6 **(a)** Some electron energy levels in atomic hydrogen are illustrated in Fig. 6.1.

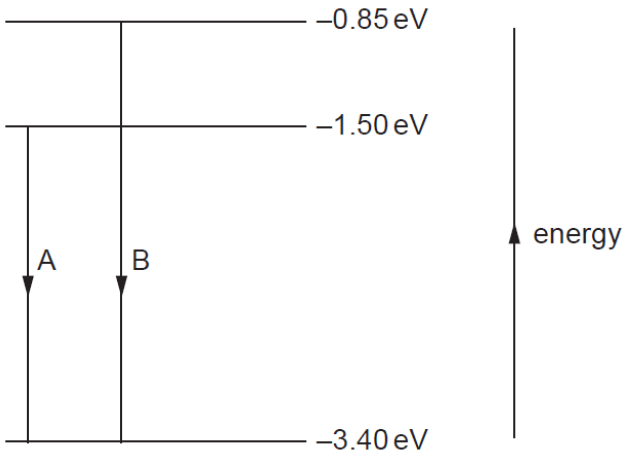

Fig. 6.1

Two possible electron transitions A and B giving rise to an emission spectrum are shown.

These electron transitions cause light of wavelengths 654 nm and 488 nm to be emitted.

(i) On Fig. 6.1, draw an arrow to show a third possible transition. [1]

(ii) Calculate the wavelength of the emitted light for the transition in **(i)**.

wavelength = ... m [2]

(b) Some hydrogen gas is heated so that electrons are excited to the highest energy level shown in Fig. 6.1.

Using the values of wavelength in **(a)**, state and explain the appearance of the spectrum of the emergent light from the hydrogen gas.

……..

……..

……..

……..

……..

……..... [3]

(c) High-speed electrons are incident on a metal target. The spectrum of the emitted X-ray radiation is shown in Fig. 6.2.

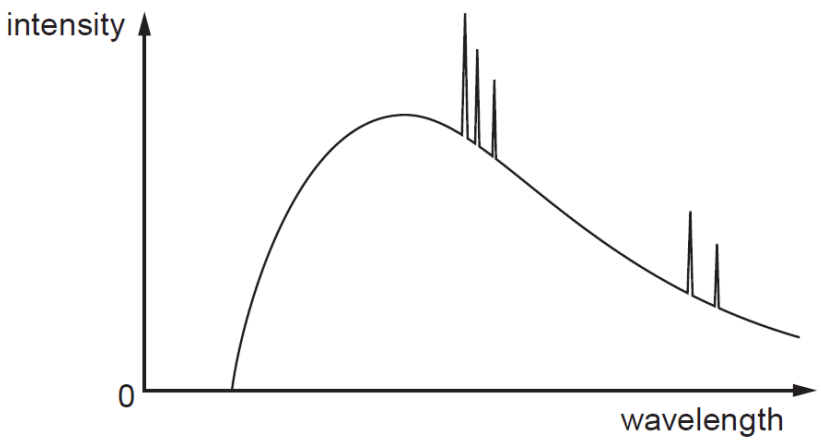

Fig. 6.2

Explain why

(i) there is a continuous distribution of wavelengths,

……

……

…… [2]

(ii) there is a sharp cut-off at short wavelength.

……

……

…… [2]

[Total: 10]