

- 6 (a) Explain what is meant by a *photon*.

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.....[2]

- (b) An X-ray photon of energy $3.06 \times 10^{-14} \text{ J}$ is incident on an isolated stationary electron, as illustrated in Fig. 6.1.

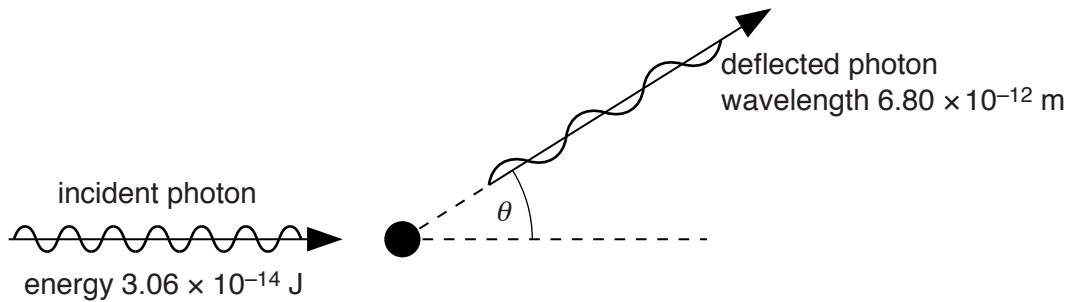


Fig. 6.1

The photon is deflected elastically by the electron through angle θ . The deflected photon has a wavelength of $6.80 \times 10^{-12} \text{ m}$.

- (i) On Fig. 6.1, draw an arrow to indicate a possible initial direction of motion of the electron after the photon has been deflected. [1]
- (ii) Calculate
1. the energy of the deflected photon,

photon energy = J [2]

2. the speed of the electron after the photon has been deflected.

speed = ms^{-1} [3]

- (c) Explain why the magnitude of the final momentum of the electron is not equal to the change in magnitude of the momentum of the photon.

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..... [2]