

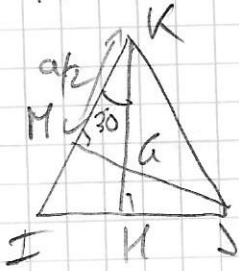
TD KPI3-4 exo6

1) Coordonnées : nb de sphères tangentes à l'axe donnée
 12 sites de la π face, 3 face sup, 3 face inf

2) Coefficient $C = \frac{V_{\text{atomes}}}{V_{\text{cell}}}$

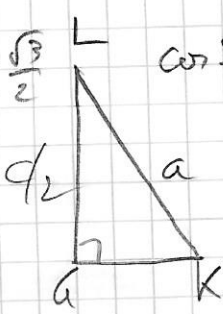
Nb d'atomes/cellule : $12 \times \frac{1}{6} + 2 \times \frac{1}{2} + 3 = 2 + 1 + 3 = 6$ atomes/cellule

Tetraèdre ISKL de côté $a = 2R$ (2 at. l'pts entre eux selon le côté de l'hexagone)



Rq $\left\{ \begin{aligned} KH &= \frac{2}{3} KH \\ KH^2 + \left(\frac{a}{2}\right)^2 &= a^2 \Rightarrow KH^2 = a^2 - \frac{a^2}{4} = \frac{3a^2}{4} \\ KH &= \frac{a\sqrt{3}}{2} \quad KG = \frac{2}{3} \frac{a\sqrt{3}}{2} \quad KA = \frac{a}{\sqrt{3}} \end{aligned} \right.$

$\cos 30 = \frac{\sqrt{3}}{2}$ $\cos 30 = \frac{KH}{a} \Rightarrow KH = \frac{a\sqrt{3}}{2}$ $KG = \frac{KM}{\cos 30} = \frac{a}{2} \times \frac{2}{\sqrt{3}} = \frac{a}{\sqrt{3}}$



$\Rightarrow LG^2 = a^2 - \frac{a^2}{3} = \frac{2a^2}{3} \quad LG = \frac{a\sqrt{2}}{\sqrt{3}}$

$LG = \frac{c}{2} = a\sqrt{\frac{2}{3}} \quad \left[c = \frac{2\sqrt{2}}{\sqrt{3}} a \right]$

$S_{\Delta ISK} = KH \times \frac{a}{2} = \frac{a}{2} \times \frac{a\sqrt{3}}{2} = \frac{a^2\sqrt{3}}{4}$

$S_{\text{tetra}} = 6 S_{\Delta ISK} = 2 \times 3 \frac{a^2\sqrt{3}}{4} = \frac{3\sqrt{3}}{2} a^2$

$V_{\text{cell}} = S_{\text{tetra}} \times c = \frac{3\sqrt{3}}{2} a^2 c = \frac{3\sqrt{3}}{2} \times \frac{2\sqrt{2}}{\sqrt{3}} a^3 = 3\sqrt{2} a^3$

$C = 6 \times \frac{4}{3} \pi r^3 \times \frac{1}{3\sqrt{2} \times 2^3 r^3} \quad C = \frac{\pi}{3\sqrt{2}} = 0,74$

2) $a = 2R \Rightarrow R = \frac{a}{2} = 160 \mu\text{m}$

$\rho = \frac{6 \times M}{N_A \times 3\sqrt{2} a^3} \quad \left[\rho = \frac{\sqrt{2} M}{N_A a^3} \right]$

$\rho = \frac{\sqrt{2} \times 243 \cdot 10^{-3}}{6,022 \cdot 10^{23} \times (320 \cdot 10^{-12})^3} = 1741,5 \text{ kg m}^{-3}$