

- 7 An evacuated tube contains two plane, parallel, metal electrodes, one of which is an emitter of electrons and the other a collector. When the emitter is illuminated with electromagnetic radiation of photon energy 4.7 eV at a power of 3.8 mW, photoelectrons are emitted.

The potential difference V between collector and emitter is adjusted, and the photocurrent I is measured.

Fig. 7.1 is a graph of the variation with the potential difference V of the photocurrent I .

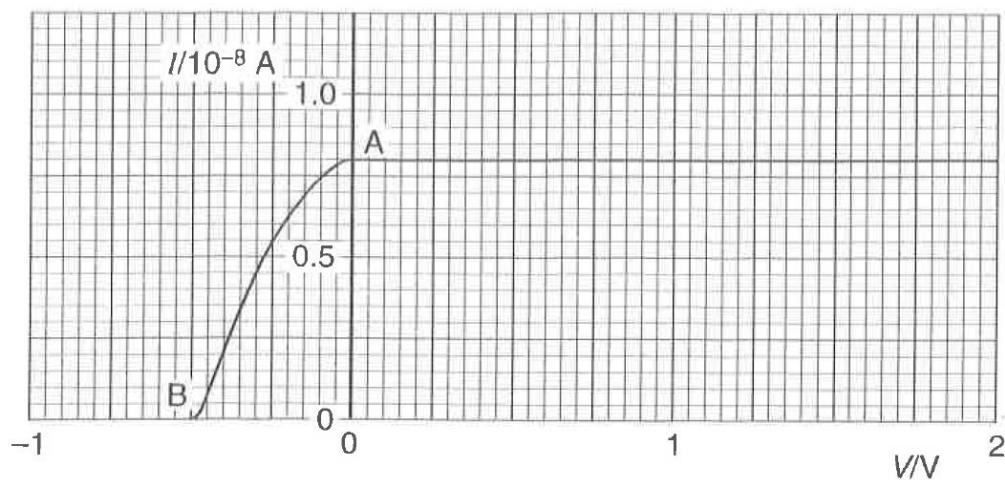


Fig. 7.1

- (a) Calculate the rate at which photons are incident on the emitter.

$$\text{rate} = \dots \text{ s}^{-1} [2]$$

(b) Calculate the maximum rate at which electrons leave the emitter.

$$\text{maximum rate} = \dots \text{ s}^{-1} [1]$$

(c) Suggest two reasons to explain for the difference between your answers to **(a)** and **(b)**.

1.
.....

.....

2.
.....

..... [2]

(d) Calculate the maximum speed at which electrons leave the emitter.

maximum speed = m s^{-1} [3]

- (e) The intensity of illumination is then increased and the experiment repeated. Sketch, on Fig. 7.1, the new variation with the potential difference V of the photocurrent I . [2]

