

7 Fig. 7.1 shows some of the energy levels of an helium atom.



Fig. 7.1

An electron with kinetic energy of 50.0 eV collides with a helium atom in its ground state and the helium atom is excited.

- (a) (i) In Fig. 7.1, use arrows to show the possible energy transitions when the excited helium atom de-excites. [2]
- (ii) Calculate the shortest wavelength of the radiation that is emitted from the transitions in (a)(i).

$$\text{shortest wavelength} = \dots \text{m} \quad [2]$$

- (b) When a beam of white light is passed through a cold helium gas, an absorption spectrum of coloured background with dark lines is observed.

Use Fig. 7.1 to explain quantitatively why one of the dark lines correspond to a wavelength of 471 nm.

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Section B

Answer **one** question from this Section in the spaces provided.