

- 7 Fig. 7.1 shows an X-ray spectrum produced by a medical X-ray tube operating at an accelerating potential of 40 kV.

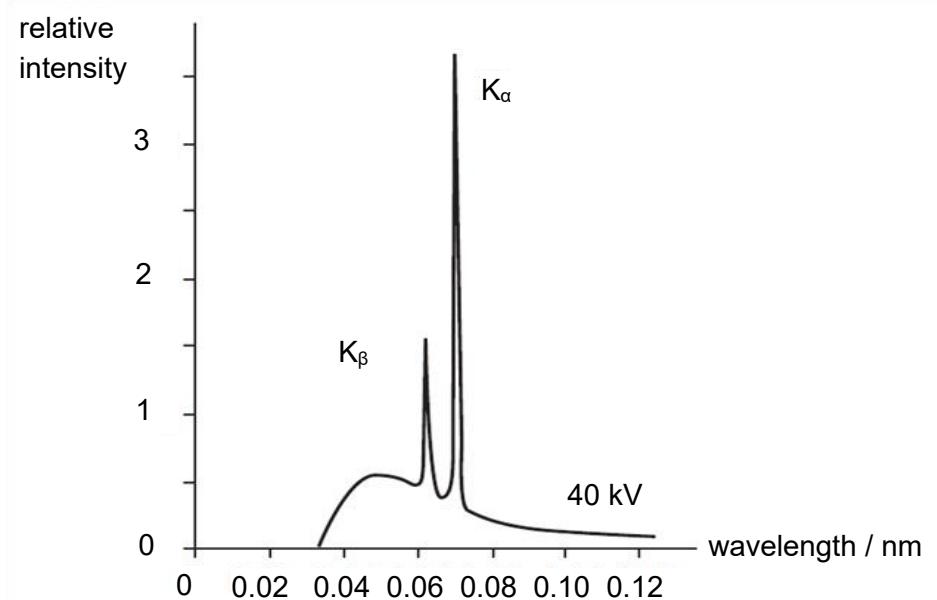


Fig. 7.1

- (a) (i) Using Fig. 7.1, estimate the highest energy of the X-rays emitted by the tube.

highest energy = J [2]

- (ii) Calculate the maximum velocity of the high energy electrons hitting the target atom when the tube operates at 40 kV.

maximum velocity = m s⁻¹ [2]

- (iii) Hence calculate the de Broglie wavelength of the electrons at maximum velocity.

de Broglie wavelength = m [2]

- (b) Explain how the characteristic X-ray lines K_{α} and K_{β} are produced in Fig. 7.1.

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Section B

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