

- 3 (a) A photon of wavelength 940.0×10^{-12} m collides with an isolated stationary electron, as illustrated in Fig. 3.1.

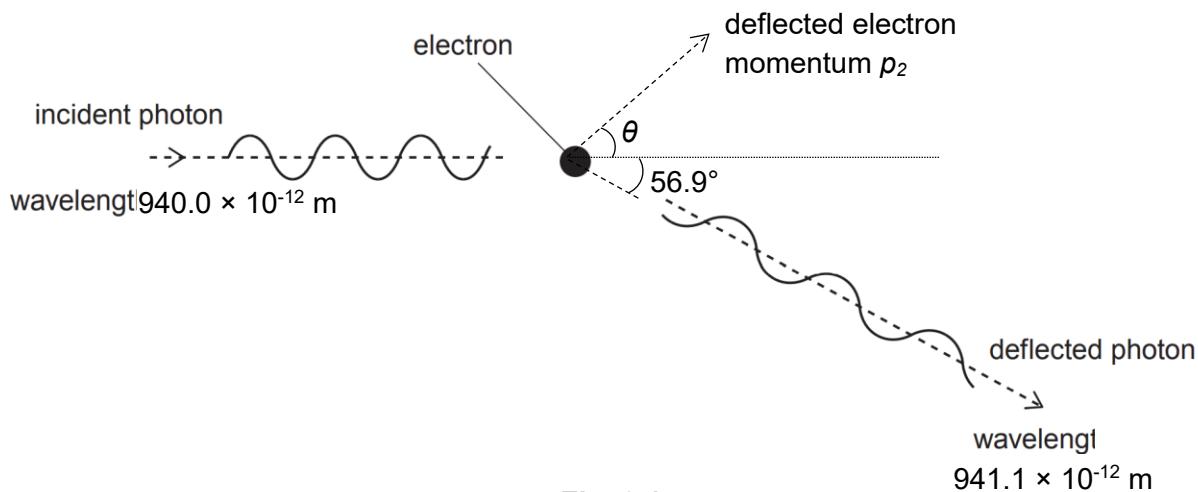


Fig. 3.1

The photon is deflected elastically by the electron.

The wavelength of the deflected photon is 941.1×10^{-12} m.

- (i) Without making any calculations, sketch in the space below a vector triangle to show conservation of momentum. Label the triangle with the initial momentum p_1 of incident photon, the final momentum p_2 of electron, and the final momentum p_3 of the deflected photon.

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- (ii) Calculate the final momentum p_3 of the deflected photon.

$$p_3 = \dots \text{ N s} [1]$$

- (iii) Calculate the kinetic energy of the deflected electron.

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

- (iv) Using your answer in (a)(i), or otherwise, determine p_2 and θ .

$$p_2 = \dots \text{ N s}$$

$$\theta = \dots ^\circ [3]$$

