

AS Level in Physics A
H156/02 Depth in physics

Question Set 15

1 Einstein derived the following equation to explain the photoelectric effect:

$$hf = \phi + KE_{\max}$$

(a) Define the following terms from the equation

(i) hf

[1]

(ii) ϕ

[1]

(b) Electromagnetic radiation of frequency 1.2×10^{15} Hz is incident on the surface of a negatively charged aluminium plate. The work function of aluminium is 4.1 eV.

(i) Show that the maximum speed of the electrons emitted from the surface of the aluminium is 5.5×10^5 m s⁻¹.

[4]

(ii) State and explain what change, if any, occurs to the maximum speed of the emitted electrons when the intensity of the electromagnetic radiation is increased.

[2]

(c) Moving electrons have wave-like properties.
Calculate the de Broglie wavelength λ for electrons travelling at 5.5×10^5 m s⁻¹.

$\lambda =$ m [2]

Total Marks for Question Set 15: 10

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