

- 7 An explanation of the photoelectric effect includes the terms photon energy and work function energy.

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Use

(a) Explain what is meant by

(i) a *photon*,

.....  
.....  
..... [2]

(ii) *work function energy*.

.....  
..... [1]

- (b) In an experiment to investigate the photoelectric effect, a student measures the wavelength  $\lambda$  of the light incident on a metal surface and the maximum kinetic energy  $E_{\max}$  of the emitted electrons. The variation with  $E_{\max}$  of  $\frac{1}{\lambda}$  is shown in Fig. 7.1.

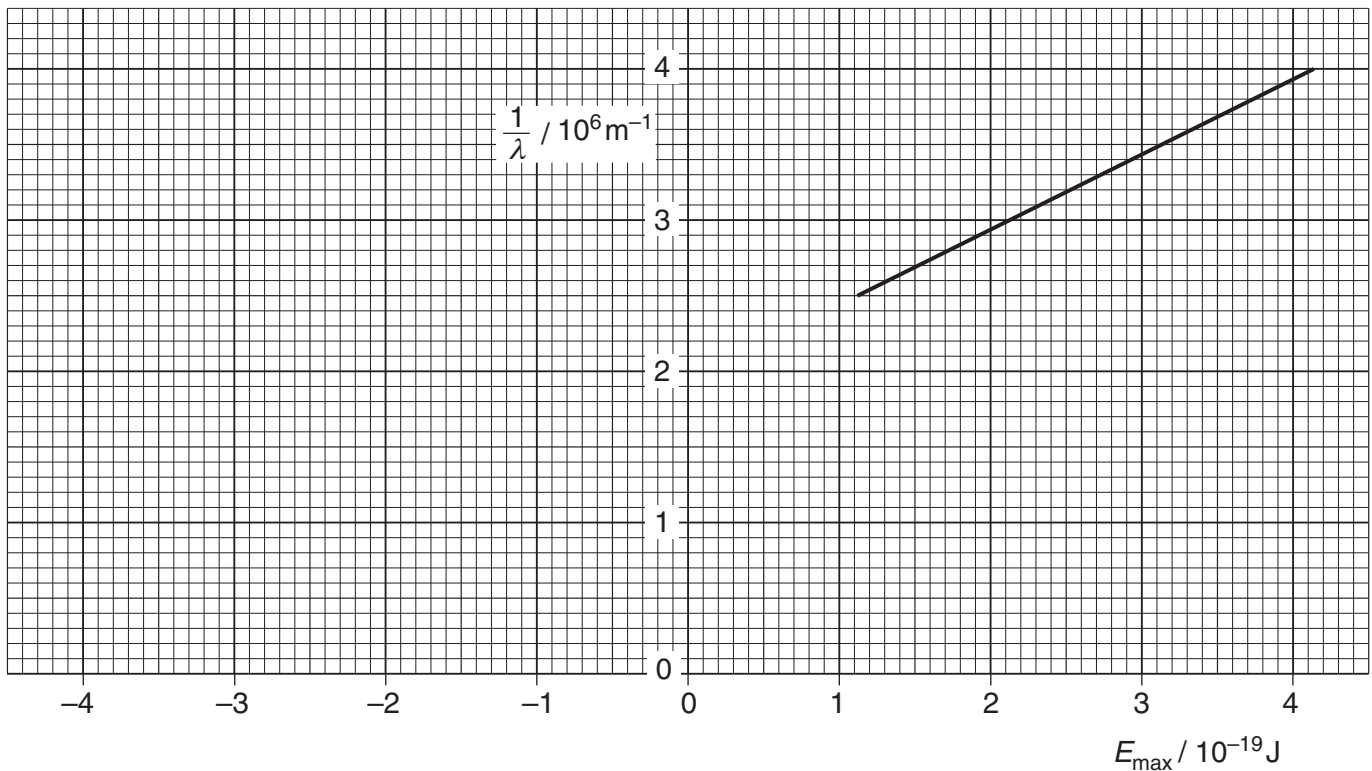


Fig. 7.1

- (i) The work function energy of the metal surface is  $\phi$ .  
State an equation, in terms of  $\lambda$ ,  $\phi$  and  $E_{\max}$ , to represent conservation of energy for the photoelectric effect. Explain any other symbols you use.

.....  
.....  
..... [2]

(ii) Use your answer in (i) and Fig. 7.1 to determine

1. the work function energy  $\phi$  of the metal surface,

$\phi = \dots\dots\dots$  J [2]

2. a value for the Planck constant.

Planck constant =  $\dots\dots\dots$  Js [3]

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