



A Level Physics A

H556/02 Exploring physics

Question Set 6

1(a) Electromagnetic radiation is incident on a negatively charged zinc plate. Electrons are emitted from the surface of the plate when a weak intensity ultraviolet source is used. Electrons are not emitted at all when an intense visible light from a lamp is used.

Explain these observations.

[4]

(b) The **maximum** wavelength of the electromagnetic radiation incident on the surface of a metal which causes electrons to be emitted is 2.9×10^{-7} m.

Calculate the maximum kinetic energy of electrons emitted from the surface of the metal when each incident photon has energy of 5.1 eV.

maximum kinetic energy = J [3]

- (c) Electromagnetic radiation of constant wavelength is incident on a metal plate. Photoelectrons are emitted from the metal plate. Fig. 19.1 shows an arrangement used to determine the maximum kinetic energy of electrons emitted from a metal plate.

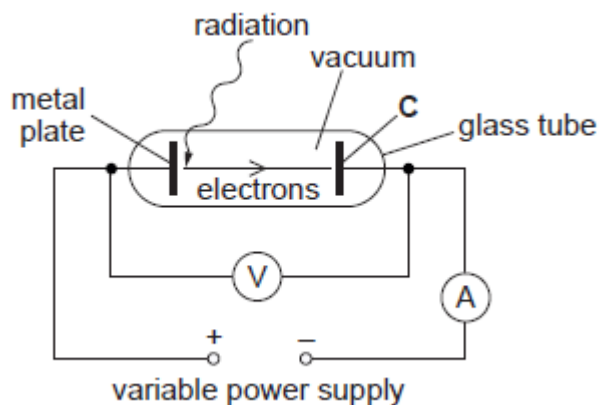


Fig. 19.1

The metal plate and the electrode **C** are both in a vacuum. The electrode **C** is connected to the negative terminal of the variable power supply.

Fig. 19.2 shows the variation of current I in the circuit as the potential difference V between the metal plate and **C** is increased from 0V to 3.0V.

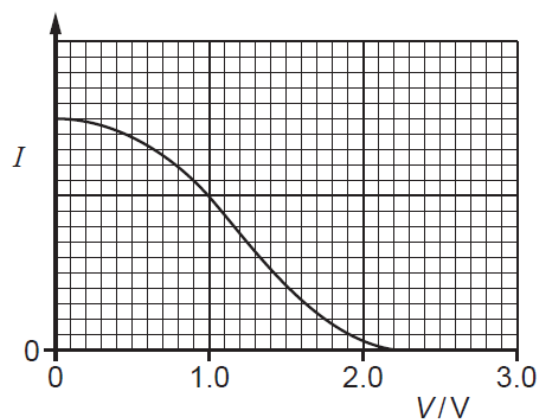


Fig. 19.2

Explain why the current decreases as V increases and describe how you can determine the maximum kinetic energy of the emitted electrons.

[3]

Total Marks for Question Set 6: 10

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