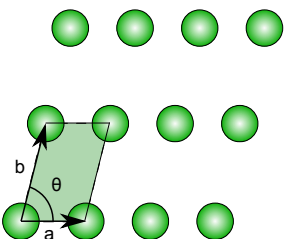
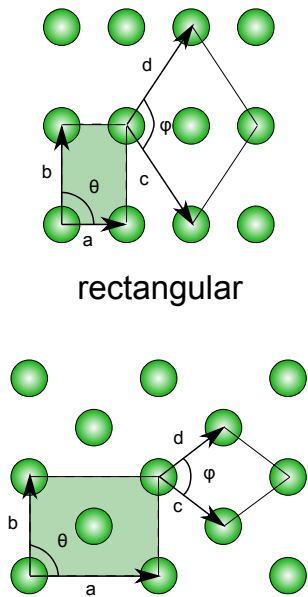
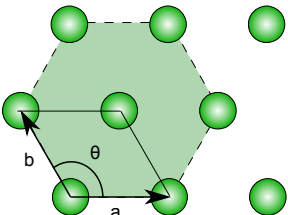
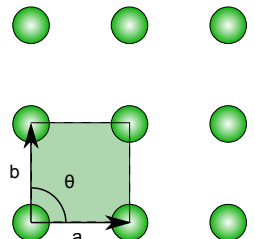


# Sistemas cristalinos

Se definen en base a las longitudes de los vectores primitivos y al ángulo que forman entre si.

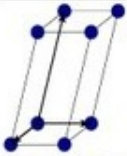
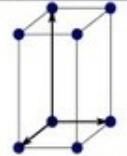
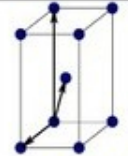
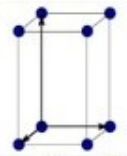
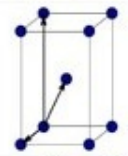
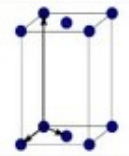
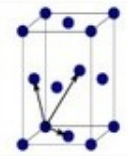
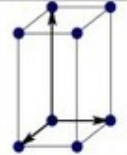
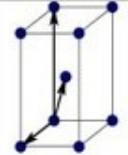
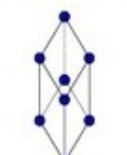
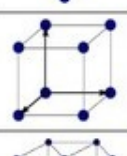
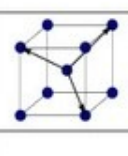
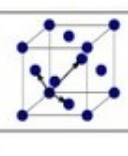
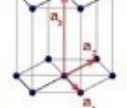
Sistema cristalino	Longitudes	Ángulos
cúbico	$a = b = c$	$\alpha = \beta = \gamma = 90^\circ$
trigonal	$a = b = c$	$\alpha = \beta = \gamma < 120^\circ, \neq 90^\circ$
hexagonal	$a = b \neq c$	$\alpha = \beta = 90^\circ, \gamma = 120^\circ$
tetragonal	$a = b \neq c$	$\alpha = \beta = \gamma = 90^\circ$
ortorómbico	$a \neq b \neq c$	$\alpha = \beta = \gamma = 90^\circ$
monoclínico	$a \neq b \neq c$	$\alpha = \beta = 90^\circ \neq \gamma$
triclínico	$a \neq b \neq c$	$\alpha \neq \beta \neq \gamma$

# Redes de Bravais en 2D

 <p>The diagram shows a 2D lattice of green spheres. A parallelogram is drawn with lattice vectors <math>a</math> and <math>b</math> originating from a central point. The angle between them is <math>\theta</math>. The lattice is oblique, meaning <math>a \neq b</math> and <math>\theta \neq 90^\circ</math>.</p>	 <p>The diagram shows a 2D lattice of green spheres. A rectangle is drawn with lattice vectors <math>a</math> and <math>b</math> originating from a central point. The angle between them is <math>\theta</math>. A rhombus is also drawn with lattice vectors <math>c</math> and <math>d</math> originating from a central point. The angle between them is <math>\phi</math>. The lattice is orthorhombic, meaning <math>a \neq b</math>, <math>\theta = 90^\circ</math>, <math>c \neq d</math>, and <math>\phi \neq 90^\circ</math>.</p> <p>rectangular</p> <p>rectangular centrado</p>	 <p>The diagram shows a 2D lattice of green spheres. A hexagon is drawn with lattice vectors <math>a</math> and <math>b</math> originating from a central point. The angle between them is <math>\theta</math>. The lattice is hexagonal, meaning <math>a = b</math> and <math>\theta = 120^\circ</math>.</p>	 <p>The diagram shows a 2D lattice of green spheres. A square is drawn with lattice vectors <math>a</math> and <math>b</math> originating from a central point. The angle between them is <math>\theta</math>. The lattice is tetragonal, meaning <math>a = b</math> and <math>\theta = 90^\circ</math>.</p> <p>cuadrada</p>
<p><math> a  \neq  b , \theta \neq 90^\circ</math></p> <p><b>oblicuo</b></p>	<p><math> a  \neq  b , \theta = 90^\circ</math> <math> c  =  d , \phi \neq 90^\circ</math></p> <p><b>ortorrombico</b></p>	<p><math> a  =  b , \theta = 120^\circ</math></p> <p><b>hexagonal</b></p>	<p><math> a  =  b , \theta = 90^\circ</math></p> <p><b>tetragonal</b></p>

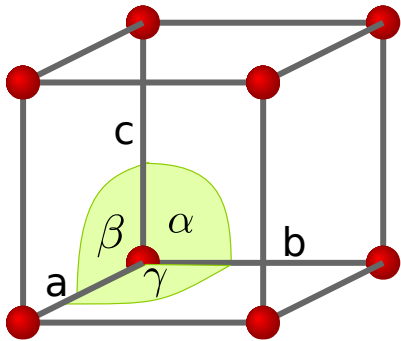
# Redes de Bravais en 3D

Hay 14 redes de Bravais en tres dimensiones

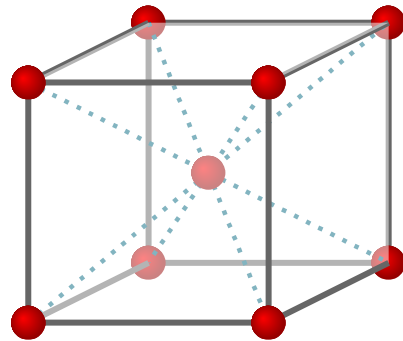
Bravais lattice	Parameters	Simple (P)	Volume centered (I)	Base centered (C)	Face centered (F)
Triclinic	$a_1 \neq a_2 \neq a_3$ $\alpha_{12} \neq \alpha_{23} \neq \alpha_{31}$				
Monoclinic	$a_1 \neq a_2 \neq a_3$ $\alpha_{23} = \alpha_{31} = 90^\circ$ $\alpha_{12} \neq 90^\circ$				
Orthorhombic	$a_1 \neq a_2 \neq a_3$ $\alpha_{12} = \alpha_{23} = \alpha_{31} = 90^\circ$				
Tetragonal	$a_1 = a_2 \neq a_3$ $\alpha_{12} = \alpha_{23} = \alpha_{31} = 90^\circ$				
Trigonal	$a_1 = a_2 = a_3$ $\alpha_{12} = \alpha_{23} = \alpha_{31} < 120^\circ$				
Cubic	$a_1 = a_2 = a_3$ $\alpha_{12} = \alpha_{23} = \alpha_{31} = 90^\circ$				
Hexagonal	$a_1 = a_2 \neq a_3$ $\alpha_{12} = 120^\circ$ $\alpha_{23} = \alpha_{31} = 90^\circ$				

# Redes de Bravais en 3D

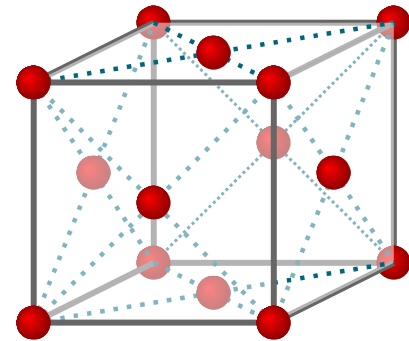
- Cúbica



cúbica simple  
(SC)



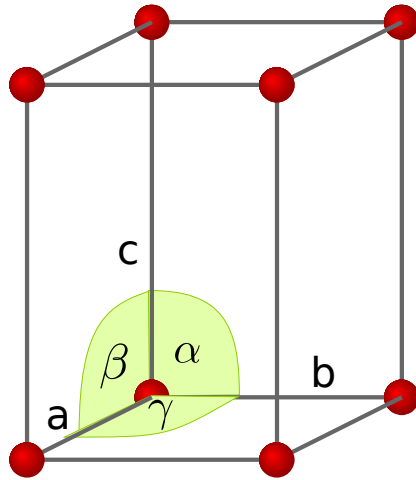
centrada en el  
cuerpo (BCC)



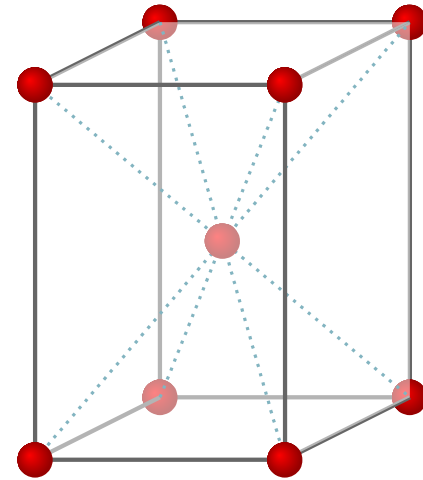
centrada en la  
cara (FCC)

# Redes de Bravais en 3D

- Tetragonal



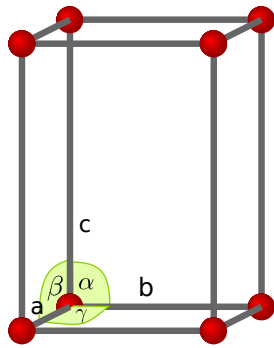
simple



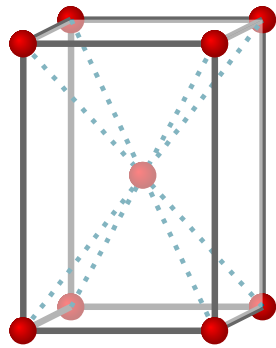
centrada en el  
cuerpo (BCT)

# Redes de Bravais en 3D

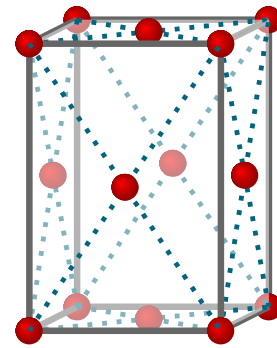
- Ortorómbica



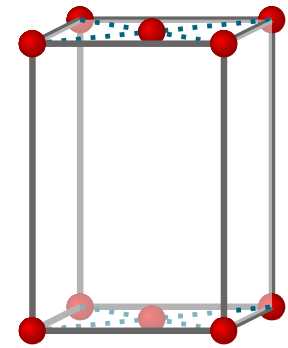
simple



centrada en  
el cuerpo



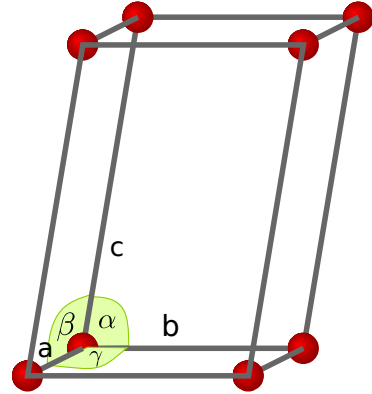
centrada en  
la cara



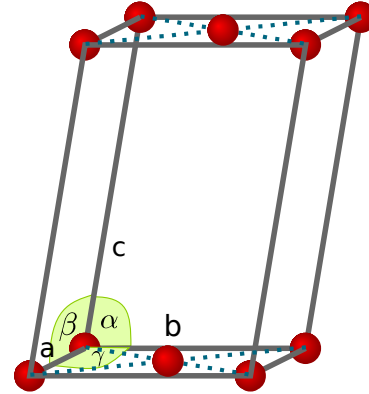
centrada en  
la base

# Redes de Bravais en 3D

- Monoclínica



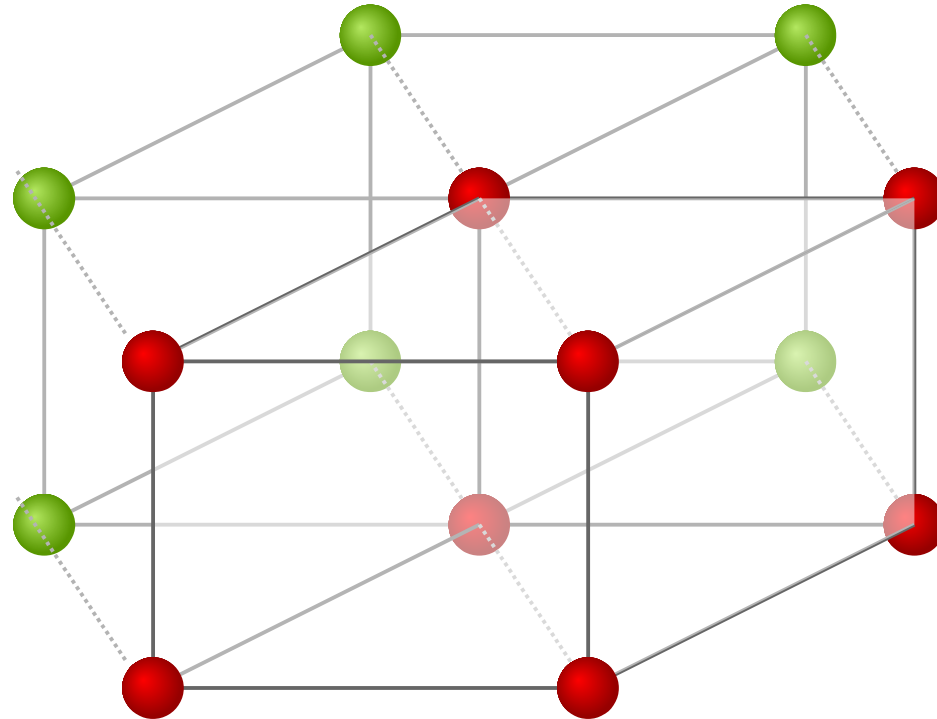
primitiva



centrada en  
la base

# Redes de Bravais en 3D

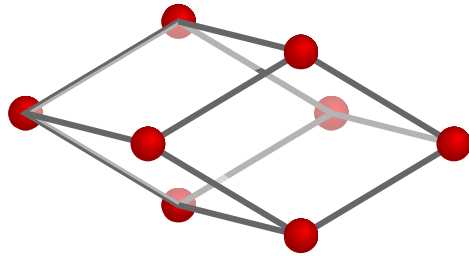
- Hexagonal



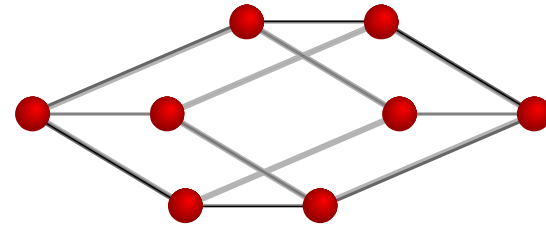


# Redes de Bravais en 3D

- Trigonal y triclínica

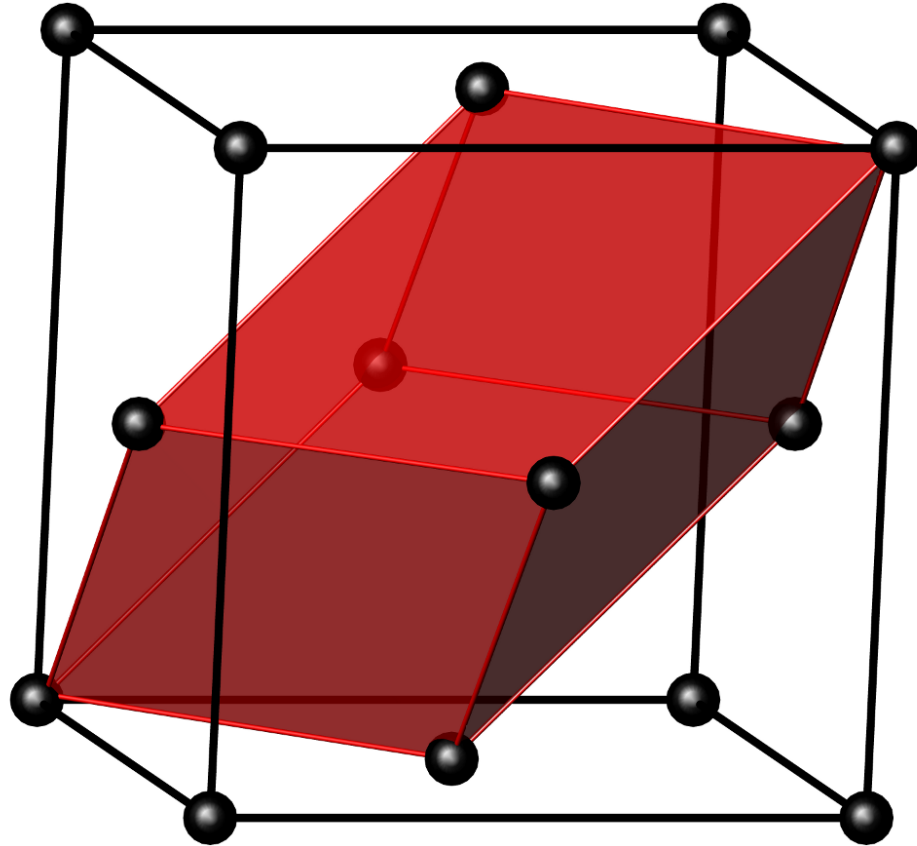


trigonal

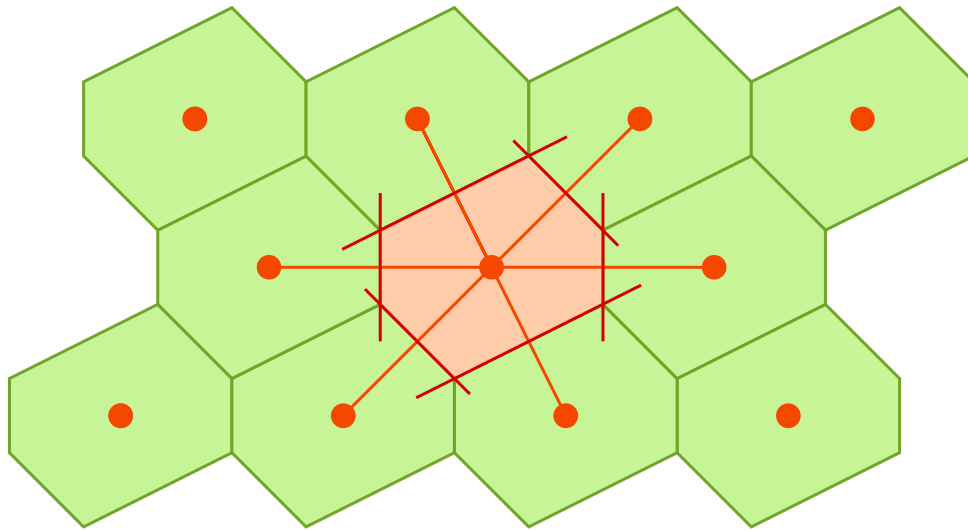


triclinica

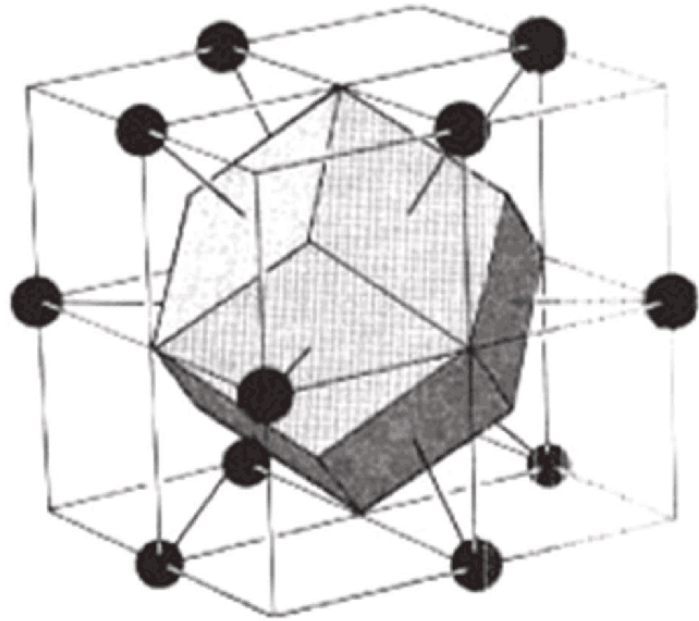
# Celda primitiva FCC



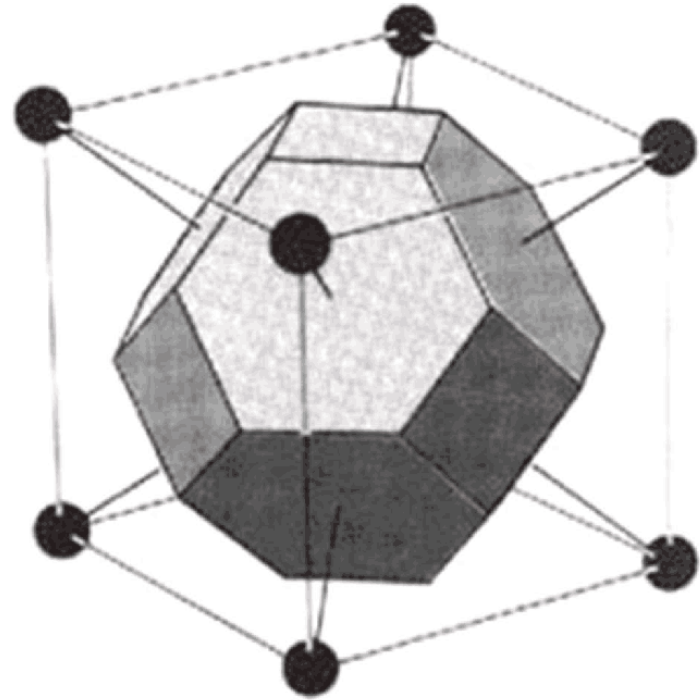
# Celda de Wigner-Seitz



# Celda de Wigner-Seitz



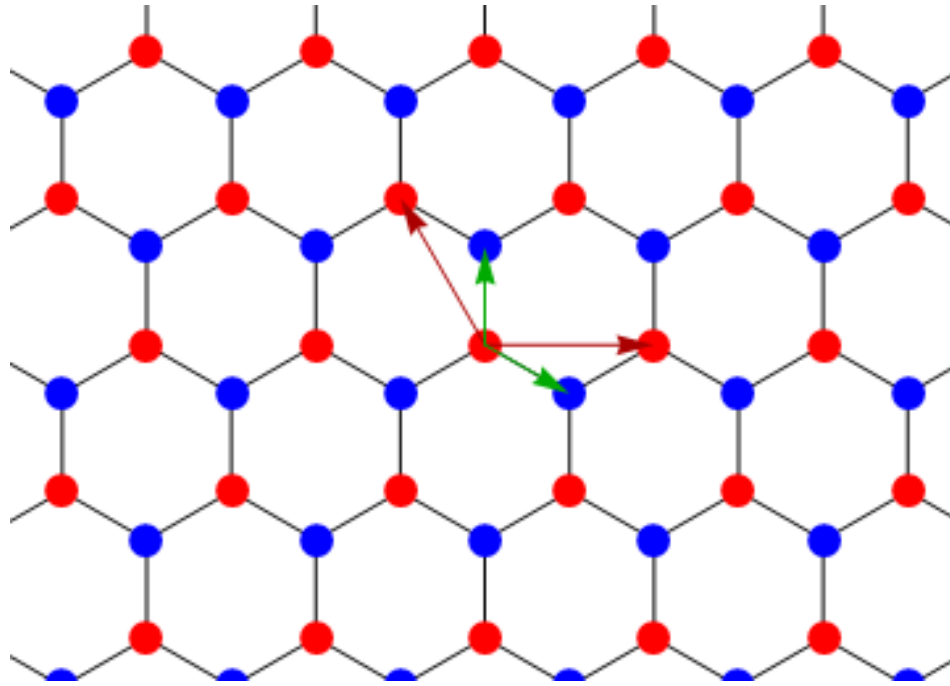
**Face Centered Cubic**



**Body Centered Cubic**

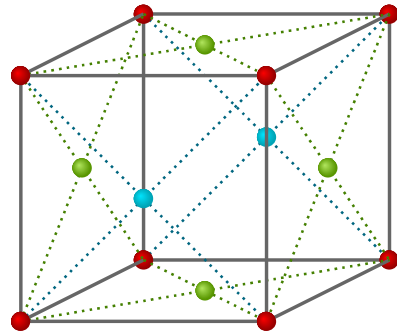
# Estructuras cristalinas

Grafeno



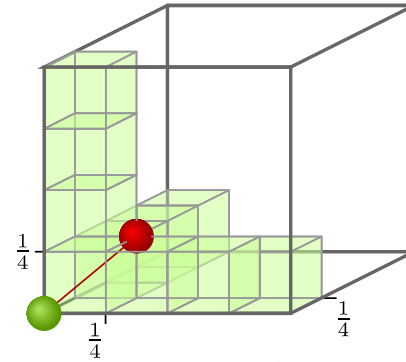
# Estructuras cristalinas

Diamante

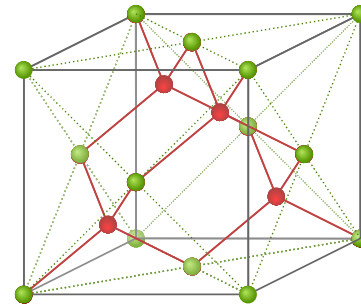
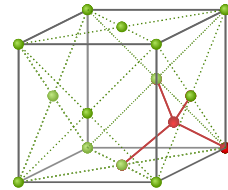
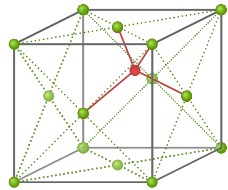
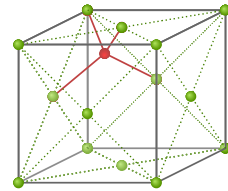
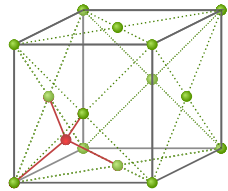


fcc structure

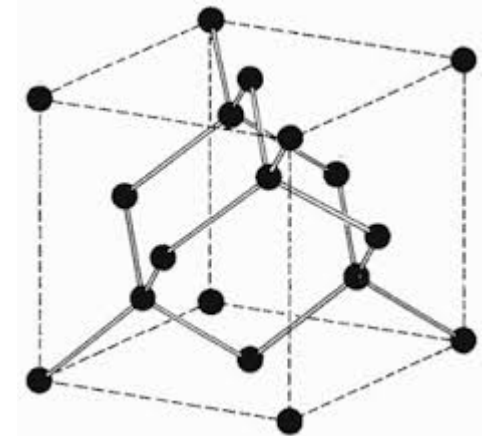
+



two-atomic basis

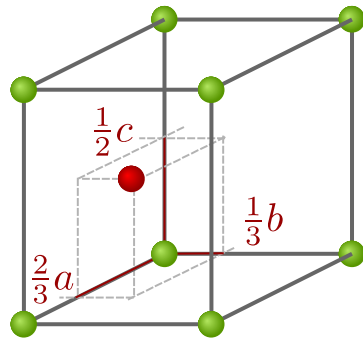


diamond structure

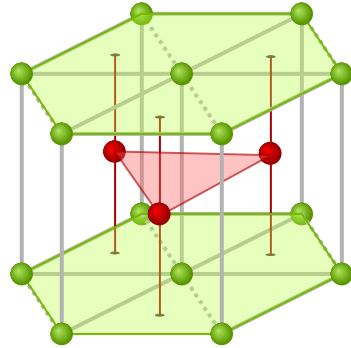


# Estructuras cristalinas

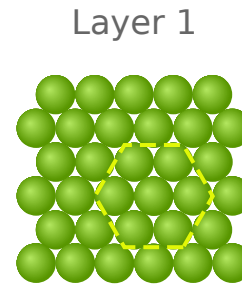
## HCP



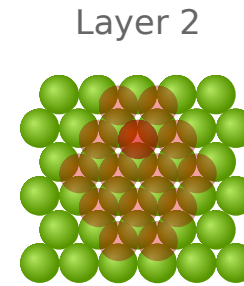
(a)



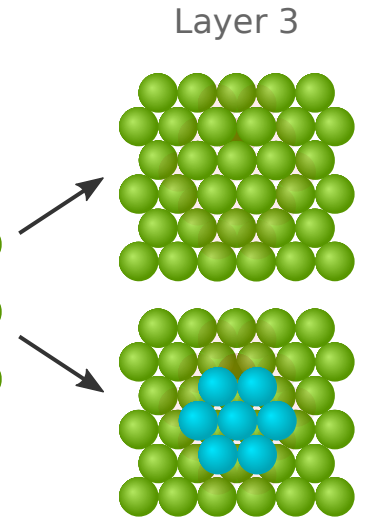
(b)



A



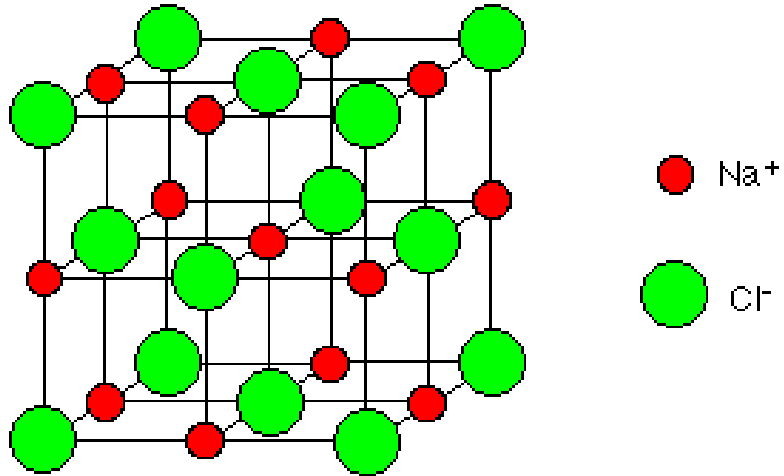
B  
A



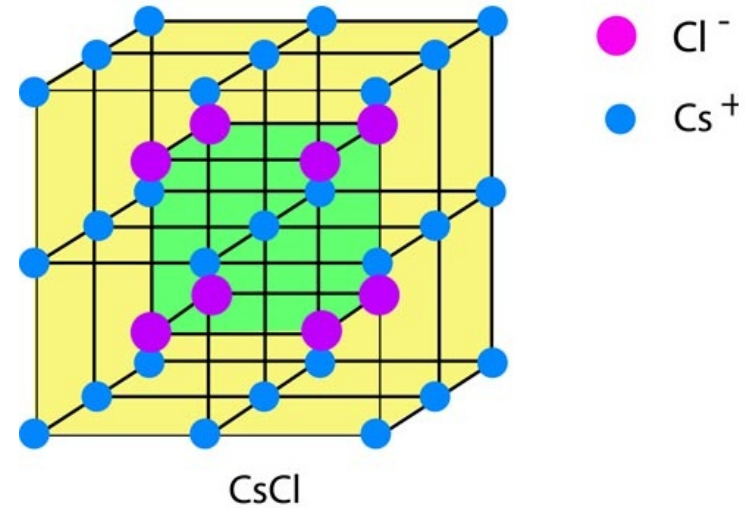
hcp  
A  
B  
A  
fcc  
C  
B  
A

# Estructuras cristalinas

Cloruro de sodio



Cloruro de cesio





# Estructuras cristalinas

Zincblenda

