8 (a) White light passes through a cloud of cool low-pressure gas, as illustrated in Fig. 8.1.

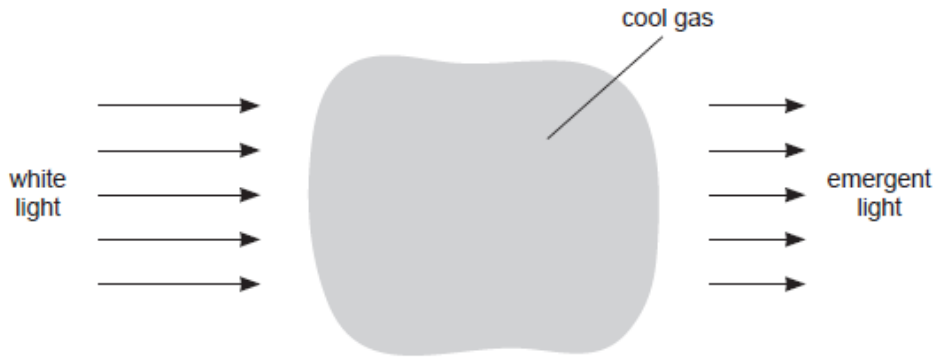

Fig. 8.1

For light that has passed through the gas, its continuous spectrum is seen to contain a number of darker lines.

Use the concept of discrete electron energy levels to explain the existence of these darker lines.

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(b) Electrons in a beam are travelling at high speed in a vacuum. The electrons are incident on a metal target, causing X-ray radiation to be emitted.

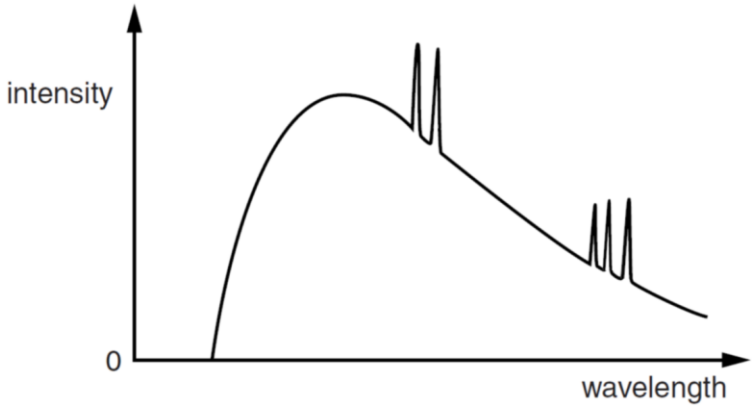

Fig. 8.2

The variation with wavelength of the intensity of the emitted X-ray radiation is shown in Fig. 8.2.

Explain why:

(i) there is a continuous distribution of wavelengths.

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(ii) at certain wavelengths, there are narrow peaks of increased intensity.

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[Total: 9]