Let $E_n = \frac{-1}{8\varepsilon_0^2}\frac{me^2}{n^2h^2}$ be the energy of the nth level of H-atom. If all the H-atoms are in the ground state and radiation of frequency (E2-E1)/h falls on it,

A. it will not be absorbed at all

B. some of atoms will move to the first excited state.

C. all atoms will be excited to the n = 2 state.

D. no atoms will make a transition to the n = 3 state.

Answer:

The correct answers are the options (b, d). Let us assume E2 and E2 as the energy corresponding to n = 2 and n = 1 respectively. According to the Bohr's model of atom few of the atoms will reach to the first excited state if the radiation of energy on a sample in which all the hydrogen atoms at ground state is ΔE = (E2 – E1) = hf incident. But as the energy is insufficient for the transition to take place from n = 1 to n =3, therefore none of the atoms present will reach up to the n = 3 state.