

# OCR B Physics A Level

## 4.1.2 - Particle Theory of Light

### Flashcards

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What is the alternative model to the wave theory of light?



What is the alternative model to the wave theory of light?

The particle theory of light.



How does the particle theory of light describe the composition of light?



How does the particle theory of light describe the composition of light?

It describes light as consisting of small packets/quanta of energy, called photons.



What equation is used to calculate the energy of light photons?



What equation is used to calculate the energy of light photons?

*Energy = Planck's Constant  $\times$  Frequency*

$$E = hf$$



# What is an electronvolt?





## What is an electronvolt?

An electronvolt is the energy transferred when a single electron is moved through a potential difference of one volt.



How many joules is an electron volt equal to?



How many joules is an electron volt equal to?

$$1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$$



# What is the photoelectric effect?



## What is the photoelectric effect?

The photoelectric effect is when electrons are emitted from the surface of a metal due to light being incident on it.



Explain the requirements for photoelectrons to be emitted from a metal.



Explain the requirements for photoelectrons to be emitted from a metal.

- The incident light must have a frequency above the threshold frequency.
- This is because one photon must transfer sufficient energy to one electron to allow it to overcome the metal's work function and be released.



# What is a metal's work function?





## What is a metal's work function?

The work function of a metal is the minimum energy needed to liberate an electron from its surface.



What can be said about the kinetic energies of the emitted photoelectrons?



What can be said about the kinetic energies of the emitted photoelectrons?

The photoelectrons will be emitted with a range of kinetic energies up to a maximum value.



What equation can be used to calculate the maximum kinetic energy of a photoelectron?



What equation can be used to calculate the maximum kinetic energy of a photoelectron?

$$E_{k(max)} = hf - \Phi$$

Where  $\Phi$  is the metal's work function.



# What does electron diffraction provide evidence for?



What does electron diffraction provide evidence for?

The wave behaviour of matter.



What is the name of the wavelength of matter?





What is the name of the wavelength of matter?

The De Broglie Wavelength.



How do you calculate the De Broglie  
Wavelength ( $\lambda$ )?



How do you calculate the De Broglie Wavelength  
( $\lambda$ )?

$$\lambda = h/mv$$

