

Example 1

An electron is accelerated through a potential difference of 60 kV. What is its energy (a) in electron volts (b) in joules?

Solution

By definition:

Potential = Work done per unit charge

$$V = \frac{W}{q}$$

Therefore $W = qV$

$$\text{Energy} = qV$$

(a) Energy = $(1e)(60000\text{ V})$ where $e =$ charge on the electron

$$= 60000\text{ eV}$$

$$= 60\text{ keV}$$

(b) Energy = $(1.6 \times 10^{-19}\text{ C})(60000\text{ V})$

$$= 1.6 \times 10^{-19} \times 6 \times 10^4\text{ CV}$$

$$= 9.6 \times 10^{-15}\text{ CV}$$

$$= 9.6 \times 10^{-15}\text{ J}$$