作 业 纸

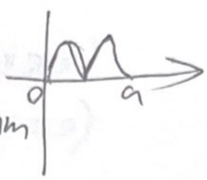
课程名称：大物

班级：63012216 教学班级：08012204 姓名：俞乐棹 学号：1120221303 第 1 页

3-1. (1). $E_1 = \frac{\pi^2 \hbar^2}{2m_e a^2} = \frac{(6.63\times10^{-34})^2}{4\pi^2 \cdot 2 \cdot 9.11\times10^{-31}\cdot(0.2\times10^{-9})^2} = 1.5\times10^{-18}$ J

$= 9.33$ eV

(2). $|\psi_2|^2 = \frac{2}{a}\sin^2\frac{2\pi}{a}x$

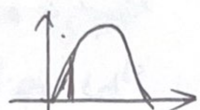


x = 0nm. 0.1nm. 0.2nm

3-3. $n^2-(n-1)^2=3$: $n=1$.

从基态到 n = 2

$P_1 = \int_0^{\frac{a}{4}} |\psi_1|^2 dx = \frac{1}{4} - \frac{1}{2\pi}$



$P_2 = \int_0^{\frac{a}{4}} |\psi_2|^2 dx = 0.25$

3-4 (1) $\Delta E = E_2 - E_1 = \frac{3\pi^2\hbar^2}{2m_e a^2} = \frac{3h^2}{8m_e a^2} = \frac{3(6.63\times10^{-34})^2}{8\cdot 9.11\times10^{-31}\cdot(0.1\times10^{-9})^2}$

$= 1.809\times10^{-17}$ J

(2). $P = \int_0^{\frac{a}{3}} |\psi_1|^2 = \int_0^{\frac{a}{3}} \frac{2}{a}\sin^2\frac{n\pi}{a}x$ [illegible]

$= \int_0^{\frac{a}{3}} \frac{1-\cos\frac{2\pi x}{a}}{a} dx = \frac{1}{3} - \left(\frac{\sin\frac{2\pi x}{a}}{2\pi}\right)\Big|_0^{\frac{a}{3}} = \frac{1}{3} - \left(\frac{\sin\frac{2\pi}{3}}{2\pi}\right) \approx 0.2$

3-5. $a = n\frac{\lambda_n}{2}$. $n\in N^+$.

$p = \frac{h}{\lambda_n}$

$E_n = \frac{p_n^2}{2m} = \frac{(h/\lambda_n)^2}{2m} = \frac{h^2}{2m\lambda_n^2} = \frac{n^2h^2}{8ma^2}$ $E_1 = \frac{h^2}{8ma^2}$..

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3-7. 117. $1=\int_{-\infty}^{\infty}\psi^2(x)dx=A^2\int_0^{\infty}x^2e^{-2\lambda x}dx=\frac{A^2}{4\lambda^3}$

$\therefore A=2\lambda^{\frac{3}{2}}$

b) $P=\begin{cases}4\lambda^3x^2e^{-2\lambda x} & (x\geq 0)\\ 0. & (x<0)\end{cases}$

3-8. $n=3$. $2n^2=18$.

$Zn: 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$.

$Cu=1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$