78. (a) Using the result of problem 3,

$$E = \frac{hc}{\lambda} = \frac{1240\,\mathrm{nm\cdot eV}}{10.0 \times 10^{-3}\,\mathrm{nm}} = 124\,\mathrm{keV}\ .$$

(b) The kinetic energy gained by the electron is equal to the energy decrease of the photon:

$$\begin{aligned}
\Delta E &= \Delta\left(\frac{hc}{\lambda}\right) = hc\left(\frac{1}{\lambda} - \frac{1}{\lambda+\Delta\lambda}\right) = \left(\frac{hc}{\lambda}\right)\left(\frac{\Delta\lambda}{\lambda+\Delta\lambda}\right) = \frac{E}{1+\frac{\lambda}{\Delta\lambda}} \\
&= \frac{E}{1+\frac{\lambda}{\lambda_C(1-\cos\phi)}} = \frac{124\,\mathrm{keV}}{1+\frac{10.0\,\mathrm{pm}}{(2.43\,\mathrm{pm})(1-\cos 180^\circ)}} \\
&= 40.5\ \mathrm{keV}\ .
\end{aligned}$$

(c) It is impossible to "view" an atomic electron with such a high-energy photon, because with the energy imparted to the electron the photon would have knocked the electron out of its orbit.