cos 72^\circ$	0	-2

D_{6h}	E	$2C_6$	$2C_3$	C_2	$3C_2'$	$3C_2''$	i	$2S_3$	$2S_3^3$	σ_h	$3\sigma_v$	$3\sigma_d$	R_2	$x^2 + y^2, z^2$ (R_2, R_2) (xz, yz) $(x^2 - y^2, xy)$ z (x, y)
A_{1g}	1	1	1	1	1	1	1	1	1	1	1	1	1	1
A_{2g}	1	1	1	1	1	1	1	1	1	1	1	1	1	1
B_{1g}	1	1	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	1	1
E_{1g}	2	1	1	-2	0	0	2	1	1	-2	0	0	0	0
E_{2g}	2	1	1	-2	0	0	2	1	1	-2	0	0	0	0
A_{1u}	1	1	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	1	1
B_{1u}	1	1	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	1	1
E_{1u}	2	1	1	-2	0	0	-2	1	1	2	0	0	0	0
E_{2u}	2	1	1	-2	0	0	-2	1	1	2	0	0	0	0

12
6x6
A_{1u} + B_{2u} + E₁ + 2

6. The D_{6h} Groups (Continued).

D_{6h}	E	$2C_6$	$2C_3^2$	$2C_2$	C_2	$4C_3'$	$4C_2'$	I	$2S_6$	$2S_6^5$	$2S_4$	σ_h	$4\sigma_d$	$4\sigma_v$	
A_{1g}	1	1	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	1	1	R_z
E_{1g}	2	$\sqrt{2}$	$-\sqrt{2}$	0	-2	0	0	0	2	2	$\sqrt{2}$	$-\sqrt{2}$	0	0	(xz, yz)
E_{2g}	2	0	0	-2	2	0	0	0	2	2	0	0	0	0	$(x^2 - y^2, x^2 + y^2, z^2)$
E_{1u}	2	$-\sqrt{2}$	$\sqrt{2}$	0	-2	0	0	0	2	2	$-\sqrt{2}$	$\sqrt{2}$	0	0	(R_x, R_y)
E_{2u}	2	0	0	2	-2	0	0	0	2	2	0	0	0	0	(xz, yz)
A_{1u}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	z
A_{2u}	1	1	1	1	1	1	1	1	1	1	1	1	1	1	z
E_{1u}	2	$\sqrt{2}$	$-\sqrt{2}$	0	-2	0	0	0	2	2	$-\sqrt{2}$	$\sqrt{2}$	0	0	(x, y)
E_{2u}	2	0	0	2	-2	0	0	0	2	2	0	0	0	0	(x, y)

7. The D_{6d} Groups

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

D_{3d}	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	$(x^2 - y^2, xy)$
E_g	2	-1	0	2	-1	0	(xz, yz)
A_{1u}	1	1	1	1	-1	-1	z
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	z
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, y)
E_3	2	$-\sqrt{2}$	0	$\sqrt{2}$	-2	0	0	$(x^2 - y^2, xy)$

D_{3d}	E	$2C_3$	$2C_3^2$	$3C_2$	I	$2S_6$	$3\sigma_d$	
A_{1g}	1	1	1	1	1	1	1	$x^2 + y^2, z^2$
A_{2g}	1	1	1	1	1	1	-1	R_z
E_{1g}	2	$2 \cos 72^\circ$	$2 \cos 144^\circ$	0	2	$2 \cos 72^\circ$	0	(xz, yz)
E_{2g}	2	$2 \cos 144^\circ$	$2 \cos 72^\circ$	0	2	$2 \cos 144^\circ$	0	$(x^2 - y^2, z^2)$
A_{1u}	1	1	1	1	1	-1	-1	z
A_{2u}	1	1	1	1	1	-1	1	z
E_{1u}	2	$2 \cos 72^\circ$	$2 \cos 144^\circ$	0	-2	$2 \cos 72^\circ$	0	(x, y)
E_{2u}	2	$2 \cos 144^\circ$	$2 \cos 72^\circ$	0	-2	$2 \cos 144^\circ$	0	(x, y)

7. The D_{6d} Groups (Continued).

D_{6d}	E	$2S_{12}$	$2C_6$	$2S_4$	$2C_3$	$2S_6^5$	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	z
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	$(x^2 - y^2, xy)$
E_3	2	0	-2	0	2	0	-2	0	0	(x, y)
E_4	2	-1	1	2	-1	-1	2	0	0	(x, y)
E_5	2	$-\sqrt{3}$	1	0	-1	$\sqrt{3}$	-2	0	0	(R_x, R_y)

8. The S_6 Groups

S_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	$x^2 - y^2, xy$
E	1	i	-1	$-i$	$(x, y); (R_x, R_y)$	(xz, yz)

S_6	E	C_3	C_3^2	I	S_6^5	S_6	
A_1	1	1	1	1	1	1	$x^2 + y^2, z^2$
E_1	1	ϵ	ϵ^2	1	ϵ	ϵ^2	$(x^2 - y^2, xy); (xz, yz)$
A_2	1	1	1	-1	-1	-1	z
E_2	1	ϵ	ϵ^2	-1	$-\epsilon$	$-\epsilon^2$	(x, y)

S_6	E	S_6	C_4	S_6^5	C_2	S_6^3	C_2	S_6^5	C_4^3	S_6^7	
A	1	1	1	1	1	1	1	1	1	1	$x^2 + y^2, z^2$
B	1	-1	1	-1	1	-1	1	-1	1	-1	R_z
E_1	1	ϵ	i	$-\epsilon^2$	-1	$-\epsilon$	-1	ϵ^2	i	ϵ^2	$(x, y); (R_x, R_y)$
E_2	1	ϵ	i	$-\epsilon^2$	-1	$-\epsilon$	-1	ϵ^2	i	ϵ^2	$(x^2 - y^2, xy)$
E_3	1	ϵ	i	$-\epsilon^2$	-1	$-\epsilon$	-1	ϵ^2	i	ϵ^2	(xz, yz)

The Cubic Groups

T	E	$4C_3$	$4C_3^2$	$3C_2$		
A	1	1	1	1	$\epsilon = \exp(2\pi i/3)$	$x^2 + y^2 + z^2$
E	1	ϵ	ϵ^2	1	$(2\epsilon^2 - \epsilon^2 - \epsilon^2 - y^2)$	$(x^2 - y^2)$
T	3	0	0	-1	$(R_x, R_y, R_z); (x, y, z)$	(xy, xz, yz)

9. The Cubic Groups (Continued).

T_n	E	$4C_3$	$4C_2$	$3C_2$	i	$4S_6$	$4S_6^5$	$3C_2$	$\epsilon = \exp(2\pi i/3)$		
A_1	1	1	1	1	1	1	1	1	$x^2 + y^2 + z^2$		
E_g	$\begin{Bmatrix} 1 & \epsilon & \epsilon^2 \\ 1 & \epsilon^2 & \epsilon \end{Bmatrix}$	$\begin{Bmatrix} \epsilon & \epsilon^2 \\ \epsilon^2 & \epsilon \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 \\ 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} \epsilon & \epsilon^2 \\ \epsilon^2 & \epsilon \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 \\ 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} \epsilon & \epsilon^2 \\ \epsilon^2 & \epsilon \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 \\ 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 \\ 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} 2z^2 - x^2 - y^2, x^2 - y^2 \\ (xz, yz, xy) \end{Bmatrix}$		
T_d	$\begin{Bmatrix} 3 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} 0 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} -1 & 1 & 1 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} -\epsilon & -\epsilon^2 \\ -\epsilon^2 & -\epsilon \end{Bmatrix}$	$\begin{Bmatrix} -1 & 1 \\ 1 & -1 \end{Bmatrix}$	$\begin{Bmatrix} -1 & 1 \\ 1 & -1 \end{Bmatrix}$	$\begin{Bmatrix} (R_x, R_y, R_z) \\ (xz, yz, xy) \end{Bmatrix}$		
E_u	$\begin{Bmatrix} 1 & \epsilon & \epsilon^2 \\ 1 & \epsilon^2 & \epsilon \end{Bmatrix}$	$\begin{Bmatrix} \epsilon & \epsilon^2 \\ \epsilon^2 & \epsilon \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 \\ 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} \epsilon & \epsilon^2 \\ \epsilon^2 & \epsilon \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 \\ 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} \epsilon & \epsilon^2 \\ \epsilon^2 & \epsilon \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 \\ 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 \\ 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} 2z^2 - x^2 - y^2, x^2 - y^2 \\ (xz, yz, xy) \end{Bmatrix}$		
T_u	$\begin{Bmatrix} 3 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} 0 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} -1 & 1 & 1 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{Bmatrix}$	$\begin{Bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{Bmatrix}$	$\begin{Bmatrix} -\epsilon & -\epsilon^2 \\ -\epsilon^2 & -\epsilon \end{Bmatrix}$	$\begin{Bmatrix} -1 & 1 \\ 1 & -1 \end{Bmatrix}$	$\begin{Bmatrix} -1 & 1 \\ 1 & -1 \end{Bmatrix}$	$\begin{Bmatrix} (x, y, z) \\ (x, y, z) \end{Bmatrix}$		

O_h	E	$8C_3$	$6C_2$	$6C_2$	$3C_2(=C_4)$	i	$6S_6$	$8S_6$	$3C_2$	$6C_2$	
A_1	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	1	$x^2 + y^2 + z^2$
E_g	2	-1	0	0	2	2	0	-1	2	0	$(2z^2 - x^2 - y^2, x^2 - y^2)$
T_g	3	0	-1	1	-1	3	1	0	-1	-1	(R_x, R_y, R_z)
T_d	3	0	1	-1	-1	3	-1	0	-1	1	(xz, yz, xy)
A_{2u}	1	1	1	1	1	1	1	-1	-1	1	$x^2 + y^2 + z^2$
A_{1u}	1	1	-1	-1	1	1	1	-1	-1	1	$x^2 + y^2 + z^2$
E_u	2	-1	0	0	2	2	0	1	-2	0	$(2z^2 - x^2 - y^2, x^2 - y^2)$
T_u	3	0	-1	1	-1	3	-1	0	1	1	(R_x, R_y, R_z)
T_d	3	0	1	-1	-1	3	1	0	-1	-1	(xz, yz, xy)

10. The Groups $C_{\infty v}$ and $D_{\infty h}$ for Linear Molecules

$D_{\infty h}$	E	$2C_{\infty}^{\phi}$	\dots	∞C_2	i	$2S_{\infty}^{\phi}$	\dots	∞C_2	
$A_1 \equiv \Sigma^+$	1	1	\dots	1	1	1	\dots	1	$x^2 + y^2, z^2$
$A_2 \equiv \Sigma^-$	1	1	\dots	1	1	1	\dots	1	$x^2 + y^2, z^2$
$E_1 \equiv \Pi$	2	$2 \cos \Phi$	\dots	0	2	$-2 \cos \Phi$	\dots	0	(R_x, R_y)
$E_2 \equiv \Delta$	2	$2 \cos 2\Phi$	\dots	0	2	$2 \cos 2\Phi$	\dots	0	(xz, yz)
$E_3 \equiv \Phi$	\dots	\dots	\dots	\dots	\dots	\dots	\dots	\dots	$(x^2 - y^2, xy)$
\dots	1	1	\dots	1	1	1	\dots	1	z
\dots	2	$2 \cos \Phi$	\dots	0	2	$-2 \cos \Phi$	\dots	0	(x, y)
\dots	2	$2 \cos 2\Phi$	\dots	0	2	$2 \cos 2\Phi$	\dots	0	(xz, yz)
\dots	\dots	\dots	\dots	\dots	\dots	\dots	\dots	\dots	$(x^2 - y^2, xy)$