

Light Emitting Diodes

Apparatus

a selection of LEDs, a power supply, a switch, voltmeter, variable resistor

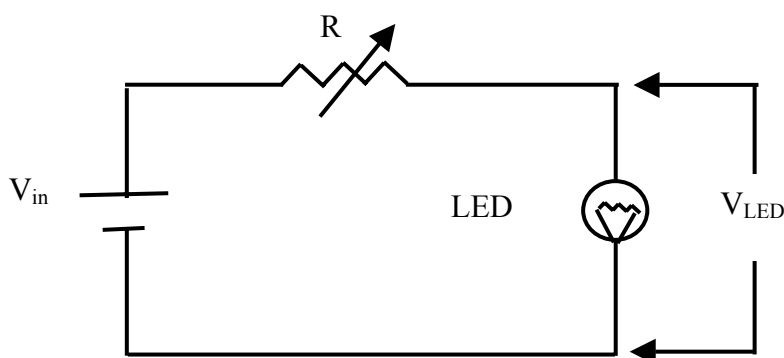
The switch, power supply variable resistor and an LED are wired in series, with the circuit set so that the LEDs can be swapped. The voltmeter is connected across the led.

Action

The students look at the various LEDs in the circuit, and try to explain why they produce different colours. The students adjust the variable resistor until the LED starts to glow. They then measure voltage across the LED. They should recognize that the shorter the wavelength produced, the greater the voltage needed, and relate this to the band gap of the semiconductor material of the LED.

The Physics

The colour of the LED depends on the band gap. When an electron transition occurs a photon with energy depending on the change in energy of the electron is emitted.



Accompanying sheet:

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Connect an LED to the Power Supply.

Vary the resistor until the LED just starts to glow.

What is the voltage across the LED now?

Repeat this measurement with the other coloured LEDs.

How does the voltage vary?

How does the LED produce photons?

What determines the colour of the light produced by a LED?