

- 10 (a)** Briefly describe two phenomena associated with the photoelectric effect that cannot be explained using a wave theory of light.

1.

.....

2.

.....

[2]

- (b)** The maximum energy E_{MAX} of electrons emitted from a metal surface when illuminated by light of wavelength λ is given by the expression

$$E_{\text{MAX}} = hc \left(\frac{1}{\lambda} - \frac{1}{\lambda_0} \right)$$

where h is the Planck constant and c is the speed of light.

- (i)** Identify the symbol λ_0 .

..... [1]

- (ii) The variation with $\frac{1}{\lambda}$ of E_{MAX} for the metal surface is shown in Fig. 10.1.

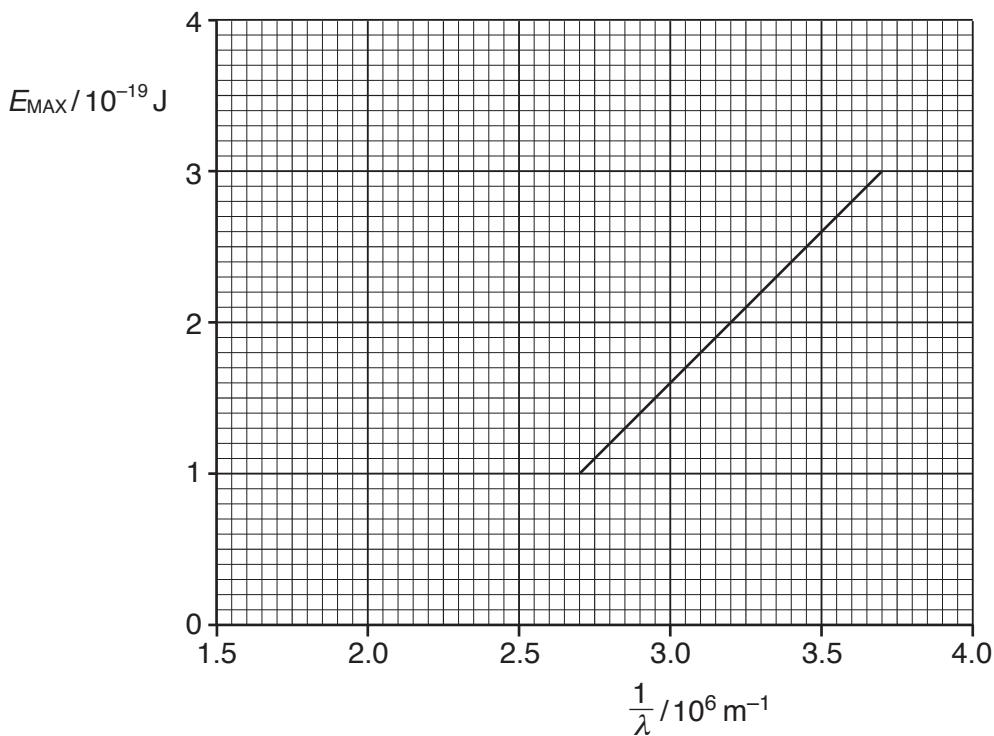


Fig. 10.1

1. Use Fig. 10.1 to determine the magnitude of λ_0 .

$$\lambda_0 = \dots \text{m} [1]$$

2. Use the gradient of Fig. 10.1 to determine a value for the Planck constant h .

$$h = \dots \text{ Js} [3]$$

- (c) The metal surface in (b) becomes oxidised.
Photoelectric emission is still observed but the work function energy is increased.

On Fig. 10.1, draw a line to show the variation with $\frac{1}{\lambda}$ of E_{MAX} for the oxidised surface. [2]

[Total: 9]