

## Potential Difference

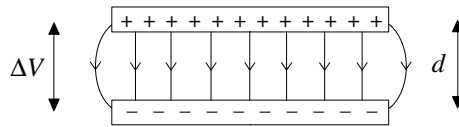
Electrical potential difference is also known as voltage. It is a measurement of the energy that would be transported (work done) by a charge in an electric field.

$$E = \frac{\Delta V}{d}$$

electric field strength in  $\text{NC}^{-1}$  or  $\text{Vm}^{-1}$

potential difference (voltage) in V (volts) or  $\text{JC}^{-1}$

distance in m (metres)



If the potential difference is 1 V, a charge of 1 C would gain 1 J by being pushed through the distance by the field, or 1 J would be required to push the charge through the distance against it.

$$W = q\Delta V$$

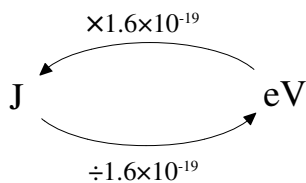
work done (energy) in J (joules)

potential difference (voltage) in V (volts) or  $\text{JC}^{-1}$

charge in C (coulombs)

One electron has a small charge,  $1.6 \times 10^{-19}$  C. For this reason a small unit of energy, “electron volt” (eV) is sometimes used. It is the energy to push an electron through 1 volt:  $1.6 \times 10^{-19}$  J.

To convert between joules and electron volts:



Another way to measure energy (work done) is the force applied to an object for a distance:

$$W = Fd$$

work done (energy) in J (joules)

distance in m (metres)

force in N (newtons)