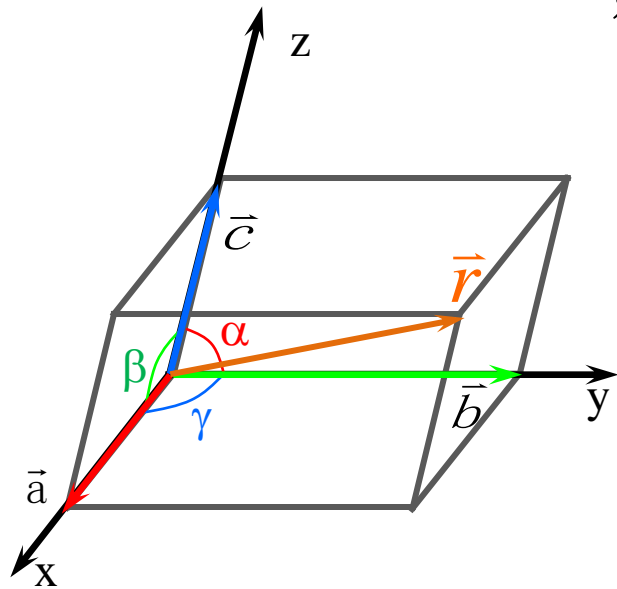




第二讲 晶系与布拉菲点阵

一、点阵的矢量表示法

—— 建立坐标，确定棱长 a 、 b 、 c 和夹角 α 、 β 、 γ



$$\vec{r}_{u.v.w} = u\vec{a} + v\vec{b} + w\vec{c}$$

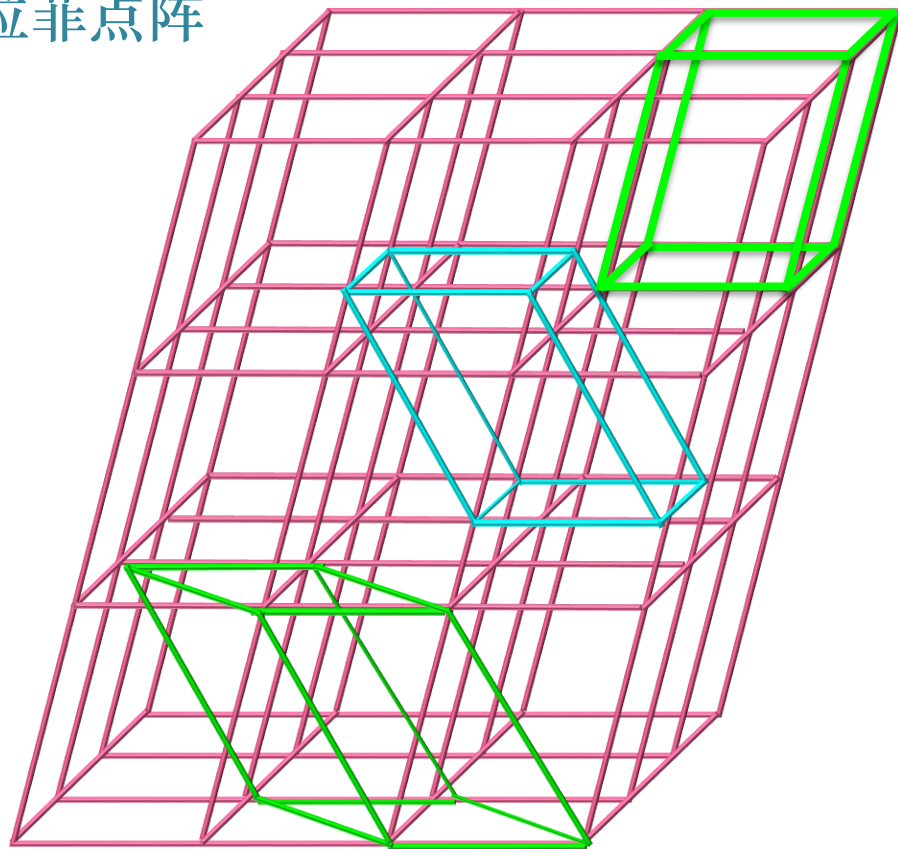
$\vec{r}_{u.v.w}$ —— 由原点指向点阵中格点

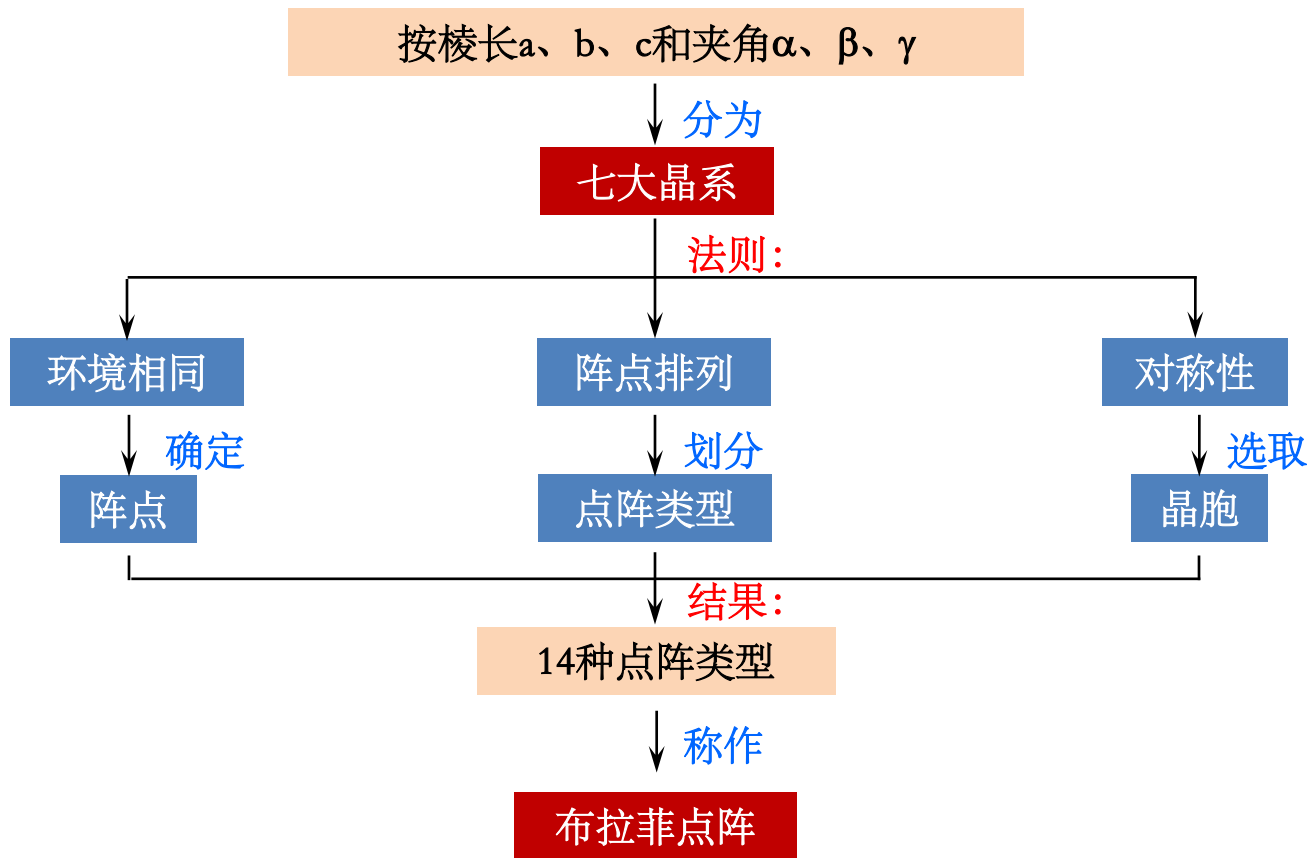
\vec{a} 、 \vec{b} 、 \vec{c} —— 平移矢量（基矢）

u 、 v 、 w —— 平移量（阵点坐标）



二、晶系与布拉菲点阵







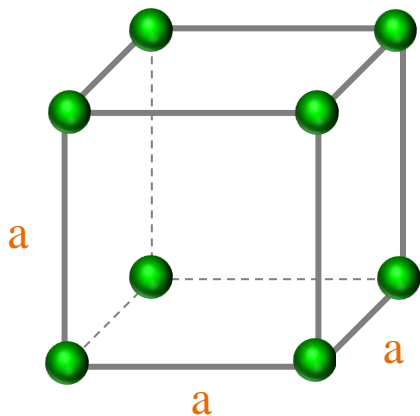
七大晶系及其特征

晶系	特征
立方	$a=b=c, \alpha=\beta=\gamma=90^\circ$
正方	$a=b \neq c, \alpha=\beta=\gamma=90^\circ$
正交	$a \neq b \neq c, \alpha=\beta=\gamma=90^\circ$
菱方	$a=b=c, \alpha=\beta=\gamma \neq 90^\circ$
六方	$a=b \neq c, \alpha=\beta=90^\circ, \gamma=120^\circ$
单斜	$a \neq b \neq c, \alpha=\gamma=90^\circ \neq \beta$
三斜	$a \neq b \neq c, \alpha \neq \beta \neq \gamma$

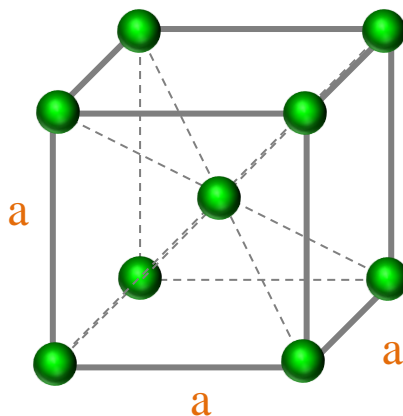


立方晶系 (Cubic)

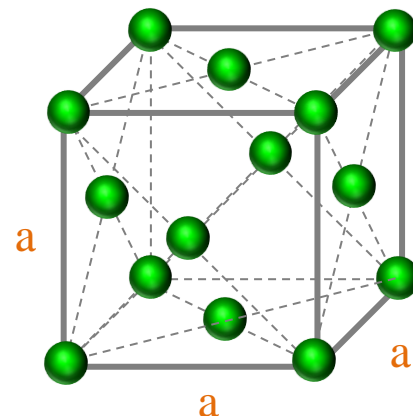
Simple



Body centered



Face centered

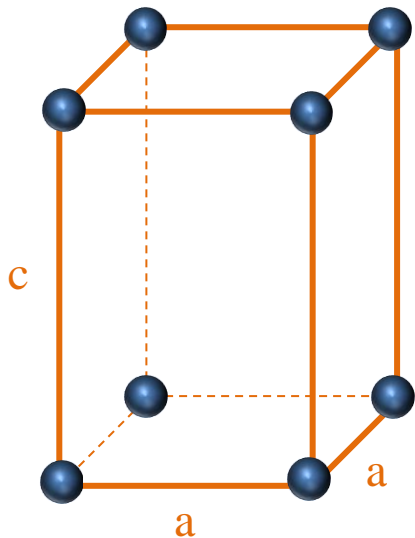


$$a = b = c, \alpha = \beta = \gamma = 90^\circ$$

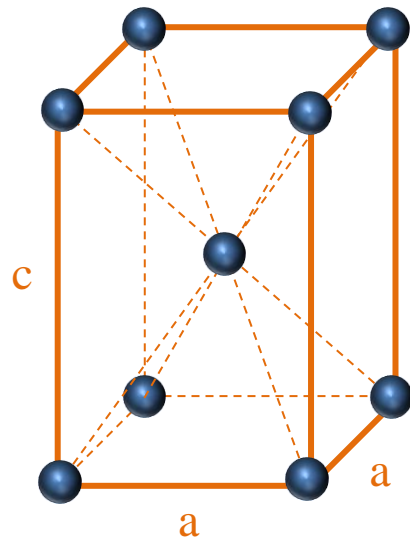


正方晶系 (Tetragonal)

Simple



Body centered

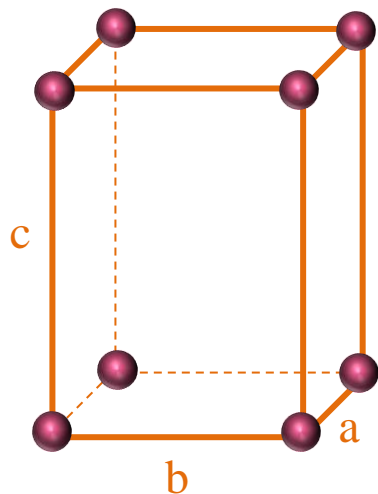


$$a = b \neq c, \alpha = \beta = \gamma = 90^\circ$$

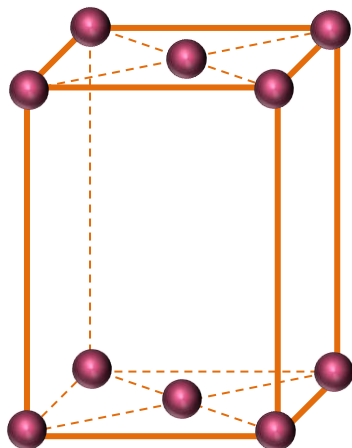


正交晶系 (Orthorhombic)

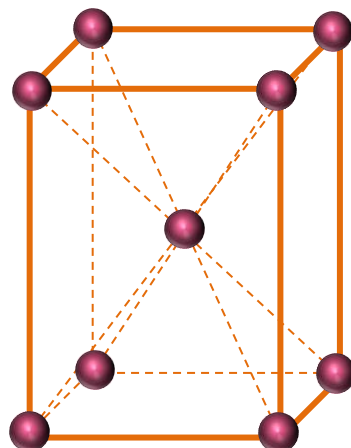
Simple



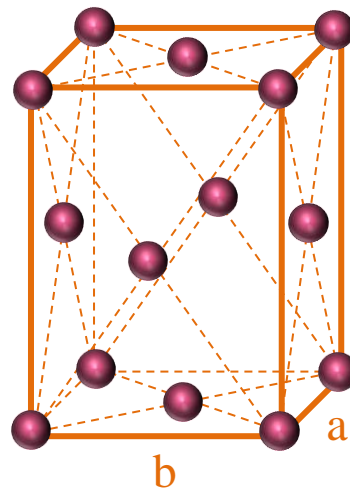
Base centered



Body centered



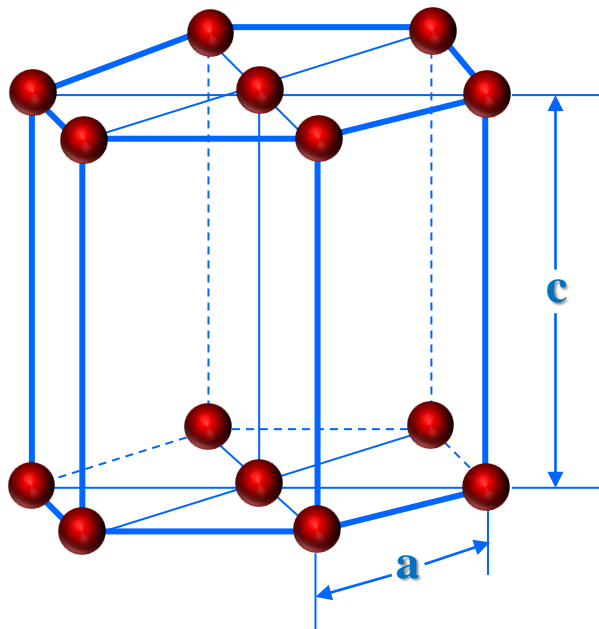
Face centered



$$a \neq b \neq c, \alpha = \beta = \gamma = 90^\circ$$

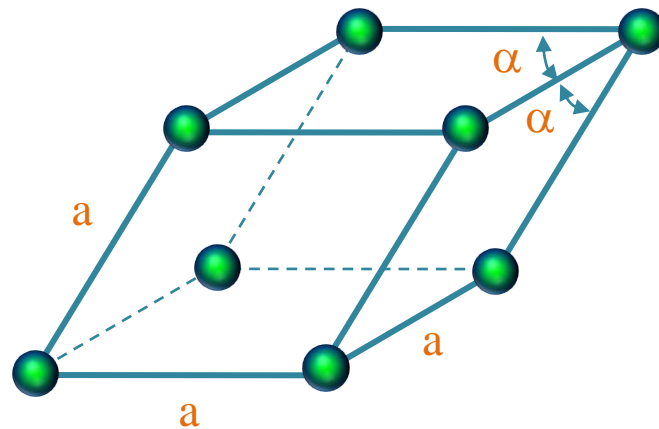


六方晶系 (Hexagonal)



$$a = b \neq c, \alpha = \beta = 90^\circ, \gamma = 120^\circ$$

菱方晶系 (Rhombohedral)

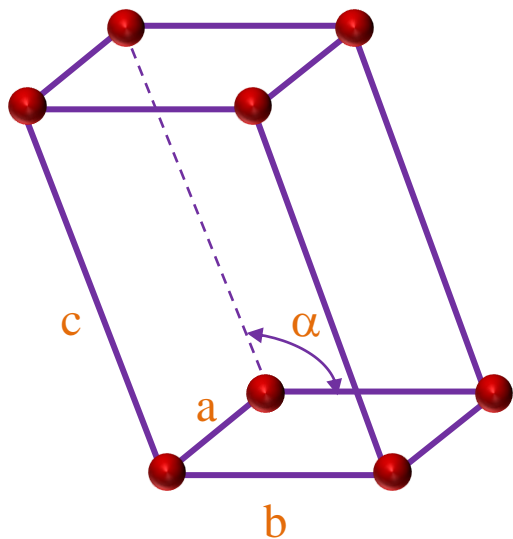


$$a = b = c, \alpha = \beta = \gamma \neq 90^\circ$$



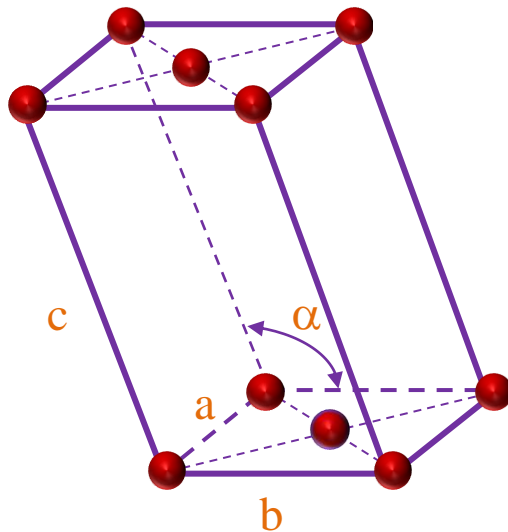
单斜晶系 (monoclinic)

Simple

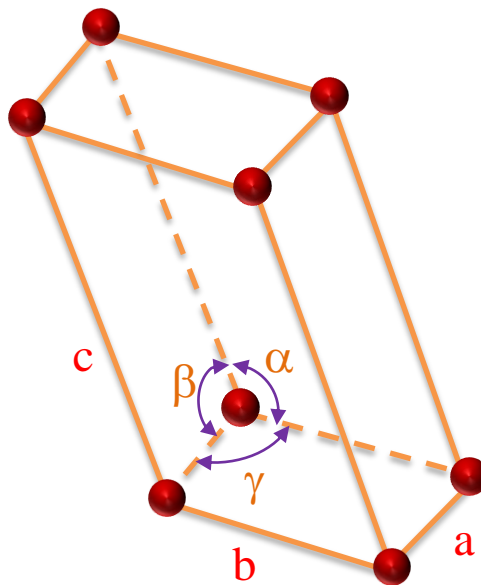


$$a \neq b \neq c, \beta = \gamma = 90^\circ \neq \alpha$$

Base centered



三斜晶系 (triclinic)



$$a \neq b \neq c, \alpha \neq \beta \neq \gamma \neq 90^\circ$$