

- 7 Fig. 7.1 shows the energy levels of a hydrogen atom. Transitions A, B, C and D represent some of the possible transitions of an excited electron of the atom.

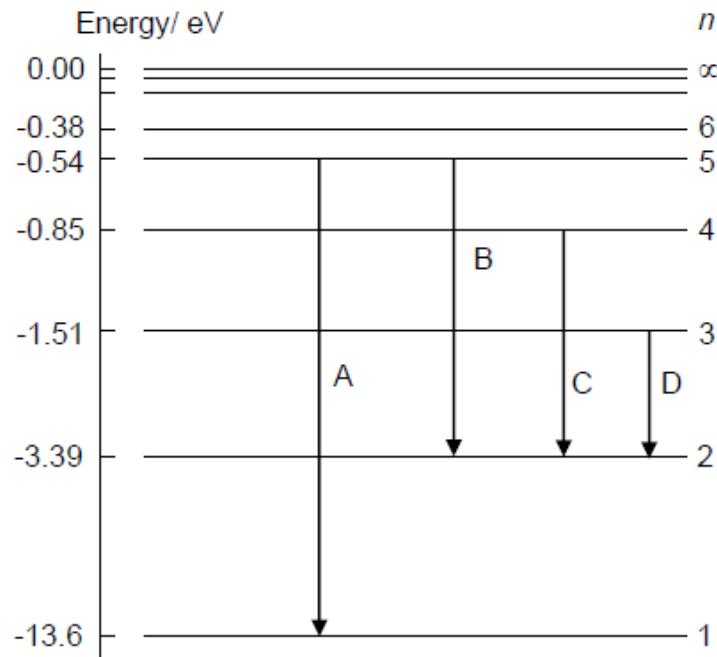


Fig. 7.1

- (a) Explain why the energy levels are negative.

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.....  
.....  
.....  
..... [3]

- (b) Which of the transitions A, B, C, or D would lead to the emission of radiation of the shortest wavelength?

..... [1]

- (c) Using your answer in (b), calculate the wavelength of the radiation and state the region of the electromagnetic spectrum in which this radiation lies.

wavelength = ..... nm [2]

region = ..... [1]

- (d) List all possible transition(s) in an emission spectrum if an unexcited hydrogen atom is separately bombarded by the following. Explain your answer.

In the case where no transitions are possible, state so clearly and explain your answer.

- (i) An incoming electron with energy 12.6 eV

.....  
.....  
..... [2]

- (ii) An incoming photon with energy 12.6 eV

.....  
.....

..... [2]

- (e) Suggest an application of emission spectrum.

..... [1]

[Total: 12]

### **Section B**

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