

- 7 Electrons are emitted from a metal surface when it is illuminated with electromagnetic radiation of suitable frequency. This process is known as the photoelectric effect.

- (a) State two observations of the photoelectric effect that cannot be explained using the wave nature of electromagnetic radiation.

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- (b) Data for the wavelength  $\lambda$  of the radiation incident on the metal surface and the maximum kinetic energy  $E_k$  of the emitted electrons are shown in Fig. 7.1.

$\lambda$ / nm	$E_k$ / $10^{-19}$ J
650	-
240	4.44

**Fig. 7.1**

- (i) Suggest why emitted electrons are likely to have a range of values of kinetic energy for any one frequency of the electromagnetic radiation.

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- (ii) Without any calculation, suggest why no value is given for  $E_K$  for radiation of wavelength 650 nm.

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- (iii) Use data from Fig. 7.1 to determine the work function energy of the surface.

[2]

work function energy = ..... J

- (c) Radiation of wavelength 240 nm gives rise to a maximum photoelectric current. The wavelength is maintained constant and the intensity of the incident radiation is now reduced.

State and explain the effect of this change on the maximum photoelectric current.

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