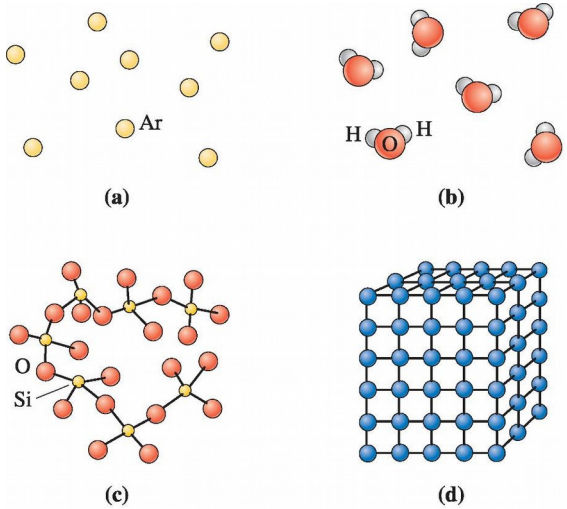
Organización Atómica.

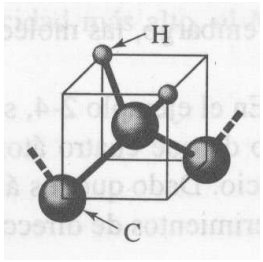
Existen tres niveles de arreglo atómico:

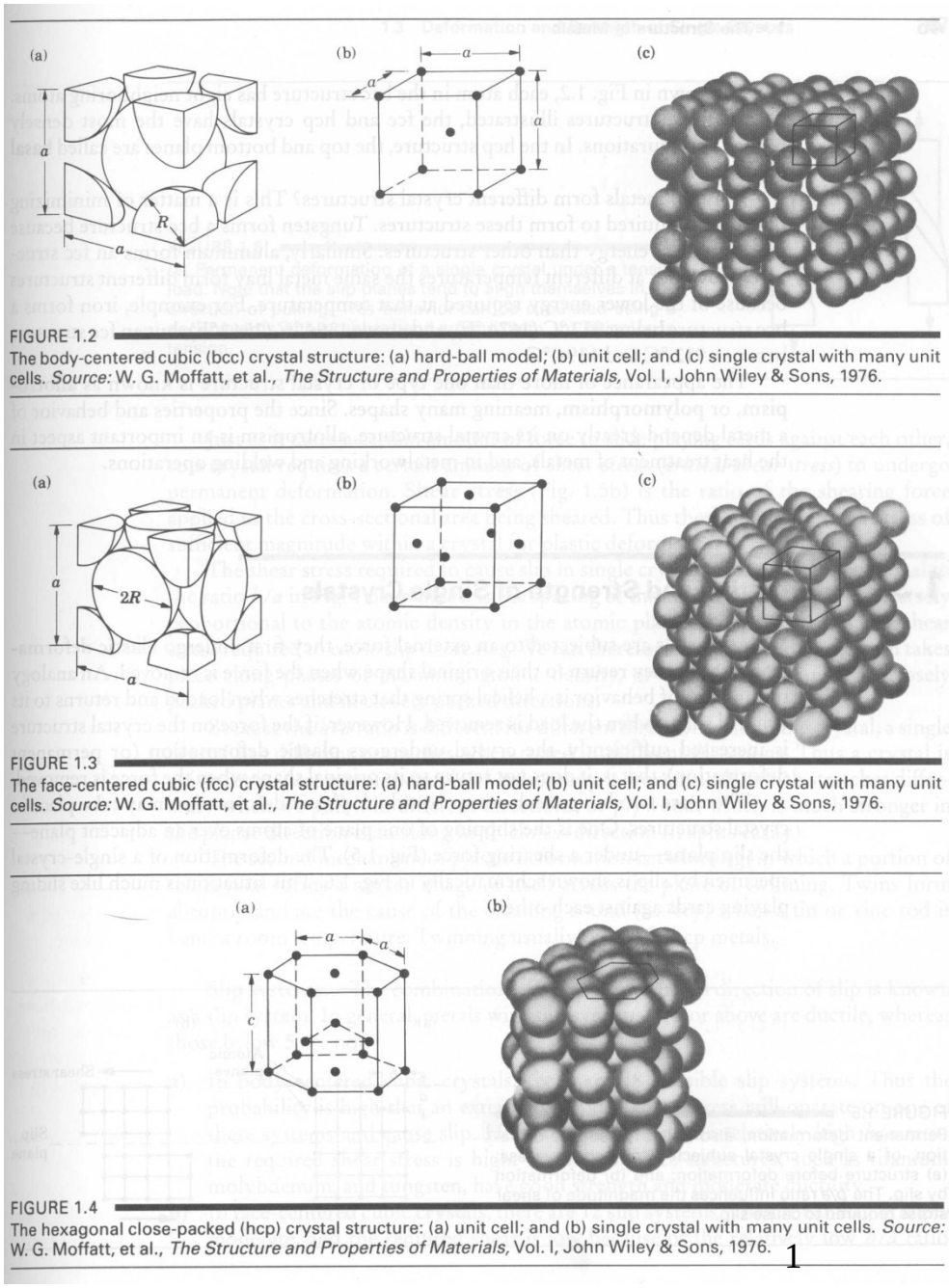
- Sin Orden.
- Orden de Corto Alcance.
- Orden de Largo Alcance.



Rejilla o Red

Figure 3-1 Levels of atomic arrangements in materials: (a) Inert monoatomic gases have no regular ordering of atoms. (b,c) Some materials, including water vapor, nitrogen gas, amorphous silicon, and silicate glass, have short-range order. (d) Metals, alloys, many ceramics and some polymers have regular ordering of atoms/material.





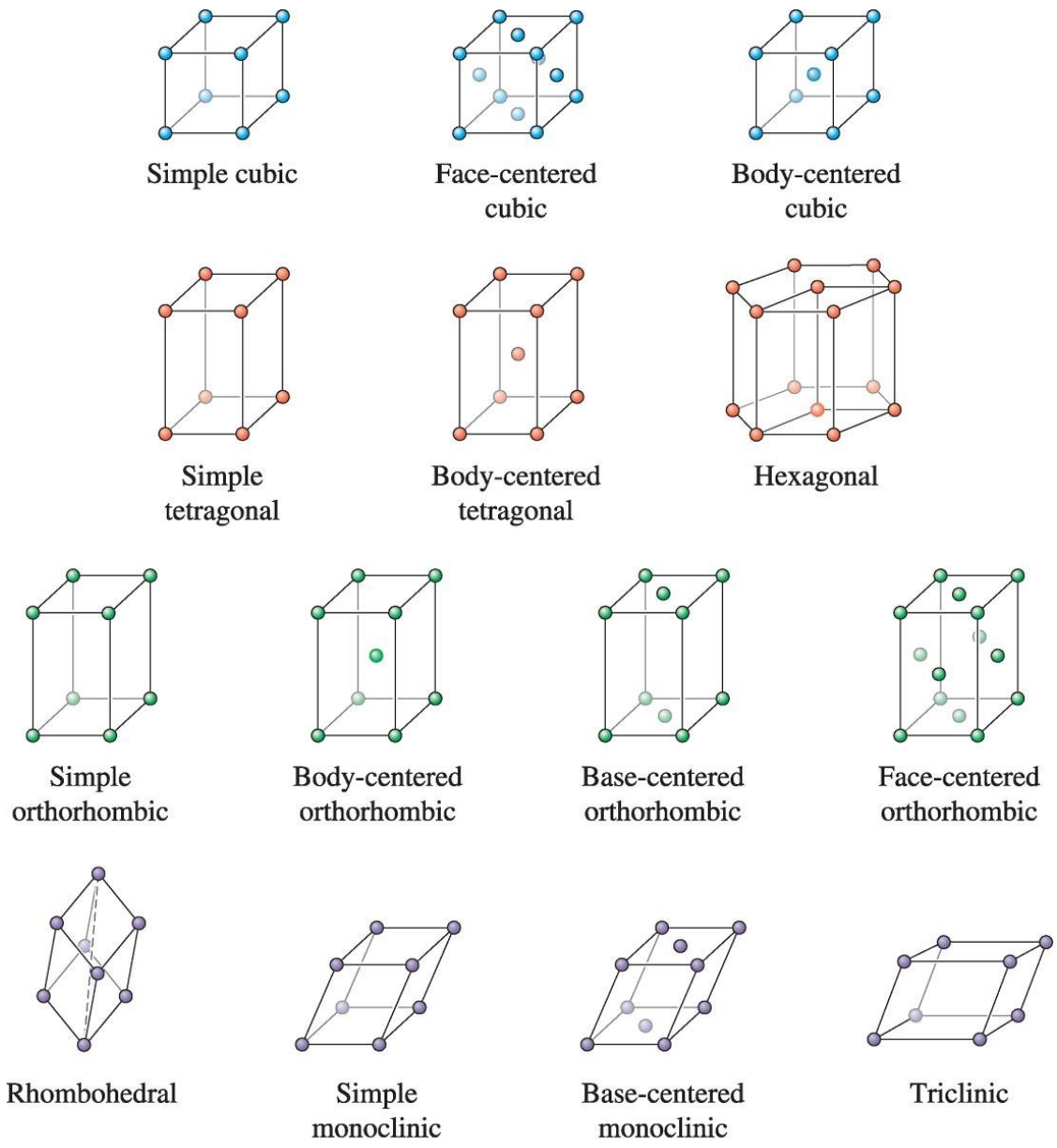


Figure 3-6 The fourteen types of Bravais lattices grouped in seven crystal systems. The actual unit cell for a hexagonal system is shown in Figures 3-8 and 3-13.

TABLE 3-1 ■ *Characteristics of the seven crystal systems*

Structure	Axes	Angles between Axes
Cubic	$a = b = c$	All angles equal 90°.
Tetragonal	$a = b \neq c$	All angles equal 90°.
Orthorhombic	$a \neq b \neq c$	All angles equal 90°.
Hexagonal	$a = b \neq c$	Two angles equal 90°. The angle between a and b equals 120°.
Rhombohedral or trigonal	$a = b = c$	All angles are equal and none equals 90°.
Monoclinic	$a \neq b \neq c$	Two angles equal 90°. One angle (β) is not equal to 90°.
Triclinic	$a \neq b \neq c$	All angles are different and none equals 90°.

El Número de Coordinación es el número de átomos vecinos más cercanos a otro.

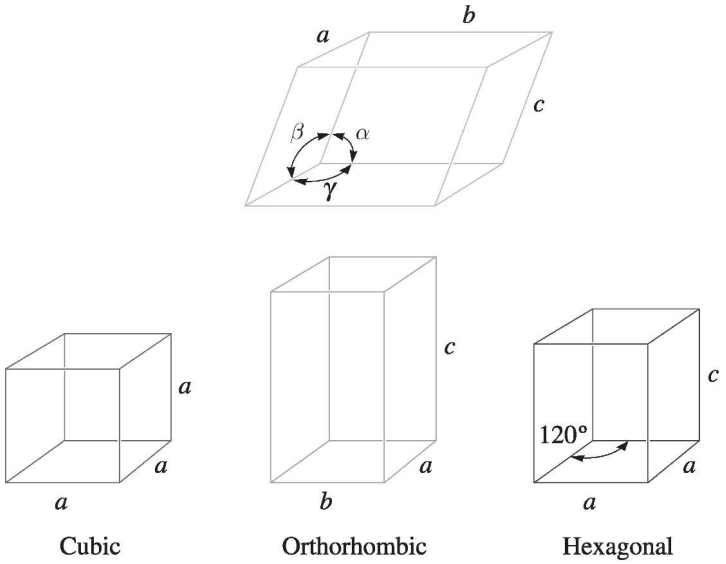


Figure 3-8 Definition of the lattice parameters and their use in cubic, orthorhombic, and hexagonal crystal systems.

Los parámetros de red describen el tamaño y la forma de la celda unitaria y consta de dimensiones de los lados y sus respectivos ángulos.

de átomos por celda unitaria

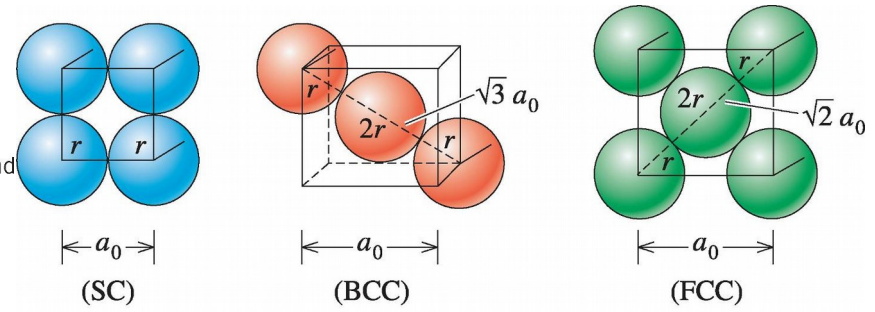


Figure 3-11 The relationships between the atomic radius and the lattice parameter in cubic systems (for Example 3-3).

Factor de empaquetamiento, es la fracción de espacio ocupada por átomos.

$$F.E. = \frac{(\#\,átomos\,/\,celda)(4/3\pi r^3)}{Volumen\_de\_la\_Celda}$$

$$\rho = \frac{\sum (\#\,átomos\,/\,celda)(Masa\_atómica)}{(Volumen\_de\_la\_Celda)(N_A)}$$

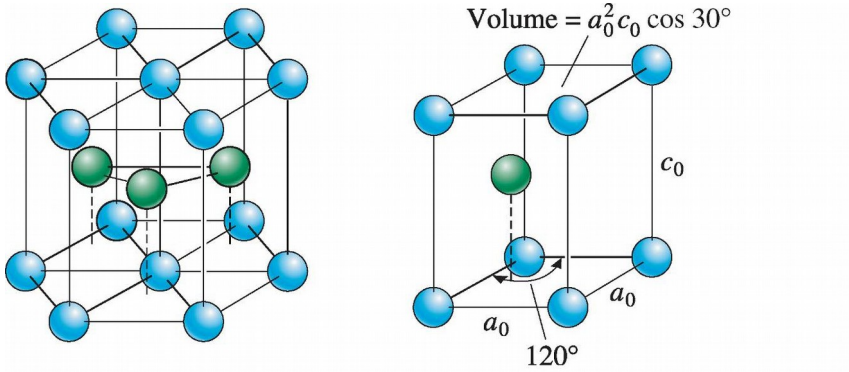


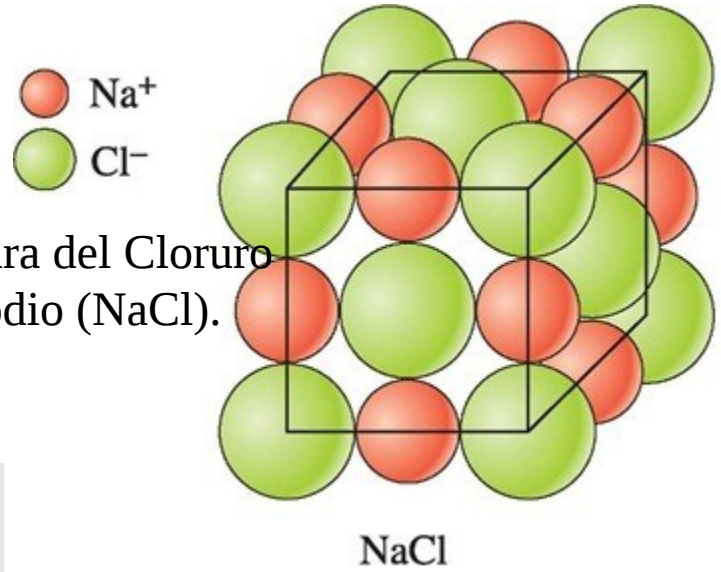
Figure 3-13 The hexagonal close-packed (HCP) structure (left) and its unit cell.

TABLE 3-2 *Crystal structure characteristics of some metals at room temperature*

Structure	a_0 versus r	Atoms per Cell	Coordination Number	Packing Factor
Simple cubic (SC)	$a_0 = 2r$	1	6	0.52
Body-centered cubic (BCC)	$a_0 = 4r/\sqrt{3}$	2	8	0.68
Face-centered cubic (FCC)	$a_0 = 4r/\sqrt{2}$	4	12	0.74
Hexagonal close-packed (HCP)	$a_0 = 2r$ $c_0 \approx 1.633 a_0$	2	12	0.74

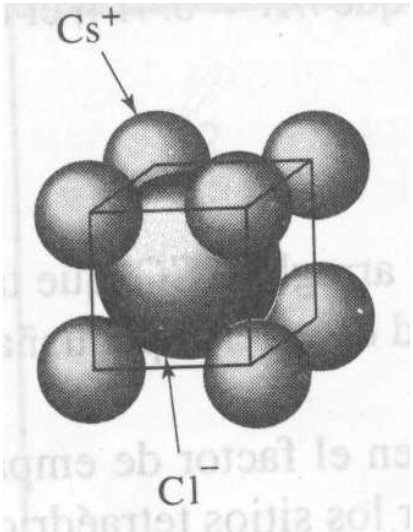
Cristales Iónicos.

Cálculo del sitio intersticial octaédrico.

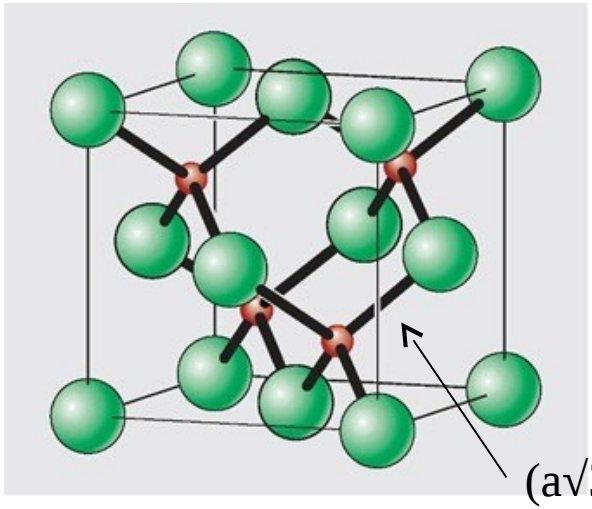


Estructura del Cloruro de Sodio (NaCl).

Neutralidad Eléctrica: para asegurar un equilibrio correcto de la carga se debe de revisar el número de coordinación para los compuestos (AX, AX_2).

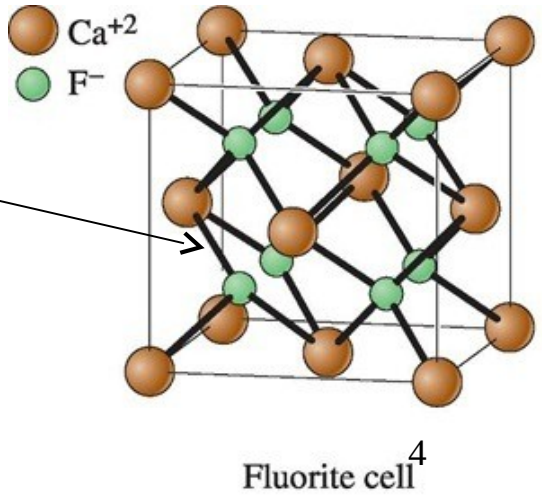


Estructura del Cloruro de Cesio (CsCl).
> 0,732

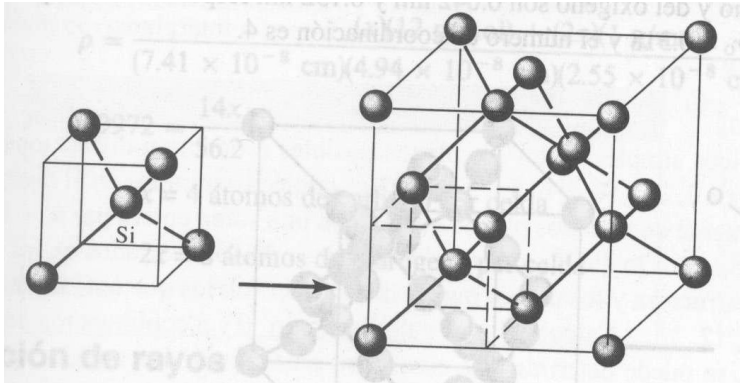


Estructura de la Blenda de Zinc (ZnS).
< 0,414

Estructura de la Fluorita (CaF_2).

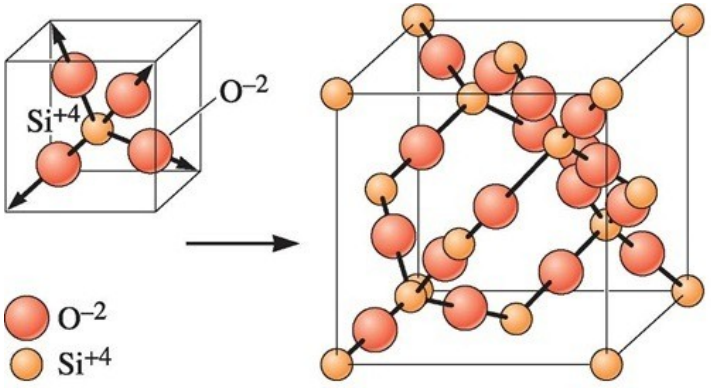


Estructuras Covalentes.

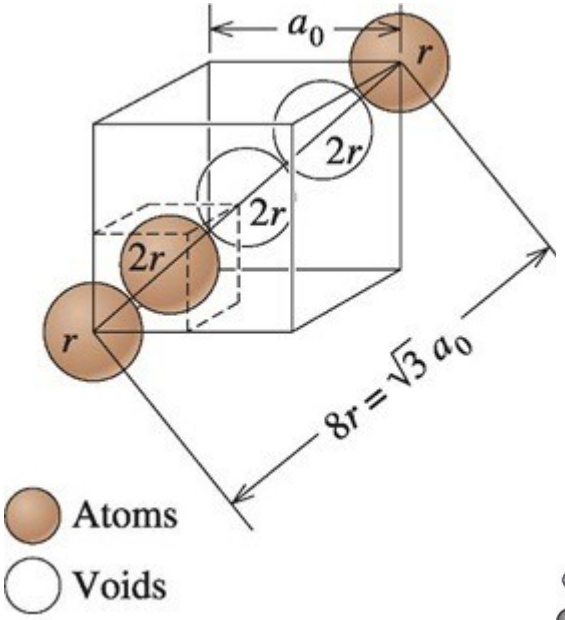


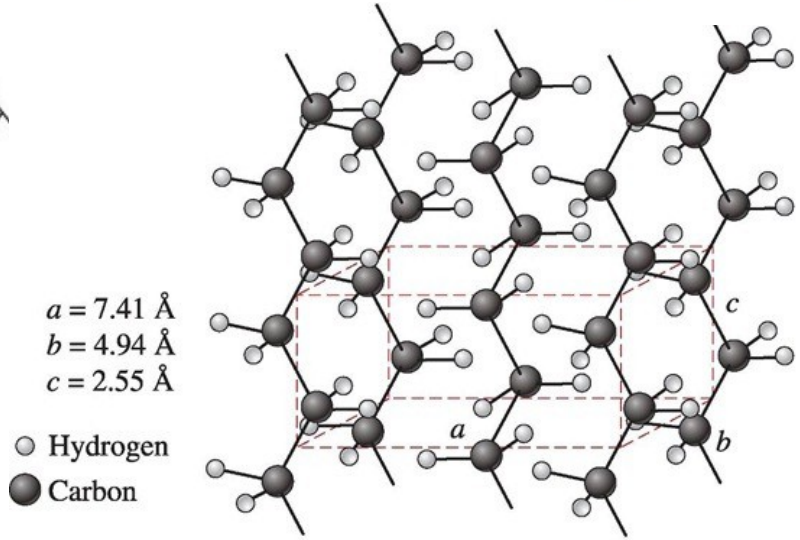
Celda Unitaria Cúbica de Diamante (CD).

Estructura del Sílice (SiO_2).



Estructura Cúbica de Diamante: El silicio, el germanio y el carbono en su forma de diamante, están unidos por enlaces covalentes y producen un tetraedro.





Estructura del Polietileno Cristalino (C_2H_4).