The Seven Crystal Systems

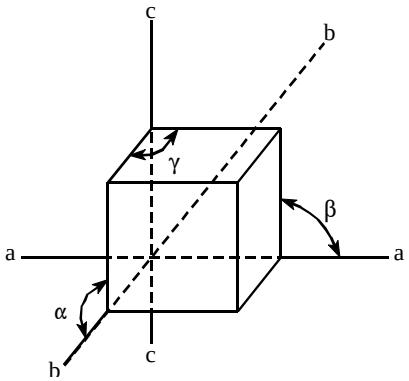
Cubic cell dimensions:

$a = b = c$

$\alpha = \beta = \gamma = 90°$

(three mutually perpendicular axes of equal lengths)

This cell is a perfect cube.



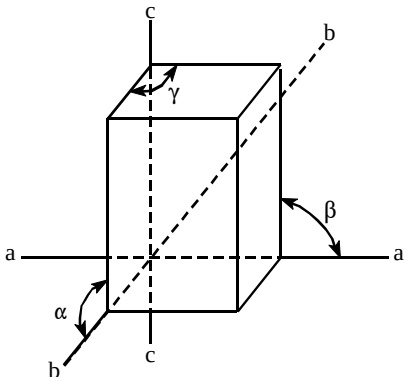
Tetragonal cell dimensions:

$a = b \neq c$

$\alpha = \beta = \gamma = 90°$

(three mutually perpendicular axes; two of equal lengths and one unequal)

This cell is like a saltine-cracker box.



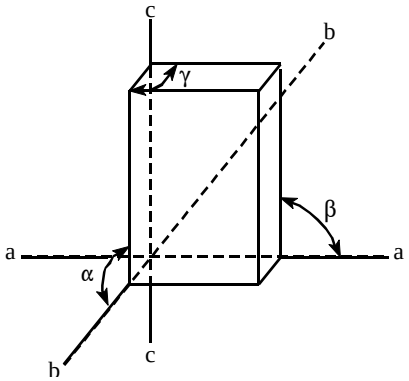
Orthorhombic cell dimensions:

$a \neq b \neq c$

$\alpha = \beta = \gamma = 90°$

(three mutually perpendicular axes; two of equal lengths and one unequal)

This cell is like a shoe box.

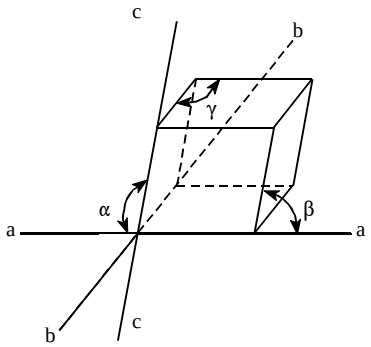


Rhombohedral cell dimensions:

$a = b = c$
$\alpha = \beta = \gamma \neq 90°$

(two mutually non-perpendicular axes; third axes is perpendicular to one axis but not perpendicular to other; axes of equal lengths)

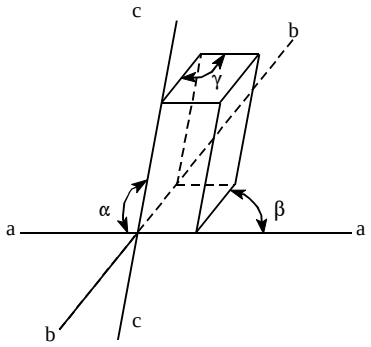
This cell is like a cube tilted twice.



Monoclinic cell dimensions:
$a \neq b \neq c$
$\alpha = \gamma = 90° \quad \beta \neq 90°$

(two mutually non-perpendicular axes; third axes is perpendicular to one axis but not perpendicular to other; axes of unequal lengths)

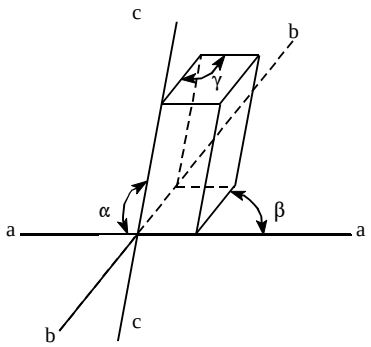
This cell is like a shoe box tilted once.



Triclinic cell dimensions:
$a \neq b \neq c$
$\alpha \neq \beta \neq \gamma \neq 90°$

(three mutually non-perpendicular axes of unequal lengths)

This cell is like a shoe box tilted twice.

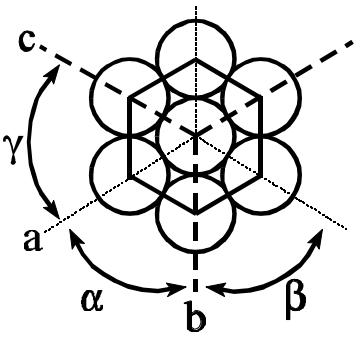


Hexagonal cell dimensions:

$a = b = c \neq d$
$\alpha = \beta = \gamma = 60°;\ \delta = 90°$

(three axes of equal length at 60° to each other; one axis of unequal length at 90° to the other three axes)

This cell is like a saltine-cracker box compressed at opposite corners.



Note: There are three unit cells shown. In each unit cell, there are parts of eight atoms at the corners of each unit cell. For the atoms at the 30° corners only 1/12 of the atoms are in the cell while 1/6 of each atom at the 60° angles are in the cell. Therefore there are a total of 2 atoms in each cell.