

12 (a) State an effect, one in each case, that provides evidence for

(i) the wave nature of a particle,

.....[1]

(ii) the particulate nature of electromagnetic radiation.

.....[1]

(b) Four electron energy levels in an isolated atom are shown in Fig. 12.1.

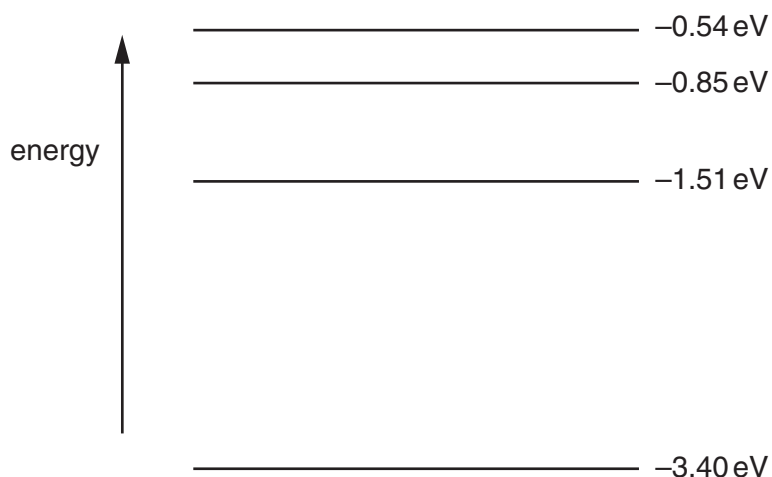


Fig. 12.1

For the emission spectrum associated with these energy levels,

(i) on Fig. 12.1, mark with an arrow the transition that gives rise to the shortest wavelength, [1]

(ii) show that the wavelength of the transition in (i) is 4.35×10^{-7} m.

[2]

- (c) (i) State what is meant by the *de Broglie wavelength*.

.....
.....
.....[2]

- (ii) Calculate the speed of an electron having a de Broglie wavelength equal to the wavelength in (b)(ii).

speed = ms^{-1} [2]

[Total: 9]