

- 5 A circuit used to investigate the photoelectric effect is shown in **Fig. 5.1**.

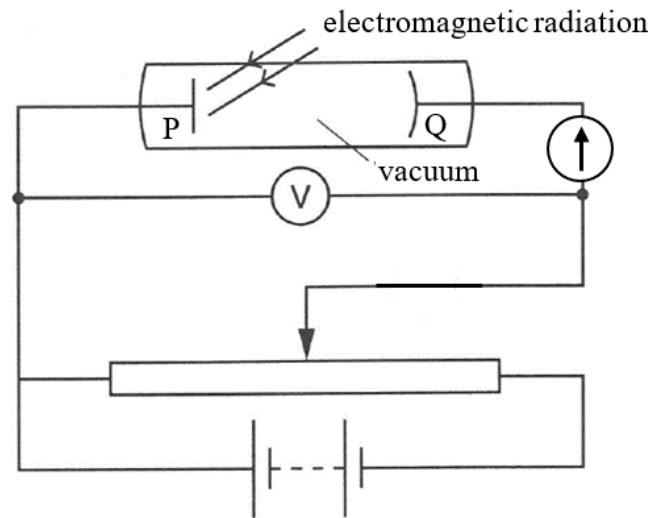


Fig. 5.1

A potential divider circuit is connected to two metal electrodes P and Q enclosed in an evacuated glass tube.

The electromagnetic radiation incident on P is of a single frequency and constant intensity.

The voltmeter measures the potential difference V between the electrodes and a sensitive meter measures the current I between the electrodes. The potential difference applied across P and Q can be changed from positive to negative by reversing the battery terminals.

- (a) Explain the energy transformation that occurs during photoelectric emission.

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[2]

The variation with potential difference V of current I is shown in **Fig. 5.2**.

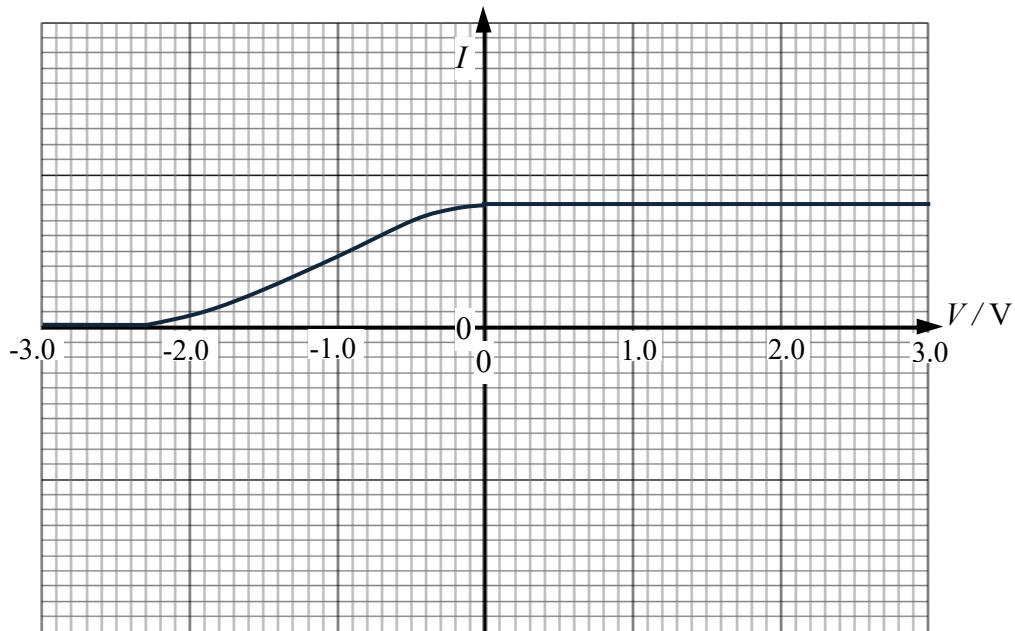


Fig. 5.2

(b) The work function of metal P is 2.0 eV. Use **Fig. 5.2** to calculate

(i) the maximum kinetic energy of the photoelectrons.

$$\text{Maximum KE} = \dots \text{ J} [2]$$

(ii) the frequency of the electromagnetic radiation.

$$\text{frequency} = \dots \text{ Hz} [2]$$

(c) The frequency of the electromagnetic radiation is kept constant as its intensity is doubled. Sketch on **Fig. 5.2** the variation with V of I for this increased intensity. Label this graph A. [2]

- (d) The same electromagnetic radiation in (c) is now incident on Q in **Fig. 5.1**. Given that the stopping potential for photoelectric emission from metal Q is 1.8 V, sketch on **Fig. 5.2** the variation with V of I when the electromagnetic radiation is incident on Q. Label this graph B.

[2]