(1)

1.- Es la energia minima en el nivel $n=1$ que conserva la particula no puede ser 0.

(0.5)

2. $\lambda_{u2} = 794\ nm$ pasa de $n=2$ a $n=1$

Encuentre L (longitud del pozo)

$\Delta E_n = E_{n2} - E_{n1} = 1.56\ eV$

$$\Rightarrow E_n = n^2 \left(\frac{h^2}{8 m_e L^2} \right)$$

$$E = \frac{1240}{794 nm} = 1.56\ ev = 2.49 \times 10^{-19}\ j$$

$$\Rightarrow L = \sqrt{\frac{h^2}{8 m_e E}}$$

$$\Rightarrow L = \frac{h}{\sqrt{8 m_e E}} = \frac{6.626 \times 10^{-34}}{\sqrt{8(9.11 \times 10^{-31})2.49 \times 10^{-19}}} = \frac{6.626 \times 10^{-34}}{\sqrt{(7.28 \times 10^{-30})\ 2.49 \times 10^{-19}}}$$

$$= \frac{6.626 \times 10^{-34}}{\sqrt{1.814 \times 10^{-48}}} = \frac{6.626 \times 10^{-34}}{1.3468 \times 10^{-24}} = \underline{4.9198 \times 10^{-10}}$$

$L = 0.849\ nm$

(1)

3 $E_T = 4.5 eV$ $U = 5.0 eV$ $L = 9.5 \mathring{A} \Rightarrow 1 \mathring{A} = 1\times10^{-10} m$

$9.5 \mathring{A} = 9.5 \times 10^{-10} m$

$\Rightarrow T = e^{-2CL}$

$C = \sqrt{\frac{2m(U-E)}{\hbar^2}} \Rightarrow \frac{\sqrt{2(9.10\times10^{-31})(5-4.5)}}{1.054\times10^{-34}}$ EV

$\hbar = \frac{h}{2\pi} = \frac{6.626\times10^{-34}}{2\pi} = 1.054\times10^{-34}$

$5ev = 8.01\times10^{-19} j$

$4.5ev = 7.20\times10^{-19} j$

$\Rightarrow \frac{\sqrt{(1.82\times10^{-30})(8.01\times10^{-19} - 7.20\times10^{-19})}}{1.054\times10^{-34}}$

$\Rightarrow \frac{\sqrt{(1.82\times10^{-30})(8.1\times10^{-20})}}{1.054\times10^{-34}} = \frac{\sqrt{1.4742\times10^{-49}}}{1.054\times10^{-34}} = \frac{3.8395\times10^{-25}}{1.054\times10^{-34}} = 3642813996$
$= 3.6428\times10^{9}$

$\Rightarrow -2C = -7.2856\times10^{9}$

$\Rightarrow -2CL = (-7.2856\times10^{9})(9.5\times10^{-10} m) = -6.92132$

$e^{-2CL} = \exp(-6.92132) = 0.00098 = 0.098\%$

0.98×10^{-3}

Erika.

(0) 4º $\psi = A x e^{-x^2/L^2}$

$E_T = E_c + E_p = 0$ $\qquad E_c = -E_p \qquad \psi = A x e^{kx} \qquad k = \frac{2\pi}{\lambda}$

$E_c = \frac{1}{2} m \cdot v^2 \qquad \lambda = \frac{2\pi}{k}$

$mv = \frac{hk}{2\pi} \rightarrow v = \frac{hk}{2m\pi} \qquad E_c = \frac{1}{2} m \left(\frac{hk}{2\pi m} \right)^2 \qquad k = \frac{1}{L^2}$

$p = \frac{h}{\lambda} = mv = \frac{h}{\frac{2\pi}{k}} \qquad = \frac{1}{2} m \left(\frac{\hbar k}{m} \right)^2$

$= \frac{1}{2} m \left(\frac{\hbar^2 k^2}{m^2} \right) = \frac{\hbar^2 k^2}{2m}$

$E_c = -E_p \longrightarrow E_p = -\frac{\hbar^2 k^2}{2m} = -\frac{\hbar^2 \left(\frac{1}{L^2}\right)}{2m}$

$\therefore = \frac{\hbar}{2mL^2}$

No se llega a la solución,

(1)

5) $-\frac{\hbar^2}{2m}\frac{d^2}{dx^2}\psi + U\psi = E\psi \quad U\psi = 0 \quad \psi = Ae^{ikx}$

$-\frac{\hbar^2}{2m}\frac{d^2}{dx^2}\psi = E\psi$

$\frac{d}{dx}\psi = \frac{d}{dx}(A(\cos(kx) + i\sin(kx)))$

$= A(-k\sin(kx) + ki\cos(kx))$

$\frac{d^2}{dx^2}\psi = A(-k^2\cos(kx) - k^2 i\sin(kx)) = -Ak^2 e^{ikx}$

$-\frac{\hbar^2}{2m}(-Ak^2 e^{ikx}) = E\psi \quad \frac{\hbar^2 k^2}{2m}(\psi) = E\psi \quad \boxed{E = \frac{\hbar^2 k^2}{2m}}$

$E_c = \frac{1}{2}mv^2, \quad v = \frac{hk}{2m\pi}$

$E_c = \frac{1}{2}m\left(\frac{\hbar k}{m}\right)^2 = \frac{1}{2}\left(\frac{k^2\hbar^2}{m^2}\right)m = \boxed{\frac{\hbar^2 k^2}{2m}}$