

- 4 (a) Explain what is meant by the *potential energy* of a body.

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[2]

- (b) Two deuterium (${}^2_1\text{H}$) nuclei each have initial kinetic energy E_K and are initially separated by a large distance.

The nuclei may be considered to be spheres of diameter $3.8 \times 10^{-15}\text{ m}$ with their masses and charges concentrated at their centres.

The nuclei move from their initial positions to their final position of just touching, as illustrated in Fig. 4.1.

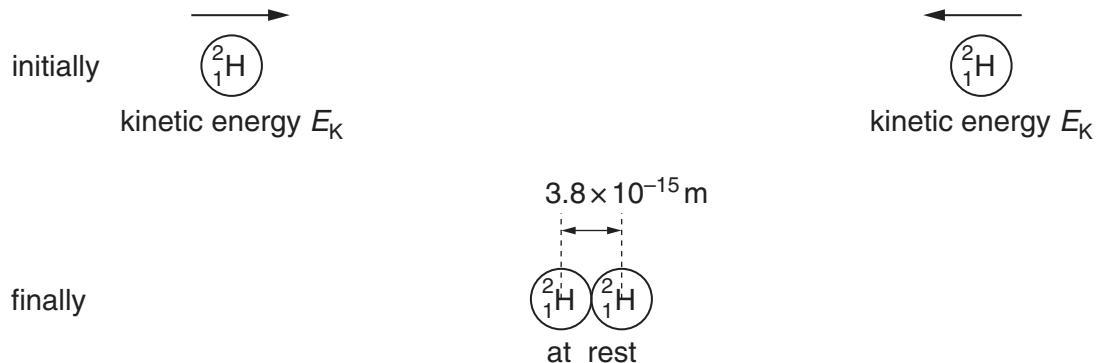


Fig. 4.1

- (i) For the two nuclei approaching each other, calculate the total change in

1. gravitational potential energy,

energy = J [3]

2. electric potential energy.

energy = J [3]

- (ii) Use your answers in (i) to show that the initial kinetic energy E_K of each nucleus is 0.19 MeV.

[2]

- (iii) The two nuclei may rebound from each other. Suggest one other effect that could happen to the two nuclei if the initial kinetic energy of each nucleus is greater than that calculated in (ii).

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[1]