

Board – CBSE

Class – 12

Topic – Atoms

## 1 Marks Questions

1. Define ionization energy. What is its value for a hydrogen atom? [All India 2010]
2. What is the ratio of radii of the orbits corresponding to first excited state and ground state, in a hydrogen atom? [Delhi 2010]
3. The radius of innermost electron orbit of a hydrogen atom is  $5.3 \times 10^{-11}$  m. What is the radius of orbit in the second excited state?
4. Write the expression for Bohr's radius in hydrogen atom. [Delhi 2010]

## 2 Marks Questions

5. The ground state energy of hydrogen atom is  $-13.6$  eV. What are the kinetic and potential energies of the electron in this state?
6. If Bohr's quantisation postulate (angular momentum =  $nh / 2\pi$ ) is a basic law of nature, it should be equally valid for the case of planetary motion also. Why then do we never speak of quantisation of orbits of planets around the sun?

## 3 Marks Questions

7. How many  $\alpha$  and  $\beta$  –particles are emitted when  ${}_{90}\text{Th}^{232}$  changes to  ${}_{82}\text{Pb}^{208}$ ?
8. What is the shortest wavelength present in the Paschen series of spectral lines?
9. In accordance with the Bohr's model, find the quantum number that characterizes the earth's revolution around the sun in an orbit of radius  $1.5 \times 10^{11}$  m with orbital speed  $3 \times 10^4$  m/s. (Mass of earth =  $6.0 \times 10^{24}$  kg)
10. A hydrogen atom initially in the ground level absorbs a photon, which excites it to the  $n = 4$  level. Determine the wavelength and frequency of the photon

## 5 Marks Questions

11. Draw a graph showing variation of potential energy of a pair of nucleon as a function of their separation indicate the region in which the nuclear force is (a) Attractive (b) Repulsive. Also write two characteristics features which distinguish it from the coulomb's force.
12. (a) Using the Bohr's model calculate the speed of the electron in a hydrogen atom in the  $n = 1, 2,$  and  $3$  levels.  
(b) Calculate the orbital period in each of these levels.