

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

When ultraviolet radiation with a photon energy of  $7.95\text{ eV}$  is incident on the metal plate, electrons are emitted from the plate with a maximum kinetic energy of  $3.48\text{ eV}$ . 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.

maximum wavelength = ..... m [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]

