

- 7 (a) By reference to the photoelectric effect, state what is meant by the *threshold frequency*.

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[2]

- (b) Electrons are emitted from a metal surface when light of a particular wavelength is incident on the surface.
 Explain why the emitted electrons have a range of values of kinetic energy below a maximum value.

.....

[2]

- (c) The wavelength of the incident radiation is λ .
 The variation with $1/\lambda$ of the maximum kinetic energy E_{MAX} of electrons emitted from a metal surface is shown in Fig. 7.1.

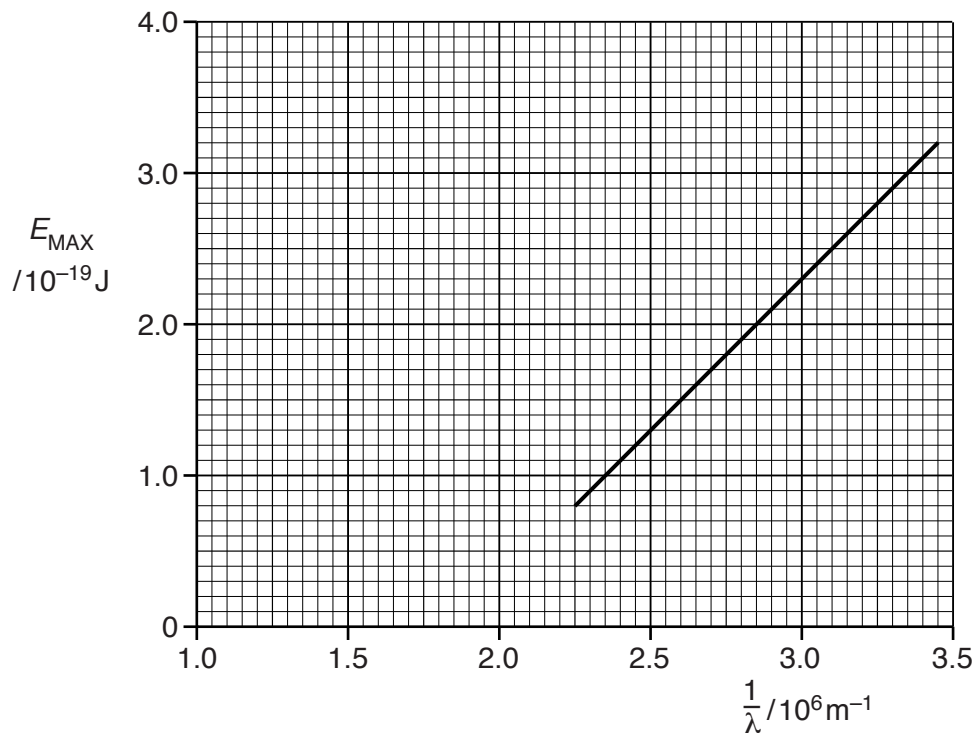


Fig. 7.1

- (i) Use Fig. 7.1 to determine, without reference to the work function energy, the threshold frequency f_0 .

$$f_0 = \dots\dots\dots \text{ Hz [2]}$$

- (ii) Use your answer in (i) to calculate the work function energy Φ .

$$\Phi = \dots\dots\dots \text{ J [2]}$$

- (d) Caesium metal has a work function energy of $2.2 \times 10^{-19} \text{ J}$.

On the axes of Fig. 7.1, sketch a graph to show the variation with $1/\lambda$ of E_{MAX} for caesium metal. [2]