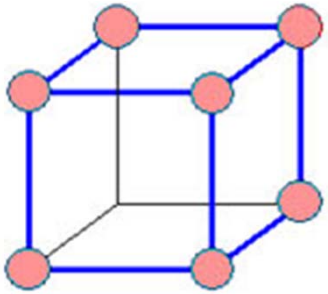
Crystal Systems

Bravais Lattice

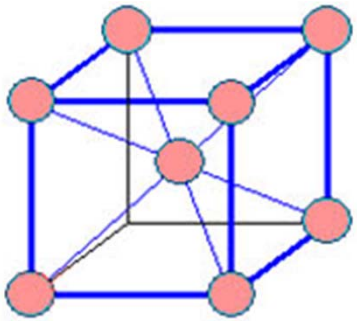
The unit vectors *a*, *b* and *c* are called lattice parameters. Based on their length equality or inequality and their orientation (the angles between them, α, β and γ) a total of 7 crystal systems can be defined. With the centering (face, base and body centering) added to these, 14 kinds of 3D lattices, known as ***Bravais lattices***, can be generated.

Crystal Systems

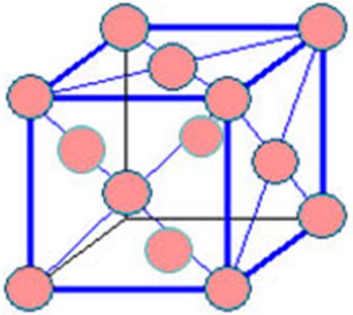
Cubic: $a = b = c$, $\alpha = \beta = \gamma = 90^o$



Simple cubic

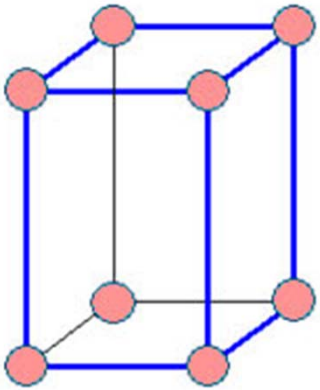


Body-centered cubic (BCC)

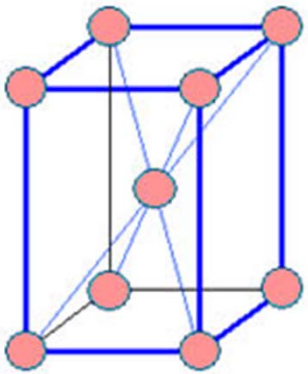


Face-centered cubic (FCC)

Tetragonal: $a = b \neq c$, $\alpha = \beta = \gamma = 90^o$



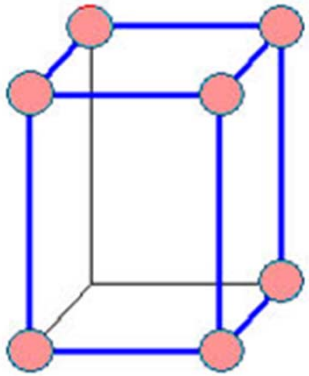
Simple Tetragonal



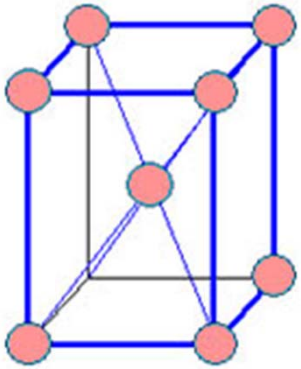
Body-centered Tetragonal (BCT)

Crystal Systems

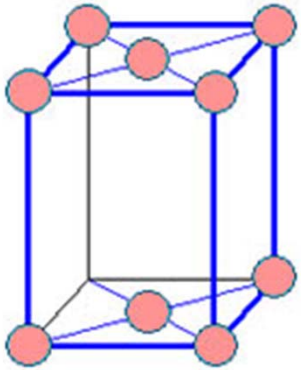
Orthorhombic: $a \neq b \neq c$, $\alpha = \beta = \gamma = 90^o$



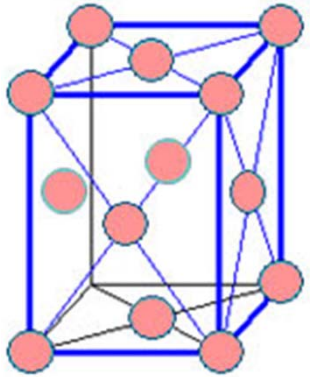
Simple



Body-centered

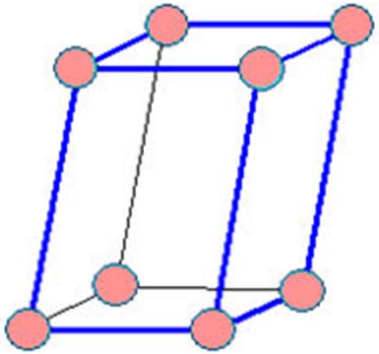


Base-centered

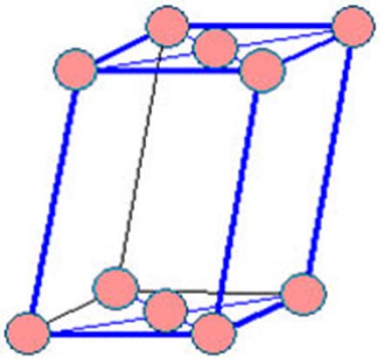


Face-centered

Monoclinic: $a \neq b \neq c$, $\alpha = \gamma = 90^o \neq \beta$

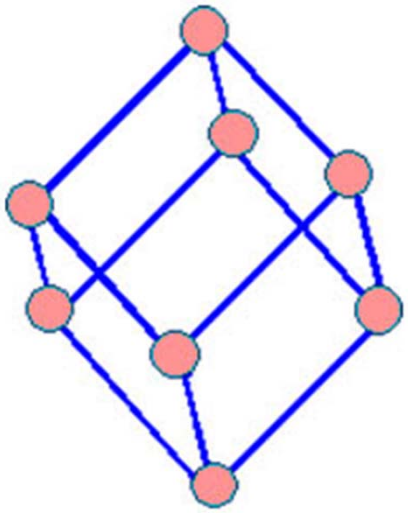


Simple monoclinic



Base-centered monoclinic

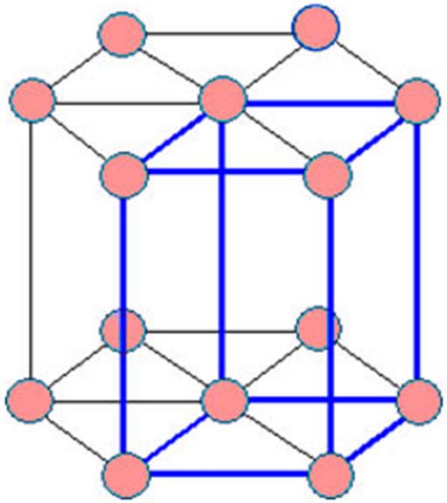
Crystal Systems



Rhombohedral

$a = b = c$

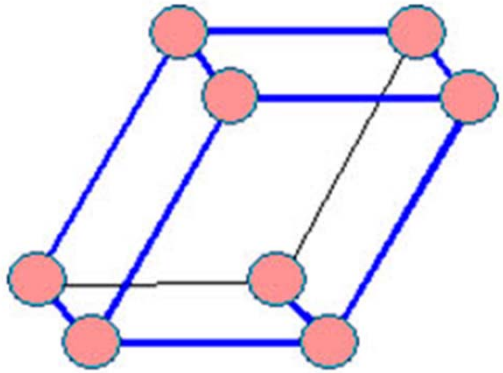
$\alpha = \beta = \gamma \neq 90^o$



Hexagonal

$a = b \neq c$

$\alpha = \beta = 90^o \; \gamma = 120^o$



Triclinic

$a \neq b \neq c$

$\alpha \neq \beta \neq \gamma \neq 90^o$

Crystal Systems

Crystal system	**Example**
Triclinic	$K_2S_2O_8$,$K_2Cr_2O_7$
Monoclinic	As_4S_4, KNO_2,$CaSO_4.2H_2O$, β-S
Rhombohedral	Hg, Sb, As, Bi, $CaCO_3$
Hexagonal	Zn, Co, Cd, Mg, Zr, NiAs
Orthorhombic	Ga, Fe_3C, α-S
Tetragonal	In, TiO_2, β-Sn
Cubic	Au, Si, Al, Cu, Ag, Fe, NaCl