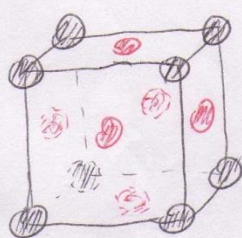


P1) a)

Objeto		Enlace	Estructura	Comp. Eléctrica
Rueda de Auto	Llanta	Metálico	Cristalina	Conductor
	Neumático	Covalente V.D.W.	Semicristalina	Aislante
Martillo	Cabeza	Metálico	Cristalina	Conductor
	Mango	Covalente V.D.W.	Semicristalina	Aislante
Salero	Frasco	Iónico	Amorfo	Aislante
	Tapa	Covalente V.D.W.	Semicristalina	Aislante

b)



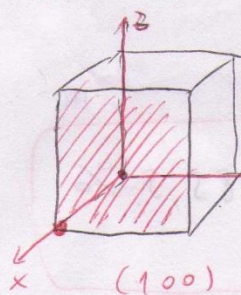
Au

Cu

$$8 \cdot \frac{1}{8} = 1 \text{ át. Au}$$

$$6 \cdot \frac{1}{2} = 3 \text{ át. Cu}$$

* Planos:

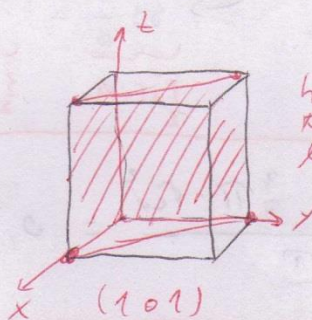


$$h=1$$

$$k \rightarrow 0$$

$$l \rightarrow 0$$

(100)

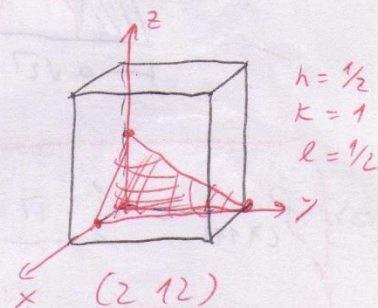


$$h=1$$

$$k \rightarrow 0$$

$$l=1$$

(101)



$$h=1/2$$

$$k=1$$

$$l=1/2$$

(212)

* Cu_3Au posee estructura FCC. Calculando el parámetro de red a :

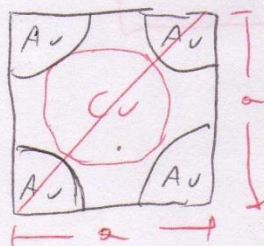
$$\Rightarrow a^2 + a^2 = (2r_{\text{Au}} + 2r_{\text{Cu}})^2$$

R. iónicos!

$$2a^2 = 4(r_{\text{Au}} + r_{\text{Cu}})^2$$

$$\therefore a = \sqrt{2}(r_{\text{Au}} + r_{\text{Cu}}) = 0,385 \text{ nm}$$

Plano (100)



$$* \rho_{Cu} = \frac{N^{\circ} dt \times PA}{V_{Cu}} = \frac{1 \text{ [at]} \cdot 196,97 \left[\frac{g}{mol} \right] + 3 \text{ [at]} \cdot 63,55 \left[\frac{g}{mol} \right]}{(0,385 \cdot 10^{-7})^3 [\text{cm}^3] \cdot 6,02 \cdot 10^{23} \left[\frac{dt}{mol} \right]}$$

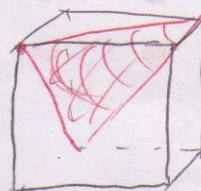
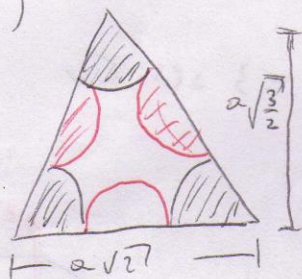
$$\Rightarrow \rho_{Cu} = 11,28 \left[\frac{g}{\text{cm}^3} \right]$$

$$* FAA = \frac{N^{\circ} dt \times V_{dt}}{V_{Cu}} = \frac{1 \cdot \frac{4}{3} \pi \cdot r_{Au}^3 + 3 \cdot \frac{4}{3} \pi \cdot r_{Cu}^3}{a^3}$$

$$\Rightarrow FAA = 0,68$$

$$* \rho_{(\bar{1}11)} = \frac{N^{\circ} dt \times \text{Área } dt \cdot [\%]}{\text{Área plano}} \quad \text{ó} \quad \rho_{(\bar{1}11)} = \frac{N^{\circ} dt}{\text{Área plano}} \left[\frac{dt}{\text{nm}^2} \right]$$

$\rightarrow (\bar{1}11)$



$$\rightarrow 3 \cdot \frac{1}{2} + 3 \cdot \frac{1}{2} = 2 dt$$

$\underbrace{\quad}_{1 \text{ dt. Au}} \quad \underbrace{\quad}_{\frac{3}{2} \text{ dt. Cu}}$

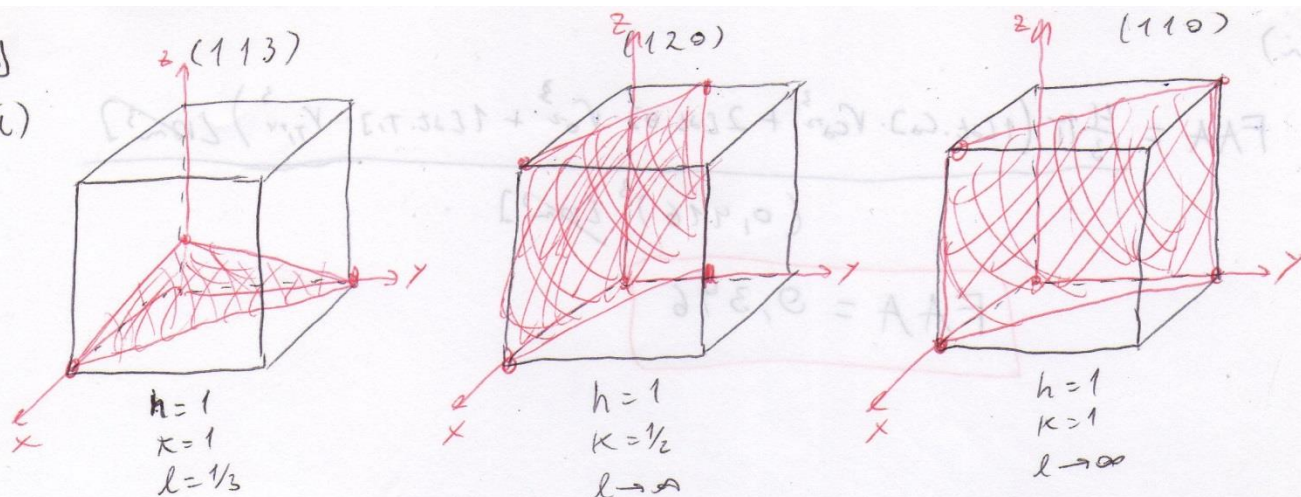
$$\Rightarrow \rho_{(\bar{1}11)} = \frac{\frac{1}{2} \cdot \pi \cdot r_{Au}^2 + \frac{3}{2} \pi \cdot r_{Cu}^2}{\frac{a^2 \sqrt{3}}{2}} = 0,855 = 85,5 \%$$

ó

$$\Rightarrow \rho_{(\bar{1}11)} = \frac{2 dt}{\frac{a^2 \sqrt{3}}{2}} = 15,58 \left[\frac{dt}{\text{nm}^2} \right]$$

P2)

i)



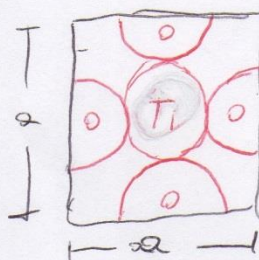
ii) La celda contiene:

↳ 1.8 ± 1 átomos de Ca

↳ $6 \cdot \frac{1}{2} = 2$ átomos de O

↳ 1 átomo de Ti

Plano (100)



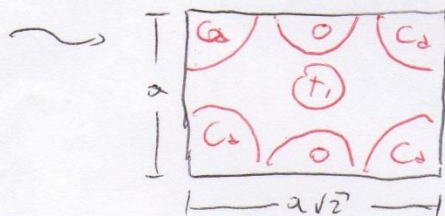
$$a = 2(r_o + r_{Ti})$$

$$a = 0,416 \text{ nm}$$

$$\Rightarrow \rho_{c.v.} = \frac{1[\text{át. Ca}] \cdot 40,08 \left[\frac{\text{g}}{\text{mol}} \right] + 2[\text{át. O}] \cdot 16 \left[\frac{\text{g}}{\text{mol}} \right] + 1[\text{át. Ti}] \cdot 47,88 \left[\frac{\text{g}}{\text{mol}} \right]}{(0,416 \cdot 10^{-7})^3 [\text{cm}^3]} \cdot 6,02 \cdot 10^{23} \left[\frac{\text{át}}{\text{mol}} \right]$$

$$\therefore \rho_{c.v.} = 2,768 \left[\frac{\text{g}}{\text{cm}^3} \right]$$

$\Rightarrow \rho_{(110)}$



• 1 át. de Ca^{+2} , 1 át. de Ti^{4+} , 1 át. de O^{2-}

• Área = $a^2 \sqrt{2} \approx 0,245 [\text{nm}^2]$

$$\Rightarrow \rho_{(110)} = \frac{3 [\text{át}]}{0,245 [\text{nm}^2]} = 12,245 \left[\frac{\text{át}}{\text{nm}^2} \right]$$

$$\Rightarrow \rho_{(110)} = \frac{(1[\text{át. Ca}] \cdot \pi \cdot r_{\text{Ca}^{+2}}^2 + 1[\text{át. Ti}] \cdot \pi \cdot r_{\text{Ti}^{4+}}^2 + 1[\text{át. O}] \cdot \pi \cdot r_{\text{O}^{2-}}^2) [\text{nm}^2]}{0,245 [\text{nm}^2]}$$

$$\rho_{(110)} = 0,439 \approx 43,9\%$$

iii)

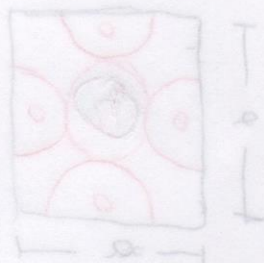
$$FAA = \frac{4}{3}\pi \left(1 \text{ Oct. Co} \cdot V_{Co}^3 + 2 \text{ Oct. O} \cdot V_{O}^3 + 1 \text{ Tet. Ti} \cdot V_{Ti}^3 \right) \text{ [nm}^3]$$

$$(0,416)^3 \text{ [nm}^3]$$

$$FAA = 0,396$$

$$(a/2 + r) \cdot 5 = 0$$

$$a = 0,416 \text{ nm}$$



$$\left[\frac{4}{3}\pi \cdot 1 \cdot V_{Co}^3 \right] + \left[\frac{4}{3}\pi \cdot 2 \cdot V_{O}^3 \right] + \left[\frac{4}{3}\pi \cdot 1 \cdot V_{Ti}^3 \right] = 0,396$$

$$\left(0,416 \cdot 10^{-9} \right)^3 \cdot \left(\frac{4}{3}\pi \cdot 1 \cdot V_{Co}^3 + \frac{4}{3}\pi \cdot 2 \cdot V_{O}^3 + \frac{4}{3}\pi \cdot 1 \cdot V_{Ti}^3 \right) = 0,396$$

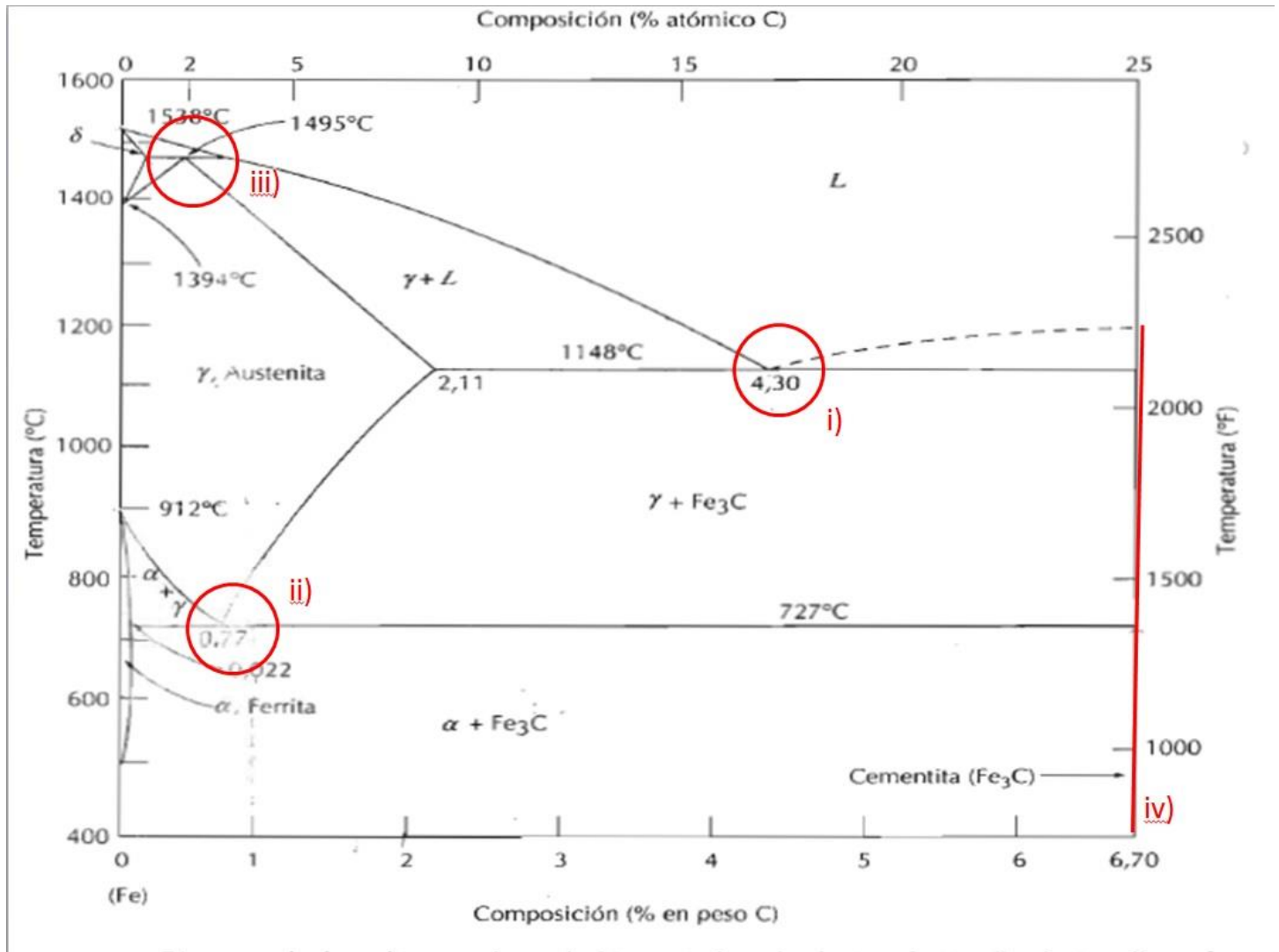
$$0,416 = 0,416$$



$$\left[\frac{4}{3}\pi \cdot 1 \cdot V_{Co}^3 \right] = \frac{0,396}{0,416^3} = 0,396$$

$$\left(0,416 \cdot 10^{-9} \right)^3 \cdot \left(\frac{4}{3}\pi \cdot 1 \cdot V_{Co}^3 + \frac{4}{3}\pi \cdot 2 \cdot V_{O}^3 + \frac{4}{3}\pi \cdot 1 \cdot V_{Ti}^3 \right) = 0,396$$

$$0,416 = 0,416$$



- i) Rxn. Eutética (Ledeburita): $L \rightarrow \gamma + \text{Fe}_3\text{C}$
- ii) Rxn. Eutectoide (Perlita): $\gamma \rightarrow \alpha + \text{Fe}_3\text{C}$
- iii) Rxn. Peritética: $L + \delta \rightarrow \gamma$
- iv) Comp. Intermetálico (Cementita): Fe_3C