PC2232: Physics for Electrical Engineers

Tutorial 4 Answers

1. (a) $\phi = 5.8\text{eV}$

   (b) $n = 1.56 \times 10^{18}$

   (c) n is halved

   (d) n is halved

   (e) K_{max} does not change for part (c)
   K_{max} increases for part (d)

2. (a) $\lambda'' - \lambda = \dfrac{h}{mc}(2 - \cos\theta_1 - \cos\theta_2)$

   (b) Nope. Only when $\theta = 180°$

   (c) $\left(2 - \sqrt{3}\right)\dfrac{h}{mc}$

   (d) $\dfrac{1}{2}\dfrac{h}{mc}$

3. (a) $r_{\text{He}^+} = 2.65 \times 10^{-11}\text{m}$,
   $E_{\text{He}^+} = 54.2\text{eV}$

   (b) $r_{\text{Li}^{2+}} = 1.77 \times 10^{-11}\text{m}$,
   $E_{\text{Li}^{2+}} = 121.9\text{eV}$

   (c) $r_{\text{Be}^{3+}} = 1.33 \times 10^{-11}\text{m}$,
   $E_{\text{Be}^{3+}} = 216.8\text{eV}$

4. (a) $r = \left(\dfrac{n^2\hbar^2}{mD}\right)^{\frac{1}{4}}$

   (b) $E = Dr^2$

   (c) $E_f - E_i = (n_f - n_i)\hbar\sqrt{\dfrac{D}{m}}$,
   where $n_f > n_i$

   (d) Spring system

5. Both are proving questions, so there's no answer.