6 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 the collector and the emitter is adjusted, and the photocurrent I is measured. Fig. 6.1 shows the variation with V of I.
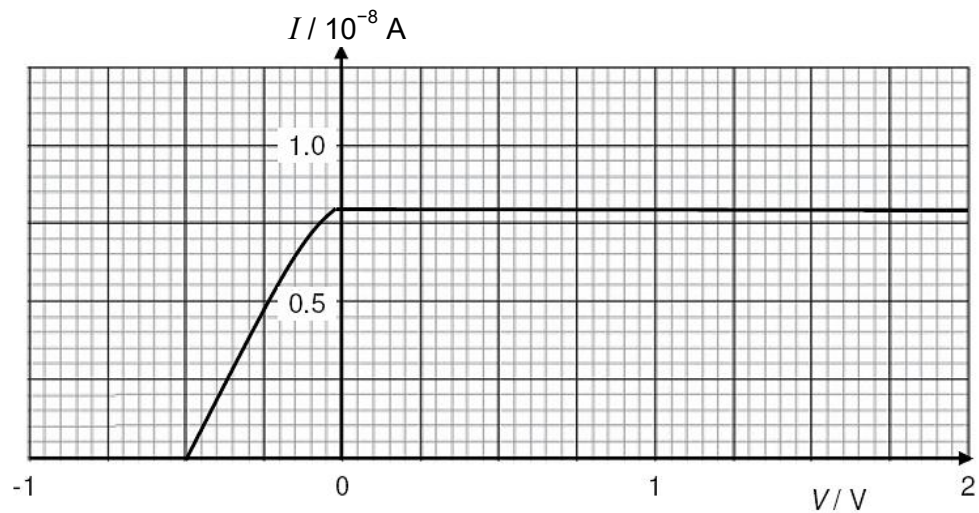
I / 10^{-8} A

Fig. 6.1

(a) State what is meant by the *photoelectric effect*.

....

....

.... [1]

(b) Determine the rate at which photons are incident on the emitter.

rate of incident photons = ... s^{-1} [2]

(c) Determine the maximum rate at which electrons leave the emitter.

maximum rate = ... s^{-1} [2]

(d) Comment on, and suggest an explanation for, any difference between your answers to **(b)** and **(c)**.

....

....

....

.... [2]

(e) Determine the maximum kinetic energy at which the electrons leave the emitter.

maximum energy = ... J [2]

(f) (i) Explain what is meant by the *work function* of a metal surface.

....

....

.... [1]

(ii) Hence, deduce the work function of the material of the emitter.

work function = ... eV [1]