7 **(a)** Explain how the line spectrum of hydrogen provides evidence for the existence of discrete electron energy levels in atoms.

.....

.....

.....

.....

.....[3]

(b) Some electron energy levels in atomic hydrogen are illustrated in Fig. 7.1.

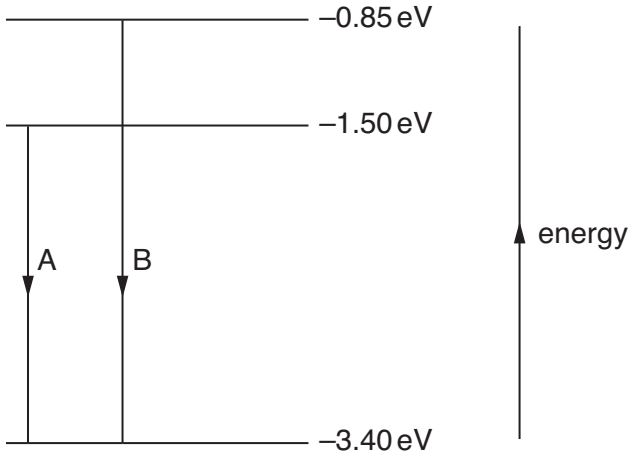

Fig. 7.1

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. 7.1, 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 [3]

[Turn over

(c) The light in a beam has a continuous spectrum of wavelengths from 400 nm to 700 nm. The light is incident on some cool hydrogen gas, as illustrated in Fig. 7.2.

For Examiner's Use

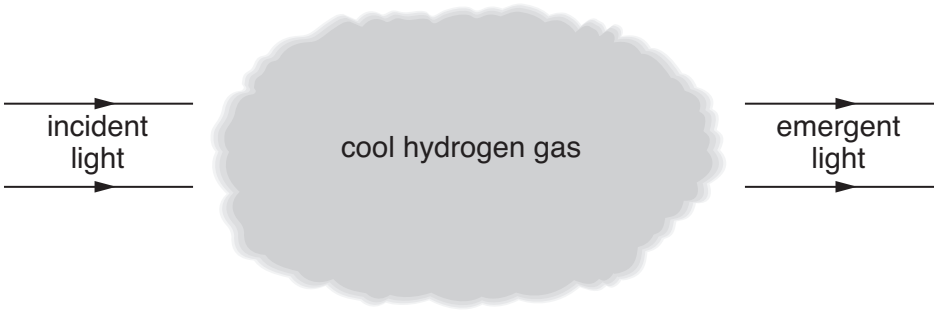

Fig. 7.2

Using the values of wavelength in **(b)**, state and explain the appearance of the spectrum of the emergent light.

.....

.....

.....

.....

.....

.....[4]