

- 11 A photon of wavelength 540 nm collides with an isolated stationary electron, as illustrated in Fig. 11.1.

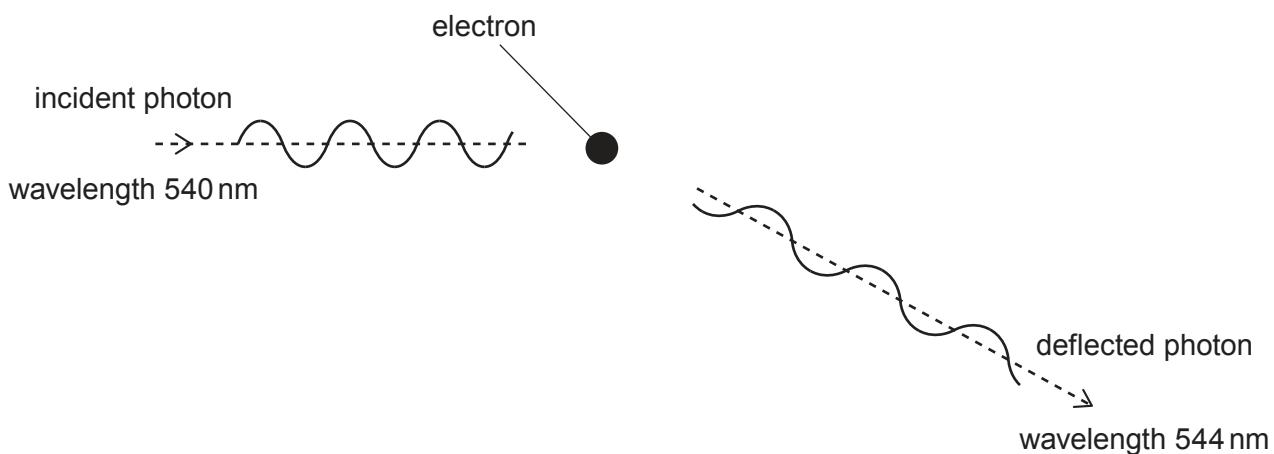


Fig. 11.1

The photon is deflected elastically by the electron.
The wavelength of the deflected photon is 544 nm.

- (a) (i) State what is meant by a *photon*.

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..... [2]

- (ii) On Fig. 11.1, draw an arrow to indicate the approximate direction of motion of the deflected electron. [1]

(b) Calculate:

(i) the momentum of the deflected photon

$$\text{momentum} = \dots \text{Ns} [2]$$

(ii) the energy transferred to the deflected electron.

$$\text{energy} = \dots \text{J} [2]$$

(c) Another photon of wavelength 540 nm collides with an isolated stationary electron.

Explain why it is not possible for the deflected photon to have a wavelength less than 540 nm.

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[2]

[Total: 9]