

Exercise 2.33 – The hydrogen spectrum

Q233-01 The lines in the series that appears in the visible region of the hydrogen spectrum are caused by transitions to which energy level?

Q233-02 Which phrase correctly completes the sentence. The lines in a series in the hydrogen spectrum...

- A. Converge towards the high energy side
- B. Diverge towards the high energy side
- C. Are evenly spaced
- D. Converge towards the IR region

Q233-03 An electron can move from one orbital of a hydrogen atom to another. In which movement will the photon of highest energy be emitted?

- A. $2p \rightarrow 1s$
- B. $1s \rightarrow 2p$
- C. $3s \rightarrow 2s$
- D. $2s \rightarrow 3s$

Q233-04 In which electronic state would a hydrogen atom be able to absorb a photon of electromagnetic radiation but not be able to emit a photon? (HL only)

- A. $1s^1$
- B. $2s^1$
- C. $3p^1$
- D. $4d^1$

Q233-05 The emission spectrum of the hydrogen atom

- A. is caused by the removal (ionization) of the electron.
- B. is continuous because the electron can emit any frequency of light during a transition.
- C. is caused by the absorption of light at characteristic frequencies the electron to be excited into higher energy levels.
- D. is a result of the excited electron undergoing transitions to lower energy levels and emitting photons of light at specific frequencies.

Q233-06 Which transition is associated with the largest change in energy in the hydrogen atom?

- A. $n = 5$ to $n = 3$
- B. $n = 2$ to $n = 1$
- C. $n = 3$ to $n = 2$
- D. $n = 4$ to $n = 2$

Q233-07 According to the evidence supplied by the hydrogen spectrum, which transition involves the greatest energy difference, $n=2$ to $n=1$ or $n=\infty$ to $n=2$?

Q233-08 What name is given to an electron that is in a higher energy level than it should be?

- A. transition electron
 - B. excited electron
 - C. relaxed electron
 - D. ground state electron
-

Exercise 2.33 – The hydrogen spectrum

Q233-09 Which transition corresponds to the ionisation energy of the hydrogen atom?

Q233-10 The term 'relaxation' refers to which of the following in the context of the hydrogen spectrum:

- A. The dark gap between the different series of the hydrogen spectrum.
 - B. The difference in energy between the lines in the Balmer and Lyman series
 - C. The movement of an electron from a higher to a lower energy level
 - D. The movement of an electron from a lower to a higher energy level
-