

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

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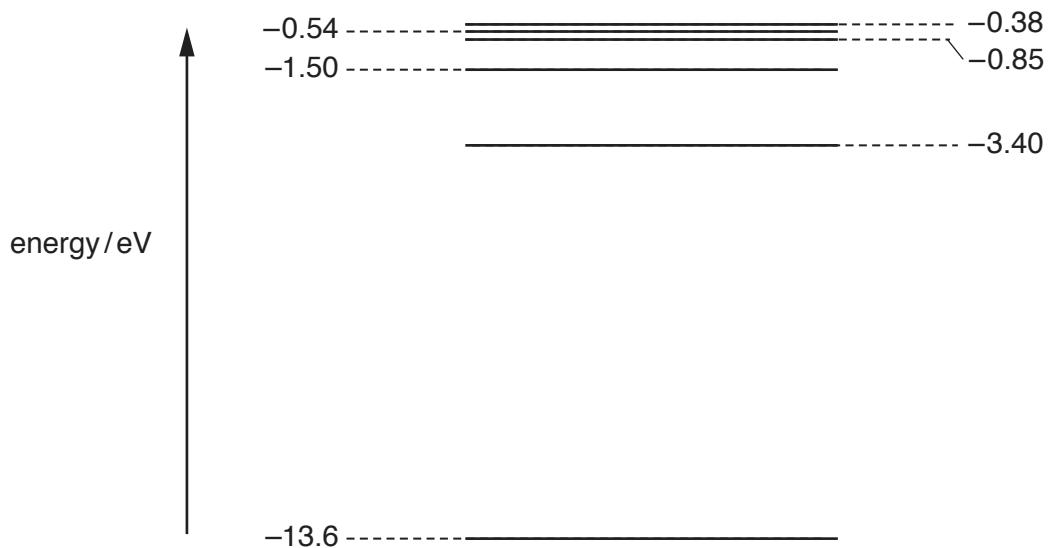
[2]

- (b) Describe the appearance of a visible line emission spectrum, as seen using a diffraction grating.

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[2]

- (c) The lowest electron energy levels in an isolated hydrogen atom are shown in Fig. 11.1.



**Fig. 11.1** (not to scale)

- (i) An electron is initially at the energy level  $-0.85\text{ eV}$ . State the total number of different wavelengths that may be emitted as the electron de-excites (loses energy).

number = ..... [1]

- (ii) Photons resulting from electron de-excitation from the  $-0.85\text{ eV}$  energy level are incident on the surface of a sample of platinum.

Platinum has a work function energy of  $5.6\text{ eV}$ .

Determine

1. the maximum kinetic energy, in eV, of a photoelectron emitted from the surface of the platinum,

maximum energy = ..... eV [2]

2. the wavelength of the photon producing the photoelectron in (ii) part 1.

wavelength = ..... m [3]

[Total: 10]