chapter 5

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1   5.1

The energy is 12.6eV, The electron mass is $0.511\text{MeV}/c^2$, speed is $2.2*10^6\text{m/s}$

The proton mass is $938.3\text{MeV}/c^2$,
speed is $2.2*10^6\text{m/s}$
The electron mass is $0.511\text{MeV}/c^2$, speed is $2.2*10^6\text{m/s}$

2   5.3

We use formula:

$$E_{n,j} = -\frac{13.6}{n^2}[1 + \frac{\alpha^2}{n}(\frac{1}{j+1/2} - \frac{3}{4n})] \tag{1}$$

When n=2, the energy difference :

$$\Delta E = 45.3\mu eV \tag{2}$$

When n=3, the energy difference :

$$\Delta E = 13.4\mu eV \tag{3}$$