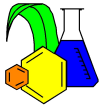


Grupos puntuales de simetría

Nominales

No Axial	C_n	C_{nv}	C_{nh}	D_n	D_{nh}	D_{nd}	S_n	Orden superior	Lineal
C_1	C_2	C_{2v}	C_{2h}	D_2	D_{2h}	D_{2d}	S_4	T_d	$C_{\infty v}$
C_s	C_3	C_{3v}	C_{3h}	D_3	D_{3h}	D_{3d}	S_6	T_h	$C_{\infty h}$
C_i	C_4	C_{4v}	C_{4h}	D_4	D_{4h}	D_{4d}	S_8	O_h	
	C_5	C_{5v}	C_{5h}	D_5	D_{5h}	D_{5d}	S_{10}	I_h	
	C_6	C_{6v}	C_{6h}	D_6	D_{6h}	D_{6d}			



No Axiales

Grupo Puntual C_1

Representación irreducible

Grupo Abelian. 1 representación

Tabla de Operaciones

	E
A	1

Tabla de Productos

	A
A	A

Grupo Puntual C_s

Representación irreducible

Grupo Abelian. 2 representaciones

Tabla de Operaciones

	E	H	Rotaciones lineales	Cuadráticas
A'	1	1	x, y, R_z	x^2, y^2, z^2, xy
A''	1	-1	z, R_x, R_y	yx, xz

Tabla de Productos

	A'	A''
A'	A'	A''
A''	A''	A'

Grupo Puntual C_i

Representación irreducible

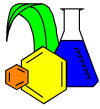
Grupo Abelian. 2 representaciones

Tabla de Operaciones

	E	i	Rotaciones lineales	Cuadráticas
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	

Tabla de Productos

	A_g	A_u
A_g	A_g	A_u
A_u	A_u	A_g



Grupo Puntual C_2

Representación irreducible

Grupo Abeliiano. 2 representaciones

Tabla de Operaciones

	E	C_2	Rotaciones lineales	Cuadráticas
A	1	1	z, R_z	x^2, y^2, z^2, xy
B	1	-1	x, y, R_x, R_y	yz, xz

Tabla de Productos

	A	B
A	A	B
B	B	A

Grupo Puntual C_3

Representación irreducible

Grupo Abeliiano. 2 (3) representaciones

Tabla de Operaciones

	E	C_3	$(C_3)^2$	Rotaciones lineales	Cuadráticas
A	1	1	1	z, R_z	x^2+y^2, z^2
E	1	e	e^*	$X+iy; R_x+iR_y$ $x-iy; R_x-iR_y$	$(x^2-y^2, xy)(yz, xz)$

Tabla de Productos

	A	E
A	A	E
E	E	$2A+E$

Grupo Puntual C_4

Representación irreducible

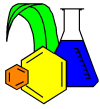
Grupo Abeliiano. 3 (4) representaciones. Subgrupo: C_2

Tabla de Operaciones

	E	C_4	C_2	$(C_4)^3$	Rotaciones lineales	Cuadráticas
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	$X+iy; R_x+iR_y$ $x-iy; R_x-iR_y$	(yz, xz)

Tabla de Productos

	A	B	E
A	A	B	E
B	B	A	E
E	E	E	$2A+2B$



Grupo Puntual C_5

Representación irreducible

Grupo Abelianno. 3 (5) representaciones.

Tabla de Operaciones

	E	C_5	$(C_5)^2$	$(C_5)^3$	$(C_4)^3$	Rotaciones lineales	Cuadráticas
A	1	1	1	1	1	z, R_z	x^2+y^2, z^2
E ₁	1	e	e ²	e ^{2*}	e*	$x+iy; R_x+iR_y$	(yz,xz)
	1	e*	e ^{2*}	e ²	e	$x-iy; R_x-iR_y$	
E ₂	1	e ²	e*	e	e ^{2*}		(x ² -y ² , xy)
	1	e ^{2*}	e	e*	e ²		

Tabla de Productos

	A	E ₁	E ₂
A	A	E ₁	E ₂
E ₁	E ₁	2A+E ₂	E ₁ +E ₂
E ₂	E ₂	E ₁ +E ₂	2A+E ₁

Grupo Puntual C_6

Representación irreducible

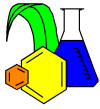
Abelianno. 4 (6) representaciones Subgrupos: C_2 y C_3 .

Tabla de Operaciones

	E	C_5	$(C_5)^2$	$(C_5)^3$	$(C_4)^3$	Rotaciones lineales	Cuadráticas
A	1	1	1	1	1	z, R_z	x^2+y^2, z^2
B	1	1	1	1	1	z, R_z	x^2+y^2, z^2
E ₁	1	e	e ²	e ^{2*}	e*	$x+iy; R_x+iR_y$	(yz, xz)
	1	e*	e ^{2*}	e ²	e	$x-iy; R_x-iR_y$	
E ₂	1	e ²	e*	e	e ^{2*}		(x ² -y ² , xy)
	1	e ^{2*}	e	e*	e ²		

Tabla de Productos

	A	B	E ₁	E ₂
A	A	B	E ₁	E ₂
B	B	A	E ₂	E ₁
E ₁	E ₁	E ₂	2A+E ₂	2B + E ₁
E ₂	E ₂	E ₁	E ₁ +E ₂	2A+E ₂



Conjunto C_{nv}

Grupo Puntual C_{2v}

Representación irreducible

Grupo Abelianno. 4 representaciones. Subgrupos C_{2v} de los grupos C_s y C_2

Tabla de Operaciones

	E	$C_2(z)$	$\sigma_v(xz)$	$\sigma_v(yz)$	Rotaciones lineales	Cuadráticas
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

Tabla de Productos

	A_1	A_2	B_1	B_2
A_1	A_1	A_2	B_1	B_2
A_2	A_2	A_1	B_2	B_1
B_1	B_1	B_2	A_1	A_2
B_2	B_1	B_2	A_2	A_1

Grupo Puntual C_{3v}

Representación irreducible

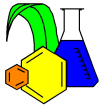
Grupo No Abelianno. 3(4) representaciones. Subgrupos: C_s y C_3

Tabla de Operaciones

	E	$2C_3(z)$	$3\sigma_v$	Rotaciones lineales	Cuadráticas
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_x)	$(x^2-y^2, xy)(xz, yz)$

Tabla de Productos

	A_1	A_2	E
A_1	A_1	A_2	E
A_2	A_2	A_1	E
E	E	E	A_1+A_2+E



Grupo Puntual C_{4v}

Representación irreducible

Grupo No Abelian. 5(6) representaciones. Subgrupos: C_s , C_2 , C_4 y C_{2v}

Tabla de Operaciones

	E	$2C_4(z)$	C_2	$2\sigma_v$	$2\sigma_d$	Rotaciones lineales	Cuadráticas
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		
E	2	0	-2	0	0	(x, y), (R_x, R_y)	(xz, yz)

Tabla de Productos

	A_1	A_2	B_1	B_2	E
A_1	A_1	A_2	B_1	B_2	E
A_2	A_2	A_1	B_2	B_1	E
B_1	B_1	B_2	A_1	A_2	E
B_2	B_2	B_1	A_2	A_1	E
E	E	E	E	E	$A_1+A_2+B_1+B_2$

Grupo Puntual C_{5v}

Representación irreducible

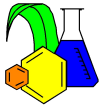
Grupo No Abelian. 4(6) representaciones. Subgrupos: C_s y C_5

Tabla de Operaciones

	E	$2C_5(z)$	$2(C_5)^2$	$5\sigma_v$	Rotaciones lineales	Cuadráticas
A_1	1	1	1	1	z	x^2+y^2, z^2
A_2	1	1	1	-1	R_z	
E_1	2	$2\cos(2\pi/5)$	$2\cos(4\pi/5)$	1	(x, y)(R_x, R_y)	(xz, yz)
E_2	2	$2\cos(4\pi/5)$	$2\cos(2\pi/5)$	-1		(x^2-y^2, xy)

Tabla de Productos

	A_1	A_2	E_1	E_2
A_1	A_1	A_2	E_1	E_2
A_2	A_2	A_1	E_2	E_1
E_1	E_1	E_1	$A_1+A_2+E_2$	E_1+E_2
E_2	E_2	E_2	E_1+E_2	$A_1+A_2+E_2$



Grupo Puntual C_{6v}

Representación irreducible

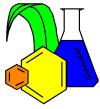
Grupo No Abelian. 6(8) representaciones. Subgrupos: C_s , C_2 , C_3 , C_6 , C_{2v} y C_{3v}

Tabla de Operaciones

	E	$2C_6(z)$	$2C_3(z)$	$C_2(z)$	$3\sigma_v$	$5\sigma_d$	Rotaciones lineales	Cuadráticas
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, xy)

Tabla de Productos

	A_1	A_2	B_1	B_2	E_1	E_2
A_1	A_1	A_2	B_1	B_2	E_1	E_2
A_2	A_2	A_1	B_2	B_1	E_1	E_1
B_1	B_1	B_2	E_1	E_1	E_2	E_1
B_2	B_2	B_1	E_1	E_1	E_2	E_1
E_1	E_1	E_1	E_2	E_2	$A_1+A_2+E_2$	$B_1+B_2+E_1$
E_2	E_2	E_2	E_1	E_1	$B_1+B_2+E_1$	$A_1+A_2+E_2$



Conjunto C_{nh}

Grupo Puntual C_{2h}

Representación irreducible

Grupo Abelian. 4 representaciones. Subgrupos: C_s , C_i , y C_2

Tabla de Operaciones

C_{2h}	E	$C_2(z)$	i	σ_h	Rotaciones lineales	Cuadráticas
A_g	1	1	1	1	R_z	x^2+y^2, z^2
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	

Tabla de Productos

C_{2h}	A_g	B_g	A_u	B_u
A_g	A_g	B_g	A_u	B_u
B_g	B_g	A_g	B_u	A_u
A_u	A_u	B_u	A_g	B_g
B_u	B_u	A_u	B_g	A_g

Grupo Puntual C_{3h}

Representación irreducible

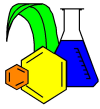
Grupo Abelian. 4(6) representaciones. Subgrupos: C_s , y C_3

Tabla de Operaciones

C_{3h}	E	$C_3(z)$	$(C_3)^2$	σ_h	S_3	$(C_3)^5$	Rotaciones lineales	Cuadráticas
A'	1	1	1	1	1	1	R_z	x^2+y^2, z^2
E'	1	e	e^*	1	e	e^*	$x + iy$	(x^2-y^2, xy)
	1	e^*	e		e^*	e	$x - iy$	
A''	1	1	1	-1	-1	-1	z	
E''	1	e	e^*	-1	-e	$-e^*$	R_x+iR_y	(xz, yz)
	1	e^*	e	-1	$-e^*$	-e	R_x-iR_y	

Tabla de Productos

C_{3h}	A'	E'	A''	E''
A'	A'	E'	A''	E''
E'	E'	$2A'+E'$	E''	$2A''+E''$
A''	A''	E''	A'	E'
E''	E''	$2A''+E''$	E'	$2A'+E'$



Grupo Puntual C_{4h}

Representación irreducible

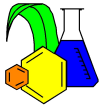
Grupo Abelian. 6(8) representaciones. Subgrupos: C_s , C_i , C_2 , C_4 , C_{2h} , y S_4

Tabla de Operaciones

C_{4h}	E	$C_4(z)$	C_2	$(C_4)^3$	i	$(S_4)^3$	σ_h	S_4	Rotaciones lineales	Cuadráticas
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	i	-1	-i	1	i	-1	-i	R_x+iR_y R_x-iR_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	i	-1	-i	-1	-i	1	i	x + iy x - iy	

Tabla de Productos

C_{4h}	A_g	B_g	E_g	A_u	B_u	E_u
A_g	A_g	B_g	E_g	A_u	B_u	E_u
B_g	B_g	A_g	E_g	B_u	A_u	E_u
E_g	E_g	E_g	$A_g+B_g+E_g$	E_u	E_u	$A_u+B_u+E_u$
A_u	A_u	B_u	E_u	A_g	B_g	E_g
B_u	B_u	A_u	E_u	B_g	A_g	E_g
E_u	E_u	E_u	$A_u+B_u+E_u$	E_g	E_g	$A_g+B_g+E_g$



Grupo Puntual C_{5h}

Representación irreducible

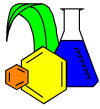
Grupo Abelian. 6(10) representaciones. Subgrupos: C_5 y C_5

Tabla de Operaciones

C_{5h}	E	C_5	$(C_5)^2$	$(C_5)^3$	$(C_5)^4$	σ_h	S_5	$(S_5)^7$	$(S_5)^3$	$(S_5)^9$	Rotaciones lineales	Cuadráticas
A'	1	1	1	1	1	1	1	1	1	1	R_z	x^2+y^2, z^2
E'_1	1	e	e^2	e^{2*}	e^*	1	e	e^2	e^{2*}	e^*	$x + iy$	
	1	e^*	e^{2*}	e^2	e	1	e^*	e^{2*}	e^2	e	$x - iy$	
E'_2	1	e^2	e^*	e	e^{2*}	1	e^2	e^*	e	e^{2*}		(x^2-y^2, xy)
	1	e^{2*}	e	e^*	e^2	1	e^{2*}	e	e^*	e^2		
A''	1	1	1	1	-1	-1	-1	-1	-1	-1	z	
E''_1	1	e	e^2	e^{2*}	e^*	-1	-e	$-e^2$	$-e^{2*}$	$-e^*$	R_x+iR_y	(xz, yz)
	1	e^*	e^{2*}	e^2	e	-1	$-e^*$	$-e^{2*}$	$-e^2$	$-e$	R_x-iR_y	
E''_2	1	e^2	e^*	e	e^{2*}	-1	$-e^2$	$-e^*$	-e	$-e^{2*}$		
	1	e^{2*}	e	e^*	e^2	-1	$-e^{2*}$	-e	$-e^*$	$-e^2$		

Tabla de Productos

C_{5h}	A'	E'_1	E'_2	A''	E''_1	E''_2
A'	A'	E'_1	E'_2	A''	E''_1	E''_2
E'_1	E'_1	$2A'+E'_2$	$E'_1+E'_2$	E''_1	$2A''+E''_2$	$E'_1+E''_2$
E'_2	E'_2	$E'_1+E'_2$	$2A'+E'_1$	E''_2	$E''_1+E''_2$	$2A''+E''_1$
A''	A''	E''_1	E''_2	A'	E'_1	E'_2
E''_1	E''_1	$2A''+E''_2$	$E'_1+E''_2$	E'_1	$2A'+E'_2$	$E'_1+E'_2$
E''_2	E''_2	$E''_1+E''_2$	$2A''+E''_1$	E'_2	$E'_1+E'_2$	$2A'+E'_1$



Grupo Puntual C_{6h}

Representación irreducible

Grupo Abelianno. 8(12) representaciones.

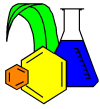
Subgrupos: C_s , C_i , C_2 , C_3 , C_6 , C_{2h} , C_{3h} y S_6

Tabla de Operaciones

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	Rotaciones lineales	Cuadráticas
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	e	$-e^*$	-1	-e	e^*	1	e	$-e^*$	-1	-e	e^*	R_x+iR_y R_x-iR_y	(xz, yz)
E_{2g}	1	$-e^*$	-e	1	$-e^*$	-e	1	$-e^*$	-e	1	$-e^*$	-e		(x^2-y^2, xy)
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	e	$-e^*$	-1	$-e^*$	e^*	-1	-e	e^*	1	e	$-e^*$	x + iy x - iy	
E_{2u}	1	$-e^*$	-e	1	$-e^*$	-e	-1	e^*	e	-1	e^*	e		

Tabla de Productos

C_{6h}	A_g	B_g	E_{1g}	E_{2g}	A_u	B_u	E_{1u}	E_{2u}
A_g	A_g	B_g	E_{1g}	E_{2g}	A_u	B_u	E_{1u}	E_{2u}
B_g	B_g	A_g	E_{2g}	E_{1g}	B_u	A_u	E_{2u}	E_{1u}
E_{1g}	E_{1g}	E_{2g}	$2A_g+E_{2g}$	$2B_g+E_{1g}$	E_{1u}	E_{2u}	$2A_u+E_{2u}$	$2B_u+E_{1u}$
E_{2g}	E_{2g}	E_{1g}	$2B_g+E_{1g}$	$2A_g+E_{2g}$	E_{2u}	E_{1u}	$2B_u+E_{1u}$	$2A_u+E_{2u}$
A_u	A_u	B_u	E_{1u}	E_{1u}	A_g	B_g	E_{1g}	E_{2g}
B_u	B_u	A_u	E_{2u}	E_{2u}	B_g	A_g	E_{2g}	E_{1g}
E_{1u}	E_{1u}	E_{2u}	$2A_u+E_{2u}$	$2B_u+E_{1u}$	E_{1g}	E_{2g}	$2A_g+E_{2g}$	$2B_g+E_{1g}$
E_{2u}	E_{2u}	E_{1u}	$2B_u+E_{1u}$	$2A_u+E_{2u}$	E_{2g}	E_{1g}	$2B_g+E_{1g}$	$2A_g+E_{2g}$



Conjunto D

Grupo Puntual D_2

Representación irreducible

Grupo Abelian. 4 representaciones. Subgrupo: C_2

Tabla de Operaciones

D_2	E	$C_2(z)$	$C_2(y)$	$C_2(x)$	Rotaciones lineales	Cuadráticas
A_1	1	1	1	1		x^2, y^2, z^2
B_1	1	1	-1	-1	z, R_y	xy
B_2	1	-1	1	-1	y, R_x	xz
B_3	1	-1	-1	1	x, R_x	yz

Tabla de Productos

D_2	A	B_1	B_2	B_3
A	A	B_1	B_2	B_3
B_1	B_1	A	B_3	B_2
B_2	B_2	B_3	A	B_1
B_3	B_3	B_2	B_1	A

Grupo Puntual D_3

Representación irreducible

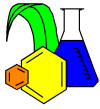
Grupo No Abelian. 3(4) representaciones. Subgrupos: C_2 y C_3

Tabla de Operaciones

D_3	E	$2C_3(z)$	$3C'_2$	Rotaciones lineales	Cuadráticas
A_1	1	1	1		x^2+y^2, z^2
A_2	1	1	-1	z, R_z	
E	2	-1	0	$(x,y) (R_x, R_z)$	$(x^2-y^2, xy) (xz, yz)$

Tabla de Productos

D_3	A_1	A_2	E
A_1	A_1	A_2	E
A_2	A_2	A_1	E
E	E	E	$A_1 + A_2 + E$



Grupo Puntual D_4

Representación irreducible

Grupo No Abeliano. 5(6) representaciones. Subgrupos: C_2 , C_4 y D_2

Tabla de Operaciones

D_4	E	$2C_4(z)$	$C_2(z)$	$2C'_2$	$2C''_2$	Rotaciones lineales	Cuadráticas
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		yz
E	2	0	-2	0	0	$(x,y) (R_x,R_y)$	(xz, yz)

Tabla de Productos

D_4	A_1	A_2	B_1	B_2	E
A_1	A_1	A_2	B_1	B_2	E
A_2	A_2	A_1	B_2	B_1	E
B_1	B_1	B_2	A_1	A_2	E
B_2	B_2	B_1	A_2	A_1	E
E	E	E	E	E	$A_1+A_2+B_1+B_2$

Grupo Puntual D_5

Representación irreducible

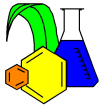
Grupo No Abeliano. 4(6) representaciones. Subgrupos: C_2 y C_5

Tabla de Operaciones

D_5	E	$2C_5(z)$	$2(C_5)^2$	$5C'_2$	Rotaciones lineales	Cuadráticas
A_1	1	1	1	1	z, R_z	x^2+y^2, z^2
A_2	1	1	1	-1	$(x, y)(R_x, R_y)$	
E_1	2	$2\cos(2\pi/5)$	$2\cos(4\pi/5)$	0		(xz, yz)
E_2	2	$2\cos(4\pi/5)$	$2\cos(2\pi/5)$	0		

Tabla de Productos

D_5	A_1	A_2	E_1	E_2
A_1	A_1	A_2	E_1	E_2
A_2	A_2	A_1	E_2	E_1
E_1	E_1	E_2	$A_1+A_2+E_2$	E_1+E_2



E_2	E_2	E_1	E_1+E_2	$A_1+A_2+E_2$
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Grupo Puntual D_6

Representación irreducible

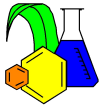
Grupo No Abelian. 6(8) representaciones. Subgrupos: C_2 , C_3 , C_6 , D_2 y D_3

Tabla de Operaciones

D_6	E	$2C_6(z)$	$2C_3(z)$	$C_2(z)$	$3C'_2$	$3C''_2$	Rotaciones lineales	Cuadráticas
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, xy)

Tabla de Productos

D_6	A_1	A_2	B_1	B_2	E_1	E_2
A_1	A_1	A_2	B_1	B_2	E_1	E_2
A_2	A_2	A_1	B_2	B_1	E_1	E_2
B_1	B_1	B_2	A_1	A_2	E_2	E_1
B_2	B_2	B_1	A_2	A_1	E_2	E_1
E_1	E_1	E_1	E_2	E_2	$A_1+A_2+E_2$	$B_1+B_2+B_1$
E_2	E_2	E_2	E_1	E_1	$B_1+B_2+E_2$	$A_1+A_2+E_2$



Conjunto D_{nh}

Grupo Puntual D_{2h}

Representación irreducible

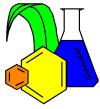
Grupo Abelianno. 8 representaciones. Subgrupos: C_s , C_i , C_2 , C_{2v} y C_{2h}

Tabla de Operaciones

D_{2h}	E	$C_2(z)$	$C_2(y)$	$C_2(x)$	i	$\sigma(xy)$	$\sigma(xz)$	$\sigma(yz)$	Rotaciones Lineales	Cuadráticas
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	

Tabla de Productos

D_{2h}	A_g	B_{1g}	B_{2g}	B_{3g}	A_u	B_{1u}	B_{2u}	B_{3u}
A_g	A_g	B_{1g}	B_{2g}	B_{3g}	A_u	B_{1u}	B_{2u}	B_{3u}
B_{1g}	B_{1g}	A_g	B_{3g}	B_{2g}	B_{1u}	A_u	B_{3u}	B_{2u}
B_{2g}	B_{2g}	B_{3g}	A_g	B_{1g}	B_{2u}	B_{3u}	A_u	B_{1u}
B_{3g}	B_{3g}	B_{2g}	B_{1g}	A_g	B_{3u}	B_{2u}	B_{1u}	A_u
A_u	A_u	B_{1u}	B_{2u}	B_{3u}	A_g	B_{1g}	B_{2g}	B_{3g}
B_{1u}	B_{1u}	A_u	B_{3u}	B_{2u}	B_{1g}	A_g	B_{3g}	B_{2g}
B_{2u}	B_{2u}	B_{3u}	A_u	B_{1u}	B_{2g}	B_{3g}	A_g	B_{1g}
B_{3u}	B_{3u}	B_{2u}	B_{1u}	A_u	B_{3g}	B_{2g}	B_{1g}	A_g



Grupo Puntual D_{3h}

Representación irreducible

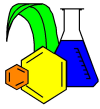
Grupo Abeliiano. 6(8) representaciones. Subgrupos: C_s , C_2 , C_3 , D_3 , C_{2v} , C_{3v} y C_{3h}

Tabla de Operaciones

D_{3h}	E	$2C_3$	$3C'_2$	σ_h	$2S_3$	$3\sigma_v$	Rotaciones Lineales	Cuadráticas
A'_1	1	1	1	1	1	1		x^2+y^2, z^2
A'_2	1	1	-1	1	1	-1	Rz	
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	(Rx, Ry)	(xz, yz)

Tabla de Productos

D_{3h}	A'_1	A'_2	E'	A''_1	A''_2	E''
A'_1	A'_1	A'_2	E'	A''_1	A''_2	E''
A'_2	A'_2	A'_1	E'	A''_2	A''_1	E''
E'	E'	E'	$A'_1+A'_2+E'$	E''	E''	$A''_1+A''_2+E''$
A''_1	A''_1	A''_2	E''	A'_1	A'_2	E'
A''_2	A''_2	A''_1	E''	A'_2	A'_1	E'
E''	E''	E''	$A''_1+A''_2+E''$	E'	E'	$A'_1+A'_2+E'$



Grupo Puntual D_{4h}

Representación irreducible

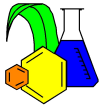
Grupo Abeliiano. 6(8) representaciones. Subgrupos: C_S , C_2 , C_3 , D_3 , C_{2v} , C_{3v} y C_{3h}

Tabla de Operaciones

D_{4h}	E	$2C_4(z)$	C_2	$2C'_2$	$2C''_2$	i	$2S_4$	σ_h	$2\sigma_v$	$2\sigma_d$	Rotaciones Lineales	Cuadráticas
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	Rz	
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	(Rx, Ry)	(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		x^2+y^2, z^2
A_{1g}	1	1	1	1	1	1	1	1	1	1	Rz	
A_{2g}	1	1	1	-1	-1	1	1	1	-1	-1		

Tabla de Productos

D_{4h}	A_{1g}	A_{2g}	B_{1g}	B_{2g}	E_g	A_{1u}	A_{2u}	B_{1u}	B_{2u}	E_u
A_{1g}	A_{1g}	A_{2g}	B_{1g}	B_{2g}	E_g	A_{1u}	A_{2u}	B_{1u}	B_{2u}	E_u
A_{2g}	A_{2g}	A_{1g}	B_{2g}	B_{1g}	E_g	A_{2u}	A_{1u}	B_{2u}	B_{1u}	E_u
B_{1g}	B_{1g}	B_{2g}	A_{1g}	A_{2g}	E_g	B_{1u}	B_{2u}	A_{1u}	A_{2u}	E_u
B_{2g}	B_{2g}	B_{1g}	A_{2g}	A_{1g}	E_g	B_{2u}	B_{1u}	A_{2u}	A_{1u}	E_u
E_g	E_g	E_g	E_g	E_g	$A_{1g}+A_{2g}+B_{1g}+B_{2g}$	E_u	E_u	E_u	E_u	$A_{1u}+A_{2u}+B_{1u}+B_{2u}$
A_{1u}	A_{1u}	A_{2u}	B_{1u}	B_{2u}	E_u	A_{1g}	A_{2g}	B_{1g}	B_{2g}	E_g
A_{2u}	A_{2u}	A_{1u}	B_{2u}	B_{1u}	E_u	A_{2g}	A_{1g}	B_{2g}	B_{1g}	E_g
B_{1u}	B_{1u}	B_{2u}	A_{1u}	A_{2u}	E_u	B_{1g}	B_{2g}	A_{1g}	A_{2g}	E_g
B_{2u}	B_{2u}	B_{1u}	A_{2u}	A_{1u}	E_u	B_{2g}	B_{1g}	A_{2g}	A_{1g}	E_g
E_u	E_u	E_u	E_u	E_u	$A_{1u}+A_{2u}+B_{1u}+B_{2u}$	E_g	E_g	E_g	E_g	$A_{1g}+A_{2g}+B_{1g}+B_{2g}$



Grupo Puntual D_{5h}

Representación irreducible

Grupo No Abelian. 8(12) representaciones.

Subgrupos: C_s , C_2 , C_5 , D_5 , C_{2v} , C_{5v} , y C_{5h}

Tabla de Operaciones

D_{5h}	E	$2C_5$	$2(C_5)^2$	$5C'_2$	h	$2S_5$	$2(S_5)^3$	$5\sigma_v$	Rotaciones lineales	Cuadráticas
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	$2\cos(2\pi/5)$	$2\cos(4\pi/5)$	0	2	$2\cos(2\pi/5)$	$2\cos(4\pi/5)$	0	(x, y)	
E'_2	2	$2\cos(4\pi/5)$	$2\cos(2\pi/5)$	0	2	$2\cos(4\pi/5)$	$2\cos(2\pi/5)$	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	$2\cos(2\pi/5)$	$2\cos(4\pi/5)$	0	-2	$-2\cos(2\pi/5)$	$-2\cos(4\pi/5)$	0	(R_x, R_y)	(xz, yz)
E''_2	2	$2\cos(4\pi/5)$	$2\cos(2\pi/5)$	0	-2	$-2\cos(4\pi/5)$	$-2\cos(2\pi/5)$	0		

Tabla de Productos

D_{5h}	A'_1	A'_2	E'_1	E'_2	A''_1	A''_2	E''_1	E''_2
A'_1	A'_1	A'_2	E'_1	E'_2	A''_1	A''_2	E''_1	E''_2
A'_2	A'_2	A'_1	E'_1	E'_2	A''_2	A''_1	E''_2	E''_1
E'_1	E'_1	E'_1	$A'_1+A'_2+E'_2$	$E'_1+E'_2$	E''_1	E''_1	$A''_1+A''_2+E''_2$	$E''_1+E''_2$
E'_2	E'_2	E'_2	$E'_1+E'_2$	$A'_1+A'_2+E'_2$	E''_2	E''_2	$E''_1+E''_2$	$A''_1+A''_2+E''_2$
A''_1	A''_1	A''_2	E''_1	E''_2	A'_1	A'_2	E'_1	E'_2
A''_2	A''_2	A''_1	E''_1	E''_2	A'_2	A'_1	E'_1	E'_2
E''_1	E''_1	E''_1	$A''_1+A''_2+E''_2$	$E''_1+E''_2$	E'_1	E'_1	$A'_1+A'_2+E'_2$	$E'_1+E'_2$
E''_2	E''_2	E''_2	$E''_1+E''_2$	$A''_1+A''_2+E''_2$	E'_2	E'_2	$E'_1+E'_2$	$A'_1+A'_2+E'_2$



Grupo Puntual D_{6h}

Representación irreducible

Grupo Abelianno. 12(16) representaciones.

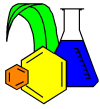
Subgrupos: $C_s, C_i, C_2, C_3, C_6, D_2, D_3, D_6, C_{2v}, C_{3v}, C_{6v}, C_{2h}, C_{3h}, C_{6h}, D_{2h}, D_{3h}, D_{3d},$ y S_6

Tabla de Operaciones

D_{6h}	E	$2C_6$	$2C_3$	C_2	$3C'_2$	$3C''_2$	i	$2S_3$	$2S_6$	σ_h	$3\sigma_d$	$3\sigma_v$	Rotaciones lineales	Cuadráticas
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		

Tabla de Productos

D_{6h}	A_{1g}	A_{2g}	B_{1g}	B_{2g}	E_{1g}	E_{2g}	A_{1u}	A_{2u}	B_{1u}	B_{2u}	E_{1u}	E_{2u}
A_{1g}	A_{1g}	A_{2g}	B_{1g}	B_{2g}	E_{1g}	E_{2g}	A_{1u}	A_{2u}	B_{1u}	B_{2u}	E_{1u}	E_{2u}
A_{2g}	A_{2g}	A_{1g}	B_{2g}	B_{1g}	E_{1g}	E_{2g}	A_{2u}	A_{1u}	B_{2u}	B_{1u}	E_{1u}	E_{2u}
B_{1g}	B_{1g}	B_{2g}	A_{1g}	A_{2g}	E_{2g}	E_{1g}	B_{1u}	B_{2u}	A_{1u}	A_{2u}	E_{2u}	E_{1u}
B_{2g}	B_{2g}	B_{1g}	A_{2g}	A_{1g}	E_{2g}	E_{1g}	B_{2u}	B_{1u}	A_{2u}	A_{1u}	E_{2u}	E_{1u}
E_{1g}	E_{1g}	E_{1g}	E_{2g}	E_{2g}	$A_{1g}+A_{2g}+E_{2g}$	$B_{1g}+B_{2g}+E_{1g}$	E_{1u}	E_{1u}	E_{2u}	E_{2u}	$A_{1u}+A_{2u}+E_{2u}$	$B_{1u}+B_{2u}+E_{1u}$
E_{2g}	E_{2g}	E_{2g}	E_{1g}	E_{1g}	$B_{1g}+B_{2g}+E_{1g}$	$A_{1g}+A_{2g}+E_{2g}$	E_{2u}	E_{2u}	E_{1u}	E_{1u}	$B_{1u}+B_{2u}+E_{1u}$	$A_{1u}+A_{2u}+E_{2u}$
A_{1u}	A_{1u}	A_{2u}	B_{1u}	B_{2u}	E_{1u}	E_{2u}	A_{1g}	A_{2g}	B_{1g}	B_{2g}	E_{1g}	E_{2g}
A_{2u}	A_{2u}	A_{1u}	B_{2u}	B_{1u}	E_{1u}	E_{2u}	A_{2g}	A_{1g}	B_{2g}	B_{1g}	E_{1g}	E_{2g}
B_{1u}	B_{1u}	B_{2u}	A_{1u}	A_{2u}	E_{2u}	E_{1u}	B_{1g}	B_{2g}	A_{1g}	A_{2g}	E_{2g}	E_{1g}
B_{2u}	B_{2u}	B_{1u}	A_{2u}	A_{1u}	E_{2u}	E_{1u}	B_{2g}	B_{1g}	A_{2g}	A_{1g}	E_{2g}	E_{1g}
E_{1u}	E_{1u}	E_{1u}	E_{2u}	E_{2u}	$A_{1u}+A_{2u}+E_{2u}$	$B_{1u}+B_{2u}+E_{1u}$	E_{1g}	E_{1g}	E_{2g}	E_{2g}	$A_{1g}+A_{2g}+E_{2g}$	$B_{1g}+B_{2g}+E_{1g}$
E_{2u}	E_{2u}	E_{2u}	E_{1u}	E_{1u}	$B_{1u}+B_{2u}+E_{1u}$	$A_{1u}+A_{2u}+E_{2u}$	E_{2g}	E_{2g}	E_{1g}	E_{1g}	$B_{1g}+B_{2g}+E_{1g}$	$A_{1g}+A_{2g}+E_{2g}$



Grupo Puntual D_{2d}

Representación irreducible

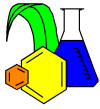
Grupo No abeliano. 5 (6) representaciones. Subgrupos: C_S , C_2 , D_2 , C_{2v} y S_4

Tabla de Operaciones

D_{2d}	E	$2S_4$	$C_2(z)$	C'_2	$2\sigma_d$	Rotaciones Lineales	Cuadráticas
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)
A_1	1	1	1	1	1		x^2+y^2, z^2

Tabla de Productos

D_{2d}	A_1	A_2	B_1	B_2	E
A_1	A_1	A_2	B_1	B_2	E
A_2	A_2	A_2	A_1	B_2	B_1
E	E	B_1	B_1	B_2	A_1
A_2	A_2	E	B_2	B_2	B_1
A_2	A_2	A_1	E	E	E



Grupo Puntual D_{3d}

Representación irreducible

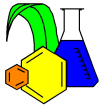
Grupo No Abelian. 6(8) representaciones. Subgrupos: C_S , C_i , D_2 , C_3 , D_3 , C_{3v} y S_6

Tabla de Operaciones

D_{3d}	E	$2C_3$	$3C'_2$	i	$2S_6$	$3\sigma_d$	Rotaciones lineales	Cuadráticas
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)	

Tabla de Productos

D_{3d}	A_{1g}	A_{2g}	E_g	A_{1u}	A_{2u}	E_u
A_{1g}	A_{1g}	A_{2g}	E_g	A_{1u}	A_{2u}	E_u
A_{2g}	A_{2g}	A_{1g}	E_g	A_{2u}	A_{1u}	E_u
E_g	E_g	E_g	$A_{1g}+A_{2g}+E_g$	E_u	E_u	$A_{1u}+A_{2u}+E_u$
A_{1u}	A_{1u}	A_{2u}	E_u	A_{1g}	A_{2g}	E_g
A_{2u}	A_{2u}	A_{1u}	E_u	A_{2g}	A_{1g}	E_g
E_u	E_u	E_u	$A_{1u}+A_{2u}+E_u$	E_g	E_g	$A_{1g}+A_{2g}+E_g$



Grupo Puntual D_{4d}

Representación irreducible

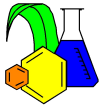
Grupo No Abelian. 6(8) representaciones. Subgrupos: C_S , C_2 , C_4 , D_2 , D_4 , C_{2v} , C_{4v} y S_8

Tabla de Operaciones

D_{4d}	E	$2S_8$	$2C_4$	$2(S_8)^3$	C_2	$4C'_2$	$4\sigma_d$	Rotaciones lineales	Cuadráticas
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	$(2)^{1/2}$	0	$-(2)^{1/2}$	-2	0	0	(x, y)	
E_2	2	0	-2	0	2	0	0		(x^2-y^2, xy)
E_3	2	$-(2)^{1/2}$	0	$(2)^{1/2}$	-2	0	0	(R_x, R_y)	(xz, yz)

Tabla de Productos

D_{4d}	A_1	A_2	B_1	B_2	E_1	E_2	E_3
A_1	A_1	A_2	B_1	B_2	E_1	E_2	E_3
A_2	A_2	A_1	B_2	B_1	E_1	E_2	E_3
B_1	B_1	B_2	A_1	A_2	E_3	E_2	E_1
B_2	B_2	B_1	A_2	A_1	E_3	E_2	E_1
E_1	E_1	E_1	E_3	E_3	$A_1+A_2+E_2$	E_1+E_3	$B_1+B_2+E_2$
E_2	E_2	E_2	E_2	E_2	E_1+E_3	$A_1+A_2+B_1+B_2$	E_1+E_3
E_3	E_3	E_3	E_1	E_1	$B_1+B_2+E_2$	E_1+E_3	$A_1+A_2+E_2$



Grupo Puntual D_{5d}

Representación irreducible

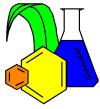
Grupo No Abelian. 6(8) representaciones. Subgrupos: C_5 , C_2 , C_4 , D_2 , D_4 , C_{2v} , C_{4v} y S_8

Tabla de Operaciones

D_{5d}	E	$2C_5$	$2(C_5)^2$	$5C'_2$	i	$2(S_{10})^3$	$2S_{10}$	$5\sigma_d$	Rotaciones lineales	Cuadráticas
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	$2\cos(2\pi/5)$	$2\cos(4\pi/5)$	0	2	$2\cos(2\pi/5)$	$2\cos(4\pi/5)$	0	(R_x, R_y)	(xz, yz)
E_{2g}	2	$2\cos(4\pi/5)$	$2\cos(2\pi/5)$	0	2	$2\cos(4\pi/5)$	$2\cos(2\pi/5)$	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	$2\cos(2\pi/5)$	$2\cos(4\pi/5)$	0	-2	$-2\cos(2\pi/5)$	$-2\cos(4\pi/5)$	0	(x, y)	
E_{2u}	2	$2\cos(4\pi/5)$	$2\cos(2\pi/5)$	0	-2	$-2\cos(4\pi/5)$	$-2\cos(2\pi/5)$	0		

Tabla de Productos

D_{5d}	A_{1g}	A_{2g}	E_{1g}	E_{2g}	A_{1u}	A_{2u}	E_{1u}	E_{2u}
A_{1g}	A_{1g}	A_{2g}	E_{1g}	E_{2g}	A_{1u}	A_{2u}	E_{1u}	E_{2u}
A_{2g}	A_{2g}	A_{1g}	E_{1g}	E_{2g}	A_{2u}	A_{1u}	E_{1u}	E_{2u}
E_{1g}	E_{1g}	E_{1g}	$A_{1g}+A_{2g}+E_{2g}$	$E_{1g}+E_{2g}$	E_{1u}	E_{1u}	$A_{1u}+A_{2u}+E_{2u}$	$E_{1u}+E_{2u}$
E_{2g}	E_{2g}	E_{2g}	$E_{1g}+E_{2g}$	$A_{1g}+A_{2g}+E_{2g}$	E_{2u}	E_{2u}	$E_{1u}+E_{2u}$	$A_{1u}+A_{2u}+E_{2u}$
A_{1u}	A_{1u}	A_{2u}	E_{1u}	A_{2u}	A_{1g}	A_{2g}	E_{1g}	E_{2g}
A_{2u}	A_{2u}	A_{1u}	E_{1u}	E_{2u}	A_{2g}	A_{1g}	E_{1g}	E_{2g}
E_{1u}	E_{1u}	E_{1u}	$A_{1u}+A_{2u}+E_{2u}$	$E_{1u}+E_{2u}$	E_{1g}	E_{1g}	$A_{1g}+A_{2g}+E_{2g}$	$E_{1g}+E_{2g}$
E_{2u}	E_{2u}	E_{2u}	$E_{1u}+E_{2u}$	$A_{1u}+A_{2u}+E_{2u}$	E_{2g}	E_{2g}	$E_{1g}+E_{2g}$	$A_{1g}+A_{2g}+E_{2g}$



Grupo Puntual D_{6d}

Representación irreducible

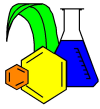
Grupo No Abelian. 9(14) representaciones. Subgrupos: C_3 , C_2 , C_6 , D_2 , D_3 , D_6 , C_{2v} , C_{3v} , C_{6v} , S_4 y S_{12}

Tabla de Operaciones

D_{6d}	E	$2S_{12}$	$2C_6$	$2S_4$	$2C_3$	$2(S_{12})^5$	C_2	$6C'_2$	$6\sigma_d$	Rotaciones lineales	Cuadráticas
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	$(3)^{1/2}$	1	0	-1	$-(3)^{1/2}$	-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		
E_4	2	-1	-1	2	-1	-1	2	0	0		
E_5	2	$-(3)^{1/2}$	1	0	-1	$(3)^{1/2}$	-2	0	0	(R_x, R_y)	(xz, yz)

Tabla de Productos

D_{6d}	A_1	A_2	B_1	B_2	E_1	E_2	E_3	E_4	E_5
A_1	A_1	A_2	B_1	B_2	E_1	E_2	E_3	E_4	E_5
A_2	A_2	A_1	B_2	B_1	E_1	E_2	E_3	E_4	E_5
B_1	B_1	B_2	A_1	A_2	E_5	E_4	E_3	E_2	E_1
B_2	B_2	B_1	A_2	A_1	E_5	E_4	E_3	E_2	E_1
E_1	E_1	E_1	E_5	E_5	$A_1+A_2+E_2$	E_1+E_3	E_2+E_4	E_3+E_5	$B_1+B_2+E_4$
E_2	E_2	E_2	E_4	E_4	E_1+E_3	$A_1+A_2+E_4$	E_1+E_5	$B_1+B_2+E_3$	E_3+E_5
E_3	E_3	E_3	E_3	E_3	E_2+E_4	E_1+E_5	$A_1+A_2+B_1+B_2$	E_1+E_5	E_2+E_4
E_4	E_4	E_4	E_2	E_2	E_3+E_5	$B_1+B_2+E_2$	E_1+E_5	$A_1+A_2+E_4$	E_1+E_3
E_5	E_5	E_5	E_1	E_1	$B_1+B_2+E_4$	E_3+E_5	E_2+E_4	E_1+E_3	$A_1+A_2+E_2$
A_1	A_1	A_2	B_1	B_2	E_1	E_2	E_3	E_4	E_5



Conjunto S_n

Grupo Puntual S_4

Representación irreducible

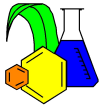
Grupo Abelian. 3 (4) representaciones. Subgrupo: C_2

Tabla de Operaciones

S_4	E	S_4	C_2	$(S_4)^3$	Rotaciones Lineales	Cuadráticas
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	$x+iy; R_x+iR_y$ $x-iy; R_x-iR_y$	(xz, yz)

Tabla de Productos

S_4	A	B	E
A	A	B	E
B	B	A	E
E	E	E	2A+2B



Grupo Puntual S_6

Representación irreducible

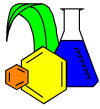
Grupo Abeliano. 3 (4) representaciones. Subgrupo: C_2

Tabla de Operaciones

S_6	E	$C_3(z)$	$(C_3)^2$	i	$(S_6)^5$	S_6	Rotaciones Lineales	Cuadráticas
A_g	1	1	1	1	1	1	R_z	x^2+y^2, z^2
E_g	1 1	e e*	e* e	1 1	e e*	e* e	R_x+iR_y R_x-iR_y	$(x^2-y^2,$ $xy)(xz, yz)$
A_u	1	1	1	-1	-1	-1	z	
E	1 1	e e*	e* e	-1 -1	e e*	e* e	x+iy x-iy	

Tabla de Productos

S_6	A	B	E	E
A_g	A_g	E_g	A_u	E_u
E_g	E_g	$2A_g+E_g$	A_u	$2A_u+E_u$
A_u	A_u	E_u	A_g	E_g
E_u	A_u	$2A_u+E_u$	E_g	$2A_g+E_g$



Grupo Puntual S_8

Representación irreducible

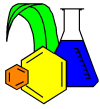
Grupo Abelian. 3 (4) representaciones. Subgrupo: C_2

Tabla de Operaciones

S_8	E	S_8	$C_4(z)$	$(S_8)^3$	C_2	$(S_8)^5$	$(C_4)^3$	$(C_4)^3$	$(S_8)^7$	Rotaciones Lineales	Cuadráticas
A	1	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	-1	z	
E₁	1	e	i	-e*	-1	-e	-i	-i	e*	x+iy x-iy	
E₂	1	i	-1	-i	1	i	-1	-1	-i		(x^2-y^2, xy)
E₃	1	-e	i	e*	-1	e	-i	-i	-e*	R_x+iR_y R_x-iR_y	(xz, yz)

Tabla de Productos

S_8	A	B	E ₁	E ₂	E ₃
A	A	B	E ₁	E ₂	E ₃
B	B	A	E ₃	E ₂	E ₁
E₁	E ₁	E ₃	2A+E ₂	E ₁ +E ₃	2B+E ₂
E₂	E ₂	E ₂	E ₁ +E ₃	2A+2B	E ₁ +E ₃
E₃	E ₃	E ₁	2A+B	E ₁ +E ₃	2A+E ₂



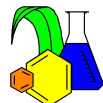
Grupo Puntual S_{10}

Representación irreducible

Grupo Abeliiano. 6 (10) representaciones. Subgrupos: C_i y C_5

Tabla de Operaciones

S_{10}	E	C_5	$(C_5)^2$	$(C_5)^3$	$(C_5)^4$	i	$(S_{10})^7$	$(S_{10})^9$	S_{10}	$(S_{10})^3$	Rotaciones Lineales	Cuadráticas
A_g	1	1	1	1	1	1	1	1	1	1	R_z	z^2, x^2+y^2
E_{1g}	1	e	e^2	e^{2*}	e^*	1	+e	$+e^2$	$+e^{2*}$	$+e^*$	R_x+iR_y	(xz, yz)
	1	e^*	e^{2*}	e^2	e	1	e^*	e^{2*}	e^2	e+	R_x-iR_y	
E_{2g}	1	e^2	e^*	e	e^{2*}	1	$+e^2$	$+e^*$	+e	$+e^{2*}$		(x^2-y^2, xy)
	1	e^{2*}	e	e^*	e^2	1	e^{2*}	e+	e^*	e^2		
A_u		1	1	1	1	-1	-1	-1	-1	-1	z	
E_{1u}	1	e	e^2	e^{2*}	e^*	-1	-e	$-e^2$	$-e^{2*}$	$-e^*$	x+iy	
	1	e^*	e^{2*}	e^2	e	-1	$-e^*$	$-e^{2*}$	$-e^2$	-e	x-iy	
E_{2u}	1	e^2	e^*	e	e^{2*}	-1	$-e^2$	$-e^*$	-e	$-e^{2*}$		
	1	e^{2*}	e	e^*	e^2	-1	$-e^{2*}$	-e	$-e^*$	$-e^2$		



Grupo Puntual T_d

Representación irreducible

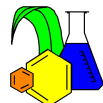
Grupo Abelian. 5(10) representaciones.

Tabla de Operaciones

T_d	E	$8C_3$	$3C_2$	$6S_4$	$6\sigma_d$	Rotaciones Lineales	Cuadráticas
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		$(2z^2-x^2-y^2, x^2-y^2)$
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)

Tabla de Productos

T_d	A_1	A_2	E	T_1	T_2
A_1	A_1	A_2	E	T_1	T_2
A_2	A_2	A_1	E	T_2	T_1
E	E	E	A_1+A_2+E	T_1+T_2	T_1+T_2
T_1	T_1	T_2	T_1+T_2	$A_1+E+T_1+T_2$	$A_2+E+T_1+T_2$
T_2	T_2	T_1	T_1+T_2	$A_2+E+T_1+T_2$	$A_1+E+T_1+T_2$



Grupo Puntual T_h

Representación irreducible

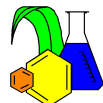
Grupo Abeliiano. 5(10) representaciones.

Tabla de Operaciones

T_h	E	C_3	$4C_3^2$	$3C_2$	i	$4S_6^5$	$4S_6$	3h	Rotaciones Lineales	Cuadráticas
Ag	1	1	1	1	1	1	1	1		$x^2+y^2+z^2(=r^2)$
E_g	1	$e^{2\cdot i/3}$	$e^{4\cdot i/3}$	1	1	$e^{2\cdot i/3}$	$e^{4\cdot i/3}$	1		$(x^2-y^2, 3z^2-r^2)$
	1	$e^{4\cdot i/3}$	$e^{2\cdot i/3}$	1	1	$e^{4\cdot i/3}$	$e^{2\cdot i/3}$	1		
T_g	3	0	0	-1	3	0	0	-1	(lx, ly, lz)	(xy, xz, yz)
A_u	1	1	1	1	-1	-1	-1	-1		
E_u	1	$e^{2\cdot i/3}$	$e^{4\cdot i/3}$	1	-1	$-e^{2\cdot i/3}$	$-e^{4\cdot i/3}$	-1	(x, y, z)	
	1	$e^{4\cdot i/3}$	$e^{2\cdot i/3}$	1	-1	$-e^{4\cdot i/3}$	$-e^{2\cdot i/3}$	-1		
T_u	3	0	0	-1	-3	0	0	1	(x, y, z)	

Tabla de Productos

T_h	A _g	E _g	T _g	A _u	E _u	T _u
A _g	A _g	E _g	T _g	A _u	E _u	T _u
E _g	E _g	2A _g +E _g	2T _g	E _u	2A _u +E _u	2T _u
T _g	T _g	2T _g	A _g +E _g +2T _g	T _u	2T _u	A _u +E _u +2T _u
A _u	A _u	E _u	T _u	A _g	E _g	T _g
E _u	E _u	2A _u +E _u	2T _u	E _g	2A _g +E _g	2T _g
T _u	T _u	2T _u	A _u +E _u +2T _u	T _g	2T _g	A _g +E _g +2T _g



Grupo Puntual O_h

Representación irreducible

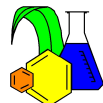
Grupo No Abelian. 10(20) representaciones.

Tabla de Operaciones

O_h	E	$8C_3$	$6C_2$	$6C_4$	$3C_2=(C_4)^2$	i	$6S_4$	$8S_6$	$3\sigma_h$	$6\sigma_d$	Rotaciones Lineales	Cuadráticas
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		$(2z^2-x^2-y^2, x^2-y^2)$
T_{1g}	3	0	-1	1	-1	3	1	0	-1	-1	(Rx, Ry, Rz)	
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		

Tabla de Productos

O_h	A_{1g}	A_{2g}	E_g	T_{1g}	T_{2g}	A_{1u}	A_{2u}	E_u	T_{1u}	T_{2u}
A_{1g}	A_{1g}	A_{2g}	E_g	T_{1g}	T_{2g}	A_{1u}	A_{2u}	E_u	T_{1u}	T_{2u}
A_{2g}	A_{2g}	A_{1g}	E_g	T_{2g}	T_{1g}	A_{2u}	A_{1u}	E_u	T_{2u}	T_{1u}
E_g	E_g	E_g	$A_{1g}+A_{2g}+E_g$	$T_{1g}+T_{2g}$	$T_{1g}+T_{2g}$	E_u	E_u	$A_{1u}+A_{2u}+E_u$	$T_{1u}+T_{2u}$	$T_{1u}+T_{2u}$
T_{1g}	T_{1g}	T_{2g}	$T_{1g}+T_{2g}$	$A_{1g}+E_g+T_{1g}+T_{2g}$	$A_{2g}+E_g+T_{1g}+T_{2g}$	T_{1u}	T_{2u}	$T_{1u}+T_{2u}$	$A_{1u}+E_u+T_{1u}+T_{2u}$	$A_{2u}+E_u+T_{1u}+T_{2u}$
T_{2g}	T_{2g}	T_{1g}	$T_{1g}+T_{2g}$	$A_{2g}+E_g+T_{1g}+T_{2g}$	$A_{1g}+E_g+T_{1g}+T_{2g}$	T_{2u}	T_{1u}	$T_{1u}+T_{2u}$	$A_{2u}+E_u+T_{1u}+T_{2u}$	$A_{1u}+E_u+T_{1u}+T_{2u}$
A_{1u}	A_{1u}	A_{2u}	E_u	T_{1u}	T_{2u}	A_{1g}	A_{2g}	E_g	T_{1g}	T_{2g}
A_{2u}	A_{2u}	A_{1u}	E_u	T_{2u}	T_{1u}	A_{2g}	A_{1g}	E_g	T_{2g}	T_{1g}
E_u	E_u	E_u	$A_{1u}+A_{2u}+E_u$	$T_{1u}+T_{2u}$	$T_{1u}+T_{2u}$	E_g	E_g	$A_{1g}+A_{2g}+E_g$	$T_{1g}+T_{2g}$	$T_{1g}+T_{2g}$
T_{1u}	T_{1u}	T_{2u}	$T_{1u}+T_{2u}$	$A_{1u}+E_u+T_{1u}+T_{2u}$	$A_{2u}+E_u+T_{1u}+T_{2u}$	T_{1g}	T_{2g}	$T_{1g}+T_{2g}$	$A_{1g}+E_g+T_{1g}+T_{2g}$	$A_{2g}+E_g+T_{1g}+T_{2g}$
T_{2u}	T_{2u}	T_{1u}	$T_{1u}+T_{2u}$	$A_{2u}+E_u+T_{1u}+T_{2u}$	$A_{1u}+E_u+T_{1u}+T_{2u}$	T_{2g}	T_{1g}	$T_{1g}+T_{2g}$	$A_{2g}+E_g+T_{1g}+T_{2g}$	$A_{1g}+E_g+T_{1g}+T_{2g}$



Grupo Puntual I_h

Representación irreducible

Grupo No Abeliano. 10(32) representaciones.

Tabla de Operaciones

I_h	E	$12C_5$	$12(C_5)^2$	$20C_3$	$15C_2$	i	$12S_{10}$	$12(S_{10})^3$	$20S_6$	15σ	Rotaciones Lineales	Cuadráticas
A_g	1	1	1	1	1	1	1	1	1	1		$x^2+y^2+z^2$
T_{1g}	3	$-2\cos(4\pi/5)$	$-2\cos(2\pi/5)$	0	-1	3	$-2\cos(2\pi/5)$	$-2\cos(4\pi/5)$	0	-1	(R_x, R_y, R_z)	
T_{2g}	3	$-2\cos(2\pi/5)$	$-2\cos(4\pi/5)$	0	-1	3	$-2\cos(4\pi/5)$	$-2\cos(2\pi/5)$	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	$-2\cos(4\pi/5)$	$-2\cos(2\pi/5)$	0	-1	-3	$2\cos(2\pi/5)$	$2\cos(4\pi/5)$	0	1	(x, y, z)	
T_{2u}	3	$-2\cos(2\pi/5)$	$-2\cos(4\pi/5)$	0	-1	-3	$2\cos(4\pi/5)$	$2\cos(2\pi/5)$	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		

Tabla de Productos

I_h	A_g	T_{1g}	T_{2g}	G_g	H_g	A_u	T_{1u}	T_{2u}	G_u	H_u
A_g	A_g	T_{1g}	T_{2g}	G_g	H_g	A_u	T_{1u}	T_{2u}	G_u	H_u
T_{1g}	T_{1g}	$A_g+T_{1g}+H_g$	G_g+H_g	$T_{2g}+G_g+H_g$	$T_{1g}+T_{2g}+G_g+H_g$	T_{1u}	$A_u+T_{1u}+H_u$	G_u+H_u	$T_{2u}+G_u+H_u$	$T_{1u}+T_{2u}+G_u+H_u$
T_{2g}	T_{2g}	G_g+H_g	$A_g+T_{2g}+H_g$	$T_{1g}+G_g+H_g$	$T_{1g}+T_{2g}+G_g+H_g$	T_{2u}	G_u+H_u	$A_u+T_{2u}+H_u$	$T_{1u}+G_u+H_u$	$T_{1u}+T_{2u}+G_u+H_u$
G_g	G_g	$T_{2g}+G_g+H_g$	$T_{1g}+G_g+H_g$	$A_g+T_{1g}+T_{2g}+G_g+H_g$	$T_{1g}+T_{2g}+G_g+2H_g$	G_u	$T_{2u}+G_u+H_u$	$T_{1u}+G_u+H_u$	$A_u+T_{1u}+T_{2u}+G_u+H_u$	$T_{1u}+T_{2u}+G_u+2H_u$
H_g	H_g	$T_{1g}+T_{2g}+G_g+H_g$	$T_{1g}+T_{2g}+G_g+H_g$	$T_{1g}+T_{2g}+G_g+2H_g$	$A_g+T_{1g}+T_{2g}+2G_g+2H_g$	H_u	$T_{1u}+T_{2u}+G_u+H_u$	$T_{1u}+T_{2u}+G_u+H_u$	$T_{1u}+T_{2u}+G_u+2H_u$	$A_u+T_{1u}+T_{2u}+2G_u+2H_u$
A_u	A_u	T_{1u}	T_{2u}	G_u	H_u	A_g	T_{1g}	T_{2g}	G_g	H_g
T_{1u}	T_{1u}	$A_u+T_{1u}+H_u$	G_u+H_u	$T_{2u}+G_u+H_u$	$T_{1u}+T_{2u}+G_u+H_u$	T_{1g}	$A_g+T_{1g}+H_g$	G_g+H_g	$T_{2g}+G_g+H_g$	$T_{1g}+T_{2g}+G_g+H_g$
T_{2u}	T_{2u}	G_u+H_u	$A_u+T_{2u}+H_u$	$T_{1u}+G_u+H_u$	$T_{1u}+T_{2u}+G_u+H_u$	T_{2g}	G_g+H_g	$A_g+T_{2g}+H_g$	$T_{1g}+G_g+H_g$	$T_{1g}+T_{2g}+G_g+H_g$
G_u	G_u	$T_{2u}+G_u+H_u$	$T_{1u}+G_u+H_u$	$A_u+T_{1u}+T_{2u}+G_u+H_u$	$T_{1u}+T_{2u}+G_u+2H_u$	G_g	$T_{2g}+G_g+H_g$	$T_{1g}+G_g+H_g$	$A_g+T_{1g}+T_{2g}+G_g+H_g$	$T_{1g}+T_{2g}+G_g+2H_g$
H_u	H_u	$T_{1u}+T_{2u}+G_u+H_u$	$T_{1u}+T_{2u}+G_u+H_u$	$T_{1u}+T_{2u}+G_u+2H_u$	$A_u+T_{1u}+T_{2u}+2G_u+2H_u$	H_g	$T_{1g}+T_{2g}+G_g+H_g$	$T_{1g}+T_{2g}+G_g+H_g$	$T_{1g}+T_{2g}+G_g+2H_g$	$A_g+T_{1g}+T_{2g}+2G_g+2H_g$