

- 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.

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 .....  
 .....

[2]

- (c) The wavelength of the incident radiation is  $\lambda$ .

The variation with  $1/\lambda$  of the maximum kinetic energy  $E_{\text{MAX}}$  of electrons emitted from a metal surface is shown in Fig. 7.1.

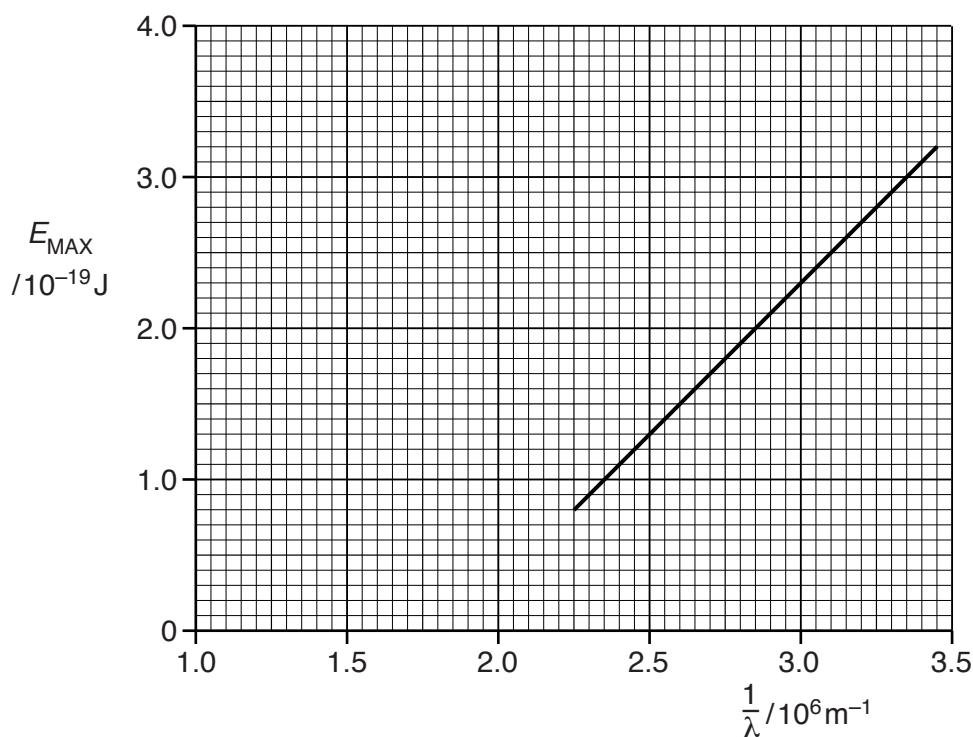


Fig. 7.1

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

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

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

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

- (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  $E_{\text{MAX}}$  for caesium metal. [2]