

# Photo Energy and Finding Plank's Constant

18 March 2020 10:31

A photo is thought of as a "packet" of energy. They can either loose all or none of their energy (so in that sense not really that like a particle then...)

## Using an LED to find Plank's Constant

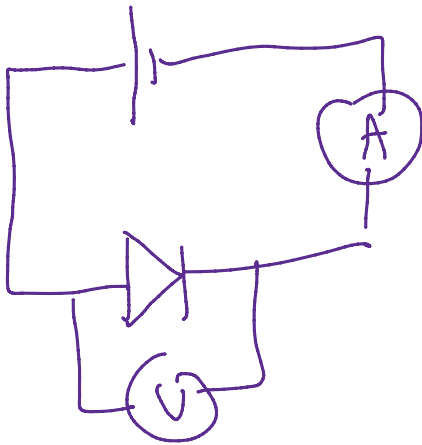
As you know current will only pass one way through and LED (its a diode that emits light). However, even if the current is flowing in the right direction it will only flow if the voltage across the LED is bigger than the threshold voltage  $V_0$  - usually around 0.6V

At this voltage the electrons have just the right amount of energy to cause photons to be emitted. All of the electrons  $E_k$  is passed over to the photon.

$$E = hf \Rightarrow E = \frac{hc}{\lambda} \Rightarrow h = \frac{E\lambda}{c}$$

$$\text{And: } E \text{ of photon} = eV_0 \text{ so } h = \frac{eV_0\lambda}{c} \\ \text{or } h = \frac{eV_0}{f}$$

Use several different LEDs of different colour, ie different wavelength (usually you can look up the wavelength of a given LED so that's ok).

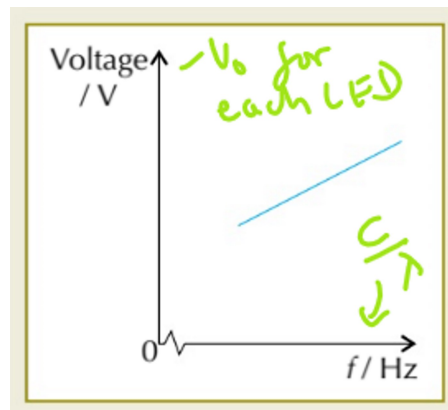


Set up this circuit.

Set  $I = 0$  - so  $V$  will be below the threshold

Use a variable power supply and vary the voltage until light just is emitted. Record  $V$

Repeat for different LEDs



$$\frac{h}{e} = \frac{V_0}{f} = \frac{\Delta Y}{\Delta X}$$