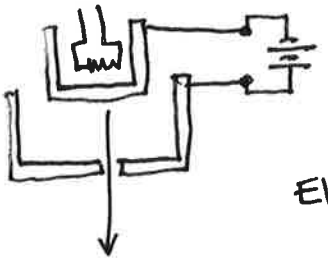
TL 5-3 (electron microscope)



Electron deBroglie wavelength is $p = \frac{h}{\lambda}$

where $\lambda = 0.04\text{nm}$. So we can find the accelerating voltage ΔV by conservation of energy. In particular, the electron "falls" through a potential energy difference of $\Delta U = e\Delta V$.

In so doing, it gains kinetic energy $\Delta K = \frac{p^2}{2m}$. Thus

$$\frac{p^2}{2m} = e\Delta V$$

So $$\Delta V = \frac{p^2}{2me} = \frac{h^2}{\lambda^2 2me}$$

$$\boxed{\Delta V = 940 \text{ volts}}$$