

7 A metal plate is negatively charged so that its charge is $-Q$.

When ultraviolet radiation with a photon energy of 7.95 eV is incident on the metal plate, electrons are emitted from the plate with a maximum kinetic energy of 3.48 eV. After a certain time, the plate is fully discharged.

- (a) Explain why the emitted electrons have a range of kinetic energies up to a maximum value.

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..... [3]

- (b) Determine the maximum wavelength of ultraviolet radiation that causes electrons to be emitted from the metal plate.

$$\text{maximum wavelength} = \dots \text{m} \quad [3]$$

- (c) The metal plate is again negatively charged to $-Q$. It is now exposed to ultraviolet radiation of the same frequency but a greater intensity.

State and explain the effect of this change on the time taken for the metal plate to fully discharge.

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..... [2]





- (d) The metal plate is again negatively charged to $-Q$. It is now exposed to infrared radiation of the same intensity.

Explain why no electrons are emitted, even after a long period of time.

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[2]

[Total: 10]

